GROUP C.2

FIRE WARNING AND EXTINGUISHER (CODE FW & FE)

LIST OF CONTENTS

Introduction

1. This group contains the description, and operation, of the fire warning and extinguisher circuit installed in this aircraft, together with information on the servicing required to maintain the equipment in an efficient condition. Routeing and theoretical circuit diagrams are included. For a general description of the aircraft electrical system reference should be made to Groups A1, A2 and A3 of this chapter. Detailed information on the standard items of equipment used in the circuit will be found in the Air Publications listed in Table 1.

DESCRIPTION

Equipment details

2. A lamp, to give warning of fire in the engine bay, is contained in a combined fire warning lamp and extinguisher switch unit, situated on the starboard arch panel in the cabin. This lamp is controlled by a number of automatic re-setting flame switches, which are situated around the engine bay between the rear spar frame and rear transport joint and at frame 45 in the rear fuselage. The warning lamp may be tested by the operation of a fire warning test push-switch, which is located on the cabin starboard windscreen arch panel.

3. The fire extinguisher is carried in a cradle mounted in the centre fuselage on the aft face of the main spar frame, and is connected, by a system of pipe-lines, to two spray rings which encircle the engine bay at frames 34 and 38. The extinguisher is discharged electrically, either by manual pressing of the button of the combined fire warning and extinguisher switch unit, or automatically, in the event of a crash landing, etc. by operation of relay X, situated on the supply panel. Relay X is energized by the operation of two inertia switches connected in series; one

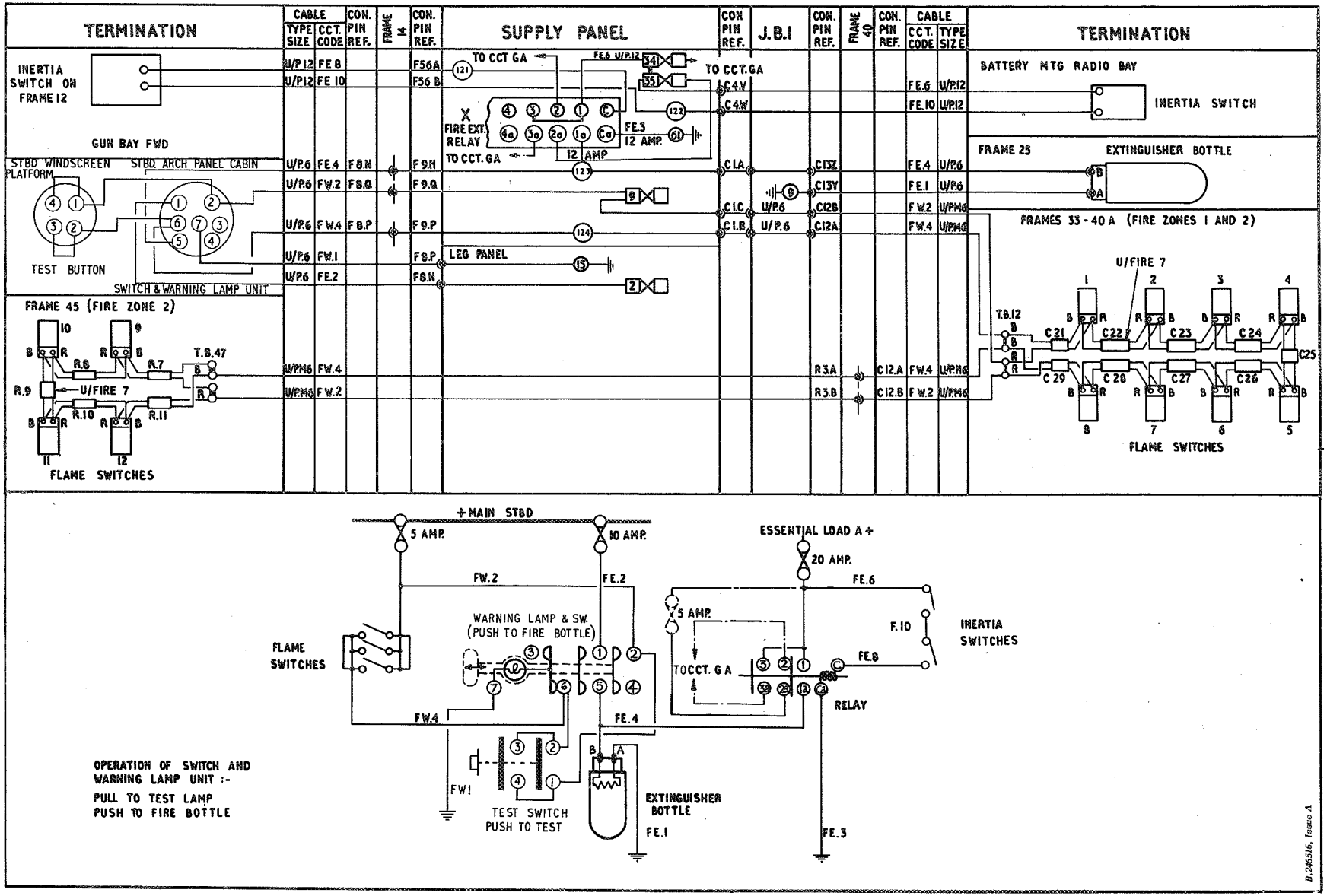

Fig. 1. Fire warning and extinguisher (routeing and theoretical)

RESTRICTED

is mounted underneath the battery platform in the radio bay and the other on frame 12 in the gun bays. When energized this relay also isolates the batteries from all but the essential load line and energizes the crash relays to off-load the generators *(Group B.1)*. For a full description of the fire protection system, reference should be made to Section 4, Chapter 5.

