Chapter 1

AIRCREW EQUIPMENT ASSEMBLIES
EJECTION SEATS
TYPES 7A1 Mk 3 and 7A2 Mk 3
(PHANTOM AIRCRAFT FGR Mk 2)

CONTENTS

LEADING PARTICULARS

▶Ejection seat Type 7A1 Mk 3	
NSN/Ref	1680-99-6118526
Part No	MBEU 52410
Ejection seat Type 7A2 Mk 3	
NSN/Ref	1680-99-6118527 ◀
Part No	MBEU 52411
Ejection system	Cartridge operated telescopic ejection gun with rocket assistance.
Ejection velocity	64 ft/s approx.
Firing system	Face screen or seat pan firing handle. The initial pull on either firing handle operates the canopy jettison system and the jettisoned canopy withdraws the interlock block from the firing mechanism permitting the continued pull on either firing handle to fire the ejection gun and eject the seat.
Drogue gun	Operates 0.75s after ejection.
Barostatic time-release unit	Operates 2.25s after ejection providing the delay is not arrested: At altitudes above 10 000 ft the delay is arrested until the seat has descended to 10 000 ft.
Seat pan actuator	Operation limited to 30s in any 10 min period.

COMPOSITION OF THE ASSEMBLY

1 The aircrew equipment assembly comprises the following items of equipment which are fully described in the publications listed in the List of Related Publications:

Equipment	Contractor
Ejection seats, Type 7	Martin-Baker
Parachute assembly, B Mk 58	Martin-Baker
Quick-release fitting, Mk 17	AML
Personal survival pack, Type ZD Mk 3 (Pre-mod SE 161)	Martin-Baker
Personal survival pack, Type ZD Mk 4 (Post-mod SE 161)	Martin-Baker
Emergency oxygen set Demand emergency oxygen cylinder/operating head Mk 4B used in conjunction with a miniaturised oxygen regulator assembly, high or low altitude.	Normalair-Garret
▶ Aircrew List (Flying clothing)	M.L. Lifeguard ◀

INTRODUCTION

NOTE...
Reference to left hand and right hand throughout this chapter unless otherwise specified, refers to the location of an item of equipment as installed in the aircraft.

2 The Type 7A1 and 7A2 Mk 3 ejection seats (fig 1 and 2) are fitted to the front and rear positions respectively in the Phantom FGR Mk 2 aircraft. Modifications ES 3695, PA 536 and SE 95 introduced a new negative-g strap with a quick-release fitting, a combined seat/parachute harness and a single-handed release personal survival pack (PSP) Type ZD Mk 3. Modification ES 7076 introduced an anchor bracket on the right hand side of the seat pan to facilitate attachment of the static line of the PSP automatic deployment unit (ADU), a component part of the PSP Type ZD Mk 4 introduced by modification SE 161. This publication 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 functions is included.

DESCRIPTION AND OPERATION

SEAT FIRING

3 Ejection of the seat is initiated by pulling either the face screen or seat pan firing handles. The initial pull operates the canopy jettison mechanism, and the jettisoned canopy removes the interlock block from the seat firing mechanism. The continued pull on either firing handle fires the ejection gun to eject the seat.

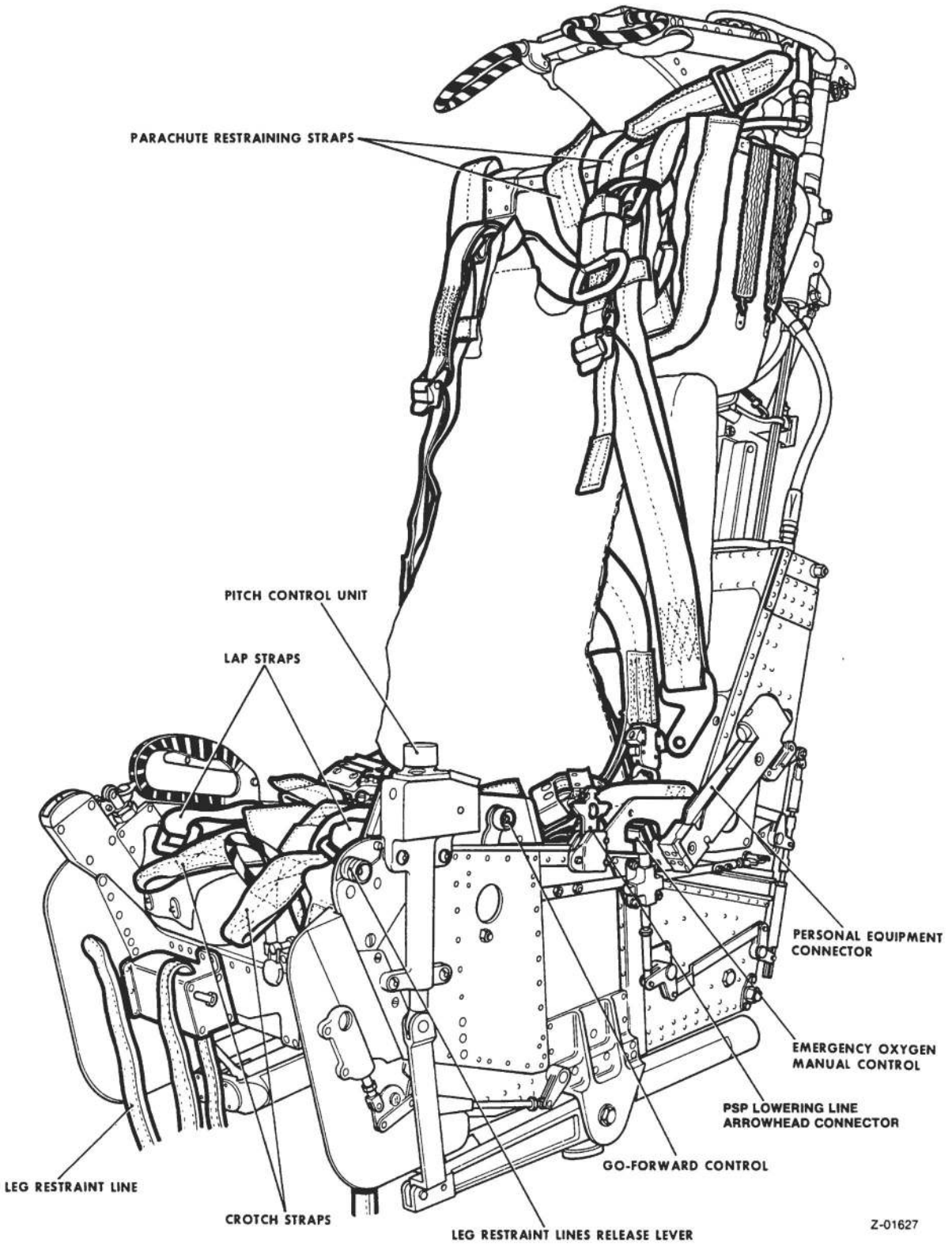
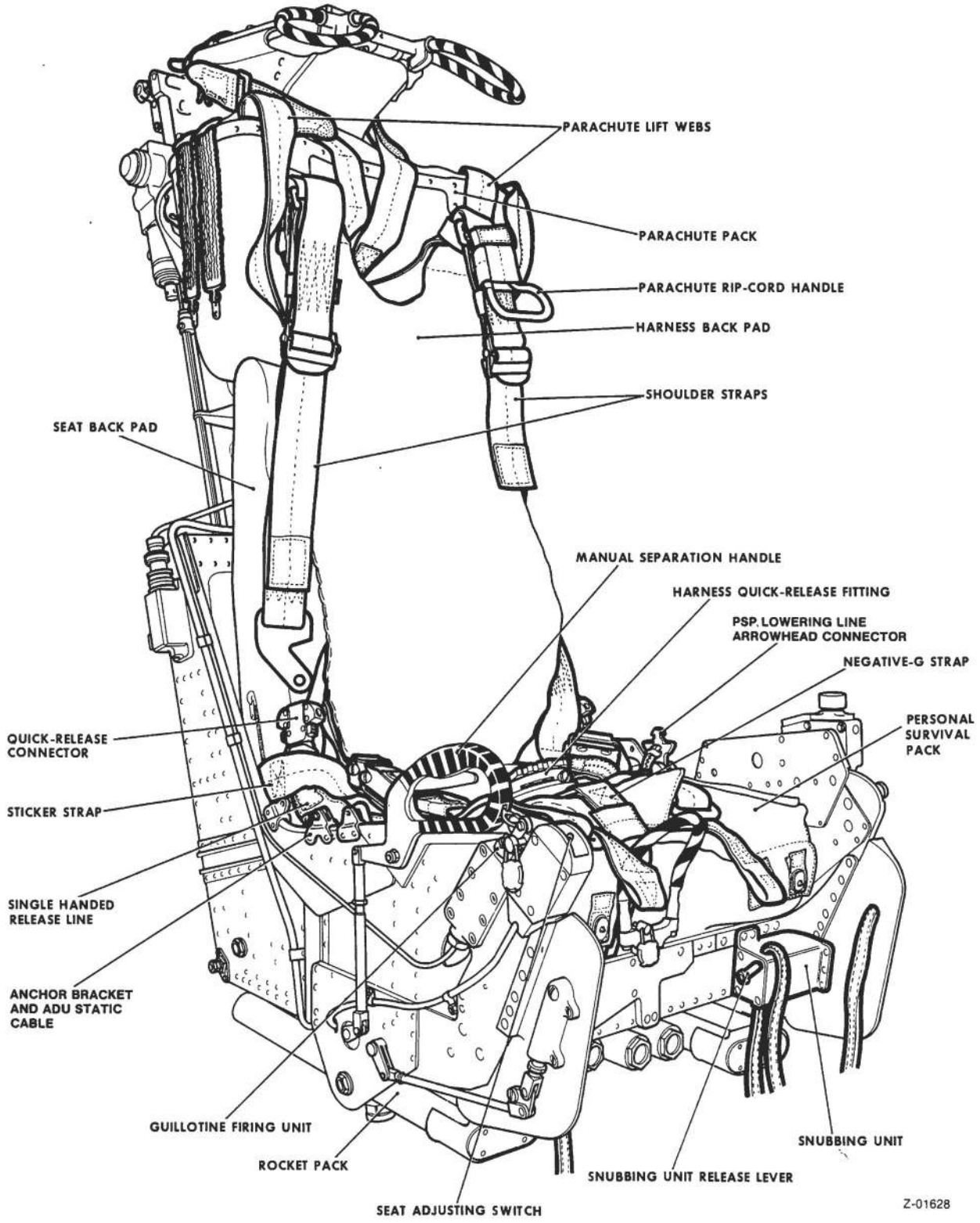


