CHAPTER X

The Electrical System

General—Dynamo—Fuse Box—Fuse Data—Output Regulator and Cut-out—Switchbox—Ammeter—Battery—Ignition—Ignition Coil—Ignition Timing—Firing Order of Cylinders—Sparking Plugs—Starter Motor—Starter Motor Switch—Use of Starter Motor—Electric Fuel Pumps and Gauge—Electric Horns—De-mister and De-froster—Electrical Fault Location—Recommended Lamp Bulbs—Headlamps—Replacing a Headlamp Bulb—Aligning the Headlamps—Side Lamps—Radio.

General.

The equipment comprises a dynamo, fuse box, automatic output regulator and cut-out, switchbox, ammeter, a 12-volt, approximately 55-ampere-hour battery, a starter motor with relay-operated switch, two electric horns with push-button switch at head of steering column, head, side, rear and interior lights, windscreen wiper, trafficators, de-froster, de-mister, car heater, radio, electric fuel pumps and gauge, and battery ignition, consisting of coil with combined low-tension contact breaker and high-tension distributor, and the necessary wiring.

Incorporated in the distributor is a governor, which effects automatic control of the ignition timing.

The wiring diagram (Fig. **35**), shows the units with their electrical connections, the various wires being indicated in colours to correspond with those of their actual coverings.

The electrical system is earthed on the positive side of the battery to the chassis frame, and all switching is done in the negative leads.

Before doing any work on a chassis which is likely to involve the electrical system, it is advisable to remove the chassis frame connection from the positive battery terminal, and so render the whole system dead, but do not disconnect whilst any charge or discharge current is passing.

Dynamo.

The dynamo, shown in Fig. **32**, is driven by the same belt which also drives the water pump and fan. It is of the shunt-wound type, the excitation of the field being automatically regulated, in order to adjust the charge rate to suit the dynamo speed, the state of charge of the battery and the lighting load.

There are two external connections, the actual leads being coloured and the dynamo marked as follows:—

Lead.	*Colour.*	*Corresponding mark on dynamo.*
Armature	Blue	D.
Field	Grey	F.

The internal connections of the field coils are made one to the earthed brush, and the other to the terminal marked "F". The armature lead from terminal "D" is taken to the correspondingly marked terminal of the output regulator, and the field connection to the terminal marked "F" in the fuse box.

Every 10,000 miles, as directed on page 31, take out the securing screws and remove the cover. This will expose the commutator and brushes, which should be inspected. Deposits of brush dust, moisture and oil, should be removed, and note taken of any appreciable wear of the brushes.

Cleanliness of the commutator and freedom of the dynamo brushes in their holders are the most important points in the maintenance of the dynamo.

Premature failure or excessive wear, however, indicates some definite fault in the machine, which should be returned for correction. In normal circumstances the brushes should need replacing only after considerable running; in the event, however, of a new set of brushes being required, it is recommended that this work should be done by Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers". Emphasis is laid on this point, as cases have arisen of faulty operation of the dynamo, due to inexpert fitting of brushes.

When it is necessary to disconnect the wires to the dynamo, care must be taken to ensure their correct replacement, which is facilitated by the colouring and lettering adopted.

Fuse Box.

The unit is shown in Fig. **36**, with its cover removed.

There are two different types of fuses, easily distinguishable, as follows:—

(a) The main fuse, this should be three strands of No. 32 S.W.G. tinned copper wire.

(b) The circuit fuses are all of one strand of No. 32 S.W.G. tinned copper wire.

Spare wire of this gauge is provided on a special holder within the box.

Special care must be taken that all fuses are gripped firmly in their holders, and that the contacts are clean and tight.

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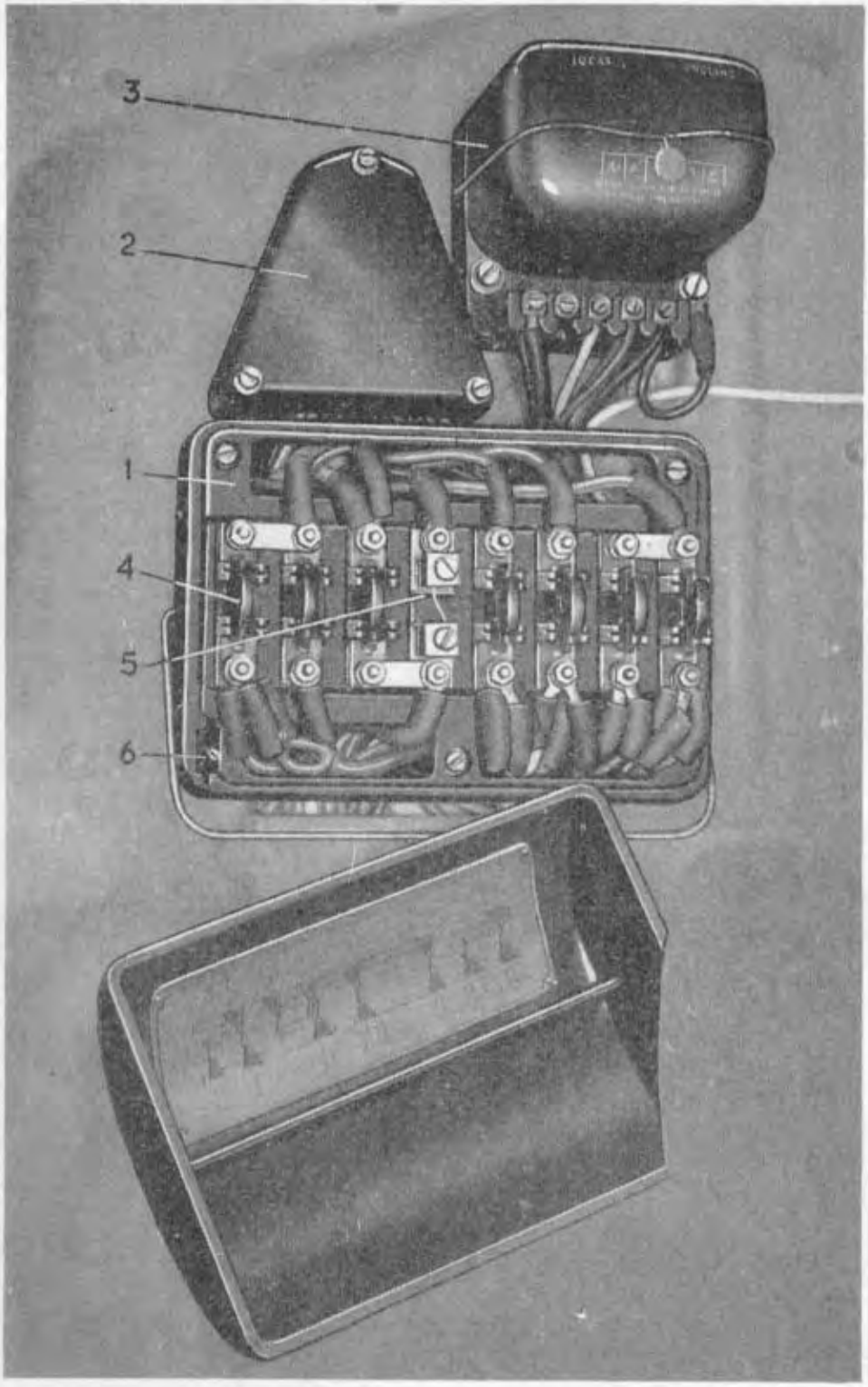

Fig. 36.—FUSE BOX, CONNECTING BOX, OUTPUT REGULATOR AND CUT-OUT.

