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Chapter 23

VOLTAGE PICK-UP BOX, E.E., TYPE AE7723, Mk. 1

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Voltage pick-up box, E.E., Type AE7723, Mk. 1 ...	*Ref. No. 5CW/7380*
Input voltage	... 200 *V a.c. (coil)* 28 *V, d.c. (contact)*
Frequency of mains supply	400 *c/s*
Contact rating	2 *amp non-inductive load at* 28 *V, d.c.*
Temperature range	−65°*C to* +70°*C*
Cooling	*Natural*
Altitude range	0–65,000 *ft*
Weight	2 *lb.*

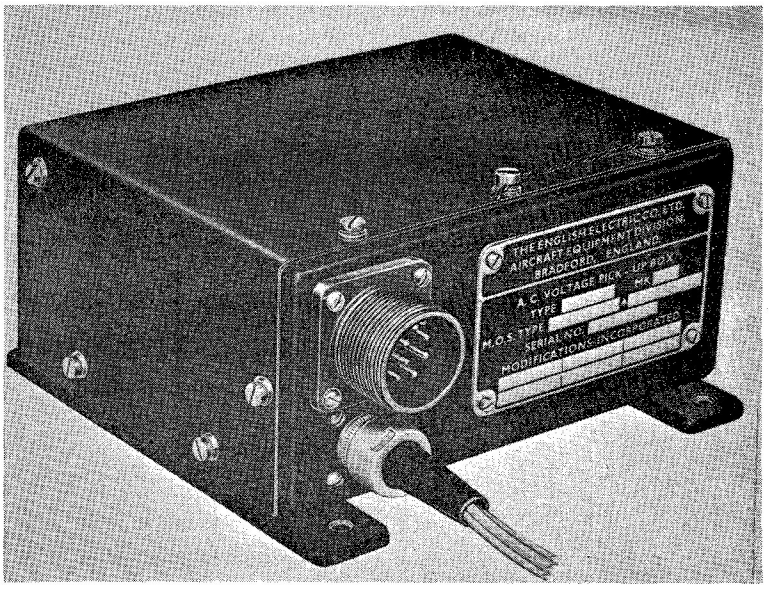

Fig. 1. Voltage pick-up box, E.E., Type AE7723, Mk. 1

Introduction

1. The unit is designed for use in multi-generator systems. Its function is to prevent connection of ground, or auxiliary power units, to the synchronizing bus-bars when the main aircraft generators are already on line. Conversely, if any one of the available power supplies was on line the unit would prevent either one of the other two supplies from being connected to the synchronizing bus-bars.

DESCRIPTION

Base and front assembly

2. This comprises two mounting strap feet and a fabricated base and front. Attached to the base and front are double anchor plates providing location for the cover retaining screws when the cover is finally assembled. Two 'diamond H' relays are mounted on the base and in between a 'P' clip clamps the connecting leads.

3. One Cannon plug and a set of four flying leads provide the means for connecting the unit to the aircraft electrical system. The Cannon plug supplies the relay contacts, and the flying leads the operating coils.

4. The flying leads are brought out through a gland in the base and front assembly, and immediately above, the Cannon plug is fitted.

Relays

5. The two relays incorporate 'freewheeling' diodes across the operating coil to obviate the inductive effect when switching off. The relays are hermetically sealed against atmospheric conditions.

6. The contacts are all wired through the normally closed position except for one set in each relay, which may be connected either normally closed (N/C) or normally open (N/O) as required for any interlocking requirements. The contact rating is 2 amp non-inductive loading at 28V, d.c. and have an approved life of 20,000 operations under these conditions.

7. The pull in voltage, at 400 c/s, is not more than 128 volts and drop-out not less than 10 volts.

Cover

8. To complete the unit a light alloy cover is fitted over the relays and secured to the base and front with a series of cheese-head screws and washers. When all testing is completed and the unit is ready for despatch from the manufacturer, locking wire is