Fig 1 The seat equipped - left hand view (Post-mod ES 3799)



▶ Fig 2 The seat equipped - right hand view (Post-mod ES 3799, ES 7076 and SE 161) ◀

PARACHUTE ASSEMBLY

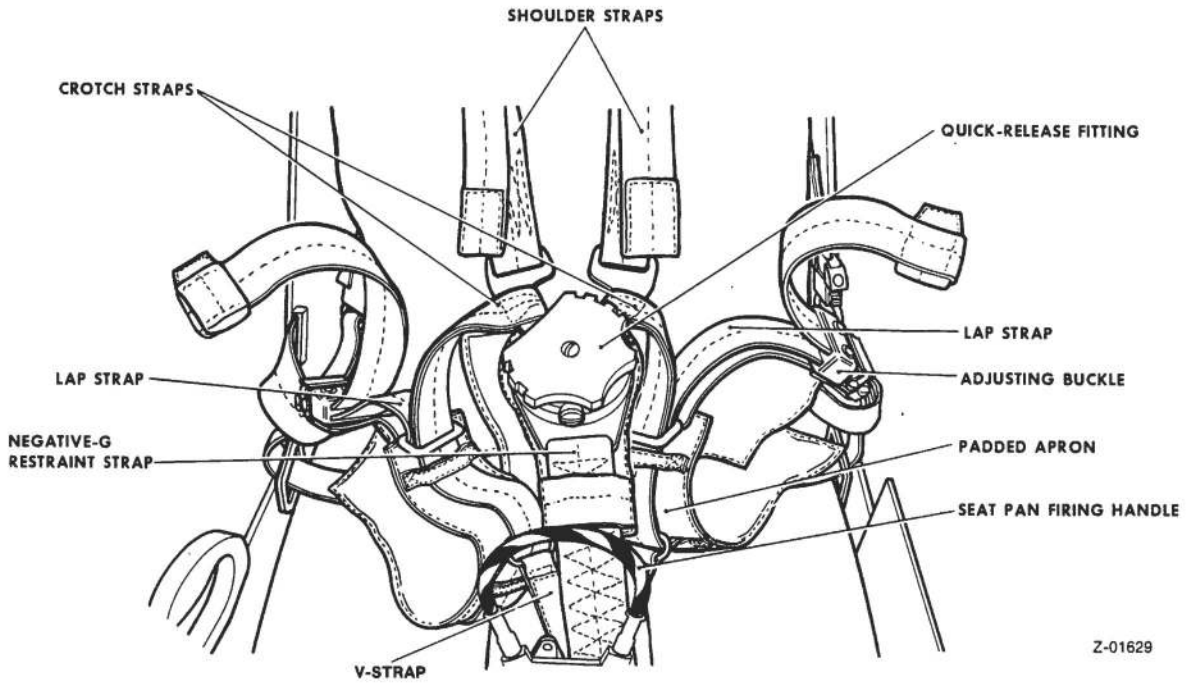
4 The rigid horseshoe shaped parachute assembly seats upon the support arch and is held in position by two restraining straps. The parachute lift webs are incorporated into the harness assembly to become an integral part of it. The harness comprises two adjustable shoulder straps, two adjustable lap straps, two crotch straps and a back pad. The shoulder straps terminate in ▶ angled lugs which are locked into the quick-release fitting (QRF) on a negative-g restraint strap. The inner blue shoulder straps are deleted from harness assemblies by STI/SE/370 and on those which were introduced by Mod PA 604. Two short straps, attached one to each shoulder strap, terminate in a yoke assembly. The harness reel webbing strap is passed down through the yoke and the lug of the strap is locked into the top harness lock during the equipping procedure to attach the harness shoulder straps to the seat. The parachute rip-cord handle is attached to the left hand lift web at shoulder height; a downward pull being required to deploy the parachute after a manual separation. Two parachute pack retention straps attached to the bottom of the pack are connected to buckles on the rear of the PSP cushion. The straps retain the parachute pack in position during parachute deployment. Pack ejector springs are fitted between the parachute pack and the back plate to facilitate rapid deployment. The lap straps terminate in D-rings and incorporate adjusting buckles. Incorporated in the lower harness are two lugs which are engaged in the lower locks in the seat pan to form the lower harness attachment. Two additional lugs attached to the lower harness are clipped into spring sticker clips inside the seat pan to restrain the occupant in the seat after the operation of the harness release mechanism. The developing parachute pulls the occupant from the ejection seat separating the sticker straps lugs from the clips. This slight check in separation precludes the possibility of man and seat collision during parachute deployment. Two quick-release connectors provide attachment points for the PSP single-handed release line. The back pad is attached to the harness by beckets and serves to locate the straps making fitting of the harness easier and also more comfortable. A small apron attached to the lower harness by beckets serves the same purpose.

5 When strapping-in, the crotch straps are drawn up between the legs, passed through the D-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 QRF (fig 3).

6 The shoulder straps are tightened by pulling down on the free ends and loosened by lifting up the lever on the adjusting buckles. The lap straps are tightened by pulling inwards on the free ends of the straps and can be loosened by pulling on the lever attached to the snubber lever incorporated in the buckle.

NEGATIVE-G RESTRAINT (fig 3)

7 Negative-g restraint is provided by a negative-g restraint strap and a V-strap. The negative-g strap consists of a Y-shaped webbing strap having a QRF on the single arm. The strap passes through brackets in the floor of the seat pan, the rear ends being passed over the lower harness lugs before the lugs are inserted into the lower harness locks. The negative-g V-strap has a ◀



▶ Fig 3 Securing the harness straps
(Amended illustration)

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 stap and located between the beckets on the padded apron. The lower ring is passed over the left hand strap of the negative-g straps, so that the V-strap is to the rear of the QRF, before the negativ-g strap is passed through the brackets in the seat pan floor.

PERSONAL SURVIVAL PACK TYPE ZD Mk 3 (Pre-mod SE 161)

8 The Type ZD Mk 3 PSP is a rigid cased pack complete with cushion and is housed in the seat pan where it forms a comfortable seat for the occupant. The pack has two side attachment straps each ending in a D-ring. A single-handed release line with an arrowhead connector at each end is passed through both attachment straps D-rings on the PSP and is mated with the quick-release connectors on the parachute harness. Release of either connector allows the pack to fall away, the free end of the release line slipping through the rings, providing a single-handed release facility. A lowering line which is stowed in a rolled case in the left hand side of the cushion terminates in an arrowhead connector and lug. The lug is held in a sticker clip on the left hand side of the seat pan. The arrowhead connector is mated, on strapping-in, with a quick-release connector on a lanyard attached to the life preserver and personal locator beacon (PLB) operating mechanism. The line enables the PSP to be suspended approximately 14.5 ft ◀ below the ejectee during a parachute descent. Two buckles on the rear of the cushion are provided to attach the parachute pack retention straps. This attachment provides parachute pack restraint, thus facilitating parachute deployment and retains the parachute pack during descent.

▶ PERSONAL SURVIVAL PACK TYPE ZD Mk 4 (Post-mod SE 161)

9 The Type ZD Mk 4 PSP is similar in construction to the Type ZD Mk 3 PSP, with the added facility of automatic deployment. A 4s delay cartridge fired automatic deployment unit (ADU) with MANUAL/AUTO mode selection is bolted to the right hand inside face of the PSP shell. A single-handed release strap with an arrowhead connector at each end is passed through two buckles on an ADU release strap and mates with the quick-release connectors on the parachute harness. The ADU release strap is routed through two shackles on the PSP and secured at its looped end by the ADU piston. An ADU static cable is secured to a bracket on the seat pan and connected to the sear of the ADU firing unit.

10 On man/seat separation, with the ADU selector set to AUTO, the static cable removes the sear from the firing unit and the firing pin strikes the base of the 4s delay cartridge. After approximatley 4s the cartridge gases withdraws the piston and releases the ADU release strap which allows the PSP to fall away suspended by the lowering line approximately 14.5 ft below the ejectee. If the ADU is set to MANUAL or should failure of the AUTO mode occur, the occupant can release the PSP by disconnecting one of the arrowhead connectors on the single-handed release strap from the quick-release connector on the parachute harness. This allows the single-handed release strap to slip through the buckles on the ADU release strap and the PSP to fall away to the extent of the lowering line.

LEG RESTRAINT SYSTEM (fig 4)

11 The leg restraint system is fitted to the ejection seat to draw back and restrain the seat occupant's legs close to the seat pan during ejection, to prevent injury to the legs due to flailing in the airstream. The system consists of two leg restaint lines, two taper plug assemblies, two snubbing units and a leg restraint garter on each of the occupant's legs positioned just below the knees.

12 The lower end of each leg rstraint line is attached to the floor of the aircraft by a fitting incorporating a shear rivet designed to fail at approximately 400 lbf. From this fitting each line is routed up through the snubbing unit, passed inboard to outboard around the front of the leg through the rings on the garter and finishing with the taper plug inserted into the taper plug assembly on the inside face of the thigh guard extension of the seat pan. The taper plug assemblies are interconnected with the harness release mechanism to ensure that the lines are released simultaneously with the harness. Fitted to the left hand side of the seat pan is a leg restraint lines release lever which, when operated manually, releases the taper plugs from the taper plug assemblies prior to vacating the seat.

