

Chapter 2

VULCAN B Mk. 2

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Introduction

1. The Vulcan B Mk. 2 normally carries a crew of five: a pilot and co-pilot who occupy side by side positions in ejection seats in the cockpit, and three crew members who sit facing aft at the instrument bench on static seats.

2. The pilot's and the co-pilot's ejection seats are almost identical; they only differ in regard to the position of the seat adjustment levers which are on the outboard side of each seat and emergency oxygen release knobs which are on the inboard side of each seat. The three static seats used by the rear crew are again identical, except that mounted on the back of the two outboard seats are oxygen 'transfer leads' and on the centre seat the parachute static line stowage. An additional wander lead is provided for at the prone bomb aiming position for use of the rear crew.

3. There are therefore two types of aircrew equipment assemblies; one for the pilots used in conjunction with the ejection seats and another for the rear crew members used in conjunction with the static seats.

EJECTION SEATS

Composition of the assembly

4. The assembly for the pilots consists of the following items :-

Ejection seat	Mk. 3KS 1 : 1st pilot Mk. 3KS 2 : 2nd pilot
Parachute assembly	Back Type Mk. 33
Personal survival pack	Type R (embodying Mod. SR332) or Type R Mk. 1 c/w comfort cushion 27C/2428
Emergency oxygen set	Mk. 8D (mounted on the ejection seat)
Flying clothing	See Appendix 1

The Mk. 3KS ejection seat

5. The Mk. 3KS seat is ejected from the aircraft by a cartridge-operated gun; during ejection, the seat slides on a guide rail attached to the airframe structure.

Firing handles

6. Two firing handles are fitted to each seat.

The face screen handle, which has an integral face screen, projects from the front of the drogue container; the seat pan handle is located at the front of the seat pan and is for use when the occupant is unable to reach the face screen handle, e.g., when subjected to high G forces.

7. The firing handles on both ejection seats are coupled to the canopy jettison mechanism. If either the 1st or 2nd pilot pulls one of the firing handles, a time delay mechanism at the back of the seat is set in motion at the same time as the canopy is jettisoned. After one second the time delay unit fires the ejection gun. Similarly, there will be a one second delay after pulling either of the firing handles of the other seat before the second ejection seat operates, even though the canopy may already have been jettisoned. The canopy can also be jettisoned manually, independently of the seats, by operating a black and yellow striped handle, at either side below the cockpit rail.

Leg restraint

8. 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 below the front of the seat pan and are then attached to the aircraft floor with shear rivets. The snubbing units allow the cords to pass freely downwards, but prevent the cords passing upwards except when released by the spring loaded toggle at the front of each unit. An interconnection between the taper plug assemblies on the front of the seat pan and the P.E.C. releases the leg restraint cords when the personal component of the P.E.C. is disconnected.

Armrests and seat raising gear

9. Adjustable armrests are controlled by either of two levers on each armrest; one at the forward end, and one at the rear. The seat pan is adjustable for height by means of a handle on the outboard side of each seat. The plunger in the end of the handle must be depressed before the height can be adjusted.

Combined harness

10. Provision is made on the seats for attachment of the combined harness of the parachute assembly at three points, one centrally just below shoulder level and one on each side at

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the back of the seat pan. These three anchorages are released automatically, in the normal ejection sequence, by the operation of a barostatic time-release unit. A manual separation lever is provided at the rear left hand side of the seat pan, so that the occupant can release himself from the seat should the automatic device fail to operate. This lever disconnects the personal component of the P.E.C., the leg restraint cords and the parachute restraining straps simultaneously. The manual separation lever is held in a gate to reduce the risk of accidental operation and requires pressing inwards against a spring before it can be released.

11. The upper anchorage for the harness embodies a 'go-forward' spring roller mechanism which permits the occupant to lean forward when required. This is controlled by a spring-loaded lever situated at the forward end of the port side of the seat pan. If the lever is pushed towards the front and is held in that position the spring roller mechanism is unlocked, permitting the occupant to lean forward. Release of the lever re-locks the mechanism and prevents any further forward movement of the body. On leaning back the slack is taken up automatically by the spring roller mechanism.

Automatic equipment

12. Fully automatic facilities are provided to withdraw the parachute canopy and separate the occupant from the seat after ejection. The automatic equipment includes a drogue gun and drogues and a barostatic time-release unit. The drogue gun is operated by a static rod which initiates a time delay of $\frac{1}{2}$ sec. and then fires out a heavy bullet to open the drogue container and extract the drogues, which develop and stabilize the seat. The barostatic time-release unit is also initiated by another static rod. If ejection takes place at or below a predetermined height, and the forward speed is compatible with safe parachute opening, the time-delay mechanism starts and runs for $1\frac{1}{4}$ sec. After this delay the mechanism (a) releases the drogues from the top of the seat so that they transfer their pull to the apex of the parachute (to which they are attached) (b) releases the rear anchorage of the face screen and the parachute pack restraining straps (c) releases the harness from the seat (d) releases the personal component of the P.E.C.

and (e) the leg restraint cords.

13. In the case of malfunctioning of these automatic arrangements, the parachute harness waist belt is provided with two D handles and the seat has a manual separation lever to release the harness. The first D handle (nearest the quick-release fitting) disconnects the apex of the personal parachute from the automatic arrangements. When pulled, it exposes the second D handle which may then be used to deploy the parachute. In the event of failure to eject the same procedure inside the cockpit may enable the pilot to make a manual bale-out in favourable circumstances.

Personal equipment connector

14. The personal equipment connector (referred to as the P.E.C.) is fitted to the right-hand side panel of the seat pan. It enables the main oxygen, emergency oxygen, air-ventilated suit, and Mic/Tel leads to be connected or disconnected in one action. It is also linked to the leg restraint (para. 8) so that the legs are released when the P.E.C. is disconnected. The connector comprises three components :-

- (1) *Aircraft component.* Connected to the cockpit structure by a telescopic static rod, and to the personal supply systems in the aircraft.
- (2) *Seat component.* Bolted to the seat pan, and connected to the emergency oxygen system (see para. 19). This component has an operating linkage from the main barostatic time release unit and another linkage to the leg restraint.
- (3) *Personal component.* Attached to the flying clothing.

15. As the seat ascends the guide rail during ejection, the aircraft component of the P.E.C. is detached from the seat component when the static rod becomes fully extended, thus severing and sealing off the connections between the seat and the aircraft. At the same time the emergency oxygen supply is turned on automatically. Later, when the harness is released from the seat, the personal component is also automatically detached from the seat component.

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16. A full description of the personal equipment connector will be found in Sect. 1, Chap. 5. The P.E.C. fitted is the 'Bomber' type having two passages; one for the air-ventilated suit supply (forward) and one for the oxygen hose (rear).

