Cancelled obsolete

Chapter 36

VOLTAGE REGULATOR TYPE 50/42909E (MAIN)

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LEADING PARTICULARS

Voltage regulator, Type 50/42909E	**Ref. No. 5UC/6137**
Controlled voltage	... 24·5 *volts* ± 2½%
Pile resistance range	... 0·5 *to* 12 *ohms*
Maximum pile loading	... ... 180 *watts*
Actual loading	... ... 150 *watts*
Carbon pile	*Ref No. 5UC/6254*
Operating coil current	... 0·63 *to* 0·65 *amp*
Operating coil resistance	... 9 *ohms cold*
Boost coil resistance	... ... 975 *ohms*
Boost coil series resistance (650 *ohms*, 30 *watt*)	*Ref. No. 5UC/6265*
Ballast resistor (33 *ohms*, 12 *watt*)	*Ref. No. 5UC/2857*
Trimmer resistor (10 *ohms*, 7½ *watt*)	*Ref. No. 5UC/5525*
Stabilizing transformer	*Ref. No. 5UC/6266*
Ratio	... ... 3:1
Primary winding	... ... 73 *ohms*
Secondary winding	... ... 1·9 *ohms*

Introduction

1. The main voltage regulator, Type 50/42909E, is used in conjunction with the pilot regulator, Type 22/50836, to control the output of the a.c. generator, Type LA2413, Form B/10, at 28 volts $\pm 2\frac{1}{2}\%$.

2. A description of the regulating system, with a circuit diagram of the complete installation, is given in Chap. 37.

DESCRIPTION

3. This regulator (Fig. 1) is of the single carbon pile type, and in general construction and principle of operation is similar to the standard design as described in A.P.113D–0003–16 (formerly A.P.4343, Vol. 1, Sect. 6, Chap. 1). The pile is approximately 4 in. long, and consists of not less than fifty 0·5 mm. washers. The pile is built up of two 0·5 mm. washers, interleaved with a 3 mm. washer, starting and finishing with a 3 mm. washer.

4. The regulator unit is mounted on a base, beneath which are the ballast and trimmer resistors, the boost coil resistor and rectifier, and stabilizing transformer (Fig. 2).

5. The stabilizing transformer has its primary winding connected in series with the pile, and its secondary in series with the operating coil. Under stable conditions, no voltage is induced in the secondary winding, but when the generator speed increases, a voltage will be induced in the secondary winding such as to oppose the compensating effect of the operating coil and so damp any tendency towards oscillation.

6. An external rectifier is used to supply d.c. for the operation of the voltage regulator and an internal rectifier supplies d.c. to the boost coil. This coil provides balanced control under no load condition when the equalizer circuit is inoperative and in addition provides a boost to the normal equalizer control under load conditions.

INSTALLATION

7. The regulator is mounted with the axis of the carbon pile horizontal, and the

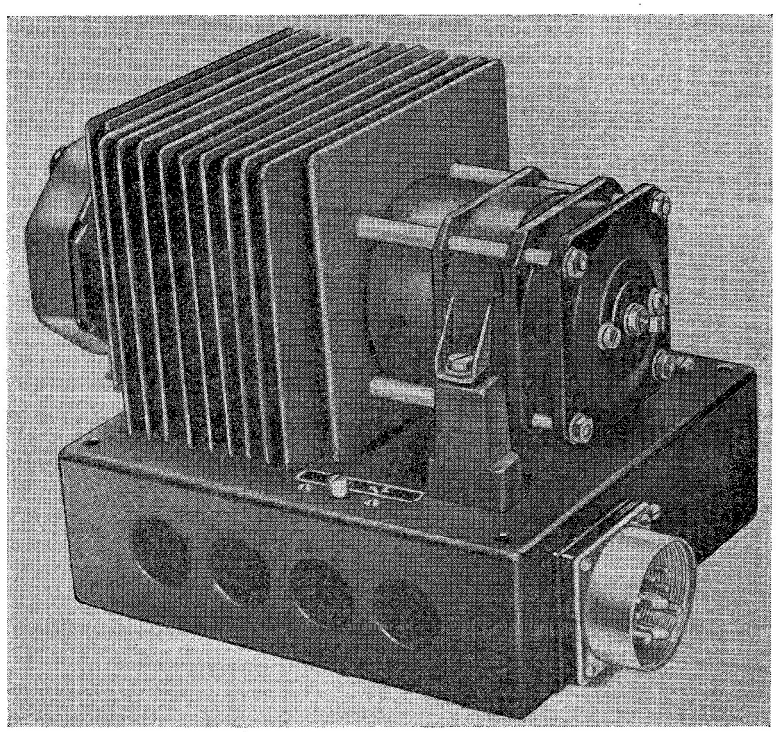

Fig. 1. Voltage regulator, Type 50/42909E (main)