13 The snubbing units permit the leg restraint lines to be drawn downwards through the unit but prevent the lines being pulled upward. To release the snubbing units to permit adjustment of the lines it is necessary to operate the release lever situated on the inboard face of each unit. ◀

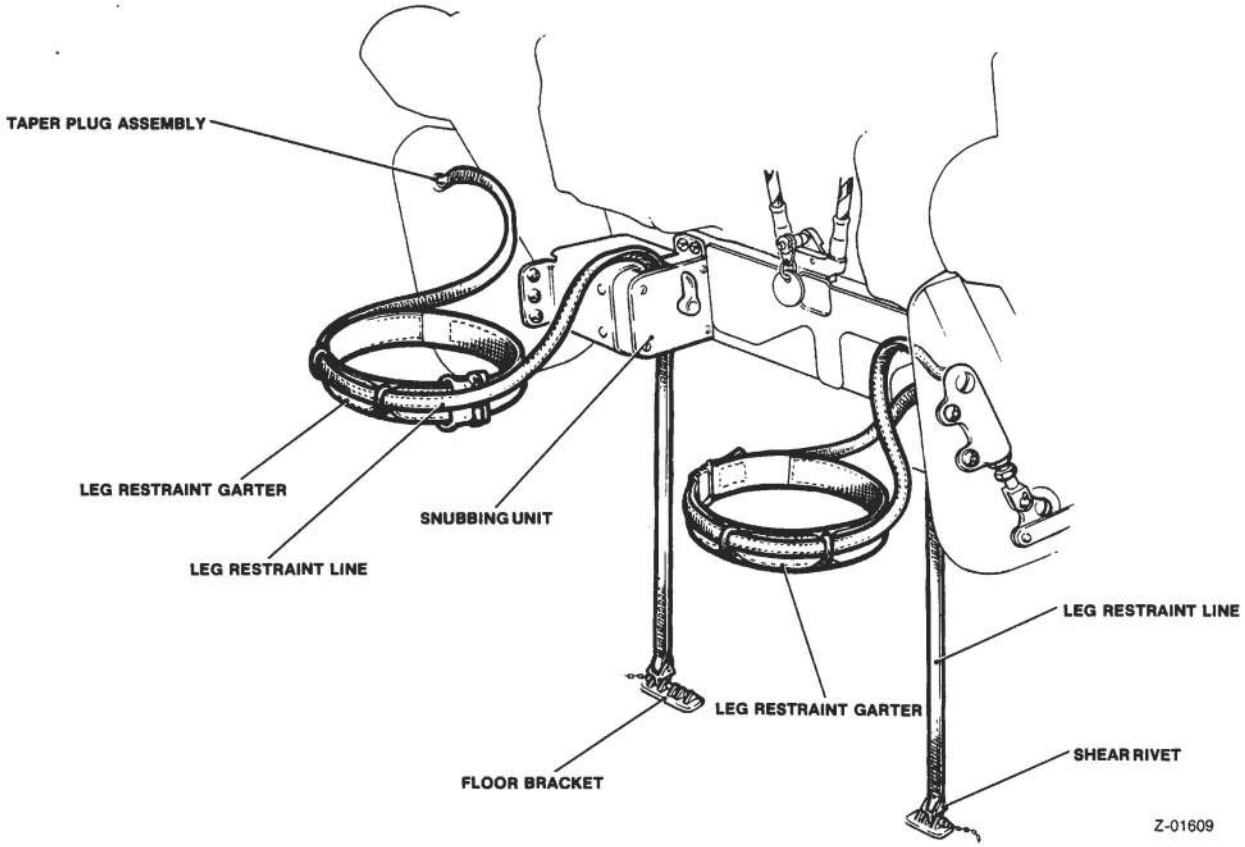


Fig 4 The leg restraint system

Leg garters

▶14 The leg garters are made from webbing having at one end a female quick-release connector. The other end passes through a slider bar buckle with an arrowhead fitting to mate with the quick-release connector. Two D-rings stitched into the webbing are positioned at the front of the legs and serve as locating guides for the leg restraint lines. The garters are fitted below the knees with the rings forward and with the quick-release connectors inboard. After tightening, the free ends of the webbing are secured by touch-and-close fastener.

GO-FORWARD MECHANISM

15 A go-forward mechanism is linked to the harness reel permitting the occupant to lean forward when required. The mechanism is controlled by a three-position spring-loaded lever situated on the left hand side of the seat pan. If the lever is pushed fully rearwards and then released to the centre position, the occupant can lean forward and backward at will. Movement of the lever to the forward position brings the snubbing unit in the harness reel into action, preventing further forward movement and automatically locking the harness in the rearward position as the occupant leans back. In the event of either a crash landing, or ejection occurring whilst the occupant is in the central position, an automatic inertia device brings the snubbing unit into action to prevent the occupant being thrown forward. ◀

MANUAL SEPARATION

▶16 In the event of failure of the automatic release facilities, a manual separation handle is provided on the right hand side of the seat pan. When operated it releases the occupant from the seat and fires the guillotine firing unit to sever the parachute withdrawal line, separating the parachute from the seat structure. The parachute can then be deployed by pulling down the handle attached to the left lift web.

PERSONAL EQUIPMENT CONNECTOR

17 The personal equipment connector (PEC) is fitted to the left hande side of the seat pan. It enables the emergency oxygen, main oxygen, air ventilated suit (AVS), anti-g and mic/tel supplies to be either connected or disconnected in one action. The PEC comprises three components:

17.1 Aircraft portion: Connected to the cockpit floor by a static line and to the personal supply systems in the aircraft. The handle trips the emergency oxygen operating linkage when the aircraft portion is separated from the seat portion.

17.2 Seat portion: Bolted to the seat pan and connected to the emergency oxygen cylinder.

17.3 Man portion: Attached to the flying clothing by supply pipes. A lanyard is attached between the handle and the flying clothing so that the man portion is pulled free from the seat portion as the occupant separates from the seat.

EMERGENCY OXYGEN SYSTEM

18 The emergency oxygen system consists of an emergency oxygen cylinder and operating head assembly, with in-situ cocking, mounted in the left hand rear corner of the seat pan and connected to a PEC on the left hand side of the seat pan. From the PEC the oxygen is fed through a high pressure hose to a miniaturised man-mounted regulator of either low or high altitude type which is mounted on the life preserver closure plate. The low pressure supply tube from the oxygen mask is connected to the regulator. The supply from the cylinder is turned on automatically during ejection as the aircraft portion of the PEC is disconnected. Provision is made for the manual operation of the system, in the event of failure of the main oxygen supply, by means of a yellow/black striped knob situated forward of the PEC on the left hand side ◀ of the seat pan. The emergency oxygen system is capable of meeting the breathing requirements of the occupant in the event of either failure of the main supply or when abandoning the aircraft.

ROCKET PACK

▶19 A multi-tubed rocket pack, located under the seat pan, supplements the thrust of the ejection gun, giving a higher trajectory to enable a safe ejection to be made from zero speed/zero altitude. An extension arm from the centre body is attached by an adjustable link to a pitch control unit bolted forward on the left hand side of the seat pan. Rotation of the adjusting knob on top of the unit rotates the rocket motor about its mounting bolts, thereby altering the angle of incidence between the rocket motor and the seat pan and thus varying the direction of thrust of the efflux nozzles to compensate for the effect of the occupant's weight upon the centre of gravity of the seat. A system of pinions connects an indicator drum to the adjusting knob and the occupant must set the pitch control unit so that the number visible through a window agrees with his dressed weight. Rotation clockwise raises the front of the rocket motor decreasing the weight compensation and vice versa.

SEAT PAN HEIGHT ADJUSTMENT

CAUTION...
The actuator is not to be operated in excess of its duty cycle of 30s in any 10 min period due to the danger of overheating.

20 Adjustment of the seat pan height is effected by an electrically operated actuator which is attached to a cross-beam below the harness reel on the seat structure and the cross-beam of the seat pan. Operation of the actuator is controlled by a switch mounted on the forward edge of the right hand thigh guard; the switch is biased to the centre, OFF, position.

SEQUENCE OF EVENTS DURING EJECTION

21 When either firing handle is pulled the emergency ejection-sequencing system is activated and the jettisoned canopy withdraws the interlock block from the firing mechanism permitting the continued pull on the firing handle to fire the ejection gun and eject the seat. As the seat ascends the guide rails the following sequence occurs:

21.1 The leg restraint lines tighten until the rivets shear.

21.2 The time-delay mechanism of the drogue gun is activated, a delay of 0.75s elapsing before the cartridge is fired.

21.3 The time-delay mechanism for the barostatic time-release unit (BTRU) is tripped. The functioning of the mechanism is dependent upon aircraft height at the time of ejection.

21.4 The electric supply leads to the seat raising actuator are disconnected.

21.5 The identification, friend or foe (IFF) switch is tripped. ◀

▶ 21.6 The aircraft portion of the PEC is separated from the seat portion, disconnecting the main oxygen, anti-g supply, AVS and mic/tel supplies between the aircraft and the seat. The handle trips the operating link and turns on the emergency oxygen supplies.

21.7 The static line is withdrawn from the remote rocket initiator (RRI) until it finally becomes taut as the seat leaves the aircraft, withdrawing the sear and firing the RRI cartridge, the gas from which is piped to the gas operated firing unit of the rocket pack which fires to supplement the upward thrust of the ejection gun.

21.8 After 0.75s the drogue gun fires and the two drogues stabilize and retard the seat. If the ejection occurs at high altitude the seat will eventually fall in a near vertical attitude with the occupant restrained from falling forward by the combined harness. At low altitudes there may not be time for the seat to attain the near vertical position. During this phase the occupant will be breathing emergency oxygen from the emergency oxygen system fitted on the seat.

21.9 After an appropriate delay the occupant is released from the seat and his parachute canopy opens automatically. Deployment of the parachute pulls the occupant from the seat, separating the sticker strap and lowering line lugs from the clips on the seat and initiating the PLB and ADU (Post-mod SE 161). If the ADU (Post-mod SE 161) is set to AUTO the PSP will automatically be lowered 4s after man/seat separation and suspended by the lowering line approximately 14.5 ft below the ejectee. At the same time the man portion of the PEC is pulled from the seat portion, detaching the personal services from the seat and enabling ambient air to be inhaled. At low or moderate aircraft speeds and height, the delay is 2.25s after ejection. At high altitude the 2.25s delay is arrested until the seat has descended below 10 000 ft.

