Chapter 11 EMERGENCY EQUIPMENT

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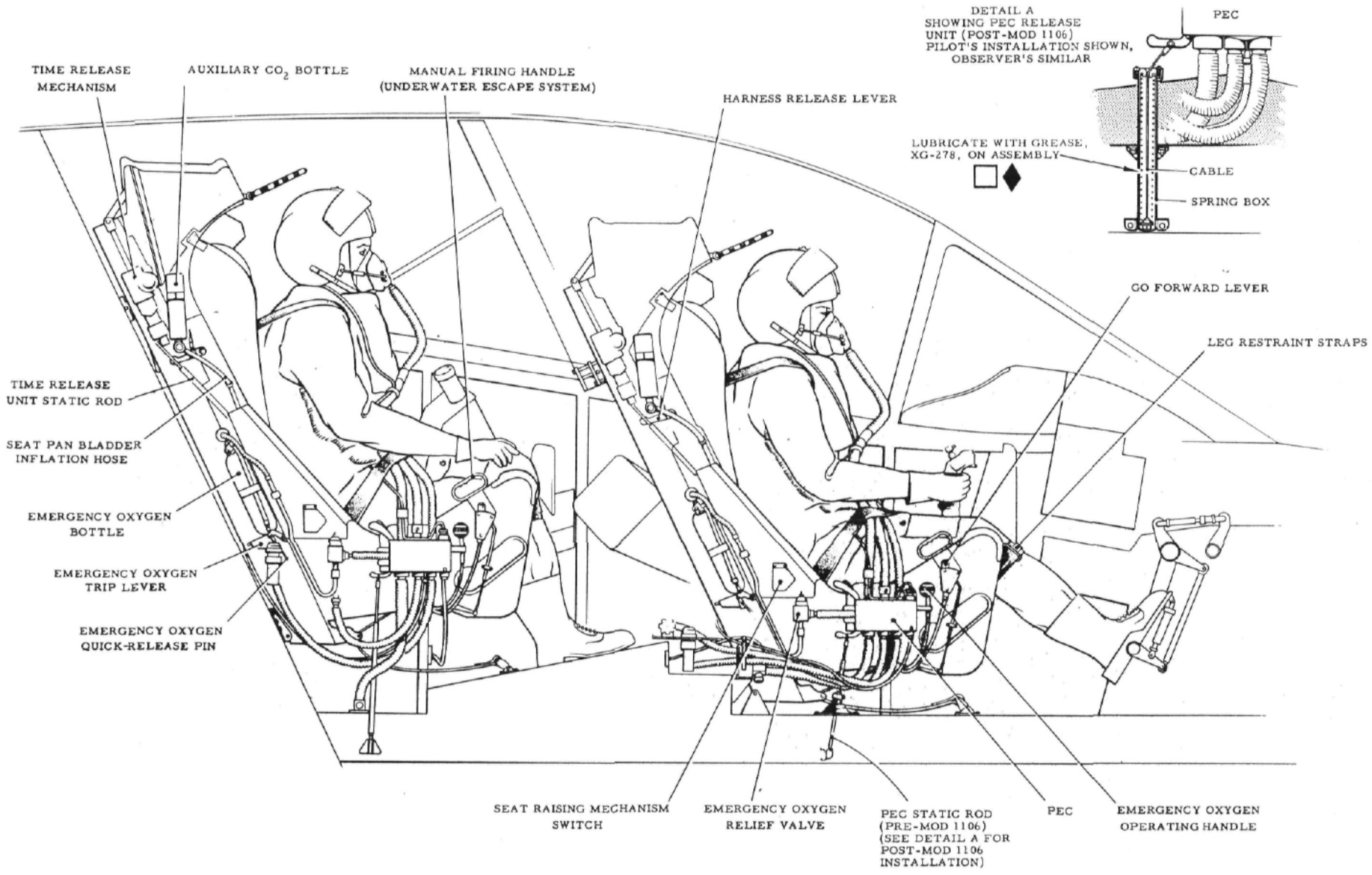
LIST OF ILLUSTRATIONS

WARNING...

Before entering or leaning into the cockpit, the safety precautions detailed on the Lethal Warning card in the front of this book must be observed.

RESTRICTED



BUCCANEER S MK. 1 AIRCRAFT AIR DIAGRAM 7539/MIN.	
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Fig. 1. Installation of ejection seats (starboard side) – pre-Mod 12 17
◀Mod 1106 incorporated▶

DESCRIPTION AND OPERATION

Introduction

1. The following items of emergency equipment are installed in the aircraft:-

◀(1) Two Type 4 MSA ejection seats or, on post-Mod 1217 aircraft, two Type 6 MSA rocket-assisted ejection seats, one for each crew member. ▶

Note...
The different marks of seat which may be fitted are listed in the Leading Particulars at the front of Cover 1.

(2) Emergency oxygen supply for cockpit use, for use during descent after high altitude ejection or for use during underwater escape.

(3) An automatic underwater escape system for pilot and observer. ▶◀

(4) A cartridge-powered canopy jettison mechanism operated from inside or outside the cockpit.

(5) A hand-operated fire extinguisher mounted in the cockpit at the observer's station.

and are briefly described in the following paragraphs. Detailed information on the fire protection systems for the engines, bomb bay, accessories bay and fuel tanks is in Cover 3, Sect. 4, Chap. 5.

Modification standard

2. The following modifications are incorporated in this chapter:- 309, 546, 564, ◀631, 749, 902, 1093, 1106, 1148, 1217 and 1236. ▶

◀ Ejection seats *(fig 1, 1A and 2)*

3. Both the pilot and observer are provided with a lightweight ejection seat and, on post-Mod 1217 aircraft, each seat is fitted with a rocket pack to assist ejection. Each seat is fitted with two firing ▶ handles; the main handle is positioned above the occupant's head and is attached to a face blind, while the alternative handle is positioned at the front of the seat pan between the occupant's legs. Each seat has two leg restraint straps, which pull the occupant's legs into position against the seat pan during ejection, and hold them until the seat harness is released. To permit safe ejection through the canopy, each seat is fitted with four canopy breakers; two mounted at the top of the seat, one on each side of the drogue container; the other two, which also serve as thigh guards, are mounted one on each side of the seat pan.

4. The seat pan can be adjusted for height by an electric seat-raising actuator, controlled by a switch on the starboard side of the seat pan. A go-forward lever, also on the starboard side of the seat pan, allows the occupant freedom of movement, by unlocking the shoulder straps of the combined harness; the harness automatically returns to the locked position when the occupant leans back in the seat.

5. A personal equipment connector (PEC) is located on the starboard side of the seat pan and is used to connect the ◀ occupant's service lines to the appropriate aircraft supplies by a single action. Prior to the embodiment of Mod 1106, the aircraft portion of the PEC is disconnected from the seat portion during ejection by the action of a static rod anchored to the aircraft structure. As this arrangement is prone to accidental damage, Mod 1106 introduces a cable and spring assembly enclosed in a housing in lieu of the static rod. The following services are connected ▶ to the PEC:-

(1) Mic-tel lead

(2) Life-saving waistcoat (LSW) inflation supply ▶◀

(3) Anti-g suit supply

(4) Air ventilated suit supply

(5) Main oxygen supply

(6) Emergency oxygen supply

6. A manual separation handle, situated on the port side of the seat pan, operates the mechanism to release the harness, the PEC and the leg restraint locks after ◀ ejection. Detailed information on the construction and operation of the Type 4 MSA ejection seats and their equipment is in A.P. 109A-0002-1; information on the Type 6 MSA seats is in A.P. 109B-0132-1C. ▶

◀ 7. The seat pan accommodates a personal survival pack containing a life-raft and other items of survival equipment. A pack containing rocket tubes is fitted to the underside of the seat pan on Type 6 MSA ▶