Operation

4. The flame switches are all connected in parallel, so that operation of any one switch will complete the circuit from the fuse to the warning lamp, via the contacts of the combined fire warning lamp and extinguisher switch unit. The flame switch contacts close at $300 \pm {}^{30}_{0}$ deg.C. and the lamp may light intermittently on the ground or in the air, due to heat surges in the engine bay.

5. It must be noted that operation of the flame switches does not discharge the fire extinguisher but, if the lamp remains alight steadily for a period of 5 to 10 seconds, the extinguisher must be discharged by pressing the fire extinguisher push-button. When pressed, this push-switch completes the circuit to blow the operating fuze in the extinguisher discharge head. To test the warning lamp filament, the fire warning test push-switch is pressed, thus supplying the lamp directly from the fuse without operation of the flame switches.

6. In the event of a crash landing etc., the inertia switches, which are connected in series with the coil of relay X, will operate and complete the circuit from the essential load line to energize the relay. When relay X is energized, contacts within the relay will close to complete the circuit from the essential load line to the fuze in the extinguisher discharge head and also feed the generator crash relays. The extinguisher is thus discharged and the generator crash relays energized to open circuit the generator fields *(Group B.1)*. Further contacts in relay X, which feed the battery relay, via the battery master switch when relay X is de-energized, are opened when relay X is energized, so de-energizing the battery relay to isolate the batteries from all but the essential load line. The essential load line also feeds the tele-briefing control relays via a pair of contacts in relay X and this feed is also broken, when relay X is energized, to prevent a possible fire hazard.

TABLE 1

Equipment type and Air Publication reference

Equipment	Air Publication
Fire warning lamp and extinguisher switch (5CW/6311)	A.P.4343C, Vol.1, Book 1, Sect.1
Push button switch, Type 5162Y, Mk.3	A.P.113D–1108–1
Flame switches, Mk.4, No.HS/RS.300 or 150.D/01/300 *(Mod.1322)*	A.P.4343E, Vol.1, Sect.14
Fire extinguisher, Mk.13A or Type 5AX	A.P.107E–0400–1A
Inertia switches, Mk.1, Type 8C	A.P.113D–1206–1
Relay, Type S, No.1	A.P.113D–1309–1

SERVICING

General

7. For general servicing of the electrical system, reference should be made to the information given in Group A.1. All the components should be kept clean and inspected periodically for signs of damage and to ensure that they are securely mounted. Apart from the servicing described in the following paragraphs, together with the standard bench testing of the components as described in the appropriate Air Publications listed in Table 1, no further servicing should be necessary.

CAUTION

As operation of the battery master switch will not isolate the fire extinguisher circuit completely, the system must be rendered safe, by removing the circuit fuses, before commencing any servicing operations found necessary after carrying out the following tests.

Testing fire warning circuit

8. The fire warning lamp must be tested, before each flight, by the operation of the fire warning test push-switch. When the switch is set to the CCT TEST position, the lamp should light to indicate that the bulb filament is serviceable and that the wiring is complete.

Testing fire extinguisher

9. To test the continuity of the fuse in the fire extinguisher discharge head, dis-connect the electrical socket from the plug on the discharge head and remove the head from the extinguisher. Connect a suitable safety ohmeter to the discharge head plug, and, if the reading obtained does not lie between 5 and 6 ohms *(Type A716 head)* or 7 to 11 ohms *(Type A216 head)*, replace the unit with a fully serviceable component. It must be noted that the actuating fuze is very sensitive and the electrical checks must be made with care. The safe test current is 10 mA. As an additional safeguard, it is recommended that the discharge head is mounted on a suitable fixture with the charge end shielded but unrestricted in case of accidental firing. To measure the insulation resistance, take a reading between each plug pin and the discharge head body. The reading obtained should be at least 20 megohms. After replacing the discharge head and reconnecting the electrical connection, ensure that the extinguisher circuit wiring is undamaged by checking the resistance between terminal 123 on the supply panel and earth, using the safety ohmmeter with a 5 ohms resistor in parallel. The reading obtained should be between 2.5 and 3 ohms.

Testing flame switches

10. The re-setting flame switches, which operate the fire warning lamp, may be tested in situ, by using a 24 volt, 6 amp. battery-operated tong tester *(Ref.No.5G/566)*. After allowing 6 minutes for the tester to warm up, it should be fitted over the barrel of each switch in turn, when the warning lamp should light to indicate satisfactory operation. The temperature setting adjusters of the flame switches are locked and sealed during manufacture and in no circumstances must any attempt be made to interfere with their setting. An inspection should, however, be made to ensure that the expansion barrel of each flame switch is not damaged.

Re-setting inertia switches

11. To re-set each inertia switch proceed as follows:–

(1) Disconnect the aircraft's main battery and ensure that an external supply is not connected to the aircraft.

(2) Gain access to the switch *(Group A.3)* and remove the terminal cover.

(3) Re-set the switch, by pressing the re-setting plunger situated between the terminals of the switch.

(4) Replace the terminal cover.

(5) Reconnect the aircraft's battery and replace any panels removed to gain access.

REMOVAL AND ASSEMBLY

General

12. Once access has been obtained, the removal and assembly of the electrical equipment forming the fire warning and extinguisher circuit should present no difficulty. The location of, and access to all the components is indicated in Group A.3 and the removal of the fire extinguishers is described in Section 4, Chapter 5.