CONNECTIONS TO THE AIRCRAFT

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

22.1 Left hand side of the seat:

22.1.1 RRI cable to drogue gun trip rod.

22.1.2 Trip rod from the drogue gun to the cross beam.

22.1.3 Static line from the aircraft portion of the PEC.

22.1.4 All PEC services.

22.2 Right hand side of the seat:

22.2.1 Trip rod from the BTRU to the cross beam.

22.2.2 Electric supply lead to the seat adjusting actuator. ◀

▶ 22.3 Underside of the seat:

22.3.1 Leg restraint lines to the floor brackets.

22.4 Top of the seat:

22.4.1 Static cable from the canopy to the interlock block.

22.4.2 Firing linkage to the primary initiator of the ejection sequencing system.

EQUIPPING THE SEAT

TABLE 1 SPECIAL TOOLS AND EQUIPMENT

Nomenclature	NSN/Ref	Part No
Tool, inserting, harness reel lug	5120-99-1050228	MBEU 18802
Tool, inserting, lower harness lugs	4920-99-6172606	MBEU 56293
Pin and streamer, quick-release assembly (PSP Post-mod SE 161)	5340-99-2527727	MBEU 77362

PREPARATION

23 Prepare the seat as follows:

23.1 Ensure the seat has been made Safe for Maintenance in accordance with current instructions.

23.2 The emergency oxygen system must be fitted before the ejection seat is equipped.

23.3 Ensure the seat pan is clean and that the leg restraint lines are clear of the seat pan.

23.4 Ensure that the manual separation handle is in the locked position.

23.5 Separate the upper and lower parachute restraining straps. ◀

EQUIPPING

▶24 The following procedure shall be used when installing the equipment in the seat, refer to fig 1 to 15 as necessary:

24.1 Fit the negative-g strap and V-strap as follows:

24.1.1 With the QRF facing forward route the left hand bifurcated tape of the negative-g strap through the circular ring of the V-strap at the junction of the two arms. Ensure that the V-strap is located to the rear of the QRF.

24.1.2 Route the two bifurcated tapes of the negative-g strap through the front bracket in the floor of the seat pan from front to rear. Pass the bifurcated tapes rearwards and route them through their respective tunnel brackets in the rear lower corners of the seat pan (fig 5).

24.2 Ensure that the loops of the bifurcated tapes are pulled well through the rear tunnel brackets and that the V-strap and negative-g strap are vertical in the front of the seat pan.

24.3 Pre-mod SE 161. Fit the PSP into the seat pan ensuring that the parachute retention strap buckles, side attachment strap buckles and lowering line are not trapped.

24.4 Pre-mod SE 161. Route the single-handed release line through the side attachment strap D-rings of the PSP.

24.5 Post-mod SE 161. Prior to installation of PSP into the seat pan ensure that the ADU safety pin and streamer is fitted and that the ADU mode selector is set to MANUAL/AUTO as required. Fit the PSP as follows:

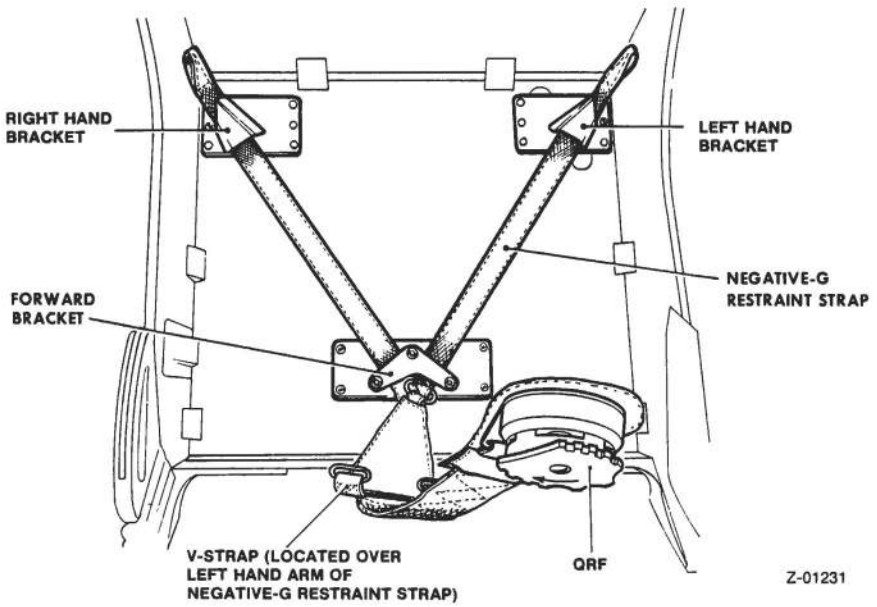


Fig 5 Installation of the negative-g restraint strap and V-strap (Amended illustration) ◀

▶ CAUTION...
After removal of ADU safety pin, ensure that ADU static cable is not pulled.

24.5.1 Remove safety pin and streamer from PSP/ADU.

24.5.2 Fit PSP into seat pan ensuring that ADU static cable, ADU release strap and buckles, and lowering line are not trapped.

24.5.3 Insert static cable end fitting into rear of anchor bracket on the right hand side of the seat pan and secure with the clevis pin (head inboard) and split pin.

24.6 Post-mod SE 161. Route the single-handed release line through the buckles of the ADU release strap.

24.7 Insert the lowering line arrowhead connector lug into the sticker clip on the left hand side of the seat pan. Ensure the lowering line safe tie is intact.

24.8 Lay the negative-g strap and QRF on the PSP cushion taking care not to pull on the strap as this will pull the bifurcated tapes from the rear tunnel brackets.

24.9 Place the parachute assembly in the seat pan. Carefully open the protective flap, check that the rip-cord cable pins are correctly positioned through the cones and that the scarlet cotton tie securing the right hand pin is unbroken. Check that the locking ring is positioned over the locking cone and that the STRAIGHT leg of the locking pin is through the cone to retain the ring in position (fig 6). Close the flap. Ensure that the harness is not either entangled or twisted and place the parachute on the support bracket, engaging the spring clip under the arch of the pack with the front edge of the support arch.

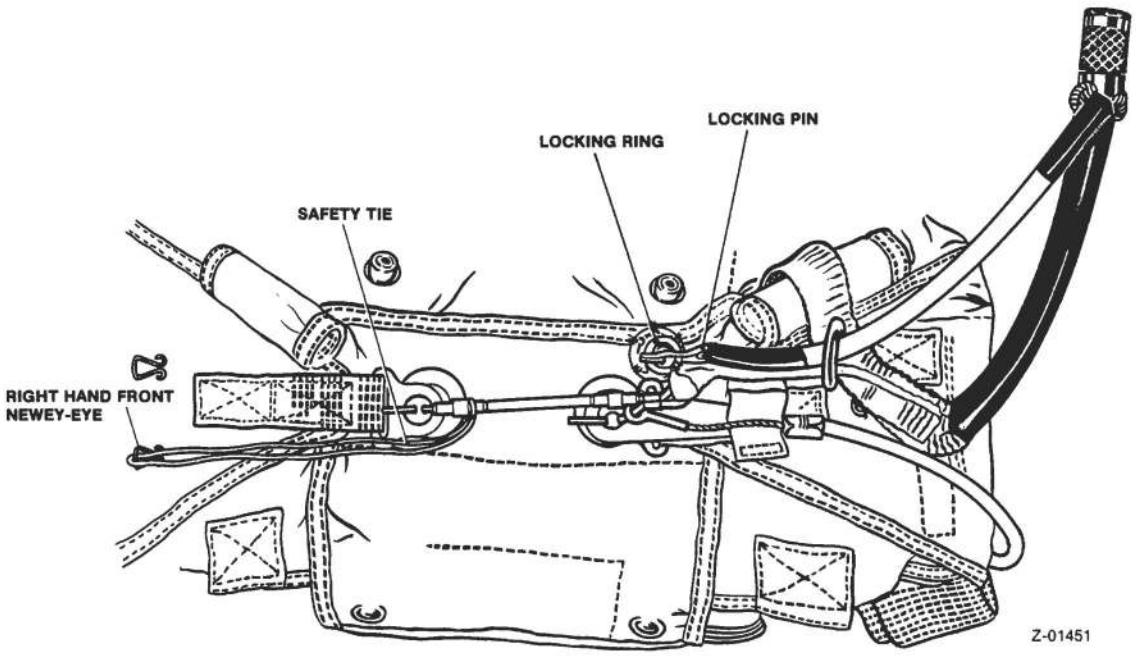


Fig 6 Parachute safety tie
(Amended illustration) ◀

▶24.10 Open the spreader arms situated in front of the top harness lock and pass the O-rings of the two lower parachute restraining straps one over each spreader arm. Push each O-ring well back towards the pivot end of its spreader arm and close the arms inwards towards each other as far as they will go (fig 7).

24.11 Move the go-forward control lever to the rearward position, release it to the central position, restrain the spreader arms, pull out the webbing strap from under the parachute support bracket and hold it against the spring tension.

24.12 Lift up the D-shackle yoke on the shoulder straps ensuring that the straps are not twisted. Pass the webbing straps DOWNWARDS through the D-shackle and either:

24.12.1 Engage a tool with the lug fitted to the end of the webbing strap and, using the tool, insert the lug between the inner extremities of the spreader arms into the top harness lock (fig 8), push the lug in until it locks into position, or:

24.12.2 Partially depress the harness release lever situated below the BTRU and insert the lug of the webbing strap by hand between the inner extremities of the spreader arms into the top harness lock. Release the harness release lever to permit the plunger to engage the lug.