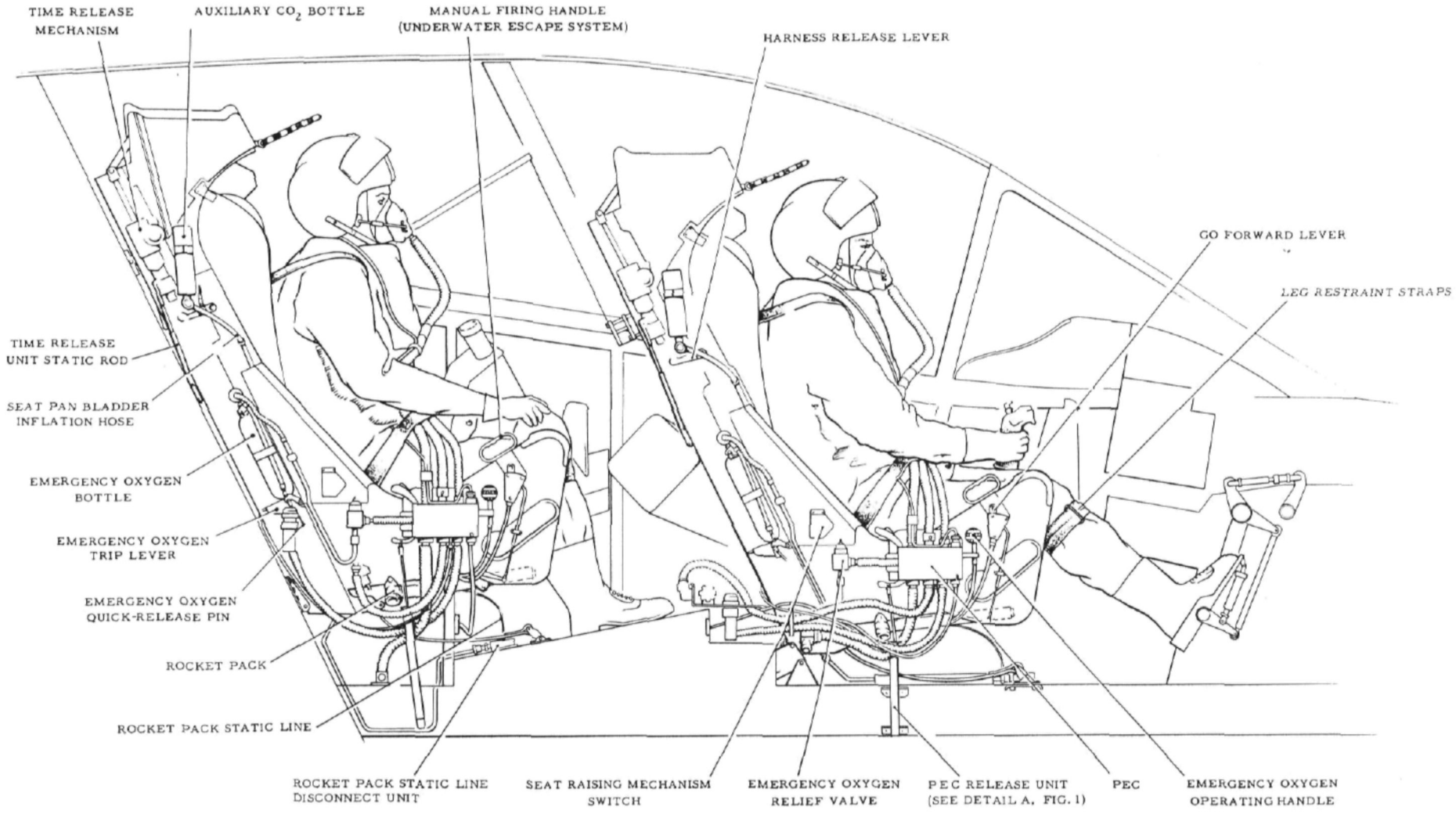

Fig. 1A. *Installation of ejection seats (starboard side) – post-Mod 1217*

◀1 and 2 seats for the purpose of rocket-assisted ejection. When the ejection gun cartridges have been fired, the ejection seat ascends and in doing so operates a static line connecting the rocket pack to a disconnect unit secured to the cockpit floor at the starboard side of the seat. The static line then breaks away from the rocket pack, firing the rocket tubes in the process. The disconnect unit is used during underwater ejection (*para* 18). ▶

Emergency oxygen system

8. Each ejection seat has an emergency oxygen bottle mounted on the starboard side of the seat structure. The bottle may be operated either automatically during ejection or manually whenever an emergency oxygen supply is required. Manual operation is controlled by a lever mounted on the starboard side of the seat pan and, once selected, oxygen will continue to flow until the bottle is exhausted. When the seat is ejected, the bottle is automatically opened and will supply the occupant with oxygen until he is separated from the seat. A description of the emergency oxygen sets is in A.P. 1275G, Vol. 1; details of their installation are in A.P. 109A-0002-1 and in Chap. 10 of this Cover.

Underwater escape system

General

9. A fully automatic underwater escape system is provided at each crew station. Part of the system is embodied on the ◀ejection seats, part is embodied on the▶ aircrew's life-saving waistcoat and the remainder is permanently fitted to the aircraft structure. ▶◀

10. The pilot and observer each have a similar but independent system. A schematic diagram of one system is shown in fig 3; the layout of the two systems is shown in fig 1 and 2. It will be noted that the main air bottle in the pilot's cockpit is fitted with the operating head uppermost, while the one in the observer's cockpit is inverted.

Controls

11. *Underwater escape selector handle.* An underwater escape selector handle is fitted on the port side of each crew station, alongside the ejection seat. The handle has two positions, SAFE (up) and UNDERWATER (down); it is locked in either of these positions by a spring-loaded locking catch, which must be released before the handle can be moved. This handle must always be selected SAFE except during carrier take-off and landing.

12. When SAFE is selected, a slide valve is moved to blank off the delivery ports to the base of the ejection gun and the drogue gun trip rod release unit. The same movement opens a port to allow compressed air to exhaust to atmosphere outside the cockpit should the main air bottle be inadvertently discharged. Upon selection of UNDERWATER, the slide valve is moved to close the vent to atmosphere and the bottle contents, upon release, initiate the ejection sequence.

Note...

During accidental discharge with SAFE *selected, the pilot's bottle vents to atmosphere at the sea-water pressure sensing port, while the observer's bottle vents into the accessories bay forward compartment.*

13. *Manual firing handle.* A manual firing handle is situated on the starboard thigh ◀guard of the ejection seats. Normally,▶ the escape sequence is initiated by pulling the handle up. The automatic facility is reserved for extreme emergencies.

Main components

14. The components in the system are situated at each crew station as follows:-

Aircraft structure

(1) Main air bottle

(2) Water pressure sensing port

(3) Stainless steel sensing pipes

(4) Stainless steel operating pipes to drogue gun static rod release unit and base of seat ejection gun

(5) Flexible air hose to PEC

◀(6) Static line disconnect unit – post-Mod 1217 aircraft only.

(7) Stainless steel operating pipes to rocket pack static line disconnect unit – post-Mod 1217 aircraft only. ▶

◀*Ejection seat*▶

(8) Drogue gun static rod release unit

(9) CO_2 bottle (seat bladder inflation)

(10) Inflatable seat pan bladder

(11) Inflatable seat back bladder

(12) Flexible hoses (seat bladder inflation)

Life-saving waistcoat (LSW)

(13) CO_2 bottle (LSW inflation)

(14) Relief valve

(15) Flexible air hose from PEC

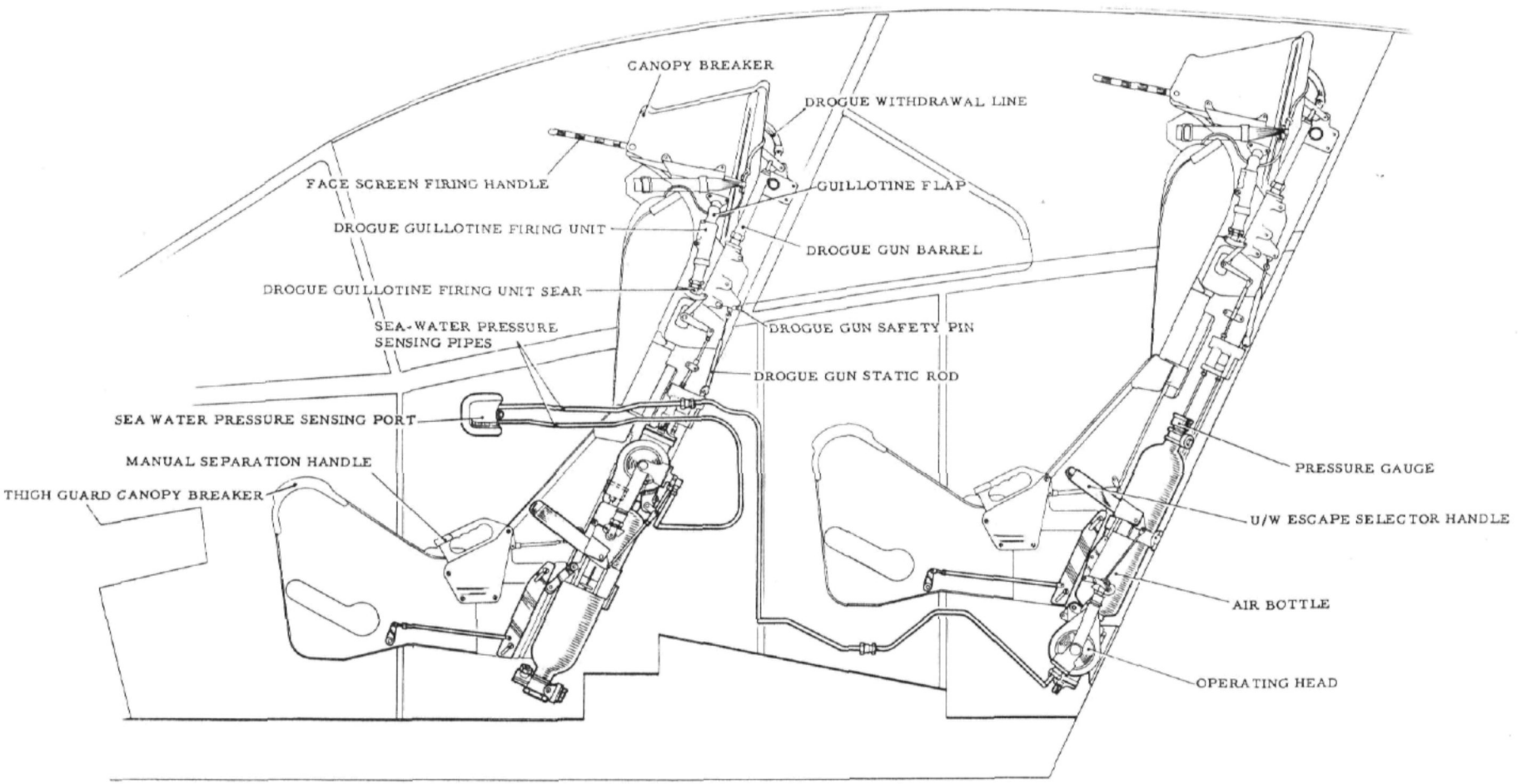

Fig. 2. Installation of ejection seats (port side)
◀ Mod 1217 and 1236 incorporated ▶

The components of the underwater escape system are described and illustrated in A.P. 109A-0002-1.

