Chapter 5 FIRE PROTECTION SYSTEM

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

APPENDIX

General

1. This chapter contains the description, operation, servicing details and instructions for the removal and installation of components in the fire extinguisher and explosion suppression systems.

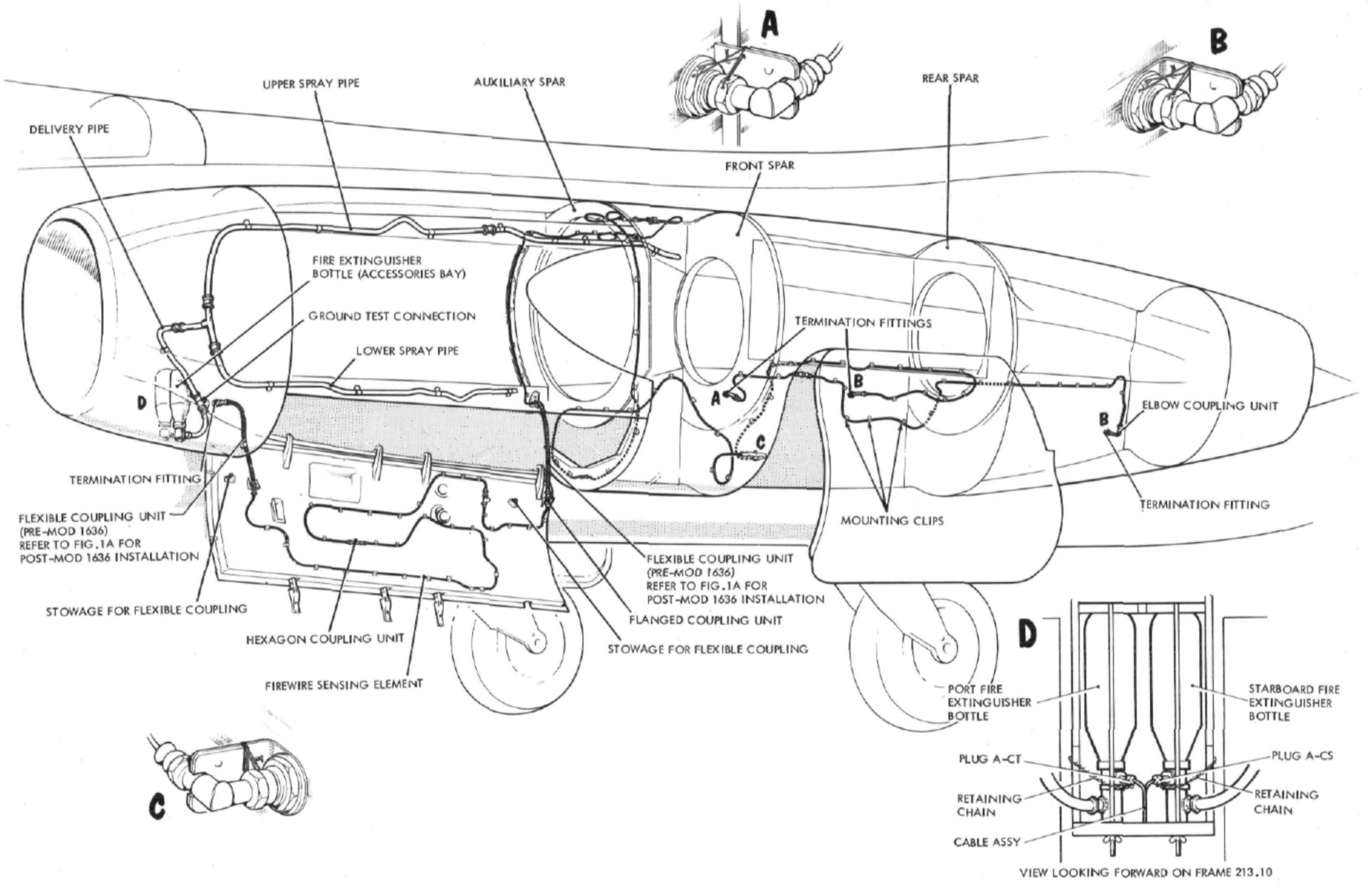

Fig. 1. Fire extinguisher system — power unit
(Reference to Mod 1636 added)

