

Chapter 3

(Completely revised)

CANBERRA PR Mk. 7

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Introduction

1. The Canberra PR. Mk. 7 carries a crew of two, a pilot who occupies an ejection seat in the front cockpit and a navigator who occupies an ejection seat in the rear cockpit. The ejection seats and aircrew equipment assemblies are identical; the following instructions will therefore apply to both.

2. This chapter is primarily concerned with the installation of the A.E.A. in the seat, 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. and their functions is included; full details will be found in the other publications, references to which are contained in the appropriate paragraphs.

COMPOSITION OF THE ASSEMBLY

3. The aircrew equipment assembly for each crew member consists of the following items:—

Ejection seat	Mk. 1 CN
Safety harness	Type ZG
Parachute assembly	Seat Type Mk. 11
Personal survival pack	Type M
Emergency oxygen set (in parachute pack)	Mk. 4
Flying clothing assembly	To be included later

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Ejection seat

4. All the Mk. 1 CN ejection seats, details of which will be found in A.P.4288, Vol. 1, are fitted with canopy breakers to enable ejection to be made through the canopy. In this aircraft, however, it is only possible for the pilot in the front cockpit to eject through the canopy; the rear hatch is not at present suitable for ejection in this manner because of possible injury, even though canopy breakers may be fitted to the seat. Until aircraft modifications are embodied, the rear hatch MUST be jettisoned before ejection. In the pilot's position the control column snatch unit must be operated manually before ejection (See Pilot's Notes A.P.4326G - P.N.).

5. The Mk. 1 CN seat is ejected from the aircraft by a cartridge operated gun at a speed of 80 ft./sec. During ejection the seat slides on the guide rail attached to the aircraft structure.

6. The seat pan is adjustable for height by a handle on the right-hand side of the seat; the plunger in the end of the handle must be depressed before the height can be adjusted.

7. On the same side of the seat pan (mounted on the thigh guard) is the harness "go-forward" lever which, when operated, allows the occupant to lean forward in the seat without releasing the safety harness. When assuming the normal upright sitting position, the "go-forward" mechanism is locked by its ratchet and prevents the occupant moving forward until the lever is operated again.

Firing handle

8. The firing handle projects from the front of the drogue container and has an integral face screen. Pulling this firing handle fires the ejection gun and operates the seat immediately.

Leg restraint system

9. Leg restraint cords are provided to ensure that the legs are drawn back and held close to the seat pan during and after ejection. The cords pass through snubbing units in front of the seat pan and are then attached to the aircraft floor by shear rivets. The snubbing units allow the cords to pass freely down through the unit, but prevent the cords passing upwards except when released by pressing the spring button underneath each unit.

10. The leg restraint cords are threaded through rings attached to garters worn by the occupant just below the knee. The cords are then looped over the shoulder strap lugs of the safety harness at the quick-release fitting. The garters are provided with small quick-release couplings and the rings (which are usually threaded on the leg restraint cords beforehand) have lugs which lock into the quick-release couplings and attach the rings to the garters. The rings are released by squeezing the triggers on each side of the coupling simultaneously.

Automatic harness release

11. An automatic harness release is mounted on the left-hand side of the seat, connected by means of a guarded cable and conduit to the safety harness quick-release fitting. The release contains a spring-controlled time-delay mechanism which is set in operation by the withdrawal, on ejection, of a pin connected by static line to the seat guide rail. After an appropriate delay the spring mechanism is tripped, opening the harness quick-release fitting and freeing the occupant from the seat. The automatic harness release does not interfere with manual operation of the quick-release fitting.

Sequence of events during ejection

12. The following is the normal sequence of events after the firing handle has been pulled. There is no delay between pulling the handle and firing the ejection gun. As the seat ascends the guide rail, the following sequence occurs: -

- (1) The leg restraint cords tighten until the rivets shear in the floor anchorages.
- (2) The static line on the automatic harness release withdraws the pin which sets the time-delay mechanism in motion. The time delay is two seconds.
- (3) The main oxygen supply hose is disconnected at the aircraft bulkhead flanged fitting. The supply hose to the air-ventilated suit (if used) is disconnected. The Mic/tel lead is disconnected at the push-pull connection.
- (4) The static line to the emergency oxygen cylinder is withdrawn, turning on the emergency oxygen supply.