1. Fuse box.
2. Connecting box.
3. Output regulator and cut-out.
4. Circuit fuse.
5. Main fuse.
6. Spare fuse wire.

FUSE DATA.

Circuit fuse No. 1—Coachbuilders' accessories.
Circuit fuse No. 2—Horn and cigar lighters.
Circuit fuse No. 3—Roof light.
Circuit fuse No. 4—Trafficators, reversing light, stop light and companion lights.
Circuit fuse No. 5—De-mister and de-froster, screen wiper, petrol pumps, ignition, warning lamps and car heater.
Circuit fuse No. 6—Centre lamp
Circuit fuse No. 7—Instrument lamps, side lamps, map lamp, tail lamp and rear number plate.

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Output Regulator and Cut-Out.

The output regulator and cut-out are mounted on the front of the dashboard, and are shown (**3**, Fig. **36**).

The output regulator operates to control the dynamo output by varying the field excitation in accordance with the load on the battery and its state of charge.

The operation of the regulator depends upon the fact that the voltage of a battery varies between certain fixed limits according to the state of charge of the battery, the voltage being, of course, a maximum when the battery is fully charged, and a minimum when the battery is fully discharged.

The regulator is combined structurally with the cut-out. The regulator and cut-out are, however, electrically separate, employing separate armatures, though they possess field systems which are common over a portion of the magnetic path.

The cut-out is operated when the dynamo speed rises high enough for the dynamo to charge the battery by means of its shunt coil connected across the main terminals of the dynamo. This closes the cut-out contacts and so connects the dynamo with the battery, via the regulator and ammeter, as shown in the wiring diagram (Fig. **35**.)

The series coil is so connected that, when carrying the charging current, it assists the shunt coil in holding the contacts firmly together.

When the dynamo slows down, and its voltage falls below that of the battery, the current reverses through the series coil, and the effect of the shunt winding becomes neutralised, which results in the contacts falling apart.

The output regulator and cut-out requires no attention; it is a sealed unit, and no adjustment of any kind must be attempted. If any defects in operation should develop, as described under "Electrical Fault Location" (page 96), which are traceable to the regulator, it must be detached bodily and returned, *with the seal unbroken*, to Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers", for correction.

Switchbox.

Mounted on the instrument panel, this unit includes:—

(a) Master switch and lamp switch combined.

(b) Ignition switch.

(c) Push-button switch for the starter motor.

(d) A lock which can be locked and the key withdrawn either:—

1. When the master switch is in the **"Off"** position; or,
2. When the master switch is in the **"P.L."** (parking lights) position.

No attempt must be made to lock the switch in other positions.

With the master switch in the **"Off"** position, all accessories and lighting circuits, with the exception of the roof lamp, are rendered inoperative. Movement of this master switch to the **"On"** position renders these accessories available.

The various combinations controlled are clearly indicated, as follows:—

Off.—All circuits off except for roof lamp.

On.—Accessories available.

S. and **T.**—Side and tail lamps on and accessories available.

H., S. and **T.**—Head, side and tail lamps on and accessories available.

P.L.—"Parking Lights", side, tail and roof lamps on. (No reading is shown on the ammeter and all other accessories are "off".)

A separate switch is provided for the ignition, marked **"On"** and **"Off"**. Normally, this switch can be left in the **"On"** position, and the switching to start the engine can be carried out on the master switch.

No independent charge position is provided owing to the presence of the output regulator. Whenever the master switch is on, connections are made which cause the dynamo to charge the battery through the regulator, as previously described.

Operation of the push-button switch for the starter motor completes a relay circuit, which in turn causes the main starter switch to close.

Ammeter.

The ammeter is an instrument with a central zero and 20-ampere range, a needle deflection indicating Charge or Discharge.

As already explained under "Output Regulator", the charge rate varies in accordance with the state of the battery. Consequently, no alarm need be felt if the charge indicated on the ammeter is quite small, especially after a considerable period of running with no extra consuming apparatus, such as lamps, in use.

This will probably indicate that the battery is well charged. Under these circumstances, switching on the head lamps may cause a discharge reading to be shown, but this will only occur for a short time, as the dynamo will quickly respond to the slightest drop in battery voltage, due to the discharge, and re-adjust the output accordingly.

An unnoticed reversal of the ammeter connections causes the charge and discharge indications to be reversed.

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Battery.

The battery recommended and specified for this car, is as follows:—

Battery Maker's Type Designation.		Voltage.	Normal Charging Current.
P. & R. Dagenite.	Exide.		
6 HZD9-S or 6 HZDP9-S	6 MXR9-L or 6 MXP9-L	12	5 amperes.

The full title should be given when ordering a replacement battery or spare parts.

First Charge.

If the battery is received in a dry condition, it will be necessary to fill the cells with acid solution of the correct specific gravity and charge the battery, before it is put into use.

In such cases, it is strongly recommended that the necessary charging should be undertaken by a properly equipped service station, as unless the initial charge is correct the battery will never give satisfactory service.

Topping-Up.

In the majority of cases, however, the battery will have already been charged and the cells filled with acid solution. Under normal operating conditions the level of the solution will gradually fall in each cell, mainly owing to evaporation losses. A regular inspection should be made, as directed on page 29, to see that the level of the acid solution has not fallen to such an extent that the tops of the separators and plates are exposed.

In this case, the battery should be "topped-up", by removing the vent plug in the centre of each cell lid and adding distilled water to each cell, until the level of the solution is approximately $\frac{3}{8}$" above the tops of the separators.

It is difficult to lay down a hard and fast rule as to how frequently "topping-up" will be required, because this varies so much, according to the use to which the car is put, and also the temperature in which it operates. It must be remembered that "topping-up" will be necessary more frequently in hot weather than in cold.

Normally it should never be necessary to add sulphuric acid to the cells, unless it is definitely known that some of the acid has been lost owing to slopping or spilling. The addition of acid to the battery should only be done by an experienced battery man, who at the same time will carry out any adjustments to the acid gravity.

Specific Gravity of Electrolyte.

Various acid specific gravity figures are given for reference in the following table, and they apply to both makes of batteries as given above.

Acid gravity figures are taken by means of an hydrometer.

Climate.	Specific Gravity of Sulphuric Acid Solution. (Corrected to 70° F.).		
	Filling in for First Charge.		Fully Charged.
	6 HZD9-S 6 MXR9-L	6 HZDP9-S 6 MXP9-L	
Temperate	1.340	1.260	1.280 (1.270–1.285)
Tropical (i.e. where the temperature is frequently 90° F. or over).	1.260	1.190	1.210 (1.200–1.215)

Charging.

The output of the dynamo on the car is controlled so as to vary with the state of charge of the battery. Overcharging the battery is thus automatically avoided. The dynamo will, under ordinary running conditions, provide enough current to ensure re-charging of the battery, but in special cases, e.g., when the car is frequently standing with the lights on and daylight running is of short duration, it may be necessary to take the battery off the car from time to time for a bench re-charge. This re-charge can be done by any well-equipped service station.

Charging Battery from an outside source.

It is possible to charge the battery in position on the car, making use of a flexible lead and the special two-pin plug supplied, which fits the charging plug socket on the facia board arranged just above the steering column.

Be certain that the direction of current is correct, the socket holes are marked + and — respectively, and, in addition, are made of different sizes in order to clearly distinguish them.

