

Chapter 5

FIRE PROTECTION SYSTEM

LIST OF CONTENTS

DESCRIPTION	Para.	DESCRIPTION	Para.
<i>Introduction</i>	1	<i>Fire - extinguishing system - leading edge</i>	15
<i>Fire - extinguishing system - Olympus engines</i>		<i>Emergency equipment</i>	16
<i>General</i>	3	SERVICING	
<i>System installation</i>	7	<i>Automatic extinguishers</i>	18
<i>Method of operation</i>	8	<i>Spray holes</i>	21
<i>Fire - extinguishing system - fuel tanks</i>	10	<i>Flame detector switches</i>	22
<i>System installation - fuselage tanks</i>	11	<i>Inertia switches</i>	23
<i>System installation - wing tanks</i> ...	13	▶ ◀	
		<i>Hand-operated extinguishers</i> ...	25

LIST OF TABLES

	Table
<i>Fire-extinguisher details</i>	1

LIST OF ILLUSTRATIONS

	Fig.
<i>Fire protection system - engines</i>	1
<i>Fire protection system - fuel tanks</i>	2

DESCRIPTION

Introduction

1. This chapter contains a description of the fire protection system and gives details of servicing operations. Two methyl-bromide fire-extinguishing systems are provided, one for the engine compartments and the other, which is subdivided into three systems, supplies the fuselage fuel tanks, the inboard group of the wing fuel tanks and the wing leading edge. Nitrogen purging of the fuel tanks

(pre Mod.171) or "Explosion protection" (post Mod.171), descriptions of which are in Sect.4, Chap.6 of this book and in A.P.4505 A & C, Vol.1, Book 2, and suitably located engine drains and vents also minimise fire risks.

2. Inertia switches Mk.2, Type 10C, (Ref.No.27N/94) on the lower forward face

of the rear pressure bulkhead are provided to break the circuits to the generators, isolate the batteries to prevent the outbreak of fire in crash conditions, and also to discharge automatically the containers when the deceleration exceeds 4½G. Details of these installations are given in Vol.1, Book 2, Sect.5, Chap.1 of this publication. The switches are described in A.P.4343C, Vol.1, Book 2, Sect.3, Chap.33.