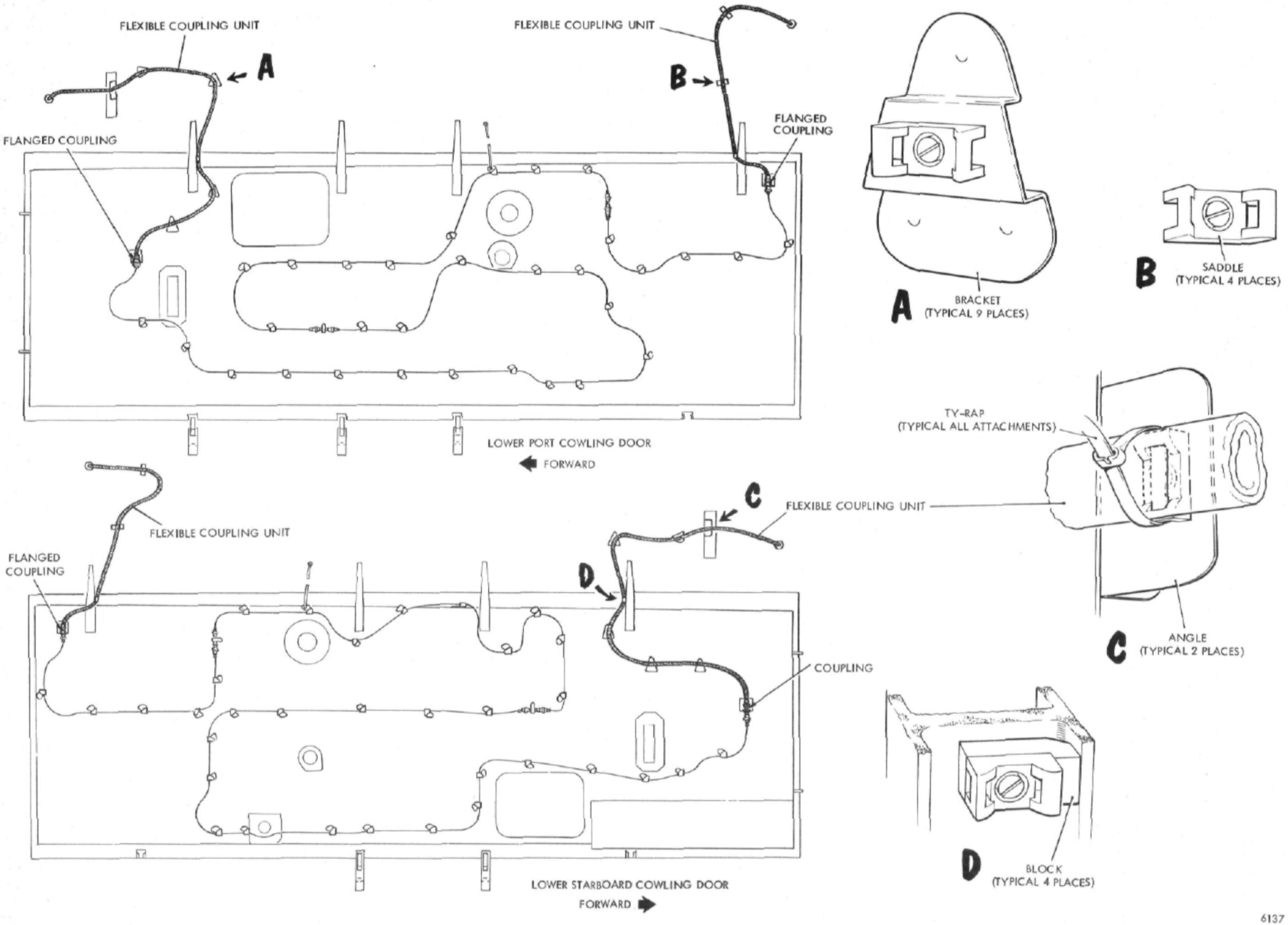

Fig.1A. Installation of flexible coupling units on engine lower cowling doors (post-Mod 1636)

FIRE EXTINGUISHER SYSTEMS

DESCRIPTION AND OPERATION

Introduction

2. Three fire extinguisher systems are provided which comprise identical systems for each power unit zone and a combined system for the fuel tanks, bomb bay and accessories bay zone. There are two further extinguishing systems available when required, one providing fire protection for the bomb door tank (Mod 5300) when fitted and the other providing fire protection for pre-Mod 5234 jettisonable wing fuel tanks when fitted. No fire extinguishing facilities are provided in post-Mod 5234 wing tanks. Details of the bomb door tank system are in Appendix 1 of this Chapter while details of the wing tanks system are in Sect. 4, Chap. 2 of this Cover. In addition, a hand-operated BCF fire extinguisher bottle is mounted on the port side of the observer's station and is described and illustrated in Cover 2, Sect. 3, Chap. 11 and Cover 1, Sect. 1, Chap. 2 of this Volume, respectively.

3. Abnormally high temperature or fire in any part of the power unit or fuel tanks, bomb bay and accessories bay zones is detected by Graviner firewire triple FD (fault free fire detection) circuits which, acting in conjunction with a standard warning system, provide the pilot with visual and audible warning of the emergency. When the temperature returns to normal, the detection circuits automatically reset themselves and cancel the emergency warnings.

4. Fire protection is provided by five methyl bromide automatic-type fire extinguishers. Two extinguishers are mounted on the rear face of the accessories bay dividing bulkhead to serve the power unit zones, two in the radio bay serve the bomb bay and No. 2 to 8 fuel tanks and one in the nose wheel bay serves the accessories bay and No. 1 fuel tank.

5. In the case of the fuel tanks, bomb bay and accessories bay zone, the extinguisher bottles are discharged automatically whenever abnormally high temperature or fire is detected within the zone, or the aircraft is crash landed. The extinguisher bottles serving the power unit zones are discharged manually by the pilot depressing the relevant fire extinguisher switch on receipt of a fire warning or, automatically, in the event of a crash landing. For further details of the electrical circuits associated with the fire extinguisher systems, refer to A.P.101B-1202-1B, Cover 1, Sect. 6, Chap. 10. For further details of the crash trip elements refer to A.P.113D-1205-1 and for details of other components in the system refer to the A.P.107E series of publications listed at the front of Cover 1 of this Volume.

Power unit systems *(fig 1)*

Description

6. Two 6 lb single-head type fire extinguisher bottles are mounted side-by-side on the rear face of the accessories bay dividing bulkhead. Each bottle is connected to two ½ in. diameter spray pipes located in the appropriate engine bay, both pipes being clipped to the aircraft bodyside. A firewire sensing element circuit, clipped to the inner surface of the lower cowling door and nacelle structure, is connected electrically to a relay unit situated on the starboard side of the radio bay, the relay unit in turn being connected to the appropriate warning lamp (FIRE P – fire in port engine nacelle, or FIRE S – fire in starboard engine nacelle) and fire extinguisher push-switch lamp on the pilot's standard warning panel, the attention warning lamps on each side of the pilot's instrument panel coaming, and the audio warning unit.

Note...

To prevent inadvertent cross-connection of the fire extinguisher electrical plugs, a retaining chain is fitted between the aircraft structure and the plug connecting the electrical cable on each bottle, as shown in fig 1.

Operation

7. Each power unit zone fire extinguisher system can be operated by either of the following methods:-

(1) *Crashtrip elements.* In the event of any pair of the crashtrip elements, located in the extremities of the aircraft, being operated, the contents of both extinguisher bottles will be automatically discharged through their respective spray pipes.

(2) *Firewire sensing elements.* Abnormally high temperatures or fire in the engine nacelle is detected by the firewire sensing element circuit which, acting in conjunction with a relay, causes the appropriate fire warning and fire extinguisher push-switch lamps to be illuminated, the attention warning lamps to flash, and an audible warning to be transmitted to the pilot's head set. On receipt of these warnings, depression of the appropriate fire extinguisher push-switch by the pilot causes the contents of the extinguisher bottle to be discharged through the engine bay spray pipes.

Fuel tanks, bomb bay and accessories bay system

Description (fig 2)

8. A 12 lb single-head type fire extinguisher bottle is mounted vertically on each side of the radio bay and is connected to a gallery spray pipe routed along the appropriate side of the bomb bay in close proximity to the underside of No. 2 to 8 fuel tanks. From each gallery pipe vertical spray pipes are routed upwards into the spaces between the fuel tanks and the fuselage skin. Spray pipes are also projected upwards into the bulkhead at the rear of the bomb bay.

9. A further 12 lb single-head type fire extinguisher bottle mounted in the nose wheel bay serves the accessories bay and No. 1 fuel tank zone. The extinguisher is tee'd into gallery spray pipes which terminate at the aft bulkhead of the accessories bay. From the gallery spray pipes vertical spray pipes are projected into the bulkhead at the forward end of the accessories bay and into spaces between No. 1 fuel tank and the fuselage skin.

10. Three firewire sensing element circuits are incorporated in the system; one is clipped to the spray pipes around the fuel tanks, bomb bay and accessories bay, another projects into the rear of the bomb bay, and the remaining one is positioned immediately above the ventilating air-outlet in the accessories bay rear compartment door. Each circuit is connected electrically to associated relay units housed in the radio bay, which in turn are connected to the respective warning lamps (FIRE F – fire in the vicinity of fuel tanks; or FIRE B – fire in bomb bay or accessories bay) on the pilot's standard warning panel, the attention warning lamps on each side of the pilot's instrument panel coaming, the audio warning unit, and the extinguisher bottles.

Operation

11. Operation of this system is effected automatically by either of the following methods:-

(1) *Crashtrip elements.* In the event of a crash landing, operation of any pair of crashtrip elements, located in the extremities of the aircraft, will detonate the cartridge units in the extinguishers causing the extinguishant to discharge into the spray pipe system around the fuel tanks, bomb bay and accessories bay, and behind the two bulkheads.

