

Chapter 5

LIGHTNING T Mk. 5

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**Introduction**

1. This chapter is primarily concerned with the installation of equipment in or on the seats, strapping-in procedure, and the drill to be used when leaving the aircraft after landing. A brief description of the various components of the A.E.A. is included; full details will be found in the publications referred to in the appropriate paragraphs. Details of flying clothing and dressing procedures will be issued as an appendix to this chapter at a later date.

**COMPOSITION OF THE ASSEMBLY**

2. Two aircrew equipment assemblies are fitted to this aircraft, each of which consists of

the following items:—

- |                          |   |
|--------------------------|---|
| Ejection seat            | Type 4 BSB fitted with seat mounted oxygen group assembly |
| Parachute assembly       | Back Type Mk. 28  |
| Personal survival pack   | Type V (c/w cushion)                                      |
| Flying clothing assembly | To be issued later.                                       |

**The type 4 BSB ejection seat and associated equipment**

3. The Type 4 BSB seat is ejected from the aircraft by a cartridge-operated gun and may be used for low level ejection provided that the air

speed is over 90 knots and the aircraft flight path is straight and level. During ejection, the seat slides in two guide rails attached to the cylinder barrel of the ejection gun; the barrel is also fitted with brackets which enable the gun to be bolted to the airframe structure.

4. The back type Mk. 28 parachute assembly incorporates a combined safety/parachute harness; the pack is housed in a container which forms an integral part of the seat and the harness is attached to the seat by lugs at three quick-release points, one under the support bracket for the parachute pack and two at the back of the seat pan. These lugs may be separated from the seat by the action of a barostatic time-release unit or by a manual separation lever on the port side of the seat pan to the rear. Forward on the port side of the seat pan is a "go-forward" lever which, when the knob is pushed forward, releases the snub lever and allows the occupant to lean forward in the cockpit without separating the parachute assembly from its attachment points; forward movement of the occupant is only possible when the lever is held forward against the spring. When the lever is released, the occupant may maintain the forward position of the body but, on returning to the upright position, the spring will take up the slack and the snub lever will lock the system against renewed forward movement.

5. Housed in the seat pan is the Type V personal survival pack (P.S.P.) which, with the cushion, forms a comfortable seat for the occupant. The pack is attached to the combined harness by side quick-release connectors and its lowering line is connected to the flying clothing during strapping-in. A negative-G restraining strap is fitted to restrain the seat occupant against negative-G forces. The rear of the strap is attached to the two bottom harness lugs locked in the back of the seat pan, and the front of the strap is attached to the lugs of the harness lap straps which engage in the harness quick-release fitting. Prior to modification E.S.2690 the negative-G strap is routed over the top of the personal survival pack, through a bracket on the inside of the front face of the seat pan behind the seat pan firing handle, and upwards to the lap straps. When modification E.S.2690 is embodied, the strap is routed underneath the personal survival pack, through brackets in the floor of the seat pan (one at the front and two at the rear), and thence upwards to the lap straps. The strap introduced by modification E.S.2690 is also fitted with an improved buckle

to facilitate adjustment. The procedures for installing both types of strap when equipping the seat, are described in para. 15.

6. A seat mounted oxygen group assembly is bolted to the starboard side and back of the seat pan. The assembly contains:-

- (1) A quick-release plug, to which is connected the main oxygen supply from the aircraft.
- (2) A remote control demand regulator (Type 120) to control the main oxygen flow.
- (3) An emergency oxygen cylinder and release mechanism.
- (4) A stand by demand regulator to control the emergency oxygen flow.
- (5) A low pressure warning switch in circuit with the aircraft warning system which gives warning if the main oxygen supply falls below a predetermined pressure.
- (6) A ground test valve used for conducting ground tests on the face mask and pressure jerkin.
- (7) The personal equipment connector.

7. The components of the assembly are mounted on a detachable tray which consists of a side panel and a rear panel riveted together at right angles to each other; the complete assembly with all the components is then bolted to the seat structure. The emergency oxygen supply is turned on automatically during ejection, but provision is also made for manual operation in the event of failure of the main oxygen supply during normal flight. Full details of the seat mounted oxygen group assembly and its components are contained in A.P.1275G, Vol. 1.

8. The personal equipment connector (P.E.C.), bolted to the side plate of the seat mounted oxygen group assembly, enables the seat occupant to connect or disconnect in one action the main and emergency oxygen, the air ventilated suit, the anti-G suit and the Mic/Tel services. During ejection, it automatically disconnects the air ventilated suit, the anti-G suit and the Mic/Tel services between the seat and the aircraft. The main oxygen supply between the seat and the aircraft is disconnected during ejection, at the quick-release plug mounted on the seat mounted oxygen group assembly. When separation of seat

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and occupant occurs after ejection, the P.E.C. enables the occupant to be automatically disconnected from all the services on the seat. The following is a brief description of the three main components of the P.E.C., a full description is contained in Sect. 1, Chap. 5.

- (1) *The aircraft component.* Connected to the cockpit floor by a static line, and to aircraft services for A.V.S., anti-G and Mic/Tel systems.
- (2) *The seat component.* Bolted to the side plate of the seat mounted oxygen group assembly, which is in turn bolted to the starboard side of the seat pan; it is connected to the main oxygen supply through the remote control demand regulator and to the emergency oxygen cylinder through the standby regulator.
- (3) *The personal component.* Attached to the flying clothing and connected to the oxygen mask, pressure jerkin, air ventilated suit, anti-G suit and Mic/Tel lead.

9. Two firing handles are fitted to the seat. The face screen handle, which has an integral face screen, projects from the front of the drogue container; the seat pan handle is partly recessed into the top front edge of the seat pan and is intended for use only when the occupant is unable to reach the face screen handle, e.g., when subjected to high 'G' forces. Both handles are connected to the hood jettison mechanism and when either handle is pulled the hood is jettisoned immediately, the seat being ejected after a delay of one second. A restrictor is fitted to the time-delay firing unit of the ejection gun to prevent operation of the gun until the hood has been jettisoned. A separate hood jettison handle is also provided in the aircraft to enable the hood to be jettisoned without ejection taking place.

10. Leg restraint cords, fitted through snubbing units under the seat pan and terminating in taper plugs engaged in spring loaded sockets on the front of the seat pan, ensure that the occupant's legs are drawn back to the seat pan and restrained there during and after ejection, thereby reducing the risk of injury. An interconnection between the spring loaded sockets and the P.E.C., releases the leg restraint cords as the personal

component of the P.E.C. is released. This interconnection also ensures that the leg restraint cords cannot be connected until the personal component of the P.E.C. is correctly engaged with and locked to the seat component. If the personal component of the P.E.C. becomes disconnected in flight, the leg restraint cords will be released and their taper plugs must be re-inserted in the sockets after the personal component is replaced.

11. Seat height adjustment is achieved by an electrically operated actuator, the switch for the actuator being situated on the starboard console immediately inboard of the coder unit controls. The switch is spring loaded to the central (OFF) position. A forward movement of the switch lowers the seat and a rearward movement raises it.

12. Fully automatic facilities are provided to withdraw the parachute canopy from its pack and separate the occupant from the seat after ejection. Manual override controls, the first D-handle on the combined harness waistbelt and the manual separation lever on the side of the seat pan, enable the occupant to disconnect the parachute automatic withdrawal device and the combined harness from the seat if the need arises to (a) make a manual bale-out or (b) make a manual separation from the seat after ejection. The parachute is then deployed by operating the second D-handle on the waistbelt.

#### Note . . .

*If manual operation is employed the parachute automatic withdrawal device MUST be rendered inoperative by pulling the first D-handle.*

13. A complete description of the Mk. 4 BSB seat and personal equipment connector will be found in A.P.4288D, Vol. 1; information concerning the parachute assembly and Type V personal survival pack is contained in A.P.1182A, Vol. 1 (2nd Edtn), and A.P.1182C, Vol. 1, Book 2 respectively.

#### Connections to the aircraft

14. When the seat is installed in the aircraft and is properly equipped, the following items are connected to the aircraft:—

- (1) *Port side of seat:—*
  - (a) Static rod from drogue gun.

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- (2) *Starboard side of seat:-*
- (a) Static rod from barostatic time-release unit.
  - (b) Static line from aircraft component of P.E.C.
  - (c) Main oxygen supply hose.
  - (d) Air ventilated suit air supply hose.
  - (e) Anti-G suit air supply hose.
  - (f) Mic/Tel lead.
  - (g) Electrical lead to seat actuator.
- (3) *Underside of seat:-*
- (a) Leg restraint cords.
- (4) *Top of seat:-*
- (a) Hood jettison unit operating cable.
  - (b) Static line from hood to restrictor.

### EQUIPPING THE SEAT

15. Before equipping the seat ensure that it has been made safe for servicing in accordance with current instructions.

16. The following procedure is to be adopted when installing the equipment in the seat; refer to fig. 1 to 6 for details as necessary.

- (1) The seat mounted oxygen group assembly (*fig. 1*) must be fitted before the seat and ejection gun assembly are installed in the aircraft. Detailed instructions for fitting the oxygen group assembly are contained in A.P.4288D, Vol. 1.
- (2) Remove and retain the safety pin from the emergency oxygen cylinder operating head.
- (3) Ensure that the leg restraint cords are clear of the seat and that the seat pan is clean.
- (4) Place the parachute pack on its support bracket temporarily and ensure that the pack restraining straps and headrest cushion are immediately available.
- (5) Ensure that the harness straps are not twisted. Operate the harness "go-forward" lever, pull out the strap under the support bracket and pass it downwards through the D-shackle.
- (6) Lift the parachute pack forward (this may be done before pulling out the

centre strap if more convenient), pass each pack restraining strap O-ring over the centre strap lug and insert the lug into the attachment point below the bracket. Pull sharply on the harness to ensure that the lug is locked securely.

- (7) Pass the pack restraining straps through the arch of the pack, replace the pack on its support bracket and ensure that the restraining straps are not twisted.
- (8) Position the headrest cushion centrally on top of the parachute pack and ensure that it is not inverted.
- (9) Pass the port pack restraining strap over the drogue link line, through the buckle on the short strap at the port side of the drogue container and then forward through the buckle on the port side of the headrest cushion.

#### Note . . .

*When passing the parachute restraining strap through the buckle on the short strap at the side of the drogue container, ensure that it passes through from outside inwards.*

- (10) Pass the starboard pack restraining strap through the buckle on the short strap at the starboard side of the drogue container (refer to the note following sub-para. (9)) then forward through the buckle on the starboard side of the headrest cushion.
- (11) Tighten the pack restraining straps, ensuring that the headrest cushion remains central on top of the parachute pack.
- (12) Connect the two halves of the drogue link line coupling, ensuring that the line passes under the port pack restraining strap and UNDER THE DROGUE WITHDRAWAL LINE.
- (13) Prior to embodiment of Modification E.S.2690, fit the negative-G restraining strap as follows:-
  - (a) With the blue Y-section removed, pass the buckle end of the white Y-section through the anchor bracket inside the front of the seat pan from bottom to top. Attach the straight part of the blue Y-section to the

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- buckle so that the free end is facing forward with the Y-part uppermost.
- (b) Place the personal survival pack in the seat pan and route the white Y-section of the strap over the top of the personal survival pack to the rear bottom harness locks on the seat. Engage the looped ends of the strap over their appropriate bottom lock harness lugs and insert the lugs in the locks. Pull sharply on the harness to ensure that the lugs are securely locked and ensure that the straps lie flat across the pack.
  - (c) Pull upwards on the blue Y-section to settle the survival pack in the pan, and drape the front of the strap OVER THE TOP of the alternative firing handle.
- (14) When Modification E.S.2690 is embodied, fit the negative-G restraining strap as follows:-
- (a) Thread the white straps through the front bracket on the floor of the seat pan from front to rear, ensuring that the yellow tab on the buckle is facing forward. The white straps are marked 'PORT' and 'STARBOARD' and it is essential that they are so positioned to ensure correct installation.
  - (b) Pass the straps rearwards and thread each strap through its respective rear bracket in the floor of the seat pan.
  - (c) Engage the looped end of each strap over its respective bottom lock harness lug and insert the lugs into their respective bottom locks. It may be necessary to partially depress the harness release lever beneath the barostatic time-release unit to facilitate insertion of the lugs. Check that they have locked correctly by pulling on the lugs.
  - (d) Drape the blue Y-section of the strap OVER THE TOP of the seat pan firing handle.
  - (e) Lift the harness clear of the seat pan and insert the personal survival pack into the pan.
- (15) Fit the cushion to the seat strap of the harness as follows:-
- (a) Pass the strap under the cushion and locate it in position with the two press-studded beackets.
  - (b) Pass the leather covered straps of the cushion through the webbing loops on either side of the P.S.P. from rear to front. Pass the leg straps of the combined harness up through the slot in the cushion and secure the cushion to the pack with the lift-the-dot fasteners at the front.
- (16) Connect the side quick-release couplings of the P.S.P. to their harness components.
- (17) Insert the harness sticker straps into the spring clips on the inside of the seat pan and ensure that they pass outside the P.S.P. side quick-release couplings.
- (18) Place the harness straps in the stowage clips situated immediately below the windscreen arch under the cockpit coaming.
- (19) After the seat has been equipped, ensure that the safety pins remain in their 'safe for servicing' positions and report to the N.C.O. i/c servicing.

#### STRAPPING-IN PROCEDURE

17. The procedure for strapping-in is as follows; refer to fig. 7 to 10 for detail as necessary:-

- (1) Ensure that the seat is made safe for parking in accordance with current instructions.
- (2) Before entering the seat, ensure that the harness is securely attached to its anchorages by pulling on the straps, individually, at each attachment point.
- (3) Sit in the seat and adjust its height to approximately the middle position, this enables the seat pan firing handle safety pin to be removed at a later stage without fouling the control column.
- (4) Remove the dust cover from the seat

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component of the P.E.C. and fit it into its stowage on the right-hand side of the seat pan.