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- (5) After the ejection seat has left the aircraft another static line operates the drogue gun. This deploys the drogue which first checks the forward speed of the seat and then stabilizes it in a slightly forward attitude.
- (6) Two seconds after withdrawal of the automatic harness release pin (see (2)), the safety harness quick-release fitting opens automatically and the occupant is able to fall forward out of the seat. The main oxygen supply is disconnected and the helmet Mic/tel lead disconnects from the seat lead.
- (7) Separation from the seat causes the static line attached to the seat to withdraw the pin in the automatic parachute release and set off the barometric delay.
- (8) If ejection has taken place below 13,000 ft. the parachute rip cord will be withdrawn after a delay of 3½ to 4½ sec. and the parachute will open. If above 13,000 ft. the rip cord withdrawal mechanism is held by the barostat until the descent reaches this altitude, when, after a further delay of 3½ to 4½ sec., the parachute will open. At any time after separation from the seat, the parachute rip cord can be withdrawn manually by pulling the lower striped emergency operating knob on the parachute harness waist belt; this action overrides the barometric control.

Emergency oxygen

13. The emergency oxygen cylinder is installed in the seat type parachute pack, but the operating cable conduit is clamped by the anchor socket to the rear of the seat. The cable (which runs through the conduit) is connected to another static line by an anchor hook so that the emergency oxygen is turned on automatically on ejection. A ball handle is incorporated in the static line assembly to turn on the emergency oxygen supply manually if required.

Parachute assembly

14. The Seat Type Mk. 11 assembly, described in A.P.1182A, Vol. 1, incorporates a combined automatic and manual release attached to the harness waistbelt. The manual release consists of a rip cord, terminating in a knob situated at the lower part of the casing, which is pulled to release the canopy and initiate deployment; this knob is only used when the automatic release cannot be employed (manual bale-out) or if the automatic release fails after leaving the aircraft (manual separation).

15. The automatic release mechanism is set in operation by the withdrawal of a pin at the end of a static line cable as the occupant separates from the seat after ejection. This cable is in two sections which are coupled together at a position approximately midway between the release and the point of anchorage on the seat pan. Incorporated in the mechanism is a disconnect-key which is turned to disconnect the cable coupling and immobilise the mechanism; this key is situated under a cap on the casing above the manual operating knob. When the key is turned the static line is uncoupled and at the same time the barometric delay device is locked, so that subsequently the parachute can only be operated manually.

Personal survival pack

16. The personal survival pack, described in A.P.1182C, Vol. 1, is placed on top of the seat type parachute pack and in normal flight serves as a cushion; it is attached to the life jacket by quick-release couplings during strapping-in. A lanyard, which is connected to another quick-release coupling on the life jacket, is provided to prevent the pack being lost when the parachute harness is discarded after a descent. A slotted hole in the centre of the pack allows the leg loop of the parachute harness to pass through.

EQUIPPING THE SEAT

17. The following procedure is to be used when equipping the seat; refer to figs. 1 and 2 for detail as necessary: -

- (1) Ensure that the safety pin is in position in the seat at the top of the ejection gun.

- (2) Undo the safety harness and clear the straps from the seat pan. Ensure that the quick-release fitting is in the locked position.
- (3) Place the parachute in the seat pan; spread out the harness straps to leave the seat clear. Connect the parachute static line (on the seat) to the barometric release operating cable at the disconnect unit. Alternatively, if the disconnect unit is already coupled, connect the static line to the seat by the eyebolt spliced on the end.
- (4) Place the personal survival pack on top of the parachute with the connecting lanyard on the right. Pull the leg loop of the parachute harness through the aperture in the centre of the survival pack.
- (5) Connect the emergency oxygen cable housing fitting in the gate clamp at the rear of the seat. The cable must lie OUTSIDE the parachute harness and INSIDE the safety harness. Connect the anchor hook to the static line-cum-manual operating cable.
- (6) Remove and retain the safety pin from the emergency oxygen cylinder.
- (7) Check that the knurled cap on the automatic harness release static line is screwed into the curved tube at the left hand rear of the seat.
- (8) Open the parachute harness straps ready for occupation of the seat; ensure that the quick-release fitting is in the locked position.
- (9) Remove the safety pin from the sear of the ejection gun and fit through the firing handle safety strap.