(2) *Firewire sensing elements.* Abnormally high temperatures or fire in this zone is detected by the respective firewire sensing element circuit which, acting in conjunction with a relay unit, causes the appropriate fire warning lamp to be illuminated, the attention warning lamps to flash, an audible warning to be transmitted to the pilot's head set, and the extinguishers to discharge simultaneously into the spray pipes around the fuel tanks, bomb bay, accessories bay and bulkheads.

Component description and operation

Extinguisher bottles

12. The two extinguisher bottles, clamped to support brackets on the rear face of the accessories bay dividing bulkhead, are Type 39A 6 lb wire-wound components incorporating single outlet operating heads. The bottles mounted on each side of the radio bay and the bottle mounted in the nose wheel bay are Type 40A 12 lb wire-wound components also incorporating single outlet operating heads.

13. Both types of extinguisher bottle are fitted with an indicator pin which lies flush with the base of the operating head when it is fully charged, and protrudes from the operating head when the bottle has been discharged. For identification purposes, both types of bottle are painted peacock blue with yellow stencilled leading particulars. Further details of both types of extinguisher are in A.P.107E-0400-1A.

Spray pipes

14. *Power unit systems.* The delivery pipeline from each extinguisher bottle is routed upwards and forwards into the front compartment of the accessories bay, passes through the bodyside into the appropriate engine bay, and then branches into a two-way union. From the upper connection of the union, a spray pipe is routed upwards, then rearwards along the length of the bodyside as far as the front spar ring. A spray pipe connected to the lower union extends to station 279, just forward of the auxiliary spar ring. Three drain holes, two in the upper and one in the lower spray pipe, drain off any moisture that may accumulate in the pipes due to condensation. A ground test connection in the delivery pipeline, adjacent to the extinguisher bottle, can be connected to an air supply when it is required to check the spray pipes for blocked holes.

15. *Fuel tanks, bomb bay and accessories bay system.* The delivery pipeline from each extinguisher bottle in the radio bay is routed upwards and forwards into the bomb bay where it is connected to a gallery spray pipe which extends along the length of the bomb bay close to the underside of No. 2 to 8 fuel tanks. From the gallery pipes, vertical spray pipes project upwards into the radio bay bulkhead 471.5 and the spaces between No. 2 to 8 fuel tanks and the fuselage skin. Additional spray pipes built into the aircraft structure form extensions of the vertical spray pipes and are to ensure

wide distribution of the extinguishant. The port and starboard spray pipe extensions in the radio bay bulkhead are connected together by a crosspipe. A ground test connection in each gallery pipe at the rear of the bomb bay can be connected to an air supply when it is required to check the spray pipes for blocked holes.

16. The delivery pipe from the extinguisher bottle in the nose wheel bay is routed rearwards into the accessories bay, where it branches two ways, each branch connecting to a gallery spray pipe on either side of the bay. Each gallery spray pipe extends to the rear bulkhead of the bay in close proximity to the underside of No. 1 fuel tank. From the gallery pipes, vertical spray pipes project upwards into the accessories bay bulkhead 186 and into the spaces around No. 1 fuel tank.

Firewire sensing elements

17. *Power unit systems.* The firewire triple FD fire detection circuit incorporated within each power unit system consists of varying lengths of Mk. 2 medium temperature firewire element joined together by flanged, hexagon, elbow and flexible coupling units. Each circuit is connected electrically to a relay unit housed in the radio bay. The element is routed over the inner surface of the lower cowling door, around the auxiliary spar ring, under the zone 1 upper ventilation air-outlet, and rearwards about the inner nacelle structure as far as station 450. Termination fittings at the end of each element run incorporate 2-pin plugs for the attachment of the appropriate relay unit electrical connections. Further details of the components comprising the firewire detection circuits are contained in A.P.107E-0102-1.

18. *Fuel tanks, bomb bay and accessories bay system.* The fuel tanks, bomb bay and accessories bay system incorporates three firewire triple FD fire detection circuits similar to those employed in the power unit systems. One circuit is clipped to the spray pipe system around the fuel tanks, bomb bay and accessories bay, another projects into the rear of the bomb bay, and the remaining one is immediately above the ventilating air-outlet in the accessories bay rear compartment door.

Crashtrip elements

19. Impact-operated crashtrip elements are mounted on the extremities of the aircraft as follows:-

(1) Two mounted in tandem on the undersurface of the port wing tip fairing.

(2) Two mounted in tandem on the undersurface of the starboard wing tip fairing.

(3) Two mounted side-by-side on the undersurface of the fuselage structure, forward of the nose wheel bay.

(4) Two mounted side-by-side on the undersurface of the fuselage structure, aft of the bomb bay.

(5) Two mounted side-by-side on the undersurface of the bomb door tank when fitted.

20. In the event of a crash, all the fire extinguisher bottles are discharged simultaneously by the operation of any pair of the crashtrip elements. Details of the crashtrip elements are contained in A.P.113D-1205-1.

SERVICING

General

21. Before attempting to service the fire extinguisher systems, ensure that the aircraft has been rendered electrically safe (*A.P.*101B-1202-1B, *Cover* 1, *Sect.* 6, *Chap.* 1).

Note...

The battery isolating switch will not render the fire extinguisher systems electrically safe; the battery leads (emergency battery leads pre-Mod 1548) must be disconnected or the fuse in the fire extinguisher system circuit withdrawn.

WARNING...

Methyl-bromide in its gaseous state is toxic if inhaled and, in either its gaseous or liquid state, can cause severe burns.

Extinguisher bottles

22. No servicing is possible except for a periodic check for leakage, which is done by weighing each bottle as described in A.P.107E-0400-1A. Instructions for the removal of the extinguisher bottles are in para 25. Details on the servicing of the cartridge units are in A.P.110N-0703-1.

Spray pipes

23. Blocked holes in the spray pipes can be located and cleared as follows:-

(1) Power unit systems

(a) Enter the accessories bay rear compartment, remove the blanking plug from the ground test connection in the port delivery pipeline and connect an air supply to the connection.