- (5) Fit the personal component of the P.E.C. to the seat component and apply pressure under the handle (without touching the release catch) to check that it is securely locked to the seat component.
- (6) Connect the P.S.P. lowering line to its corresponding fitting on the pressure jerkin or life-jacket, as appropriate, and ensure that it passes outside the left leg.
- (7) Pass the left-hand leg restraint cord through the right leg garter D-ring and plug it into the socket above the left-hand snubbing unit. Pass the right-hand leg restraint cord through the left leg garter D-ring and plug it into the socket above the right-hand snubbing unit. Pull sharply on each cord to ensure that it is securely locked in its socket (remember that unless the personal component of the P.E.C. is securely fitted to the seat component the leg restraint cords cannot be secured in their sockets). It is not important which cord is secured first so long as the cords are not interlaced.
- (8) Adjust the leg restraint cords in the snubbing unit to obtain the required range of leg movement.

**Note . . .**

*If the cords are too short, pull the ring of each snubbing unit and ease the cords forward; slack can be taken up by pulling the cords backwards through the snubbing units.*

- (9) Adjust the parachute back pad and the height of the lumbar cushion. Position the harness waist-belt against the body. Draw up the blue Y-section of the negative-G restraining strap and pass the appropriate looped end over its respective lap strap. Ensure that the adjustment buckle and free end of the strap face forward and that the Y-section lies flat against the inside of the thighs. Insert the lugs of the lap straps into the quick-release fitting, ensuring that the right-hand

lap strap passes outside the hoses from the personal component of the P.E.C.

**Note . . .**

*When an inertia-proof quick-release fitting is incorporated, turn the disc knob in an anti-clockwise direction until the yellow line passes the dots on the body; retain the knob in this position and insert the first lug. Repeat the operation when inserting the three remaining lugs.*

- (10) Tighten the lap straps.

**Note . . .**

*The lap straps must be as tight as possible. To tighten these straps fully, it is necessary to relieve the tension in the 'standing end' of each strap (the ends carrying the buckles) otherwise the buckles become stiff. Pull on the 'running end' with one hand and push the webbing of the 'standing end' towards the buckle with the other; it may be necessary to do this several times before the straps are really tight and while it is being done the occupant should push himself well back into the seat.*

- (11) Tighten the negative-G restraining strap as follows:—

- (a) *Prior to Modification E.S.2690.* Pull UPWARDS on the free end of the strap until the strap is as tight as possible and tuck the free end back under the elastic band.
- (b) *When Modification E.S.2690 is embodied.* Pull DOWNWARDS on the free end of the blue strap until the strap is as tight as possible and ensure that the free end is then tucked down BEHIND the alternative firing handle. The strap introduced by Modification E.S.2690 is fitted with a buckle equipped with a snubber, which is released by pulling downwards on the yellow tab attached to the snubber lever to loosen the strap.

- (12) Pass the left leg loop upwards over the inside of the thigh and through the D-ring on the left strap (from the inside of the ring towards the outside of the

leg). Bring the end of the leg loop over towards the quick-release fitting, pass the lug of the left shoulder strap through the leg loop (from the top downwards) and insert the lug into its appropriate slot in quick-release fitting; snug the loop down over the lug. Repeat these operations for the right leg loop and shoulder strap.

- (13) Remove the safety pin from the seat pan firing handle and place it in its stowage on the console.
- (14) Adjust the sitting height to the desired position (ideally the head is to be located centrally against the headrest cushion).
- (15) Ensure that the shoulder straps pass under the folds of the life-jacket or pressure jerkin stole; tighten the inner (BLUE) straps and then the outer (KHAKE) straps.

**Note . . .**

*It is undesirable to tighten these straps excessively since this action may arch the back and produce an unsuitable position for ejection. The inner straps are not to press down on the shoulders appreciably in ordinary conditions; equally there is to be no slack, so that in inverted flight these straps can take some of the weight off the lap straps as the body tends to stretch. The outer straps are to be similarly adjusted to prevent forward movement of the shoulders.*

- (16) Connect the oxygen supply hose from the personal component of the P.E.C. to the oxygen mask or partial pressure helmet. Securely fasten the chin straps and connect the Mic/Tel lead.
- (17) Remove the safety pin from the face screen firing handle and place it in the stowage on the console (this is normally done by a member of the ground crew;

if one is not available, the pilot is to remove and stow the pin prior to strapping-in).

## EMERGENCIES

18. Instructions for dealing with emergencies are contained in A.P.4700E-P.N., to which reference is to be made, as necessary.

## LEAVING THE AIRCRAFT AFTER LANDING

19. The following sequence should be used when leaving the aircraft after landing:—

- (1) Remove the safety pins from their stowage on the console; fit the short pin through the seat pan firing handle and hand the others to the ground crew member who will then fit the long pin through the face screen firing handle lock.

**Note . . .**

*If a ground crew member is not available, the pilot is to fit the face screen firing handle safety pin before leaving the cockpit.*

- (2) Operate the harness quick-release fitting, free the harness straps (including the negative-G strap) and return the fitting to the locked position. Stow the straps in the clips provided in the cockpit.
- (3) Disconnect the personal component of the P.E.C. from the seat component; remove the dust cover from its stowage and fit it to the seat component.
- (4) Free the leg restraint cords from the garters.
- (5) Disconnect the P.S.P. lowering line from the life-jacket or pressure jerkin, as appropriate.
- (6) Disconnect the Mic/Tel lead.
- (7) Vacate the aircraft.



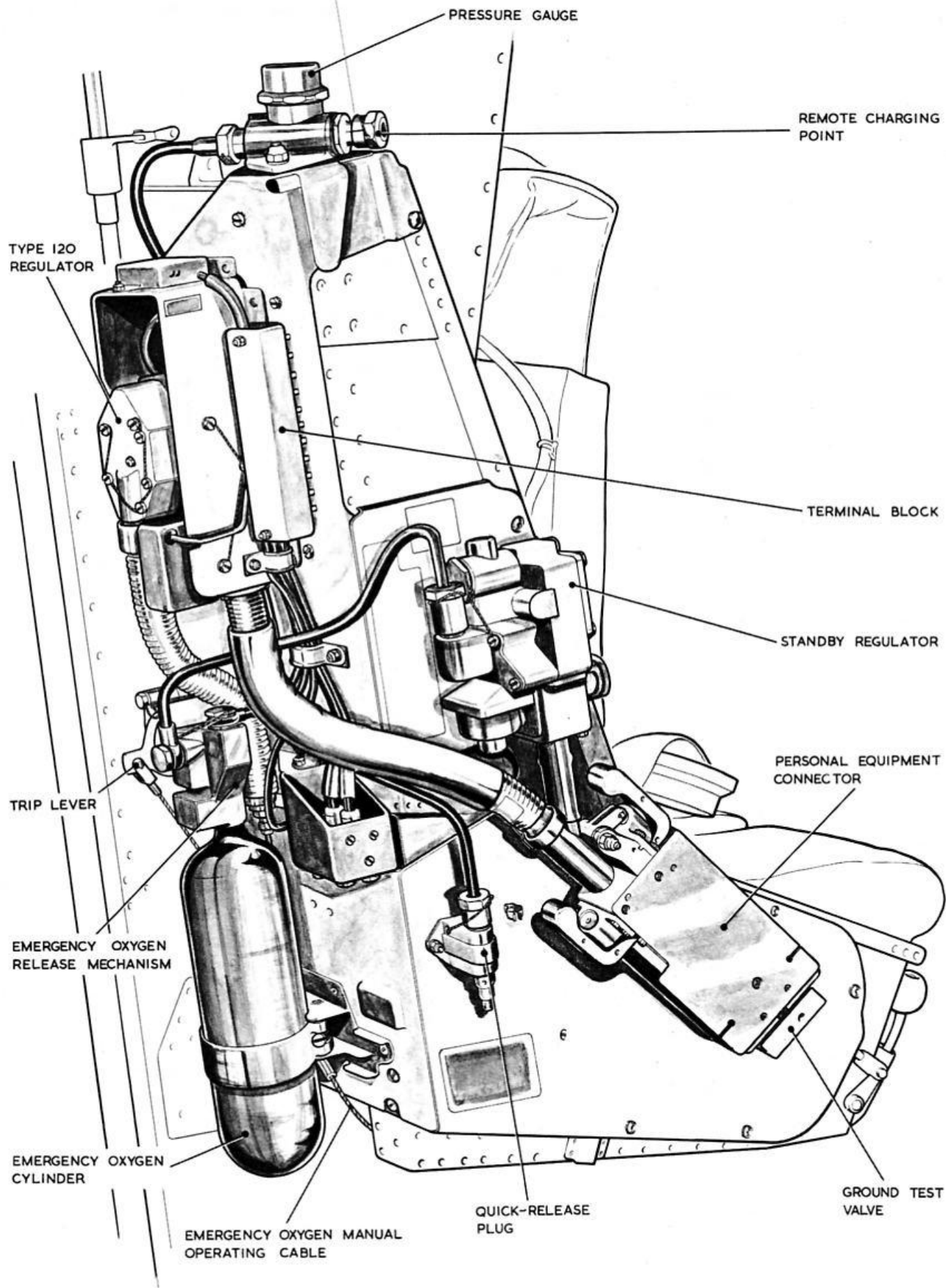


Fig. 1. Seat mounted oxygen group assembly

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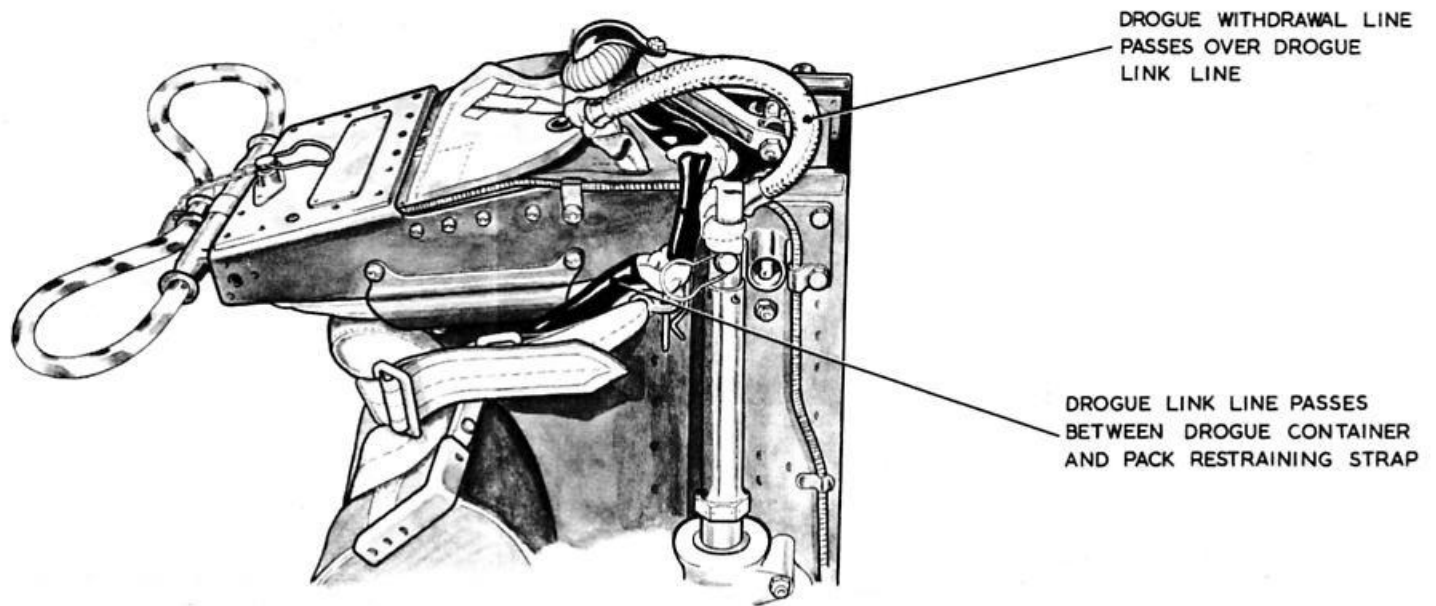