RESTRICTED

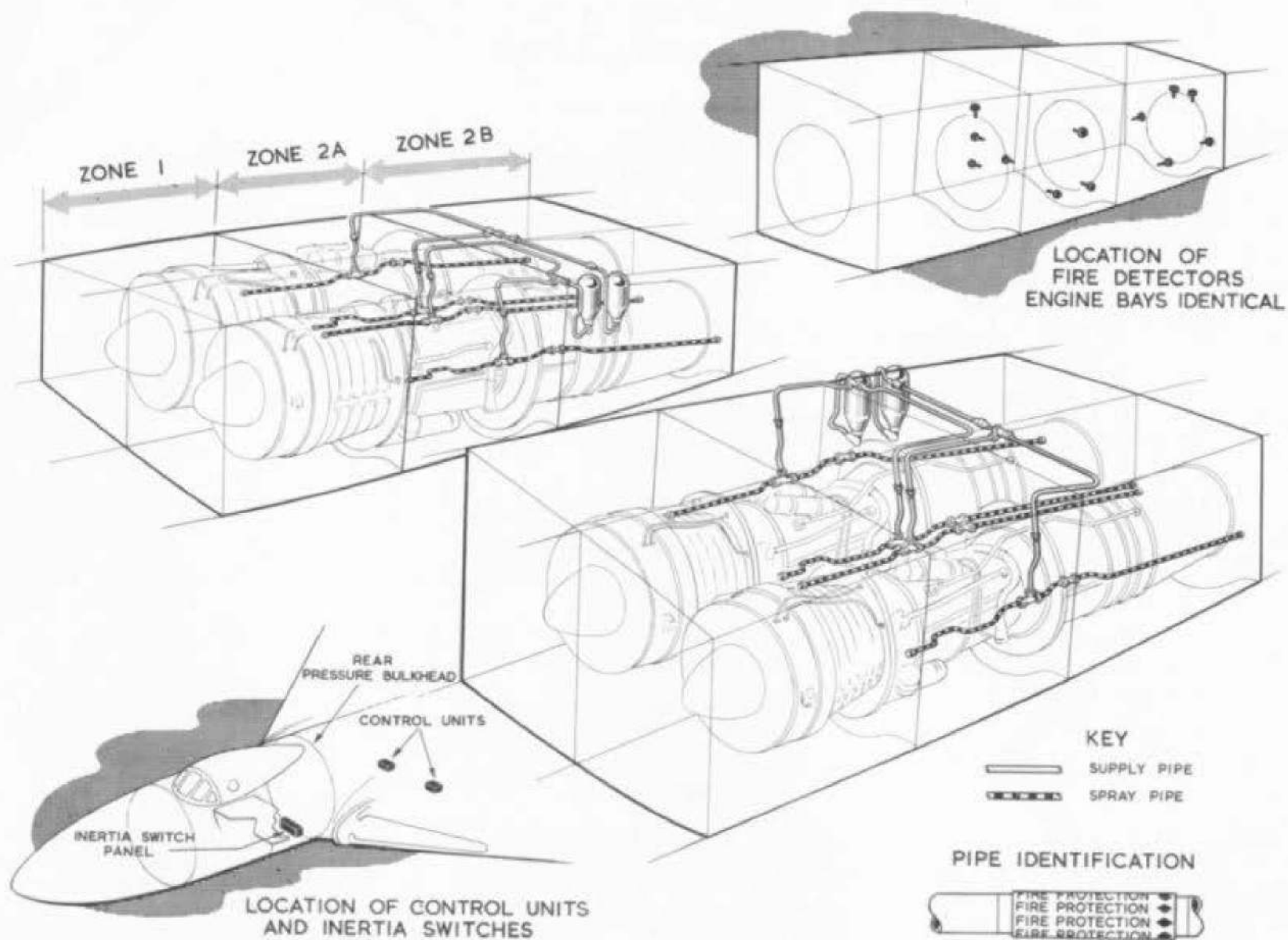


Fig. 1. Fire protection system — engines.

RESTRICTED

FIRE-EXTINGUISHING SYSTEM - OLYMPUS ENGINES

General

3. To ensure adequate protection against fire risk, each engine compartment is divided into zones, by bulkheads, integral with the engine, which seal on to the aircraft structure, the compartments thus formed being lined with 28 s.w.g. stainless steel plating. The forward zone, designated Zone 1, is not covered by the extinguishing system spray pipes. The rear zone is sub-divided by an intermediate bulkhead immediately forward of the combustion chambers, the two positions being known as Zones 2A and 2B respectively.

4. Drainage from the engine fuel system, dump valve, combustion chambers and turbine annulus is piped to collector tanks, self-emptying in flight through outlets in the centre engine doors.

5. Automatic warning of fire is given by a thermo-electric re-setting fire detector system, consisting of two master units, (Ref.No.5CZ/5551), mounted together on the starboard side of the nose-wheel bay, a set of detectors containing thermo-couples, (Ref.No.6CZ/6188), in the engine zones and combined warning indicator/operating switches, one to each engine, on the pilot's cockpit coaming. The indicator/operating switches are painted red and are numbered 1, 2, 3 and 4 from port to starboard. An automatic warning only is given and in in-flight fires the extinguishant is released by manual operation of the indicator/operating switch. In crash conditions, where the deceleration exceeds the given value of 'G' (set on the inertia switches) the containers are discharged automatically.

6. Thermo-couple detectors are also provided around the jet pipe, fire warning being given on the same cockpit indicator as that for the engine. No spray pipes

are provided in this area, since methyl-bromide will pass between the jet pipe and shroud to extinguish a fire when the engine compartment extinguishers are discharged.

System installation

7. Two Graviner fire extinguishers (12 lb. capacity), using methyl-bromide as the extinguishant, are installed on each side of the bomb bay. From the forward extinguisher, light alloy piping leads to the inboard engine compartment and from the rear extinguishers to the outboard engine compartment. These pipes feed fore-and-aft sprays on the sides of the engine bays, the sprays passing through the intermediate bulkhead to cover Zones 2A and 2B. Small diameter holes are provided in the spray pipes positioned so as to give adequate protection for each fire risk.

Method of operation

8. This system of fire detection works on the thermo-electric principle of voltage generation when heat is applied to the junction of the two dissimilar metals which form the thermo-couple. Each of the detector heads consist of two thermo-couples in series and of opposite polarity, one of which is shrouded from flame and rapid temperature variations, whilst the other, being exposed is much more rapidly affected by temperature change. When the combined temperature of the exposed thermo-couples exceeds that of the shrouded couples by 185 deg.C, sufficient electrical output is generated (7.5 millivolts) to illuminate the corresponding cockpit warning indicator. It is then necessary to depress the warning indicator/switch to fire the electrically-operated fuses which discharge the extinguishers.

9. When a cockpit indicator switch is depressed, an explosive charge in the extinguisher is ignited, electrically, to rupture the container diaphragm and create an outlet through which liquid

methyl-bromide can flow into the pipe system.

