Chapter 54

REGULATOR UNIT, ROTAX, TYPE F6201
(Part of T.R.U. Type U3301)

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LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Regulator unit, Type F6201	**Ref. No. 5UC/6603**
Voltage	28 *V d.c.*
Current	10 *amp.*
Rating	*Continuous*
Maximum pile loading	180 *watts*
Pile resistance range	0·2 *to* 2·5 *ohms*
Operating coil current	0·5 *amp.*
Ballast resistance	60 *ohms*
Maximum altitude	30,000 *ft.*
Temperature range	−30 *deg. C. to* +50 *deg. C.*

Introduction

1. The F6201 voltage regulator, forming part of the U3301 transformer rectifier unit, regulates and controls the 208 volts a.c. output from an associated a.c. generator, such as Type 155 (Rotax N0306) and also provides a controlled 28 volt d.c. supply, to meet the power requirement of an aircraft in an emergency.

DESCRIPTION

2. The unit comprises five main component assemblies, i.e., suspended within the frame assembly is the regulator coil and pile unit assembly, with a ballast resistor mounted on the frame; a main panel and blanking plate forms the external mounting for the six-way terminal block on one side with the frame and anchor nut assembly on the other.

3. Integral with the main panel is the frame and anchor nut assembly, and contained within the frame is the carbon pile regulator suspended by eight tension springs; these are anchored to associated brackets at each end of the framework assembly (*fig.* 1). The regulator unit is self-contained within its own framework and is secured to the main chassis of the U3301 transformer rectifier unit by quick-release fasteners, for ease of servicing, as illustrated in A.P.4343B, Vol. 1, Book 3, Sect. 19, Chap. 11.

Operation

Voltage control

4. The turns ratio of T3 is arranged so that 208 volts line to line on the alternator output, produces 28V d.c. from the three-phase bridge rectifier W2. (This is shown in the U3301 transformer rectifier unit circuit diagram, which should be read in conjunction with the circuit diagram for the F6201 voltage regulator). The latter voltage 28V d.c. is applied via a ballast resistor to the control coil of the voltage regulator.

5. The alternator field is connected in series with the carbon pile of the regulator, and the field current is controlled by variation in pressure on the carbon pile producing changes in pile resistance, which correspond

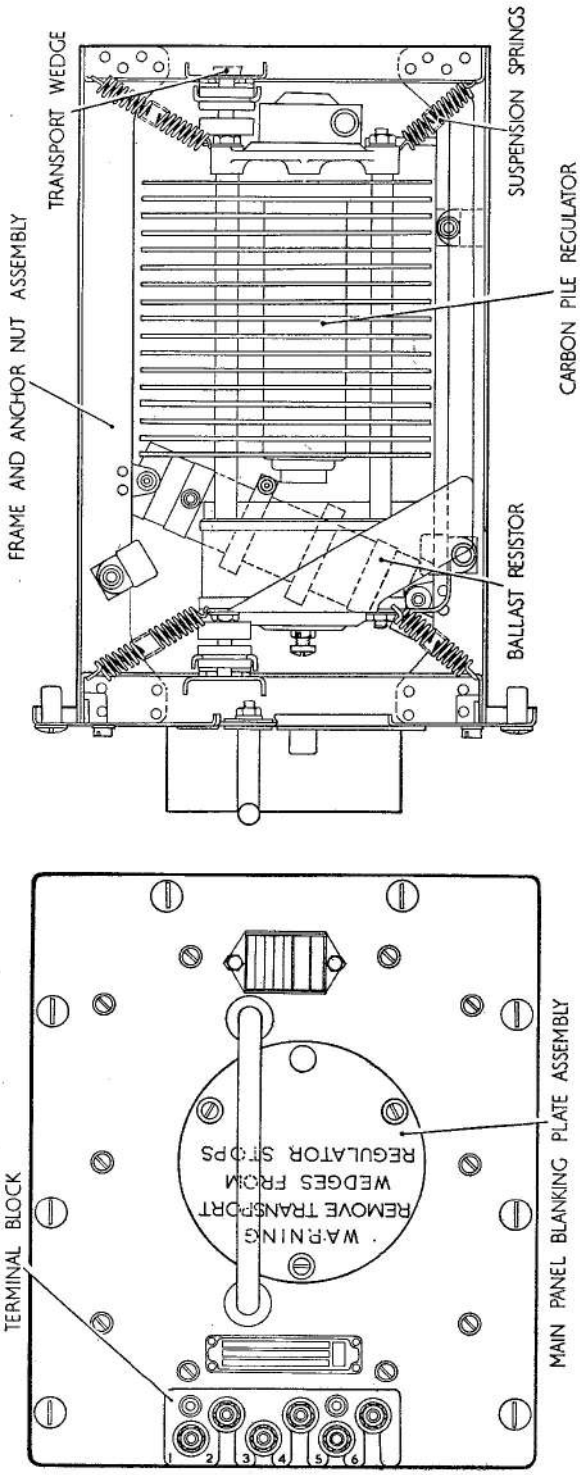

Fig. 1. General view of unit (cover removed)

to variations in alternator output, i.e., a fall in alternator output causes the carbon pile to compress, decreasing the pile resistance and thereby increasing the field current.

6. The sequence of events when a load is applied to the alternator is as follows:—

(1) The output voltage of the alternator will fall below the 208 volts nominal, causing a fall in voltage at the control coil of the regulator.

(2) The regulator carbon pile will compress due to the fall in voltage at the control coil.