In the case of early models where this plug is not fitted, the charger should be connected as follows:—

1. Connect the NEGATIVE lead, by means of a clip, to the main fuse terminal in the fuse box (Fig. **36**).
2. Connect the POSITIVE lead, by means of a clip, to any convenient clean part of the chassis, such as the windscreen wiper motor bracket, which is bolted to the dashboard.

Maintenance.

The battery must be well secured in its box so that it cannot move.

The cable terminals should be well coated with lanolin or pure vaseline (not grease), before putting the battery into service.

The top of the battery should always be kept clean, and as far as possible, dry; attention should be given immediately to the least sign of corrosion occurring on the terminals.

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Keep the terminals and connectors well covered with lanolin or pure vaseline, all contact surfaces clean and firmly screwed up, but do not use abrasives for cleaning. To remove corrosion, use a solution of ammonium carbonate, applying with a rag.

Do not inspect the battery with the aid of a naked light, and on no account disconnect any of the battery terminals or connections when a charge or discharge current is passing, for such a course incurs risk of explosion and involves personal risk.

The battery must never be allowed to remain in a discharged condition. A battery not in service should be kept in condition by fully charging it and then giving it a freshening charge at least once every two months. It should be given a thorough charge before being put back into service.

Care should be taken to avoid an inadvertent discharge of the battery. Such a discharge may occur if there is an earth in the wiring system, instruments or fittings, or if the ignition switch be left on in error, and the engine happens to come to rest with the low-tension contacts in engagement. Provision is made for the latter contingency by the red warning lamp, which will remain illuminated until the ignition switch is turned off.

Fig. 37.—CONTACT BREAKER AND DISTRIBUTOR.
1. Contact breaker.
2. Distributor.
3. Lubricator.
4. Condenser.

It should be made a practice, when leaving the car, always to observe that the warning lamp is not illuminated, and no switches are left on, and that no discharge is shown on the ammeter.

Ignition.

The battery ignition contact breaker and distributor are shown in Fig. **37**, an internal view of the contact breaker being given in Fig. **38**.

A condenser (**4**, Fig. **37**) is connected across the contact points. In setting the points, the gap opening should be .019" (.483 m/m.) to .021" (.533 m/m.), adjustment being effected by loosening the locking

screws (**3** and **4**, Fig. **38**) and turning the adjusting screws (**5** and **6**) to obtain the correct gaps, measured with a feeler gauge. Make sure that the locking screws are correctly tightened after adjustment.

The screws (**7** and **8**) *must not be disturbed*, as this would upset the synchronism of the two contact breaker arms.

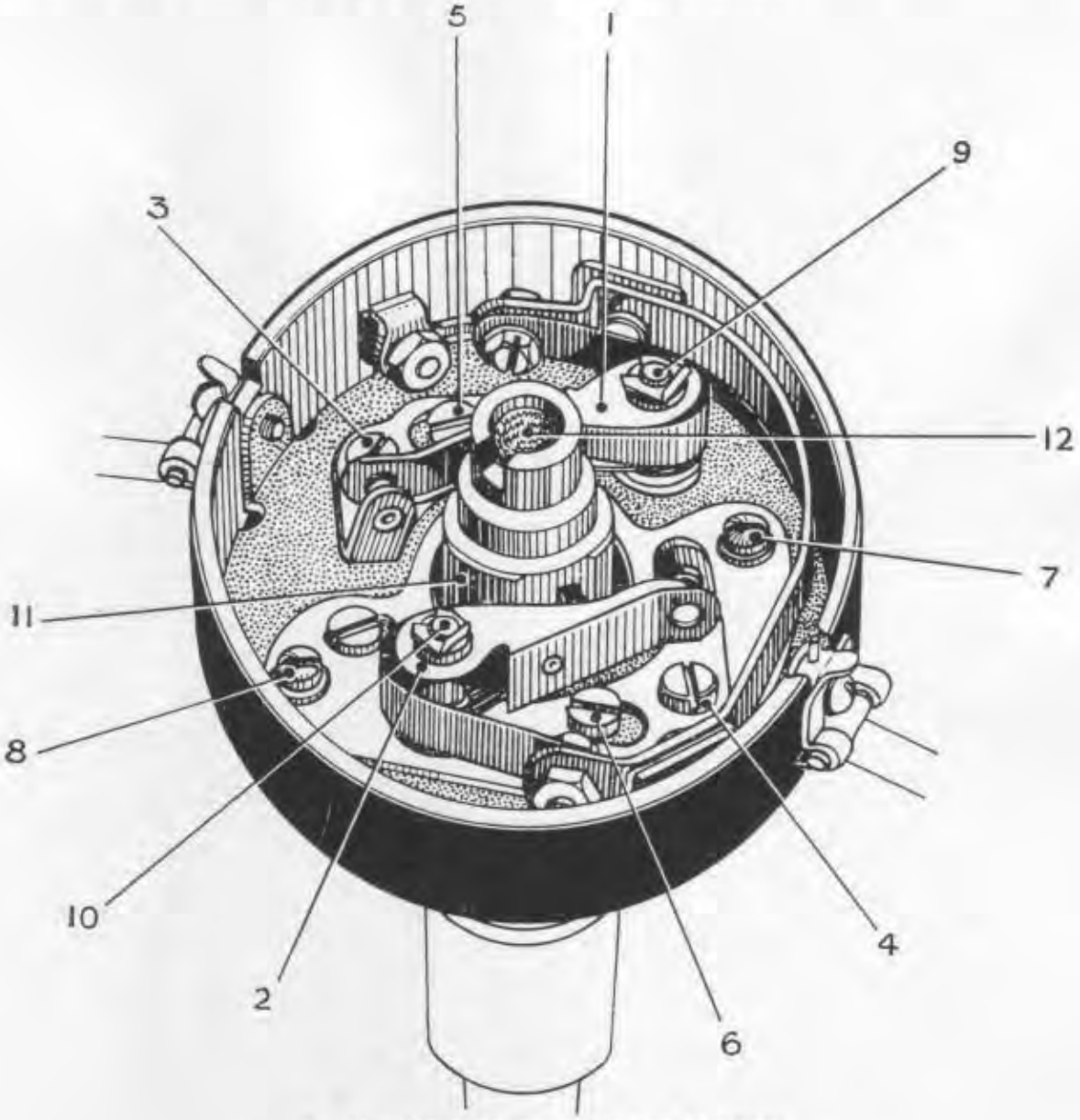

Fig. 38.—INTERIOR OF CONTACT BREAKER.

1. Contact breaker arm.
2. Contact breaker arm.
3. Locking screw.
4. Locking screw.
5. Adjusting screw.
6. Adjusting screw.
7. Locking screw.
8. Locking screw.
9. Pivot pins.
10. Pivot pins.
11. Cam.
12. Felt wick.

Every 5,000 miles, as directed on page 30, the rocker arm pivot pins (**9** and **10**) should be lubricated with one or two drops of oil "A"; at the same time a smear of Mobiloil Grease No. 2 should be applied to the cam (**11**). Also remove the rotor and apply a few drops of Oil "A" to the felt wick (**12**), to lubricate the automatic timing control.

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The lubricator (**3,** Fig. **37**) should be given a turn every 1,000 miles, and when empty, refilled with the correct grease, as specified on page 27.

The high-tension distributor requires no attention beyond an occasional wiping of the interior and exterior with a clean, dry rag.

Ignition Coil.