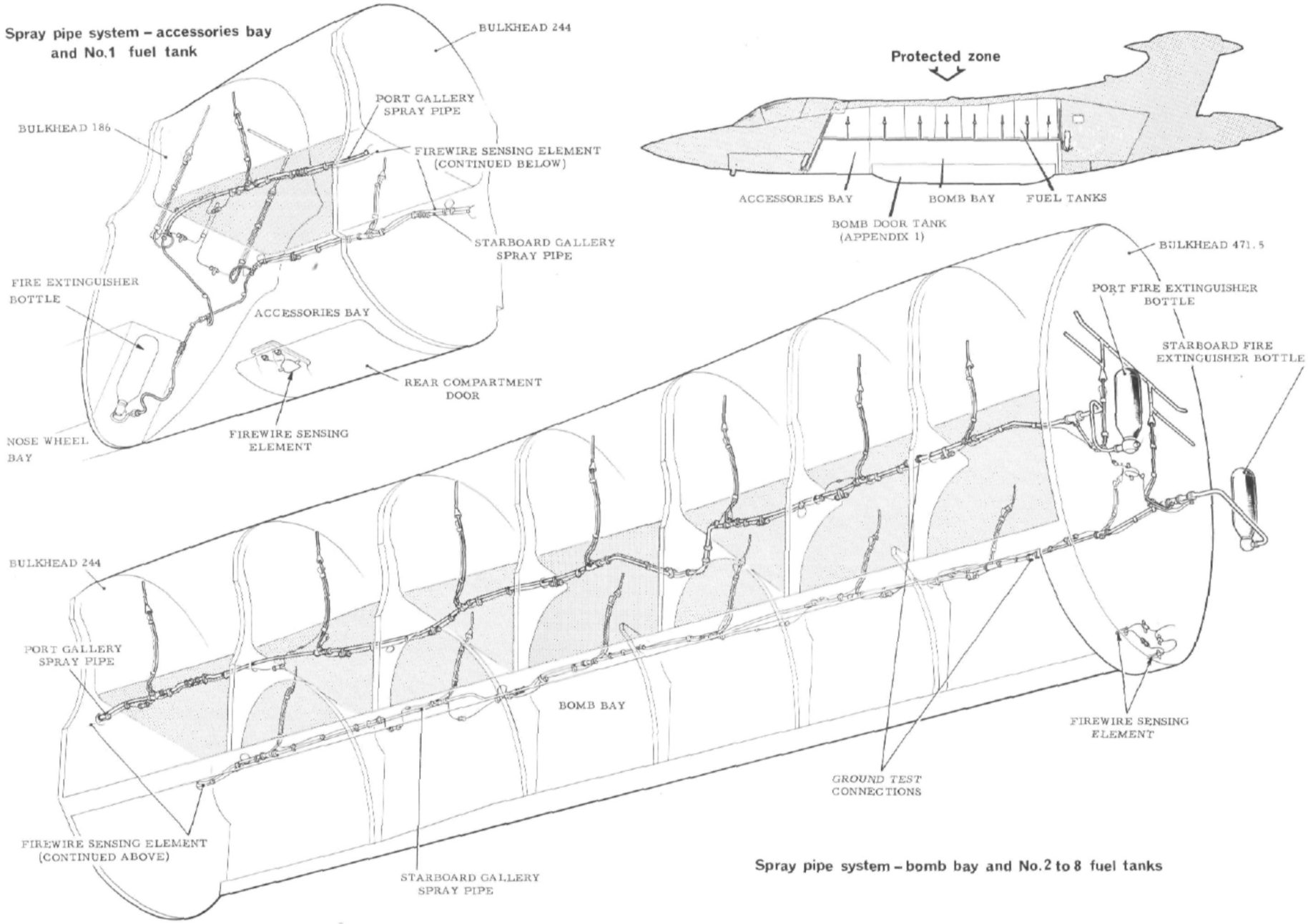

Fig.2. Fire extinguisher system – fuel tanks, bomb bay and accessories bay

845

(b) Pressurize the system to 50–100 p.s.i. and ensure that all pipe connections are leakproof and that there is a clear flow of air from all the holes in the spray pipes.

(c) If the pressure of the air does not clear the obstruction, this can be removed by passing the correct size drill through the affected holes as follows:-

Spray holes – drill size 1.00 mm (0.04 in. dia).
Drain holes – drill size $\frac{1}{8}$ in.

(d) Disconnect the air supply from the ground test connection and replace the blanking plug.

(e) Repeat operation (a) to (d) on the starboard side.

(2) Fuel tanks, bomb bay and accessories bay system.

(a) Open the bomb door to the intermediate position (*Cover* 1, *Sect.* 2, *Chap.* 1).

(b) Remove the blanking plug from the ground test connection in the port gallery pipe at the rear of the bomb bay, and connect an air supply to the connection.

(c) Pressurize the system to 50–100 p.s.i. and ensure that all pipe connections are leakproof and that there is a clear flow of air from all the holes in the spray pipes (bomb bay only).

(d) Disconnect the air supply from the ground test connection and replace the blanking plug.

(e) Repeat operation (b) to (d) for the starboard side spray pipes.

(f) Enter the nosewheel bay and disconnect the delivery pipe from the fire extinguisher at the rear bulkhead.

(g) Connect an air supply to the bulkhead connector, pressurize the system to 50–100 p.s.i. and ensure that all pipe connections are leakproof and that there is a clear flow of air from all the holes in the spray pipes (accessories bay only).

(h) Disconnect the air supply from the bulkhead connector and reconnect the pipe to the fire extinguisher.

Note...

(1) If the pressure of the air does not clear an obstruction, this can be removed by passing the correct size drill through the affected holes as follows:-

Accessories bay spray pipes – drill size $\frac{1}{16}$ in.

Bomb bay spray pipes – drill size 1.00 mm (0.040 in. dia)

Fuel tank and bulkhead spray pipes – drill size 1.00 mm (0.040 in. dia).

(2) If blockage is suspected in any of the fuel tank or bulkhead spray pipes, the relevant pipes must be removed (para 28) for obstruction to be cleared.

(3) For spray pipe extensions built into the aircraft structure, clearance of any obstruction can only be effected by air pressure as these pipes are not removable.

REMOVAL AND INSTALLATION

General

24. Before attempting to remove or install the fire extinguisher system components, ensure that the aircraft is rendered electrically safe (*para* 21). Removal procedures are in the following paragraphs; the procedure for assembly is in the reverse order, except where otherwise stated.

WARNING...

Access to both extinguisher bottles in the radio bay is limited, therefore, extreme care is to be taken during removal and installation to prevent damage to adjacent components, in particular the flying control tie-rods at the starboard side.

Extinguisher bottles – removal

25. Each fire extinguisher bottle is secured to a mounting bracket by hinged straps or a clamping block. To remove the bottle from its mounting bracket, disconnect the electrical plug from the socket on the cartridge unit, disconnect the delivery pipe from the union on the outlet adapter, unfasten the straps or clamping block, and lift the bottle from the bracket. Fit blanking caps to the exposed connections.

Extinguisher bottles – installation

26. To install an extinguisher bottle:-

(1) Remove the transport cap from the cartridge mounting platform.

(2) Fit the removable cartridge firing unit.

(3) Unscrew the junction box, remove the transport cap, and lightly smear the internal and external threads with barium chromate to DTD.369.

(4) With the locknut at the top of the thread screw on the junction box as far as it will go and leave finger-tight.

(5) Mount the extinguisher in its bracket.

Note...

When installing an extinguisher in the nose wheel bay, ensure that the cartridge firing unit is positioned at 90 deg to the bottle outlet pipe to prevent the electrical connection being chafed by the nose wheel.

(6) Turn the junction box to the required position, then lock with the locknut. Do not unscrew the outlets more than *one complete turn.*

(7) Attach the extinguishant pipe.

(8) Connect the electrical plug to the cartridge unit. If it is an engine fire extinguisher bottle which has been installed, ensure that plug A-CT is connected to the port fire bottle, plug A-CS is connected to the starboard fire bottle and that the cable retaining chains (*fig* 1) are secured to the aircraft structure.

Spray pipes

27. The spray pipe extensions in the bulkheads and around the fuel tanks cannot be removed as they are built into the structure of the aircraft. All other spray pipes may be removed as follows:-

(1) Disconnect the spray pipe at the appropriate unions.

