Chapter 6

VOLTAGE REGULATOR, TYPE J4A

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Voltage regulator, Type J4A	... ...	Stores Ref. 5UC/5076
Incorporating—		
Regulator unit, Type 1011	... ...	Stores Ref. 5UC/544
Carbon pile	... ...	Stores Ref. 5UC/3279
Trimmer resistor (5 ohms)	... ...	Stores Ref. 5UC/5082
Ballast resistor (26 ohms)	... ...	Stores Ref. 5UC/3273
Coil current	... ...	1·1 to 1·21 amp.
Pile resistance range	... ...	2·5 to 25 ohms

Introduction

1. The voltage regulator, Type J4A, is used on aircraft to regulate the output of the generator, Type HX or HX2, when operating in parallel with the generator, Type UO or O2, and in such an installation an external resistance of 10 ohms (45 watts) must be connected across terminals 3 and 4 to restrict the maximum pile resistance to 25 ohms.

2. This regulator is a modification of the voltage regulator, Type J. It differs from the Type J in that the 20-amp. compounding coil shunt is removed, and the terminal markings, reading from left to right, are now 1, 3, 4, 2. The regulator, Type J4A, is set to operate with a normal full loading of 50 amp. at 28 volts instead of 60 amp. in the case of the Type J.

DESCRIPTION

3. The voltage regulator, Type J4A (fig. 1), incorporates a voltage control unit and a current limiting unit, the current unit being

that remote from the terminal block assembly. To the left of the regulator, and not shown in the illustration, is the link box, which for normal operation is kept with the link in the position A-C, i.e., for parallel running. This brings the compensating winding of the voltage unit into circuit. Fine adjustment is made by means of a trimmer resistance, fitted under the base (fig. 2), with the adjuster brought out to the front of the regulator.

4. Besides the main operating coil and the compensating winding, the voltage unit incorporates two stabilizing windings, which can be seen in the circuit diagram in fig. 3. These are a high-resistance winding connected across the field, acting in the same direction as, and superimposed on, the main coil, and also a coil wound in series with the pile to balance the effect of the shunt stabilizing coil under steady conditions. With rapid changes of speed or load the shunt
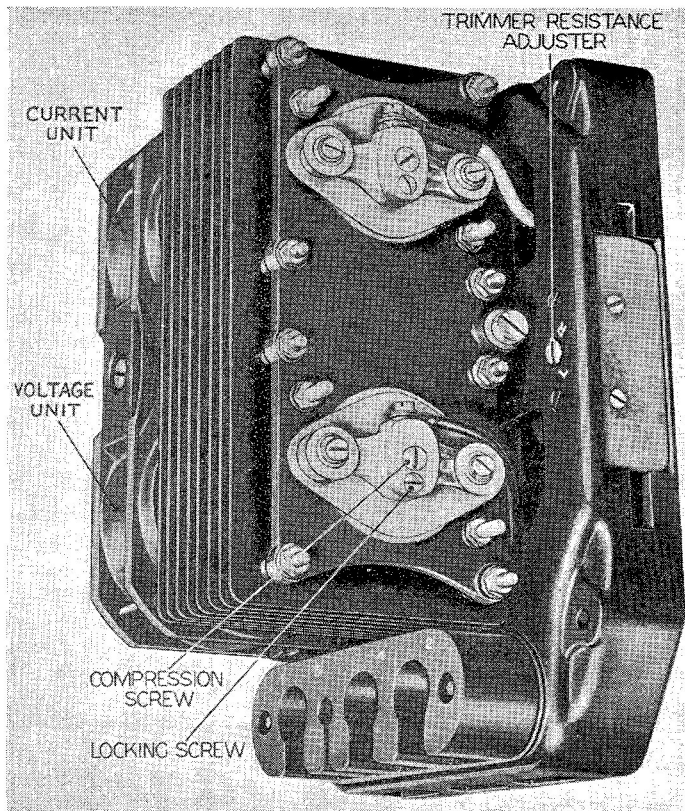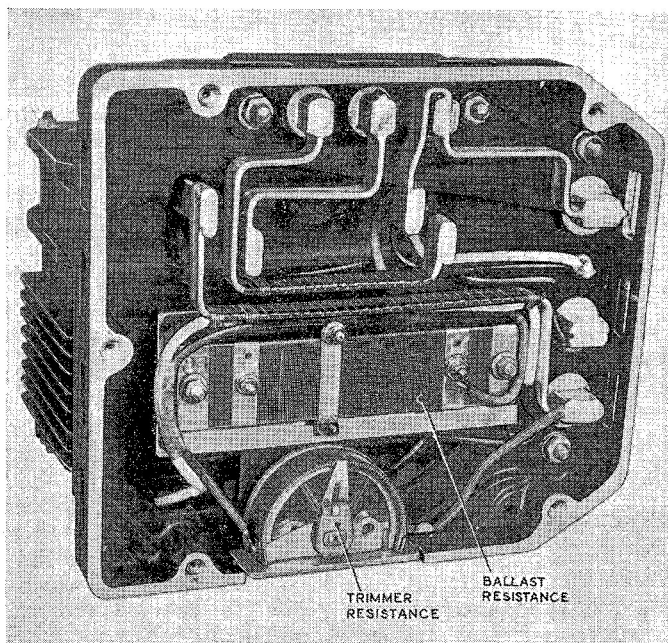
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(A.L.2, Nov. 57)