Fig. 2. Arrangement on port side of drogue container

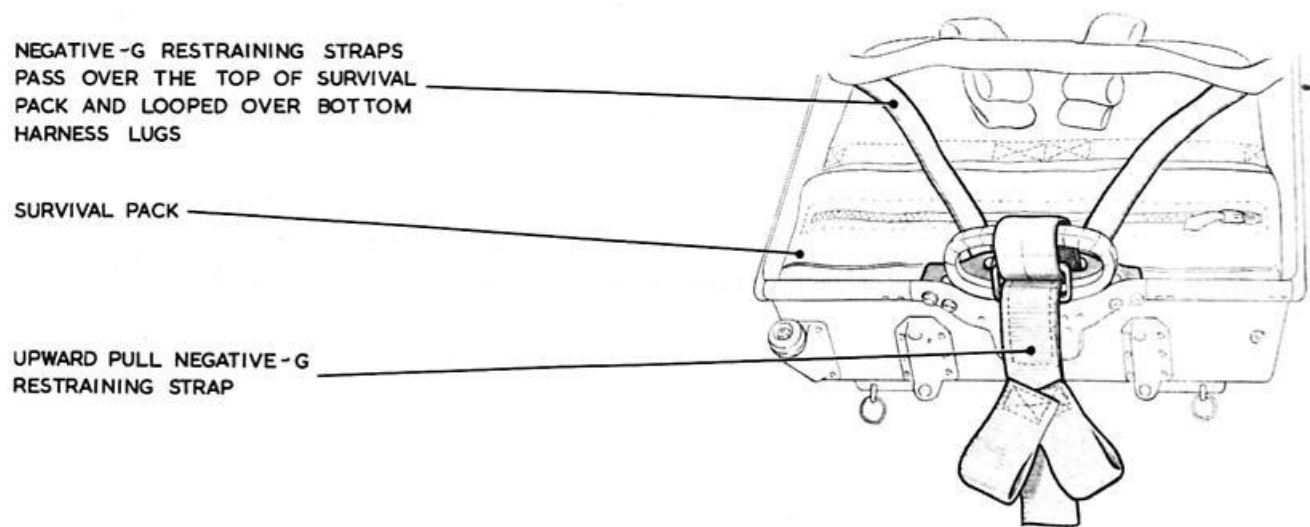
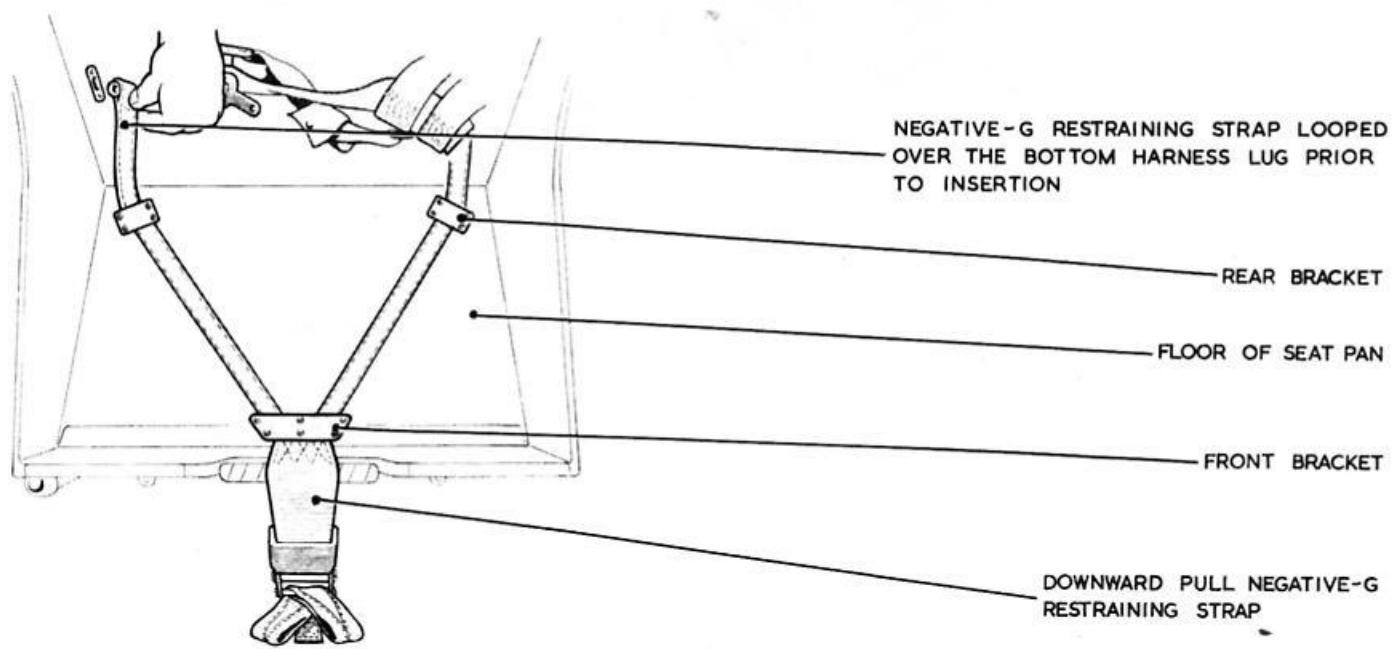


Fig. 3. Installation of negative-G strap: prior to Mod. E.S.2690

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**Fig. 4. Installation of negative-G strap: post Mod. E.S.2690**

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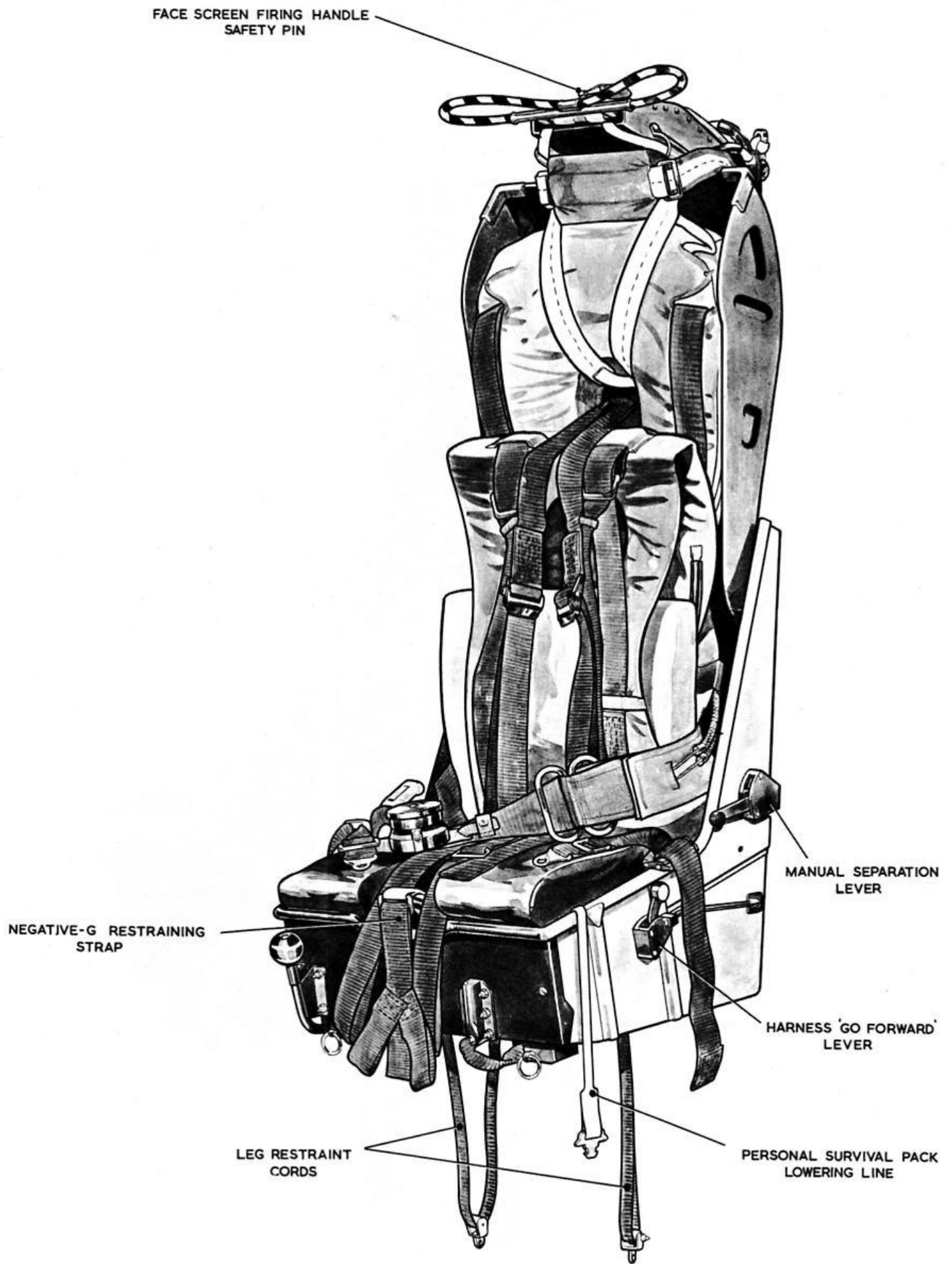


Fig. 5. The seat equipped (port)

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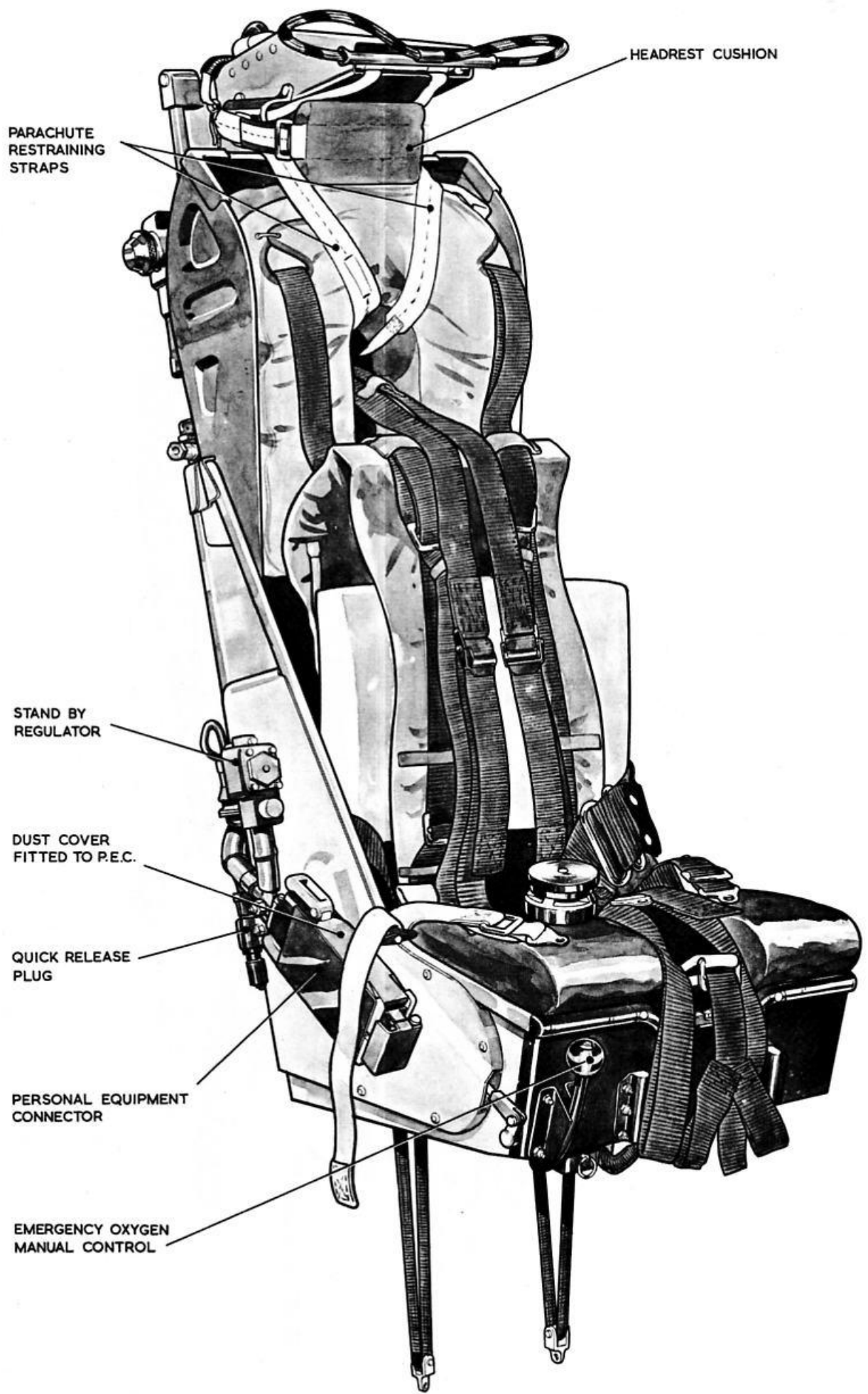


Fig. 6. The seat equipped (starboard)

