AP 108B-0141-1
September 1980

AIRCREW EQUIPMENT ASSEMBLY

EJECTION SEATS TYPE 10A

(MARTIN-BAKER)

(TORNADO AIRCRAFT)

GENERAL AND TECHNICAL INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

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AMENDMENT RECORD

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Amendments

Changes of technical import to this publication are indicated by the symbols ▶——◀ outside the type area.

LETHAL WARNING

1. The assisted escape system and associated explosive operated jettison mechanisms fitted to aircraft are a potential source of lethal injury to personnel and damage to Government property if inadvertently operated.

2. Safety devices in the form of safety pins, levers and switches are provided for use when the aircraft is on the ground to safeguard against this danger.

3. On entering the cockpit/cabin of an aircraft, it is the responsibility of the individual to be able to recognise the assisted escape system safety devices in that aircraft and to ensure that they are correctly applied at all times in accordance with para 4 below.

4. Instructions for the correct positioning of the assisted escape system safety devices in each aircraft type and mark are detailed in the Servicing Schedules and Aircrew Manual related to that aircraft.

5. Attention is drawn to the lethal hazard presented to ground personnel by the operation of the Miniature Detonating Cord (MDC) canopy fragmentation system in emergency conditions with the aircraft on the ground. For further details refer to AP 110N-0311-1 and Air Diagram 110N-0311-D1.

MODIFICATION RECORD

The following record confirms that this publication incorporates all technical changes necessitated by the modifications listed below. Information on modification titles, classification categories and mark applicabilities is given in Topic 2 of the relevant publication.

Mod No	Brief details	Class
MQ 32/159	Improved arm restraint line beckets on PSP	B/2
MQ 32/161	Intro. arm restraint line beckets to para. harness assy.	B/2
MQ 32/157	Intro. additional Velcro to arm restraint lines	B/2
▶ MQ 32/176	To introduce a fixed rocket motor in lieu of an adjustable motor	B/2
MQ 32/208	To introduce longer leg restraint garters (For record purposes only)	S.O.O. ◀

Chapter 1

AIRCREW EQUIPMENT ASSEMBLY EJECTION SEAT TYPE 10A MK 1

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LEADING PARTICULARS

Ejection seat Type 10A Mk 1	
Reference No	27L/NIV
Part No	MBEU 60004
Weight (fully equipped)	100 kg approximately
Escape system	Consists of two ejection seats and a seat firing sequencing system
Seat firing system	Firing handle on seat pan initiating a gas-operated system
Drogue gun	Operates 0.50 s after ejection
Barostatic time-release unit	Operates 1.50 s after ejection providing that delay mechanism is not arrested by: (a) The barostatic g-controller if high speed induces a deceleration load in excess of $2\frac{1}{2}$ g above 7 500 ft (b) The barostat at altitudes above 10 000 ft until the seat has descended to 10 000 ft.
Seat pan actuator	Operation limited to one minute in any period of eight minutes

COMPOSITION OF THE ASSEMBLY

1 The aircrew equipment assembly comprises the following items of equipment which are described in the listed publications.

Equipment	AP or FAP No	Contractor
Ejection seat, Type 10A Mk 1	FAP 109B-0141-1	Martin-Baker
Parachute assembly, Type H2 Mk 1	FAP 108C-0145-123	Martin-Baker
Quick-release fitting Mk 17	AP 108D-0504-12	A.M.L.

Equipment	AP or FAP No	Contractor
Personal survival pack, Type ZQ Mk 1	FAP 108E-0526-123	Martin-Baker
Emergency oxygen cylinder and release mechanism Pt No 1601 WOOO	FAP 107D-1001-12	Normalair Garrett
Oxygen regulator assembly Pt No 1842 WOOO	FAP 107D-0217-123	Normalair Garrett
Combined services unit Pt No 1703 WOOO		Normalair Garrett
▶ Aircrew equipment assemblies (flying clothing)	AP 108B-0001-1	M.L. Lifeguard ◀

INTRODUCTION

2 The Type 10A Mk 1 ejection seat (fig 1 and 2) is fitted to the Tornado GR 1 aircraft. This chapter is primarily concerned with the installation of the aircrew equipment assembly (AEA) in the seat, the strapping-in procedure and the drill to be used when leaving the seat after landing. A brief description of the various components of the AEA and their function is included.

DESCRIPTION AND OPERATION

SEAT FIRING

3 Ejection of the seat is initiated by an upward pull on the firing handle situated centrally in the front face of the seat pan. The seat firing system is integrated with command firing and canopy jettison systems to form a seat firing sequencing system.

SEAT FIRING SEQUENCING SYSTYEM

4 Gas pressure from the firing of either seat passes to a two-position selector valve located in the rear cockpit. When the valve handle is in the forward position, initiation of ejection by either crew member jettisons the aircraft canopy and ejects both seats. When the valve handle is in the rear position, initiation of ejection by the front crew member jettisons the aircraft canopy and ejects both seats, but initiation of ejection by the rear seat occupant jettisons the aircraft canopy and ejects the rear seat only. The front seat occupant can eject later.

PARACHUTE ASSEMBLY

5 The parachute assembly consists of a GQ aeroconical man-carrying parachute packed together with a duplex drogue assembly, composed of 5 ft main and 22 in. controller drogue parachutes in a rigid pack and connected to a combined seat and parachute harness. The main canopy is fitted with water pockets to ensure that the canopy collapses quickly on water entry to eliminate dragging. The pack is of light alloy construction and has two sets of fabric closure flaps, an outer set secured around the upper edge and an inner set about 3.5 in. below. The pack is fitted to the

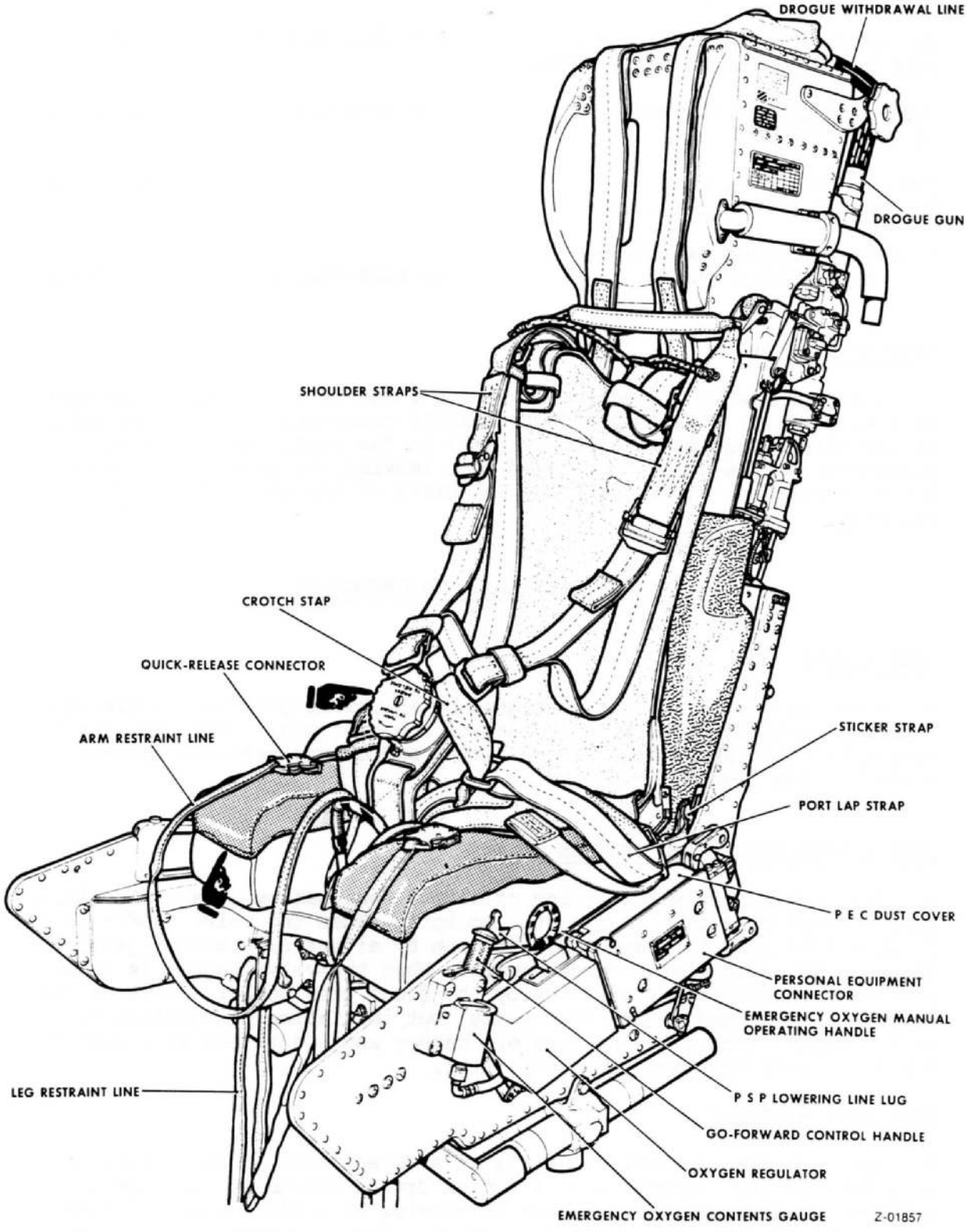

Fig 1 The seat equipped - port view
(Amended illustration)

upper forward face of the seat structure, two brackets on the bottom locate behind the harness power retraction unit and two brackets at the top are secured by one bolt through each bracket to the scissor shackle and top latch plunger housings. The front face of the container is shaped to provide head location and contains a series of holes through which is piped air to cool the outer surface of the flying helmet. Two strips of touch-and-close fastening tape are fitted to the front of this head support to locate the lift webs connecting the parachute to the harness.