FIRE-EXTINGUISHING SYSTEM - FUEL TANKS

10. A methyl-bromide system is installed to protect the fuselage and the wing inboard group fuel tank positions. No action is required by the crew to operate the extinguishers, they are operated solely by the action of the inertia switches in the event of a crash landing. It should be noted that on the wing methyl-bromide system only one head of the dual headed extinguishers is fired to supply extinguishant to the inboard group of fuel tanks.

System installation - fuselage tanks

11. The air space around the outside of the inner tank bay plating of the forward (No.1) fuel tanks is covered by two 12 lb. fire extinguishers. The extinguishers, secured in mounting brackets on the rear pressure bulkhead, supply three horizontal spray pipes clipped along the length of the tanks, and, one transverse pipe at the front face of the tank.

12. Air space around the rear (No.2) tanks in the nose wheel bay is covered by two 12 lb. extinguishers, mounted in brackets on the bulkhead between the forward and rear tanks, which feed three horizontal spray pipes passing rearwards along the length of the tanks and one vertical spray pipe at the forward face of the tanks.

System installation - wing tanks

13. The five wing tanks on each side of the aircraft are divided into two bays by a double-skinned rib, from the front to the rear spars, between the three inboard tanks and the two outboard tanks. The inner tanks are contained on their inboard face by the undercarriage outboard