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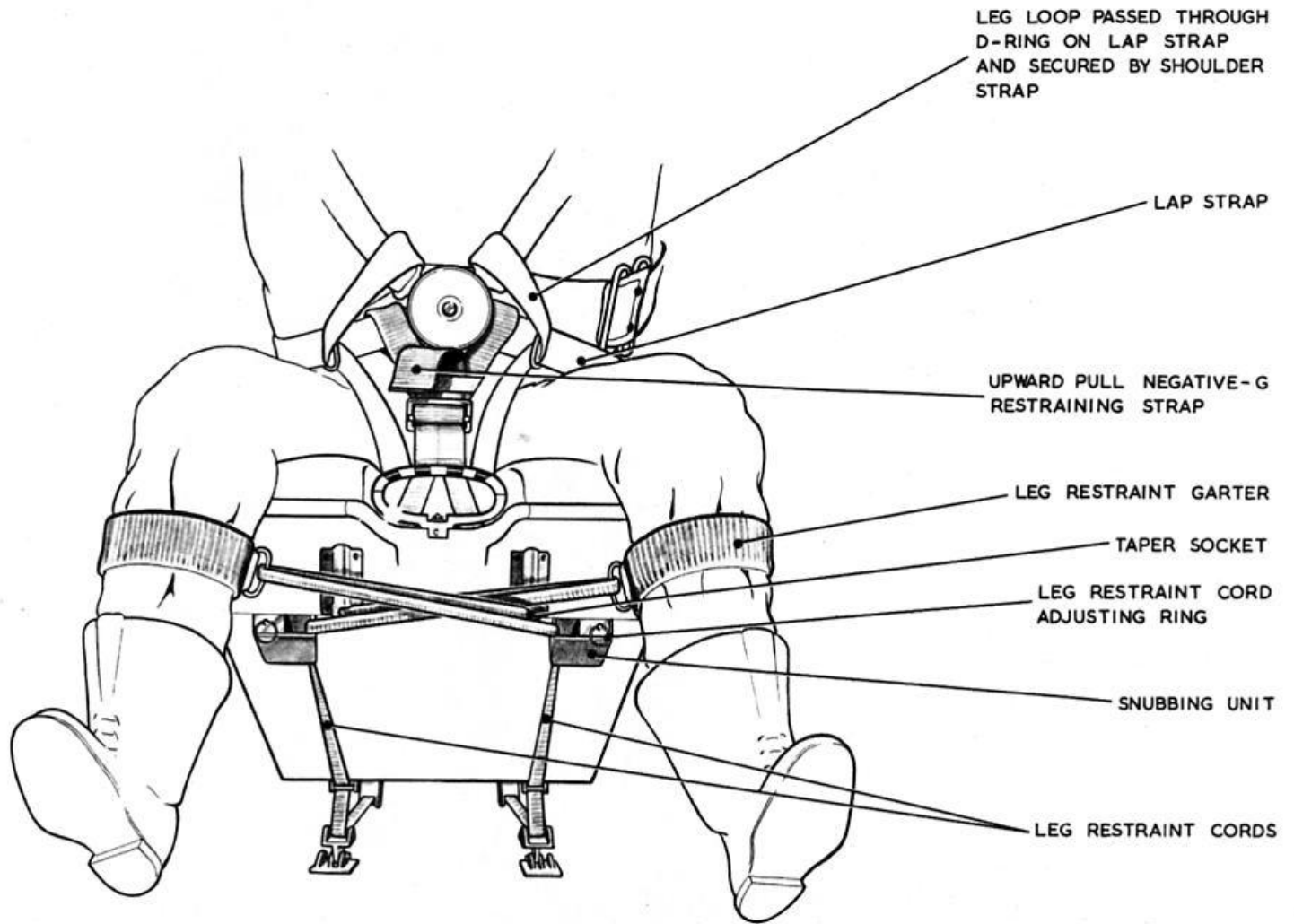


Fig. 7. Arrangement of leg restraint cords and harness : upward pull negative-G restraining strap fitted

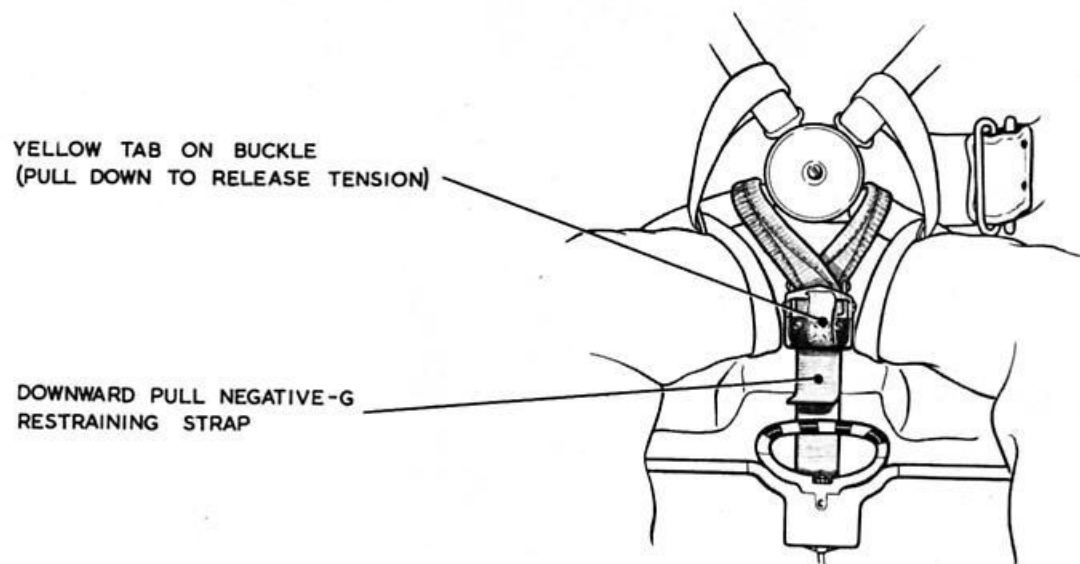


Fig. 8. Arrangement of harness: downward pull negative-G restraining strap is fitted

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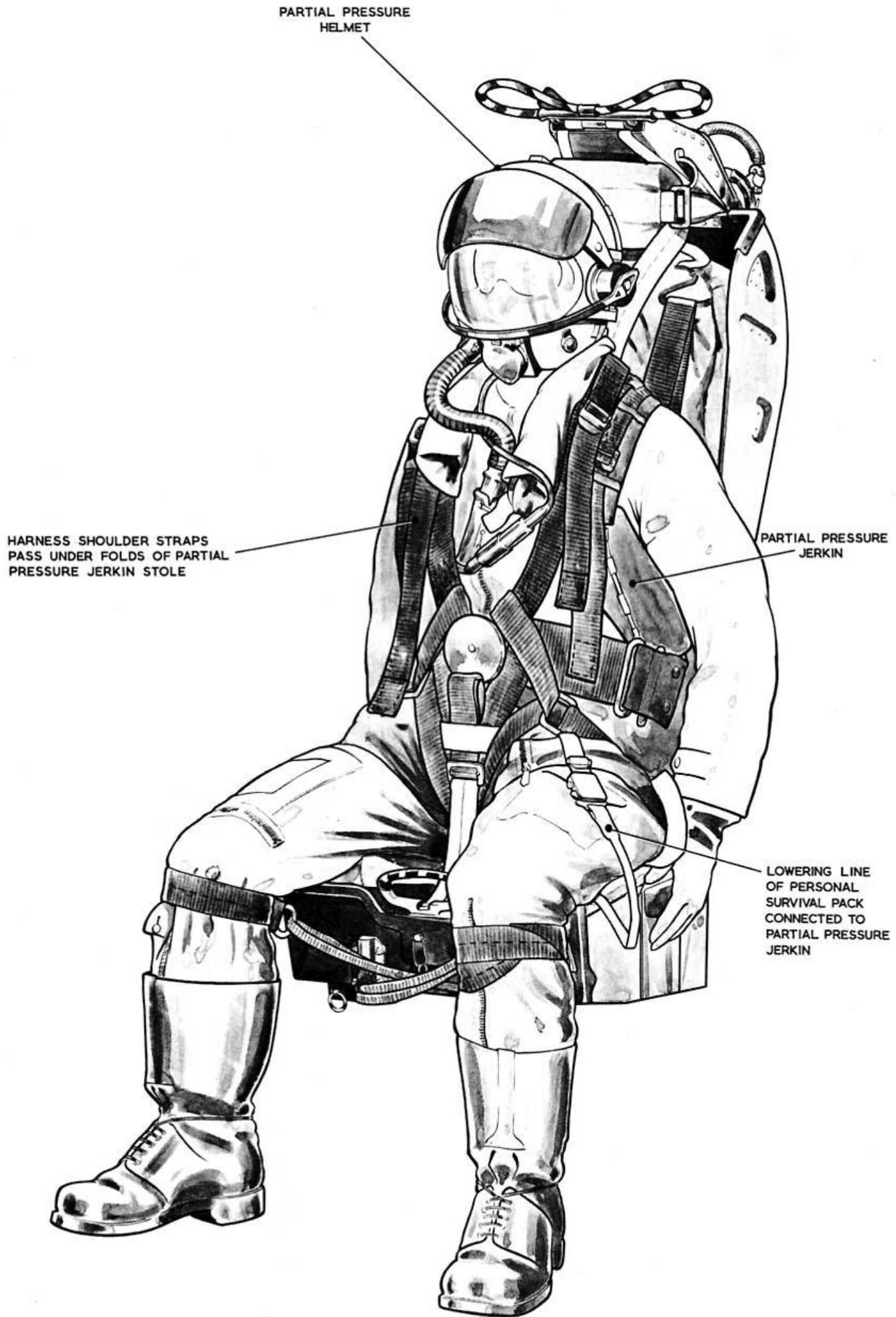


Fig. 9. The seat occupied (port)

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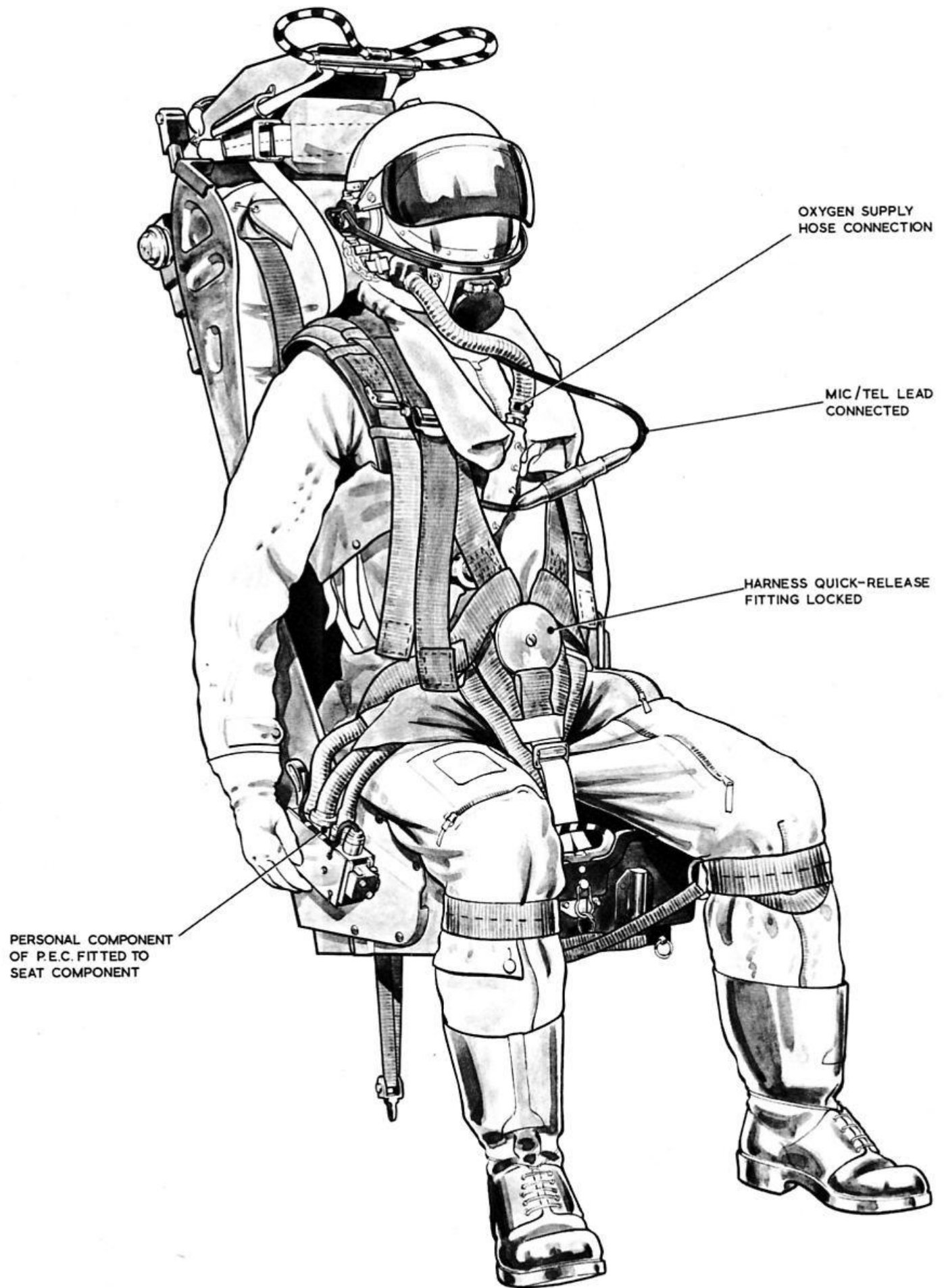


Fig. 10. The seat occupied (starboard)

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## Appendix 2

## AIRCRAFT FITTED WITH TYPE 4BSB MK.2 EJECTION SEAT

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## COMPOSITION OF THE ASSEMBLY

1. Two aircrew equipment assemblies are fitted to this aircraft, each of which consists of the following items:—

|                          |  |
|--------------------------|--|
| Ejection seat            | Type 4 BSB Mk.2                                  |
| Parachute assembly       | Back Type Mk.45                                  |
| Personal survival pack   | Type V (c/w cushion)                             |
| Emergency oxygen system  | Group assembly Type 120 Mk. 1 (Ref. No. 6D/2789) |
| Flying clothing assembly | To be issued later                               |

## The Type 4 BSB Mk.2 ejection seat

2. The Type 4 BSB Mk.2 seat is ejected from the aircraft by a cartridge operated gun, the seat sliding up two guide rails attached to the cylinder tube of the ejection gun and the gun being attached to the airframe by brackets.

3. A combined safety and parachute harness is attached to the seat at three quick-release points. It can be released in two ways; by the action of a barostatic time release unit, or by the operation of a manual separation handle, situated on the

port side of the seat pan. A 'go-forward' harness release control is situated on the port side of the seat pan, and is operated by a three position, spring loaded lever. If, the lever is pushed fully forward and then released to the centre position, the occupant can lean forward and backward at will. Return of the lever to the rear position brings the snubbing unit in the top harness lock into action, preventing further forward movement and automatically locking the harness in the rearward position as the occupant leans back. In the event of a crash landing or ejection occurring whilst the lever is in the central position, an automatic inertia device brings the snubbing unit into action to prevent the occupant being thrown forward.

4. A negative-G restraint strap is fitted to restrain the occupant against vertical movement when subjected to negative-G forces. The strap passes through brackets in the floor of the seat pan, the rear ends being attached to the bottom lock harness lugs and the forward ends attached to the harness lap strap lugs which are retained in the quick-release fitting. Means are provided for tensioning the strap during strapping-in procedure.