Note . . .

The personal component of the Pilot's P.E.C. will not fit the aircraft components of rear aircrew P.E.C. either on the static seats, wander or transfer leads.

Personal survival pack

17. The personal survival pack is housed in the seat pan and serves as a cushion. It is attached to the lower harness straps by two side quick-release couplings and to the life jacket or jerkin by a lowering line stowed in the left-hand attachment flap on the pack. The harness attachments are connected when the equipment is installed in the seat, and the lowering line by the occupant when strapping-in. The lowering line, being attached to the clothing, enables the side quick-release couplings to be released during a parachute descent so that the pack falls and hangs 15 ft. below the body. On alighting this enables the harness to be immediately discarded without losing the pack.

Note . . .

The quick-release couplings have two plungers which must be squeezed simultaneously to effect release.

18. A thin cushion is provided with the pack to cover the underleg straps of the harness, both in normal use and during parachute development. It is attached to the harness by press studs.

Emergency oxygen

19. The emergency oxygen cylinder is mounted on the starboard beam of each seat; the supply is turned on automatically during ejection by a static line attached to the aircraft structure. This static line is also connected to a yellow/black striped knob on a lever at the rear inboard side of each seat; operation of this lever turns on the emergency oxygen supply manually.

20. The oxygen is fed to the rear end of the seat component of the P.E.C. (see para. 13) through the inward relief and excess pressure valve (RV/51). This valve allows excess of oxygen,

during the early stages of discharge of the cylinder, to spill out to atmosphere and also permits inward inhalation of ambient air when the supply of oxygen has dropped below demand. To prevent dilution of oxygen under normal conditions, however, and to ensure recognition if a 'no-flow' failure of the main oxygen regulator should occur, the inward relief element is spring-loaded so that breathing through it demands a noticeable effort. The excess pressure relief element is barometrically controlled to give pressure breathing above 40,000 ft., but is only very lightly spring loaded below this altitude. A full description of the valve will be found in Sect. 1, Chap. 6. When the emergency oxygen is turned on automatically during ejection it feeds oxygen through the seat component of the P.E.C., until automatic separation from the seat occurs at a predetermined height where an oxygen supply is no longer needed.

21. The emergency oxygen set provides a steady flow of oxygen but the rate of flow diminishes gradually as the pressure in the cylinder falls. The initial flow is more than is needed for breathing but the surplus is not sufficient to inflate the high altitude pressurized garments with the rapidity necessary in an emergency (the emergency oxygen set can maintain the garments at the correct inflated pressure, but cannot supply the initial flow required to inflate them). Garment inflation on loss of cabin pressure is therefore provided from the aircraft main oxygen system which has the necessary flow characteristics. This is an important factor in high altitude escape drills (see Pilot's Notes) otherwise ejection could take place with an inadequate oxygen supply.

22. Information concerning the Mk. 3KS ejection seats will be found in A.P.4288C, Vol. 1. Information concerning the parachute assemblies will be found in A.P.1182A, Vol. 1 and the survival packs in A.P.1182C, Vol. 1. Information concerning flying clothing will be found in A.P.1182E, Vol. 1, and in Appendix 1 of this chapter, together with information on dressing and testing.

Sequence of events during ejection

23. The following is the normal sequence of events after the firing handle has been pulled. The canopy is jettisoned. There is a delay of one second.

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As the seat ascends the guide rail, the following sequence occurs:-

- (1) The leg restraint cords tighten until the rivets shear in their floor anchorages.
- (2) The time-delay mechanism for the drogue gun is actuated, the gun being fired after $\frac{1}{2}$ second.
- (3) The time-delay mechanism for the barostatic time-release unit is tripped. The delay is variable depending upon aircraft height and speed at the time of ejection.
- (4) The aircraft component of the P.E.C. is separated from the seat component, disconnecting the oxygen and A.V.S. hoses and the Mic/Tel leads between the aircraft and the seat.
- (5) The emergency oxygen supply is turned on.

After the seat leaves the aircraft the following events occur:-

- (6) After $\frac{1}{2}$ sec. the drogue gun fires and the two drogues stabilize the seat. If the ejection occurs at high altitude the seat will eventually fall nearly vertical, with the occupant restrained by his combined harness from falling forwards. 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 cylinder carried on the seat.
- (7) After an appropriate delay ($1\frac{1}{4}$ sec.) the occupant is released from the seat and his parachute canopy opens automatically; the personal component of the P.E.C. is released from the seat component, detaching the personal services from the seat and enabling ambient air to be inhaled. At high altitude the $1\frac{1}{4}$ second delay does not start until the seat has descended to a predetermined height; at high speeds,

at the predetermined height, or below, delay does not start until the seat has decelerated to a safe speed for parachute canopy opening.

Equipping the ejection seats

Connections to the aircraft

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

- (1) *Port side of seat:-*
 - (a) Static rod to drogue gun.
- (2) *Starboard side of seat:-*
 - (a) Static rod to barostatic time-release unit.
 - (b) Static line to emergency oxygen cylinder operating head.
 - (c) The aircraft component of the P.E.C. is locked to the underside of the seat component. The aircraft component has a static rod to the aircraft structure, and an oxygen supply hose, an A.V.S. supply hose and a Mic/Tel lead from the appropriate systems, which will normally already be connected.
- (3) *Underneath the seat:-*
 - (a) Leg restraint cords.
- (4) *Top of seat:-*
 - (a) Face screen firing handle to canopy jettison unit operating cable.
 - (b) Articulated sear linkage from time-delay firing units.

Equipping the seat

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

26. The following procedure is to be used when installing the equipment in the seat; refer to fig. 1 to 6 for detail, as necessary:-

