

CHAPTER 5

FIRE PROTECTION SYSTEM

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DESCRIPTION AND OPERATION

Introduction (fig.1).

1. Operation of the fire protection system is effected in two ways as follows:-

(1) Manually by means of push-button control from the cabin.

(2) Automatically by means of inertia switches which operate in the event of a crash landing.

The manual control in the cabin incorporates a fire warning lamp which is actuated by flame detector switches mounted in the engine bay. The type and

reference numbers of the major components used in the system will be found in the Leading Particulars and details of the electrical circuit in Sect.5, Chap.1, Group C,2 of this volume. For a description of fire protection generally, reference should be made to A.P.957, Vol.1.

Extinguisher bottles (fig.1)

2. Two methyl bromide fire extinguisher bottles are provided, these being located in the centre fuselage where they are mounted in cradles, one on the aft face of the main spar frame and the other on the forward face of frame 26. The bottles are secured in their cradles by metal straps which incorporate toggle fasteners. Each bottle has a single discharge head which is piped into a tee-piece from which a common pipe conveys the extinguisher fluid to a second tee-piece in the region of frame 31. From this tee-piece, separate pipes branch off to feed the two-spray rings in the engine bay. The discharge heads are fired electrically, either by means of the pilot's push-button control, or automatically on operation of the inertia switches (para.4). The capacity of the forward bottle is 12 lb. and that of the rear bottle 6 lb. Each bottle is provided with an indicator pin which lies flush with the surface of the operating head when the bottle is fully charged. When the bottle is discharged, the pin protrudes 3/8in. approx.

Spray units

3. For fire protection purposes, the engine bay is divided into two zones by a fireproof bulkhead at frame 38. A similar firewall at frames 29 and 30 isolates the forward fire zone from components forward of the engine bay. A spray ring is fitted in each fire zone, the forward ring encircling the engine compressor outlet casing and the rear ring encircling the turbine nozzle box. The two spray

rings are separately fed from the tee-piece off the main supply line from the extinguishers (para.2). The forward ring is drilled with two rows of holes which are alternately staggered to direct the spray on to the engine both fore and aft. The holes in the rear ring are similarly drilled and staggered but are so positioned that they direct the spray both inwards and aft from the firewall.

Inertia switches (fig.3)

4. The inertia switches operate in the event of a crash landing. The forward switch is mounted at the bottom of frame 12 in the gun bay and the rear switch is in the radio bay where it is fitted to the underside of the battery mounting platform.

Flame detector switches (fig.4)

5. Twelve unit resetting flame detector switches are mounted at vital points in the engine bay and in the region of the jet pipe joint. The switches operate when subjected to temperatures in excess of that for which they are pre-set, thus completing the circuit to illuminate the fire warning lamp incorporated in the pilot's push-button control (para.6). They do NOT operate the fire extinguishing system. The location of the switches is shown in fig.1.

NOTE...

In certain circumstances during an engine run on the ground, when the engine bay may become temporarily overheated, the fire warning lamp may flicker on and off although there is no fire. In such circumstances emergency action is not necessary unless the lamp remains steadily illuminated.

Fire extinguisher manual control (fig.5)