Fig. I. Voltage regulator, Type J4A

Fig 2. View of underside of regulator

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LINKING ARRANGEMENT:—

C AND B LINKED FOR NON – PARALLEL RUNNING

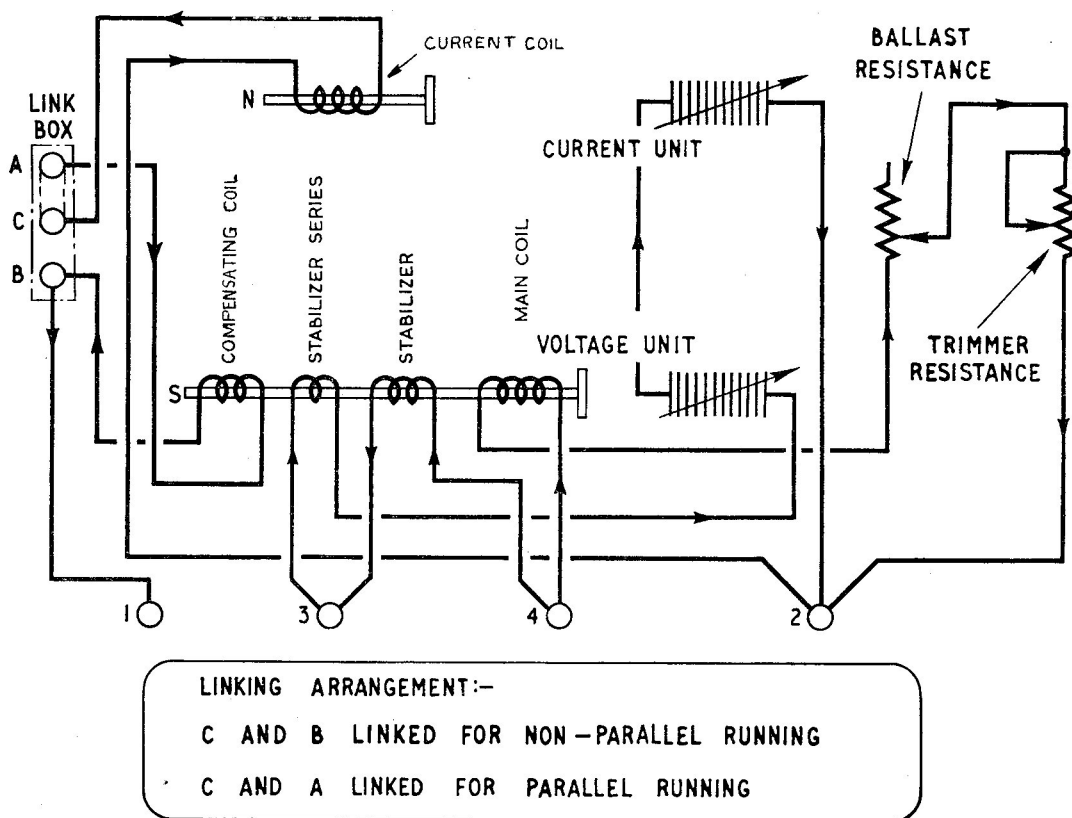**C AND A LINKED FOR PARALLEL RUNNING**

Fig. 3. Circuit diagram

stabilizing coil acts as a damping device and prevents hunting.

SERVICING

5. 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 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. Before connecting the regulator in the test circuit, measure the current in the voltage coil. This must be between 1·10 and 1·21 amp. at 20 deg. C., with the trimmer resistance set at half-value and 28 volts applied across the entire coil circuit.

7. Apply 60 volts to the operating coil circuit of the voltage unit, and switch on and off three times. Connect the regulator as shown in the test circuit (*fig.* 4).

Voltage unit

Regulation test

8. The line volts must remain within the limits of 26·6 and 28·0 throughout the resistance range of the pile, i.e., 2·5 to 25 ohms, for the tests given in para. 9 and 10.