- (1) Fit the emergency oxygen cylinder into its clamping brackets on the seat beam ensuring that the loop of the supply tube at the top of the cylinder faces forward.
- (2) Connect the emergency oxygen supply tube to the underside of the inward relief and excess pressure valve. Arrange the tube to form an easy sweep and then insert it into the clips on the back and on the side of the seat pan. Wirelock the tube connector to the valve mounting bracket.
- (3) Connect the nipple of the emergency oxygen cylinder operating cable to the anchor section of the static line and engage the end fitting of the cable housing in the anchor socket.
- (4) Connect the anchor hook to the static line-cum-manual operating cable.
- (5) Ensure that the 'go-forward' lever is in the locked position.
- (6) Place the parachute assembly in the seat pan with the horseshoe pack uppermost, and its top end to the front of the seat.
- (7) Take up the outer shoulder straps of the harness, ensuring they are not twisted. These are attached at the top to a metal D-shackle. Pass this from front to rear through the arch of the parachute pack.
- (8) Remove the two parachute restraining straps. These are stowed in the buckles on each side of the drogue container together with the headrest pad.
- (9) Operate the 'go-forward' lever and pull out the webbing strap from under the parachute support bracket. This strap must be held against the spring tension.
- (10) Pass the strap up through the D shackle from underneath.
- (11) Each parachute restraining strap has a metal D-ring at one end. Hook these over the lug on the end of the webbing strap.
- (12) Still holding the webbing (threaded through the harness shackle) and the two restraining straps (hooked over lug), press down the harness release lever on the starboard side of the seat. This lever is immediately below the harness release plunger on the barostatic time-release unit and it withdraws the harness locking plunger.
- (13) Insert the webbing strap end lug in the hole under the parachute support bracket, release the 'go-forward' lever and the plunger will lock in the eye of the lug. Check by pulling on the webbing strap, then allow the strap to wind back.
- (14) Swing the metal D-rings of the restraining straps upwards so that the straps emerge above the webbing strap. Pass the free ends of the restraining straps through the arch of the parachute pack.
- (15) Lift the horseshoe pack into position on the support bracket and hold it there.
- (16) Draw the unattached ends of the parachute restraining straps forwards through the arch and then (in front of the pack) upwards towards the buckles on each side of the drogue container. Ensure the straps are not twisted.
- (17) Pass the port strap through the loop in the parachute withdrawal line (fig. 3).
- (18) Pass the end of the strap through the drogue container buckle from the outside inwards.
- (19) Take the starboard parachute restraining strap and assemble to the starboard buckle similarly. (There is no parachute withdrawal line to pass the strap through on this side).
- (20) Pass the ends of the parachute restraining straps through the buckles on each side of the headrest cushion so that the

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strap ends emerge on the outside of the buckles.

- (21) Work the straps back and forth in the self-locking buckles on the headrest cushion until the parachute pack and cushion are strapped tightly to the seat. Neatly stow the free ends between the drogue container and the strap.
- (22) Operate the 'go-forward' lever and check that the harness shoulder straps can be pulled forward and return automatically.
- (23) Connect the parachute withdrawal line to the link line by the screw coupling, ensuring:—
 - (a) That the link line (to the securing pin) passes between the port headrest restraining strap and the side of the drogue container.
 - (b) Also check that the port lifting line (between the securing pin and the drogue shackle) has been passed *under* the drogue extraction line (between the drogue gun and the drogue flap securing pin).
- (24) On each side, press the main attachment lug, on the harness lap strap, into the lower locks at the back of the seat pan (fig. 5). They will clip into place. Check, by pulling in several directions, that they are secure.
- (25) Lift the combined harness and hold in the stowed position by pushing the lugs on the harness shoulder straps between the headrest restraining straps and the side of the drogue container.

Note . . .

This operation is for stowage purposes only, to keep the harness straps suspended out of the way until the seat is ready for occupation.

- (26) Clear the seat pan. Place the survival

pack in position, lowering line to port. Ensure that the transverse seat strap of the harness crosses **OVER THE TOP** of the pack, at the back.

- (27) Connect the quick-release couplings on each side of the survival pack, to the combined harness.
- (28) Press the sticker straps into the clips on the inside face of the seat pan, bringing the straps up on the inboard side of the survival pack couplings, then over the couplings and down into the clips on the outboard side. Check that the personal survival pack couplings are still connected (fig. 6).
- (29) Place the cushion on top of the survival pack, secure it to the harness seat strap with the press fasteners provided and tuck its rear corners well into the back of the seat pan. Arrange the harness leg loops and lap straps ready for occupation; the cushion has a slot near the centre through which the leg loops are passed.
- (30) Examine carefully the two D-handles on the left waistbelt of the parachute harness. The second handle (i.e. furthest from the quick-release fitting) has a cover flap which will be released by operation of the first handle. There may (with older harnesses) be a similar cover flap over the first D-handle; this is provided solely to avoid accidental operation during transit and installation; if fitted, remove it and leave the handle unobstructed for the pilot.
- (31) **EXTEND THE LAP AND SHOULDER STRAPS** fully; this is to be repeated before **EVERY** subsequent flight.
- (32) Ensure that the safety pin for the emergency oxygen cylinder has been removed.

27. After equipping the seat, restore it to the safe for parking condition.

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Strapping-in procedure

28. The strapping-in procedure is as follows; refer to figs. 9 to 11 for detail, as necessary :-

- (1) Ensure that the seat has been made safe for parking and that harness straps have been fully extended.
- (2) Remove the dust cover from the seat component of the P.E.C. and fit it into the stowage on the right-hand side of the seat (if this has not already been done).
- (3) Sit in the seat.
- (4) Press the front end of the personal component (attached to clothing) of the P.E.C. into the front end of the seat component in an inclined attitude, and press down with a hinging motion until it clips into place. Test by inserting one or two fingers under the handle and attempting to lift it.
- (5) Thread the leg restraint cords through the quick-release couplings on the garters (*fig. 9*) as follows. Thread the cord from the starboard snubbing unit (under the seat pan) through the garter coupling of the left leg and then plug the end-fitting of the cord into the starboard taper socket (on the front of the seat pan).

Note . . .

- (1) *If there is insufficient length of cord, pull forwards on the ring in the front of the snubbing unit and withdraw more cord.*
- (2) *Unless the personal component of the P.E.C. is mating correctly with the seat component, the plug will not lock in its socket.*
- (6) Similarly thread the port cord through the right garter and back to the port taper socket, thus crossing the cords. It does not matter which loop is in front, but do not interlace them.
- (7) Pull back any excess cord through the snubbing units, leaving enough slack

to enable the occupant to operate the rudder fully.

- (8) Adjust the height of the seat until a satisfactory position for flying is obtained, ideally with the head positioned centrally against the headrest cushion. Stretch the arms upwards towards the firing handle to ensure there is no restriction to firing handle access by the clothing.
- (9) Connect the survival pack lowering line on the left side to the quick-release coupling on the life jacket or pressure jerkin. The line should lie across the left thigh (*fig. 11*).
- (10) Bring the harness waistbelt across the body. Adjust the quick-release fitting so that it lies centrally with the waistbelt close to the body.
- (11) Connect the lugs on the lap straps to the quick-release fitting. (The hoses to the P.E.C. pass under the right lap strap). The back pad should be drawn up by a ground crew member and the lumbar cushion adjusted to suit. Sit well back in the seat. Any slack in the hoses to the P.E.C. should lie below the right lap strap to allow body movement without straining the hoses.
- (12) Tighten the lap 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 tension on the buckles. After the first tightening, move the body about inside the harness and then re-tighten, repeating this process until the harness is really tight. It is most important that the lap straps are tight, since they provide the principal restraint under all stress conditions.
- (13) Bring the leg loops up between the legs and thread the left one through the metal D-ring on the left lap strap. Repeat on the right side. If twisted correctly the leg loops will lie flat on the inside of the thighs.
- (14) Remove the ends of the shoulder straps

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from the stowed position. Arrange them under the life jacket or jerkin stole, thread the end fittings through the leg loops and connect them to the quick-release fitting. The harness leg loops should engage on the metal lugs and not on the webbing above them, so that they will disengage freely on operating the quick-release fitting. To facilitate this engagement it is normally essential that the shoulder straps be let out fully.