6. The fire extinguisher manual control consists of

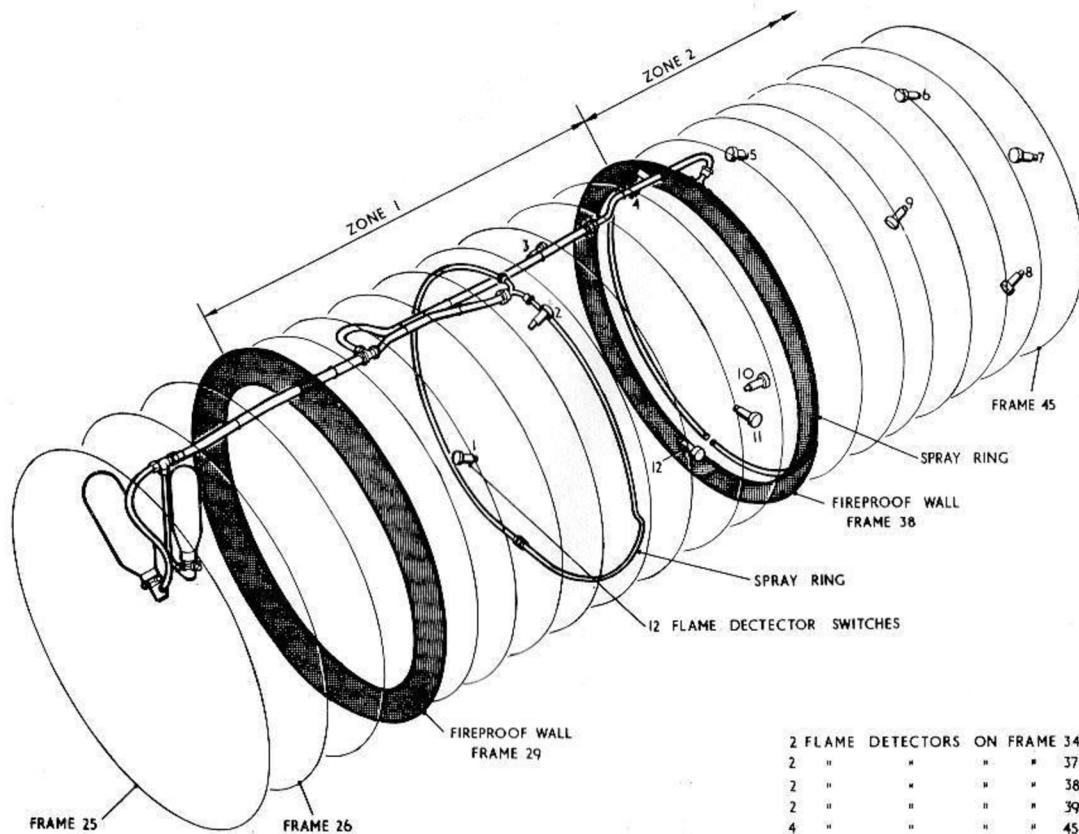


FIG.1 FIRE PROTECTION SYSTEM

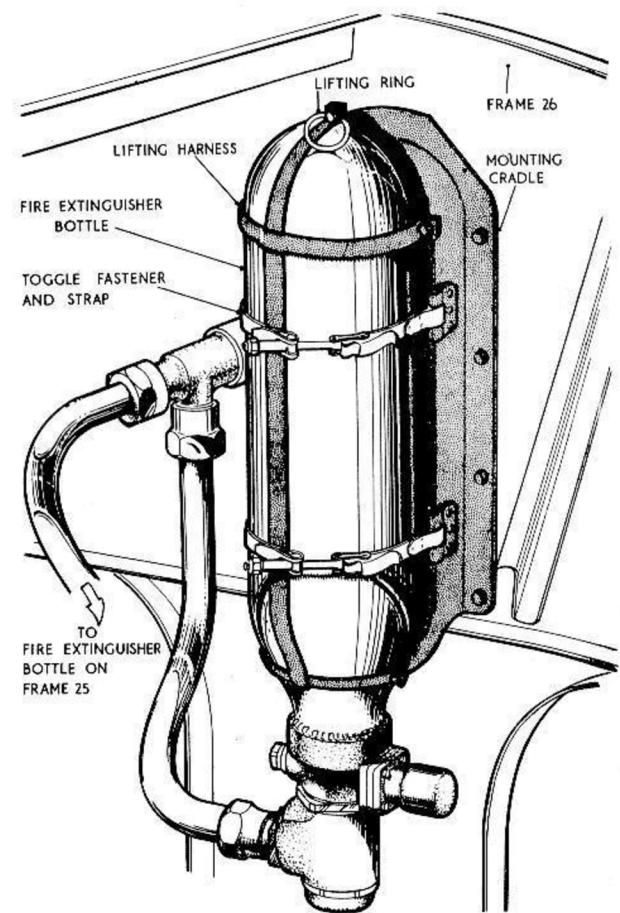


FIG. 2 FIRE EXTINGUISHER BOTTLE

a push-button switch which is mounted on the starboard arch panel in the cabin. Depression of the push-button energizes the fuse in the discharge head of each extinguisher bottle, which being piped to the engine system, feed extinguisher fluid to the spray rings in the engine bay. The switch incorporates the ENGINE FIRE warning lamp which is actuated by the flame detector switches (para.5). The lamp should be checked for serviceability before each flight by pulling out the button of the push-button switch.