6 The man-carrying parachute is packed first into the container and secured by the inner closure flaps which are retained by a closure pin attached to the canopy withdrawal line. To prevent the airstream extracting the man-carrying parachute until harness release occurs, a length of nylon line secures the canopy withdrawal line to a plunger on the rear of the container, which is released when the time-release unit operates. The main and controller drogues, joined by a connecting strop, are packed on top of the inner closure flaps and the top of the container is then closed by the outer closure flaps. A wire loop on the rear flap is passed through eyelets on the other three flaps and all are secured by a closure pin on the drogue withdrawal line which is attached to the apex of the controller drogue. The free end of the drogue withdrawal line is secured to the drogue gun piston. An extender strap is fitted to the eye end of the main drogue rigging lines and is connected to the drogue shackle which is retained by the scissor shackle on top of the seat structure. Also secured to the drogue shackle is the upper end of the parachute canopy withdrawal line.

7 The parachute lift webs are incorporated into the harness assembly to become an integral part of it. The harness comprises two adjustable shoulder straps, two adjustable lap straps, two crotch straps and a back pad. The shoulder straps terminate in lugs which are locked into the quick-release fitting on a negative-g restraint strap and are also connected to two roller shackles through which are passed the webbing straps of the harness retraction unit. Lugs on the webbing straps, when locked into the upper harness locks form the upper harness attachment points. A cross strap joining the two roller shackles prevents the straps slipping off the occupant's shoulders. The lap straps terminate in metal connector rings and incorporate adjusting buckles. The lower part of the harness has four lugs, two engage in the seat lower locks and two are clipped into spring sticker clips inside the seat pan. Two quick-release connectors on the lower harness provide attachment points for the personal survival pack single handed release line. The back pad is attached to the harness by beckets and serves to locate the straps, making the harness easier to fit and also more comfortable. An elasticated cord secured to the shoulder straps and passing through a becket on the back pad prevents the back pad from slipping down on the harness. Padded extensions integral with the top of the back pad are secured to the shoulder straps by beckets for added comfort. A small padded apron is attached to the lower harness by beckets to assist in comfort and strap location. To restrain the lift webs to the front of the seat when exposed to the airstream a retention strap is secured within a becket on the port lift web and passed over the starboard lift web. Each end of the strap terminates in a lug which is locked into the upper harness locks below the lugs of the harness retraction unit straps.

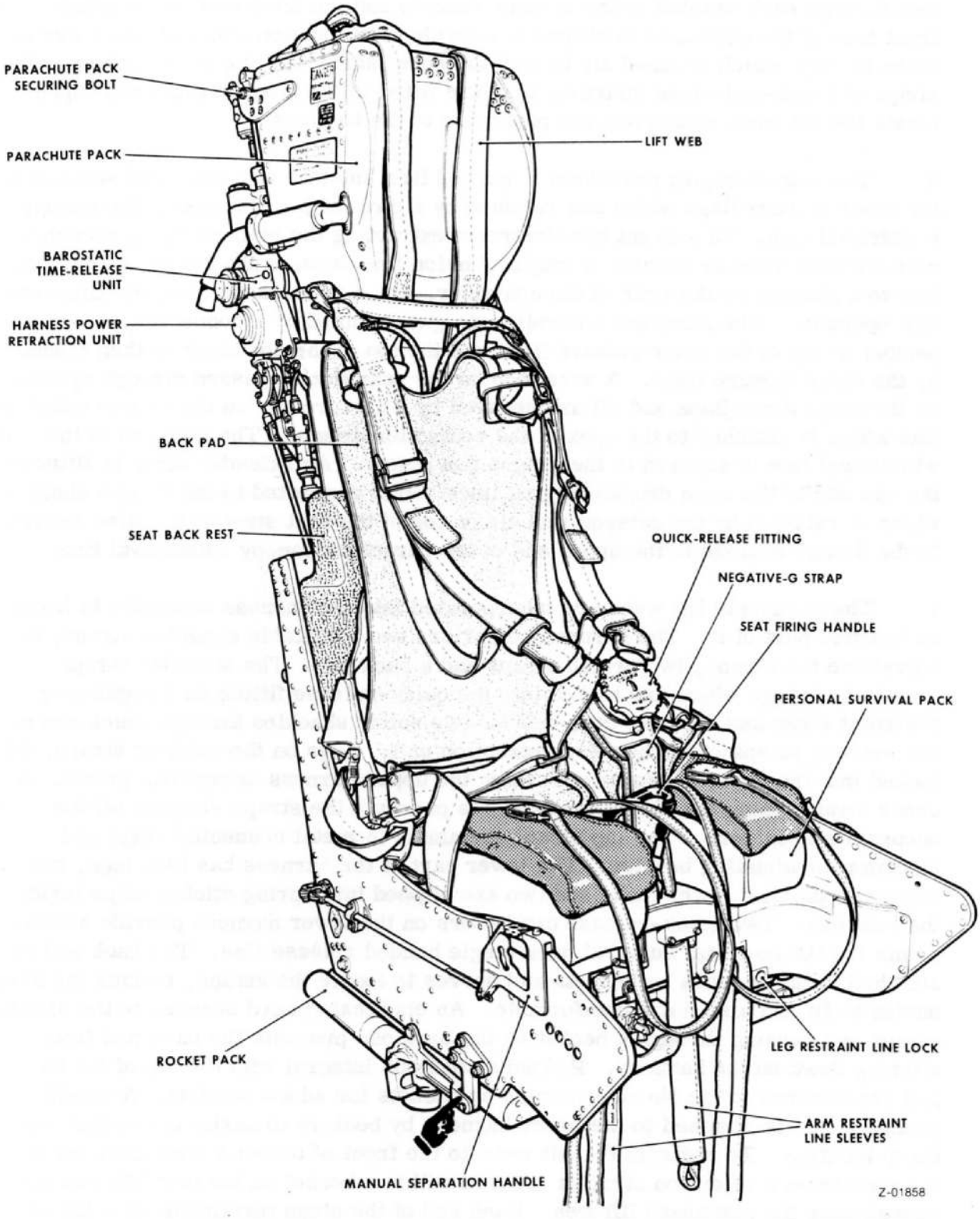

Fig 2 The seat equipped - starboard view (Post Mod MQ 32/176)

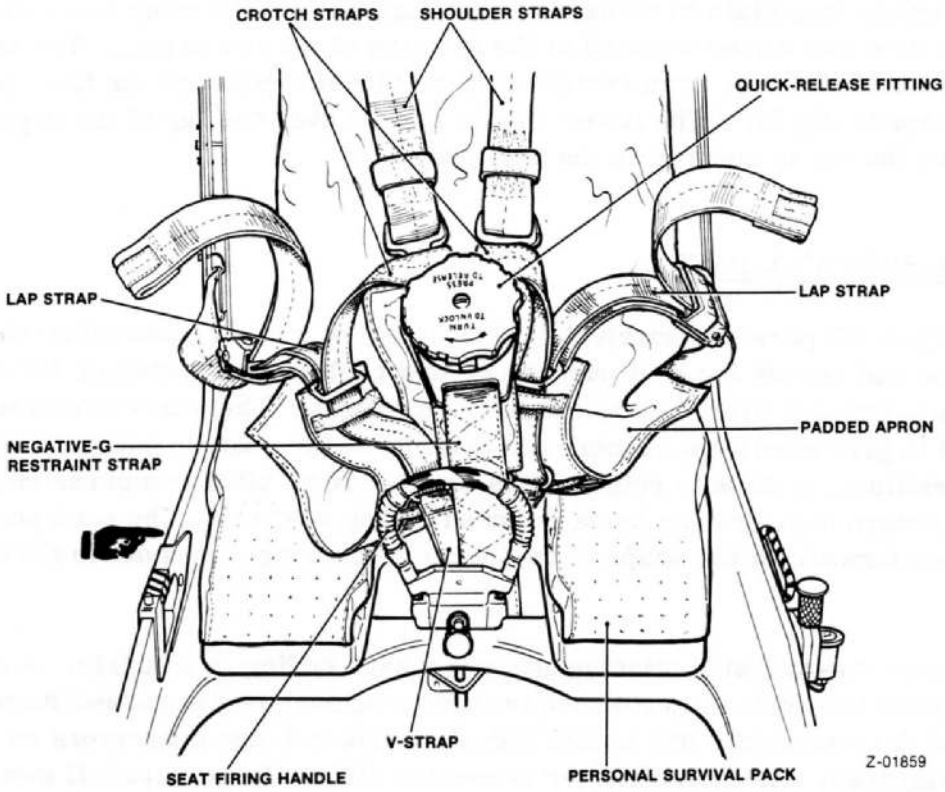

Fig 3 Securing the harness straps
(Post Mod MQ 32/176)

8 When strapping-in, the crotch straps are drawn up between the legs, passed through the connector rings of the lap straps and then the shoulder straps are passed down through the loops on the ends of the crotch straps before the lugs are engaged in the quick-release fitting (fig 3.).

9 The shoulder straps are tightened by pulling down on the free ends and loosened by lifting up the lever on the adjustable buckles. The lap straps are tightened by pulling inward on the free end of the straps and loosened by pulling on the lever attached to the snubber lever incorporated in the buckles.

NEGATIVE-G RESTRAINT

10 Negative-g restraint is provided by a fixed length negative-g restraint strap and a VEE strap. The negative-g strap consists of a webbing strap having a lug on the lower end which is engaged in the lock in the centre front floor of the seat pan. At the upper end of the strap is a quick-release fitting into which the lugs on the harness shoulder straps are engaged. The negative-g restraint strap is released at the lower end when the lock in the seat pan is opened on operation of the lower harness release mechanism. Release of the lugs when locked into the fitting is

effected by rotating the face plate a quarter turn (90 degrees) from the locked position and pressing the face plate to release. The negative-g VEE strap has a ring at the end of each arm and a ring secured at the junction of the two arms. The upper two rings are passed one over each crotch strap and located between the fixed beckets on the padded apron (fig 3). The lower ring is passed over the lug of the negative-g strap before the lug is secured in the seat pan lock.

PERSONAL SURVIVAL PACK

11 The Type ZQ personal survival pack consists of a rigid glass-fibre shell topped by a cushion and serves the dual purpose of seat cushion and container for an automatically inflated liferaft, and survival equipment. The seat cushion is designed and shaped to give maximum support and comfort to the seated occupant. The padding, although resilient, is slow to return to its original form after compression, thereby helping to absorb acceleration loads imposed during ejection. The pack and cushion are extended forward in the shape of two horns to give rigid support to the thighs on ejection.