- (15) Fit the safety clip between the disc knob and body of the quick-release fitting.

Note . . .

If the latest type of quick-release fitting is incorporated in the harness (inertia-proof fitting) the safety pin clip is not required and instructions to fit it behind the disc knob are to be ignored.

- (16) Thin subjects will need to tuck the left leg loop carefully behind the first D-handle on the waistbelt.
- (17) To tighten the harness, first take-up the slack on the blue inner (underneath) shoulder straps of the harness and then, take up the slack in the brown outer (top) shoulder straps. Move the body in the harness as described in operation (12), but do not overtighten the shoulder straps sufficiently to cause the back to arch; this is a bad attitude for ejection.
- (18) This tightening will ruck that part of the lift-webs lying between the inner and outer straps. The assistance of a member of the ground crew should be obtained to pull back the lift webs through the metal runners on the shoulders and then stow the excess length neatly (by lengthening the loops in the lift webs) behind the back.
- (19) Put on the flying and protective helmets (if this has not already been

done) and fasten the chin straps. Fit the oxygen mask.

Note . . .

If the chin straps are not fastened, the helmets may be wrenched off during ejection. At high altitudes, this would mean the loss of vital oxygen supply.

- (20) Connect the Mic/Tel lead and oxygen mask tube. In the low altitude role (pressure jerkin not being worn) connect the mask tube spring clip to the D-ring on the life jacket stole.
- (21) Reach upwards and check that the face screen firing handle is within reach; DO NOT PULL.
- (22) Conduct pre-flight oxygen checks (see Pilot's Notes).
- (23) With assistance from a ground crew member, ensure that the various safety pins are correctly repositioned and stowed.

Emergencies

29. For drill and procedure to be taken in emergencies refer to Pilot's Notes, A.P.4505B-P.N.

Leaving the seat after landing

30. (1) Remove the firing handle safety pins from the stowage and fit to face screen and seat pan firing handles; assistance should be obtained, wherever possible, from a member of the ground crew when fitting the pin to the face screen firing handle.
- (2) Disconnect the personal component of the P.E.C. by pulling upwards on the handle. (This will also free the leg restraint cords).
- (3) Remove the spring clip from the harness quick-release fitting and undo the harness. Return the quick-release fitting to the locked position.

- (4) Disconnect the lowering line to the survival pack.
- (5) Leave the seat.
- (6) Fit the dust cover to the P.E.C.

STATIC SEATS

Composition of the assembly

31. The assembly consists of the following items :-

An adjustable static seat

Safety harness	Type ZB
Parachute assembly	Back Type Mk. 20
Emergency oxygen set	Mk. 3C (in parachute assembly)
Personal survival pack	Type S
Flying clothing	See Appendix 1

The static seat

32. The static seat consists of a pan section, to accommodate the survival pack, and a back section carrying a headrest cushion. The seat is pivoted to the aircraft deck and adjusting struts (attached to the front of the seat pan on each side) enable it to be tilted backwards or forwards and locked in the selected position by operation of the seat adjustment lever; this lever projects from below the centre front of the seat pan. The rear of the seat pan has a padded shelf to support the parachute pack.

Safety harness

33. The seat is fitted with a ZB type safety harness with a bolt type release knob for the shoulder straps on the right hand side of the seat pan.

Personal equipment connector

34. A personal equipment connector (P.E.C.) Type MSC3 is fitted to the right hand side of the seat. It enables the main oxygen supply, air-ventilated suit supply and Mic/Tel leads to be connected or disconnected in one action. (The anti-g suit is connected into the oxygen line between the P.E.C. and the jerkin). The connector comprises two components.

- (1) *Aircraft component.* Attached to the seat.

- (2) *Personal component.* Attached to the flying clothing.

35. The personal and aircraft components are coupled together by pressing them into engagement; when they are uncoupled use is made of the manual release lever. This lever has a gate which requires movement in two directions to uncouple the components and prevents inadvertent release. To release, the lever must be pressed in and pulled upwards.

36. The aircraft component of the P.E.C. has a removable dust cover for protection while not in use. These covers are removed and stowed in a pocket on the centre seat, before the two components are coupled. The aircraft component is mounted on a swinging arm pivoted to the front of the seat. When the two components are coupled correctly, the occupant can stand up without uncoupling. The arm has a catch to limit downward movement and provide a positive reaction when mating the two components.

37. Stowed in a bracket on the back of each of the outboard seats is an MSC5 transfer lead connector, on the end of a hose which is anchored at the back of the seat near the headrest cushion. When a rear crew member wishes to leave the seat during flight the personal component of the P.E.C. is disconnected from the MSC3 aircraft component and connected to the MSC5 transfer lead connector. The MSC5 transfer lead is long enough to permit the crew member to take sextant sights and to reach the nose of the aircraft where, if required, he may transfer to an MSC105 wander lead provided at that position.

38. The MSC5 and MSC105 leads have a scissors type release mechanism for uncoupling from the personal component; both handles must be squeezed simultaneously to effect release. A pistol grip handle is also provided so that the aircraft component can be securely held during coupling and uncoupling. The transfer and wander leads have standard hinged spring covers which must be raised before coupling.

39. The MSC105 wander lead at the sighting position provides ventilation air (A.V.S. supply), but this service is absent on the MSC5 transfer lead.

40. Each of the six aircraft components of the P.E.C. (i.e., three Type MSC3 on the seats, two

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Type MSC5 on the transfer leads, and one Type MSC105 at the sighting position) receives its supply from a separate oxygen regulator.

41. A full description of the personal equipment connector will be found in Sect. 1, Chap. 5.

Parachute assembly

42. The Back Type Mk. 20 parachute assembly is used in conjunction with a static line anchored to the aircraft and connected to the parachute rip cord via a barometric time-delay unit. Before an escape is attempted, the static line is hooked to a spring clip on the harness; when an escape is made, the static line withdraws a pin and arms the time-delay unit. If escape takes place above 13,000 ft. there is a delay until that height is reached; at or below 13,000 ft., there is a delay of 2 sec. before the rip cord is withdrawn and the canopy is deployed. A striped release knob on the left harness shoulder strap enables the barometric delay device to be overridden and the parachute rip-cord withdrawn directly without the use of the static line.

