

Chapter 13**FIRE DETECTION RELAY BOX, TYPE D2790****LIST OF CONTENTS**

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LEADING PARTICULARS

<i>Relay box, Type D2790</i>	<i>Ref. No.</i> 5CZ/6630
<i>Overall dimensions</i>	7.38in x 4.8in x 4.95in.
<i>Weight</i>	2lb 12oz.
<i>Input voltages</i>	115V or 200V 400 c.p.s.
<i>Relay operating current</i>	13—17mA
<i>Relay release current</i>	6—10mA

Introduction

1. The relay box Type D2790 is a 2-unit relay box for use in the Gravier Firewire type of fire detection system. Provision is made to test both circuits with a remote test switch. Only the relay box is dealt with in this Chapter and for general information on the system as a

whole, reference should be made to A.P.4343, Vol. 1, Sect. 22, Chap. 2 and for details of the Firewire sensing elements to Chapter 2 of this section. The Type 2790 is a high temperature relay box, suitable for installation in aircraft locations where the ambient temperature may reach 100 deg. C.

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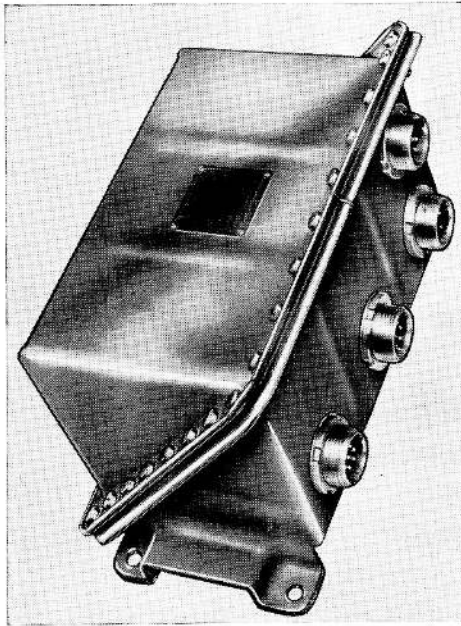


Fig. 1. Relay box, Type D2790

DESCRIPTION

2. The relay box, shown in fig. 1, is hermetically sealed and comprises two light alloy pressings, similar in size and shape, the top half serving as a lid to the base which is secured to the aircraft. The mounting brackets are fitted to the bottom half of the box and are drilled to take $\frac{1}{4}$ in. dia. fixing bolts. The two

halves of the box are secured together by thirty-two screws and nuts which ensure that an even pressure exists around the entire length of the sealing flanges so as to maintain a good hermetic seal.

3. The components of the relay box shown in fig. 2, are mounted on a light alloy chassis which is screwed to the base of the box. These components form two complete and separate single-way circuits, each circuit comprised of a transformer, a full-wave rectifier and a warning relay as shown in the circuit diagram in fig. 3. A double-pole changeover relay serves as a test relay for both units, no provision is made to test each circuit individually.

4. One 3-pole and three 6-pole plugs are mounted on the rear face of the relay box. The plugs are Plessey high temperature plugs, Part No. 2CZ84991 and 2CZ84985 respectively, and viewing from the back they are arranged as follows.

(1) Lower left-hand corner (Pl. 1). A 6-pole plug which takes the 400 c/s a.c. supply 115V or the alternative 200V. Pins A and B for the 115V and pins D and B for the 200V, the remaining pins are spare.

(2) Lower centre (Pl. 4). A 6-pole plug used for the warning lamp circuits. The 24V d.c. positive is supplied via pin E and is passed on to the warning lamps via pins A and B, when their respective relay is closed. The remaining pins are spare.

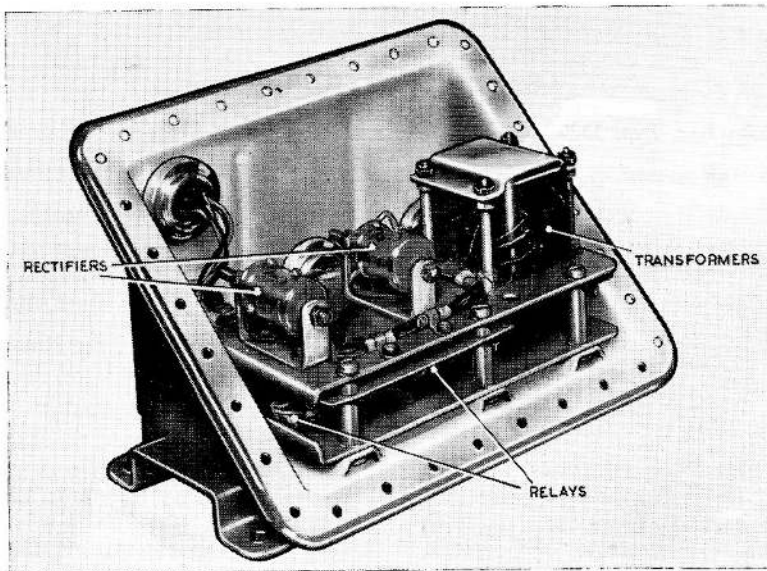


Fig. 2. Contents of relay box

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(3) Lower right-hand corner (Pl. 3). A 3-pole plug, pins A and B of which takes the 24V d.c. supply to the test relay when the remote test switch is operated. Pin C is spare.

