Chapter 35
VOLTAGE REGULATOR, TYPE 105

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LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Voltage regulator, Type 105	*Stores Ref. 5UC/6178*
Controlled voltage	*27·0 to 28·5 volts*
Maximum pile loading	*125 watts*
Pile resistance range	*1·5 to 20 ohms*
Carbon pile	*Stores Ref. 5UC/4260*
Ballast resistor, 26 ohms	*Stores Ref. 5UC/3273*
Trimmer diverter, 12 ohms (set to 10 ohms) ...	*Stores Ref. 5UC/1028*
Remote trimmer resistor, 10 ohms	*Stores Ref. 5UC/5780*
Operating coil current	*1·18 to 1·22 amp.*
Operating coil resistance	*6·5 ohms cold*
Stabilizing shunt coil	*480 ohms*

Introduction

1. The voltage regulator, Type 105, is used to maintain the output of the 6 kW generator, Type P2 or P3, between the limits of 27 and 28·5 volts. Where two or more generators are used in parallel, a master regulator, Type 32, is used to control the voltage coil circuit of the individual generator regulators.

2. It is basically the same as the Type 23 regulator, but differs in that the internal trimmer resistor has been deleted, and a trimmer diverter resistor is connected between the rectifier and terminal 4, its adjusting arm being taken out to a new terminal 6. A remote trimmer resistor is connected across terminals 4 and 6, i.e., across part of the trimmer diverter resistor which is in series with the operating coil, thus ensuring that in the event of open-circuiting of one of the leads of the remote trimmer, the voltage level is still maintained within safe limits.

DESCRIPTION

3. This regulator (*fig.* 1 *and* 2) 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.4343, Vol. 1, Sect. 6, Chap. 1.

4. A finned cooler is fitted over the ceramic tube housing the carbon washers, and the whole unit is mounted upon a base under which are housed the ballast and trimmer diverter resistors and the rectifier unit.

(*A.L.1, Aug. 57*)

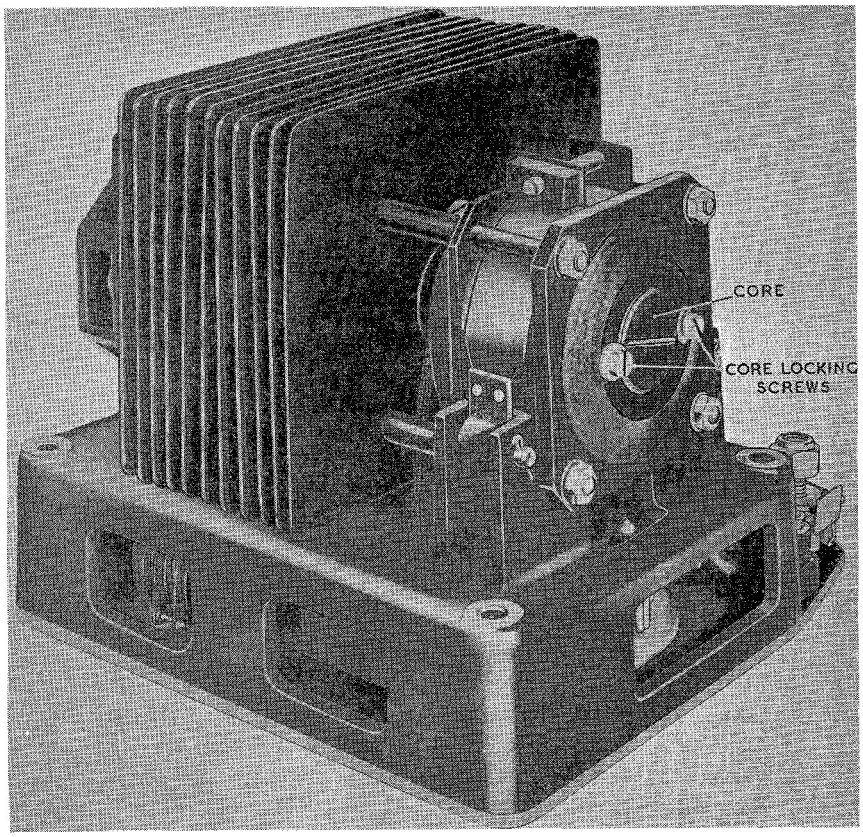

Fig. 1. Voltage regulator, Type 105

5. The main operating coil is connected through the rectifier and terminals 1 and 4 across the generator output, through the pile of the master regulator, Type 32 (*fig.* 3). Voltage stabilization is assisted by the provision of a small shunt coil connected directly across the generator field through terminals 3 and 5. This coil acts as a damping device and prevents hunting with rapid changes of speed and load. A coil of low resistance is connected in series with the pile element, and wound in the opposite sense to the shunt stabilizing winding, to counter-balance its effect under steady operating conditions.