Two H.T. coils are mounted on the dash-board as shown in Fig. **39**. Only one is connected up, the other being carried as a spare. Connected to the terminal marked S.W. (Switch wire) is a 1 mfd. condenser to reduce electrical interference to the radio from the ignition system. Care must be taken that in the event of a change over to the spare coil, that the condenser is also changed over and correctly connected to the terminal marked S.W. and **not** to the output (C.B.) terminal of the coil.

The outside of the coil casing should be kept clean, misfiring is occasionally caused by an accumulation of dirt around the terminals.

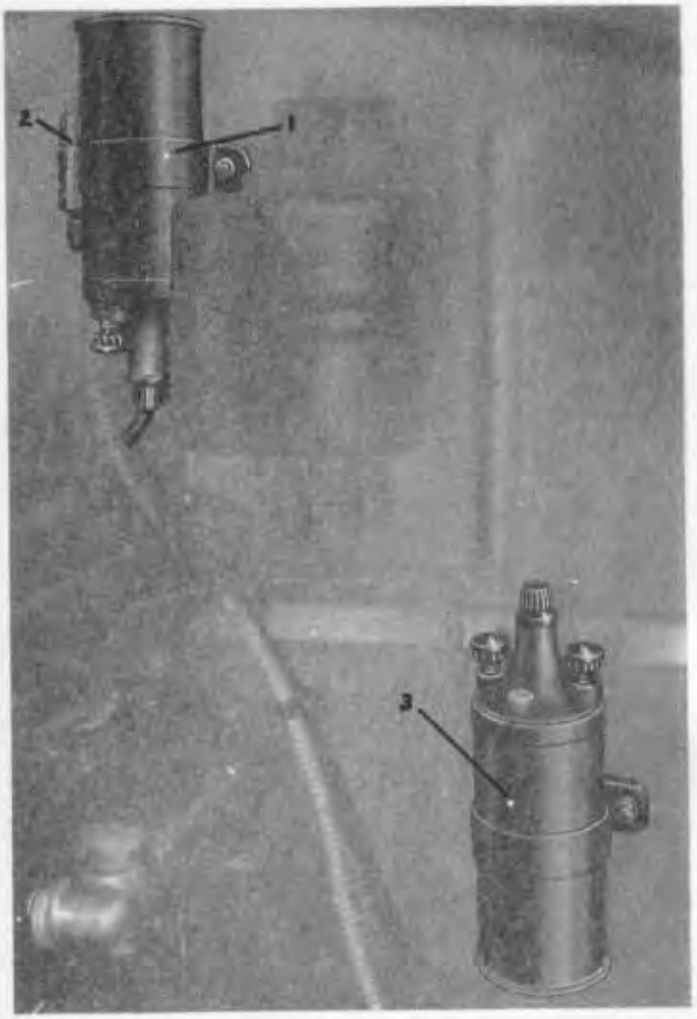


Fig. 39.—IGNITION COILS.

1. Ignition coil.
2. Condenser (suppressor).
3. Spare coil.

Ignition Timing.

If the timing of the battery ignition should have become deranged, it can be reset by reference to the flywheel markings, which can be seen on removal of the small cover on the near-side of the clutch casing, adjacent to the starter motor.

To carry out this operation, the crankshaft should be rotated until the mark **"IGN.TDC."** on the flywheel registers with the small pointer attached to the clutch casing, when No. 1 piston is at the top of its firing stroke.

Owing to the fact that a friction-damped spring drive is used for driving the valve gear and distributor, and that the starting handle

operates to turn the crankshaft through the medium of the spring drive, it is important that the crankshaft be rotated for timing purposes from the *flywheel end*, also, the starting handle should not have been used at all since the engine was last running.

The contact breaker should now be adjusted by rotating in an anti-clockwise direction, so that the cam is just on the point of causing the contact break when revolving in the normal direction, while at the same time the high-tension rotor is opposite No. 1 distributor contact. The rotor being in the fully retarded position.

A convenient method of determining precisely when the break takes place is by reference to the ammeter. With the ignition switched on, and someone watching the ammeter, the engine should be rotated until the required cam just breaks the contacts, as indicated by the reading of the ammeter.

The distributor head securing screw should then be securely tightened.

Ignition timing variation during running is entirely controlled by the centrifugal governor incorporated in the distributor, no hand control being provided.

Firing Order of Cylinders.

The firing order of the engine is, 1, 4, 2, 6, 3, 5, No. 1 being the front cylinder.

Sparking Plugs.

Alternative plugs are Champion Type N8, or Lodge Type CLN, 14 m/m. non-detachable. Every 5,000 miles, as directed on page 31, they should be removed and cleaned. The width of the gaps should be checked, and, if necessary, reset to .025" (.635 m/m.).

Starter Motor.

The starter motor is shown in Fig. **40**. A small planetary reduction gear is arranged in a casing behind the motor, the effect of which is to provide a total reduction gear ratio between motor and crankshaft of 16.0 : 1.

A plug (**4**), in the side of the gear casing, should be removed every 10,000 miles, as directed on page 31, and oil "B" injected until it reaches the mouth of the plug orifice. This oil also lubricates the driving end bearing of the armature shaft.

Ordinarily, the brushes will last a long time. In the event of replacements being necessary, application should be made to Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers".

The fitting of new brushes requires expert knowledge and care, and emphasis is laid on this point, as cases have arisen of faulty operation of the motor, due to the inexpert fitting of brushes.