24.13 Ensure that the lug has locked in correctly and that the spreader arms are securely held by pulling on the webbing strap and the parachute restraint straps. Allow the webbing strap to wind back, then return the go-forward lever to the forward position. ◀

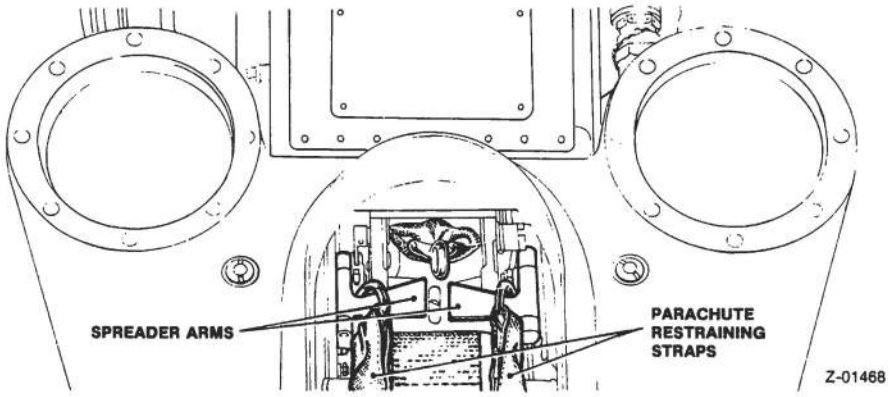


Fig 7 Attachment of parachute restraining straps to spreader arms

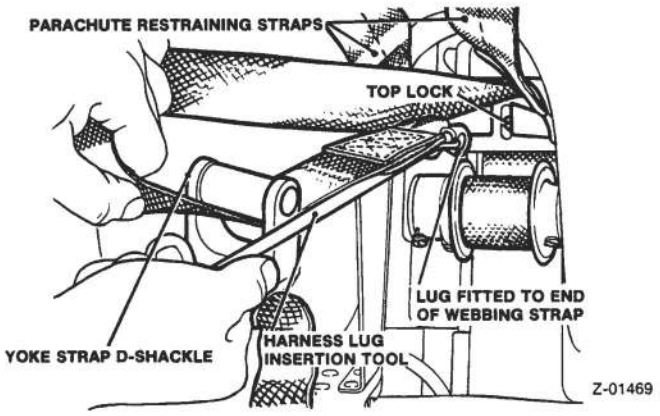
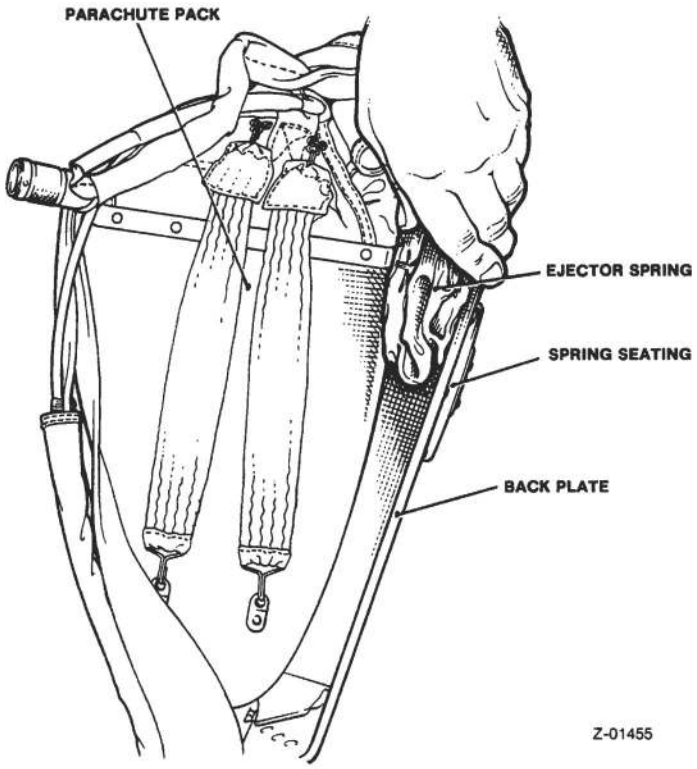


Fig 8 Insertion of lug into upper harness lock

▶ 24.14 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.

24.15 Route the lower parachute restraining straps from inboard to outboard behind the slider bars of the buckles of the short restraining straps on each side of the drogue container. Route the straps forward over the slider bars and back through the buckles again. Secure the pack using the restraining straps, tighten the straps sufficiently to retain the pack on the support arch.

24.16 Ease the parachute pack forward, compress a parachute ejector spring and insert it between the rear face of the parachute pack and the left hand ear of the back plate (fig 9). Push the spring in until it seats into the seating in the backplate. Similarly fit the right hand spring. Exert pressure on the parachute pack to fully compress the ejector springs and tighten the parachute pack restraining straps. Secure the free ends by mating the touch-and-close fastener. ◀



▶ Fig 9 Fitting a parachute ejector spring (left hand)

WARNINGS...
(1) DO NOT ROUTE THE LOCKING PIN LANYARD THROUGH THE GUILLOTINE.

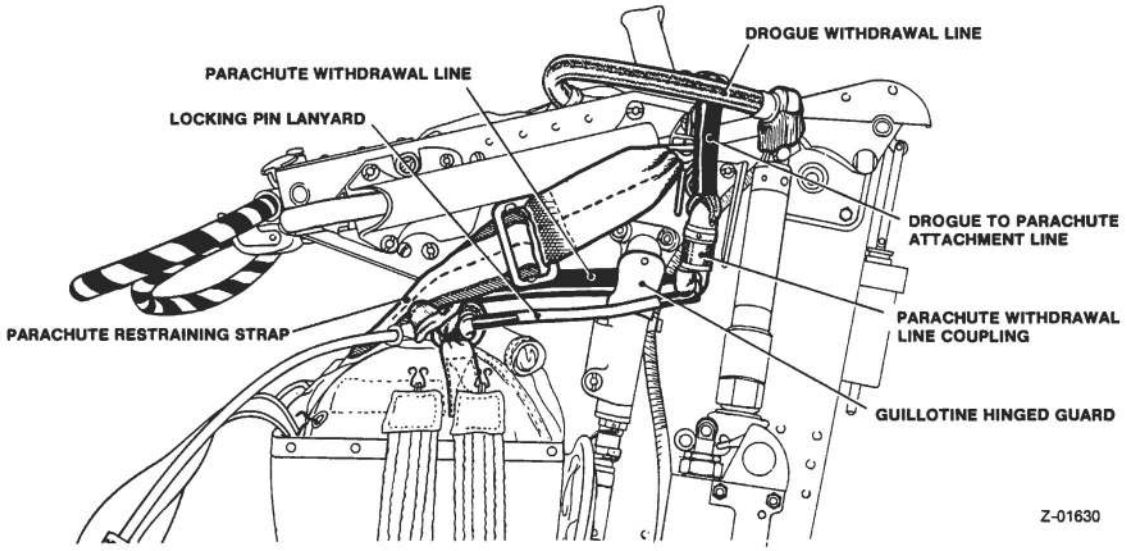
(2) DROGUE WITHDRAWAL LINE MUST BE ROUTED OVER ALL OTHER LINES.

24.17 Route the drogue attachment line outside the parachute restraining straps and connect the parachute withdrawal line to the drogue attachment line by the screwed coupling. Open the yellow spring-loaded hinged guard of the guillotine and route the parachute withdrawal line through the guillotine aperture. Close the guard and ensure that it correctly retains the withdrawal line (fig 10).

24.18 Ensure that the drogue withdrawal has been routed OVER ALL OTHER LINES.

24.19 Lift up the shoulder straps and stow them to the parachute container using the touch-and-close beckets attached to the container. Pull the shoulder straps up as high as possible so that the touch-and-close retaining beckets are around the straps and the harness back pad shoulder extensions.

24.20 Using the handle end of the lower harness lug inserting tool, pull up and line up the end loops of the negative-g strap with the slots of the lower harness locks. ◀



▶ Fig 10 Arrangement on left hand side of drogue container

24.21 Ensure that the lower harness is not either twisted or tangled and using the lower harness lug inserting tool (fig 11) insert the lug through the end loop of the negative-g strap and into the lower harness lock. Pull on the lap strap to ensure it is correctly locked.

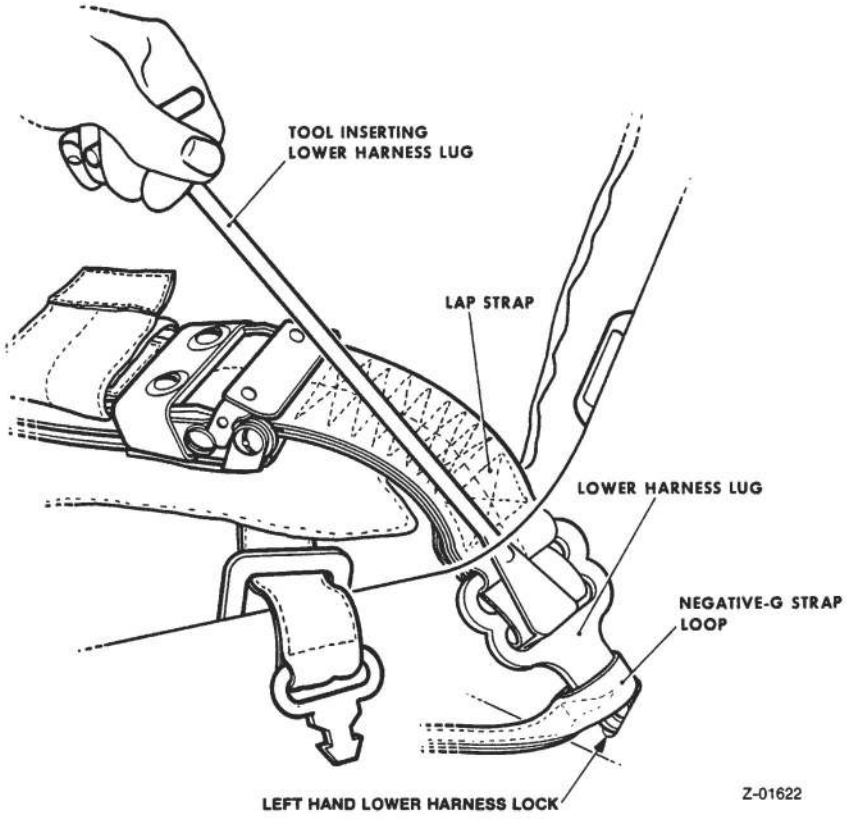
24.22 Carry out a similar procedure with the right hand lap strap.

24.23 Withdraw the crotch straps from the first becket each side of the padded apron. Pass each strap through the adjacent oval ring on the V-strap and back through the first becket on the padded apron again. The V-strap is now located on each crotch strap between the fixed beckets of the padded apron.