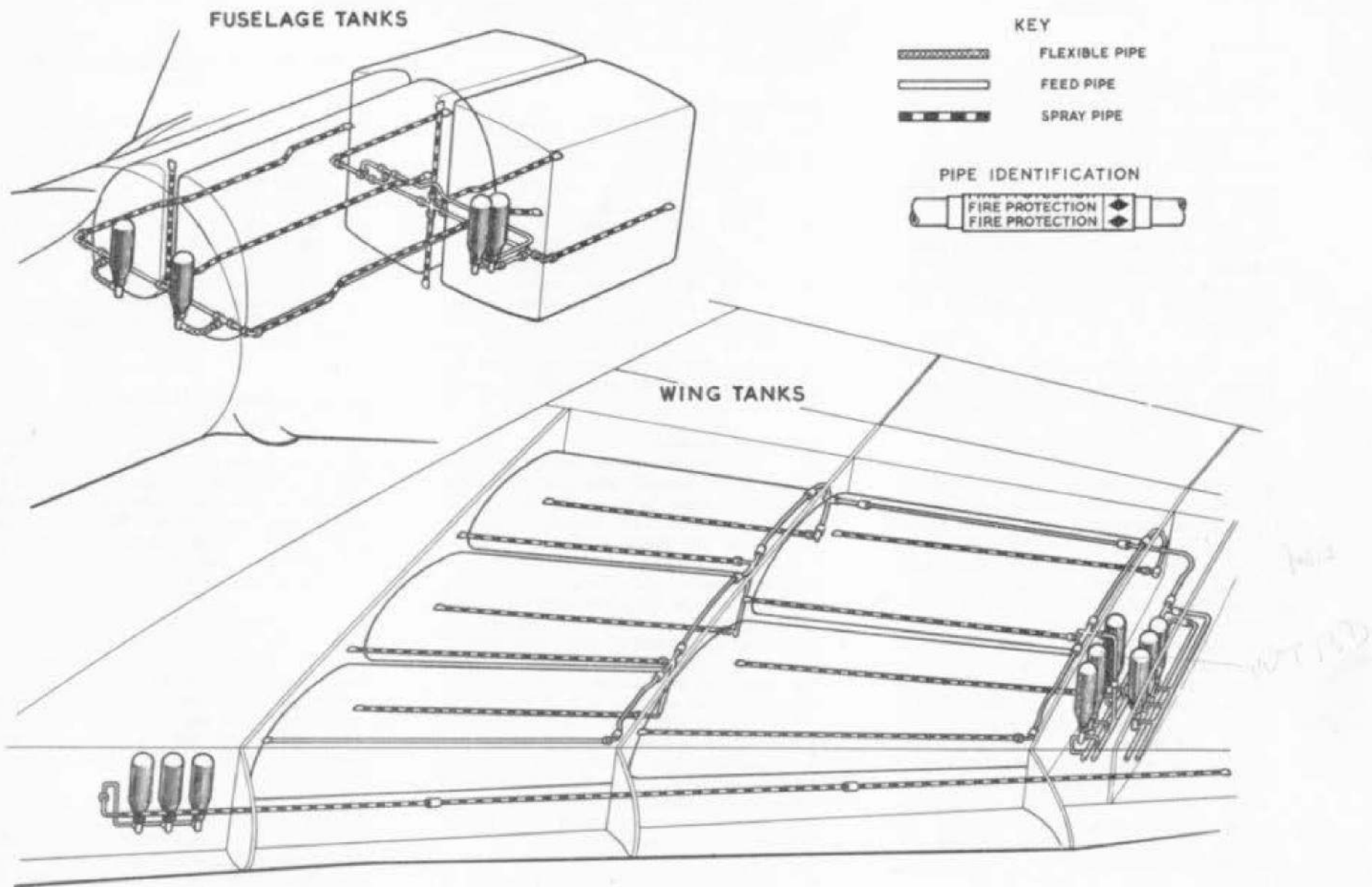


Fig. 2. Fire protection system - fuel tanks.
RESTRICTED

rib, and on their front and rear faces by the front and rear spars.

14. Six methyl-bromide extinguishers accessible, after removal of the landing lamp, through the landing lamp access panel, are mounted, three on the outboard face of rib 618-186 and three on the inboard face of rib 646-186. The extinguishers are fitted with dual heads of which only one, the head supplying the inboard group of tanks, is operative. The extinguishers are operated solely by the action of the inertia switches in the event of a crash landing. The supply pipe from the extinguishers passes along rib 618-186 and the forward face of the rear spar to connect to a further pipe, disposed centrally

OUTSIDE
TANKS NOT IN

AUTOMATIC EXTINGUISHERS

18. The automatic fire extinguisher charged to a pressure of 250 p.s.i., is painted peacock blue for identification purposes.

19. No servicing is possible to the extinguishers except to determine that they have not been inadvertently discharged. The junction boxes of the extinguishers may be fitted with tell-tale windows containing specially impregnated filter papers which change colour from white to red following contact with methyl-bromide discharge. This method is, however, obsolescent and on later issues the junction boxes have a bottom cap nut fitted with a mechanical discharge indicator pin which will protrude by about 1/8 in. from the junction box cap to give a positive indication of discharge. Interim junction boxes may carry both devices.

20. In addition, the contents of the extinguishers should be periodically checked by weighing to ensure that no loss has occurred. The fully charged

between the tank groups, to which is connected the spray pipes to the inboard group of tanks.

FIRE-EXTINGUISHING SYSTEM - LEADING EDGE

15. Three 12 lb. methyl-bromide extinguishers are provided in the bays forward of the main-wheel units to feed a spray pipe fitted along the leading edge of the wing inside the anti-icing ducting to prevent fire due to a strike ahead. The extinguishers are operated solely by the action of the inertia switches in the event of a crash landing.

SERVICING

weights are given in Table 1 and are also stamped on the head of the container. If the weight is outside the tolerance quoted in Table 1, the container is to be removed and replaced with a serviced item.

SPRAY HOLES

21. Spray pipes are to be kept clear by connecting a supply of compressed air to the feed pipes and blowing through and, at the same time, it should be checked that there are no leaks at the supply and feed pipe connections.

FLAME DETECTOR SWITCHES

22. No in-situ servicing of the flame detector switches is possible. For the servicing of the electrical circuits refer to Book 2, Sect.5, Chap.1 of this Volume.

INERTIA SWITCHES

23. At periodic intervals the switches are to be examined for the presence of moisture or damage. The inside of the switch can be observed through the transparent case. Should moisture be present,

EMERGENCY EQUIPMENT

16. Hand operated bromochlorodifluoromethane extinguishers are disposed at convenient positions in the crew's compartment. A similar extinguisher is provided for external use. Their location, together with other details, is given in Table 1.

17. Asbestos gloves and crash axes are provided for use in an emergency, details of this equipment being given in Sect.1, Chap.3 of this Book.

WARNING...

Methyl-bromide fumes are toxic and must not be inhaled.

the switch must be replaced by a serviceable one.

24. To reset an inertia switch proceed as follows:-

- (1) Remove the four screws from the terminal block cover and remove the cover. This will reveal the re-setting plunger.
- (2) Press on the re-setting plunger until the contact bow springs back into the unoperated position.
- (3) Fit the terminal block cover.

HAND-OPERATED EXTINGUISHERS

25. At the periods stipulated in the Servicing Schedule, the hand-operated extinguishers are to be weighed to ensure that no loss of charge has occurred. The reading obtained should be checked against the fully charged weight and logged against the last recorded weight on the tab provided.



This file was downloaded
from the RTFM Library.

Link: www.scottbouch.com/rtfm

Please see site for usage terms,
and more aircraft documents.