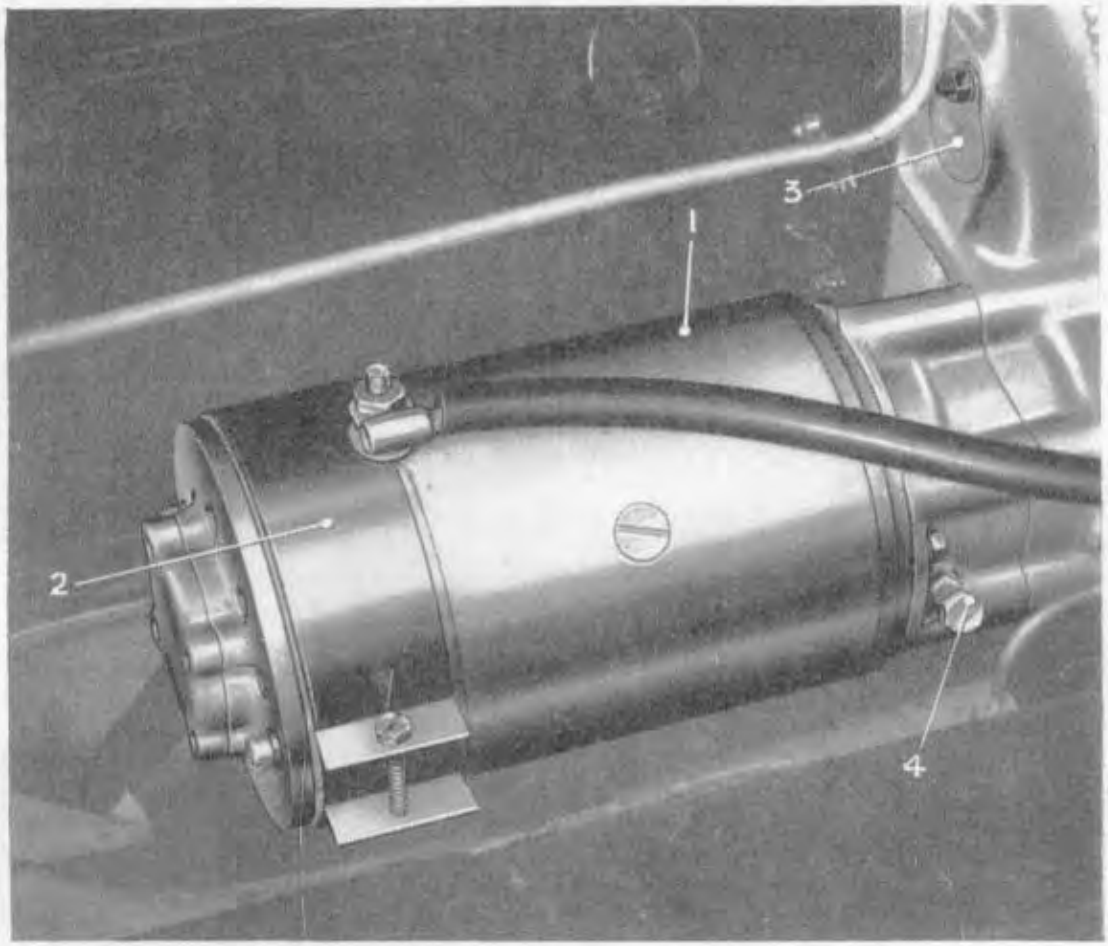


Fig. 40.—THE STARTER MOTOR.

1. Starter motor.
2. Brush gear cover.
3. Timing cover.
4. Oil level plug.

When replacing the starter motor in the chassis, it is important to be sure that a clean and sound electrical connection of cable to motor is re-obtained, owing to the heavy current which this has to carry.

Starter Motor Switch.

The main starter switch is mounted on the front of the dashboard, and is relay-operated. Closing of the push-button switch on the instrument panel energises an electric magnet, which closes the main contacts.

No attention should be necessary to the switch between general overhauls of the chassis.

Use of Starter Motor.

Careless use of the starter will reduce the life of the battery, whereas careful use will make very little difference to that life. That is to say, the heavy motor current is not detrimental to a healthy, charged battery—it only becomes detrimental to a cell which for any reason is low in charge, density or voltage. Several dozen starts may be made on a fully-charged battery without detriment. On the contrary, it is very important, if the engine does not start reasonably quickly,

to look for the cause rather than to continue to use up the battery output, with the risk of damage to one or more cells, remembering that the battery may not always be fully charged at the time.

If the starter appears to be sluggish in its action, and such sluggishness is traceable to the battery, no further attempt should be made to use the starter until the battery has been duly inspected and fully charged from an external source.

Electric Fuel Pumps and Gauge.

The electric fuel pumps should not need any attention over long periods of running, except, perhaps, the cleaning of the suction or delivery valves (see page 44); if an electrical fault is suspected, it is recommended that the necessary inspection and any work in connection with repairs should be carried out by Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers".

Reference to the wiring diagram (Fig. **35**), will show that they are supplied with current through the ignition switch, and, consequently, are only operative when the ignition switch is closed.

The fuel gauge is divided into two parts:—

(a) An indicating instrument, mounted on the instrument panel, and marked "o, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and F".

(b) A petrol tank unit, with a float for measuring the amount of petrol in the tank.

The indicating instrument has two actuating coils:—

1. A control coil, which is connected across the battery and so provides a constant torque on the pointer, tending to swing it over to the "Full" side of the scale.
2. A deflecting coil, which is connected in series with the battery and the tank unit rheostat, and so arranged to act in opposition to the control coil.

The tank unit consists of a variable rheostat, the sliding arms of which are operated by the up-and-down movement of the float, thus varying the circuit resistance from a minimum in the empty position to a maximum in the full position. With the float in the "empty" position the current in the deflecting coil is at a maximum, and its turning effort is of sufficient strength to move the pointer, against the opposing force of the control coil, back to the "O" position on the indicating instrument. Thus as the resistance is varied by the position of the float, the pointer indicates the petrol level in the tank.

A warning light is provided on the instrument panel, which is automatically illuminated when there is approximately three gallons or less of petrol in the tank.

Electric Horns.

Two tuned, wind-tone horns are provided, operated through a sealed relay mounted on the front of the dashboard.

No adjustments should be attempted. In the event of derangement, or deterioration of the tone, Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers" should be consulted.

De-Mister and De-Froster.

An electrically operated de-mister and de-froster is fitted under the scuttle, (See Fig. **41**).

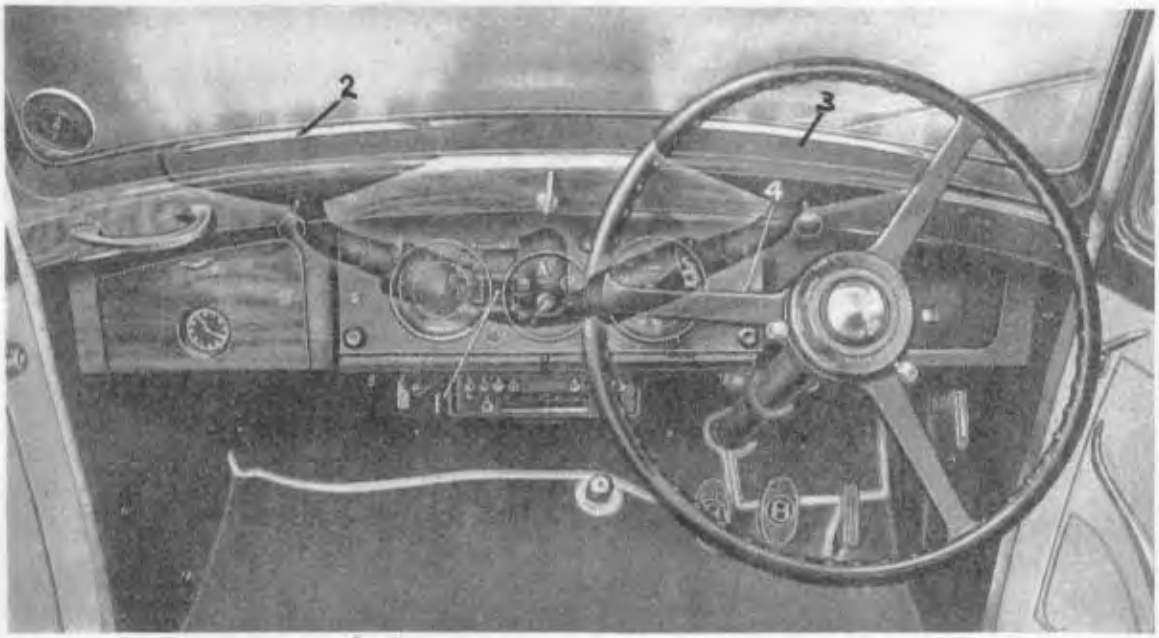


Fig. 41.—DE-MISTER AND DE-FROSTER.

1. Blower motor.
2. Air vent cover.
3. Air vent cover.
4. Motor switch.

Warmed air, after passing through the radiator, is collected and taken via the large pipe (**1**, Fig. **42**), to a blower motor mounted behind the dashboard.

Vents are so arranged in the top of the facia board to allow streams of warmed air to be forced onto the windscreen.

The vents are fitted with metal covers, these should normally remain open, but they may be closed if it is found that warmed air is being drawn into the car at unseasonable times.

