Cancelled - obsolete

Chapter 30

VOLTAGE REGULATOR, TYPE 93

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LEADING PARTICULARS

Voltage regulator, Type 93	*Stores Ref. 5UC/6006*
Control voltage	*115 volts a.c.* $\pm$ *5 per cent*
Maximum pile loading	*30 watts*
Pile resistance	*2 to 32 ohms*
Coil current	*0·160 to 0·176 amp.*
Coil resistance (cold)	*171 ohms*
Overall dimensions	
Length	$4\frac{1}{4}$ *in.*
Diameter	*3 in.*
Weight	*2 lb.*

Introduction

1. The voltage regulator, Type 93, is incorporated in the control panel, Type 34. Reference may be made to Sect. 7, Chap. 18 of this publication for connections and functioning of the voltage regulator in relation to this control panel.

DESCRIPTION

2. The voltage regulator (*fig.* 1) is of the single pile type, its assembly consisting of an operating coil and magnetic circuit, an armature and leaf spring arrangement, and a pile of carbon washers. General information on the constructional

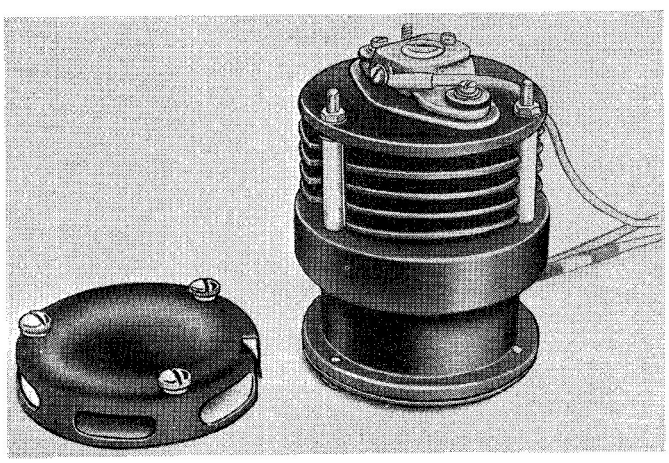

Fig. 1. Voltage regulator, Type 93

details and operating principle of this type of voltage regulator are given in A.P.4343, Vol. 1, Sect. 6, Chap. 1 and 2, which illustrate a typical voltage regulator of similar design to the Type 93. In the latter, however, the casting which surrounds the pile is finned to provide a greater cooling surface.

3. The trimmer and ballast resistors and the rectifiers, associated with the voltage regulator, are included in the control panel circuit.

SERVICING

4. Provided a voltage regulator is in working order, little servicing is required. The equipment should be examined for signs of damage, and all terminals and fixing checked for security.

Insulation resistance

5. The insulation resistance between the four leads and the case of the equipment should be measured, using a standard 250-volt insulation resistance tester (Stores Ref. 5G/152). The value obtained should not be less than 5 megohms.

Adjustment

6. If the voltage regulator is beyond the range of adjustment afforded by the trimmer resistor, it should be re-set as detailed in A.P.4343, Vol. 1, Sect. 6, Chap. 1. That chapter also describes the dismantling procedure to be carried out if severe hunting has taken place, resulting in pitting of the carbon washers.