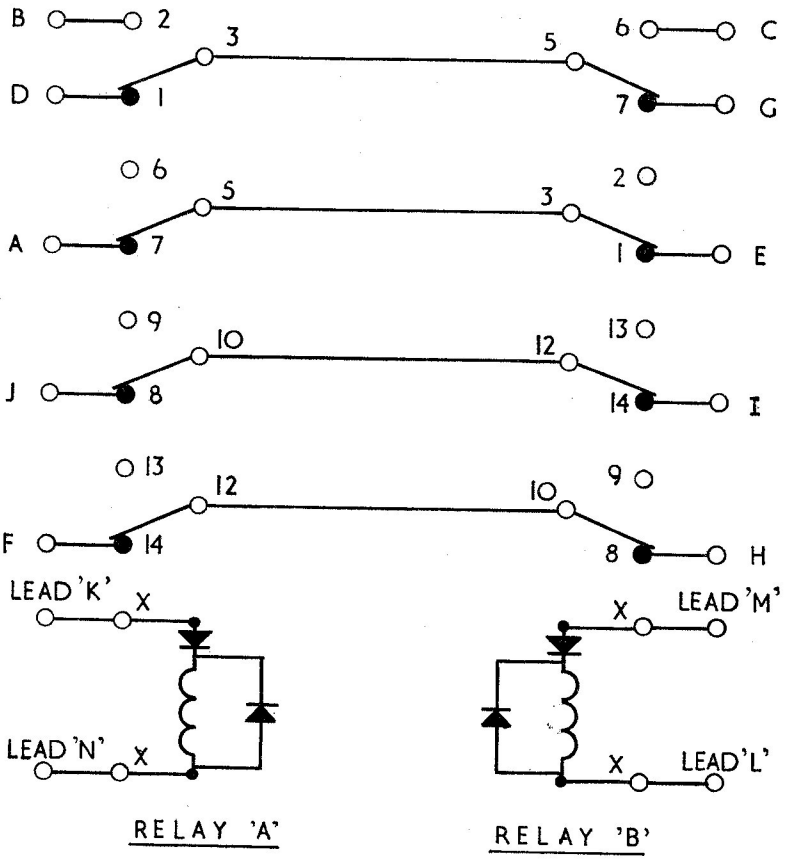

Fig. 2. Wiring diagram

threaded between two screws and a lead seal attached. This is endorsed with an inspection stamp and serves as an anti-tampering device whilst in service.

OPERATION

9. The model is not a calibrated unit and merely operates as an ON/OFF switch. When a supply of not more than 128 volts at 400 c/s is applied to the relevant pair of flying leads (K & N or L & M), the appropriate relay will operate. The contacts make or break circuits as required for the various interlocking functions of the unit. Thus the associated magnetic switches bring onto line, or isolate, the auxiliary, ground, or air power supplies.

INSTALLATION

10. The mounting of the unit in the aircraft is made through the four holes situated in the feet and this may be made in any attitude. The electrical connections are made from the aircraft electrical system to the Cannon plug and to the flying leads attached to the unit. The flying leads form the connecting link between the bus-bars (200V, 3-phase, 400 c/s) and the unit. The Cannon plug/socket connection links the unit, indirectly, with the generator, ground, or auxiliary, magnetic switches.

SERVICING

11. The unit is fitted with an "anti-tampering" device in the form of locking wire and a lead seal fitted to screws in the cover. The only servicing which should be carried out when the unit is installed in an aircraft are the following precautionery inspections.

(1) All external nuts, bolts, etc., for security.