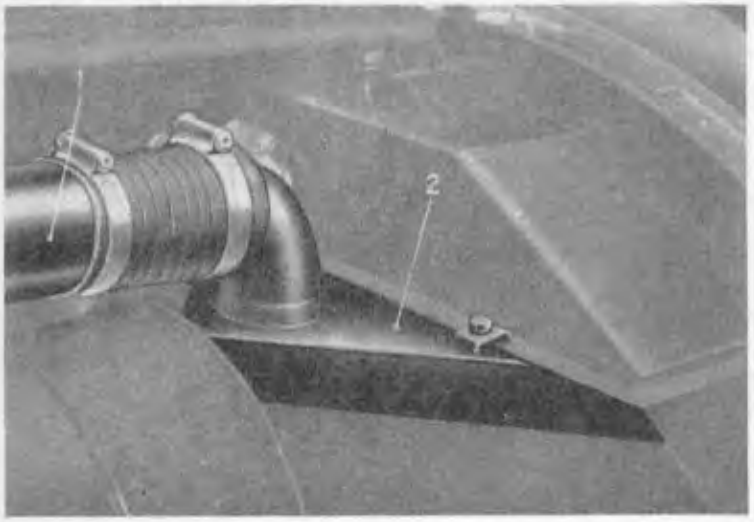


Fig. 42.—AIR COLLECTOR—DE-MISTER.

1. Pipe to blower motor.
2. Air collector.

To operate, ensure vent covers are open by gently pulling same rearwards, and switch on motor (**4**, Fig. **41**).

Electrical Fault Location.

In case of faulty operation, proceed to investigate as follows:—

1. Failure of any part of the system separately, may be due to a blown fuse in the fuse box (Fig. **36**).
2. Failure or incorrect operation of the system, may be due to the fusing of the main fuse (Fig. **36**), due to an earth.

If the dynamo does not charge:—

1. Check correctness of ammeter by switching on headlamps, this should show a "discharge" reading.

   NOTE:—See that the main switch is in the "OFF" position, before making any change to the wiring connections.
2. Ascertain whether the dynamo or regulator unit is at fault by connecting together the regulator terminals F and D, this will short circuit the regulator. Start engine gently and increase speed slowly, engine speed should not exceed a fast idle. Observe ammeter, if dynamo is in order, the ammeter will show a "charge" reading and the defect will be in the regulator unit.
3. To test dynamo, disconnect the wiring from both main terminals and connect these terminals together. Connect a lamp between one terminal and earth, and gently speed up engine as before. If the dynamo is in order the lamp will light.
4. Dynamo brushes may be sticking, due probably to oiliness. Clean brushes and holders with rag moistened in petrol.
5. Cut-out contacts may be burnt out or sticking.

If dynamo output is low, this may be due to the battery being fully charged, but if low with lights on, i.e., ammeter indicates an abnormal discharge, the regulator may be sticking in such a manner as permanently to insert the field resistance. Low output may also be caused by a slack driving belt.

If dynamo gives an excessive charge when speeded up, this may be due to the regulator sticking or to a break in the regulator shunt coil circuit. Check regulator wiring conditions.

In the case of defective operation which is traceable to the regulator, the unit must be removed and returned for rectification to Messrs. Bentley Motors (1931) *Ltd., or one of their "Special Retailers".*

If, with the fuses intact, and the lights in order, the ignition:—

(a) Misses.

1. First confirm right condition of sparking plugs.
2. Assure correct condition of contact breaker points, and adjust gap .019" to .021", if necessary.
3. Check condition of ignition coil casing. (See page 92.)

(b) Fails.

1. With ignition switched on, see by ammeter, while engine is cranked, that coil is taking current intermittently. If no current, test availability of battery voltage at coil terminals.

(Insert in Bentley Mk. VI Handbook No. VII to face page 98.)

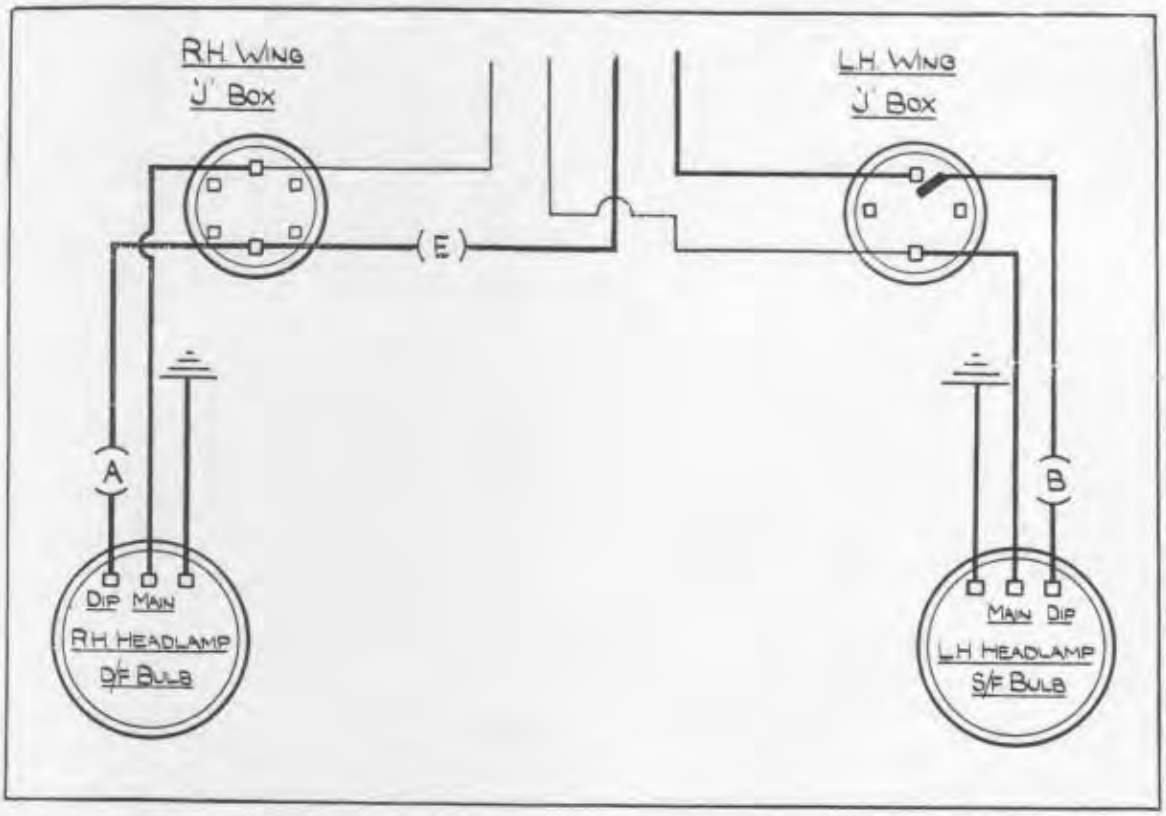
HEADLAMPS.

The original installation in which the foot-switch, operated to extinguish the headlamps and switch on the pass-lamp, has been altered; the foot-switch now operates a "dipping" system for the headlamps, whilst the pass-lamp is controlled by a separate switch on the dashboard.

The foot-switch now operates to extinguish the right-hand light, and deflect the left-hand beam vertically downwards by switching over to the displaced filament of a twin-filament bulb in the left-hand headlamp.

Provision is made so that this system can be reversed for use in countries where the car is driven on the right-hand side of the road.