(2) Remove the clips securing it to the aircraft structure.

(3) Ensure that the remaining pipes are blanked off to prevent damage to the threads and the ingress of foreign matter.

28. Spray pipes projecting into the space between the fuselage skin and the fuel tanks, and behind the bulkheads, are supplied with the firewire attached, forming a composite detector/spray unit. To remove these:-

(1) Disconnect the spray pipe at the appropriate union and the firewire element at the respective coupling units.

(2) After removing the two bolts securing the detector/spray unit to the structure it can be withdrawn from the respective aperture.

(3) Blank off the ends of the remaining pipe and firewire elements.

Note...
The firewire loops of 0.375 in. radius used on the composite detector/spray units must not, in any circumstances, be straightened out and reformed.

Firewire sensing elements

29. Firewire sensing elements, projecting upward behind the bulkheads and into the space between the fuel tanks and the fuselage skin, are supplied with the spray pipes as complete units. These should be removed as described in para 28. To remove other sections of the firewire sensing element circuits:-

(1) Disconnect the coupling unit at each end of the section.

(2) Unclip the firewire from the aircraft structure or the respective spray pipe.

(3) Cover the sensing element end fittings with a sealing cap to prevent the inress of foreign matter.

Caution...
When installing flexible coupling units on the engine lower cowling doors on post-Mod 1636 aircraft, refer to fig 1A and ensure that the coupling unit is secured at all positions, otherwise damage may result.

Note...
(1) To ensure that the firewire element connections remain clean, dry and tight after assembly, the installation procedure (A.P.107E-0102-1) must be strictly adhered to.

(2) On installation, the firewire coupling units must be tightened to a torque loading of 80 to 100 lb in. using a firewire torque spanner adapter, Ref No. 26NA/95413, or de Havilland Part No. J69263/Z11 UNF, in conjunction with an Acratork or similar type torque wrench.

(3) As the end fittings on the flexible coupling units have no location key, carefully ensure that no torsion is applied to the couplings when tightening the coupling nuts. Rotation of the coupling must be resisted by a spanner engaged with the flats on the coupling bodies.

(4) When installing a firewire elbow connector in the power unit fire protection system on post-Mod 1115 aircraft, ensure that the connector is engaged with the support bracket and the nuts are correctly locked as shown in fig 1, detail A, B or C as appropriate.

Crashtrip elements

30. Removal procedure for each crashtrip element is generally similar, but owing to the different location of each element they are dealt with separately:-

(1) Forward of the nose wheel bay

(a) Fold the nose and secure it to the fuselage side.

(b) Disconnect the element leads from the adjacent terminal block.

(c) Remove the screws securing the crashtrip elements to the structure.

(2) Port and starboard wing tips

(a) Detach the wing tip fairing (*Cover* 2, *Sect.* 3, *Chap.* 2).

(b) With the fairing adequately supported, remove the clips and disconnect the element leads from the appropriate terminal block.

(c) Remove the screws securing the crashtrip elements to the access panel in the fairing.

(3) Aft of the bomb bay

(a) Rotate the bomb door to the intermediate position (*Cover* 1, *Sect.* 2, *Chap.* 1).

(b) Enter the bomb bay, and disconnect the element leads from the terminal block on the bomb bay aft bulkhead.

(c) Remove the screws securing the elements to the structure.

(4) Undersurface of the bomb door tank (see Appendix 1).

EXPLOSION SUPPRESSION SYSTEM (PRE-MOD 1536)

DESCRIPTION AND OPERATION

31. The main fuel tanks explosion suppression system affords protection against the effects of incendiary fire etc. during hostilities; the system is inhibited against inadvertent operation during normal operations by incorporating shorting links and caps in the electrical circuits. On embodiment of Mod 1536, the system is removed completely.

32. A description of this type of explosion protection is in A.P.957.

33. Visual indication that the suppressor columns have been detonated is shown by associated indicator fuses in the starboard wheel bay.

Location of components

34. The main components of the system are located in fig 3; a wiring diagram of the electrical system is in A.P.101B-1202-1B, Cover 1, Sect. 6, Chap. 10.

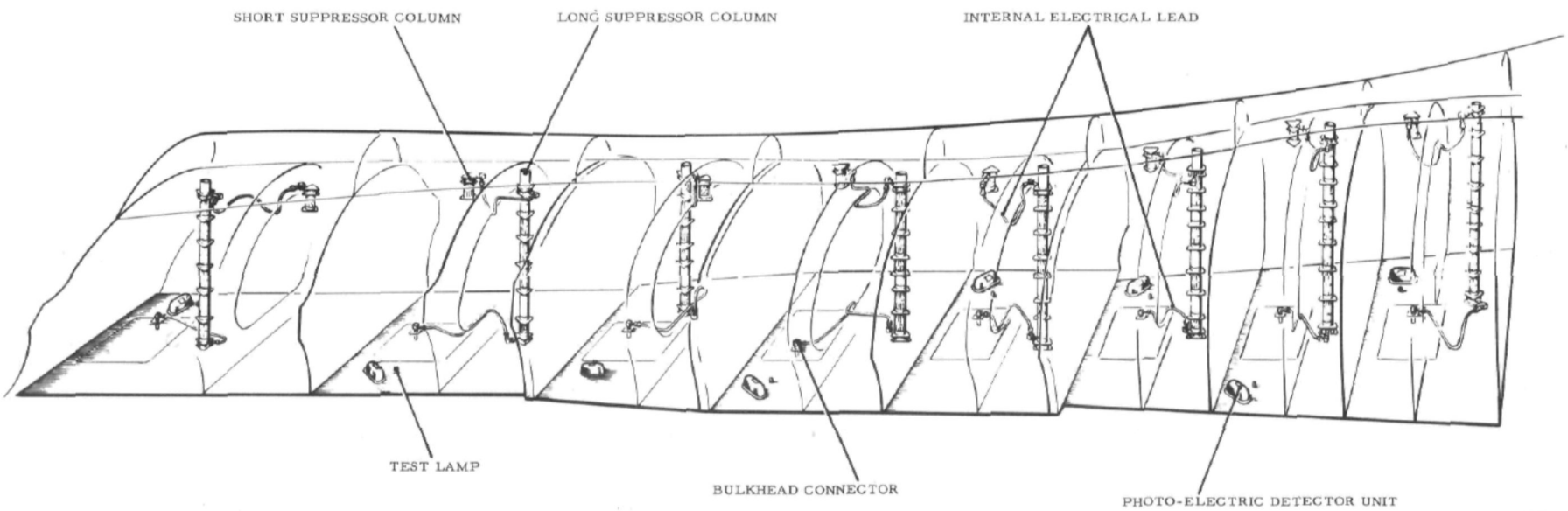

Fig.3. Explosion suppression system

Component description

35. The system consists of the following main components:-

(1) Detector units (one in the base of each main tank).

(2) Power pack and over-voltage relay (mounted in the radio bay)

(3) Columns containing long and short suppressor units (two columns per tank).

(4) Detonators (one for each suppressor unit).