43. Below the centre seat pan, at the rear, are a number of static lines for use in conjunction with the Back Type Mk. 20 parachute assemblies worn by the aircrew. These static lines are stowed in press studded covers with the striped attachment rings exposed, the line being folded underneath and anchored at the other end on a vertical bar. There is no particular order of use. During escape the nearest available line is hooked on to the parachute.

Emergency oxygen

44. An emergency oxygen cylinder is stowed in the parachute pack, the supply tube being connected directly into the main oxygen hose in both low and high altitude roles. The supply is turned on automatically by the static line attachment hook when the parachute barometric time-delay unit is tripped during escape. The emergency oxygen can also be turned on manually, by pulling the red handle on the left-hand shoulder strap.

45. The emergency oxygen set provides a steady

flow of oxygen but the rate of flow diminishes gradually as the pressure in the cylinder falls. The initial flow is more than ample for breathing, so if the emergency oxygen is turned on while still connected to the main oxygen system through the P.E.C., excessive pressure would soon build up in the lungs and clothing. Therefore it would be necessary to disconnect the P.E.C. to vent the excess. This would give no pressure breathing facilities at cabin altitudes where it is needed (above 40,000 ft.) and would also disconnect the Mic/Tel. For this reason the emergency oxygen set should not be operated when a simple failure of the aircraft oxygen system occurs. The correct procedure is to continue the flight connected to one of the MSC5 transfer leads which have separate regulators; this also avoids the necessity to descend or curtail the flight.

46. The emergency oxygen supply tube is connected into the hose assembly attached to the clothing. The bayonet connection between the emergency oxygen tube and the hose assembly should therefore be disconnected during a parachute descent after reaching an altitude (approximately 10,000 ft.) where an oxygen supply is not necessary; otherwise, when the parachute is discarded (possibly drifting downwind) on alighting, it may remain hanging on the oxygen tube. The oxygen tube connection should break away if the disconnection is overlooked or there is insufficient time to effect it, but as a precaution it should be disconnected.

Personal survival pack

47. The personal survival pack is housed in the seat pan and serves as a cushion. It is attached to the lower harness straps by two side quick-release couplings, and to the life jacket or jerkin by a lowering line, stowed in the left-hand attachment flap on the pack. The harness attachments are connected when the equipment is installed in the seat, and the lowering line by the occupant when strapping-in. The lowering line, being attached to the clothing, enables the pack side quick-release couplings to be released during a parachute descent so that the pack falls and hangs 15 ft. below the body. On alighting, this enables the harness to be immediately discarded without loss of the pack.

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Note . . .

The quick-release couplings have two plungers both of which must be squeezed simultaneously to effect release.

48. Information concerning the Back Type Mk. 20 parachute assembly and Type S Personal Survival Pack will be found in A.P.1182A, Vol. 1 and A.P.1182C, Vol. 1 respectively. Information concerning flying clothing will be found in A.P.1182E, Vol. 1, and in Appendix 1 of this chapter together with information on dressing and testing.

Equipping the static seats

49. To equip each of the static seats proceed as follows :-

- (1) Place the personal survival pack in the seat pan with the lowering line on the left hand side.
- (2) Place the parachute assembly on the shelf at the back of the seat pan.
- (3) Connect the side quick-release couplings between the survival pack and the parachute harness.

Strapping-in procedure

50. Strapping-in procedure for each crew member is the same, and is as follows :-

- (1) Remove the dust cover from P.E.C. aircraft component and stow.
- (2) Sit in the seat.
- (3) Connect the personal component of the P.E.C. to the aircraft component on the right hand side of the seat.
- (4) If the oxygen mask hose assembly is being used, (only in low altitude flight) attach the clasp hook on the hose assembly to the D-ring on the life jacket stole.
- (5) Connect the lowering line from the survival pack to the quick-release coupling on the left hand side of the life jacket or pressure jerkin.

- (6) Pass the parachute quick-release fitting in front of the body and clip the lugs of the shoulder straps into their positions. Adjust the shoulder straps so that they lie UNDER the life jacket stole.
- (7) Hook the right hand back pad strap to the parachute harness shoulder strap lug.
- (8) Draw up the leg loops between the legs and pass the thigh straps through the loops. Clip the lugs on the thigh straps into the quick-release fitting. Ensure that the right thigh strap passes OVER the supply hoses from the P.E.C.
- (9) Tighten the parachute harness shoulder straps and thigh straps.
- (10) Insert the spring safety clip in position behind the disc knob of the parachute harness quick-release fitting.

Note . . .

If the latest type of quick-release fitting is incorporated in the harness (inertia-proof fitting) the safety pin clip is not required and instructions to fit it behind the disc knob are to be ignored.

- (11) Connect the oxygen mask tube assembly into the bayonet socket at the top of the hose assembly.
- (12) Connect the emergency oxygen tube to the emergency oxygen connector on the hose assembly.
- (13) Connect the Mic/Tel plug and socket.
- (14) Bring the safety harness lap straps over the body and clip the lug of the right-hand strap into the quick-release fitting.
- (15) Connect the harness shoulder straps into the quick-release fitting.
- (16) Ensure that the parachute harness quick-release fitting is positioned

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above the safety harness quick-release fitting.

- (17) Fit oxygen mask and conduct pre-flight oxygen tests.

Changing position during flight

51. When it is required to leave the seat for any purpose during flight, proceed as follows:-

- (1) Take the transfer lead P.E.C. head from its stowage bracket on the inboard side of each of the outboard seats.
 - (a) If occupying the A.E.O's seat on the port side of the aircraft, take the transfer lead MSC5 head stowed on the rear left hand side of the seat and bring it across the body from the left-hand side, with the head close to the (connected) head of the personal component.
 - (b) If occupying the navigator's seat on the starboard side of the aircraft, take the transfer lead MSC5 head, stowed on the rear right hand side of the seat and bring it across the body from the right hand side, close to the (connected) head of the personal component transferring it into the left hand.
 - (c) If occupying the centre seat, take the MSC5 transfer lead from the back of the seat on the right (the A.E.O's seat) and bring it close to the (connected) head of the personal component transferring it into the left hand.
- (2) Disconnect the personal component of the P.E.C. from the MSC3 aircraft component with the right hand and immediately re-connect the personal component to the MSC5 head on the transfer lead.
- (3) Undo the seat safety harness and leave the seat. Outer seat occupants turn inboard; the centre seat occupant turns to the right.