(4) Top right-hand corner (Pl. 2). A 6-pole plug, which takes the connections from the sensing elements. Pins A and B are connected to the outer tubes of the elements, and pins C, B, F and E are connected to the central electrodes.

The 6-pole plug inserts are orientated so that the supply sockets are not interchangeable.

OPERATION

Fire or overheat conditions

5. From the circuit diagram shown in fig. 3, it will be seen that the two transformer pri-

maries are connected in parallel to the a.c. supply plug. These primaries are tapped to allow for the alternative supply voltages. When the test switch is in its normal position i.e. the test relay is un-energized, the transformer secondary circuits are completed through the filling material of the sensing elements.

6. A rise in temperature in the potential fire zones causes the resistance of the filling material in the elements to decrease, allowing increased currents to flow through the secondary circuits. An increase in the rectified currents through the warning relay coils will result and when these currents are within the range of 13—17mA the relays will operate and complete the circuits to the warning lamps. The warning circuits may operate individually in which case only one relay will operate and the one warning lamp be illuminated.

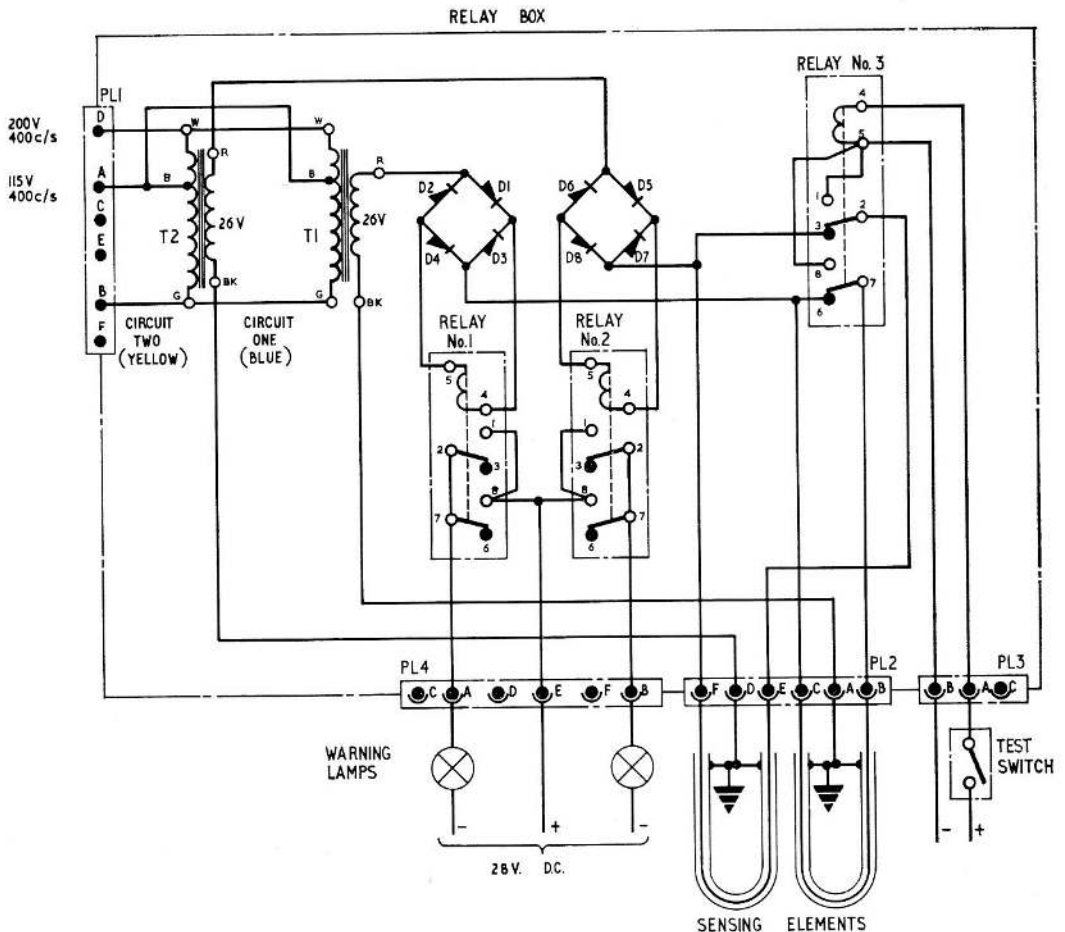


Fig. 3. Circuit diagram

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7. Should the fire zone temperature subsequently fall, the resistance of the filling material will rise and reduce the current flowing through the warning relay coils. When this current falls to within the range of 6-10mA the relay will open and break the warning lamp circuit.