Main air bottle and operating head

15. The main air bottle is fitted to the aircraft structure at the rear and to the port side of each ejection seat. It is charged with air at an initial pressure of 3000 ± 200 lb/in². Integral with the bottle are the following components:-

(1) An underwater escape selector handle (*para* 11).

(2) A pressure gauge

(3) A charging connection

(4) An operating head

The pressure gauge shows the air pressure contained within the bottle, which can be replenished to the initial charging pressure through the charging connection.

16. The operating head incorporates the following:-

(1) A breech firing unit (manual operation)

(2) A hydrostatic valve containing a pressure sensing diaphragm (automatic operation)

(3) A bottle firing unit

(4) A changeover valve

(5) A servicing safety catch

On aircraft with Mod 1093 embodied, the operating head also incorporates a compensating valve to equalize pressures inside and outside the head. A sectional view of the operating head is shown in fig 3.

Manual operation

17. With the underwater escape selector handle set in the UNDERWATER position, a direct pull upwards on the manual firing handle withdraws a sear from a spring-loaded firing pin in the breech firing unit, allowing the firing pin striker to fire a cartridge. The gas pressure thus generated acts on the pressure sensing diaphragm in the hydrostatic valve, and removes the restraint from a spring-loaded firing pin in the main air bottle firing unit.

18. With the removal of the restraint, the firing pin moves under spring pressure to detonate a cartridge which propels a bullet through a copper seal in the neck of the air bottle. The high pressure air discharges through the pierced seal to the changeover valve, where it is directed to the drogue gun static rod release unit and to the base ◀ of the seat ejection gun. On aircraft fitted with Type 6 MSA rocket-assisted ejection seats (Mod 1217), a tee joint at the base of the seat ejection gun permits high pressure air from the bottle to be directed to the rocket pack static line disconnect unit. The pressure acts upon a plunger which withdraws a retaining pin from the static line eye-end, thus disconnecting the line and rendering the rocket pack inoperative. ▶

19. The air directed to the drogue gun static rod release unit forces a plunger out of its housing; this releases the drogue gun static rod and renders the drogue gun inoperative. At the same time the plunger strikes a linkage which withdraws the guillotine sear and allows the guillotine to sever the static line between the drogues and the parachute. The air pressure then passes to the crew member's LSW inflation bottle, via the PEC, the bottle is actuated and the LSW inflated.

20. The air entering the base of the ejection gun forces the piston tubes upwards, unlocking the seat and ejecting it from the aircraft without firing the ejection gun cartridges.

21. As the seat rises on ejection, the time-release unit is tripped and runs for its normal period of 1¼ seconds when the plunger descends and strikes the harness release lever. As the harness release lever rotates, it releases the harness locks and simultaneously operates the auxiliary CO_2 bottle which inflates the seat-man separation bladders. The occupant is thus forced from the seat and is free to rise to the surface.

Automatic operation

22. With the underwater escape selector lever set in the UNDERWATER position, pressure is transmitted from the sea-water pressure sensing port in the cockpit skin, via stainless steel pipes, to the hydrostatic valve pressure sensing diaphragm in the operating head. When the sinking aircraft reaches a depth of approximately 13 feet the pressure transmitted is sufficient to actuate the pressure sensing diaphragm and remove the restraint from the spring-loaded firing pin in the main air bottle firing unit. Subsequent functioning of the underwater escape system is identical with that described in para 18 to 21.

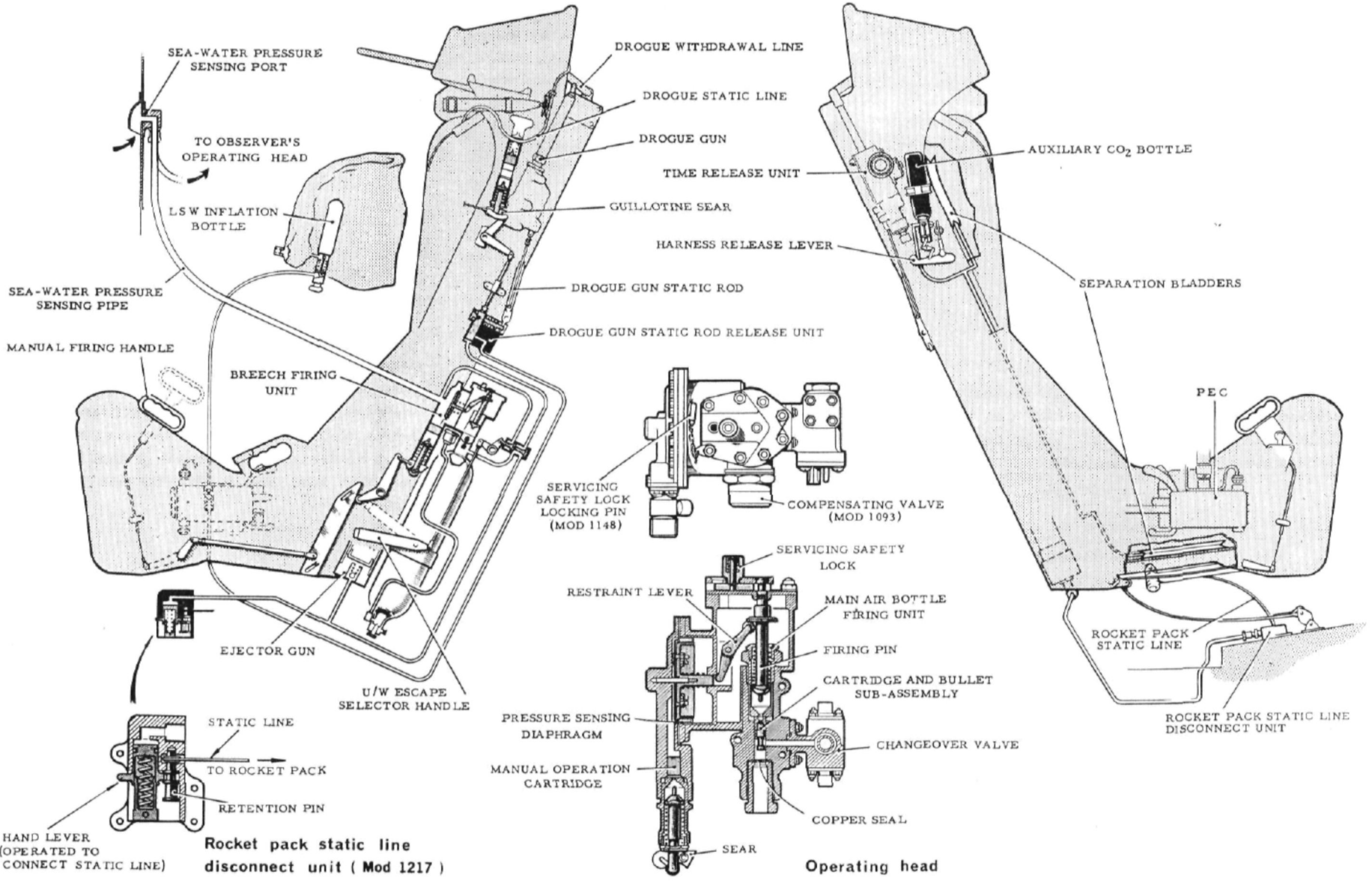

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Fig. 3. Underwater escape system
◀Mod 1217 incorporated▶

Hand-operated fire extinguisher

23. A hand-operated fire extinguisher, containing either B C F (Type 34H) or water/glycol (Type 27H) is mounted at the port side of the cockpit at the observer's station. In either case, the extinguisher is operated by depressing a trigger. A visual indicator shows when the extinguisher has been wholly or partially discharged. Details of the construction, operation and charging of these extinguishers are in A.P. 957C, Vol. 1, 2nd Edition.

Canopy jettisoning system *(fig 4)*

24. The canopy jettison system is operated by gas pressure generated by secondary explosive cartridges contained in two main breeches. These cartridges are detonated when any one of three primary cartridges is fired. The gases operate the pistons of two rail guns and two jettison guns, to unlock and displace the canopy. The gas pressure is conveyed by stainless steel pipes which connect the components of the system.