(5) Indicator fuses (one for each tank in the starboard wheel bay).

The detector units and power pack are described in A.P.4343E, Vol. 1; the suppressor units detonators and indicator fuses are described in A.P.1661F, Vol. 1.

WARNING...

It must be borne in mind that the indicator fuses and detonators, other than dummy detonators, are explosive stores, and must be handled and stored in accordance with current regulations.

KEY TO FIG 4 (SUPPRESSOR COLUMNS – COMPOSITION)

Item	Description	Type or Part No.	Ref No.
1	Long suppressor	E121	27N/179
	with detonator	E860	12G/1449
2	Short suppressor	E557	27N/292
	with detonator	E880	KJ/017
3	Terminal block	E587	27N/199
4	Terminal block	E510	27N/202
5	Long dummy suppressor	E165	27N/181
	with conductor	E228	27N/184
6	Short dummy suppressor	E626	27N/200
	with conductor	E627	27N/201
7	Shorting plate assembly	E155	27N/180
8	Spigot (No. 8 tank)	YB3-57-1039A	26NA/8679
9	Spigot (No. 1 and 7 tanks)	YB3-57-1039B	26NA/8673
10	Spigot (No. 4 tank)	YB3-57-1039C	26NA/8676
11	Spigot (No. 3 tank)	YB3-57-1039D	26NA/8675
12	Spigot (No. 5 tank)	YB3-57-1039E	26NA/8677
13	Spigot (No. 2 tank)	YB3-57-1039F	26NA/8674
14	Spigot (No. 6 tank)	YB3-57-1039G	26NA/8678

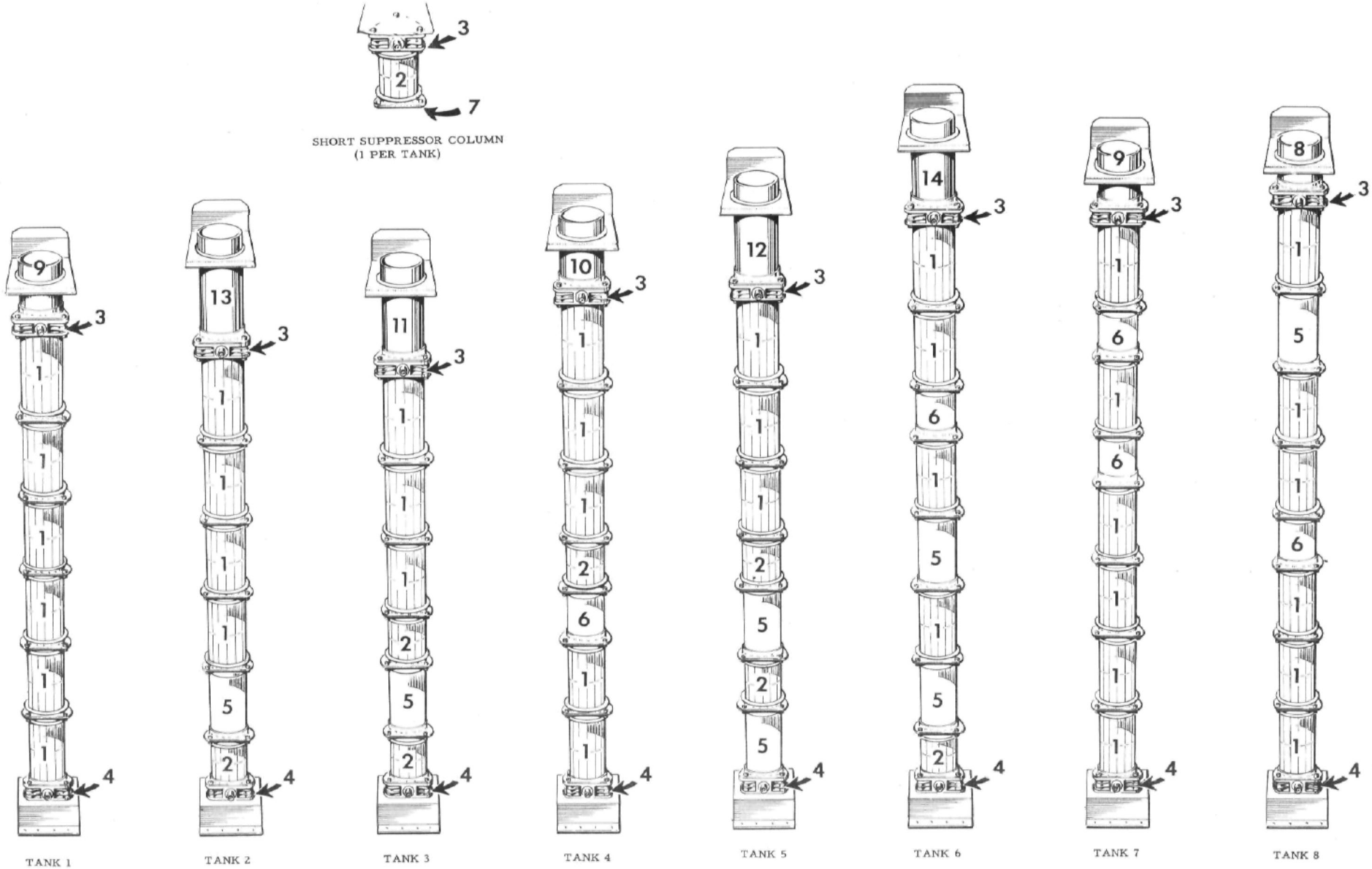

Fig.4. Suppressor columns – composition

Suppressor columns

36. A number of long and short suppressor units, interspaced by dummy suppressors, constitute each suppressor column. The composition of each column is in fig 4.

SERVICING

General

37. The servicing of the system in situ is confined to the regular testing of the electrical circuits. Information on these tests is in A.P.101B-1202-1B, Cover 1, Sect. 6, Chap. 10; tests required on components removed from the aircraft are in the relevant A.P. (*para* 35).

REMOVAL AND INSTALLATION

Precautions

38. Splinter-proof eye-shields and overalls are to be worn when removing and handling suppressor columns.

39. After a suppressor column has been discharged, extreme caution must be exercised when handling the remains of the column. The edges of the ruptured suppressor units are razor sharp, necessitating the use of gloves during handling.

Suppressor columns – removal and assembly

40. To remove a long suppressor column from a main fuel tank:-

(1) Remove fuse P7 on panel C-Q and fuse 3A7 on panel R-A.

(2) Disconnect the electrical lead from the bulkhead connector on the lower surface of the fuel tank access panel.

(3) Defuel the associated fuel tanks (*Cover* 1, *Sect.* 2, *Chap.* 2).

(4) Remove the fuel tank access panel; disconnect the electrical lead from the internal bulkhead connection.

(5) Disconnect the internal electrical leads from the terminal blocks at the top and bottom of the suppressor column; fit earthing caps to each terminal block socket.

(6) Remove the bolts securing the suppressor column to the support bracket in the tank floor.

(7) Manoeuvre the suppressor column to disengage the spigot from the support bracket in the roof of the tank and remove the column from the tank.

