Cancelled - obsolete

Chapter 10

VOLTAGE REGULATOR, TYPE E3

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Voltage regulator, Type E3	*Stores Ref. 5UC/364*
Coil current	*0·14 to 0·155 amp.*
Carbon pile	*Stores Ref. 5UC/365*
Pile resistance range	*3 to 35 ohms*
Trimmer resistor (55 ohms)	*Stores Ref. 5UC/3436*
Ballast resistor (300 ohms)	*Stores Ref. 5UC/306*

Introduction

1. The voltage regulator, Type E3, is used to control the output of the inverter, Type MG7 at 80 volts a.c.

DESCRIPTION

2. This regulator is generally similar to the earlier Type E1T, but differs in the carbon pile, which is made up of a minimum of 38 washers 1 mm. thick; the total pile length is 1·5 in. A circuit diagram is given in fig. 1, and general information on this type of regulator will be found in A.P.4343, Vol. 1, Sect. 6, Chap. 2.

SERVICING

3. General servicing instructions for this type of regulator are given in A.P.4343, Vol. 1, Sect. 6, Chap. 1 and 2. Chap. 1 describes the method of adjusting a regulator which is out of order; if any adjustment is made, the regulator must be fully tested as described in the following paragraphs.

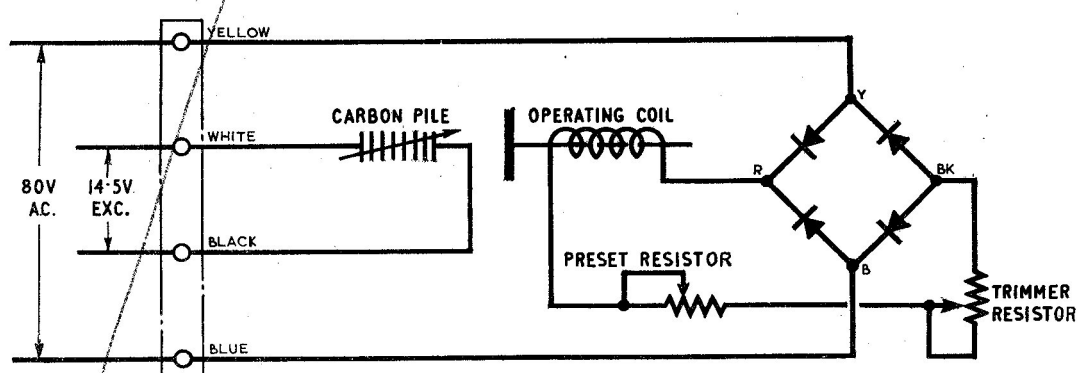

Fig. 1. Circuit diagram

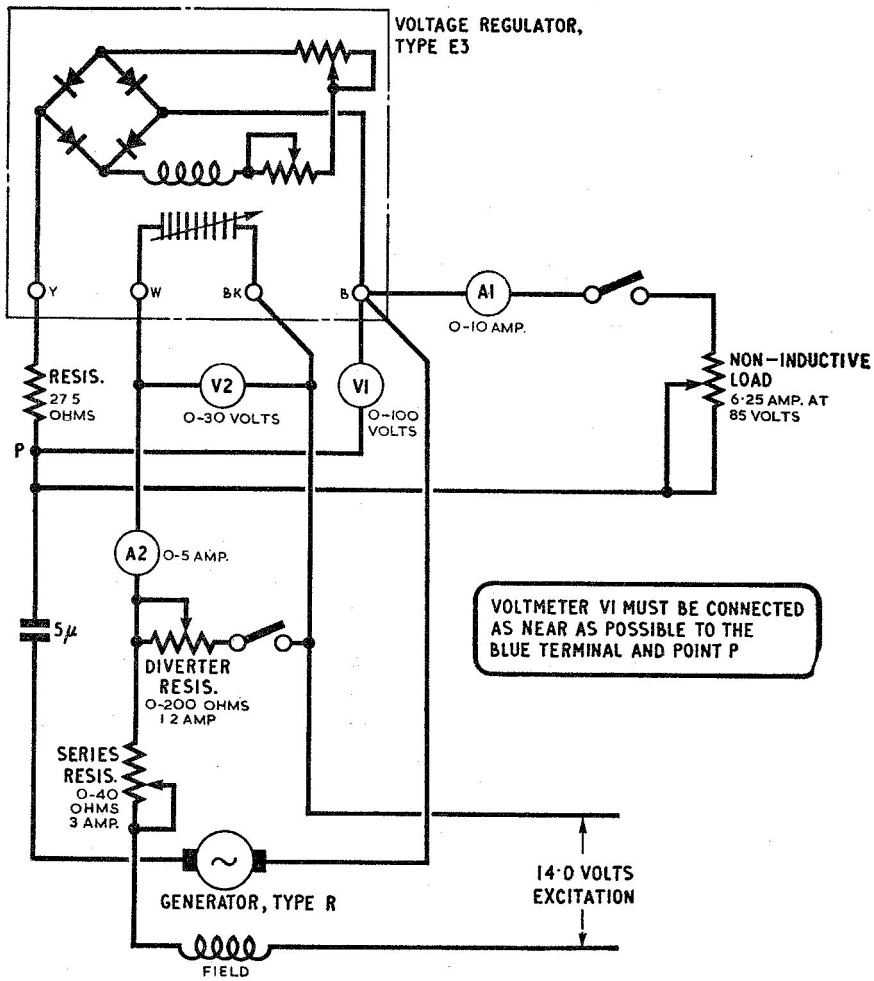

Fig. 2. Test circuit diagram

Testing

4. Connect the regulator in the test circuit as shown in fig. 2, the generator used being the Type R (Stores Ref. 5UA/1270) excited from a 14 volt supply. For all tests the adjustable arm of the trimmer resistor must be set in mid position and the speed of the generator is to be maintained at 4,000 r.p.m. unless otherwise stated.

Regulation test

5. Adjust the diverter and series resistors so that the pile resistance does not exceed 2 ohms when the generator is running at a speed of 4,000 r.p.m. and is connected to a non-inductive load set for 6·25 amp. at 85 volts.

6. The generator should then be stopped and restarted, and the pile resistance increased from 1·5 ohms to 35 ohms and then decreased to 3 ohms, by further adjustment of the diverter and series resistors. Readings of line voltage should be taken on voltmeter V1, over the range of values of pile resistance increasing from 3 ohms to 35 ohms and then decreasing to 3 ohms. Under these conditions, the readings must not vary by more than 3·5 volts and must lie between the limits of 81 volts and 86 volts.

Note . . .