SERVICING

General

7. Before attempting to service any part of the fire protection system, the aircraft must be made electrically safe, and, since the battery isolating switch in the cabin does NOT isolate the fire protection service, the following procedure MUST be adopted prior to servicing or removal of any component:-

- (1) Place the battery isolating switch in the cabin to the GROUND position.
- (2) Ensure that the ground service trolley battery is disconnected from the aircraft.
- (3) Either (a) remove the aircraft battery leads from their terminals on the battery and stow them on the dummy terminals on the battery mounting platform, or (b) remove the fuses protecting the fire protection service (Sect.5, Chap.1, Group C.2) to complete the isolation.

Flame detector switches

8. Apart from the routine checks for continuity and insulation which are described in A.P.4343 series, and a functioning check which is described in Sect.5, Chap.1, Group C2 of this volume, no servicing of the flame detector switches is possible.

Inertia switches

9. The procedure for re-setting the inertia switches is described in Sect.5, Chap.1, Group C.2 of this volume. No other servicing, apart from ensuring security of attachment, is possible.

Extinguisher bottles

10. The fire extinguisher bottles must be weighed to determine whether they have been leaking or discharged. The weights of the bottles when fully charged and complete with their cartridge assemblies is as follows:-

Forward bottle: 18 lb. $4\frac{1}{2}$ oz. \pm 4 oz.

Rear bottle: 10 lb. 1 oz. \pm 4 oz.

Should either bottle weigh less than its full weight given above, or the weight stamped on the bottle which must always be taken as the overriding authority, it should be replaced by a fully-charged bottle. Checks for determining the serviceability of the discharge heads of the bottles and other electrical tests are given in Sect.5, Chap.1, Group C.2 of this volume.

Spray rings and pipe lines

11. Examine the pipes and spray rings for security of attachment and ensure that no chafing of pipes has occurred. Ensure that the holes in the spray rings are clear and are unobstructed.

REMOVAL AND ASSEMBLY

General

12. Before attempting to remove any component of the fire protection service, the aircraft MUST be rendered electrically safe as described in Para.7. Bared ends of electrical leads removed must be taped immediately after disconnection to eliminate the possibility of fire due to shorts. This is essential as there is always a possibility of the electrics being reconnected before all the leads are replaced.

Extinguisher bottles

13. With one man releasing the extinguisher bottles through the fuel vent connection access at the top of the fuselage and another assisting through the engine starter bay below, the removal of the bottles is effected as follows:-

- (1) Render the aircraft electrically safe (para.7).
- (2) Gain access via the fuel vent connection access door and the engine starter bay door (Sect.2, Chap.4, fig,2, items (11) and (101) respectively).
- (3) Remove the electrical connections at the operating heads of the bottles.
- (4) Disconnect the supply pipes from their unions on the bottles.
- (5) Remove the tank relief valve in way of bottle removal (Sect.4, Chap.2).

- (6) Operate the toggle fasteners securing the metal straps that secure the bottles in their cradles, open out the straps and remove the bottles.

Flame detector switches

14. Once access had been obtained, the removal of the flame detector switches presents no unusual difficulties.

Removal is effected as follows:-

- (1) Render the aircraft electrically safe (para.7).
- (2) Gain access to the switch concerned and remove the electrical connections at the switch.
- (3) Remove the bolts and nuts securing the switch to structure and remove the switch.

Inertia switches

15. The removal of the inertia switches is effected as follows:-

- (1) Render the aircraft electrically safe (para.7).
- (2) Gain access to the forward inertia switch via the gun bay and the rear switch via the radio bay.
- (3) Remove the electrical connections at the switch.
- (4) Remove the nuts and bolts securing the switch to structure and remove the switch.

