CONTROL BOXES MODEL RB310

ADDITIONS AND AMENDMENTS TO SECTION F-4 ISSUE 2

PART 1 GENERAL

Since Section F–4 Issue 2 was released in March 1958 Model RB310 control boxes have undergone a number of changes—some of which are of service interest. These changes include:—

Non-reversible covers secured with two short self-tapping screws.

Electrical adjustments now effected with cheese-head type screws locked with five-turn compression springs located between screw head and regulator frame.

Wire wound resistors used for 12 and 24-volt contacts resistors, and for 24-volt field parallel and shunt winding swamp resistors.

Semi-conductor diode connected in series with field parallel resistor of 24-volt units. **These units must only be connected to generators of like polarity.** See also para. 2 (f).

In addition, some units include the following features:—

VR and CR contacts near front edge of armature.

Load windings carrying currents up to 24 amperes, previously wound with 0.160″×0.040″ copper strip, now wound with 13½ S.W.G. (0.086″ dia.) copper wire.

Lucar terminals.

Radio suppression of units having Lucar terminals effected with Model WS18 Filter Unit riveted to side of control box cover.

PART 2 MISCELLANEOUS AMENDMENTS TO SECTION F-4

(To be read in conjunction with corresponding paragraphs in the above Section)

Para. 1 (e). Temperature Compensation

In 24-volt units, bi-metal tensioning springs are now fitted to both the voltage regulator and the cut-out relay, instead of to the latter only. In addition, a swamp resistor for the voltage regulator shunt coil is retained and is shared by the shunt coil of the cut-out relay—the latter winding being now of reduced resistance and the former now the same as that used in 12-volt units.

Para. 2 (a) (i). Open Circuit Voltages

24-volt units: When checked in service on the vehicle, 28.0—28.5 volts for both the recommended "terminals up" mounting and the not-recommended "terminals down" mounting.

If checked on the bench with terminals upwards and usual vehicle mounting position is with terminals downwards, 28.4—28.9 volts.

Para. 2 (a) (ii). Conditions for Voltage Measurement

After: "The generator should be driven at 3000 r.p.m."

Add: "Except models C47, C48 and D5L24B–11, for each of which a setting speed of 1500 r.p.m. is specified."

This instruction, together with the information contained in Section F–1 PART A Page 3 Issue 2, supersedes the footnote on page 3 of Section F–4 which should now be ignored.

Para. 2 (a) (iii). Temperature Correction Factor

For: "0.3-volt from the 24-volt limits"

Read: "The bi-metal tensioning springs of voltage regulators in 24-volt units are designed to produce nominally level voltage-temperature characteristics. Thus, no correction has to be made when checking and setting open circuit voltages at differing ambient temperatures."

Para. 2 (b). Electrical Setting of Current Regulator

The two 24-volt units referred to under the above heading, namely, 37213 (Volvo and Scania-Vabis) and 37266 (Vauxhall) together with a later unit, 37282 (Albion), were of a design now obsolete and are no longer produced. They have been superseded by 37327, 37314 and 37300, respectively. Setting data for these and other 24-volt units of later design is tabulated in Part 3 of these notes.

Para. 2 (c). Electrical Setting of Cut-Out Relay

For: "27.0—27.5"

Read: "26.5—27.0"

Para. 2 (d). Resistor Values

Resistance values of wire wound resistors

(i) *Contacts Resistor*

6-volt units: No change
12-volt units: 60 ±5 ohms
24-volt units: 240 ±12 ohms

(ii) *Field Parallel Resistor*

12-volt units: No change
24-volt units: 40 ±3 ohms. (This resistor is series-connected with a Lucas diode between field terminal 'F' and base)

(iii) *Voltage Regulator Swamp Resistor*

24-volt units: 30 ±1½ ohms. (This resistor now also provides a swamp path to earth for the shunt winding of the cut-out relay)

Para. 2 (e). Resistance of Shunt Windings at 20°C.

24-volt units: Voltage Regulator, 103—115 ohms
Cut-out Relay, 58—65 ohms

Note: The above shunt winding resistance values apply only to units in which both windings are connected to earth through a common swamp resistor.

Para. 2 (f). Repolarisation

Before repolarising units having a diode in the field discharge circuit, the diode must be substituted for one of opposite polarity.

These units carry a distinctive label denoting their original polarity. Units fitted with a Lucas diode, model DD 320, Part No. 49035 carry a label with the legend '+VE EARTH' in black letters on red, while units fitted with model DD 320A Part No. 49091 have '—VE EARTH' in black on light blue.