12 The pack has two side attachment straps each ending in a buckle. A single-handed release line with an arrowhead connector at each end is passed through both buckles and the connectors are mated with the quick-release connectors on the parachute harness. Release of either connector allows the pack to fall away, the freed end of the release line slipping through the buckles to provide a single-handed release facility. A lowering line which is stowed in loops on the fabric container terminates in an arrowhead lug, the straight end of which is secured to the side of the seat pan by a retaining clip. The seat occupant connects the quick-release connector on his life preserver to the arrowhead end of the lug when strapping in enabling the pack to be lowered and suspended approximately 13 feet below the ejectee.

LEG RESTRAINT SYSTEM

13 The leg restraint system (fig 4) is fitted to the ejection seat to draw back and restrain the occupant's legs close to the seat pan during ejection thus preventing injury to the legs due to flailing. The system consists of two leg restraint lines (one for each leg), two snub boxes and two garters for each leg.

14 The lower end of each leg restraint line is attached to brackets on the aircraft floor by a fitting incorporating a shear rivet. From this fitting each line is routed up through the snub box fitted on the front face of the seat pan, forward through the pendant ring of the upper leg garter then down and passed from inboard to outboard through the D-ring of the lower leg garter and finally the taper plug is plugged into the lock in the snub box. The taper plug locks are interconnected with the lower harness release system to ensure that the lines are released simultaneously with the harness. The snub boxes permit the lines to be drawn downwards through the boxes but prevent the lines being pulled upwards. To release the snub boxes to permit adjustment of the leg lines it is necessary to operate the levers fitted on the inboard

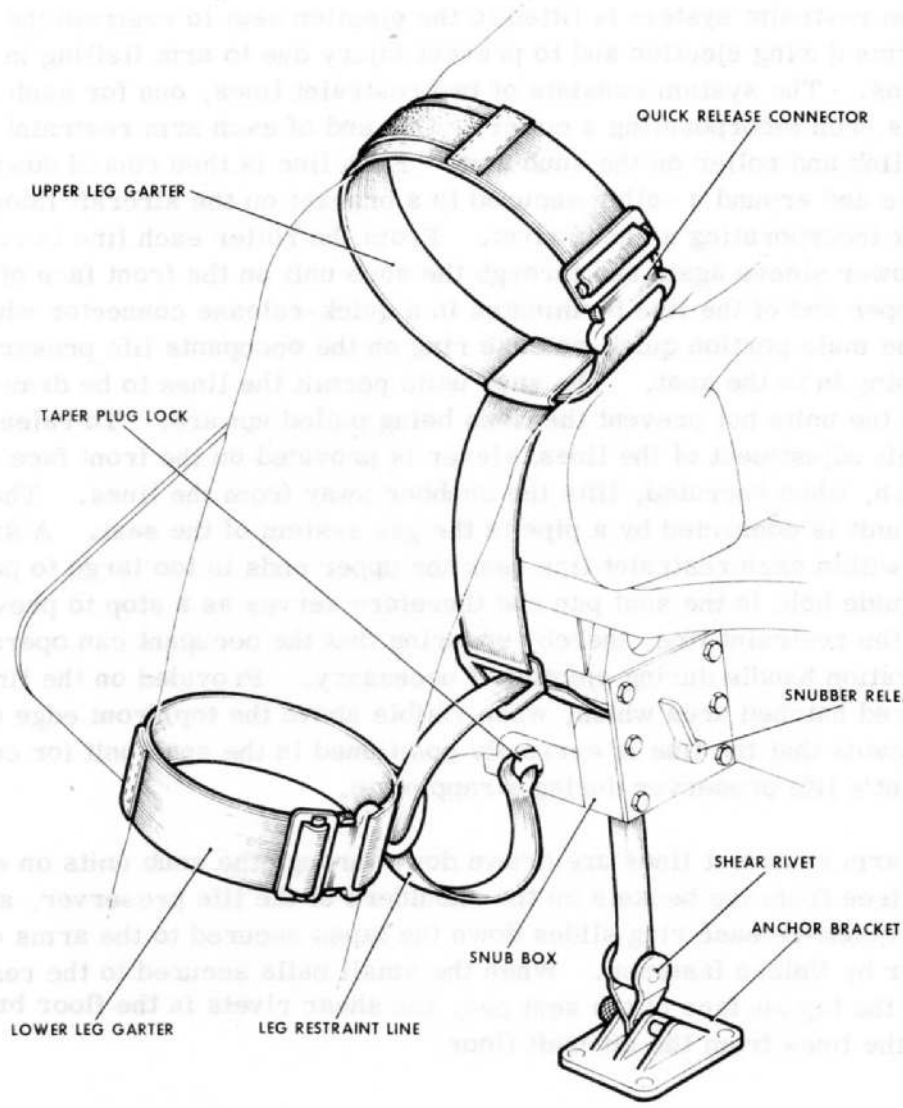

Fig 4 The leg restraint system

face of each box. The leg restraint lines can be released from the taper plug locks by operation of the lower harness release mechanism or by removal of the PEC man portion or substitute dust cover from the PEC seat portion.

15 The leg garters are made of webbing having at one end a female quick-release connector and the other end passes through a slider bar buckle with an arrow head fitting to mate with the quick-release connector. To the upper garters is stitched a pendant strap terminating in a metal D-ring and a metal D-ring is also stitched into the lower garters. The upper garters are fitted above the knees, pendant ring to the rear and quick-release connector to the inside of the legs. The lower garters are fitted on the lower calf above the boots, D-ring to the rear and quick-release connector on the inside of the legs. After tightening the garters, the free ends of the webbing are secured by touch-and-close fasteners.

ARM RESTRAINT SYSTEM (fig 5 and 6)

16 The arm restraint system is fitted to the ejection seat to restrain the occupant's arms during ejection and to prevent injury due to arm flailing in high speed ejections. The system consists of two restraint lines, one for each arm, and two snub units each incorporating a cutter. One end of each arm restraint line is secured to a link and roller on the snub unit. Each line is then routed down through a lower sleeve and around a roller secured to a bracket on the aircraft floor by a universal link incorporating a shear rivet. From the roller each line is routed up through the lower sleeve again and through the snub unit on the front face of the seat pan. The upper end of the line terminates in a quick-release connector which is mated with the male portion quick-release ring on the occupants life preserver during strapping in to the seat. The snub units permit the lines to be drawn downward through the units but prevent the lines being pulled upward. To release the units to permit adjustment of the lines, a lever is provided on the front face of the housings which, when operated, lifts the snubber away from the lines. The cutter in each snub unit is connected by a pipe to the gas system of the seat. A small ball secured within each restraint line near the upper ends is too large to pass through the guide hole in the seat pan and therefore serves as a stop to prevent overtightening of the restraint line, thereby ensuring that the occupant can operate the manual separation handle during ejection if necessary. Provided on the line below the ball is a red hatched area which, when visible above the top/front edge of the seat pan indicates that the line is correctly positioned in the snub unit for connection to the occupant's life preserver during strapping in.

17 As the arm restraint lines are drawn down through the snub units on ejection, they become free from the beckets on the shoulders of the life preserver, and the male portion quick-release ring slides down the tapes secured to the arms of the life preserver by Velcro fastener. When the small balls secured to the restraint lines contact the top surface of the seat pan, the shear rivets in the floor brackets fail, to free the lines from the aircraft floor.

HARNESS POWER RETRACTION UNIT AND GO-FORWARD CONTROL

18 The harness power retraction unit is fitted horizontally to the front face of the seat structure. It ensures that, regardless of the seat occupant's position when ejection is initiated, he will be brought to and locked in the correct posture during the ejection gun stroke. The unit permits the seat occupant to lean forward and twist around in the seat for maximum visibility but restrains forward movement in the event of excessive accelerations. For normal flight operations the shoulder harness is free to extend and retract as the occupant moves in the ejection seat. Should the occupant wish, however, the two-position go-forward control handle on the port side of the seat pan can be moved to the locked position which will permit the harness straps to retract but prevent them extending. When in the normal unlocked state, the occupant is protected against rapid forward movement under high g-loading by an automatic lock feature which responds to an excessive rate of strap extraction. On rapid strap extraction the unit mechanism will lock until the acceleration load is released and then to revert to its normal free state. In addition to the pawl which engages a ratchet wheel within the unit when the go-forward is operated, a second pawl is tripped by the gas which operates the retraction unit to lock the unit in the retracted position on ejection.