Connections to the aircraft

18. When the seats are installed in the aircraft and are properly equipped the following items are connected: -

- (1) *Left-hand side of the seat: -*
 - (a) Mic/tel lead push-pull connection.

- (b) Static line from the drogue gun.
- (c) Static line from the automatic safety harness release.
- (d) Static line from the automatic parachute release. This is not connected to the aircraft but to the left-hand side of the seat pan.

(2) *Right-hand side of the seat: -*

- (a) Main oxygen supply hose. This is clipped to the right-hand lap strap of the safety harness.
- (b) Static line and manual control knob to the anchor hook of the emergency oxygen assembly.
- (c) A.V.S. air supply hose. (This may be fitted on either the left or right-hand side according to the seat position).

(3) *Underneath the seat: -*

- (a) Leg restraint cords.

STRAPPING-IN PROCEDURE

19. The procedure is as follows; refer to fig. 3, 4 and 5 for detail as necessary: -

- (1) Check that the safety pin for the firing handle is in position.
- (2) Sit in the seat. Fit the leg restraint garters just below each knee (if this has not already been done).

Note . . .

The garters may be stitched into the flying suit, or fitted before entry to the aircraft.

- (3) Connect the personal survival pack lanyard to the life jacket quick-release coupling on the right so that the lanyard lies across the right thigh.
- (4) Connect the side quick-release couplings of the personal survival pack to the two corresponding fittings on the life jacket.
- (5) Connect the parachute harness shoulder straps to the quick-release fitting. The shoulder straps are to lie under the life jacket stole.

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- (6) Pass the parachute harness leg straps through the leg loop and couple them to the quick-release fitting.
- (7) Adjust the quick-release fitting so that it lies centrally with the waistbelt close to the body.
- (8) Tighten the shoulder straps first so that the parachute harness quick-release fitting will lie above and clear of the safety harness quick-release fitting when this harness is assembled.
- (9) Tighten the parachute harness leg straps. When tightening harness straps, pull on the running end with one hand and push the standing end towards the buckle with the other hand to relieve the tension on the buckle.
- (10) Insert the safety clip behind the disc knob of the parachute harness quick-release fitting.
- (11) If the air-ventilated suit is worn, connect the air supply hose.
- (12) Fasten the lap straps of the safety harness but do not tighten.
- (13) Thread the leg restraint cords through the quick-release coupling rings on the garters as follows: -
- (a) The cord emerging from the snubbing unit behind the left leg is fed through the garter ring on the right leg and UNDER the safety harness lap strap. Insert the lug of the right shoulder strap of the safety harness through the loop at the end of the cord and secure the strap in the quick-release fitting.
 - (b) The cord emerging from the snubbing unit behind the right leg is fed through the garter ring on the left leg and UNDER the safety harness lap strap. Insert the lug of the left shoulder strap of the safety harness through the loop at the end of the cord and secure the strap in the quick-release fitting.
- (14) If there is insufficient length of cord, press and hold the plunger under the snubbing unit and pull the cord through. If there is too much, pull back any excess through the unit in the opposite direction; (it is unnecessary to press the plunger in this instance).
- (15) Tighten the safety harness lap straps first, then tighten the shoulder straps.
- Note . . .**
- Ensure that the harness quick-release fitting is as low as possible to expose the parachute harness fitting. The emergency oxygen release cable and emergency oxygen supply tube must be under the safety harness and over the parachute harness.*
- (16) Connect the main and emergency oxygen supply to the oxygen mask tube and the locating chain to the life jacket. Any excess of emergency oxygen tube must be coiled up and tucked between the seat thigh guard and the side of the personal survival pack (loose loops of cable or hose constitute a hazard on ejection).
- (17) Connect the Mic/tel lead.
- (18) Check that the cap on the static line disconnect and override control is in place. If the cap has been removed, try to replace it; if it cannot be refitted, the parachute assembly will not operate automatically and another assembly is to be obtained.
- (19) Adjust the height of the seat. Ideally, the head should be located in the centre of the headrest.
- (20) Stretch the arms upwards to check that the firing handle is within easy reach with both hands together.