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5. A Type V personal survival pack complete with its cushion is housed in the seat pan, where it forms a comfortable seat for the occupant. The pack is attached to the combined harness by side quick-release connectors and the lowering line is connected to the flying clothing during strapping-in.

6. A remote controlled demand emergency oxygen system assembly is mounted on a detachable tray and bolted to the starboard side of the seat pan. The emergency oxygen supply is turned on automatically during ejection and is capable of both pressure jerkin inflation and meeting the breathing requirements of the occupant. A knob situated on the starboard side of the front face of the seat pan provides manual control of the emergency system in the event of failure of the aircraft main oxygen supply. Details of the seat mounted oxygen system are contained in A.P.1275G, Vol. 1 (2nd edition), Part 2, Sect. 6, Chap. 1.

7. A personal equipment connector (P.E.C.) bolted to the side plate of the seat mounted oxygen tray, enables the seat occupant to connect or disconnect in one action, the main and emergency oxygen, the air ventilated suit, the anti-G suit and the Mic/Tel services. During ejection, it automatically disconnects the air ventilated suit, the anti-G suit and the Mic/Tel services between the seat and the aircraft. The main oxygen supply between the seat and the aircraft is disconnected during ejection, at the quick-release plug mounted on the oxygen tray. When separation of the seat and occupant occurs after ejection, the P.E.C. enables the occupant to be automatically disconnected from all services on the seat. A full description of the P.E.C. is contained in Book 1, Sect. 1, Chap. 5. The connector is comprised of three components.

- (1) *Aircraft component.* Connected to the cockpit floor by a static line.
- (2) *Seat component.* Bolted to the oxygen tray.
- (3) *Personal component.* Attached to the flying clothing.

8. Two firing handles are fitted to the seat. The face screen handle, attached to the face screen, projects from the front of the drogue container. The seat pan handle is positioned on the top front edge of the seat pan, and is intended for use when the occupant is unable to reach the face screen firing handle, e.g. when subjected to

high G loading. Operation of either handle jettisons the canopy and ejects the seat. A restrictor, fitted to the breech type time-delayed firing unit of the ejection gun, prevents the firing of the unit before the canopy has been jettisoned. The canopy can be jettisoned, without ejection taking place, by the operation of a handle on the cockpit console.

9. Leg restraint cords are fitted to ensure that the occupant's legs are drawn back and restrained close to the seat pan, reducing the possibility of injury during ejection. An inter-connection between the leg restraint cord sockets and the P.E.C. ensures the cords become disconnected when the personal component of the P.E.C. is disconnected. This inter-connection also ensures that the leg restraint cords cannot be connected unless the personal component is correctly engaged with, and locked to the seat component.

10. Seat height adjustment is achieved by an electrically operated actuator, controlled by a switch on the cockpit console. The switch is spring loaded to the central (OFF) position, forward movement of the switch lowers the seat and rearward movement raises it.

11. Fully automatic facilities are provided to withdraw the parachute and separate the occupant from the seat after ejection. In the event of failure of the automatic facilities, or failure to eject, a manual separation handle is fitted on the port side of the seat, which when operated will free the occupant from the seat enabling him to make a manual separation from the seat. When the occupant separates from the seat after the operation of the manual separation handle, a static line attached to the rear of the parachute pack withdraws the seat from the guillotine firing unit on the port side of the drogue container. This causes the guillotine firing unit to fire severing the parachute withdrawal line and separating the parachute from the seat structure. The parachute is then deployed by pulling the D-handle attached to the waistband of the harness.

**Note . . .**

*The guillotine firing unit also fires during automatic separation from the seat, but the parachute withdrawal line is pulled out from the yellow gate of the guillotine firing unit by the drogues as soon as the scissor shackle is released and before the occupant separates from the seat.*

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12. A full description of the Type 4BSB Mk. 2 seat will be found in A.P.4288D, Vol. 1. The parachute assembly and personal survival pack are described in A.P.1182A, Vol. 1 and A.P.1182C, Vol. 1 respectively.

#### Connections to the aircraft

13. When a seat is installed in an aircraft the following items are connected to the airframe or fixed portion of the seat:—

- (1) *Port side of seat:—*
  - (a) Static rod from drogue gun to cross beam.
- (2) *Starboard side of seat:—*
  - (a) Static rod from barostatic time release unit to cross beam.
  - (b) Static line from aircraft component of the P.E.C. to airframe.
  - (c) All P.E.C. services.
  - (d) Main oxygen supply and static line from main oxygen disconnect.
  - (e) Electric supply leads to seat actuator and oxygen assembly.
- (3) *Underside of seat:—*
  - (a) Leg restraint cord rollers to brackets on the cockpit floor.
- (4) *Top of seat:—*
  - (a) Static line from the canopy to the restrictor on the firing unit.
  - (b) Face screen firing cable to the canopy jettison torque shaft.

#### EQUIPPING THE SEAT

14. Before equipping the seat, make sure that it has been made safe for servicing in accordance with A.P.4288D, Vol. 5.

15. The following procedure is to be followed when equipping the seat, refer to figs. 1 to 7.

- (1) The emergency oxygen system (*fig. 1*) must be fitted in accordance with A.P.4288D, Vol. 5, before the seat is installed in the aircraft.
- (2) Ensure that the safety pin has been

removed from the emergency oxygen release mechanism.

- (3) Ensure that the seat pan is clean and that the leg restraint cords are clear of the seat pan.
- (4) Open the paddle spreaders, situated in front of the top harness lock and pass the O rings of the two parachute restraining straps over the paddle spreaders, one over each spreader. Ensure that each O ring is pushed well back towards the pivot end of its paddle spreader, and close the paddle spreaders inwards towards each other as far as they will go (*fig. 2*).
- (5) Place the parachute pack in the parachute container, guiding the static line for the guillotine through its aperture in the back plate. Push the pack well into the container so that it is supported on the support bracket. Bring the two parachute restraining straps through the arch of the pack, ensuring that they are not crossed.
- (6) Ensure that the manual separation handle is in the locked position.
- (7) Move the 'go-forward' lever to the fully forward position and then release it to the centre position. Pull out the webbing strap from under the parachute support bracket and hold it against the spring tension.
- (8) Pass the webbing strap DOWNWARDS through the D-shackle attached to the harness shoulder straps, ensuring that the harness straps are not twisted. Insert the lug, fitted to the end of the webbing strap, between the inner extremities of the paddle spreaders into the top harness lock in the back of the seat (*fig. 3*). Push the lug in until it locks into position. It may be necessary to partially depress the harness release lever, situated below the barostatic time release unit, to facilitate the insertion of the lug. Check that it has locked correctly by pulling on the webbing strap. Move the 'go-forward' lever to the rear position and allow the strap to wind back.

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- (9) Connect the two halves of the parachute withdrawal line/link line coupling. Open the yellow gate on the top of the guillotine and route the parachute withdrawal line through the aperture in the guillotine. Close the yellow gate and ensure that it correctly retains the parachute withdrawal line. Only sufficient line to permit the connection should be withdrawn from the parachute.
- (10) Draw the free ends of the parachute restraining straps forward through the arch of the parachute pack, over the pack, and towards the rear of the seat, on either side of the drogue container.
- (11) Pass the port restraining strap over the parachute withdrawal line and insert its end through the buckle of the short restraining strap on the port side of the drogue container, from the outside inwards. Ensure that the drogue link line, which is connected to the parachute withdrawal line is routed OUTSIDE the short restraining strap (*fig. 4*).
- (12) Insert the end of the starboard restraining strap through the buckle of the short restraining strap on the starboard side of the drogue container, from the outside inwards.
- (13) Position the headrest wedge pad centrally on the top of the parachute pack, between the pack and the drogue container and ensure that it is not inverted. Pass the ends of the parachute restraining straps through the buckles on each side of the headrest wedge pad so that the ends emerge on the outside of the buckles.
- (14) Work the straps back and forth in the self-locking buckles on the headrest wedge pad until the parachute pack and headrest wedge pad are strapped tightly to the seat. Pass the free ends back through the buckles on the short restraining straps and stow them neatly between the drogue container and the strap.
- (15) Check that the drogue withdrawal line has been routed OVER all other lines (*fig. 4*).
- (16) Ensure that the safety pin is fitted through the sear of the guillotine firing unit. Attach the guillotine static line to the sear.
- (17) Lift the harness clear of the seat pan and fit the negative-G restraint strap
  - (a) Thread the white straps through the front bracket on the floor of the seat pan from front to rear. The white straps are marked PORT and STARBOARD; it is essential that they are so positioned to ensure correct installation.
  - (b) Pass the straps rearwards and thread each strap through its respective rear bracket on the floor of the seat pan.
  - (c) Engage the looped end of each strap over its bottom lock harness lug and insert the lugs into their locks in the back of the seat pan. ▶◀ Check that they have locked correctly by pulling on the lugs. Ensure that the harness is arranged correctly and that none of the straps are twisted.
  - (d) Drape the blue Y-piece of the negative-G restraint strap OVER THE TOP of the seat pan firing handle.
- (18) Fit the personal survival pack into the seat pan, draping the lowering line over the port side of the seat pan.
- (19) Secure the cushion to the seat strap of the harness by passing the strap under the cushion and locating it in position with the two press-studded beackets.
- (20) Pass the leather covered straps of the cushion through the two webbing loops on either side of the personal survival pack from rear to front. Pass the leg straps of the combined harness up through the slot in the cushion and secure the cushion to the pack with the lift-the-dot fasteners. Ensure that the leg loops are not crossed.
- (21) Connect the side quick-release couplings of the personal survival pack to the couplings on the harness, ensuring

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that they pass outside the harness lap straps.

- (22) Insert the harness sticker straps into the spring clips on the inside of the seat pan bringing the strap upon the inboard side of, then over and outside the personal survival pack side quick-release couplings. Ensure that none of the straps are twisted.
- (23) Fully extend all straps and place the harness straps in the stowage clips situated immediately below the wind-screen arch under the cockpit coaming.
- (24) Leave the safety pins in the safe for servicing condition and report the position of the pins to the N.C.O. i/c aircraft servicing.

#### STRAPPING-IN PROCEDURE

16. The procedure for strapping-in is as follows: Refer to figs. 8 to 10.

- (1) Ensure that the safety pins are correctly fitted in the 'safe for parking' condition.
- (2) Check that the static rods from the drogue gun and the barostatic time release unit are secured correctly.
- (3) Grasp each lap strap and shoulder strap of the harness, pull sharply on each in turn and check for security.
- (4) Sit in the seat and adjust its height; ideally the head should be central against the headrest wedge pad.
- (5) Remove the dust cover from the P.E.C. and fit it into the stowage provided in the aircraft.
- (6) Connect the personal component of the P.E.C. to the seat portion.
- (7) Connect the personal survival pack lowering line to the corresponding fitting on the life jacket or pressure jerkin as appropriate ensuring that it passes outside the left leg.
- (8) Pass the left hand leg restraint cord through the right leg garter "D" ring and plug it into the socket above the left hand snubbing unit. Pass the right

hand leg restraint cord through the left leg garter D-ring and plug it into the socket above the right hand snubbing unit. Pull sharply on both cords to ensure that they are locked correctly in their sockets. It is immaterial which cord is secured first but it is essential they are not interlaced (fig. 8).

#### Note . . .

*Unless the personal component of the P.E.C. is correctly assembled to the seat portion of the P.E.C., the leg restraint cords will not lock in their sockets.*

- (9) Adjust the leg restraint cords in their snubbing units to achieve the desired freedom of leg movement.
- (10) Adjust the back pad and lumbar cushion to the most comfortable position. Bring the harness waistbelt across the body and adjust the quick-release fitting so that it lies centrally, with the waistbelt close to the body. Check that the quick-release fitting is in the locked position.
- (11) Bring the negative-G restraint strap up between the legs, ensuring that it is to the REAR of the seat pan firing handle and NOT passing THROUGH it, and that the strap is not twisted. Thread the lugs of the lap straps through their respective loops in the blue Y-piece of the negative-G strap and connect the lug to the quick-release fitting on the waistbelt ensuring that the right-hand lap strap passes OUTSIDE the hoses from the personal component of the P.E.C. and that the harness quick-release fitting is as low as possible consistent with comfort. To fit the harness lugs into an inertia proof quick-release fitting, turn the disc knob until the yellow line passes the dots on the body, hold it in this position and insert the first lug. Repeat the operation as each of the remaining lugs is fitted.
- (12) Tighten the lap straps.

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**Note . . .**

*The lap straps must be as tight as possible. To tighten these straps fully it is necessary to relieve the tension on the standing end of each strap (the ends that carry the buckles) otherwise the buckles become stiff. Pull on the running end with one hand and push the webbing of the standing end towards the buckle with the other; it may be necessary to do this several times before the straps are really tight; and whilst it is being done the occupant should push himself well back into the seat.*

- (13) Tighten the negative-G strap by pulling DOWNWARDS on the free end of the blue strap until the strap is as tight as possible. Ensure that the free end is tucked down BEHIND the seat pan firing handle. The strap is fitted with a buckle incorporating a snubber which is released by pulling down on the yellow tab attached to the snubber lever.
- (14) Pass the left leg loop upward over the inside thigh and through the D-ring on the left lap strap, from the inside of the ring towards the outside of the leg. Bring the end of the leg loop towards the quick-release fitting, ensuring that the leg loop lies flat on the thigh. Pass the lug of the left shoulder strap through the leg loop (from the top downwards) and insert the lug into its appropriate slot in the quick-release fitting; snug the loop down over the lug. Repeat for the right leg loop and shoulder strap, ensuring that the shoulder strap passes OVER the oxygen supply hose. Ensure that the leg loops do not obstruct the quick-release fitting.
- (15) Ensure that the shoulder straps pass UNDER the folds of the life jacket or pressure jerkin stole, and tighten the inner (blue) straps, followed by the outer (khaki) straps. This will ruck the lift webs between the straps. The assistance of a ground crew member should be obtained to straighten the rucks and tuck the excess neatly behind the back. The shoulder straps

should not be over tightened as this may lead to an arched back and possible injury during ejection.