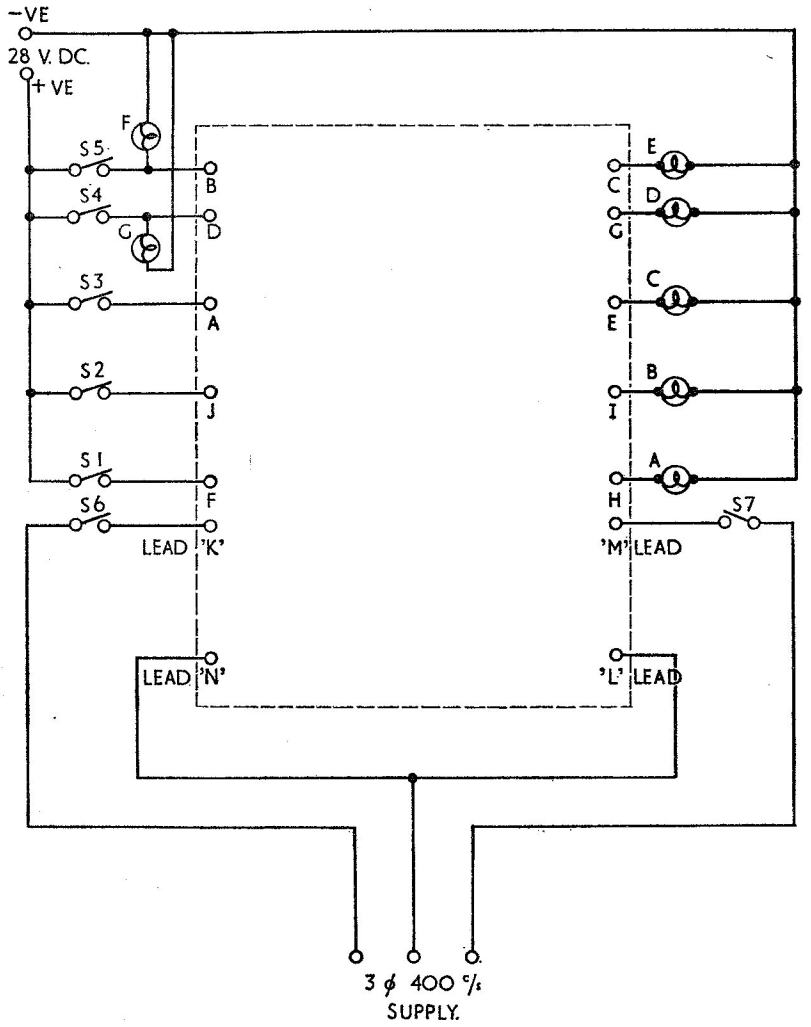

Fig. 3. Test circuit

(2) Metal casings for signs of corrosion (If this is evident, remove unit to servicing bay).

(3) Electrical connections at the plugs and the flying leads for signs of deterioration of the insulation.

12. The unit should be removed for bay servicing at the periods specified in the appropriate Servicing Schedule. Each component should be examined separately, without removing it from its mounting. Examine components for signs of damage, deterioration and corrosion.

13. The method of manufacture, design, and construction of the components in this unit does not readily admit to repair and only the re-making of broken soldered joints should be attempted. Any component found to be defective should therefore be replaced with a new serviceable item.

TESTING

14. All units must be subjected to the following tests before being released for service following an overhaul.

Supplies required for tests

15. (*a*) 0–200V, a.c. variable 3-phase 400 c/s.

(*b*) 28 volts d.c.

(*c*) 2·0 amp d.c.

Table 1

Test No.	Action	Lamps Lit.	Note
1	Close S1–S5	A B C D F G	
2	Close S6 and increase line voltage	D F G	Relay A should pick up at a voltage not exceeding 128V
3	Decrease line voltage	A B C D F G	Relay A should drop out at a voltage not less than 10V.
4	Open S6, close S7	A B C D F G	
5	Increase line voltage	E F G	Relay B should pick up at a voltage not exceeding 128V.
6	Decrease line voltage	A B C D F G	Relay B should drop out at a voltage not less than 10V.
7	Open S7	A B C D F G	

Test equipment and meters

16. (*a*) One continuity tester.

(*b*) Two 0–200V, a.c. voltmeters (accuracy ± 1·0 volt).

(*c*) Seven 28 volt lamps.

(*d*) Seven single pole on-off switches.

(*e*) One 0–5 amp d.c. ammeter (accuracy ± 0·1A).

(*f*) One 0–250 m.V. milli-voltmeter (accuracy ± 5 mV) or alternatively an oscilloscope.

(*g*) One 500V, d.c. megohmeter.

(*h*) One Wheatstone bridge (resistance).

Wiring check

17. Measure the forward and reverse resistances across leads K and N and across leads M and L (polarity insignificant). The forward resistance should be of the order of 6,000 ohms and the reverse resistance should be greater than 1 megohm when using the 500V, d.c. megohmeter.

Functioning tests

18. Connect the unit to the test circuit (*fig.* 3). Perform the tests set out in Table 1 and record the voltage at which the lamps change (col. 3).

19. With the unit still connected in the test circuit, set the line voltage to 200V and check the wiring by the switch and lamp tests set set out in Table 2.

Table 2

Test No.	Switches closed	Lamps lit
1	1 2 3 6 7	
2	1 2 3 5 6 7	E F
3	1 2 3 4 7	E G
4	1 2 3 5 6	D F
5	1 2 3 4	A B C D G
6	2 3 4	B C D G
7	1 3 4	A C D G
8	1 2 4	A B D G
9	1 2 3	A B C

Contact drop test

20. Measure the millivolt drop across the following pairs of terminals with a current of 2 amp d.c. flowing

F–H, J–I, A–E, D–G

The voltage drop should not exceed 120 mV.

21. Apply 200V across leads K and N and across leads L and M, and measure the voltage drop across terminals B and C with 2 amp d.c. flowing. This should not be greater than 120 mV.

Insulation test

22. Measure the insulation resistance of the unit between each individual point listed below and the remainder of the plug pins and leads.

Lead	K	Terminal A	Terminal C
Lead	M	Terminal B	Terminal D
Terminal	F	Terminal J	Frame

The insulation resistance should not be less than 20 megohms.