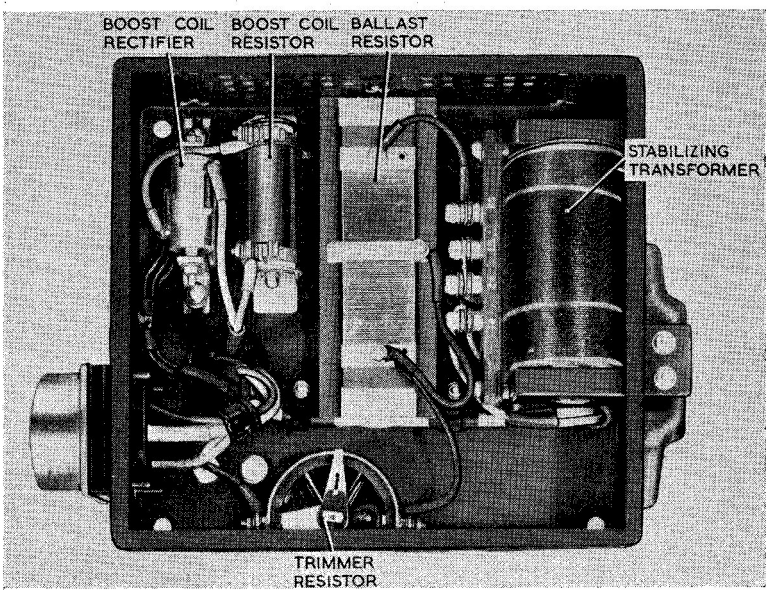

Fig. 2. Underside of regulator

regulator base in a vertical plane. It is in such a position that there is no restriction to free circulating air through the pile housing.

SERVICING

8. General servicing instructions for this type of regulator are given in A.P.113D–0003–16 (formerly A.P.4343, Vol. 1, Sect. 6, Chap. 1). That publication describes the fitting of a new pile stack and the preliminary mechanical adjustment for a regulator which is completely out of order. The latter part of this publication gives information on Repair and Re-conditioning on this type of regulator. After any adjustment is made the regulator must be subjected to a full test.

Note . . .

The correct setting for the pile compression screw on this regulator is in the dip position.

Appendix A

STANDARD SERVICEABILITY TEST

for

VOLTAGE REGULATOR TYPE 50/42909E (MAIN)

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LIST OF ILLUSTRATIONS

Introduction

1. The following tests should be applied to the regulator whenever it is necessary to determine its serviceability. The regulator should subsequently be tested again in conjunction with a pilot regulator Type 22/50836 as described in Chap. 36, Appendix A of this Book.

Test equipment

2. The following items of test equipment will be required when testing the regulator:—

(1) Generator Type 515, Ref. No. 5UA/5570.

(2) Ammeter 0–1A (A2), Ref. No. 5Q/10856.

(3) Ammeter 0–20A (A1), Ref. No. 5Q/25093.

(4) Voltmeter 0–40V (V1), Ref. No. 5Q/234.

(5) Multimeter Type 12889 (V2), Ref. No. 5QP/17447.

(6) Voltmeter 0–40V (V3), Ref. No. 5Q/234.

(7) Insulation resistance tester Type C.

TEST PROCEDURE

General

3. Connect the regulator Type 50/42909E to the test circuit as shown in Fig. 1. This circuit shows the regulator connected to a generator of the Type 515 series; but if this generator is not available any generator which is used with this regulator may be substituted.

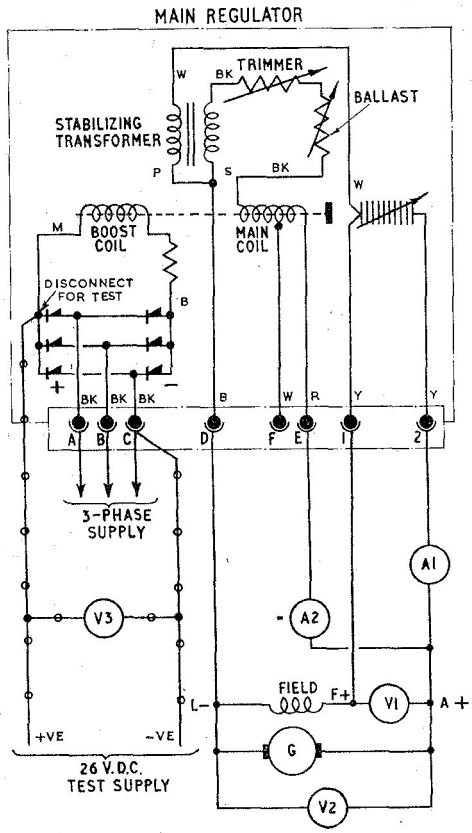

Fig. 1. Test circuit diagram

4. Apply 21 volts 3 phase a.c. to terminals A, B and C or alternatively disconnect the boost coil lead from the positive side of the rectifier and excite with 26V d.c. of the correct polarity.

Note . . .

It is important that the permissible pile loading of 150W, i.e. (product V1, A1) and a maximum pile resistance of 12 ohms is not exceeded during test.

5. With the regulator cold, run the generator at 5000 rev/min. Set the trimmer resistor in the electrical mid position. The output voltage V2 should be 24·5V and the main coil current A2 within the limits of 0·63A and 0·65A. If this voltage or current is not obtained refer to A.P.113D–0003–16, para. 40-45 (formerly A.P.4343, Vol. 1, Sect. 6, Chap 1, para. 40-45).

Note . . .

The correct setting for the pile compression screw on this regulator is in the dip position.

Regulation test

6. Run the generator over a speed range to give a pile resistance of 1 to 12 to 1 ohms, measured by the ratio V1/A1. Over this cyclic variation of pile resistance the controlled voltage should be maintained within the limits of 23·9V and 25·1V.

Insulation resistance test

7. Using the insulation resistance tester Type C, measure the insulation resistance between all connecting leads and the frame, the reading should be not less than 5 megohms. Measure the insulation resistance between the positive side of the rectifiers and terminal E, the reading should be not less than 5 megohms.

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