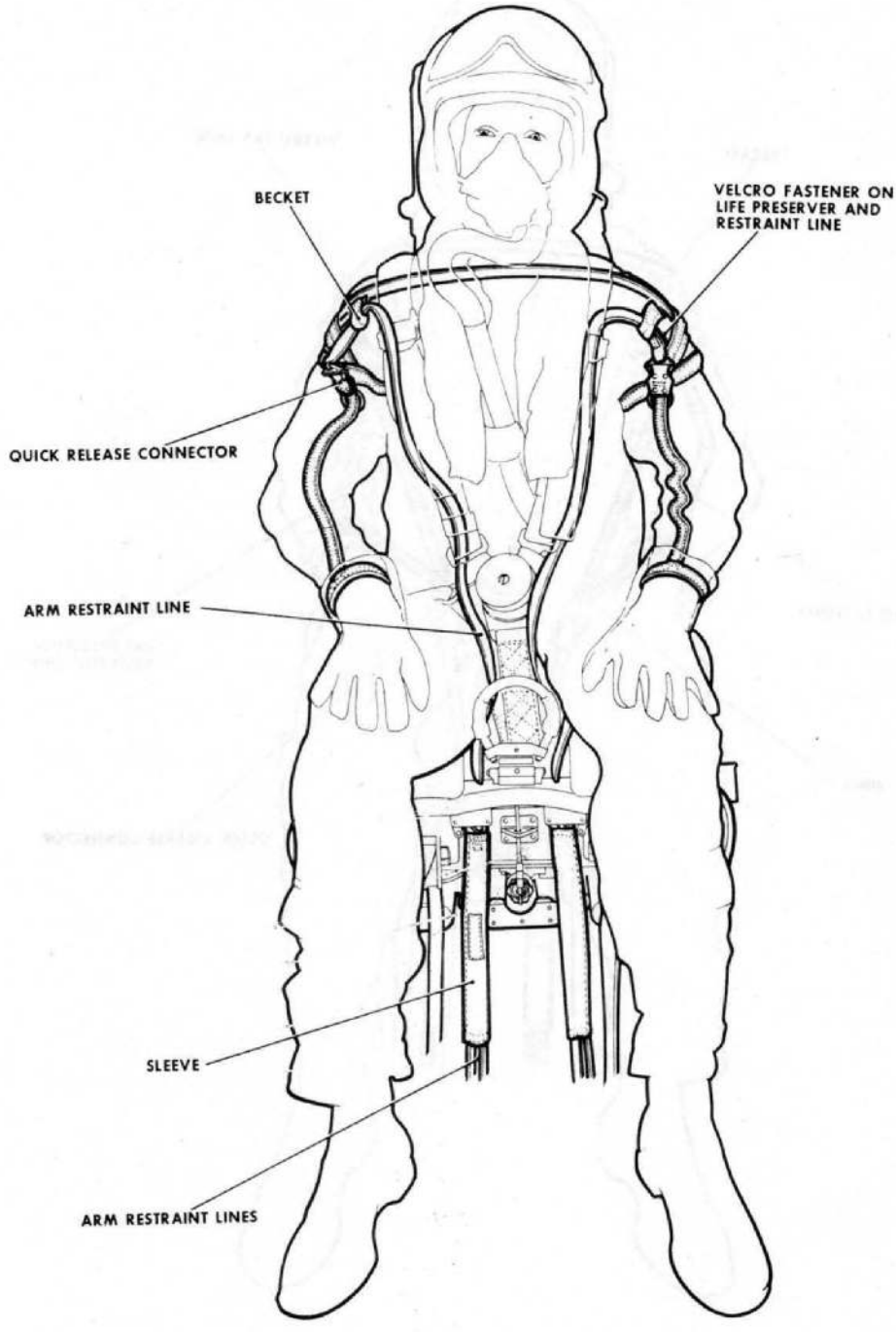

Fig 5 The arm restraint system - normal state
(STI/SE/371 incorporated)

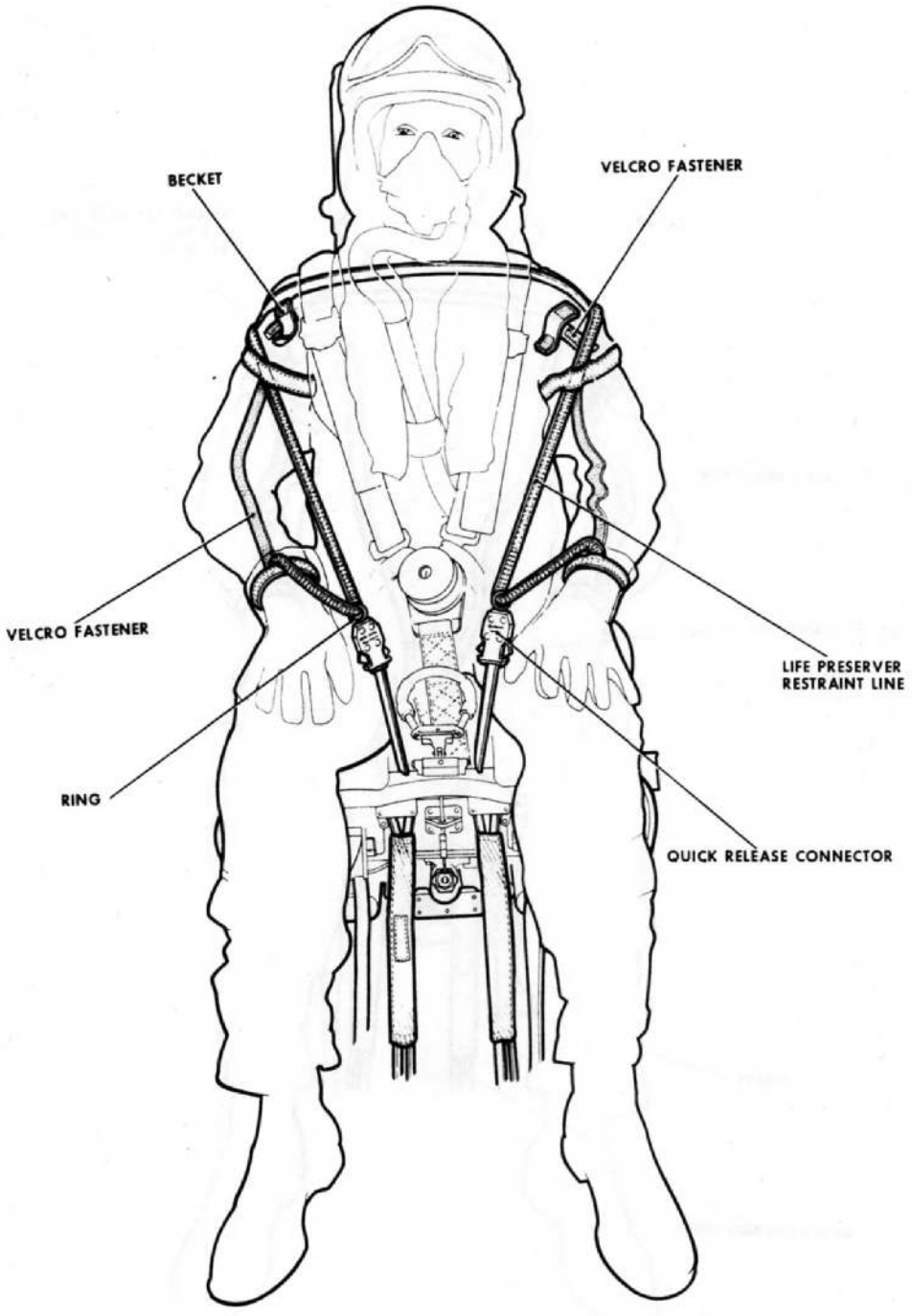

Fig 6 The arm restraint system - on ejection
(STI/SE/371 incorporated)

19 The straps from the unit are passed down through the roller fittings attached to the parachute harness shoulder straps and the lugs are engaged in the upper harness locks incorporated in the body of the retraction unit.

MANUAL SEPARATION

20 The manual separation system is an alternative method of initiating the harness release system and caters for non-operation of the drogue gun and/or the barostatic time-release unit by restarting the automatic system from the point of failure.

21 The system is operated by pulling up a spade type handle on the starboard side of the seat pan. A thumb catch on the handle must be depressed before the handle can be raised. To prevent the handle being inadvertently operated when the aircraft is on the ground, a locking mechanism prevents raising of the handle when the safety pin is fitted in the seat firing handle.

PERSONAL EQUIPMENT CONNECTOR

22 The personal equipment connector (PEC), together with an oxygen regulator, is fitted to a mounting plate secured to the port side of the seat pan. It enables main oxygen, emergency oxygen, anti-g suit supply, mic/tel circuits and helmet ventilation supply to be connected or disconnected in one action. The PEC comprises three portions:

22.1 Aircraft portion. Connected to the cockpit floor by a static line and to the main oxygen, anti-g suit, mic/tel and helmet ventilation supplies in the aircraft.

22.2 Seat portion. Fitted to the mounting plate with an oxygen regulator and connected to the emergency oxygen supply hose.

22.3 Man portion. Either a medium or low pressure oxygen type. Attached to the flying clothing by supply hoses and released from the seat portion by the harness release mechanism on man/seat separation. Normal release is by pulling up on the handle.

EMERGENCY OXYGEN SYSTEM

23 The emergency oxygen system comprises an oxygen cylinder and release mechanism mounted on the port rear of the seat pan and connected to the rear of the seat portion of the PEC by a flexible hose. From there the oxygen passes via the PEC man portion to the occupants oxygen mask. The oxygen supply is turned on automatically during ejection when the trip lever contacts the ejection gun cross beam. Provision is made for the manual operation of the system if the main oxygen supply fails, by means of a handle situated on the port side of the seat pan. An emergency oxygen pressure gauge is fitted forward on the port side of the seat pan where it can be seen by the seat occupant.

ROCKET PACK

24 A multi-tubed rocket pack, located under the seat pan, is ignited as the seat leaves the aircraft to sustain the thrust of the ejection gun, carrying the seat to a height sufficient to enable a safe ejection to be made from zero speed, zero altitude in substantially level attitude and under high sink rate conditions at low altitude. Nozzles on the underside of the rocket pack are enlarged on the starboard side on front seats and on the port side on rear seats to provide divergent trajectories and increase spatial separation. Leg guards are fitted to the front of the rocket pack to protect the occupants' legs during ejection.

SEAT PAN HEIGHT ADJUSTMENT

25 An electrically operated seat adjusting actuator is fitted to provide vertical adjustment of the seat pan in relation to the seat main beams, thereby enabling occupants of various heights to assume the correct sitting posture. The actuator is attached to the centre cross beam of the seat structure and to the bottom slide supporting the seat pan. Operation of the actuator is controlled by a switch in the cockpit, and should not be run for more than one minute in any period of ten minutes.

SEQUENCE OF EVENTS DURING EJECTION

26 When the seat firing handle is pulled, the sear is withdrawn from a firing unit under the seat pan and a cartridge is fired. The resultant gas pressure passes to a connector from where it is distributed to the harness power retraction unit (HPRU), to the shackle plunger housing at the top of the seat structure and to the seat firing sequencing system (para 4). When the HPRU operates, the seat occupant is drawn back to, and restrained in, the correct posture for ejection. When gas pressure enters the shackle plunger housing, the cross shaft is rotated and the sear is removed from the time-delay firing unit in the ejection gun to fire the primary cartridge.

27 The gas pressure developed by the firing of the ejection gun primary cartridge causes the inner and intermediate pistons to rise releasing the top latch and lifting the seat and occupant. The secondary cartridges are fired progressively as the rising pistons expose them to the heat and pressure of the primary cartridge gas. As the seat ascends the guide rails:

27.1 The trip rods withdraw the sears from the drogue gun and barostatic time-release unit.

27.2 The electrical connections are broken to disconnect the seat adjusting actuator circuit and trip the IFF and the crash recorder.