- (21) Ensure the chin straps of both helmets are fastened, fit the oxygen mask and perform pre-flight oxygen checks.

Note . . .

If the chin straps are not fastened the helmets may be wrenched off during ejection. At high altitude this may result in loss of vital oxygen supply.

- (22) Remove the safety pin from the firing handle and place it in its stowage.

EMERGENCIES

20. For drill and procedure to be taken in emergencies refer to Pilot's Notes, A.P.4326G - P.N.

LEAVING THE SEAT AFTER LANDING

21. The following procedure is to be adopted: -

- (1) Remove the firing handle safety pin

from its stowage and fit through the safety strap (assistance should be obtained, wherever possible from a member of the ground crew).

- (2) Disconnect the main and emergency oxygen supply and the Mic/tel lead.
- (3) Disconnect the air-ventilated suit, if worn.
- (4) Release the safety harness; remove the safety clip and release the parachute harness.
- (5) Disconnect the personal survival pack from the life jacket and allow the lanyard to drape over the right-hand side of the seat pan.
- (6) Remove the leg restraint cords.
- (7) Vacate the aircraft.

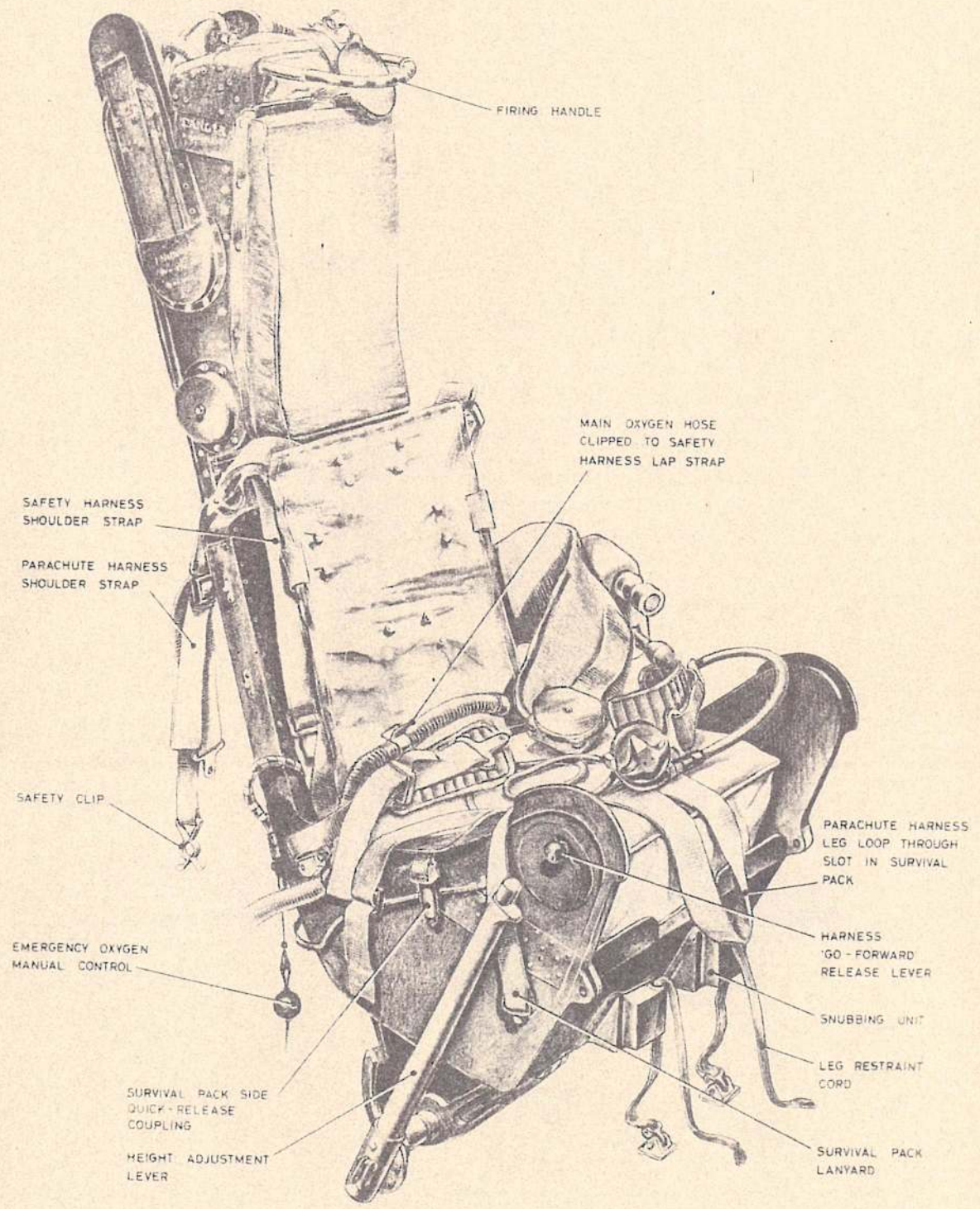
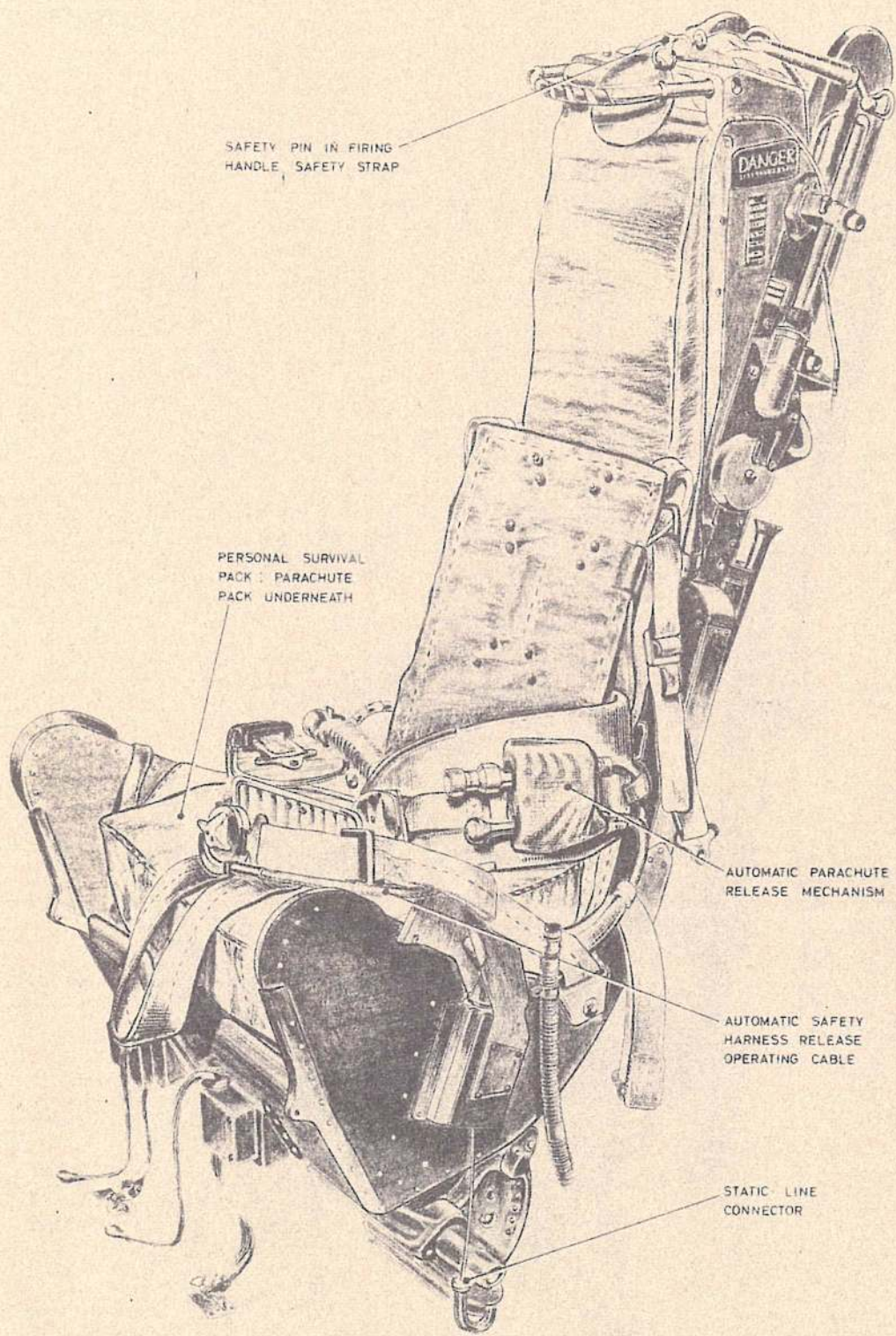