The variation of pile resistance must be made smoothly. To facilitate this, the diverter resistor must always be switched in and out at maximum resistance.

7. The pile resistance is then increased from the bottom value of 3 ohms to 35 ohms and then decreased to 3 ohms, and readings of line voltage taken on voltmeter V1. Under these conditions, the readings must not vary by more than 3 volts, and must lie between the limits of 81 volts and 86 volts. With the regulator adjusted to meet the above requirements, the operating coil current must lie between the limits of 0·14 and 0·155 amp. when the reading indicated on voltmeter V1 is 85 volts.

Alternative procedure

8. If a variable speed drive, giving a range of generator speed from 3,000 r.p.m. to 7,000 r.p.m., is available, the diverter and series resistor are not necessary. The variation pile resistance called for in the regulation test can then be obtained by running the generator on no load and varying its speed from 3,000 r.p.m. to 6,000 r.p.m. approximately.

Stability test

9. To check stability of the regulator, the series resistor is short-circuited, the diverter resistor open-circuited, and the full load of the generator switched on and off at generator speeds of 5,000 r.p.m. and 6,000 r.p.m. Under these conditions, the regulator must be critically damped.

10. Immediately following the above test, slacken the pile compression screw $\frac{1}{4}$ turn (corresponding to a pile movement of 0·009 in.), and repeat the test given in para. 9. Under this condition, the regulator must respond and settle without sustained hunting.

11. Provided the regulator satisfies the test given in para. 10, the original setting is to be restored and the regulation test given in para. 5 to 7 repeated.

Checking a new regulator

12. The full tests are not necessary for a new regulator. It can be tested as follows, by connecting it in the test circuit as shown in fig. 2, but without the series and diverter resistors.

13. Run the generator at 4,000 r.p.m., first on no load and then with a load of 6·25 amp. Throughout these tests the line volts must not vary by more than 3 volts and must remain stable when the load is switched on and off at 4,000 r.p.m.

14. If the regulator is connected in a control panel, the same test must be applied. A dummy load of 6·25 amp. must be connected through a switch to the output plug.