52. To re-occupy the seat:-

- (1) Sit down.
- (2) If the survival pack has been left behind in the seat, re-connect the side couplings of the pack to the parachute harness and the lowering line to the life jacket or jerkin.
- (3) After settling in the seat CHECK THAT THE QUADRANT ARM OF THE MSC3 AIRCRAFT COMPONENT IS ENGAGED IN ITS LOCATING STOP AND CANNOT SWING DOWNWARDS.
- (4) Take the MSC5 aircraft component in the left hand and the personal component in the right. Squeeze BOTH the release catches and transfer the personal component to the MSC3 on the side of the seat.

Emergencies

53. For drill and procedure to be taken in emergencies refer to Pilot's Notes A.P.4505B-P.N.

Leaving the seat after landing

54. To leave the seat after landing, proceed as follows:-

- (1) Remove the oxygen mask.
- (2) Disconnect the safety harness.
- (3) Disconnect the oxygen mask tube, emergency oxygen tube and Mic/Tel lead from the hose assembly.
- (4) Disconnect the parachute harness.
- (5) Disconnect the survival pack lowering line from the life jacket or pressure jerkin.
- (6) Disconnect the personal component from the aircraft component of the P.E.C. by moving the release lever inwards through the gate and then upwards.
- (7) Vacate the seat.