7. After the preliminary mechanical adjustment described in the re-setting procedure

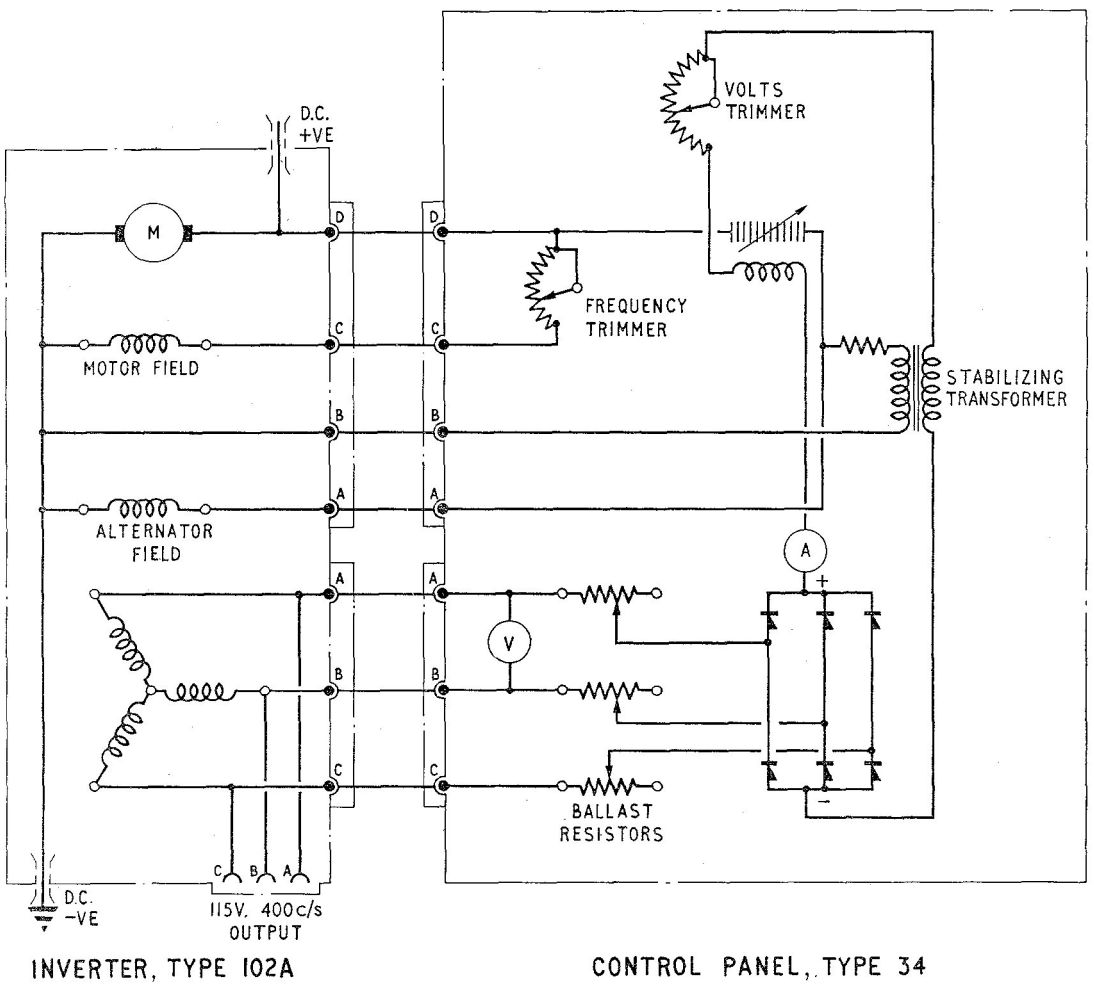

Fig. 2. Test circuit diagram

detailed in the aforementioned chapter, the final adjustments should be made with the voltage regulator installed in the control panel and connected to an inverter, Type 102A, as shown in the test circuit diagram (*fig.* 2).

8. Run the inverter on no-load, and adjust the d.c. supply voltage and the frequency trimmer on the control panel until the output line voltage (voltmeter V) is approximately 115 volts, and the frequency is 400 c/s.

9. Set the voltage trimmer to its mid-position, and adjust the ballast resistors until the operating coil current (read on ammeter A) is 0·17 amp.

10. Slacken the locking screw just sufficiently to permit movement of the compression screw. Turn this screw carefully in a clockwise direction and observe the indication of the voltmeter.

(1) If the voltage level decreases, continue turning until it decreases to a minimum and then begins to rise again. The minimum voltage or 'dip' position is the correct setting of the compression screw to give optimum regulation.

(2) If, on initially turning the screw in a clockwise direction, the voltage level rises, the screw should be turned anti-clockwise until the 'dip' position is found.

(3) When the 'dip' position has been obtained, the compression screw should be secured by tightening the locking screw.

WARNING

When the inverter is running, the compression screw is alive. Use an insulated screwdriver to make adjustments, and avoid making contact with other parts of the regulator.

11. Shut down the inverter, and then restart. Adjust the d.c. supply voltage to 28 volts and, if necessary, re-adjust the output frequency to 400 c/s. If the output voltage differs from 115 volts, it must be restored to this value by adjustment of the core of the regulator. Turning the core clockwise will lower the voltage.

12. Re-set the compression screw to obtain the 'dip' position, as detailed in para. 10. Then shut down and restart, and check the output voltage level. Any final adjustment necessary should be made on the voltage trimmer.

13. When the adjustment has been completed, check that the operating coil current is within the range 0·160—0·176 amp. If this condition cannot be met, make further adjustments as detailed in para. 9–12. When finally adjusted, carefully tighten the two locking screws securing the core.

Regulation test

14. The adjustment having been completed, run the inverter at its full load of 0·5 kW (power factor may be 0·8 lag or unity), and ensure that the output voltage is between 109·25 volts and 120·75 volts. Check that these limits are maintained at other load values between no-load and full-load.

Stability test

15. Run the inverter on no-load, and then switch in and out at least three times, loads of 0·125kW, 0·25 kW, and 0·5 kW. In each case ensure that the output voltage settles within the limits 109·25–120·75 volts without hunting.