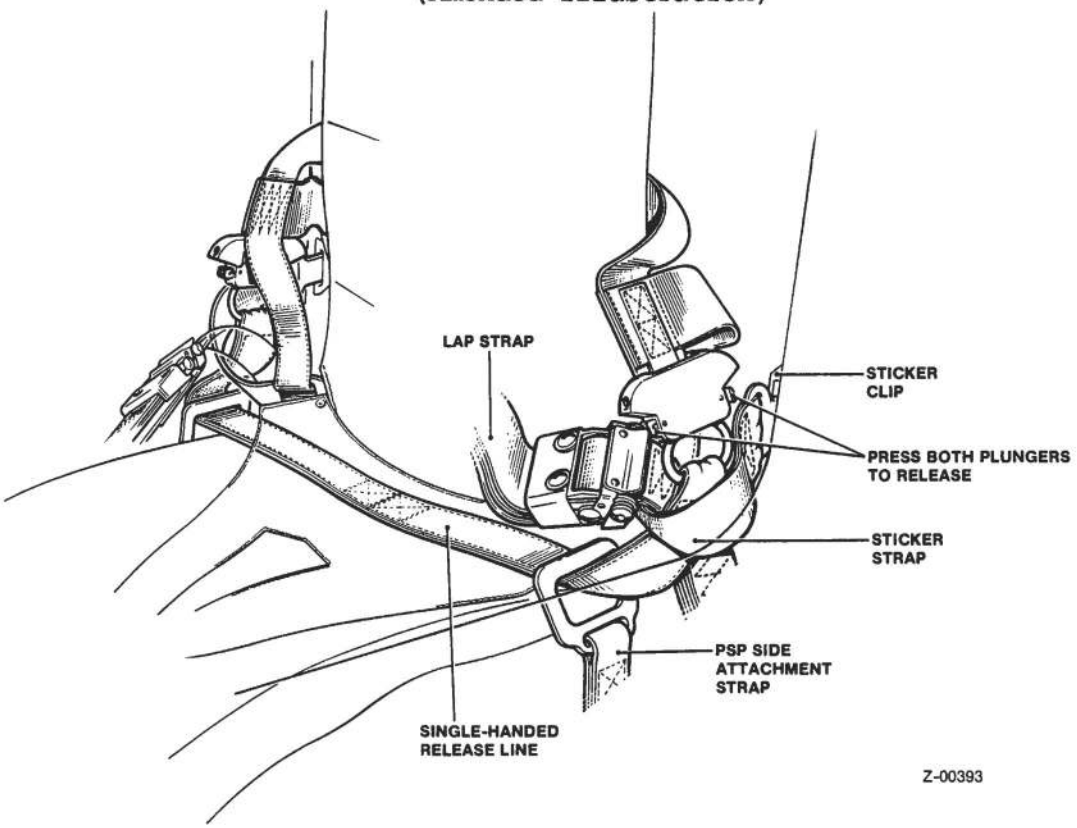
24.24 Lay the lap straps and sticker straps inboard on the harness padded apron.

24.25 Route the arrowhead connectors of the single-handed release line around the outside of the lap straps and engage them in the quick-release connectors of the combined harness (fig 12 and 13). Ensure correctly engaged.

24.26 Route the sticker straps under and outside of the lap straps and single-handed release line and engage the lugs in the sticker clips on the inboard faces of the seat pan sides (fig 12 and 13). ◀



▶ Fig 11 Fitting the left hand lower harness lug (right hand similar) (Amended illustration) ◀



▶ Fig 12 Attaching the survival pack to the harness (Pre-mod SE 161) ◀

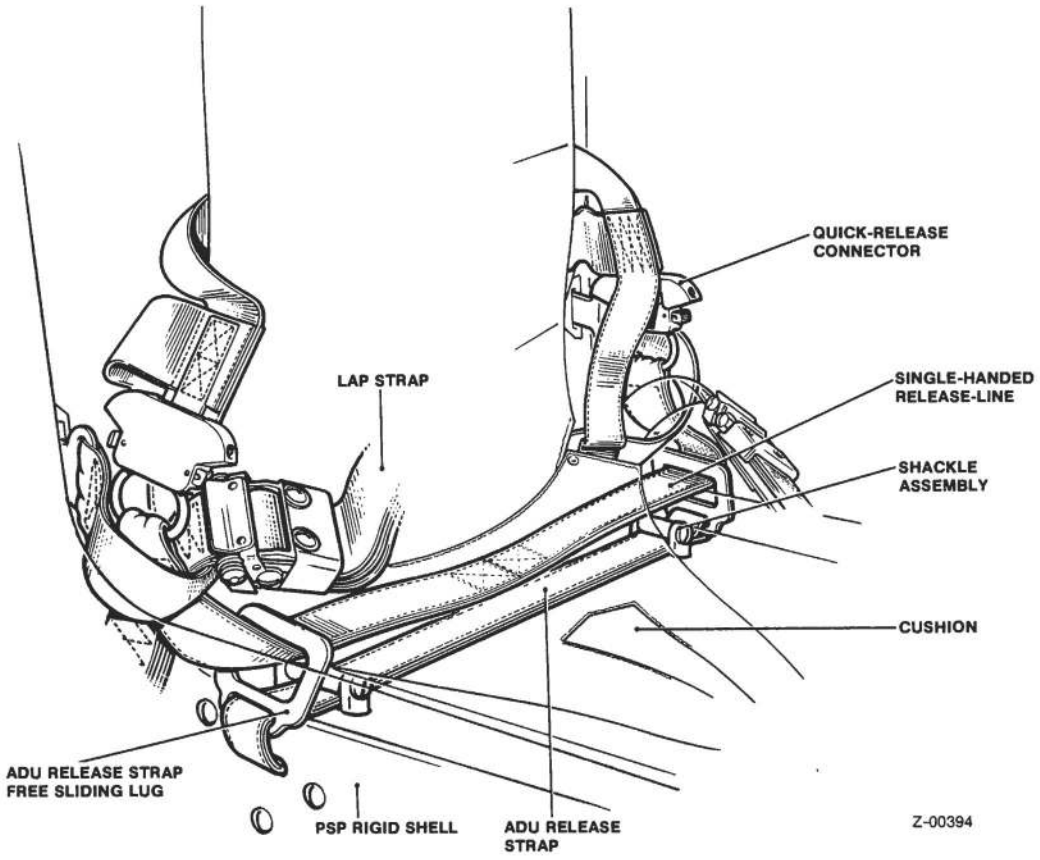


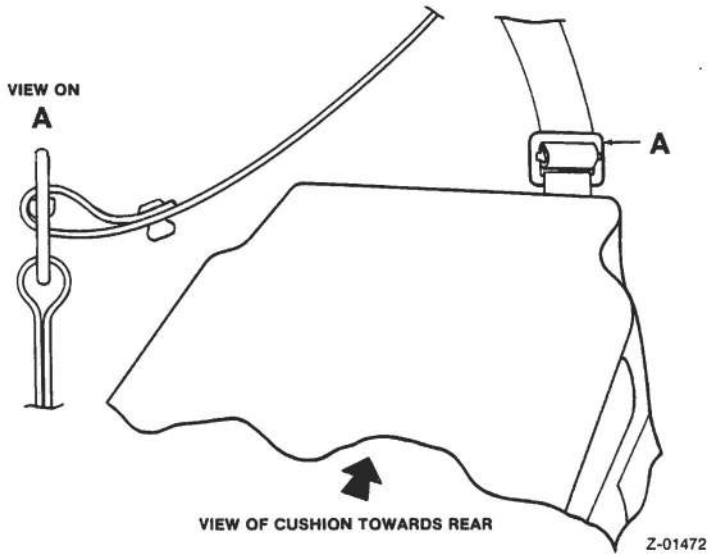
Fig 13 Attaching the survival pack to the harness (Post-mod SE 161)

24.27 Place the padded back pad behind the harness with the cutaway adjacent to the emergency oxygen cylinder. Route the parachute pack retention straps down through the beckets on the rear of the back pad, through the slider bar buckles on the PSP cushion and secure with the press studs (fig 14).

24.28 Ensure that the parachute lift webs are retained by the lift web restraint straps noting that the left hand lift web restraint strap also secures the rip-cord cable (fig 15).

24.29 Extend the shoulder straps to their full extent and stow to the parachute container using the touch-and-close fasteners provided.

24.30 Extend the lap straps to their full extent, lay the QRF on the seat cushion between the crotch straps.



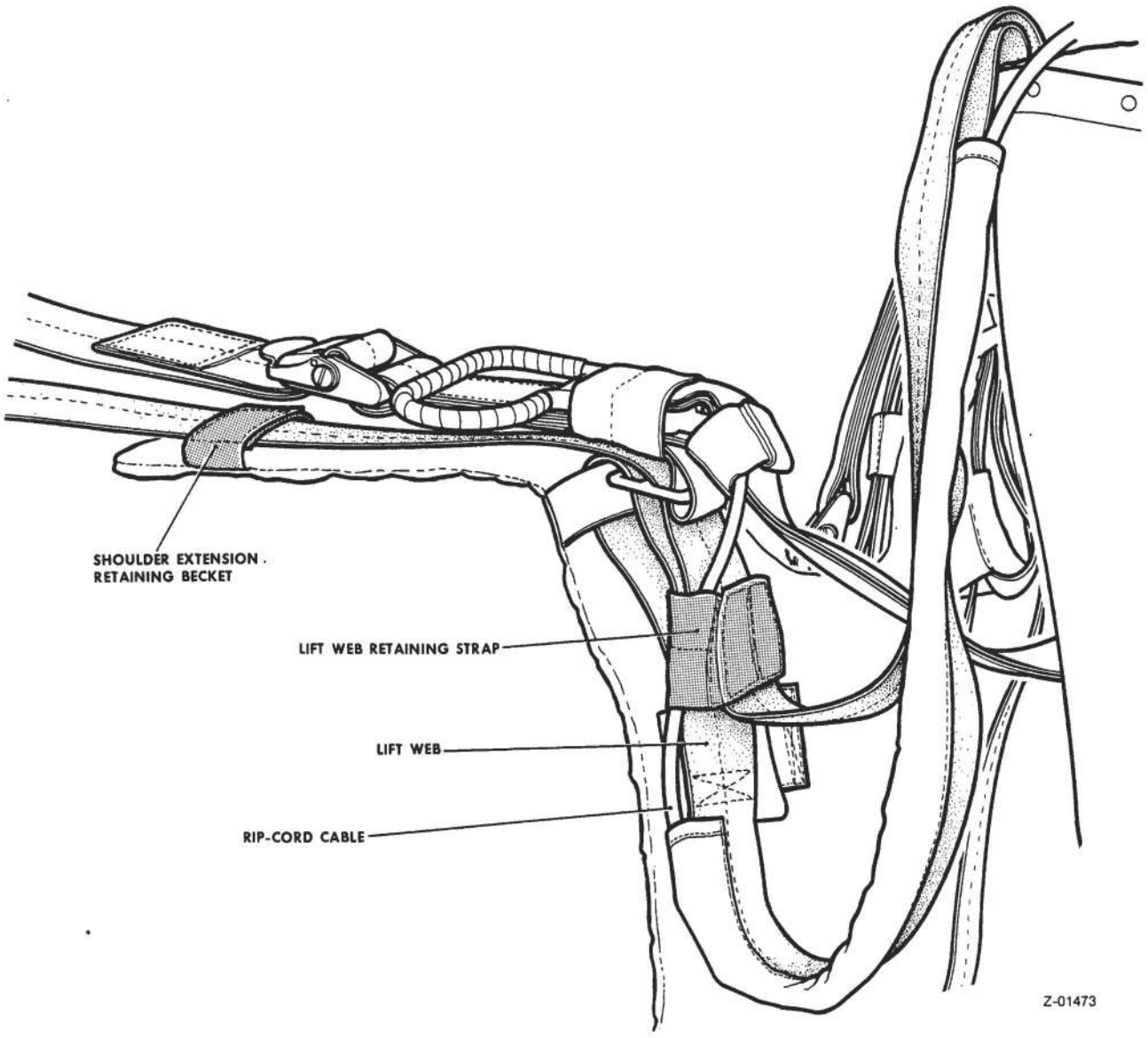
▶ Fig 14 Attachment of parachute pack retention straps