25. Each primary breech unit consists of a cartridge chamber and a spring-loaded firing pin assembly. The firing pin is held in the safe position by a sear which passes through the top of the pin. The pilot's and observer's primary breech units are fitted beneath the port console as illustrated in fig 4, whilst the primary breech for the external jettison control is located on a bracket attached to the wall of the cabin, forward of the engine control box.

26. The primary breech units are each operated by a separate control handle as shown in fig 4. The pocket containing the external control handle, on the port side of the cockpit structure, is covered by a clear plastic break panel. The external control handle is coupled to the sear of its associated primary breech by a short length of control cable, which is coiled within the pocket. The pilot's control handle is coupled to the sear of the breech by a 5-cwt cable in a flexible conduit, whereas the observer's control is coupled directly to its associated primary breech.

Note...

When connecting the control handles and cables to the sears of the primary breech units, ensure that connection is made to the hook slot and not to the safety pin hole, as shown in fig 4, detail A (pre-Mod 902).

27. The main breech units, composed of a cartridge chamber and a gas-operated firing pin, are fitted to the transverse tie-beam, one port and one starboard, at the rear of the pilot's ejection seat.

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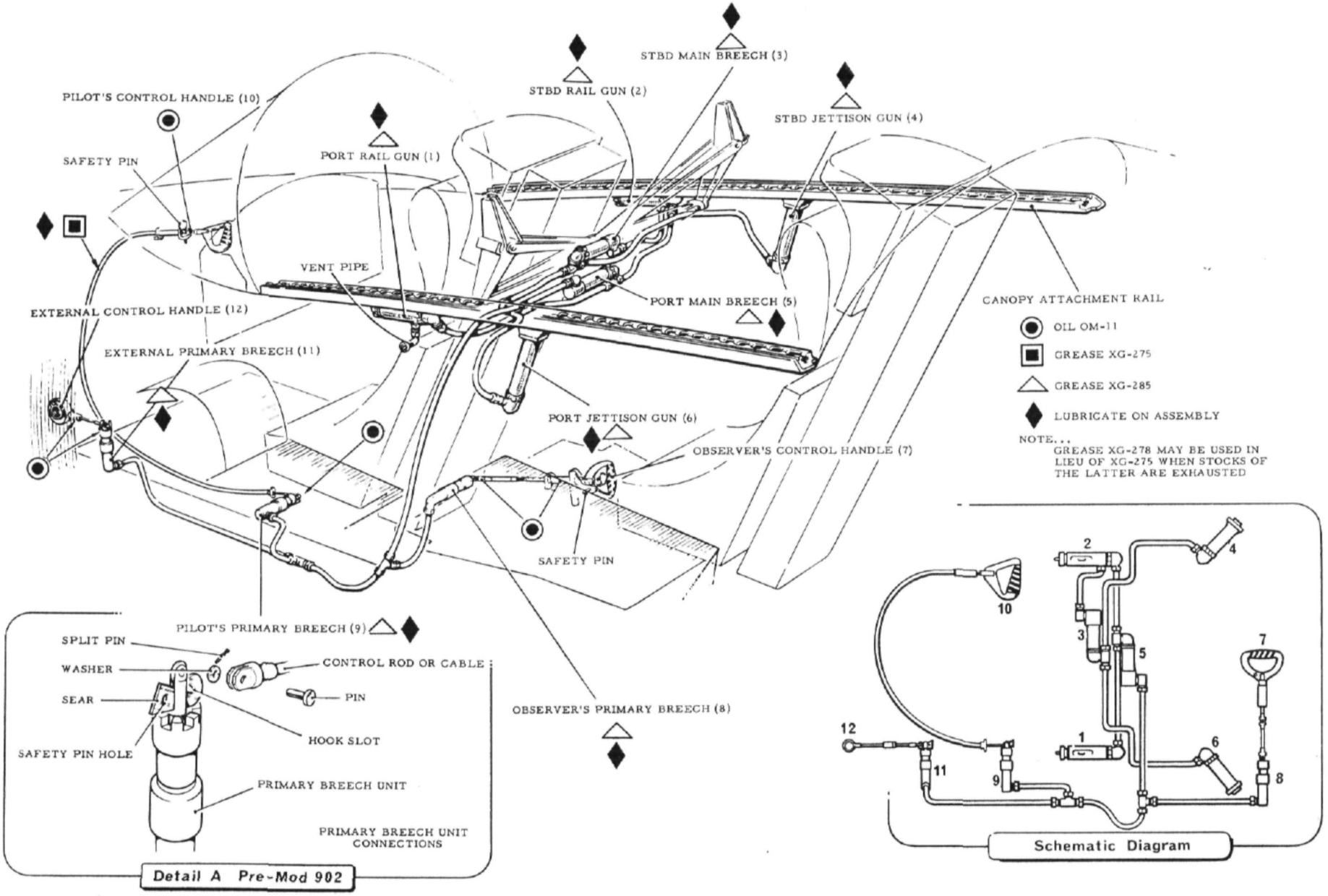

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Fig. 4. Canopy jettison system

28. Mounted horizontally beneath the two top longerons, slightly forward of the transverse tie-beam, the two rail guns each embody a tongued piston which engages in a slot in the canopy jettison rail. The canopy jettison guns, also fitted to the port and starboard longerons, are mounted almost vertically 12 in. aft of the rail guns.

29. The primary breech units are connected to a gallery pipe routed beneath the port console. A vertical pipe, tapped into the gallery pipe, is connected at its other end to the firing pin inlet of the port main breech. A transverse pipe connects the gas outlet of this breech to the inlet ports of the two rail guns.

30. The exhaust port of the starboard rail gun is connected by a pipe to the firing pin inlet of the starboard main breech, which is, in turn, connected to the two jettison guns by a further transverse pipe. The exhaust connection of the port rail gun is fitted with a short right-angled vent pipe which incorporates a frangible diaphragm to prevent the ingress of water.

Operation

31. When any one of the three jettison control handles is operated, the movement is transmitted to its associated primary breech, withdrawing the sear and allowing the spring-loaded firing pin to fire the primary cartridge.

32. The gas pressure passes along the gallery pipe and vertical pipe to the port main breech, actuating the mechanism which fires the main cartridge. The gases generated by this cartridge, force the tongued pistons in the rail guns forward to unlock the canopy rail.

33. When the pistons move forward, an exhaust port is uncovered in each rail gun. Exhaust gas from the port rail gun is vented to atmosphere. Gas from the starboard rail gun passes to the starboard main breech and fires the remaining main cartridge.

34. Gases from this cartridge are delivered, via the transverse pipe, to the jettison guns. The resultant movement of the pistons forces the canopy upwards. This upward movement disengages the canopy fairing attachment blade from the shuttle assembly, allowing the airflow to carry the canopy clear.

SERVICING

General

35. Instructions for servicing the items of emergency equipment described in para 3, 7, 8 and 23 are in the relevant Air Publications.

Underwater escape system

Charging the air bottles (fig 8)

36. With the air bottle assemblies removed from the aircraft (*para* 45) proceed to charge the air bottle as follows:-

(1) Remove the manual operation and main air bottle firing cartridges **22** and **18**, from the operating head before charging or recharging the bottle. The cartridges are not to be replaced until immediately before installation in the aircraft.

(2) Secure the delivery hose to the charging connection **24**. The connection comprises a conventional 1/8 in. BSP coupling controlled by a needle valve and bolt **25** at an angle of 90 deg to the connection (*fig* 8, *detail* A).

(3) Turn on the air supply, unscrew the needle valve bolt **25** 3 to 4 turns and charge the bottle to 3000 ± 200 lb/in² as indicated on the gauge.

(4) When charging is complete, screw down the needle valve **25** and wire-lock it to the seal retaining bolt **26**.

Note...

The air bottles are to be charged from H P air cylinders or from an H P air compressor trolley. The quality of the compressed air is to conform to N A T O standard agreement (Stanag) 3054, details of which are contained in N A M O General/A105, issue 2.

Changeover valve function test

37. The following test must be performed after an air bottle change and following re-assembly of the vent system after breakdown. Its object is to ascertain that there is an unobstructed flow through the air passages (including the associated aircraft piping) between the operating head and atmosphere when the underwater escape selector handle is in the SAFE position.

(1) Remove the canopy and both the pilot's and observer's ejection seats. Detailed information on the removal and installation of the canopy is in Sect. 3, Chap. 1 of this Cover. Removal of the ejection seats and the safety precautions to be observed are in A.P. 101B-1201-4A3, (process sheets 14-4-0 to 14-4-3).

(2) Remove the following components from the operating head:-

(a) Servicing safety lock **14**

(b) Hydrostatic valve cover plate **15**

(c) Main air bottle firing pin subassembly **16**

(d) Cartridge assembly **18** and O-ring seal **17**.

(3) Ensure that the underwater escape selector handle is selected to SAFE.

(4) Insert an air delivery hose into the firing pin sub-assembly orifice and secure it in position. Dry air to NATO (Stanag) 3054 should be used; full details are in NAMO General/A105, issue 2.