- (16) Put on the flying helmet and protective helmet or partial pressure helmet, whichever is applicable, and fasten the chin straps. Ensure that the oxygen supply is connected to the oxygen mask or partial pressure helmet. Connect the Mic/Tel lead.

**Note . . .**

*If the chin straps are not fastened, the helmet and oxygen mask may be wrenched off during ejection with the consequent loss of vital oxygen at high altitude.*

- (17) Check that the face screen handle can be reached with both hands simultaneously.
- (18) With the assistance of a ground crew member remove the safety pins from the "safe for parking" condition. Place the pins in the stowage provided.

**Note . . .**

*If a ground crew member is not available, the occupant must remove and stow all safety pins.*

**17. After strapping in proceed with the following functional checks:—**

- (1) Check that the personal component of the P.E.C. is locked to the seat component by applying pressure under the handle without touching the release trigger.
- (2) Check that the leg restraint cords are locked in their sockets.
- (3) Move to the maximum extent left and right and check that this movement does not place undue strain on the hoses from the personal component of the P.E.C.
- (4) Raise and lower the seat to its full extent and check that the aircraft component of the P.E.C. remains locked to the seat component. Reposition the seat to the desired height.
- (5) Operate the "go-forward" lever and check for correct functioning of the "go-forward" mechanism.

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**EMERGENCIES**

18. Instructions for dealing with emergencies are contained in A.P.4700E-P.N. (T. Mk. 5).

**LEAVING THE AIRCRAFT AFTER LANDING**

19. The following procedure is to be followed when leaving the aircraft after landing:-

- (1) Remove the safety pins from their stowage and with the assistance of a ground crew member insert the safety pins in the "safe for parking" condition.

**Note . . .**

*If a ground crew member is not available, the occupant must position all safety pins himself.*

- (2) Operate the harness quick-release fitting, free the harness straps and return the fitting to the locked position. Stow the straps in the clips provided in the cockpit.
- (3) Disconnect the oxygen supply.
- (4) Remove the personal component of the P.E.C. from the seat component and free the leg restraint cords from the garters.
- (5) Fit the P.E.C. dust cover.
- (6) Disconnect the personal survival pack lowering line.
- (7) Disconnect the Mic/Tel lead.
- (8) Vacate the aircraft.

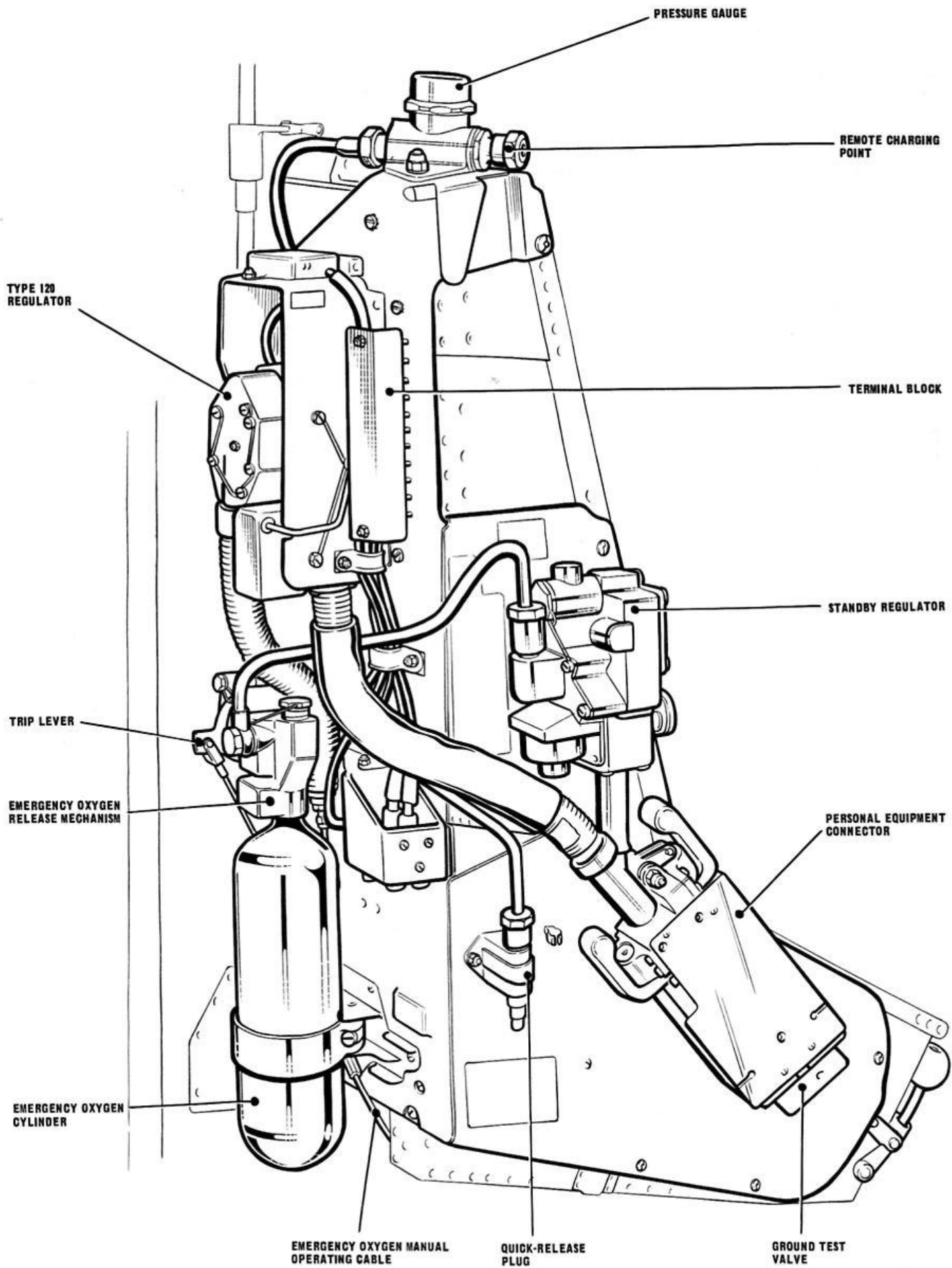


Fig. 1. Demand emergency oxygen system assembly

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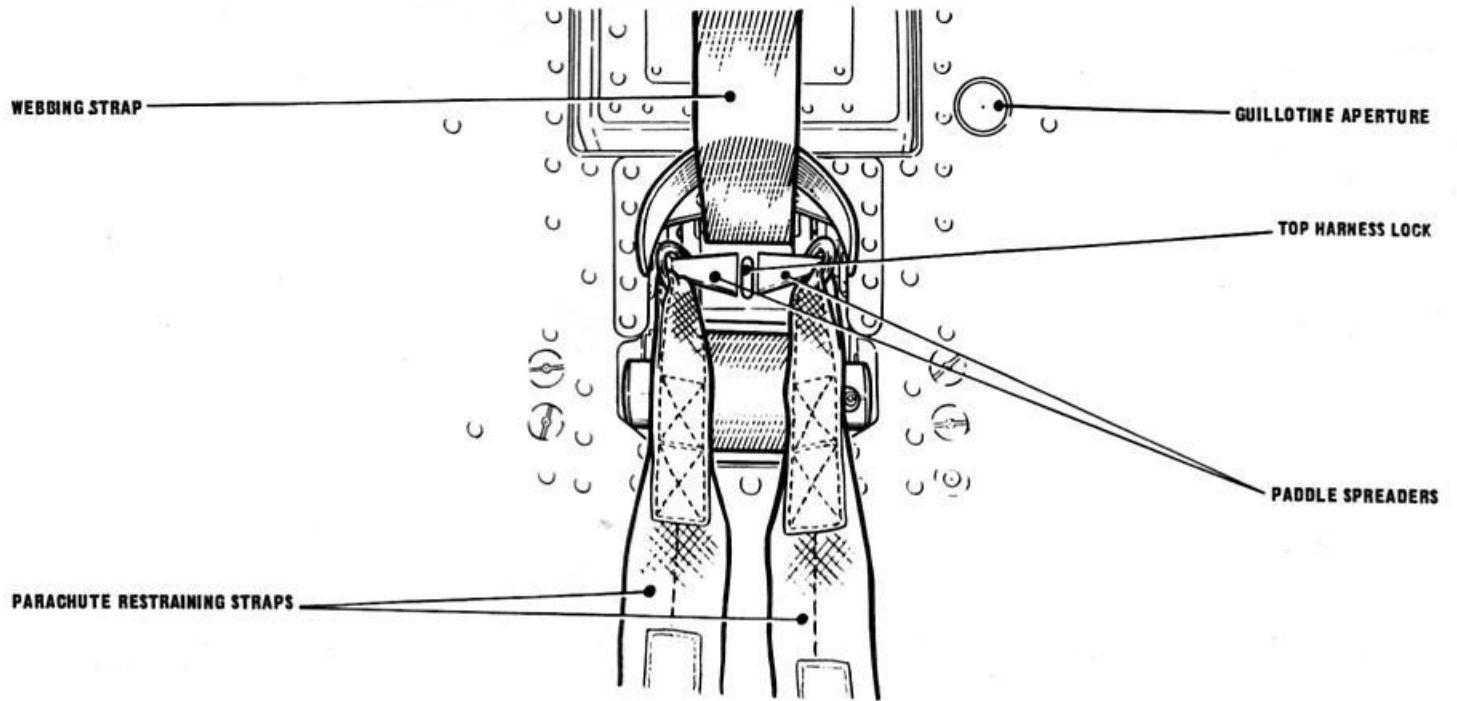