STRAPPING-IN PROCEDURE

25 The procedure for strapping-in is as follows referring to fig 3, 4 and 16 to 18 as necessary:

WARNING...
ENSURE SAFETY PINS ARE FITTED IN THE SAFE FOR PARKING CONDITION.

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 garters are to be fitted around the leg below the knee with the D-rings to the front of the leg equidistant each side of the shin bone and the quick-release connector to the inside of the leg. The free end of the garter straps when secured by the touch-and-close fastener must be at least one inch from the outboard D-ring. If necessary the excess strap is to form a loop to the rear of the leg. ◀



▶Fig 15 Routeing of parachute lift webs through restraint straps - left hand
(Post-mod PA 604 or STI/SE/370)
(Rip-cord handle cover corrected) ◀

▶25.1 Occupy the seat. Adjust the height of the seat pan to the normal in-flight position.

25.2 Remove and stow the dust cover from the seat and man portions of the PEC. Insert the forward end of the man portion in an inclined attitude and press down on the handle until it locks into place. Ensure that the pull-off lanyard is correctly attached to the life preserver.

25.3 Operate the leg restraint lines release lever to free the lines from the taper plug assemblies. Pass the leg restraint line emerging from the left hand snubbing unit around the front of the left leg and from inboard to outboard through the rings on the left leg garter and insert the taper plug into the left hand side taper plug assembly.

25.4 Similarly route the right hand leg restraint line through the rings of the right leg garter and insert into the right hand taper plug assembly.

25.5 Adjust the leg restraint lines to give the desired freedom of leg movement. If there is insufficient length of line, operate the snubber release lever and pull up more line. Excess line should be pulled down through the snubbing units.

25.6 Connect the quick-release connector of the life preserver lanyard to the lowering line arrowhead connector located in the sticker clip on the left hand side of the seat pan.

NOTE...
If the connection is short, extend the strap attached to the life preserver.

25.7 Adjust the rocket motor pitch control unit to register the occupant's dressed weight.

25.8 Place the lap straps to lie over the thighs, laying the left lap strap OVER the PSP lowering line.

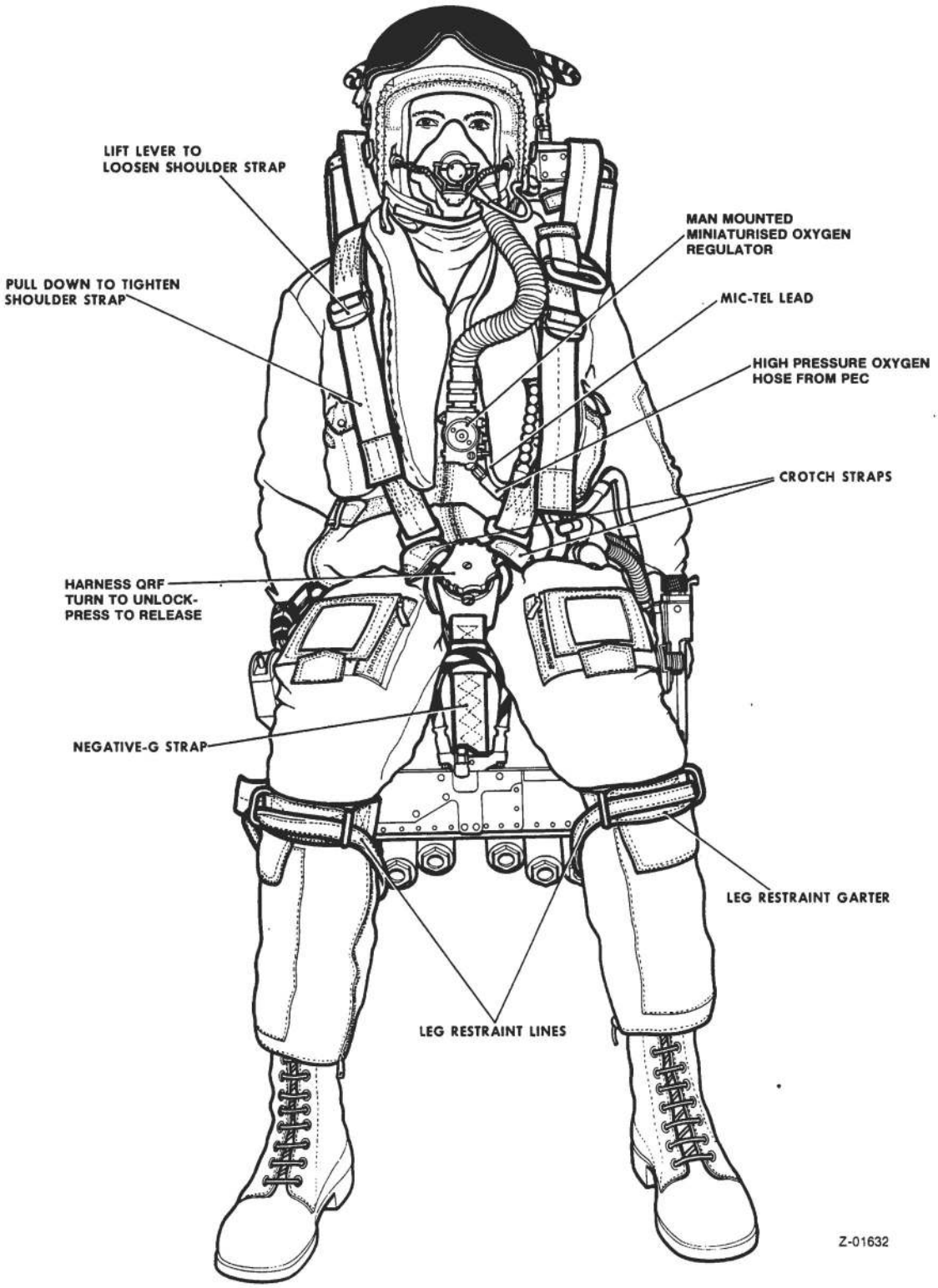
25.9 Ensure the go-forward control lever is in the locked position (forward) and bring down the shoulder straps routeing the left strap OVER the oxygen hose and mic/tel lead from the PEC.

WARNING...
ENSURE THAT THE NEGATIVE-G STRAP AND QRF ARE ROUTED BEHIND AND NOT THROUGH THE SEAT PAN FIRING HANDLE.

25.10 Bring the negative-g restraint strap and QRF up between the legs ensuring that the strap is routed behind, NOT THROUGH, the seat pan firing handle (fig 16).

NOTE...
When fitting a harness lug into the QRF 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. ◀

WARNING...
ENSURE THE CROTCH STRAPS ARE ROUTED BEHIND, NOT THROUGH, THE SEAT PAN FIRING HANDLE.



▶ Fig 16 Arrangement of the harness straps (Post-mod ES 3799) ◀

▶NOTE...
It is important that the lap straps and negative-g restraint strap are as tight as possible as they provide the principal restraint under all acceleration conditions.

25.11 Draw the left hand crotch strap forward and up between the legs ensuring that it is neither crossed nor twisted and laying the apron against the left thigh. Route the crotch strap up (inboard to outboard) through the D-ring, on the end of the left lap strap, fold the crotch strap over to the right hand (inboard) using a forward 90° twist. Pull the left shoulder strap from the stowage loop ensuring that the 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 QRF on the negative-g restraint strap (fig 3 and 16).

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

25.13 Fully tighten the lap straps ensuring that the QRF remains central. Roll up the excess free end of the lap straps and secure with the touch-and-close fastener.

25.14 Fully tighten the shoulder straps, positioning the QRF centrally. Obtain groundcrew assistance and pull the excess lift web straps to the rear and tuck away behind the shoulders. Ensure that the excess lift webs are stowed in the lift web retaining straps on the rear of the harness back pad and that the touch-and-close fasteners are secure (fig 15). The left hand restraint strap also encloses the rip-cord cable.

25.15 Ensure the excess lowering line lanyard is above the lap strap.

25.16 Operate the go-forward lever and check for freedom to move forward. Return the go-forward lever to the locked position, and sit hard back in the seat. Re-tighten the shoulder straps.

25.17 Don the flying helmet and fasten the chin straps. Connect the oxygen mask hose to the regulator. Connect the mic/tel lead and route the lead outside the left hand stole of the life preserver with the connector tucked behind the left hand edge of the mini regulator.

25.18 Remove and stow the visor cover.

25.19 Carry out the following functional checks:

25.19.1 Ensure that the face screen firing handle can be reached with both hands simultaneously. DO NOT PULL.

25.19.2 Test that the man portion of the PEC is correctly fitted by testing the mic/tel system.

25.19.3 Ensure that the leg restraint lines taper plugs are locked in their sockets. ◀

CAUTION...
Seat pan operation is limited to 30s in any 10 min period.

▶ 25.19.4 Raise and lower the seat to its full extent and ensure that the aircraft portion of the PEC remains locked to the seat portion. Reposition to the desired height.

