

Chapter 14

VOLTAGE REGULATOR, TYPE EU

LIST OF CONTENTS

	Para.		Para.
Introduction	1	Regulation test	7
Description	2	Alternative procedure	10
Servicing	5	Stability test	11
Testing	6	Checking a new regulator	14

LIST OF ILLUSTRATIONS

	Fig.		Fig.
Circuit diagram	1	Test circuit diagram	2

LEADING PARTICULARS

Voltage regulator, Type EU	Stores Ref. 5UC/2544
Coil current	0.15 to 0.165 amp.
Carbon pile	Stores Ref. 5UC/1021
Pile resistance range	5 to 90 ohms
Ballast resistor (300 ohms)	Stores Ref. 5UC/306

Introduction

1. The voltage regulator, Type EU, is normally fitted to the control panels, Types 3A and 5, to maintain the output of the generators, Types R, S, U, V, U2 and UO, constant at 80 volts a.c.

DESCRIPTION

2. A high resistance winding connected across the field of the generator is superimposed on the main voltage coil and, under conditions of rapid changes of load and speed, gives a negative feed-back to prevent hunting. To compensate for the effect of this shunt stabilizing winding under normal conditions of running, a series winding of low resistance wound in the opposite sense is also incorporated.

3. Six terminals are provided instead of the normal four, the connections being arranged so that the regulator can be used without the stabilizing feature by omitting the red and green terminals. It is very important that the regulator be connected so that the polarity is correct, as shown in fig. 1.

4. The regulator incorporates a pile 1.5 in. long, made up of a minimum of 76 washers 0.5 mm. thick. 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

5. 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.

Testing

6. Connect the regulator in the test circuit as shown in fig. 2, the generator used being a Type U (Stores Ref. 5UA/349) excited from a 28-volt supply. For all tests the speed of the generator must be maintained at 4,000 r.p.m. unless otherwise stated.

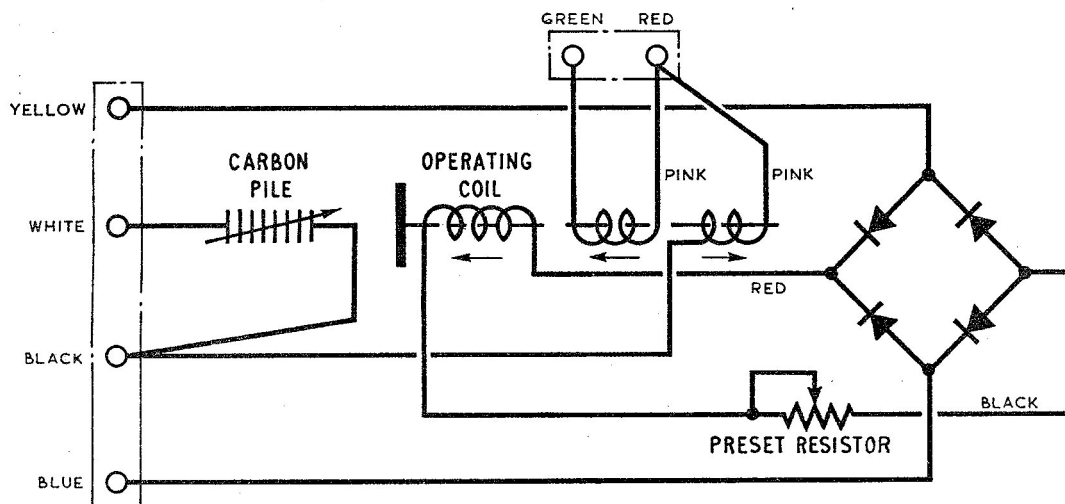


Fig. 1. Circuit diagram

Regulation test

7. 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. when connected to a non-inductive load set for 4.5 amp. at 85 volts.

8. The generator should then be stopped and restarted and the pile resistance increased from 2 ohms to 90 ohms and then decreased to 5 ohms, by further adjustment of the diverter and series resistors; readings of line voltage are taken on voltmeter V1, over the range of pile resistance increasing from 5 ohms to 90 ohms and then decreasing to 5 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, with the series resistor at the position of minimum resistance.

9. The pile resistance should then be increased from the bottom value of 5 ohms to 90 ohms and then decreased to 5 ohms, and readings of line voltage taken on voltmeter V1. Under these conditions, the readings must not vary by more than 3.0 volts and must lie between the limits of 81 volts and 86 volts.

Alternative procedure

10. 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 resistors are not necessary. The variation of 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

11. To check stability of the regulator, the series resistor must be short-circuited and the diverter resistor open-circuited. The generator must be run on a load of 4.5 amp., and an additional load of 10.5 amp. 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.

12. Immediately following the above test, slacken the pile compression screw $\frac{3}{16}$ th turn (corresponding to a pile movement of 0.0067 in.) and repeat the test given in para. 11. Under this condition the regulator must respond and settle without sustained hunting.