41. To remove a short suppressor column from its position in the roof of a main fuel tank, perform operations (1) to (4) (*para* 40), then:-

(1) Disconnect the electrical lead from the terminal block at the top of the column; fit an earthing cap to the socket.

(2) Remove the bolts securing the suppressor column to the support bracket in the top of the tank.

(3) Remove the column from the tank.

42. Assembly of the suppressor columns must be performed in stages, with an inspection/test after each stage. Details are in A.P.101B-1202-1B, Cover 1, Sect. 6, Chap. 10 of this publication.

43. Installation of the columns into the tanks is a reversal of the removal sequence given in para 40 and 41.

Appendix 1 BOMB DOOR TANK

LIST OF CONTENTS

ILLUSTRATION

Introduction

1. The fire protection system installed in the bomb door tank prevents fire or explosion occurring during a crash landing or similar incident by dispersing extinguishant throughout the air space in the tank. This is achieved by discharging a bromotrifluoromethane, automatic type fire extinguisher which is operated either manually by use of the relevant fire extinguisher push-button switch or automatically in the event of any pair of crashtrip elements being operated.

DESCRIPTION AND OPERATION

Description

2. A Graviner fire extinguisher bottle Type 243A (1) (pre-Mod 5314) or 243A (2) (post-Mod 5314) is, together with a bursting disc, Part No. DAB 205-002, mounted on the top of the bomb door tank inner skin in the vee section between frames G and H. The delivery pipeline from the extinguisher bottle is routed upwards and rearwards, passes through the inner skin into the tank and then to a three-way connector. Cross pipes connect the three-way connector to gallery spray pipes routed along both sides of the bomb door tank. The gallery pipes are drilled at intervals along their length to act as spray pipes, ensuring proportional distribution of the extinguishant. The diameter of the pipe run is decreased progressively from ¾ in. to ⅜ in. throughout its length to maintain the pressure of the extinguishant and assist in its correct distribution.

3. The bursting disc, by preventing fuel from the bomb door tank reaching the fire

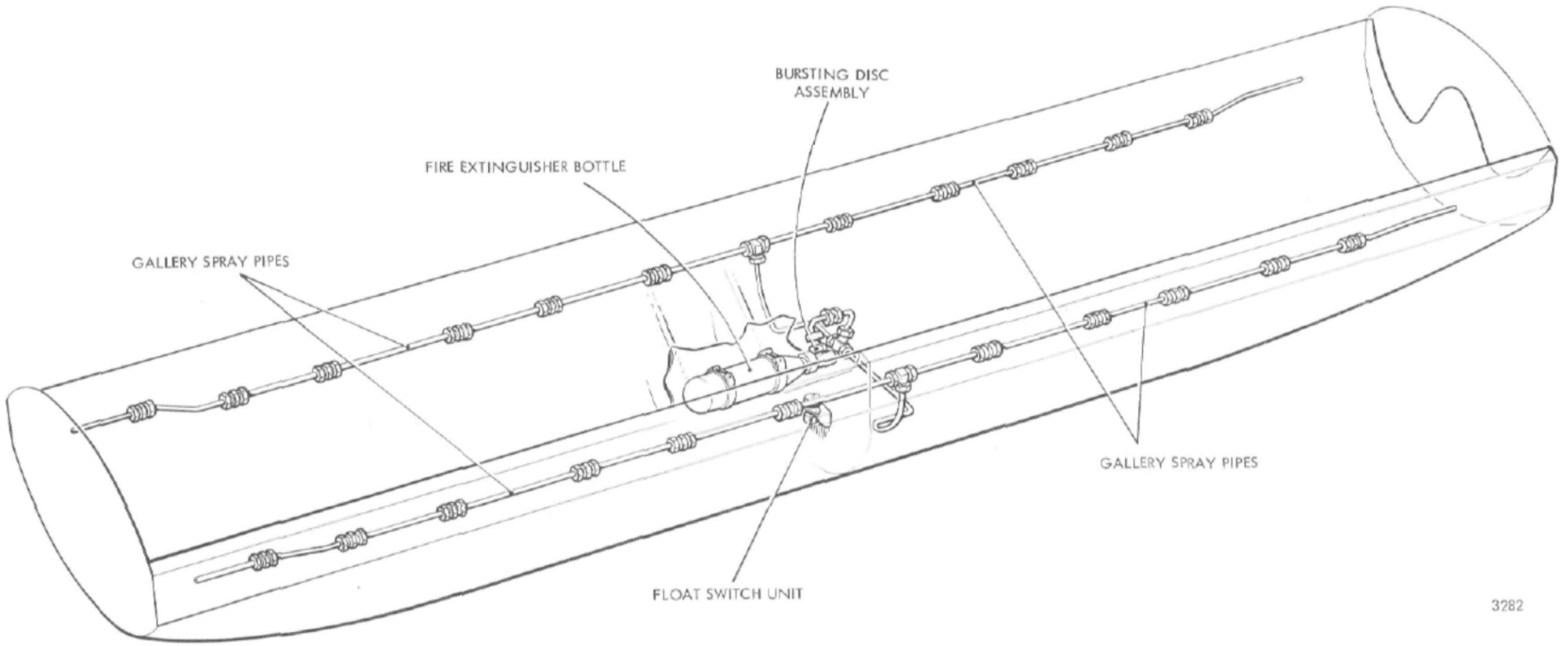

Fig.1. Fire protection system – bomb door tank

extinguisher bottle, protects the mechanical operation of the bottle and prevents fuel leaking into the bomb bay via the vent hole in the head of pre-Mod 5314 bottles. When operation of the fire protection system is effected, the pressure of the extinguishant issuing from the bottle bursts the disc to allow free passage of the extinguishant into the system.

4. A float switch unit is incorporated into the electrical circuit of the system to inhibit the system until the level of fuel in the tank falls to a predetermined value. The action of the float switch unit prevents a build-up of pressure within the tank which would result should the system be operated and extinguishant discharged into the tank while the fuel level in the tank was still high. The unit comprises two vertically-opposed float switches, each switch having its own float and associated weight. This arrangement ensures that with the bomb door tank in either the open or closed position, the upper float switch is always operational to inhibit the firing of the system when the fuel level is above the float switching level; the lower float switch is held down by its associated weight to prevent it operating in the wrong sense.

5. Two impact-operated crashtrip elements are mounted side-by-side in a pocket on the undersurface of the bomb door tank. When the bomb door tank is installed on the aircraft, the crashtrip elements act in conjunction with the aircraft fire protection system described in the basic Chapter. Details of the crashtrip elements are contained in A.P.113D-1205-1.

6. A push-button switch, on the pilot's starboard console, (*Cover* 1, *Sect.* 1, *Chap.* 1), is for manual actuation of the bomb door tank fire protection system. Operation of the push-button switch initiates the fire protection system provided that the fuel level is at or below the float switching level (*para* 4). Should the fuel level be above this point, the magnetic-hold feature of the switch maintains the circuit in a state of readiness until the fuel level drops sufficiently, when the extinguisher will discharge. The push-button switch becomes illuminated as soon as it is depressed, indicating that fire protection has been selected.

Note...