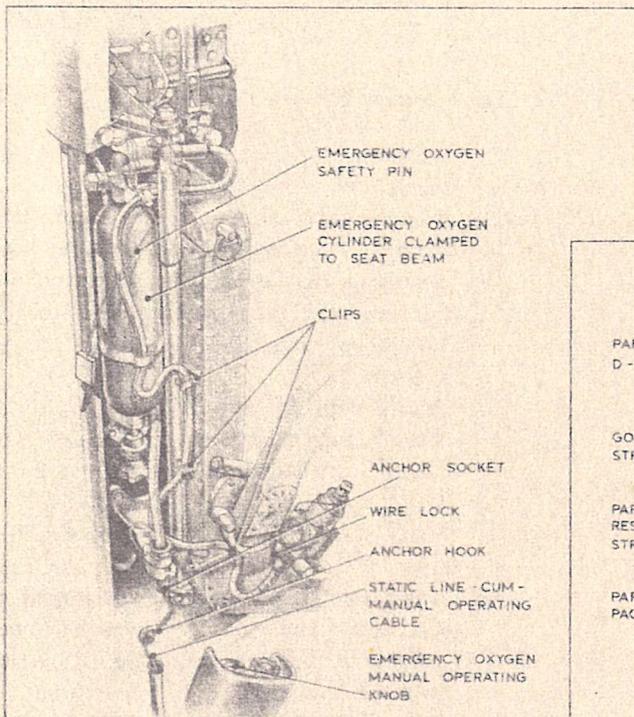


Fig. 1. Arrangement of emergency oxygen supply

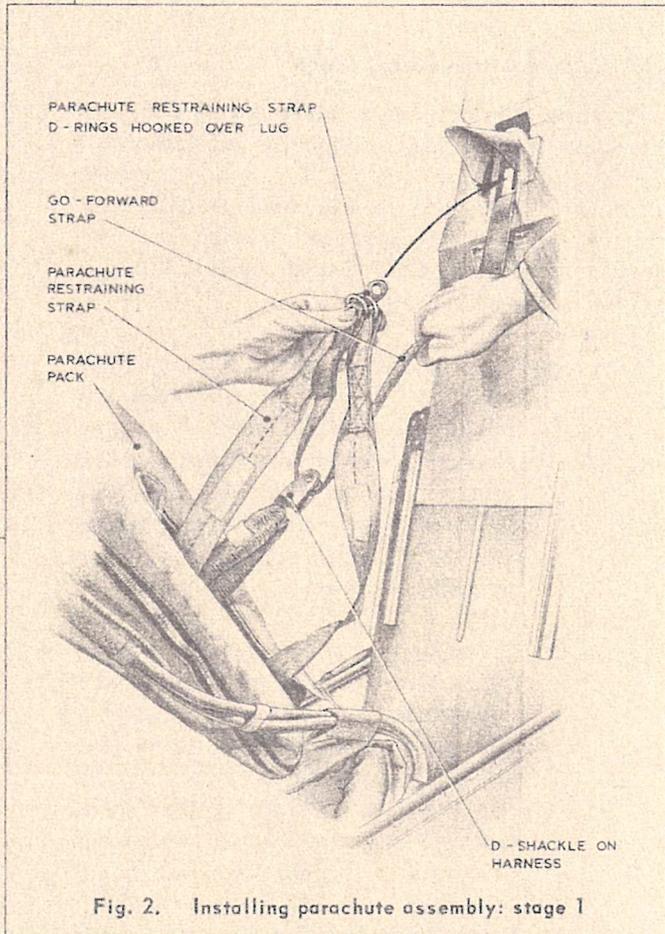


Fig. 2. Installing parachute assembly: stage 1

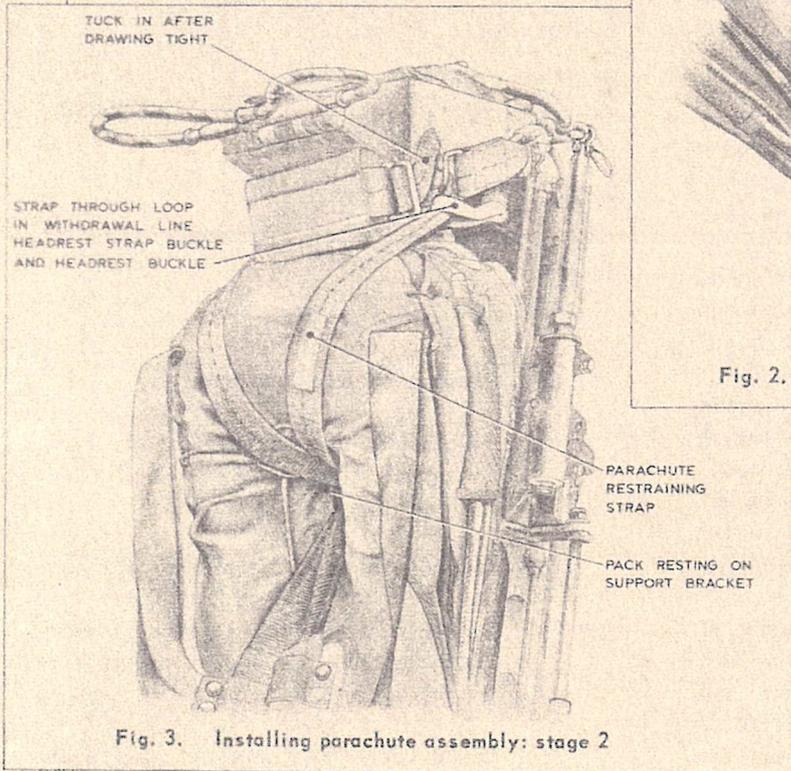


Fig. 3. Installing parachute assembly: stage 2

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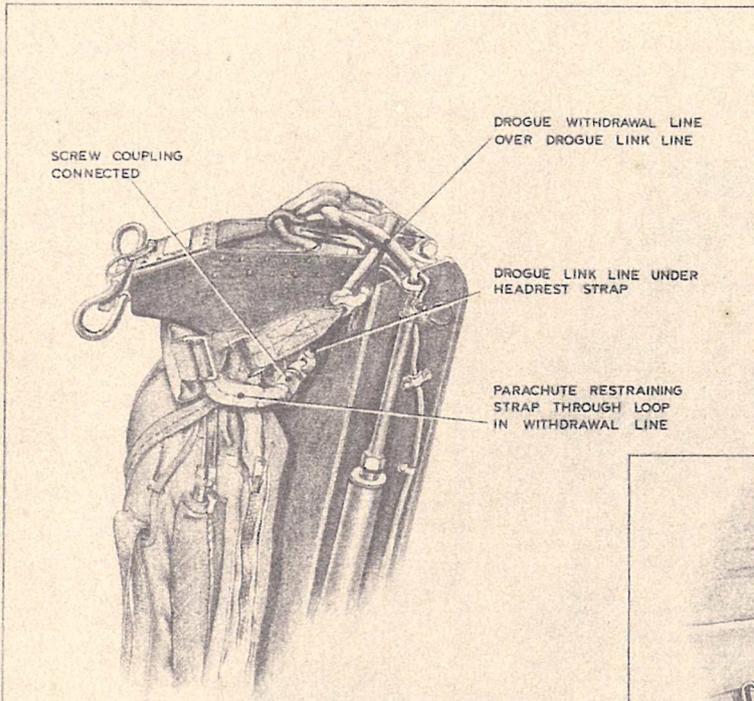


Fig. 4. Installing the parachute assembly: stage 3, arrangement of drogue withdrawal and link lines

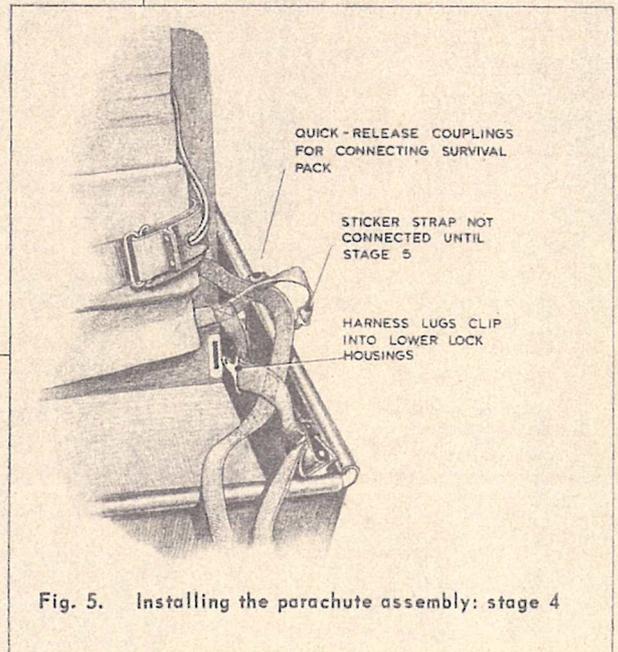


Fig. 5. Installing the parachute assembly: stage 4

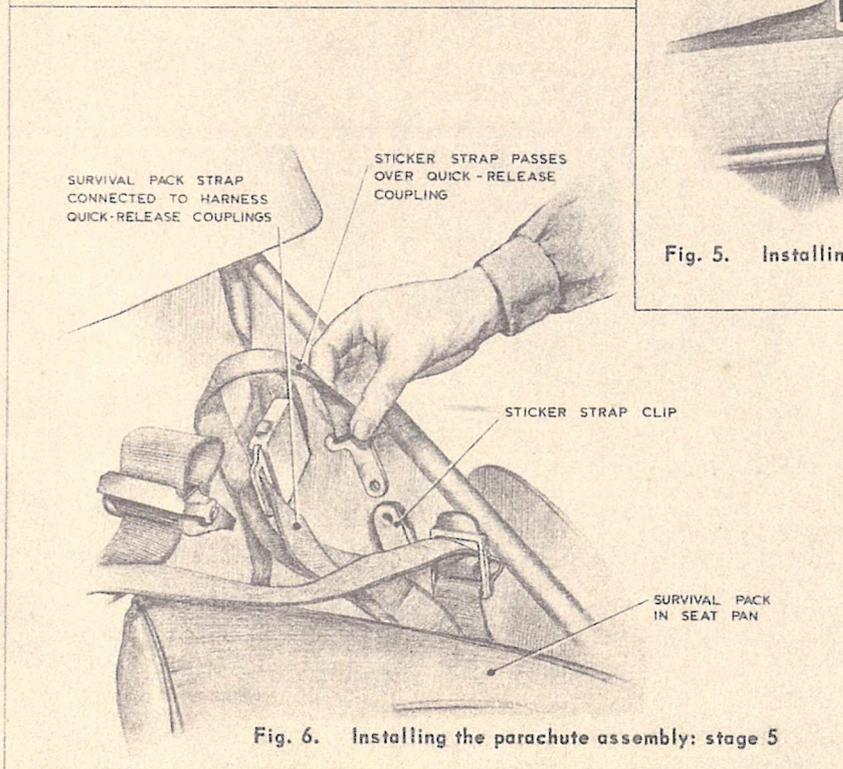


Fig. 6. Installing the parachute assembly: stage 5

END OF HEADREST STRAP
TUCKED THROUGH HARNESS
BUCKLE (FOR STOWAGE
PURPOSES ONLY)