9. With SW1 in position A–C and SW2 and SW3 open, increase the generator speed from 3,300 to 7,000 r.p.m., then decrease to 3,300 r.p.m.

10. Close SW2 with the load resistance adjusted to give 50 amp. at 28 volts. Increase the generator speed from 3,300 to 7,000 r.p.m., then decrease until the pile resistance $\dfrac{V2}{A2}$ reaches 2·5 ohms.
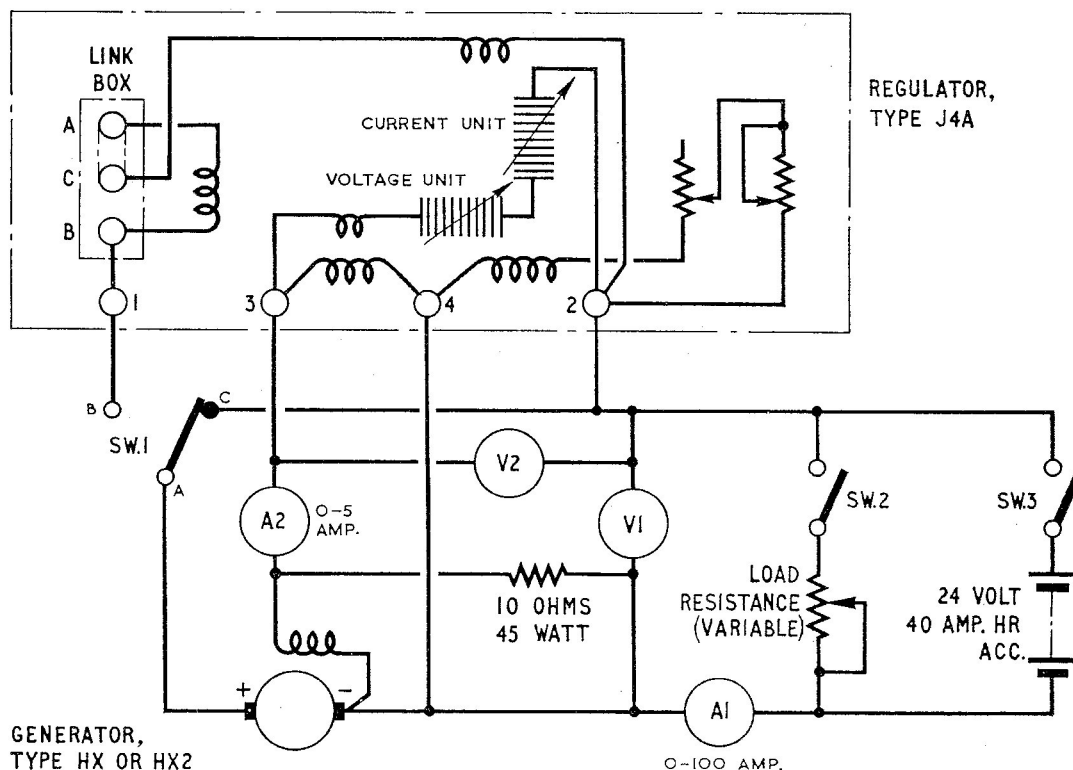
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Fig. 4. Test circuit diagram

Compounding test

11. The regulator should be trimmed so that when the generator is run up to 4,000 r.p.m. on no load, the line voltage is 28. Adjust the load resistance to give 50 amp. at 28 volts.

12. With SW1 in position A-B, run the generator from rest up to 4,000 r.p.m. The line voltage V1 should now be between 26·0 and 26·8 volts.

Stability test

13. The regulator must be stable when full generator load is switched on and off at generator speeds of 4,000 and 7,000 r.p.m.

14. With the pile compression screw turned outward ⅛ turn, repeat the test given in para. 13, when the unit must respond with not more than two oscillations.

15. If the regulator is satisfactory, restore the pile screw to its original position and repeat the test given in para. 9 and 10.

Current unit

Regulation test

16. With SW1 in position A-B, and the generator running at 5,000 r.p.m., adjust the load resistance until the line voltage V1 is reduced to 14·0, when the load shown on A1 should lie between 53 and 55 amp.

Stability test

17. Run the generator at 7,000 r.p.m. and adjust the load resistance so that the line voltage falls to 24.

18. Close SW3 to connect the accumulator. Open and close SW2 three times. The current unit must remain stable.

19. Turn the pile compression screw outward ⅛ turn and repeat the test in para. 17 and 18. The unit must respond without sustained hunting.

20. If the unit is satisfactory, restore the pile compression screw to its original position and repeat the test given in para. 16.