27.3 The aircraft portion of the PEC is disconnected and the emergency oxygen supply is tripped.

27.4 The leg restraint lines tighten to draw back and restrain the occupants' legs and the shear rivets fail, to free the lines from the floor brackets.

27.5 The arm restraint lines tighten to draw down and restrain the occupants' arms and the shear rivets fail, to free the lines from the floor brackets.

27.6 The static cable is withdrawn from the remote rocket initiator. As the ejection gun nears the end of its stroke the line becomes taut and withdraws the sear to fire the cartridge. The resultant gas is piped to fire a second cartridge which ignites the rocket pack to sustain the thrust of the ejection gun.

28 Withdrawal of the drogue gun sear allows the mechanism to function and after the delay mechanism has operated, the firing pin is released and the cartridge is fired, ejecting the piston. The ejected piston withdraws the closure pin securing the closure flaps of the parachute pack and deploys the drogues. The drogues when fully developed, stabilize and retard the seat and occupant.

29 On removal of the barostatic time-release unit sear and when tolerable conditions exist, the unit commences to function. After the delay has elapsed, the firing pin is released and the cartridge is fired. Gas from the cartridge is used to remove restraint from the scissor shackle allowing it to open and free the drogue shackle. The gas simultaneously operates the harness release system freeing the occupant from the seat. The occupant is momentarily held in the seat pan by the sticker straps.

30 The drogues now freed from the scissor shackle withdraw the parachute from the pack. The parachute, when developed, lifts the occupant and survival pack from the seat pulling the sticker straps from their clips. This arrangement ensures that there is no possibility of collision between seat and occupant after separation. A normal parachute descent follows.

CONNECTIONS TO THE AIRCRAFT

31 On an installed ejection seat the following items are connected to the airframe or fixed portion of the seat:

31.1 Port side of seat:

31.1.1 Drogue gun trip rod to the ejection gun cross beam.

31.1.2 Remote rocket initiator static cable to the drogue gun trip rod.

31.1.3 PEC aircraft portion to the seat portion and by the main oxygen, anti-g suit and helmet ventilation supply hoses and the mic/tel lead to the aircraft supplies, and by static cable to the aircraft floor.

31.2 Starboard side of seat:

31.2.1 Barostatic time-release unit trip rod to the ejection gun cross beam.

31.2.2 Seat pan actuator supply lead to the plocket on the starboard main beam.

31.2.3 Quick-disconnect unit static cables to the ejection gun cross beam.

31.3 Below the seat:

31.3.1 Leg and arm restraint lines to the aircraft floor.

EQUIPPING THE SEAT

TABLE 1 SPECIAL TOOLS

Description (1)	Part No (2)	Reference No (3)	Remarks (4)
Tool operating harness locks	MBEU 61420	27L/6176065	
Tool inserting lower harness lugs	MBEU 56293	27L/NIV	

TABLE 2 MATERIALS

Ref No (1)	Nomenclature (2)	Part No (3)	Qty (4)
30A/9148334	Lockwire, S.S. 24 swg		AR

32 The following procedure is to be used when installing the equipment in, and when removing it from the seat. The seat may be equipped before or after installation of the seat in the aircraft.

PREPARATION

33

33.1 Ensure that the seat has been made Safe for Servicing in accordance with current instructions.

33.2 The emergency oxygen cylinder must be fitted before the ejection seat is installed.

33.3 Ensure the seat pan is clean, that the leg and arm restraint lines are clear of the seat pan and place the seat pan in its lowest position.

33.4 Ensure that all harness lock plungers are fully home.

33.5 Assemble the necessary items of equipment; parachute assembly, personal survival pack, single handed release line, negative-g restraint strap, negative-g VEE strap and ensure that all items are serviceable.

EQUIPPING

34

34.1 Pass the lug of the negative-g restraint strap through the lower ring of the negative-g VEE strap so that the VEE strap lies behind the negative-g restraint strap. Engage the lug of the negative-g restraint strap in the lock located in the centre front floor of the seat pan. Ensure that the quick-release fitting faces forward and is in the locked position. Drape the straps over the front of the seat pan.

34.2 Place the survival pack in the seat pan and pass the single handed release line through the buckles of the side attachment straps (fig 7). Engage the straight end of the arrowhead lug of the lowering line in the retaining clip on the inner port side of the seat pan. Connect the automatic liferaft inflation unit battery static line to the lug on the port side of the seat pan using the attachment and securing pins.

34.3 Remove the parachute pack securing bolts from the seat structure. Locate the lower brackets of the parachute pack behind the harness retraction unit and align the holes in the side attachment brackets with the threaded holes in the plunger housings on the seat structure. Ensure that the mechanical lock of the parachute pack mates correctly with the plunger housing of the BTRU. Secure the pack using the two bolts and wirelock using 24 swg lock-wire.

Note...

The drogue shackle bolt is to be fitted so that the nut is uppermost when the scissor shackle is rotated forward.

34.4 Untie the ends of the thread which emerges from the front flap eyelet and is temporarily secured to the drogue shackle. Remove the nut and bolt from the drogue shackle and ensure that the parachute canopy withdrawal line is located under the extender strap and on the lower arm of the drogue shackle when it is fitted. Locate the drogue shackle over the closed jaws of the scissor shackle, pass the bolt up through the drogue and scissor shackles and secure with the nut.

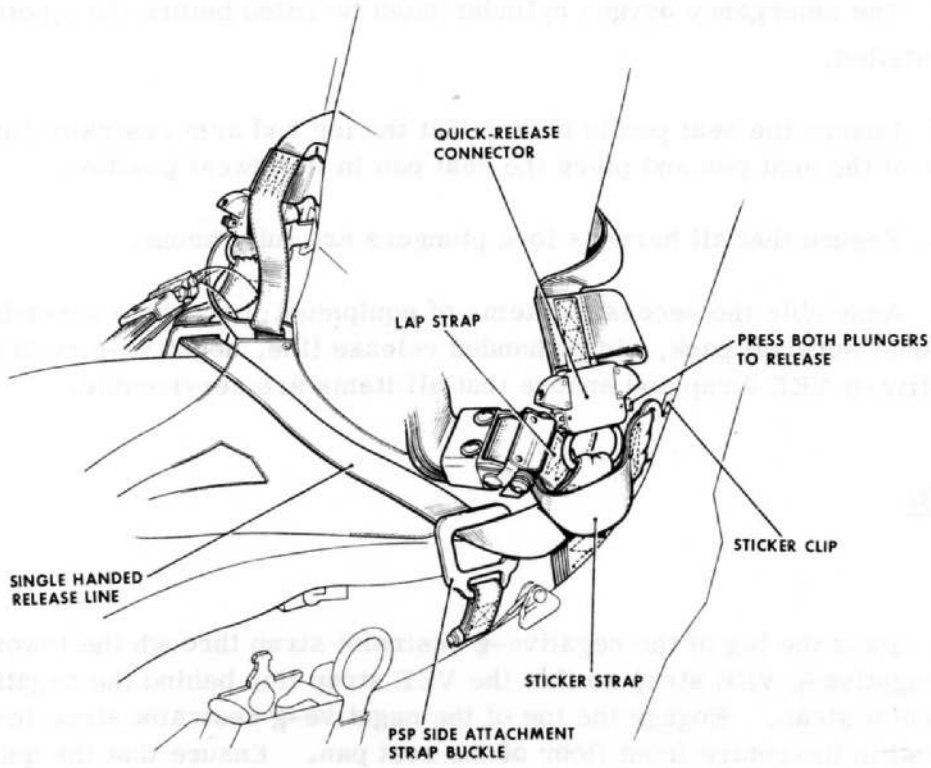

Fig 7 Attaching the survival pack to the harness

Note...

Sub-para 34.5 is to be carried out after the drogue gun is armed.

34.5 Position the spool end of the drogue withdrawal line between the lugs of the drogue gun piston and secure using the bolt provided. Wirelock the bolt using 24 swg lockwire.

34.6 Rotate the scissor shackle forward against its stops, pass the longest end of the thread untied in sub-para 34.4 through both the drogue shackle and the loop of the extender strap and tie off using a reef knot. Secure the loose ends of the thread by tying a half hitch around the main thread against each side of the reef knot (fig 8).

34.7 Ensure that the lift web retention strap is stitched to the becket on the port lift web and passed over the starboard lift web. Engage the end lugs on the strap into the top harness locks ensuring that the set on the lugs is downward (fig 9).

34.8 Secure the lift webs to the front face of the parachute pack by mating the touch-and-close fasteners on the rear of the lift webs and on the pack face.