Fig. 1 The seat equipped (1)

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SAFETY PIN IN FIRING
HANDLE, SAFETY STRAP

PERSONAL SURVIVAL
PACK : PARACHUTE
PACK UNDERNEATH

AUTOMATIC PARACHUTE
RELEASE MECHANISM

AUTOMATIC SAFETY
HARNESS RELEASE
OPERATING CABLE

STATIC LINE
CONNECTOR

Fig. 2 The seat equipped (2)

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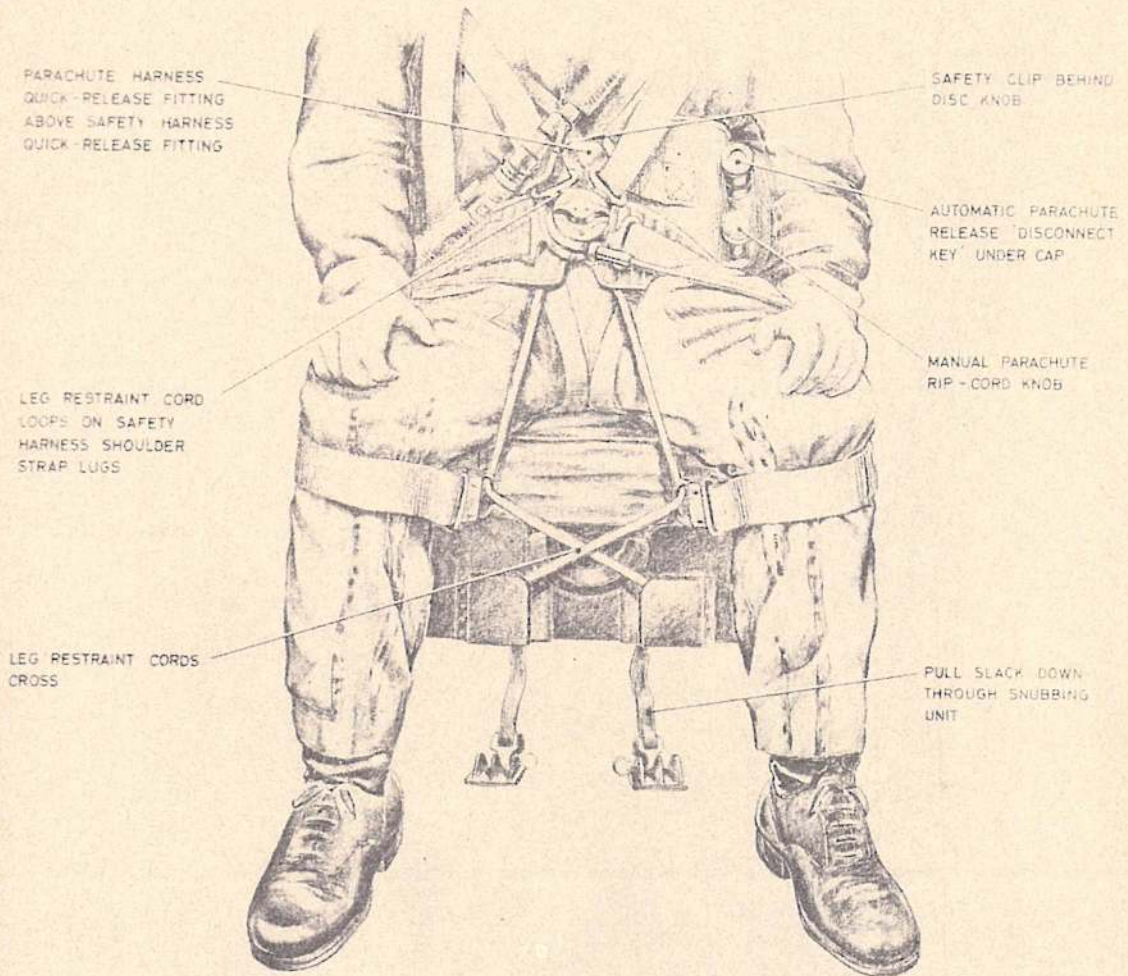