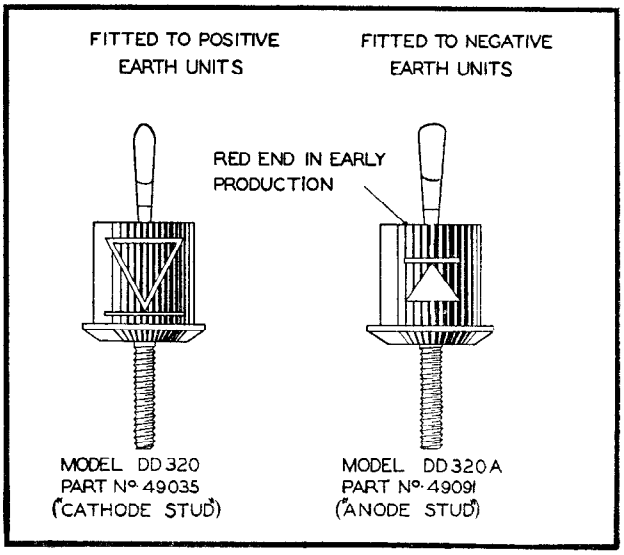

Fig. 1
Identification of diode polarity

Description of Diode

In diffusion diode Part No. 49035 the fixing stud earths the cathode. In Part No. 49091 it earths the anode. Each diode carries the rectifier symbol indicating conventional current flow. (The end opposite the stud was coloured red in early production of DD 320A 49091 fitted to negative earth units.) These diodes are one-ampere fifty-volt rectifiers for operation in the ambient temperature range —60°C. to +150°C. At the latter temperature the maximum permissible reverse current is 125 micro-amperes.

Simple Test for Diode Checking

(i) Connect a 12-volt 1.5-watt test lamp in series with the diode across a 12-volt battery. (Lucas L.E.S. bulb No. 280.)

(ii) Reverse the test probes and observe the effect.

Current should flow in one direction only. If the bulb lights in both tests or does not light in either, the diode is defective and must be replaced.

The above test is adequate for service purposes. Any accurate measurement of diode resistance necessitates the use of factory equipment. Since the forward resistance of a diode varies with the voltage applied, no realistic readings can be obtained from battery operated ohmmeters. However, if a battery operated ohmmeter is used, a good diode will yield "Infinity" in one direction and some indefinite, but much lower, reading in the other.

WARNING : Ohmmeters of the type incorporating a hand-driven generator must never be used for checking diodes.

Para. 3 (b). Adjustment of Electrical Settings

(i) Preliminary Checking of Charging Circuit

After: "Check the generator by substitution or by . . . ."

Insert: ". . . disconnecting the generator cables and (linking, etc.) . . . ."

Para. 3 (d). Checking Internal Continuity of Control Box

Overall continuity checks given under the above heading on page 6 of Section F–4 Issue 2 apply to older units in which carbon resistors were incorporated and to 24-volt units produced before a diode was introduced into the field discharge circuit.

Additional resistance values covering individual resistors and shunt windings used in units of later production are given in this supplement, Para. 2(d) and (e), for use as applicable.

Para. 3 (e). Adjustment of Air Gap Settings

(i) *Gauge Thickness*

The application to bobbin cores of copper spacers in the form of discs, wires or spray having been discontinued, the 0.009″ thick square of copper is now the only non-magnetic separation used. It is fitted to all voltage and current regulators and to cut-out relays.

As described in Section F–1 Part A Page 3 Issue 2 March 1960, identification of bi-metal springs is now provided by radiused projections about $\frac{1}{16}$″ in length situated immediately below the two rivets by which the springs are secured to the armature. When viewed from the bobbin side, the projection is below the left-hand rivet of springs 0.010″ thick and below the right-hand rivet of springs 0.012″ thick. Alternatively, 0.012″ springs were manufactured in 1959-60 that did not carry the identifying projection.

In order to differentiate the special 0.010″ bi-metal springs now used in 24-volt units, these latter springs are manufactured with *two* projections, one below each armature rivet. In addition, the tail of the spring is not rounded, as is usual, but squared. As will be seen from the table in Part 3 of these notes, the armature-to-core regulator gaps of units fitted with these special springs must be set to 0.026″.

With the standardisation of non-magnetic core gap separation, air gap settings for 6 and 12-volt units can be summarised as shown in the upper table overleaf.

(ii) *Voltage and Current Regulator Mechanical Settings*

To the penultimate sentence on page 8, "Retighten the locking nut." add ". . . . and remove the gauge."