Note...

The $\frac{3}{16}$ th turn quoted is a minimum.

13. Provided the regulator satisfies the test given in para. 12, the original setting is to be restored and the regulation test given in para. 7 to 9 repeated.

RESTRICTED

Checking a new regulator

14. 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 resistances, and without meters V2 and A2.

15. Run the generator at 4,000 r.p.m. and at 6,000 r.p.m., first on no load and then with a load of 15 amp. Throughout these tests the

line voltage must not vary by more than 3 volts, and the regulator must remain stable when a steady load of 10 amp. is switched on and off at 6,000 r.p.m.

16. If the regulator is connected in a control panel, the same test must be applied. Similar dummy loads must be connected to the output plug of the control panel.

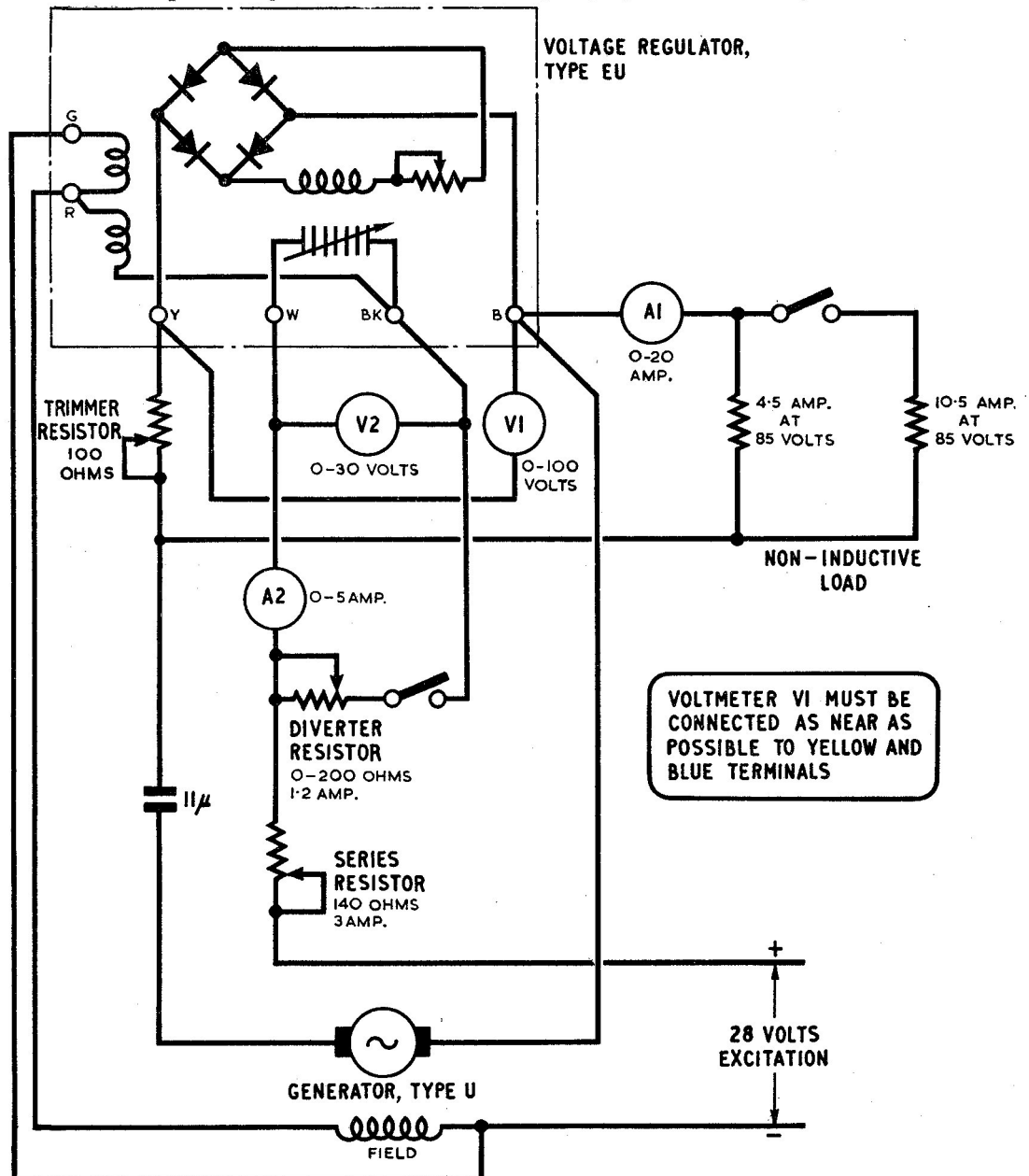


Fig. 2. Test circuit diagram

(A.L.I, Aug. 57)

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