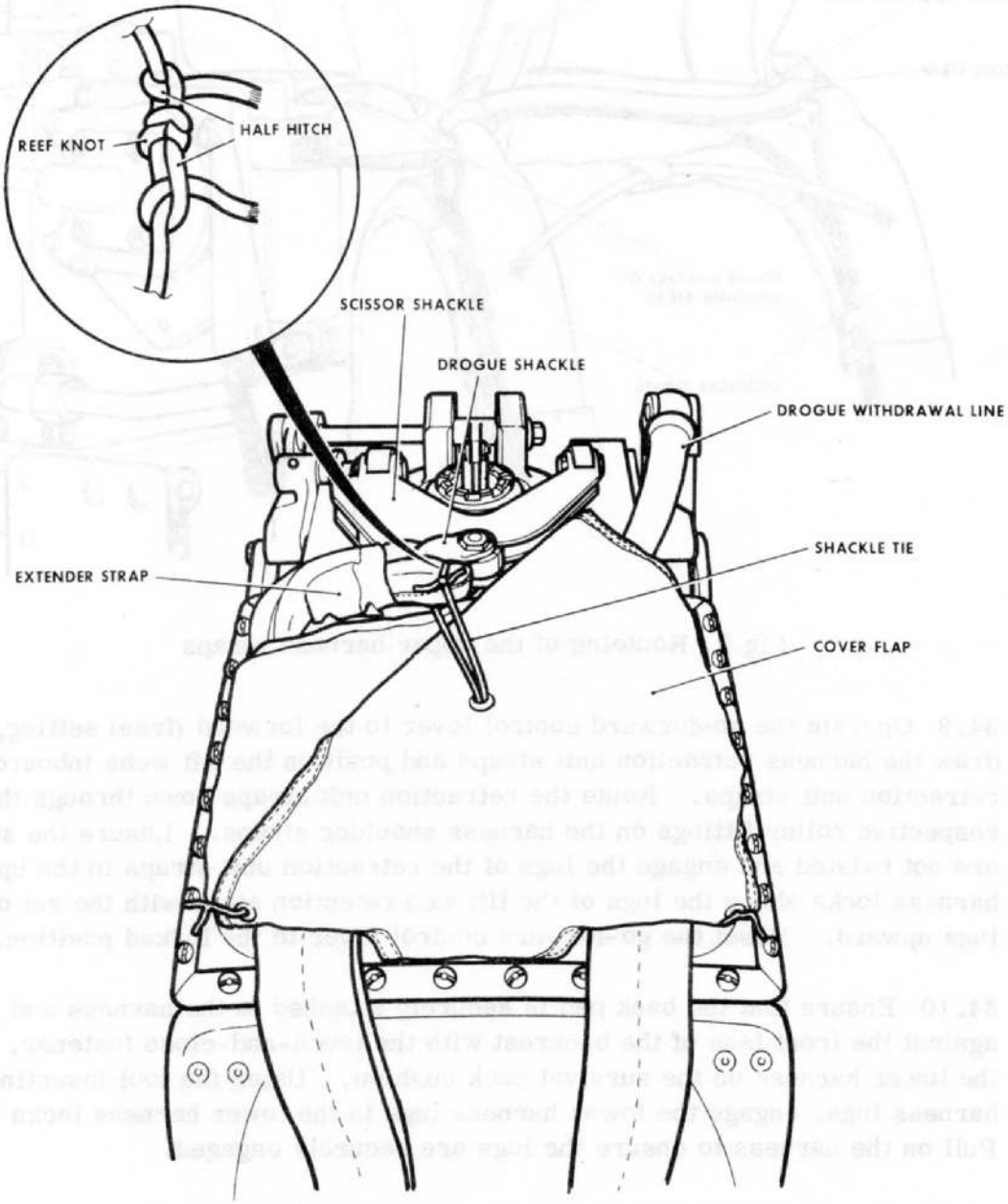

Fig 8 The scissor shackle safe tie

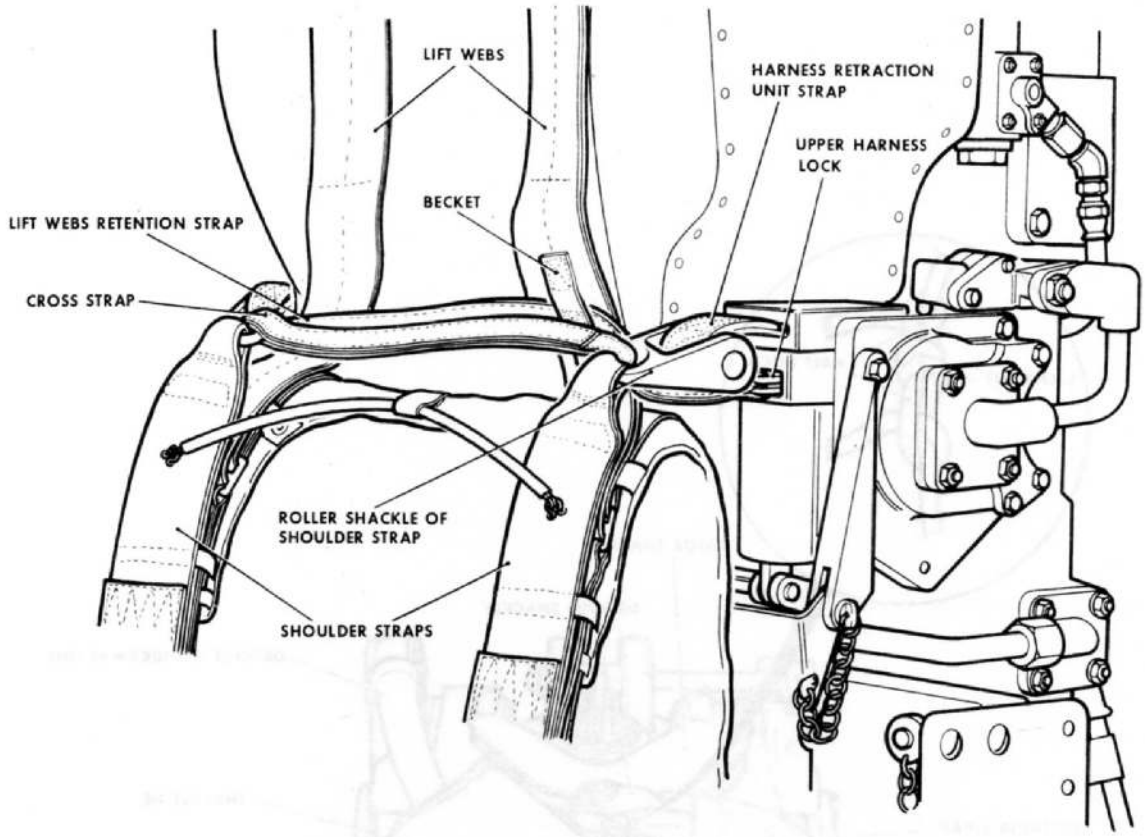

Fig 9 Routeing of the upper harness straps

34.9 Operate the go-forward control lever to the forward (free) setting, withdraw the harness retraction unit straps and position the lift webs inboard of the retraction unit straps. Route the retraction unit straps down through the respective roller fittings on the harness shoulder straps. Ensure the straps are not twisted and engage the lugs of the retraction unit straps in the upper harness locks above the lugs of the lift web retention strap with the set of the lugs upward. Reset the go-forward control lever to the locked position.

34.10 Ensure that the back pad is securely attached to the harness and secure against the front face of the backrest with the touch-and-close fastener. Lay the lower harness on the survival pack cushion. Using the tool inserting lower harness lugs, engage the lower harness lugs in the lower harness locks (fig 10). Pull on the harness to ensure the lugs are securely engaged.

34.11 Ensure that the survival pack single-handed release line is correctly routed through the buckles of the side attachment straps. Route the line outboard of the lap straps and engage the arrowhead lugs in the quick-release connectors on the parachute harness (fig 7).

34.12 Route the sticker straps around and outside of the survival pack attachment straps and the lap straps. Secure the lugs into the spring clips on the inside faces of the seat pan (fig 7).

34.13 Withdraw the crotch straps from the first becket each side of the padded apron. Pass each strap through the adjacent ring on the negative-g VEE strap and through the first beckets of the apron again. The VEE strap is now located on each crotch strap between the fixed beckets.

34.14 Fully extend the parachute harness shoulder and lap straps. Lay the harness ready for the occupant.

34.15 Pull sufficient leg restraint lines back through the snub boxes to preclude the necessity for the occupant to do so when strapping-in.

34.16 Position the arm restraint lines in the snub units so that the red hatched area on the lines is visible above the top of the seat pan. Secure the arm restraint lines in the beckets on the inside faces of the horns of the PSP.

REMOVAL OF THE PARACHUTE AND SURVIVAL PACKS

35 To remove the parachute assembly and personal survival pack, proceed as follows:

35.1 Ensure that the seat has been made "Safe for Servicing" in accordance with current instructions.

35.2 Depress both plungers of the quick-release connectors (fig 7) and release the personal survival pack single-handed release line from the parachute harness. Disconnect the automatic liferaft inflation unit battery static line from the lug on the port side of the seat pan and remove the lowering line arrowhead lug from the retaining clip on the inner port side of the seat pan.

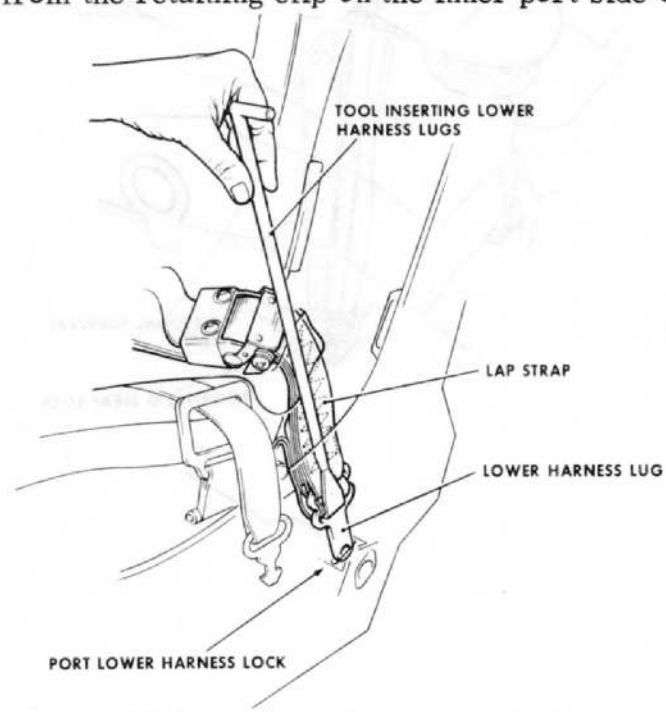

Fig 10 Inserting a lower harness lug

35.3 Pull on the sticker straps to withdraw the lugs from the spring clips.

35.4 Withdraw the crotch straps from the rings of the negative-g VEE strap. Operate the lower harness release mechanism using the tool operating harness locks (fig 11). Pull the harness lugs from the lower locks and remove the negative-g restraint and VEE straps.

35.5 Refit the unlocked PEC dust cover.

35.6 Remove the bolt securing the drogue withdrawal line to the drogue gun piston.

35.7 Cut the scissor shackle safety tie and raise the scissor shackle. Remove the nut and bolt securing the drogue shackle in the scissor shackle and disengage the drogue shackle. Refit the nut and bolt in the drogue shackle.