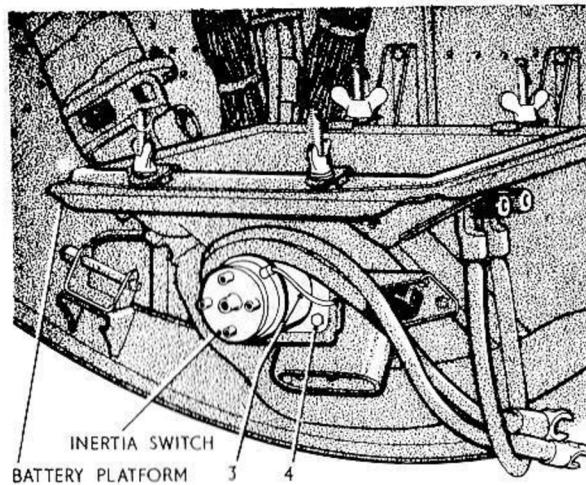


FIG.3 TYPICAL INERTIA SWITCH

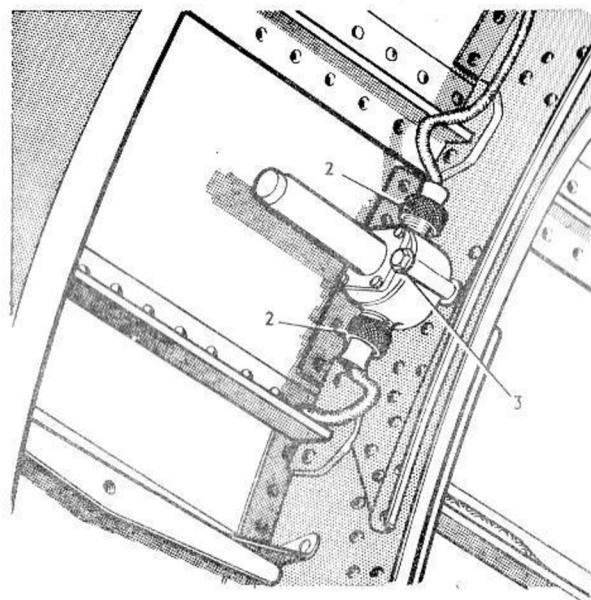


FIG.4 TYPICAL FLAME DETECTOR SWITCH ASSEMBLY

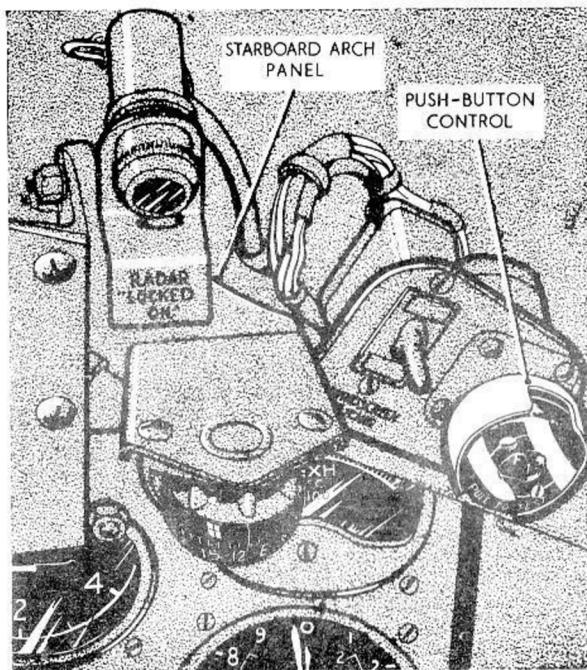


FIG.5 FIRE EXTINGUISHER MANUAL CONTROL

Assembly

16. The assembly of the components of the fire protection service is, in general, a reversal of the removal procedure, but reference should be made to Sect.5, Chap.1, Group C.2 for details of the electrical tests and the re-setting of the inertia switches prior to reconnection.

A close-up, low-angle shot of an aircraft's internal wiring harness. The harness consists of numerous orange and white insulated wires, some of which are bundled together with black zip ties. The wires are installed in a metal channel within the aircraft's fuselage. In the upper left, a large, cylindrical component, possibly a motor or pump, is visible, with several wires attached to it. The overall environment is metallic and industrial.

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