(3) Rotor field current will increase.

(4) Alternator voltage will rise owing to the increase of field current and the output voltage will be restored to the 208 volts nominal.

(5) It can similarly be shown that for an increase in output voltage, pressure on the carbon pile will decrease. The consequent reduction in field current will cause the output voltage to return to the nominal value.

(6) During the engine starting period and with the alternator switched on the busbars, the ballast resistor connected in series with the carbon pile is short circuited, thereby boosting the rotor field current. This ensures that, during this period, the output from the alternator is sufficient to meet the power requirements of the engine starter motors.

Electrical connections

7. Electrical connection from the regulator assembly to the U3301 transformer rectifier unit is made via a six-way terminal block. The terminal block is constructed in two halves, one half being secured to the regulator main panel and the other half to the main chassis support on the U3301 transformer rectifier unit; electrical connections between the two are made by six connecting links fitted to the terminal studs.

INSTALLATION

8. The voltage regulator unit slides in the main chassis of the U3301 transformer rectifier unit on its own frame, and is secured in position by eight quick-release fasteners. To connect the unit, fit the six terminal connecting links to the terminal connecting studs on both halves of the terminal blocks, tighten and secure the locking nuts on the studs. Fit the terminal block cover and secure.

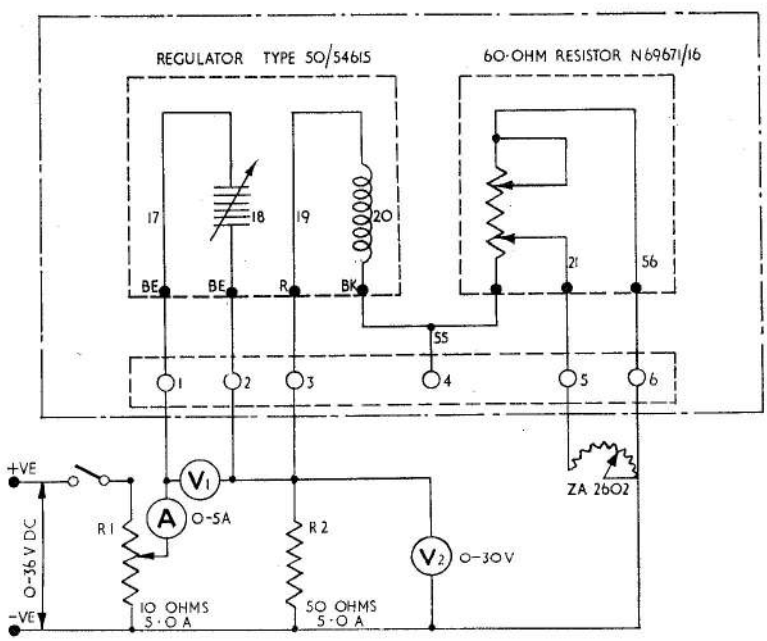

Fig. 2. Test circuit diagram

SERVICING

9. Make a visual examination of the voltage regulator panel to ensure that it has not sustained any physical damage; check the eight quick-release fasteners for satisfactory locking. Remove the terminal moulding cover from both halves of the terminal blocks and unscrew the nuts securing the connecting links to terminals 1 to 6 on the six-way terminal block on the left-hand side of the unit.

10. Unscrew the eight quick-release fasteners holding the regulator in position; the unit can then be withdrawn for servicing. Make a visual examination of the internal components to ensure that there are no signs of damage or chafed leads and that electrical connections are secure. Examine the carbon pile regulator with particular attention especially to the suspension springs any faulty spring must be renewed.

Testing

General

11. The unit should be connected as shown in the test circuit diagram (*fig.* 2). The unit should be tested on a ripple free d.c. supply, preferably obtained from batteries.

Resistance setting

12. (1) Disconnect lead No. 20 from the resistor N69671/16. Set the value of this resistor between leads No. 55 and 21 to $30 \pm 0{\cdot}5$ ohms, by means of the slider. Reconnect lead No. 20.

(2) Move the second slider such that there is maximum possible resistance between leads No. 21 and 56. Trimmer ZA2602 should be set in the mid-position.

Regulation test

13. (1) With F6201 connected as shown in the circuit diagram, set the loading resistor R2 to 30 ± 1 ohms.

(2) Vary resistor R1 till resistance of the carbon pile is 1 ohm and set voltage V2 across R2 to 27·5 volts by moving the slider (lead No. 21) of N69671/16. (ZA2602 trimmer must be left in the mid-position throughout the test).

(3) Reduce voltage V2 to zero and repeat the above test; reset N69671/16 if necessary.

(4) Decrease voltage V2 to zero by means of R1. Voltage V2 should now be steadily increased by means of resistor R1, until the carbon pile resistance reaches 0·2 ohms, and 2·5 ohms in turn. Record the readings of A, V1 and V2, for both these conditions. After recording the readings, vary resistor R1 until the carbon pile resistance is 0·2 ohms. Record the readings of A, V1 and V2.

(5) From the above sets of figures calculate the resistance of the carbon pile. The voltage V2 should lie between 26·3 and 27·7 volts.

Insulation resistance test

14. The insulation resistance should be measured between the following points with a 250-volt insulation resistance tester; the reading should not be less than 0·5 megohm (for R.N.) or 5 megohms (for R.A.F.). Disconnect regulator prior to testing.

(1) Terminal 1 to terminal 3 and frame.

(2) Terminal 1 and terminal 3.

Reconnect regulator after tests have been carried out.