25.19.5 Operate the go-forward mechanism and test for correct functioning.

25.19.6 Conduct pre-flight oxygen tests.

25.20 With assistance remove and stow the safety pins. Ensure that all safety pins are present in their stowages.

EMERGENCY PROCEDURE

26 Instructions for dealing with emergencies are contained in the Aircrew Manual and Flight Reference Cards.

LEAVING THE AIRCRAFT AFTER LANDING

27 The following procedure is to be followed when leaving the aircraft after landing:

27.1 Fit safety pins in the safe for parking positions.

27.2 Remove the oxygen mask.

27.3 Operate the harness QRF by rotating the plate 90° to the left and depressing to release harness. Release the harness and turn the QRF faceplate back to the locked position.

27.4 Disconnect the life preserver lanyard from the lowering line arrowhead connector.

27.5 Operate the leg line release lever and draw the leg lines from the rings on the leg garters.

27.6 Release the man portion of the PEC from the seat portion and fit dust covers to both portions.

27.7 Vacate the aircraft. ◀

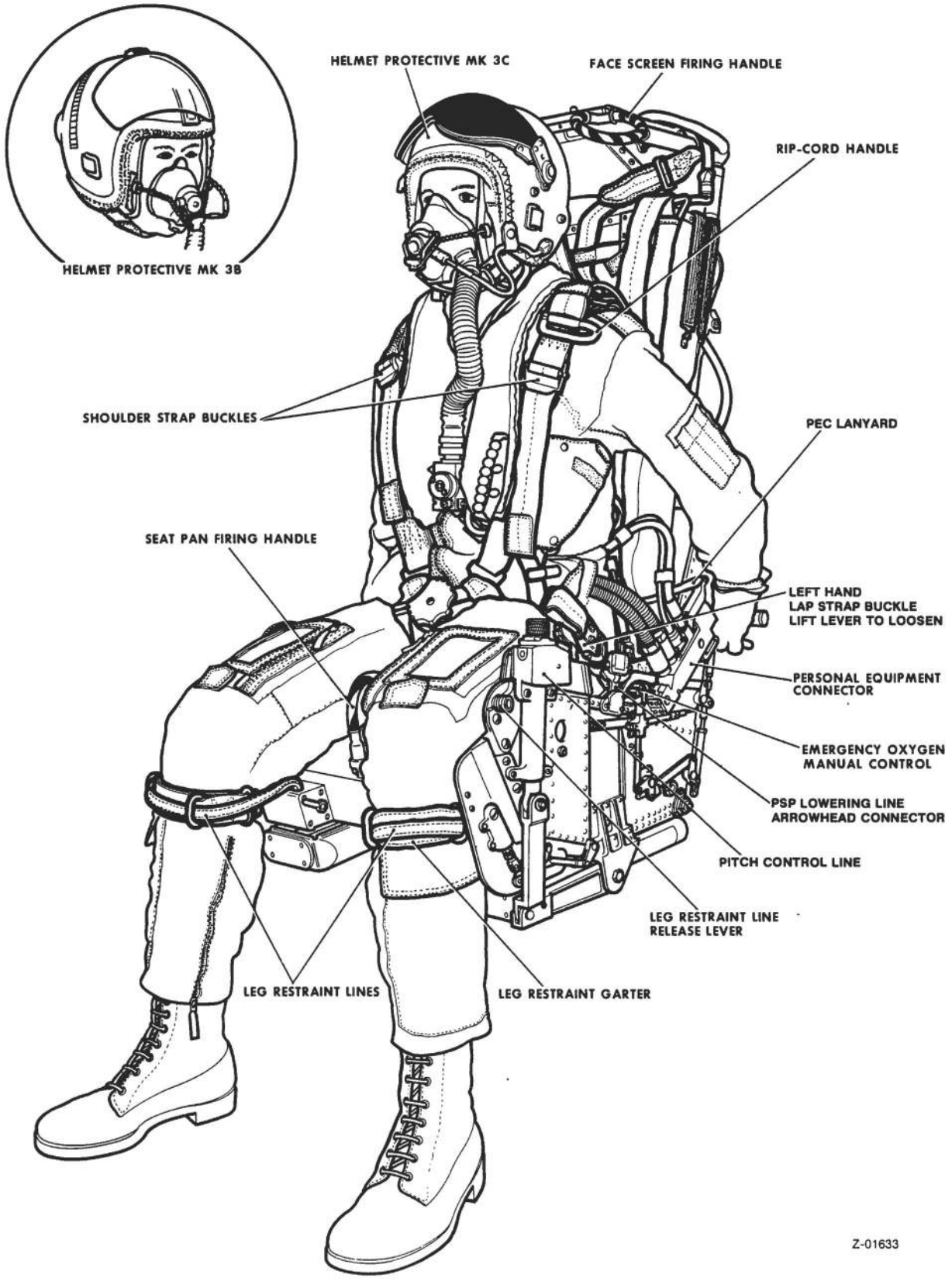
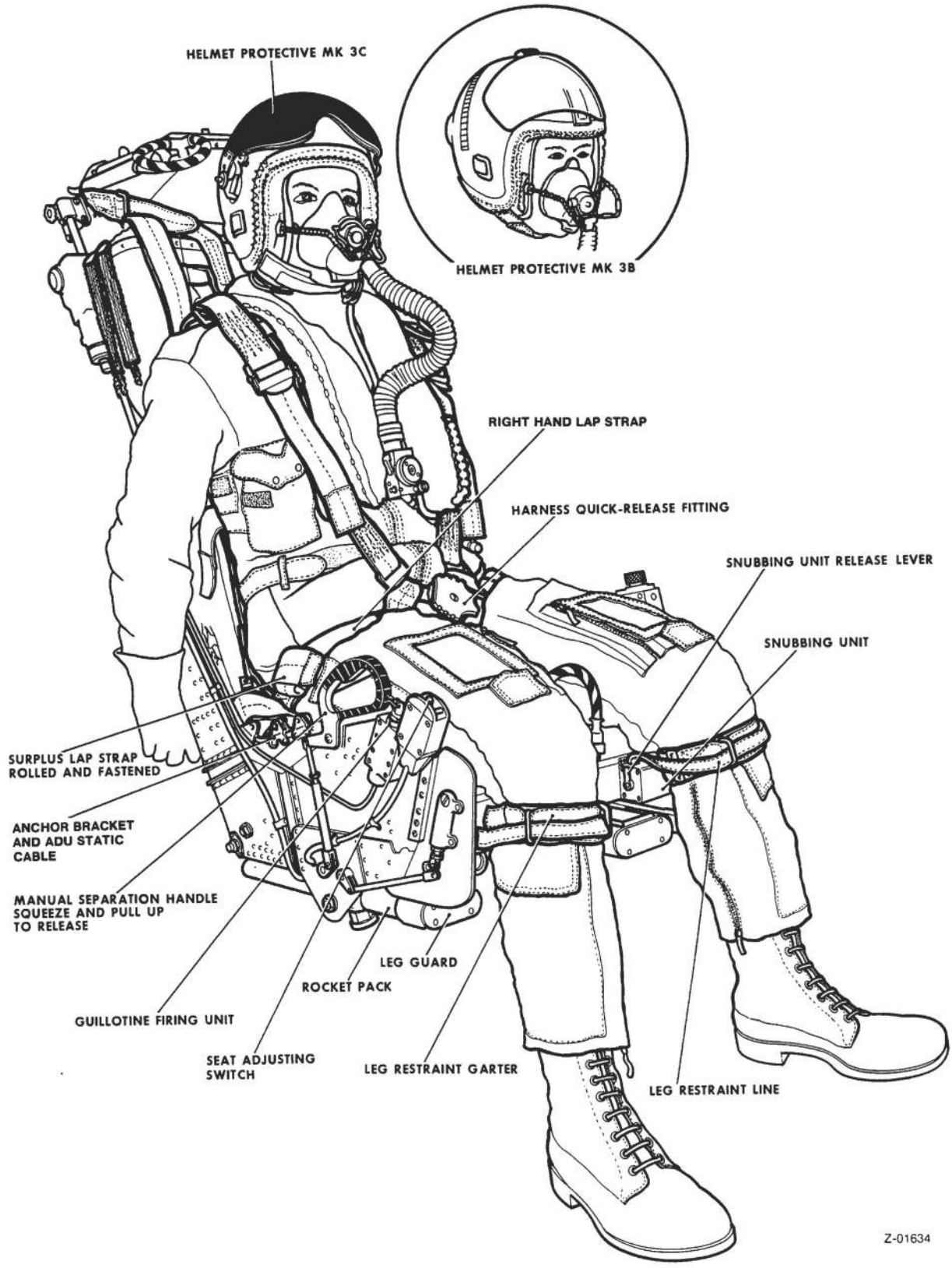


Fig 17 The seat occupied - left hand view
(Amended illustration)



▶ Fig 18 The seat occupied - right hand view (Post-mod ES 7076 and SE 161) ◀

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 With groundcrew assistance remove the overboots at the top of the boarding ladder.

2.2 Hook the portable ventilator on to the aircraft sill.

Strapping-in procedure

3

3.1 Turn ON the oxygen supply. Check contents are at least 7/8 (8.5 litres) and the pressure is 60 psi or greater.

3.2 Remove and stow the PEC dust cover.

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

3.4 Connect mic/tel lead and test mic/tel system.

3.5 Check that the oxygen magnetic indicator indicates constant white.

3.6 Hold the breath and disconnect the portable ventilator at the chest manifold and hand the hose to the ground crew.

3.7 Connect the air hose to the interim system and purge by exhalation.

3.8 Hold the breath and check the oxygen flow across the face.

3.9 Resume breathing and carry out the remainder of the normal strapping-in procedures.

ACTION AFTER FLIGHT

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

4.1 Fit the ejection seat safety pins in the safe for parking positions.

4.2 Release the harness and the leg restraint lines and disconnect the life preserver lanyard.

4.3 Connect the portable ventilator hose to the chest manifold.

4.4 Release the PEC man portion and fit its rubber cover.

4.5 Turn OFF the oxygen supply.

4.6 Remove the PEC dust cover from its stowage and fit it to the seat portion of the PEC.

4.7 Vacate the cockpit, pick up the portable ventilator and descend the ladder.

4.8 Don overboots with groundcrew assistance prior to stepping off the ladder.