Fig. 2. Attachment of parachute restraining straps to paddle spreaders

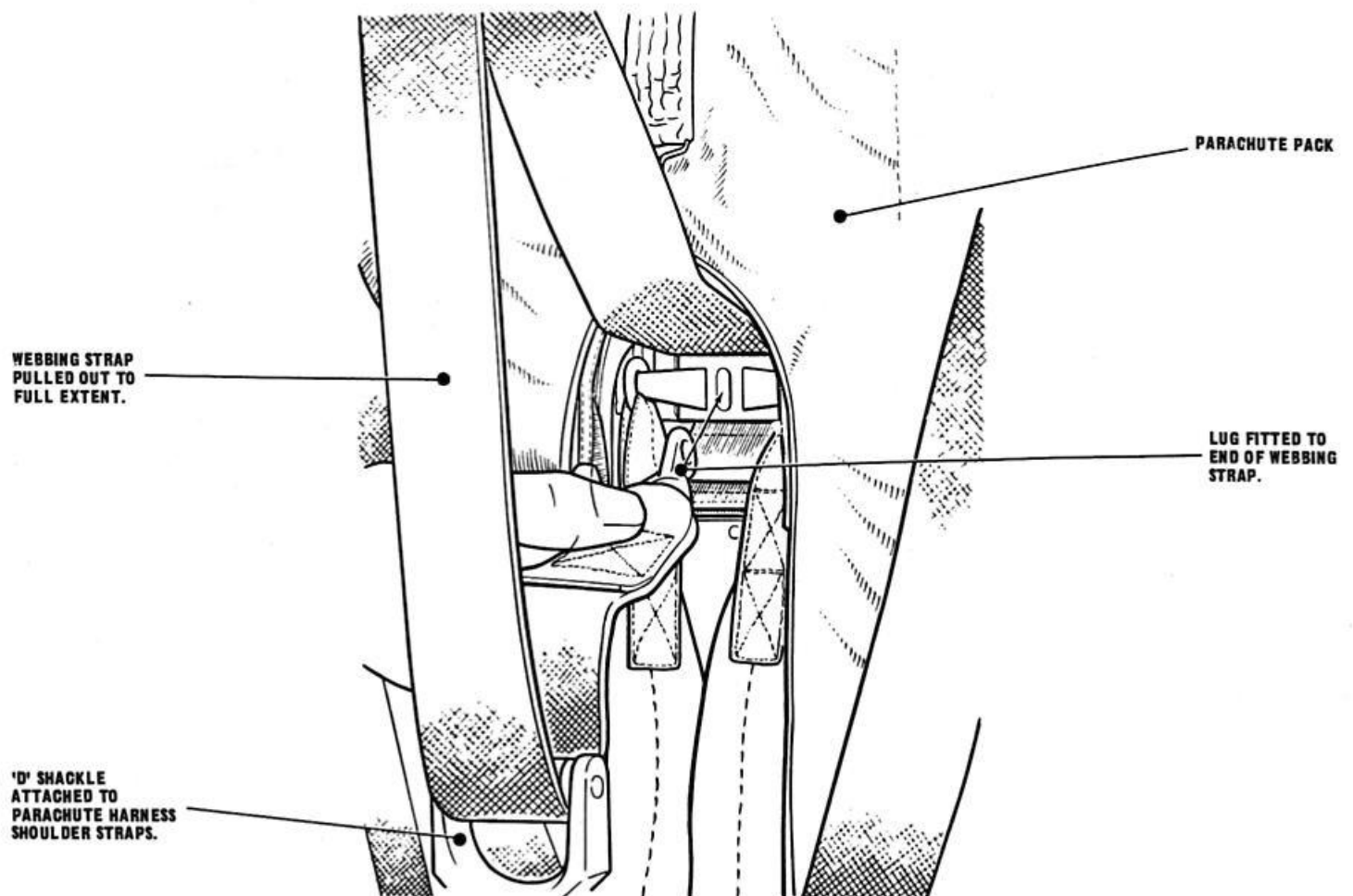


Fig. 3. Insertion of lug into top harness lock

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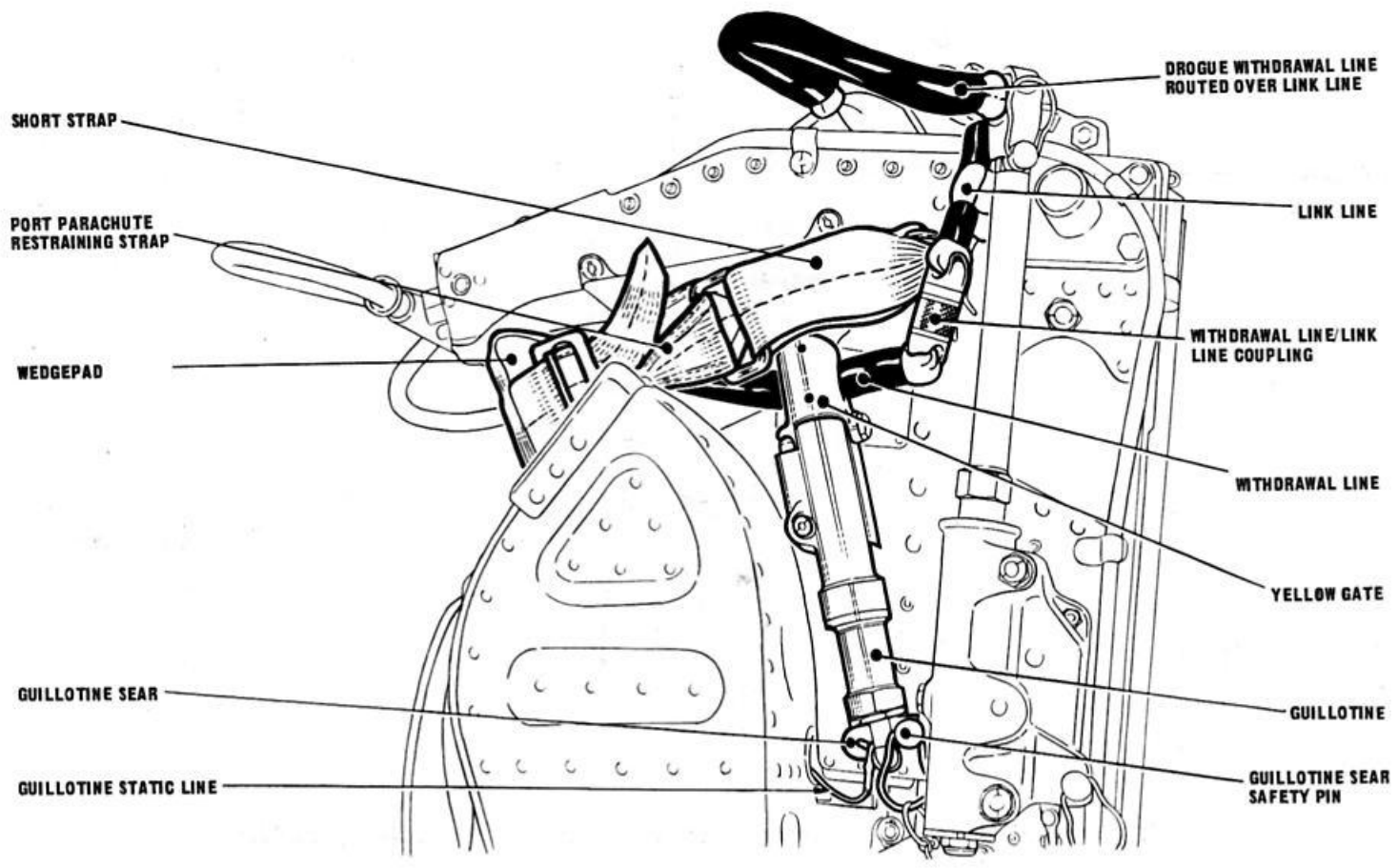


Fig. 4. Arrangement on port side of drogue container

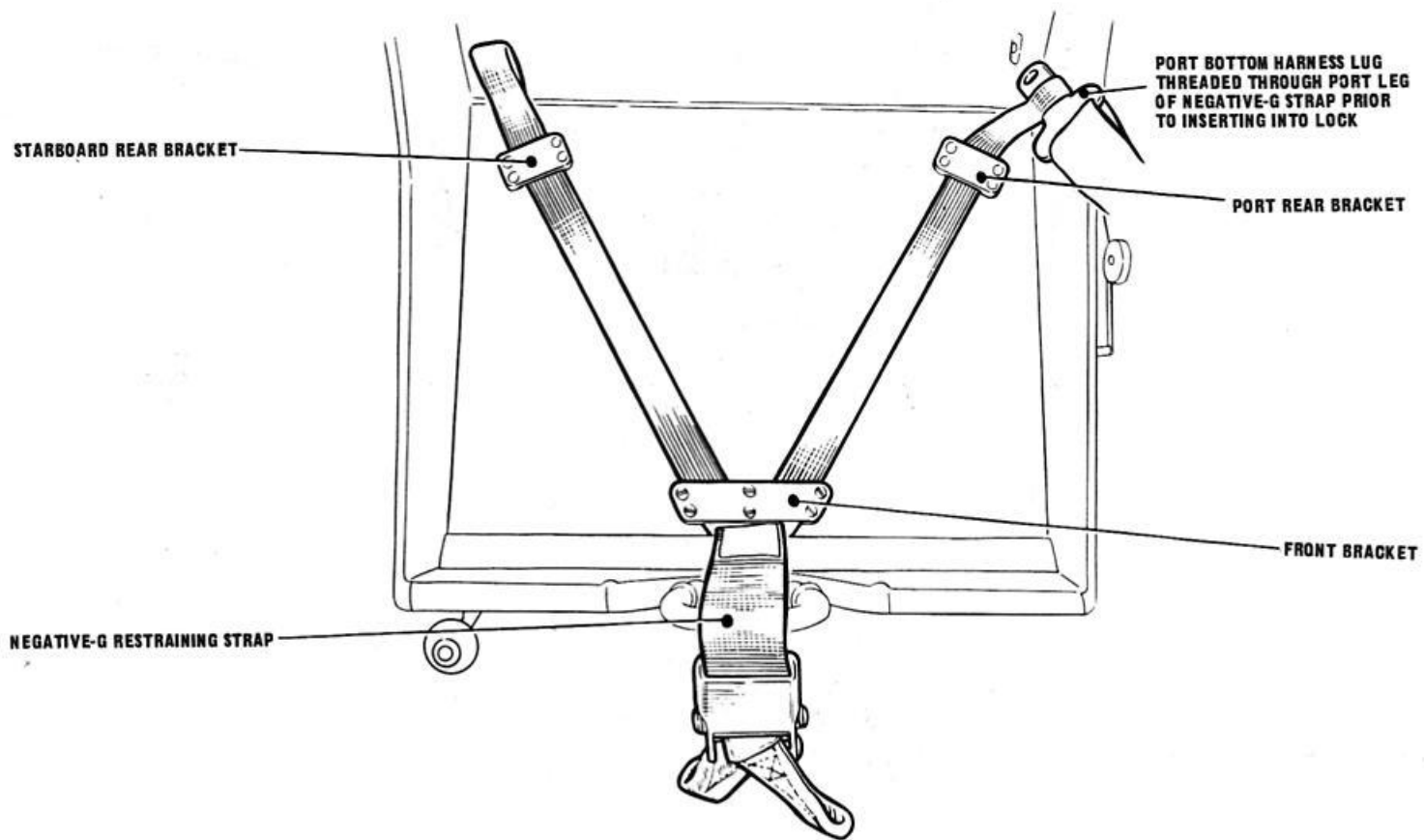


Fig. 5. Installation of negative-G strap

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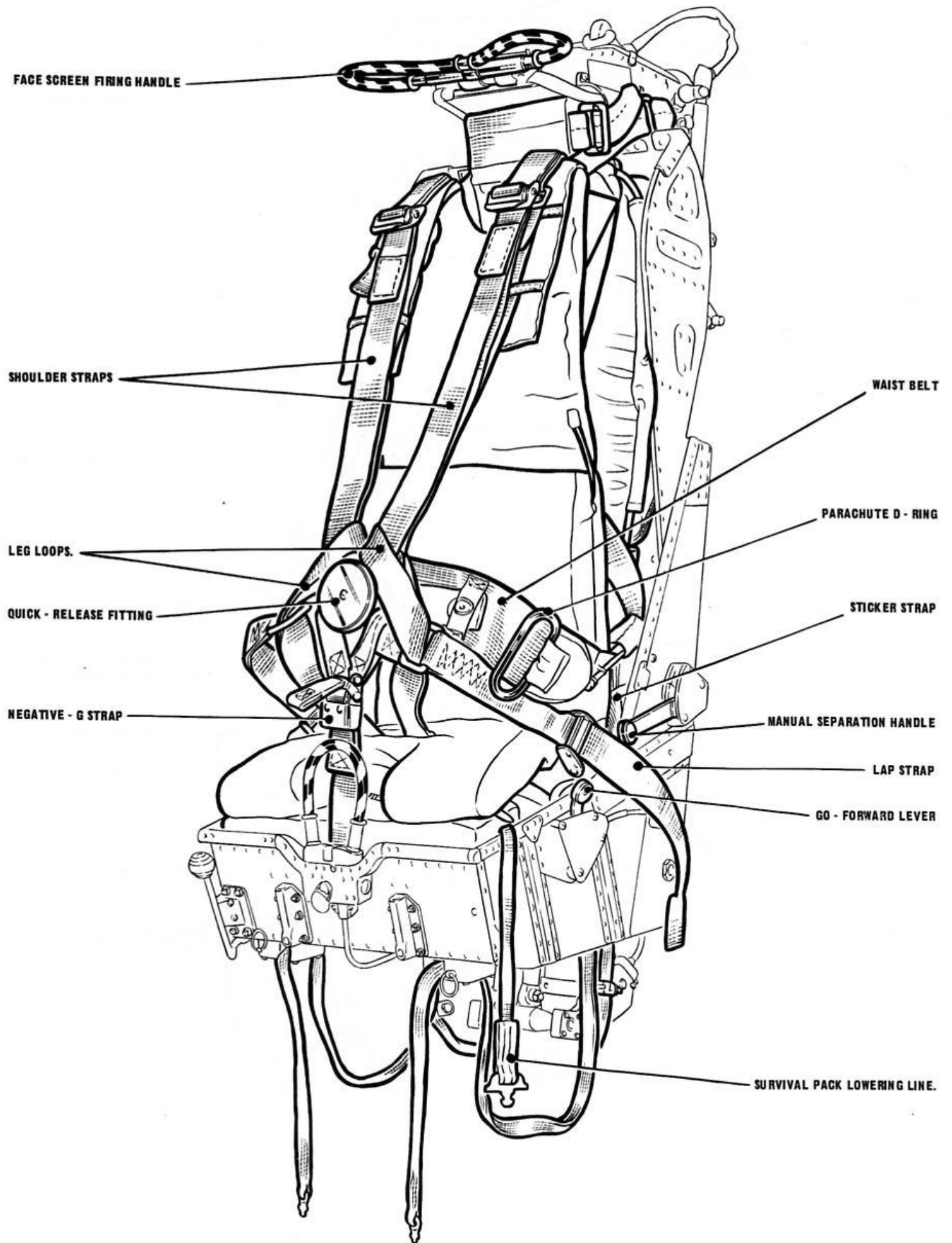


Fig. 6. The seat equipped (port)