If, after operating the push-button switch, it is required to cancel the selection before the fuel level falls to the float switching

level, the push-button can be lifted; this causes the warning light to be extinguished and the system to revert to its normal condition.

Operation

7. Operation of this system is effected by either of the following methods:-

(1) *Crashtrip elements.* In the event of a crash landing, operation of any pair of crashtrip elements, located in the extremities of the aircraft, will, when the float switching level of fuel in the tank obtains (*para* 4), detonate the cartridge unit in the extinguisher thus causing the extinguishant to be discharged into the air space in the tank via the spray pipes.

(2) *Push-button switch.* Depression of the fire extinguisher push-button switch (*para* 6) by the pilot, on anticipating a possible hazardous incident, will, when the float switching level of fuel in the tank obtains (*para* 4), detonate the extinguisher cartridge unit and cause extinguishant to be discharged into the air space in the tank.

SERVICING

General

8. If the bomb door tank is installed on the aircraft, ensure that the aircraft has been rendered electrically safe (*A.P.*101B-1202-1B, *Cover* 1, *Sect.* 6, *Chap.* 1) before attempting to service the fire protection system.

Extinguisher bottle

9. Ensure that the extinguisher bottle has not discharged by checking that the indicator pin on the bottle is not protruding. Inspect the bottle operating head for the presence of fuel, indicating a faulty bursting disc. Periodically check the bottle for leakage by weighing the bottle as described in A.P.107E-0400-1A. Instructions for the removal of the extinguisher bottle are in para 11. Servicing instructions for the cartridge unit are in A.P.110N-0703-1.

REMOVAL AND INSTALLATION

General

10. Before attempting to remove or install the fire protection system components, ensure that the aircraft is rendered electrically safe (*para* 8).

Extinguisher bottle – removal

11. As the bursting disc is removed with the extinguisher bottle there is nothing to prevent fuel feeding back and out of the extinguishant delivery pipe. This would depend on the level, if any, of fuel in the tank, the position of the bomb door tank when being serviced and the attitude of the aircraft. It is, therefore, recommended that the bomb door tank be defuelled before removing the extinguisher bottle and bursting disc.

12. The fire extinguisher bottle is secured to mounting blocks by two straps. To remove the bottle from its mounting blocks, disconnect the delivery pipe from the union on the bursting disc, unfasten the straps, and lift the bottle away from the mounting blocks. Disconnect the bursting disc from the bottle. Fit blanking caps to the exposed connections.

Continued overleaf

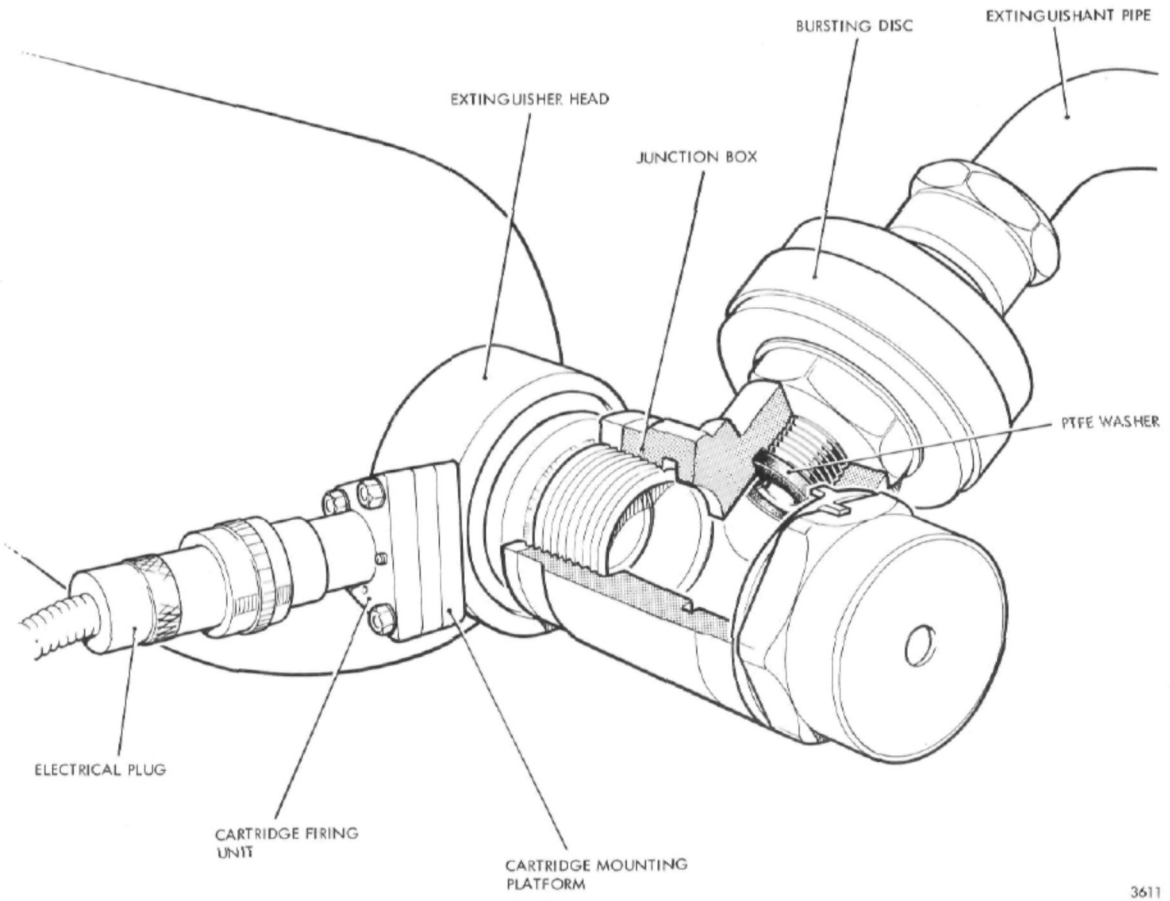

Fig.2. Extinguisher bottle – installation

Extinguisher bottle – installation (fig 2)

13. A pre-Mod 5314 extinguisher bottle is installed in accordance with the instructions in the basic chapter, with the exception that the bursting disc is fitted to the junction box before connection of the extinguishant pipe.

14. To install a post-Mod 5314 extinguisher bottle, proceed as follows:

Caution . . .
The joint between the junction box and the extinguisher head on this bottle is sealed by the manufacturer during assembly and must not be disturbed.

(1) Remove the transport cap from the cartridge mounting platform.

(2) Fit the removable cartridge firing unit.

(3) Ensure that the PTFE washer supplied with the bottle is correctly positioned at the bottom of the female thread on the junction box as shown on the illustration.

(4) Fit the bursting disc.

(5) Mount the extinguisher in its bracket.

(6) Connect the extinguishant pipe to the bursting disc.

(7) Connect the electrical plug to the cartridge unit.

Crashtrip elements

15. Removal procedure for each crashtrip element is as follows:-

(1) Remove the screws securing the crash-elements to the bomb door tank undersurface.

(2) Withdraw the crashtrip elements and leads.

(3) Disconnect the element leads from the in-line connectors.

The procedure for installation is in the reverse order.