Fig. 3 Arrangement of harness and leg restraint cords

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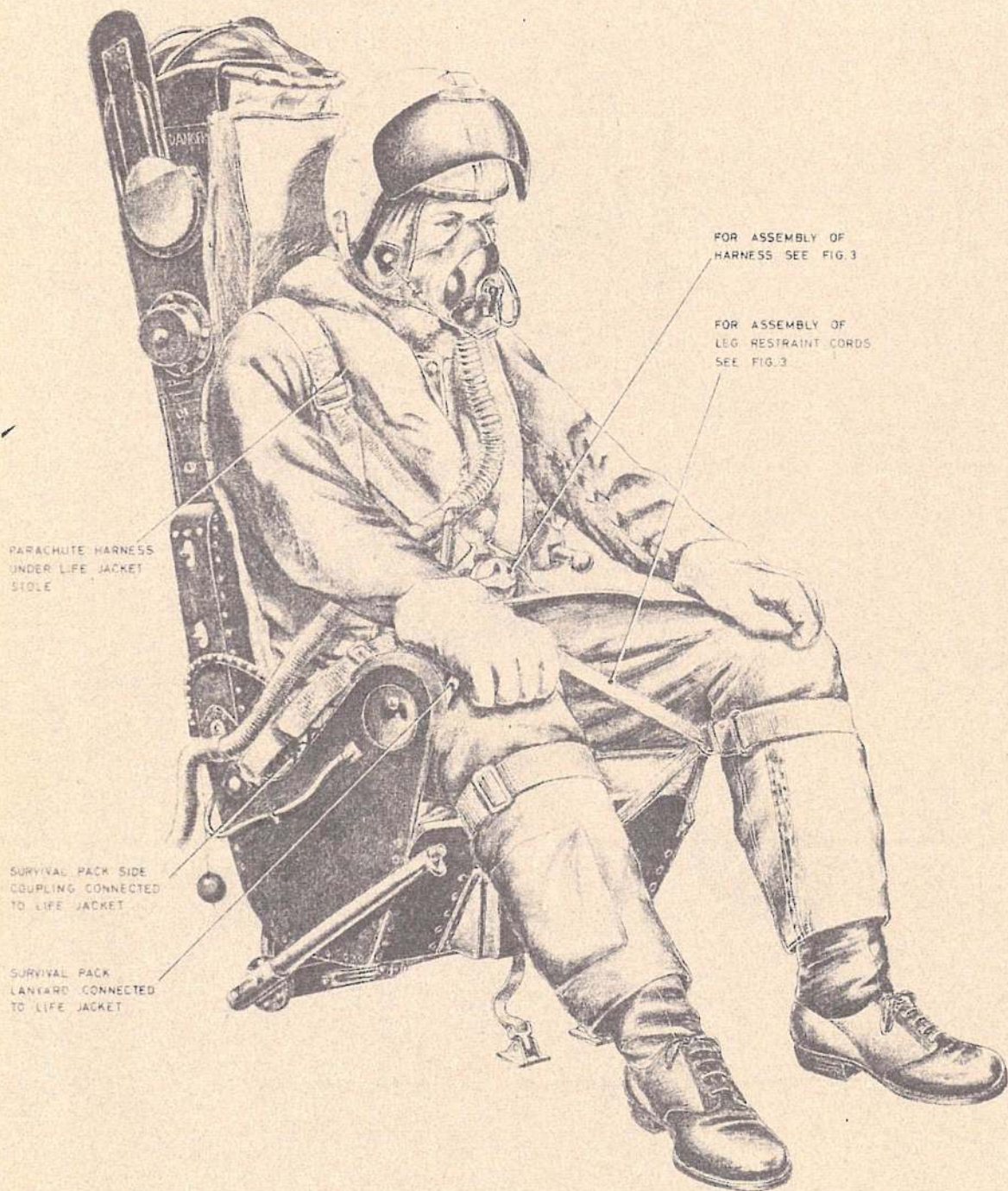


Fig. 4 The seat occupied (1)

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Fig. 5 The seat occupied (2)

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