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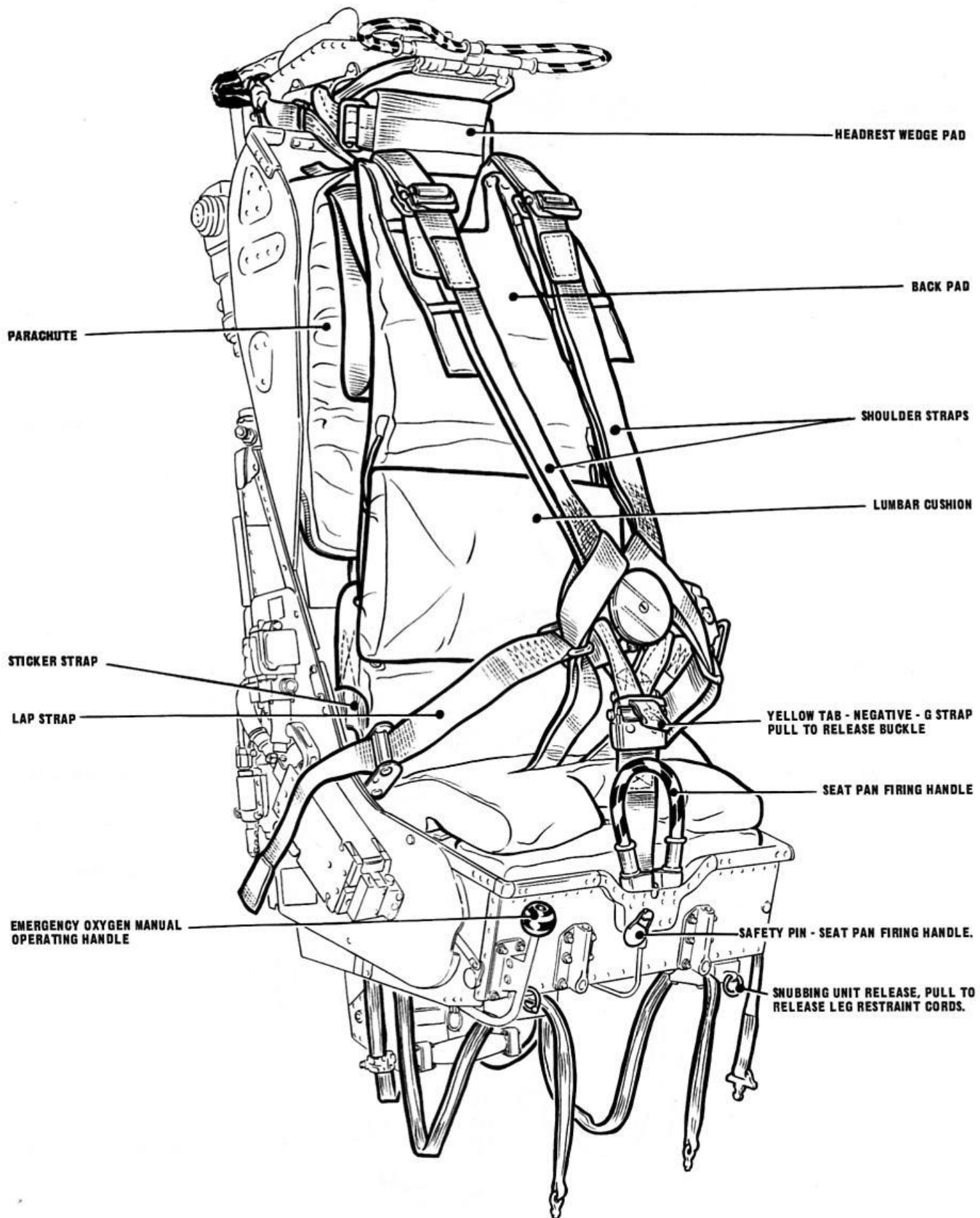


Fig. 7. The seat equipped (starboard)

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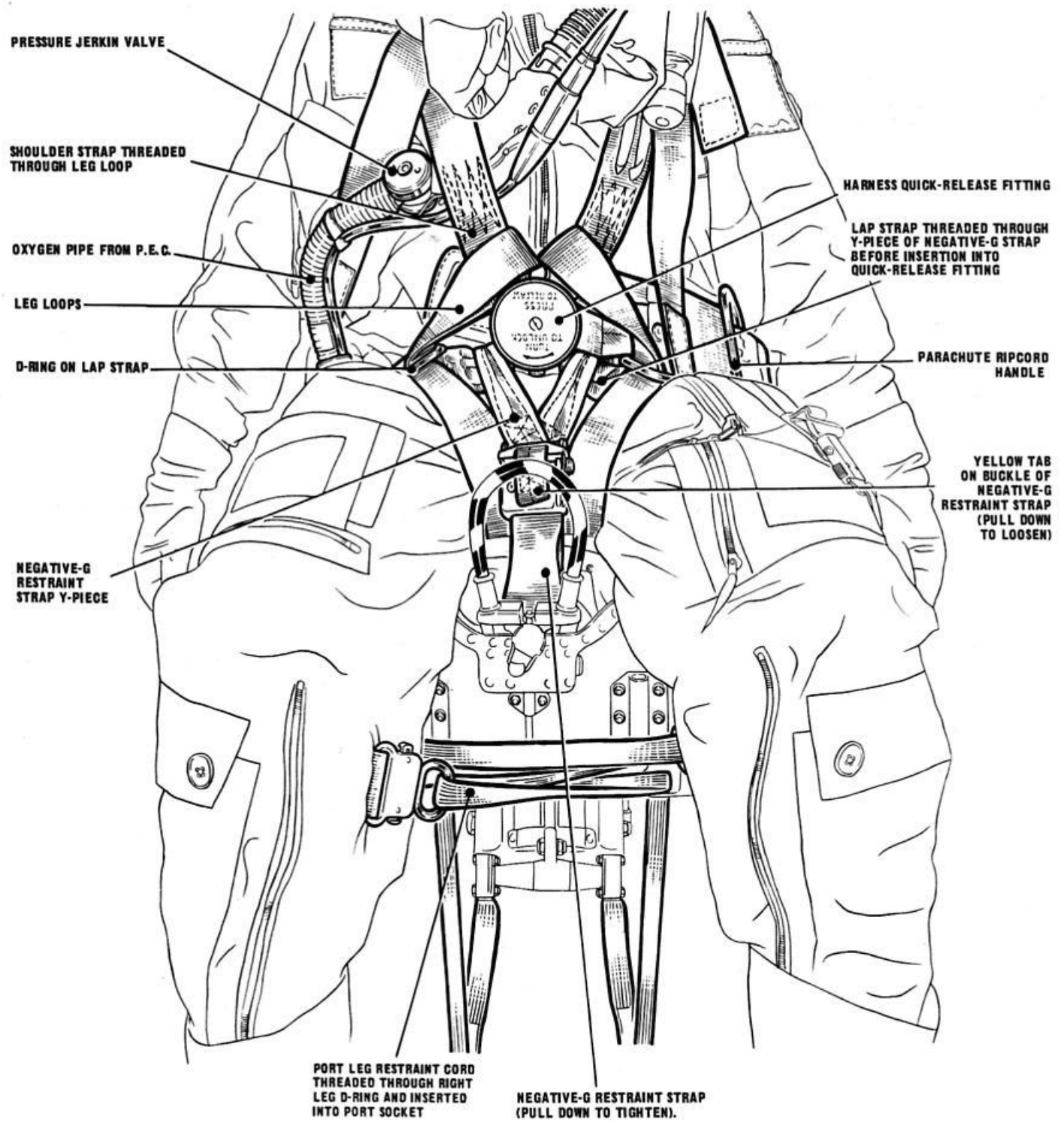
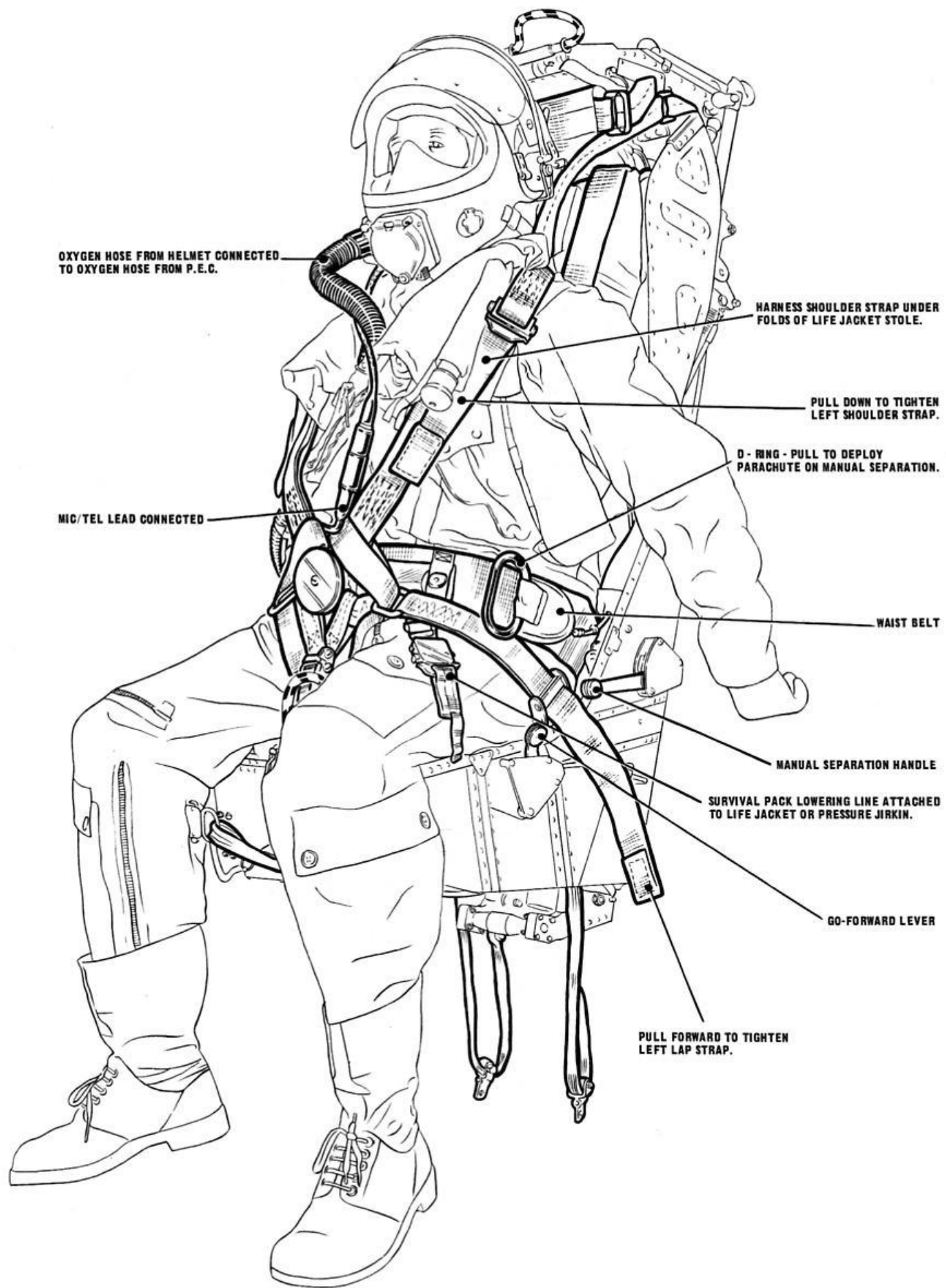


Fig. 8. Arrangement of leg restraint cords

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**Fig. 9. The seat occupied (port)**

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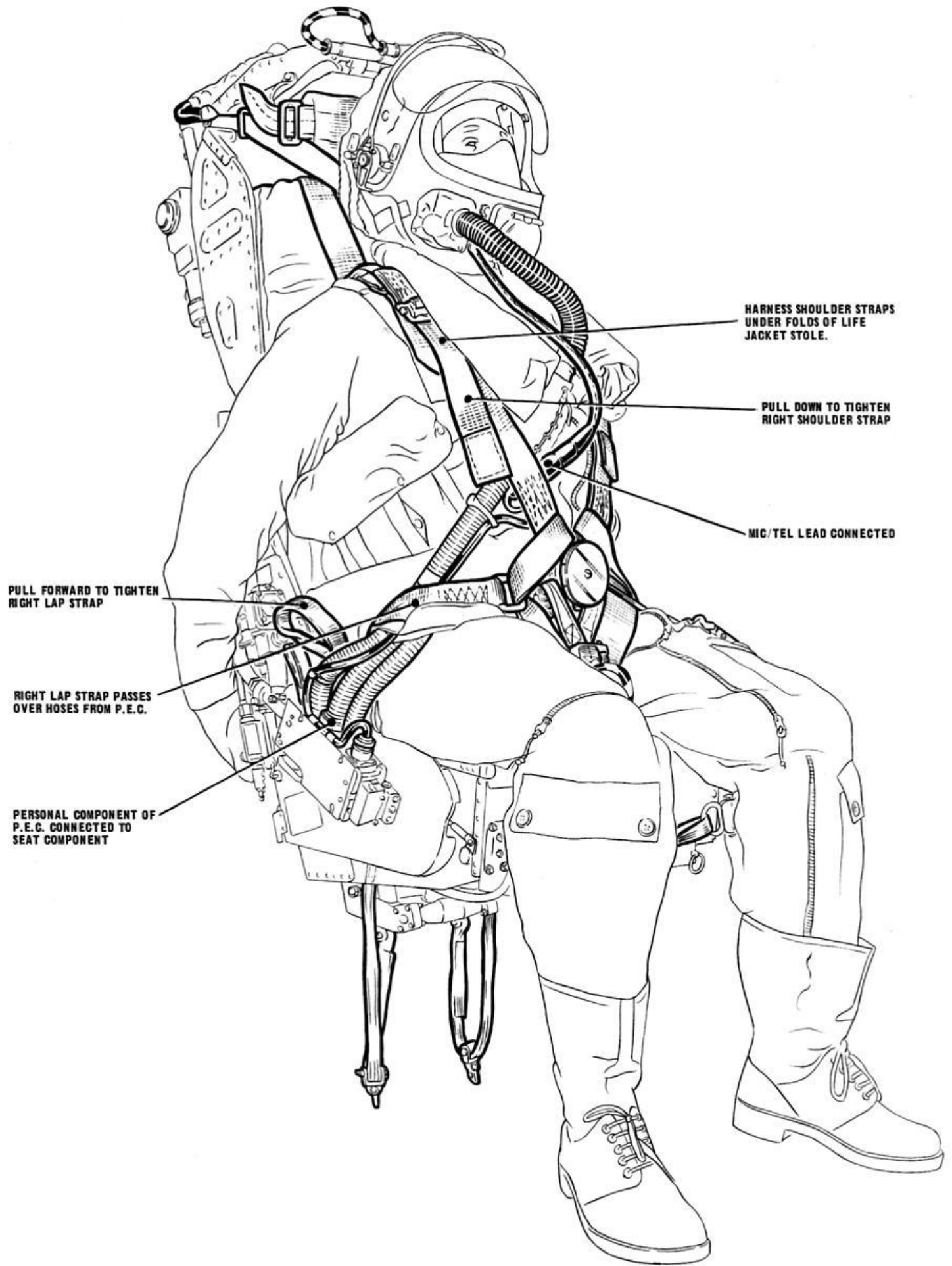


Fig. 10. The seat occupied (starboard)

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