(5) Turn on the supply and ensure that the flow of air to atmosphere at the sea-water pressure sensing port (pilot's system) or the vent port in the accessories bay forward compartment (observer's system) is unobstructed.

Note...
After completing the functional test, it may be necessary to remove the air bottle assemblies from the aircraft to facilitate refitting the cartridges, before re-installation.

Canopy jettisoning system

Control handles function test

38. To test the force required to pull-off the pilot's, observer's and external canopy jettisoning system control handles, proceed as follows:-

(1) Remove the cartridge from the respective primary breech unit.

◀(2) Fit a dummy cartridge and extractor ring to the pilot's primary breech unit and refit the firing unit. ▶

(3) Remove the clear plastic break panel from the fuselage to gain access to the external handle.

(4) Attach a suitable spring balance to the respective control handle.

(5) Apply tension to the control handle of the respective primary breech, noting the force required to actuate the striker mechanism as indicated on the spring balance.

(6) The force required to pull-off the pilot's and observer's primary breech should be between 25 and 50 lb. The primary breech associated with the external jettison control should operate between 25 and 40 lb.

Note...
Ensure that the pre-travel on the pilot's control handle is between 0.7 and 0.9 in. before tension is applied.

◀(7) Remove the dummy cartridge from the pilot's primary breech unit.

(8) Fit a serviceable cartridge and extractor ring to the breech unit and refit the firing unit; on pre-Mod 902 aircraft, ensure that the operating rod or cable is correctly connected to the sear as shown in fig 4, detail A. ▶

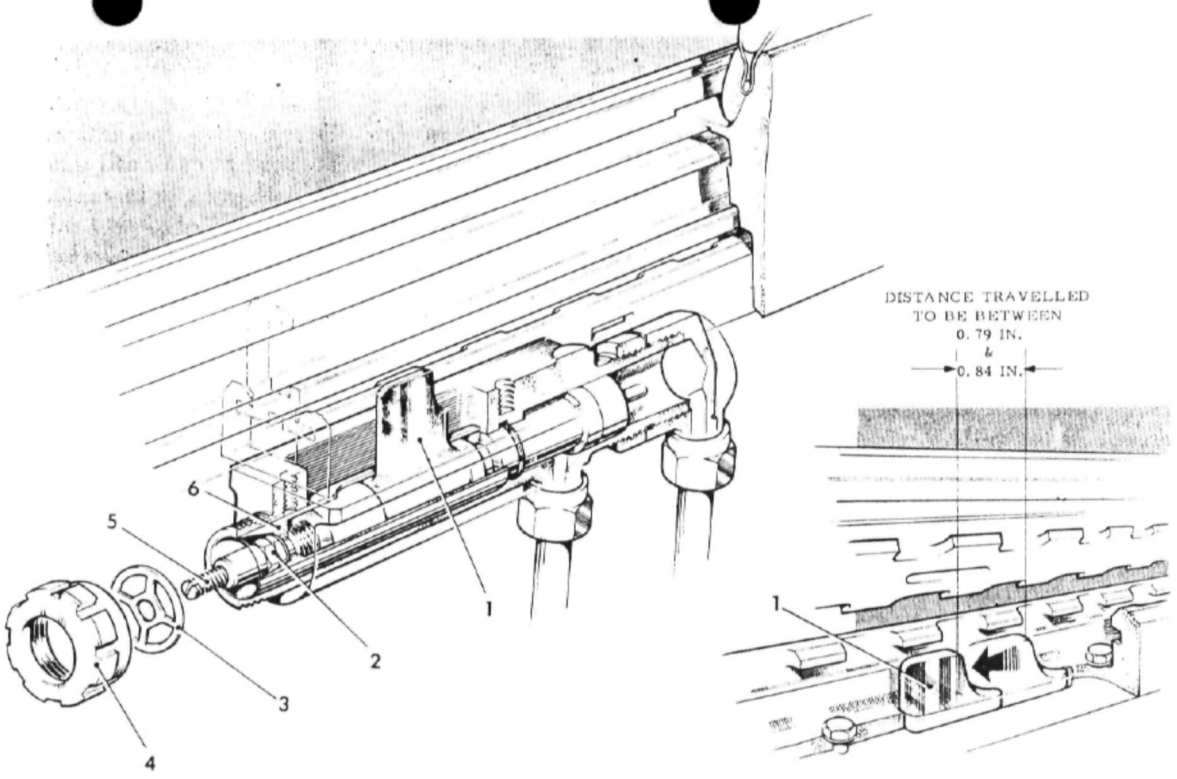

Fig. 5. Canopy jettison rail adjustment

Jettison rail guns – adjustment after installation (fig 5)

39. After installing a jettison rail gun, Part No. MBCJ 1421, the travel of the jettison rail should be checked and the rail gun tongue adjusted, as follows:-

(1) Remove the front nut **4** and shear washer **3** from the rail gun and check the piston sleeve **6** for freedom of movement.

Note...
If the piston sleeve is jammed or is stiff to move, check that the two bolts

securing the rail gun beneath the top longeron are of the correct length ◀ *(para 49).* ▶

(2) Measure the travel of the jettison rail from the fully locked to the fully unlocked position. This measurement should be between 0.79 and 0.84 in.

(3) Slacken off the special nut and locknut **2** on the rail gun piston spindle **5**, *one turn only.*

(4) Rotate the spindle **5**, using a screwdriver in the slot provided at the forward end of the spindle, to move the rail gun tongue **1** forward or rearward, as required, to obtain the jettison rail movement quoted in operation **2**.

Note...
If this operation is carried out with the rail gun in situ, the jettison rail should be removed while the adjustment is being made.

(5) Tighten the locknut and special nut **2**.

(6) With the jettison rail in the fully-locked position, ensure that the rail gun piston sleeve **6** does not extend beyond the gun body.

(7) Replace the shear washer **3** and front nut **4** removed in operation (1).

Jettison rails function test (fig 7)

40. The object of the following test is to supply hydraulic pressure to the canopy jettison rail operating guns to determine the pressure required to move the jettison rails. The aircraft canopy and jettison rails are to be used for this test. Canopy loading is to be achieved by pressurizing the cabin. The equipment required to carry out this test is as follows:-

(1) A hydraulic pressurizing rig with two pressure lines suitable for connection to the inlets of the rail guns (0.5 in. Ermeto). Each pressure line must contain a shut-off cock and a pressure gauge capable of recording hydraulic pressures up to 3000 lb/in^2. The rig is to be operable from outside the cockpit.

Note...
The inlet and exhaust connections of the jettison rail guns are a non-standard thread size and are fitted with 0.5 in. Ermeto pipe couplings. The principal dimensions of these connections are illustrated in fig 7, detail F.