1. Change over the headlamp bulbs, i.e. fit the double filament bulb in the right-hand headlamp, and the single filamant bulb in the left-hand headlamp.
2. Refer to sketch, and connect wire "A" to wire "E" in the right-hand wing valance junction box, as shown.
3. Disconnect the wire "B" in the left-hand wing valance junction box, and tape up the end.



BENTLEY MOTORS (1931) LTD.,
LONDON.

Leaflet S.B./7/49.

If, with battery in order, starter motor is sluggish or does not turn, examine commutator and brushes. Clean oily brushes and holders with a rag moistened with petrol. If motor turns without turning engine, check freedom of engine with starting handle. If found in order, the trouble lies in starter drive, and Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers" should be consulted.

If battery will not retain charge:—

1. Ascertain that no circuit is left switched on.
2. See that no cell of the battery leaks acid.

Recommended Lamp Bulbs.

R.H. Headlamp—12 volt, 48 watt—Single Centre Contact. (Lucas prefocus axial filament No. 185.)

L.H. Headlamp—12 volt, 48/48 watt—Double Contact. (Lucas prefocus transverse filaments No. 191.)

Centre Lamp—12 volt, 48 watt—Single Centre Contact. (Lucas prefocus axial filament No. 185.)

Front Wing Lamps—12 volt, 3 watt—Single Centre Contact, S.B.C. Cap.

Fig. 43.—THE HEADLAMP.

1. Rim.
2. Rim securing screw.

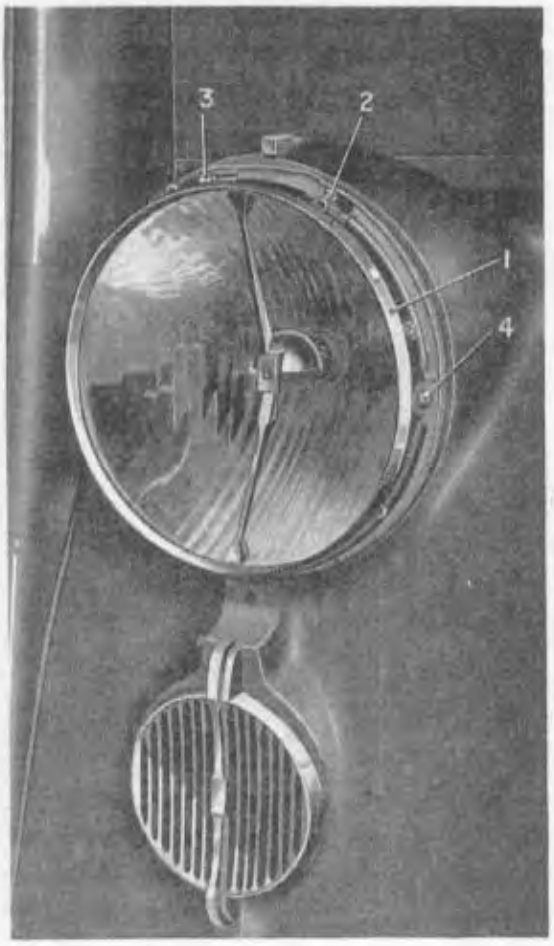


Fig. 44.—HEADLAMP—WITH RIM REMOVED.

1. Light unit.
2. Light unit securing screw.
3. Vertical trim adjustment screw.
4. Horizontal adjustment.

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Stop/Tail Lamps—12 volt, 24/6 watt—Double Contact—S.B.C. Cap. (Lucas No. 189.)

Number Plate Illumination—12 volt, 3 watt—Single Centre Contact—S.B.C. Cap.

Reverse Lamps—12 volt, 6 watt—Single Centre Contact—S.B.C. Cap. (Lucas No. 207.)

Instrument Lights—12 volt, 2.4 watt—M.E.S. Cap.

Warning Lights, Map Lamp and Boot Lamp—16 volt, 3 watt,—M.E.S. Cap.—15 m/m bulb.

Interior Roof Light—12 volt, 6 watt—Single Centre Contact—S.B.C. Cap. (Lucas No. 207.)

Trafficators—12 volt, 3 watt—Festoon. (Lucas No. 256.)

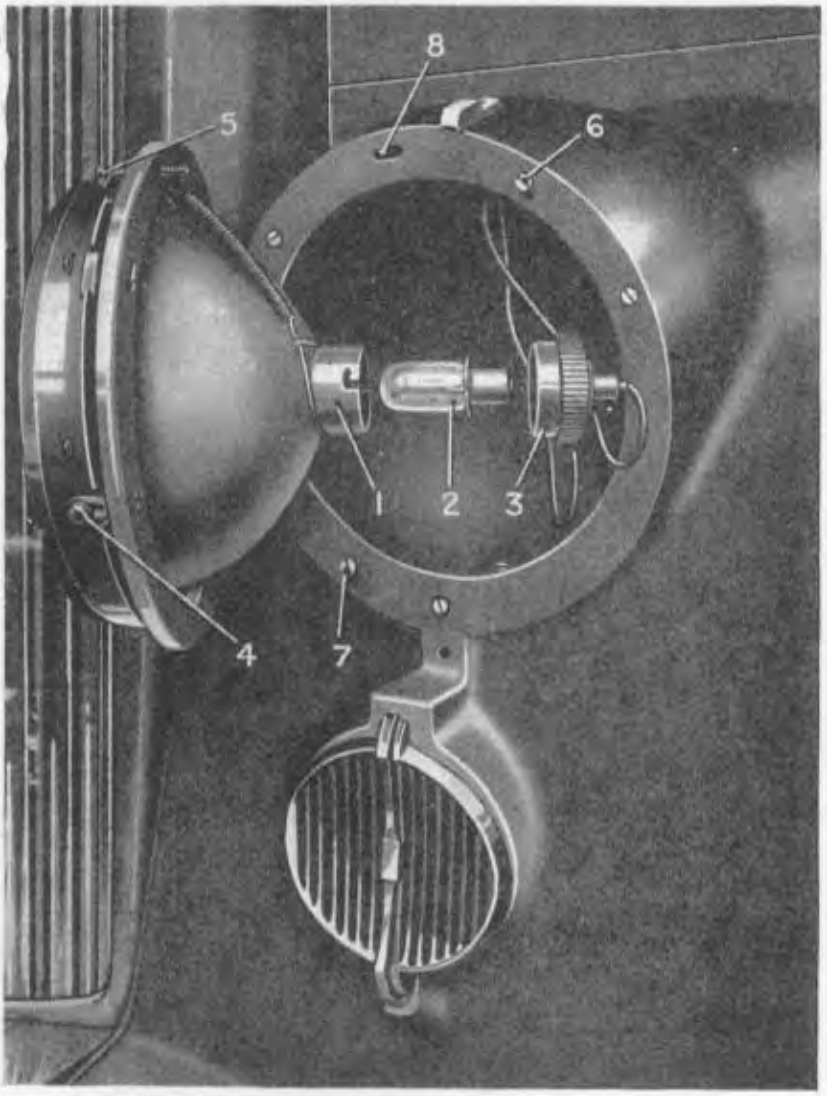

Fig. 45.—HEADLAMP—CHANGING THE BULB.

1. Bulb holder.
2. Bulb.
3. Backshell.
4. Horizontal adjustment.
5. Vertical trim adjustment screw.
6. Light unit securing screw.
7. Light unit securing screw.
8. Slot for vertical trim adjustment screw.

Headlamps.

Each headlamp incorporates a Light Unit, which consists essentially of a reflector and front glass assembly provided with a mounting flange, by means of which it is secured in the body housing.