6. The whole output of the generator is passed through a decompounding coil, which gives a falling volts/load characteristic of approximately 27 per cent from no load to full load of 200 amp. This falling volts/load ratio limits the circulating current to 25 amp. with a difference of one volt in the setting of individual generators. The embodiment of such a high ratio of dropping volts/load characteristic has necessitated the use of a master regulator to maintain the system approximately constant at 28 volts under all conditions of load and speed.

7. A blocking rectifier is connected in series with the main control winding on each regulator so that, in the event of one or more of the generators failing when working in parallel, the master regulator resistance will still be effective.

INSTALLATION

8. The regulator may be mounted in an upright or an inverted position; for details of the cable connections reference should be made to the relevant Aircraft Handbook. Care must be taken to ensure that nothing is done to prevent free circulation of air round the regulator.

SERVICING

9. General servicing instructions for this type of regulator are given in A.P.4343, Vol. 1, Sect. 6, Chap. 1. That chapter describes the fitting of a new pile stack, and

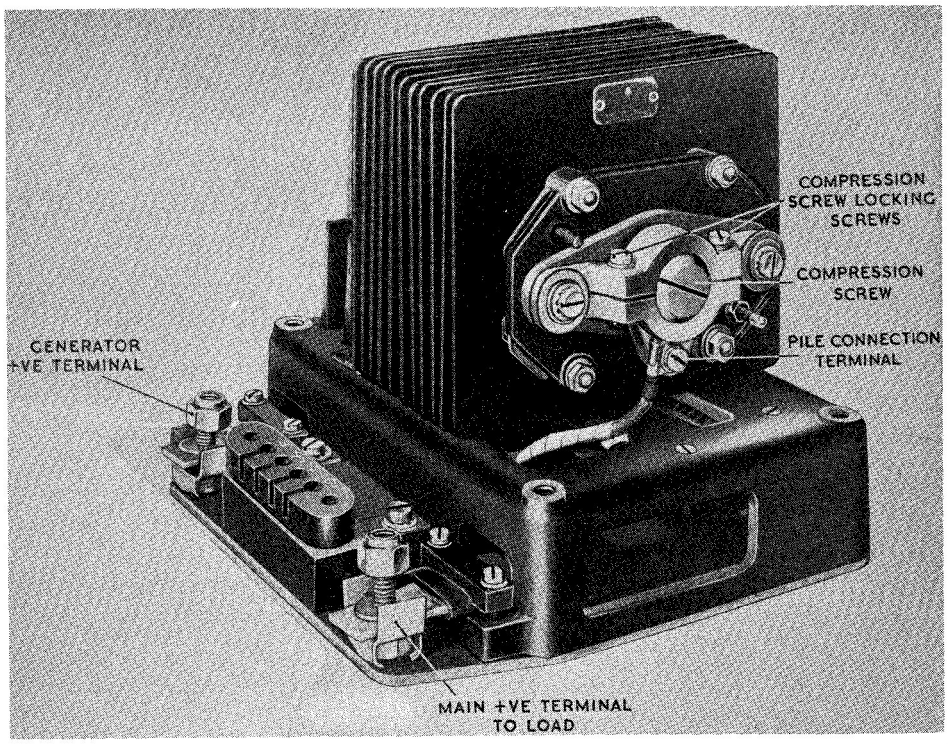

Fig. 2. View showing compression screw and terminal block

the preliminary mechanical adjustment for a regulator which is completely out of order. When any adjustment is made, the regulator must afterwards be subjected to full test.

Regulation test

10. Connect the regulator in the test circuit shown in fig. 4; the generator used should be a Type P2 or P3. The adjustable arm of the remote trimmer resistor must be in the mid position for all tests.

11. To simulate the pile element of the master regulator, a fixed resistance of 5 ohms $\pm$ $2\frac{1}{2}$ per cent must be connected in series with the voltage coil circuit as shown in fig. 4. The coil current should be 1·2 amp. measured at 20 deg. C. when the line voltage is 28 volts.