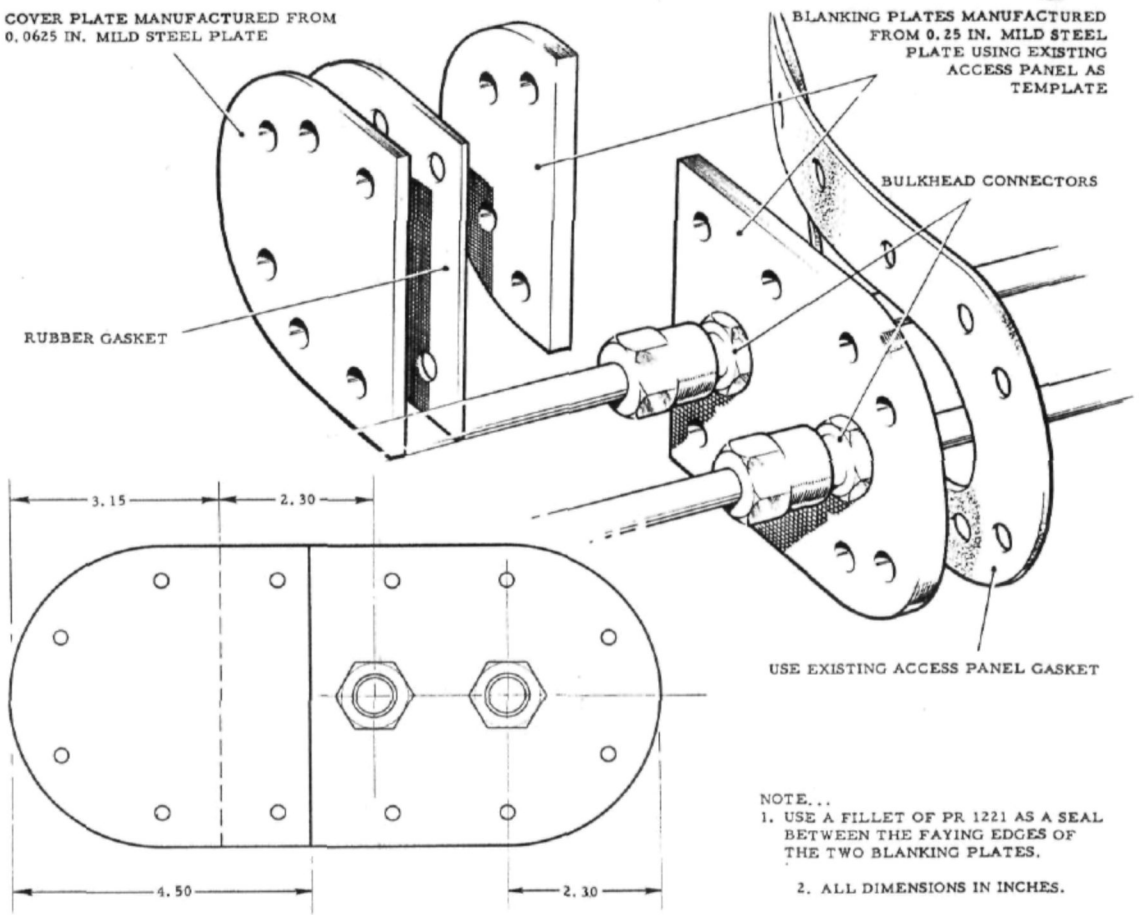

Fig. 6. Flying controls access panel – blanking plate

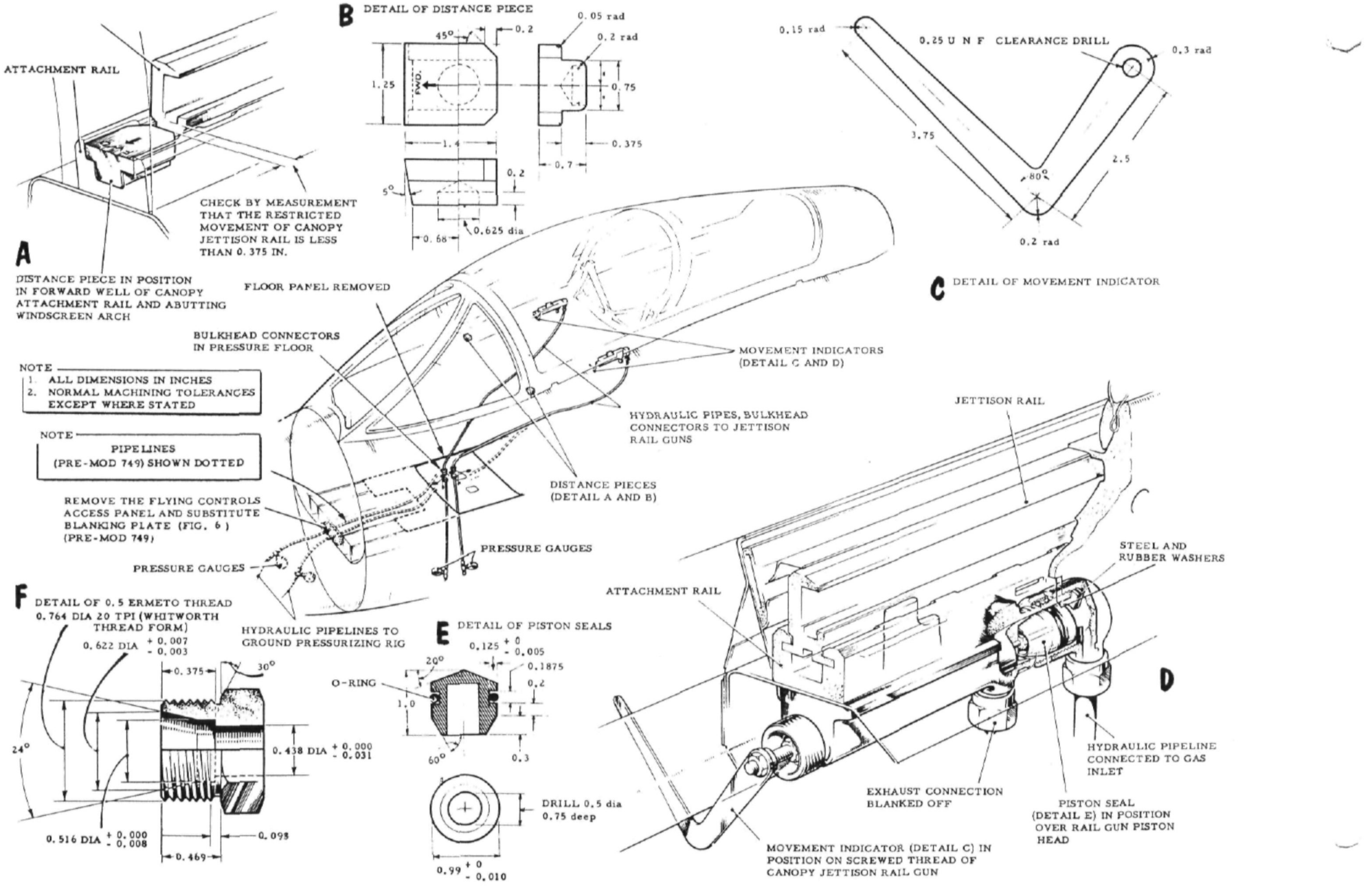

Fig. 7. Canopy jettison rails function test

◀Annotation amended at Detail F▶

(2) Cabin pressure testing equipment as listed in Table 1, Chap. 8, this Cover.

◀(3) Two locally-manufactured piston seals incorporating 1.0 in. dia O-rings, Ref No. 27QA/9439736 or 27QA/1017885, for fitting over the heads of the rail gun operating pistons.▶

(4) Several rubber washers and two metal washers to seal each rail gun at the joint between the inlet elbow and the main body.

(5) Two locally-manufactured movement indicators suitable for attachment to the screwed ends of the rail gun operating pistons. The indicators should be so arranged that, when in position, they are visible from outside the cabin.

(6) Two locally-manufactured distance pieces to fit between the ends of the jettison rails and the windscreen casting so that the movement of each jettison rail is limited to 0.375 in. maximum.

(7) A canopy removal tool, Ref No. 26NA/95022.

(8) On pre-Mod 749 aircraft, a locally-manufactured blanking plate (*fig* 6) to replace the flying control system access panel on the cabin forward pressure bulkhead at station 78 will also be required. This blanking plate is to be fitted with bulkhead unions suitable for the connection of the hydraulic pressure rig pipes.

41. *Test procedure.* Prior to the test, the ARI 5930 display is to be removed from the port side of the observer's cockpit and the ARI 5880 indicator and roller map display head are to be removed from the starboard side of the observer's cockpit. Suitable drip trays are to be positioned below the rail guns in order to protect the cockpit area from oil contamination. With the cabin pressure testing equipment in position as described in Chap. 8 in this Cover, proceed as follows:-

(1) Disconnect the gas pressure inlet and exhaust pipes from the jettison rail guns and remove the guns from their positions below the top longerons. Blank off the pipe ends.

(2) Remove the inlet elbows, withdraw the rubber sealing ring and sealing plate from the body of the rail gun at the connection of the inlet elbow. Insert the piston seals and the rubber and metal washers into the rail guns; refit the inlet elbows. Ensure that the pipe connections are at the correct angle to connect with the hydraulic pipelines.

(3) Remove the front nut and shear washer from each rail gun.

(4) Attach the movement indicators to the threaded ends of the rail gun piston spindles.

(5) Blank off the exhaust connections (0.5 in. Ermeto) on the rail guns and refit the guns to the aircraft.

Note...
To preserve the cabin sealing, apply a fillet of PR 1221 sealing compound to the base plates of the guns before refitting.

(6) Remove the pilot's ejection seat in accordance with the instructions contained in A.P. 101B-1201-4A3 (process sheets 14-4-0 to 14-4-3).

(7) Remove the appropriate cockpit floor panel between stations 92 and 120.5.

(8) Remove the blanking caps and connect the hydraulic rig pipelines to the bulkhead connectors.

(9) Remove the blanking caps and connect the supply pipes to the bulkhead connectors and to the inlet connections of the canopy rail guns.

Note...
*On pre-Mod 749 aircraft it will be necessary to remove the flying control access panel on the cabin forward pressure bulkhead and substitute the blanking plate (*fig *6) complete with cockpit hydraulic rig pipework. Connect the hydraulic rig pipelines to the bulkhead unions and the supply pipes to the rail gun inlet connections.*

(10) Ensure that the sliding surface of the canopy, canopy jettison rails and canopy attachment rails are dry and unlubricated.

(11) Insert the distance pieces between the forward ends of the jettison rails and the base of the windscreen casting.

WARNING...
It is essential that the distance pieces are fitted correctly; the unlocking of a jettison rail with the cabin pressurized could cause a fatal accident.

(12) Blank off the static sensing pipe to the accessories bay discharge valve located on the cabin rear sloping bulkhead.

(13) Select the knob on the cabin pressure controller to TEST and ensure that the emergency ventilation valve is closed.

(14) Close and lock the canopy; inflate the canopy seal to 11.5 lb/in^2 and maintain the pressure.