(iii) *Cut-out Relay Mechanical Settings*

In Fig. 9 "Second Setting" and text

For: 0.010″

Read: 0.015″

Note: This is a nominal setting that, in order to obtain the correct drop-off voltage, may later require modifying within the limits 0.010″—0.020″.

Para. 4. Radio Interference Suppression

Suppressor unit model WS14 78128 is designed for use with RB310 control boxes having screw type terminals. Units having Lucar terminals are suppressed with WS18 78136, this being secured by rivets to the control box cover.

Generators having $\frac{1}{4}$″ B.S.F. output terminals can be suppressed to a high standard and over a wide band of frequencies with suppressor unit WS15 78141. This consists of an adaptor assembly for fitting to generator terminal 'D'. The assembly includes a feed-through metallised paper capacitor of low impedance.

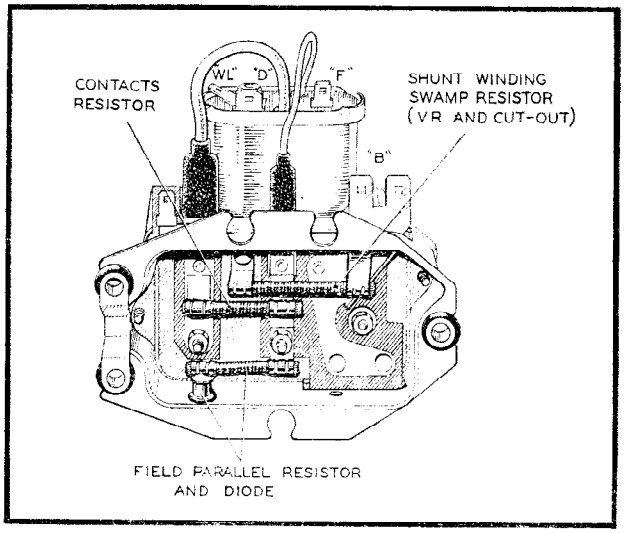

Fig. 2
Rear view of 24-volt unit with WS18 suppressor

Summary of Air Gap Settings for 6 and 12-Volt Units

Associated Generator	*VR Setting Gauge*	*CR Setting Gauge*	*VR Bi-metal Thickness*
C39PV–2, C39Q, C40–1, C40L, C45PV–5 (6 v.), C45PV–6	0.018″	0.018″	0.012″
C45PV–5 (12 v.)	0.018″	0.021″*	0.012″
C47 and C48 (When controlled with RB311)	0.021″	0.021″	0.012″
C47, C48 and uprated C45 (When controlled with RB310)	0.021″	0.021″	0.010″

Note : Air gap settings are a function, jointly, of regulator response and generator time-constants. The two 12-volt units 37303 and 37313 may be taken to illustrate this latter factor. These units contain identical twenty-turn current regulator windings and are set to 22 and 24 amperes, respectively. However, due to the differing inductance values of their associated generators, namely, models C45PV–5 and C39PVR–2, the CR air gap of the former must be set to 0.021″ and of the latter to 0.018″—despite the higher maximum ampere-turn value developed by the CR winding in the latter.

**This setting applies to the following units:* 37189–250–259–279–299–303–311–315 *and* 335

PART 3 MISCELLANEOUS DATA FOR 24-VOLT UNITS

Part Number	*Associated Generator*	*Earth Polarity*	*Current Setting (amp.) at 4000 r.p.m.†*	*VP Core Gap (in.)*	*CR Core Gap (in.)*	*VR Bi-metal Thickness (in.)*	*Field Parallel Diode*
37213	D5LF24B–21	—	19.0—19.5	0.018	0.018	—	—
37266	GH45–1	+	14.0—15.0	0.018	0.018	—	—
37282	D5L24B–11	+	11.5—12.0	0.018	0.018	—	—
37300	D5L24B–11	+	11.5—12.0	0.026	0.026	0.010	49035
37314	GH45–1	+	14.0—15.0	0.026	0.026	0.010	49035
37327	D5LFA24B–21	—	18.0—18.5	0.026	0.026	0.010	49091
37328	D5L24B–11	—	11.5—12.0	0.026	0.026	0.010	49091
37329	GH45–1	—	14.0—15.0	0.026	0.026	0.010	49091
37333	GH45–1	+	14.0—15.0	0.026	0.026	0.010	49035

Note : For voltage settings, see para. 2 (a) (i) of this Supplement. Voltage settings are made at 3,000 generator r.p.m., except 37282, 37300 and 37328 which are set with their associated generators running at 1,500 r.p.m.

†*Except* 37282, 37300 *and* 37328 *which are set with their associated generators running at* 3,000 *r.p.m.*