35.8 Using the tool operating harness locks on the upper locks cross shaft (fig 12), open the upper locks and release the harness power retraction unit and lift web retention strap lugs from the upper locks. Withdraw the retraction unit straps from the roller fittings of the harness.

35.9 Remove the two pack securing bolts and remove the parachute assembly from the ejection seat. Refit the bolts in the seat structure.

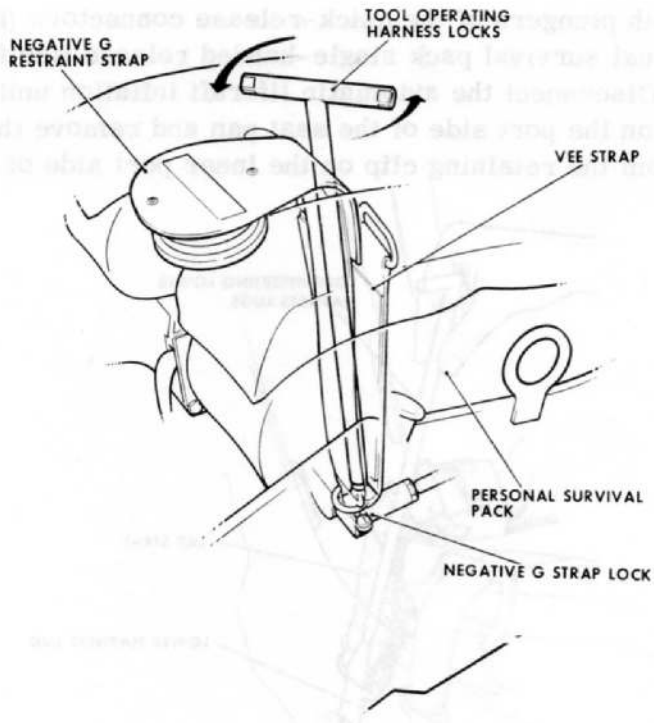

Fig 11 Opening the lower harness release mechanism

35.10 Pull on the arrowhead lug and remove the PSP lowering line lug from the retaining clip.

35.11 Remove the personal survival pack.

STRAPPING-IN PROCEDURE (fig 13 and 14)

36 Before entering the cockpit ensure that the safety pin is fitted in the seat firing handle.

▶ 37 Enter the cockpit taking care not to stand on the seat firing handle, sit well back in the seat ensuring that the back is well supported and proceed as follows:

CAUTION...
It is most important that the seat pan height is adjusted to the occupant's correct normal in-flight position before strapping-in to ensure correct adjustment of the harness.

NOTE...
Once the occupant is correctly strapped-in, the seat pan height may be adjusted to improve visibility for taxying or manoeuvring.

37.1 Adjust the height of the seat pan to the normal in-flight position.◀

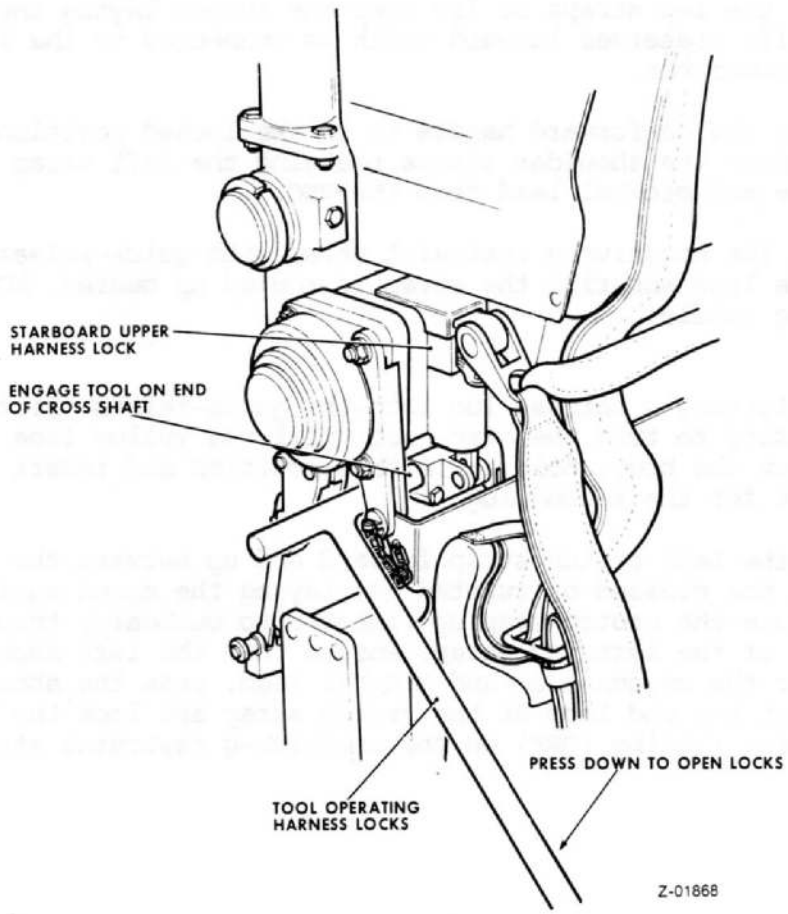

Fig 12 Opening the upper harness locks

▶37.2 Connect the quick-release connector on the life preserver lanyard to the arrowhead lug of the survival pack lowering line secured in the retaining clip on the port side of the seat pan.

37.3 Remove and stow the PEC dust cover. Insert the forward end of the PEC man portion to engage under the clamp plate of the seat portion, press down on the handle with a hinging motion until it locks into place.

NOTE...
The leg restraint garters are to be fitted before entering the aircraft. Ensure that the crank in the male portion of the quick-release connector follows the curvature of the leg. The upper garters are to be fitted around the legs above the knee with the pendant ring to the rear and quick-release connector to the inside of the legs. The lower garters are to be fitted on the lower calf above the boots with the D-ring to the rear and quick-release connector to the inside of the legs.

37.4 Pass the leg restraint line emerging from the port snub box forward through the pendant ring of the upper garter on the left leg, from inboard to outboard through the D-ring of the lower garter on the left leg and plug the taper plug into the leg line lock in the port snub box. Similarly route the starboard leg restraint line through the rings of the right leg garters and plug into the starboard leg line lock. Adjust the leg restraint lines in the snub boxes leaving just sufficient lines to allow full leg movement. Pull all excess lines down below the snub boxes.

37.5 Place the lap straps to lie over the thighs laying the left strap over the life preserver lanyard which is connected to the lowering line arrowhead connector.

37.6 Ensure the go-forward handle is in the locked position (rearward) and bring down the shoulder straps routeing the left strap over the oxygen hose and mic/tel lead from the PEC.

37.7 Bring the negative-g restraint strap with quick-release fitting up between the legs ensuring the strap is routed up behind, NOT THROUGH, the seat firing handle.

NOTE...
When fitting a harness lug into the quick-release fitting it is necessary to turn the disc knob until the yellow line passes the dots on the body, hold it in this position and insert the lug. Repeat for the second lug.

37.8 Draw the left crotch strap forward and up between the legs ensuring that it is not crossed or twisted and laying the apron against the left thigh. Route the crotch stap up (inboard to outboard) through the D-ring on the end of the left lap strap, ensure that the left shoulder strap passes over the oxygen hose and mic/tel lead, pass the shoulder strap lug down through the end loop of the crotch strap and lock the lug into the quick-release fitting (QRF) on the negative-g restraint strap (fig 3). ◀

▶ 37.9 Carry out a similar procedure using the right hand harness straps.

37.10 Position any excess oxygen hose outboard of the left shoulder strap.

37.11 Fully tighten the lap straps ensuring that the QRF remains in the central position.

37.12 Fully tighten the shoulder straps positioning the QRF centrally. Pull the excess lift web to the rear and tuck away behind the shoulders.

37.13 Engage the arm restraint rings on the life preserver with the quick-release connectors on the seat arm restraint lines. Secure the arm restraint lines in the beckets on the shoulders of the life preserver and mate the Velcro strips on the line with those outboard of the beckets on the life preserver (STI/SE/371). Tuck the slack of the line behind the lower end of the shoulder straps.

37.14 Don the helmet, connect the oxygen mask hose to the PEC hose and connect the mic/tel, routeing the lead to pass over the left shoulder and to lie between the lobe of the life preserver and the oxygen hose. Carry out a check of the mic/tel circuit.

37.15 Remove and stow the visor cover.

37.16 Move the go-forward handle to the free position and function test to ensure freedom to move forward. Return the handle to the locked position and when leaning back check at intervals for correct locking of the power retraction unit. Sit back in the seat and retighten the shoulder straps.

37.17 Remove and stow the safety pin from the seat firing handle. ◀

EMERGENCY PROCEDURE

38 Instructions for dealing with emergencies are contained in the relevant Aircrew Manual.

LEAVING THE AIRCRAFT AFTER LANDING

39 The following procedure is to be adhered to when leaving the aircraft after landing:

39.1 Fit the safety pin in the seat firing handle.

39.2 Disconnect the arm restraint lines by operating the quick-release connectors on the ends of the arm restraint lines.