Test condition

8. When the remote test switch is depressed, a 24V d.c. supply is applied to the coil of the test relay which will then operate. The operation of this relay causes the transformers secondary circuits to be completed through the central electrodes of their elements instead of through the filling material. Provided that there is continuity in the central electrodes the current under these conditions will be

sufficient to operate the warning relays. The warning lamps will then light giving a visual indication of continuity throughout the element circuits.

SERVICING

General

9. The servicing of the relay box should be restricted to an examination to ensure that it is mechanically sound and undamaged. As it is hermetically sealed no dismantling of the box is permissible.

Testing

◀10. The relay box may be functionally tested using the procedure and test circuit given in the Standard Serviceability Test, Appendix A.▶

Appendix A

STANDARD SERVICEABILITY TEST

for

FIRE DETECTION RELAY BOX, TYPE D2790 (R.N.)

Introduction

1. The following tests may be applied to ascertain the serviceability of a relay box, or prior to its installation in an aircraft.

TEST EQUIPMENT

2. The following test equipment, or suitable equivalents, will be required:—

- (1) A decade resistance box 0-11110 ohms, Ref. No. 10S/16239.
- (2) A single-pole changeover switch with

centre-off position, Ref. No. 5CW/6431, and two single-pole ON/OFF tumbler switches, Ref. No. 5CW/6430.

(3) Two Type B warning lamps, Ref. No. 5CX/1553, fitted with 24V 3.5 watt filament lamps.

(4) A 28V d.c. supply and a 115/200V 400c/s a.c. supply.

(5) A 250V insulation resistance tester, Ref. No. 0557/AP.5047.

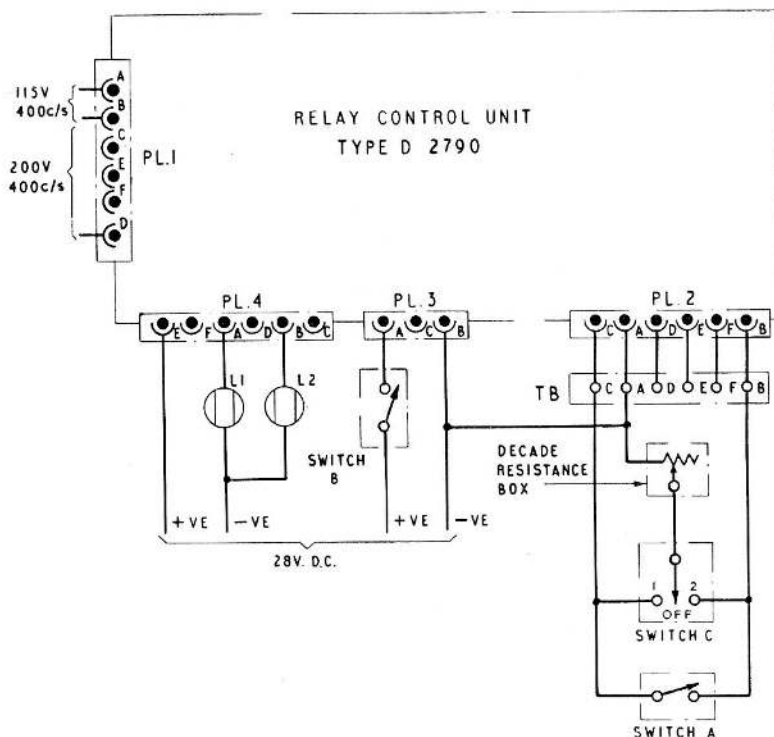


Fig. 1. Test circuit diagram

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TEST PROCEDURE

3. (1) Connect the relay box to a test circuit, as shown in fig. 1, using suitable 6-pole and 3-pole sockets and a 6-way terminal block.
- (2) Set all switches to the OFF position and the decade resistance box to 1250 ohms.
- (3) Make switch C to position 1 and ensure that both the warning lamps remain out.
- (4) Return switch C to the OFF position and adjust the decade resistance to 500 ohms.
- (5) Close switch C to position 1 and ensure that lamp L1 is now illuminated whilst lamp L2 remains out.
- (6) Slowly increase the value of the decade resistance until lamp L1 goes out,

which must occur within the limits of 1300-5350 ohms.

(7) Repeat the tests in (2)-(6) with switch C in position 2.

(8) After completing the tests outlined in (7) set switch C to OFF and switches A and B to ON, and check that lamp L1 is illuminated. Switch off all supplies.

(9) Disconnect the connections to terminals A, B and C of the 6-way terminal block and reconnect to terminals D, E and F respectively.

(10) Switch on the supplies and repeat the tests outlined in (2)-(8) checking the indications of lamp L2.

Insulation resistance test

4. The insulation resistance of the relay box may be measured using a 250V insulation resistance tester, the reading obtained testing between each pin and the case of the unit should be not less than 20 megohms.

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