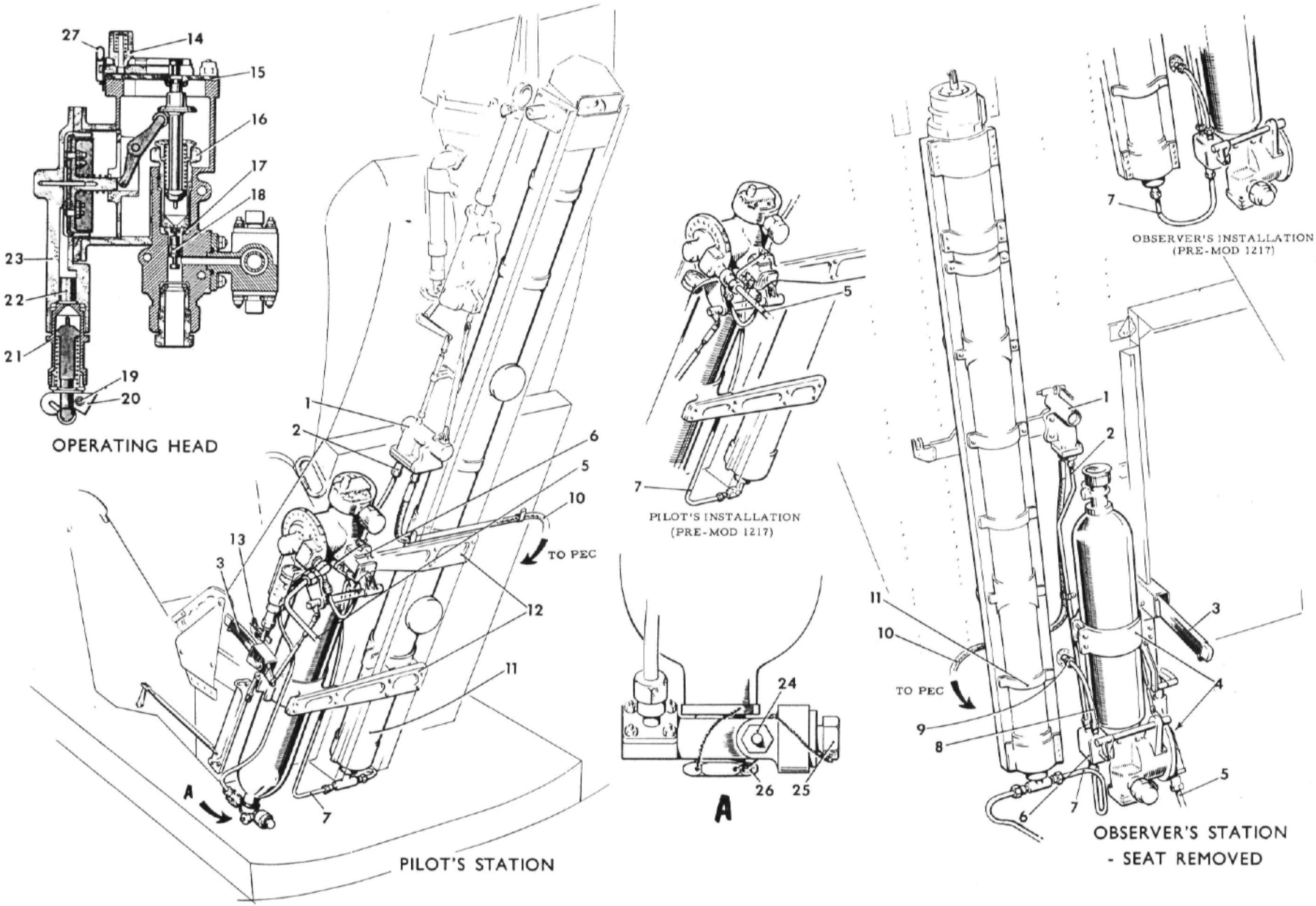

Fig. 8. Air bottle assembly and associated equipment
◀ Mod 1217 incorporated ▶

(15) Pressurize the cabin to 3.5 lb/in² and maintain this pressure throughout the test.

(16) Start the hydraulic pressurizing rig and gradually apply pressure to the port jettison rail operating gun and record the pressure in the gun when the jettison rail moves. This pressure must not exceed 2800 lb/in².

(17) Repeat operation (16) on the starboard jettison rail operating gun.

(18) Select the knob on the pressure controller to FLIGHT to relieve the cabin pressure.

(19) Unlock the canopy to deflate the seal; open the canopy.

(20) Remove the test equipment fitted in operations (8) and (9); on pre-Mod 749 aircraft, refit the flying controls access panel to the pressure bulkhead.

(21) Screw the canopy removal tool, Ref No. 26NA/95022, to the threaded end of the port rail gun operating piston and return the canopy jettison rail to its normal position.

(22) Repeat operation (21) on the starboard rail gun.

(23) Remove the distance pieces inserted in operation (11).

WARNING...
It is essential that the distance pieces are removed from the canopy rails as soon as possible after the test is completed. Failure to remove these items will render the canopy jettison rails inoperative.

(24) Remove the rail guns from their positions below the top longerons and remove the test equipment fitted in operation (2), (4) and (5).

(25) Remove the pistons from the rail guns for cleaning, clean out the gun and lightly smear the piston bores with grease XG-285.

(26) Re-assemble the rail guns.

(27) Refit the rail guns to the aircraft (*para* 49) and reconnect the gas pressure inlet and exhaust pipes.

(28) Remove the drip trays, refit the ARI equipment and roller map display head.

(29) Perform a cabin pressurization test as described in Chap. 8, this Cover.

(30) Return the accessories bay discharge valve to normal by removing the blank from the static sensing pipe.

(31) Remove the cabin pressure testing equipment and refit the dust caps to the test connections.

(32) Lock all disturbed connections in the approved manner.

REMOVAL AND INSTALLATION

Ejection seats

42. Detailed information on the removal and installation of the ejection seats is given in A.P. 101B-1201-4A3 (process sheets 14-4-0 to 14-4-3).

Underwater escape system

Air bottle assembly – removal (fig 8)

43. Each assembly comprises a high pressure air bottle, an operating head, a changeover valve and the associated mechanism and piping; they are removed and refitted as units.

44. The observer's air bottle assembly is mounted inversely and is attached to the aircraft structure by upper and lower mounting brackets. The pilot's air bottle assembly, which is mounted upright, is attached to its associated ejection gun by similar means. Apart from different pipe runs, etc., imposed by these divergencies, the two air bottle assemblies are basically similar in construction and function.

45. This paragraph describes the operations required to remove an air bottle assembly. As the removal procedure for both assemblies is similar, the removal of one assembly only is described, except where specifically stated otherwise.

Note...
The open ends of pipes and connections, attendant upon the removal of the air-bottle assemblies, must be securely blanked off to prevent the ingress of foreign matter.

(1) Ensure that the changeover selector lever **3** is set in the system SAFE position.

(2) Disconnect the pipe **2** connecting the drogue gun disconnect unit **1** to the changeover valve **6** at the changeover valve.

(3) Disconnect the pipe **10** connecting the drogue gun disconnect unit and the PEC at the drogue gun disconnect unit.

(4) Remove the pilot's and observer's ejection seats, A.P. 101B-1201-4A3 (process sheets 14-4-0 to 14-4-3).

(5) Break the locking wire (pre-Mod 1148) or remove the locking pin **27** (post-Mod 1148) and move the air bottle

servicing safety lock **14** to the safe position.

(6) Ensure that the safety pin **19** is fitted, then disconnect the sear **20** of the manual control firing mechanism **13**.

(7) Disconnect the sea-water sensing pipe **5** at the changeover valve.

(8) Disconnect the pipe **7** leading to the base of the ejection gun **11** at the changeover valve.

(9) *Pilot's air bottle assembly* – disconnect the upper and lower beam support brackets **12** connecting the air bottle assembly to the ejection gun.

(10) *Observer's air bottle assembly* – disconnect the pipe **8** leading from the changeover valve **6** to the union **9** on the sloping bulkhead.

(11) Disconnect the upper and lower beam support brackets **4** connecting the air bottle assembly to the sloping bulkhead.

(12) Remove the air bottle assemblies from the aircraft.

Air bottle assembly – installation (fig 8)

46. Installation of an air bottle assembly is mainly a reversal of the removal procedure (*para* 45). Due to the necessity to perform a changeover valve function test (*para* 37) following installation, the bottle assembly should be installed initially with the servicing safety lock **14**, hydrostatic valve cover plate **15**, main air bottle firing pin sub-assembly **16**, cartridge assembly **18** and O-ring **17** removed. To refit these items after satisfactory conclusion of the test, it may be necessary to remove the air bottle assembly; if this is so, great care must be taken when re-connecting the sea-water sensing pipe **5** (pilot's bottle) or the vent pipe **8** (observer's bottle) to ensure that no dirt or obstruction of any kind is