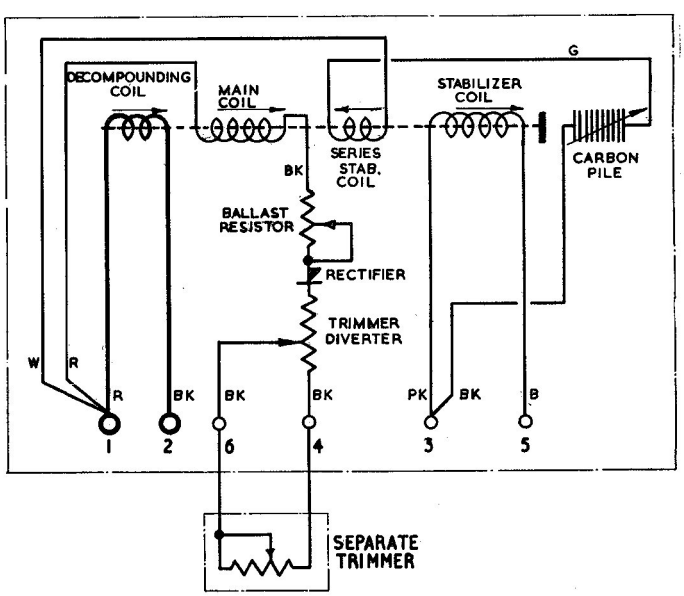

Fig. 3. Circuit diagram

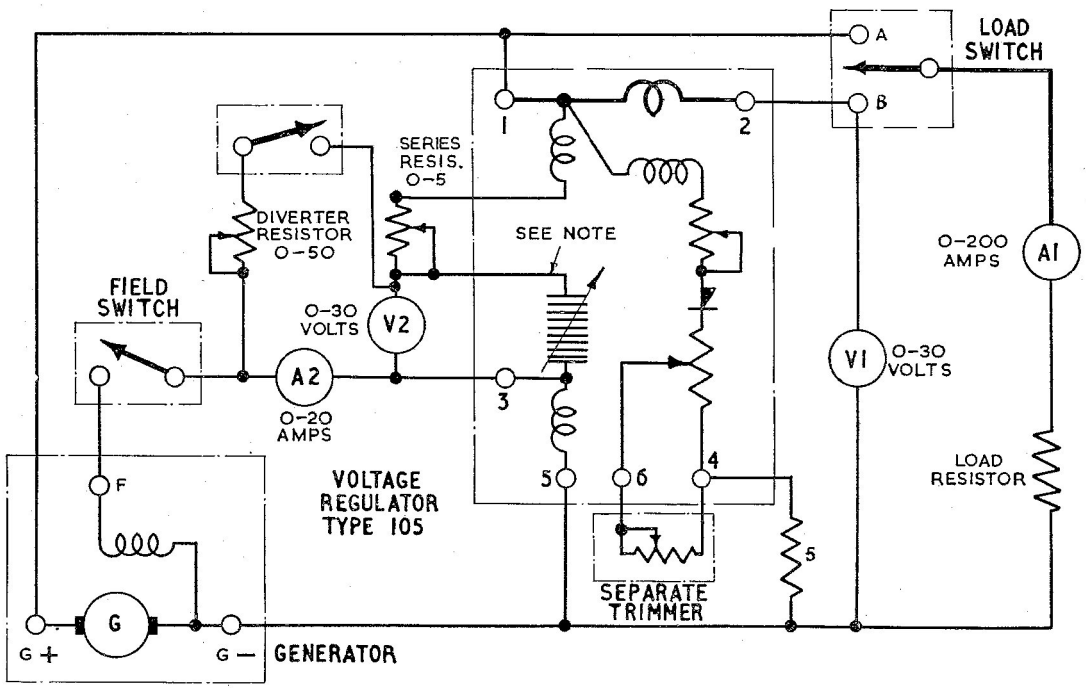

Fig. 4. Test circuit diagram

Regulation test

12. Run the generator on no load at approximately 4,000 r.p.m., and adjust the diverter and series resistors so that the pile resistance, measured by the ratio V2/A2, does not exceed 1·0 ohms. Increase the pile resistance from 1·5 ohms to 20 ohms and decrease again to 1·5 ohms. During this cycle the controlled voltage measured on voltmeter V1 must be maintained between 27 and 28·5 volts.

Note . . .

The diverter resistor must be switched in and out of circuit only when at maximum resistance.

Stability tests

13. Switch the generator field on and off at least three times with the generator running at approximately 4,000 r.p.m. and the regulator pile adjusted to 20 ohms. Under these conditions the regulator must respond without any tendency to hunt.

14. Slacken the pile compression screw $\frac{3}{8}$th turn, lock in this position and repeat the above stability tests. Under this condition the regulator spring must respond and settle with not more than two oscillations.

15. Provided the regulator satisfies the test in para. 14, restore the original setting of the pile compression screw and repeat the regulation test.

Compounding test

16. With the generator running at approximately 4,000 r.p.m. and the load switch in position A, adjust the load resistor to carry 200 amp. at 28 volts. Switch the load switch to position B, to bring the compounding winding into the load circuit; under this condition the line voltage V1 must be reduced from the no load value to between the limits of 21·7 and 23·0 volts.

Note . . .

During this test the series and diverter resistors in the regulator pile circuit must be short- and open-circuited respectively.