The bulb, which has a pre-focus cap, is located accurately in the reflector, and is secured by a bayonet-fixed backshell which also provides the contact to the bulb.

The design of the bulb and of its holder is such that the bulb is correctly positioned in

relation to the reflector, and no focusing is required when a replacement bulb is fitted.

Replacing a Headlamp Bulb.

Remove the screw (**2**, Fig. **43**), at the bottom of the lamp and lift off the rim. Slacken the two screws (**6** and **7**, Fig. **45**), which secure the flange of the Light Unit, and turn it in an anti-clockwise direction to detach the flange from the securing screws. The Light Unit can then be lifted out of the lamp body.

Twist the backshell (**3**, Fig. **45**) in an anti-clockwise direction and pull it off. The bulb can then be removed by inverting the Light Unit and holding one hand under the bulb holder so that the bulb slides into the hand.

Place the re-placement bulb in the bulb holder (**1**, Fig. **45**), taking care to locate it correctly. Engage the projections on the inside of the backshell with the slots in the holder, press on and secure by twisting it to the right.

Position the Light Unit in the lamp body so that the vertical trim adjusting screw (**5**, Fig. **45**), locates in the slot in the body rim, and the heads of the two fixing screws (**6** and **7**, Fig. **45**), protrude through the holes in the flange of the Light Unit. Twist the Light Unit in a clockwise direction and secure by tightening the two screws.

Engage the tongue on the inside of the front rim in the slot at the top of the flange of the Light Unit, press it on fully at the bottom and secure with the fixing screw (**2**, Fig. **43**).

Aligning the Headlamps.

The headlamps should be aligned so that they direct their beams straight ahead, i.e. parallel with the road and with each other.

The simplest way of checking the adjustment of the lamps is to take the car on a straight level stretch of road at night and examine the direction of the beams. If one appears to be out of adjustment, adjust as follows:—

Remove the screw (**2**, Fig. **43**) at the bottom of the lamp and lift off the rim.

Vertical adjustment is made by operating the screw (**5**, Fig. **45**), screwing in raises the beam and screwing out lowers the beam.

Horizontal adjustment is made by slackening the nuts (**4**, Fig. **45**) and sliding the reflector unit forward or backward in the slots provided.

Having obtained the correct adjustment, the nuts (**4**, Fig. **45**) must be securely re-tightened, and the rim replaced.

The Side Lamps.

The method of changing a lamp bulb is illustrated in Figs. **46** and **47**.

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The locking screw, (1) should be removed, and the lamp unit drawn bodily forward as in Fig. 46.

Fig. 46.—SIDE LAMP.
1. Locking screw.

Fig. 47.—SIDE LAMP.
2. Spring catch.

To obtain access to the bulb, detach the front portion by holding firmly, and rotating the rear portion a quarter of a turn to release the spring catch, (2).

The bulb is of the standard bayonet fitting type.

To replace, reverse the above instructions.

Radio.

"His Master's Voice" automobile radio equipment is fitted as original equipment in the Bentley car. The receiver, known as "Radiomobile" Model 100, has a six valve superheterodyne circuit designed for medium and long wave reception.

Fig. 48 illustrates the controls.

The combined Volume Control and "On/Off" switch, at the left of the control panel and below the push-buttons, switches the receiver off when turned fully anti-clockwise. Turning the knob clockwise switches the set on, indicated by the illumination of the tuning scale and controls the volume.

A period of about 40 seconds after switching on is required for the receiver valves to warm up.

The left-hand group of four push-buttons contains two buttons marked "MW" and "LW", and two marked "MU" and "SP".

The buttons marked "MW" and "LW", enable either the Medium or Long waveband to be selected, by pushing the appropriate button.

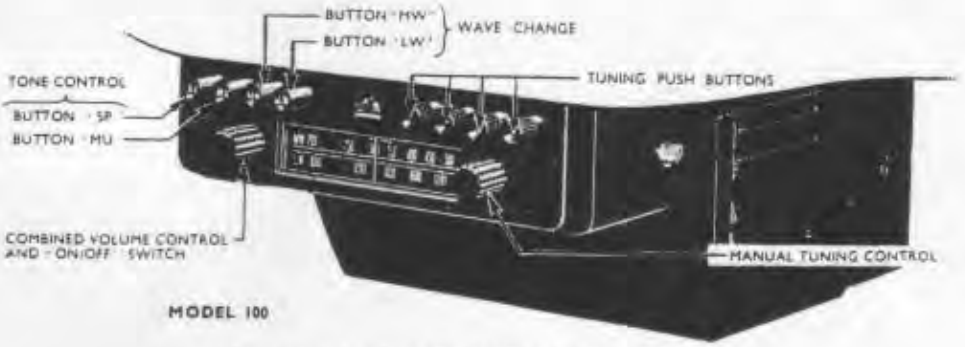

Fig. 48.—THE RADIOMOBILE CONTROLS.

The buttons marked "MU" and "SP" are for tonal control. Pushing the "MU" button the tonal balance is set to conditions favourable to musical reproduction, while the "SP" button provides accentuated high frequency response for good speech intelligibility.

The Manual Tuning Control, at the right of the control panel and below the push buttons, operates through a friction clutch, and in order to tune in a station it is necessary to press the tuning knob while turning it.

The four Tuning Push-buttons, at the right of the control panel, provide automatic tuning of four stations on the Medium or Long wavebands. These buttons can be rapidly adjusted to tune any four stations; the required station may then be selected simply by pushing the appropriate button.

The Tuning Scale is calibrated in wavelengths and is illuminated. The upper (yellow) scale covers the Medium waveband, the lower (red) the Long waveband.

TO SET UP THE TUNING PUSH-BUTTONS.

1. Switch on the receiver, leaving Volume Control set at roughly two-thirds of full rotation, and allow about 40 seconds to warm up.
2. If the station desired is on the Medium waveband, press the button marked "MW". If on the Long waveband, press the "LW" button.
3. Tune in the station, using Manual Control, in the same way as when tuning a domestic receiver. For example, if the London Home Service programme is required (wavelength 342.1 metres) turn the Tuning Control until the scale pointer reads approximately the correct wavelength on the Medium Wave scale. The station should then be heard, and a final adjustment should be made to tune it in accurately.

4. Release tuning knob.
5. Gripping the knurled portion of one of the Tuning Push-buttons between finger and thumb, unscrew it about half a turn (i.e. turn it anti-clockwise). Then push the button firmly as far as it will go. Allow it to spring back to normal position, and tighten firmly by turning it clockwise. The push-button is now set to tune the station required, and when pressed will "bring in" the station irrespective of the position to which the scale pointer may have been adjusted previously.

Proceed in the same manner for the other push-buttons, remembering that if the desired station is on the Long waveband the "LW" must first be pressed before the tuning button will bring in the station, similarly, the "MW" button must be pressed for Medium wave stations.

The aerial is normally mounted above the windscreen on the outside of the car, and is operated from the inside by a bakelite knob. An engraved arrow indicates the position of the aerial, vertical being for normal use and horizontal for when parked and not in use.

In some cases an under car aerial may be fitted, and with these there is no inside aerial control knob.

It is unlikely that either of these types of aerial will need attention, but to ensure the best reception they should be kept clean.

If any further advice or assistance in connection with the radio equipment is required, Messrs. Bentley (1931) Ltd., or one of their "Special Retailers", should be communicated with, or, if more convenient, any of the Radiomobile Service Depots.

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