39.3 Remove the oxygen mask.

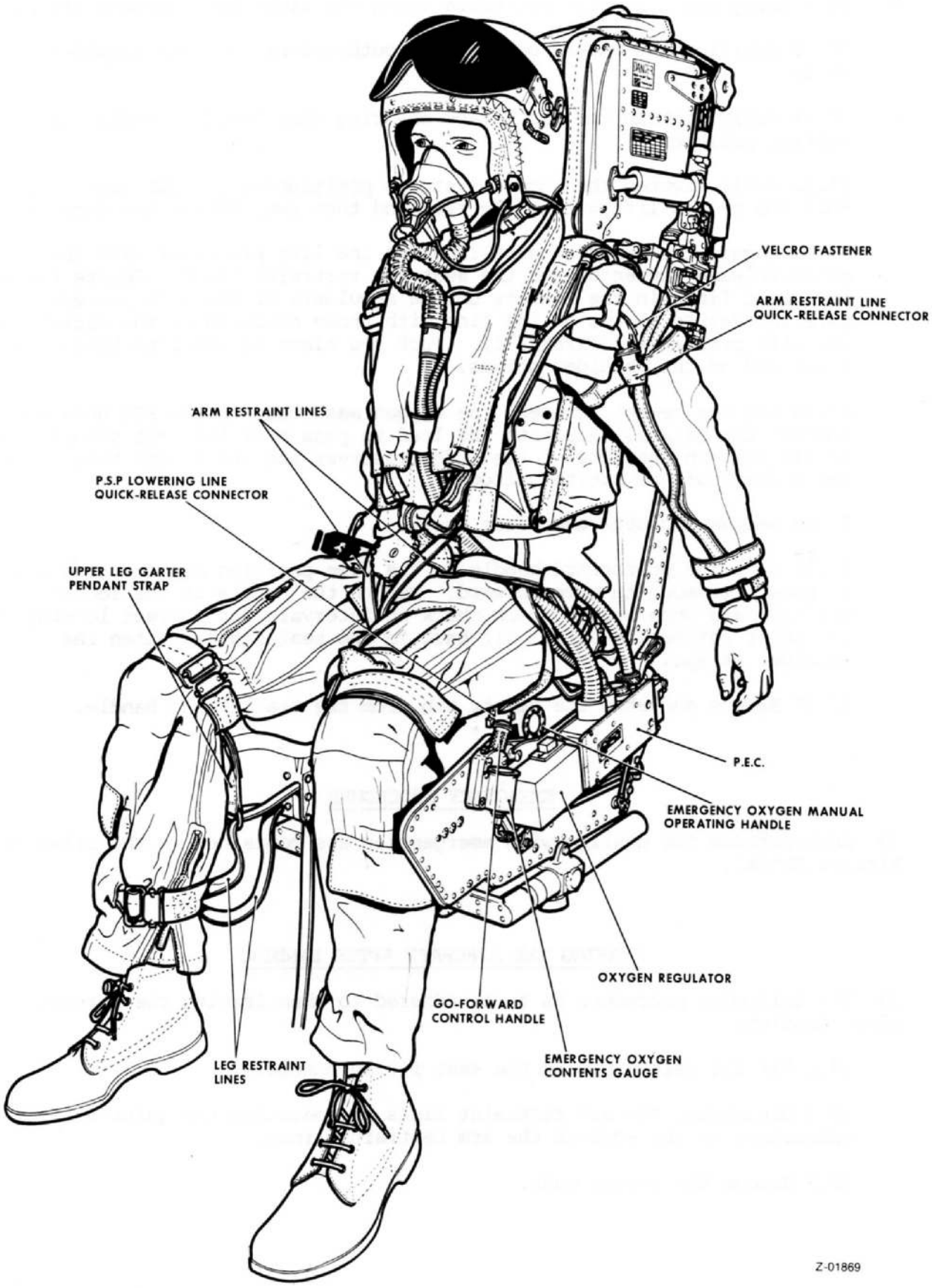

Fig 13 The seat occupied - port view
(Illustration amended and STI/SI/371 incorporated)

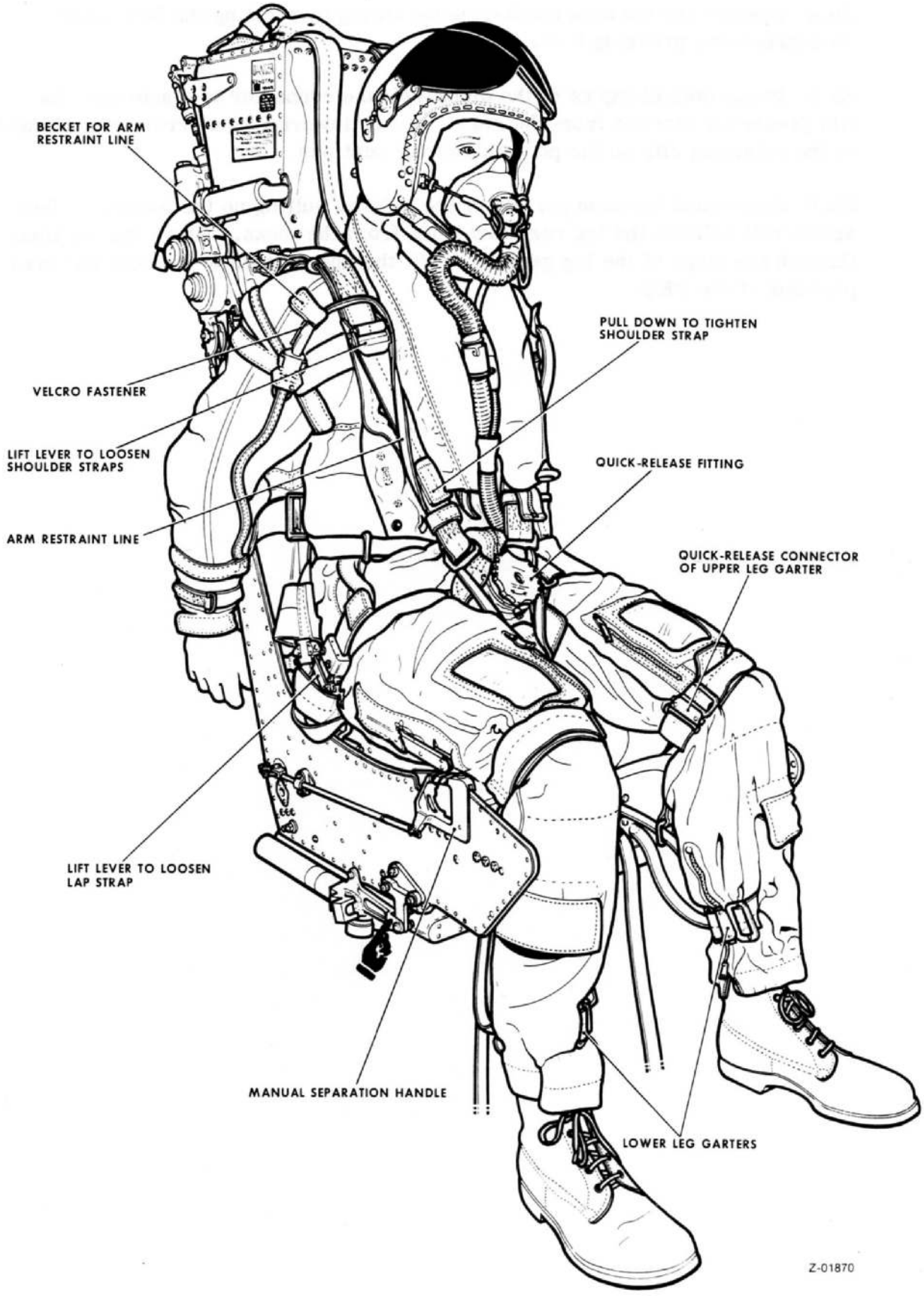

Fig 14 The seat occupied - starboard view
(STI/SE/371 incorporated and Post Mod MQ32/176)

39.4 Operate the harness quick-release fitting by rotating the face plate 90 degrees and pressing it in.

39.5 Press both plungers of the quick-release connector to disconnect the life preserver lanyard from the survival pack lowering line arrowhead lug held in the retaining clip on the port side of the seat pan.

39.6 Disconnect the man portion of the PEC by pulling up the handle. This action will release the leg restraint lines from the locks. Draw the leg lines through the rings of the leg garters. Fit the dust covers to the seat and man portions of the PEC.

Chapter 1

Annex 1

ACTIONS BEFORE FLIGHT AND AFTER FLIGHT WHEN WEARING NBC AEA

INTRODUCTION

1 The following procedures detail the additional actions required when strapping-in before flight and vacating the aircraft after flight when wearing NBC aircrew equipment assemblies.

ACTION BEFORE FLIGHT

Before cockpit entry

2

2.1 Pilot completes aircraft walkround checks.

2.2 With groundcrew assistance remove overboots at the bottom of the decontaminated ladder and step straight onto ladder.

2.3 Ascend ladder and place portable ventilator on platform.

2.4 Enter cockpit, face rearwards, complete ejection seat checks, turn clockwise and complete initial cockpit checks.

NOTE...
Turning clockwise prevents aircrew becoming entangled in the portable ventilator hose.

Strapping-in procedure

3

3.1 Adjust the seat pan height to the correct in-flight eye line.

3.2 Turn ON the oxygen supply and check that the contents are at least 7/8.

3.3 Remove and stow the PEC dust cover.

3.4 Remove the rubber cover from the PEC man portion, connect the man portion to the seat portion and stow the rubber cover in a pocket of the g-suit trousers.

3.5 Disconnect intercom unit and hand to groundcrew. Connect helmet mic/tel lead and test the mic/tel system.

3.6 Check oxygen magnetic indicator indicates constant white.

3.7 Aircrew hold breath and close eyes whilst groundcrew disconnect portable ventilator at the chest manifold and remove interim system blank. Connect the manifold hose to the interim system. Fit the blank to the portable ventilator hose and remove portable ventilator from platform and stow in HAS cabin.

3.8 Aircrew check oxygen flow across face, then open eyes and complete remainder of the strapping-in drills.

ACTION AFTER FLIGHT

4 The following procedure is to be adhered to when leaving the aircraft after landing:

4.1 Remove the seat pan safety pin, EPS pin and canopy jettison pin from their stowages and fit to their respective positions.

4.2 Release the harness straps, leg restraint lines, arm restraints and disconnect the life preserver lanyard.

4.3 Groundcrew fit communicator (if available) and switch on the portable ventilator.

4.4 Aircrew hold breath and close eyes, whilst groundcrew disconnect manifold hose from the interim system and connect the portable ventilator hose to the chest manifold and fit the blank to the interim system hose.

4.5 Aircrew open eyes and resume breathing.

4.6 Remove the PEC man portion from the seat portion and fit the rubber cover.

4.7 Remove the PEC dust cover from its stowage and fit to the seat portion.

4.8 Turn OFF the oxygen supply.

4.9 Complete the remainder of the normal drills, stand on the ejection seat, turn anti-clockwise to fit the MDC safety pin and vacate the cockpit.

4.10 Step onto the boarding ladder and descend halfway. Pick up the portable ventilator from the platform and hand to groundcrew. Descend ladder and with groundcrew assistance fit overboots before stepping off the ladder.