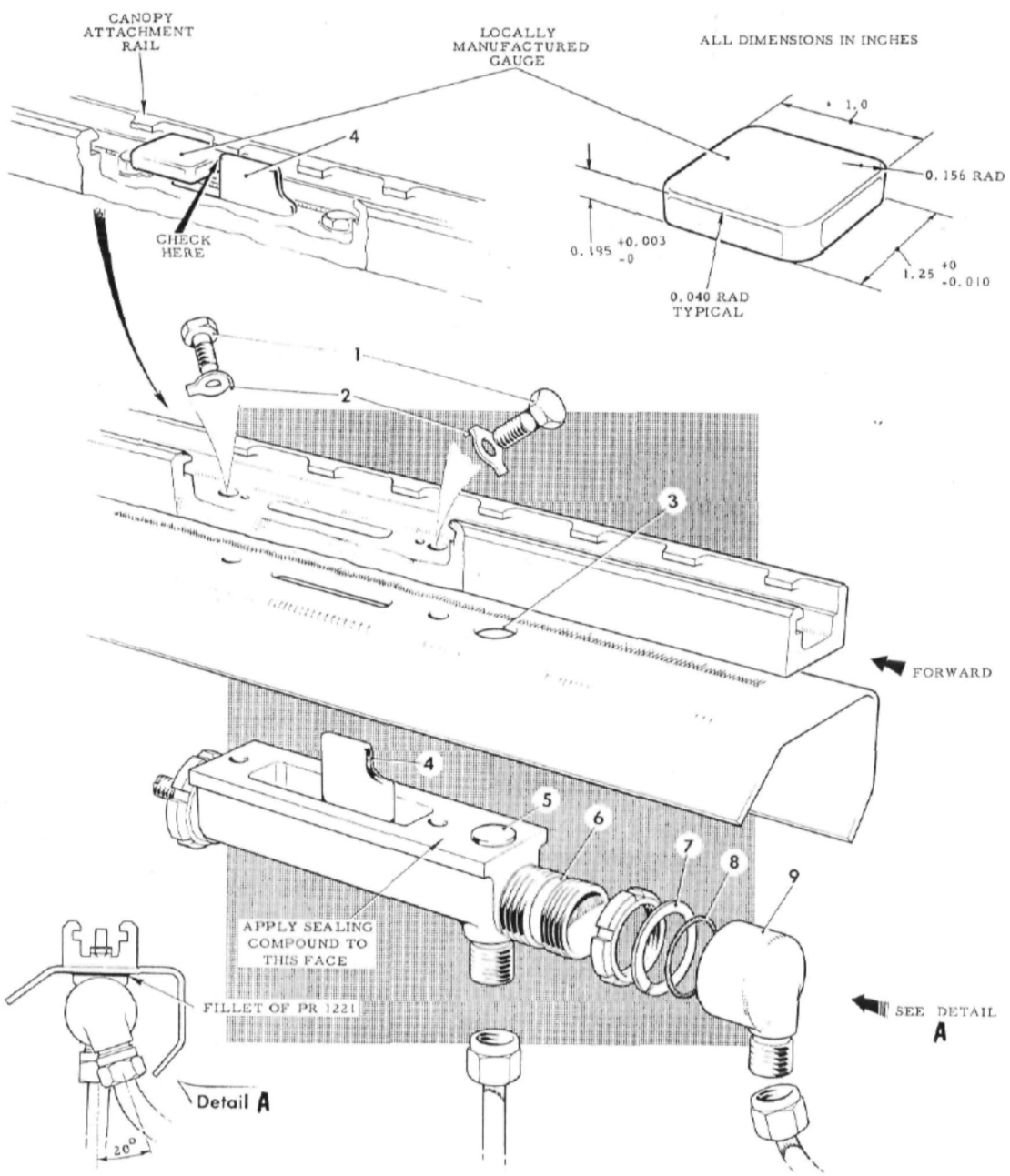

Fig. 9. Jettison rail gun – installation
◀Rail gun tongue engagement check added▶

introduced into the system. When installation is complete:-

(1) Ensure that the safety pin **19** is fitted to the manual control firing mechanism sear **20**.

(2) Lock all disturbed connections in the approved manner.

(3) Move the servicing safety lock **14** to the operating position; wire lock (pre-Mod 1148) or fit the locking pin **27** (post-Mod 1148).

Air bottle operating head – removal of cartridges (fig 8)

Note...
The following paragraphs describe the removal of the cartridges; installation is mainly a reversal of the procedure for removal.

47. To remove the manual firing unit cartridge **22**:-

(1) Ensure the sear **20** is locked with the safety pin **19**.

(2) Break the wire locking between the firing unit sub-assembly **21** and the hydrostatic valve top cap **23**.

(3) Unscrew the firing unit sub-assembly **21** from the top cap.

(4) Extract the cartridge **22**.

48. To remove the main air bottle firing cartridge **18**:-

(1) Remove the servicing safety lock sub-assembly **14**.

(2) Remove the hydrostatic valve cover plate **15**.

(3) Unscrew and remove the firing pin unit sub-assembly **16**.

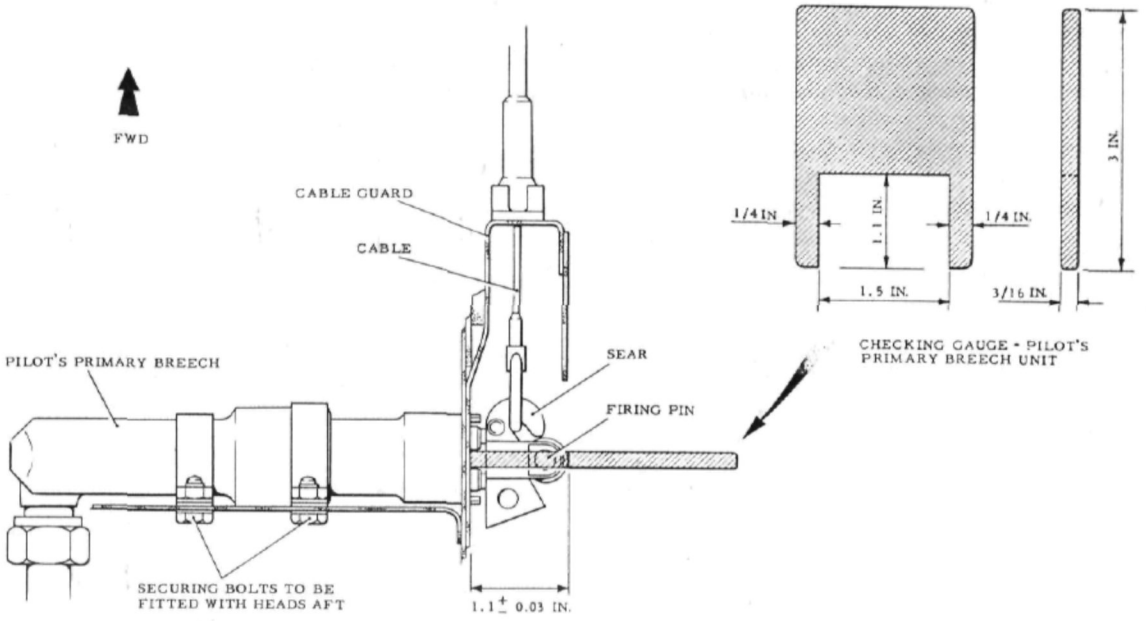

Fig. 10. Pilot's primary breech unit – installation

(4) Extract the cartridge assembly **18** and O-ring seal **17**.

Jettison rail gun – installation *(fig 9)*

49. Whenever a canopy jettison rail operating gun is being installed, particular attention must be given to the following points:-

(1) Ensure that the gas inlet elbow **9** is inclined inboard approximately 20 deg from the vertical, as shown in detail A.

Note...
*When adjusting the inclination of the gas inlet elbow, ensure that the sealing plate **7** and rubber sealing ring **8** are correctly located in the rebate **6**.*

(2) To preserve the cabin sealing, apply a film of PR 1221 sealing compound to the base plate of the rail operating gun before fitting in position and, after fitting, apply a fillet around the edges of the base plate as shown in detail A.

(3) Secure the gun beneath the top longeron with two ¼ in. UNF bolts 1, 0.7 in. long, using a new shakeproof tab washer **2** under the head of each bolt; ensure that the spigot **5** is correctly located in the hole **3** in the top longeron.

Note...
Early aircraft may have two bolts of unequal length securing the rail gun to the top longeron. On installation, sub-

stitute a ¼ in. dia UNF bolt, 0.7 in. long, Ref No. 28DU/9414340, for the longer of the two bolts.

◀ (4) Position the locally-manufactured gauge shown on fig 9 into the attachment rail slot in front of the rail gun tongue **4** and, with the gauge seated squarely in the slot, ensure that the tongue **4** is level with or protrudes beyond the upper surface of the gauge, thus representing satisfactory engagement with the jettison rail slot.

Note...
In the event of this requirement being unobtainable, the jettison rail gun must be removed and re-seated.

(5) After satisfactory installation of the rail gun, remove the gauge and adjust the travel of the tongue **4** as described in para 39. ▶

Pilot's primary breech unit – installation

50. If a pilot's primary breech unit in the canopy jettisoning system is removed, it is essential to ensure that it is refitted in its correct position, otherwise a foul may occur between the sear and the cable guard, or the firing pin and the underwater escape system control rods, preventing the withdrawal of the sear and rendering the canopy jettison system inoperative from the pilot's station.

51. When fitting a pilot's primary breech unit, ensure that, with the cartridge and cartridge extractor ring installed in the breech unit and the sear inserted through the slot in the firing pin, the distance between the inner face of the cable guard and the end of the firing pin is 1.1 ± 0.03 in. as shown in fig 10. It is recommended that a locally-manufactured gauge, to the dimensions shown, be employed to check this dimension.