SAFETY CLIP

FOR ASSEMBLY OF HARNESS
STICKER STRAPS SEE FIG. 6

INWARD RELIEF AND
EXCESS PRESSURE
VALVE

P.E.C. STATIC ROD

CUSHION

PERSONAL SURVIVAL
PACK

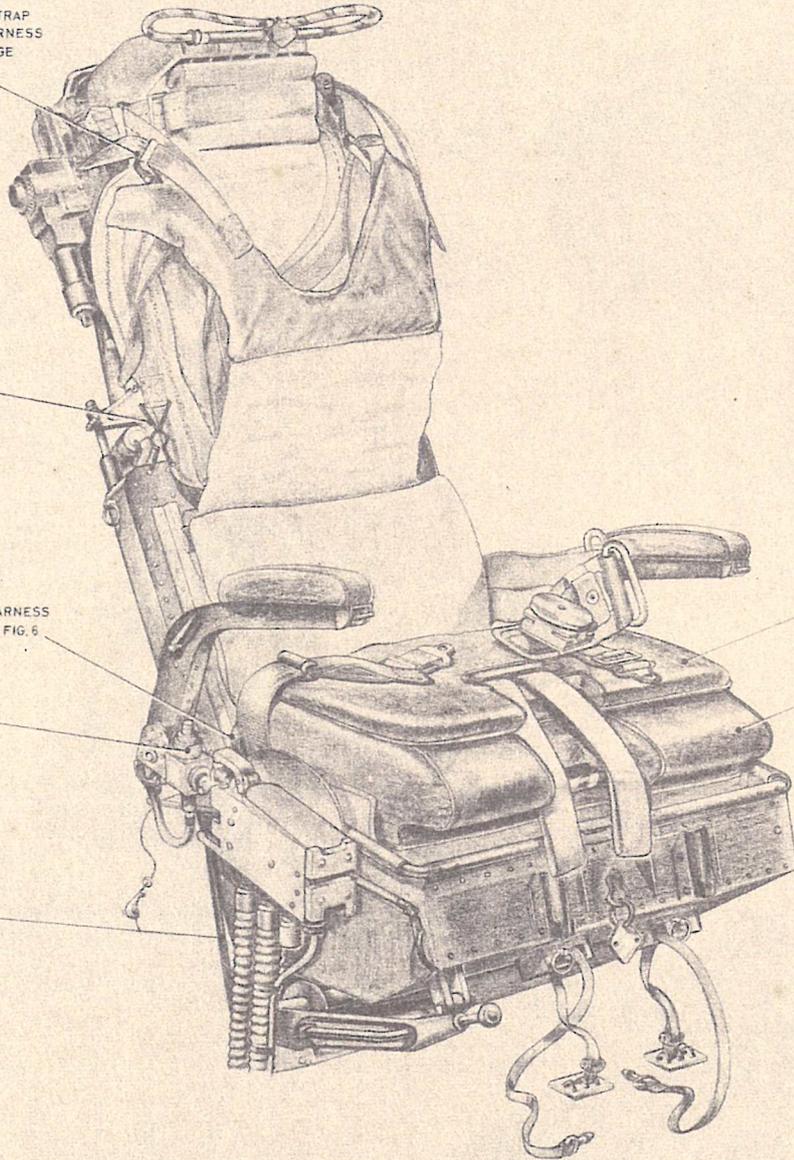


Fig. 7. The ejection seat equipped (1)

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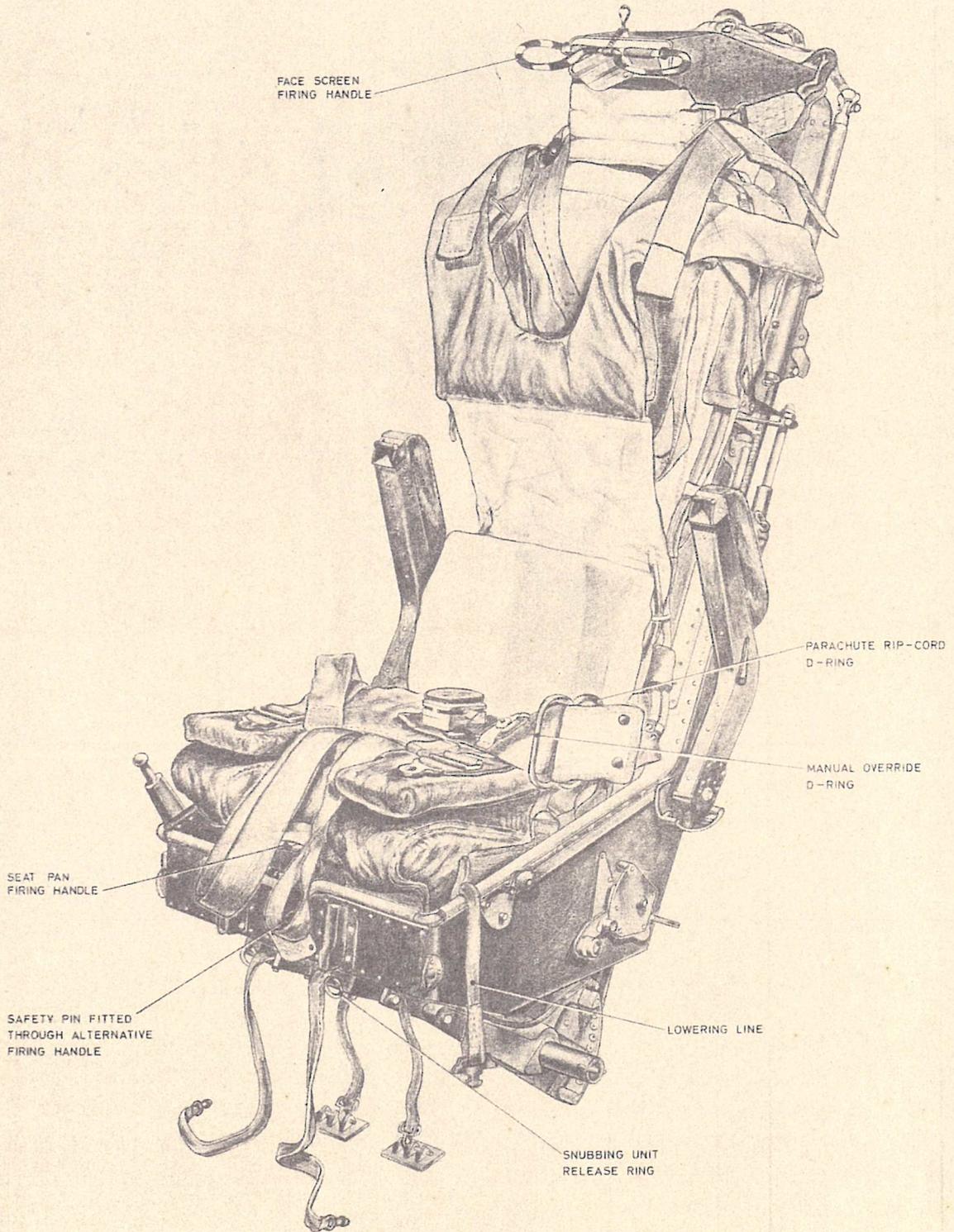
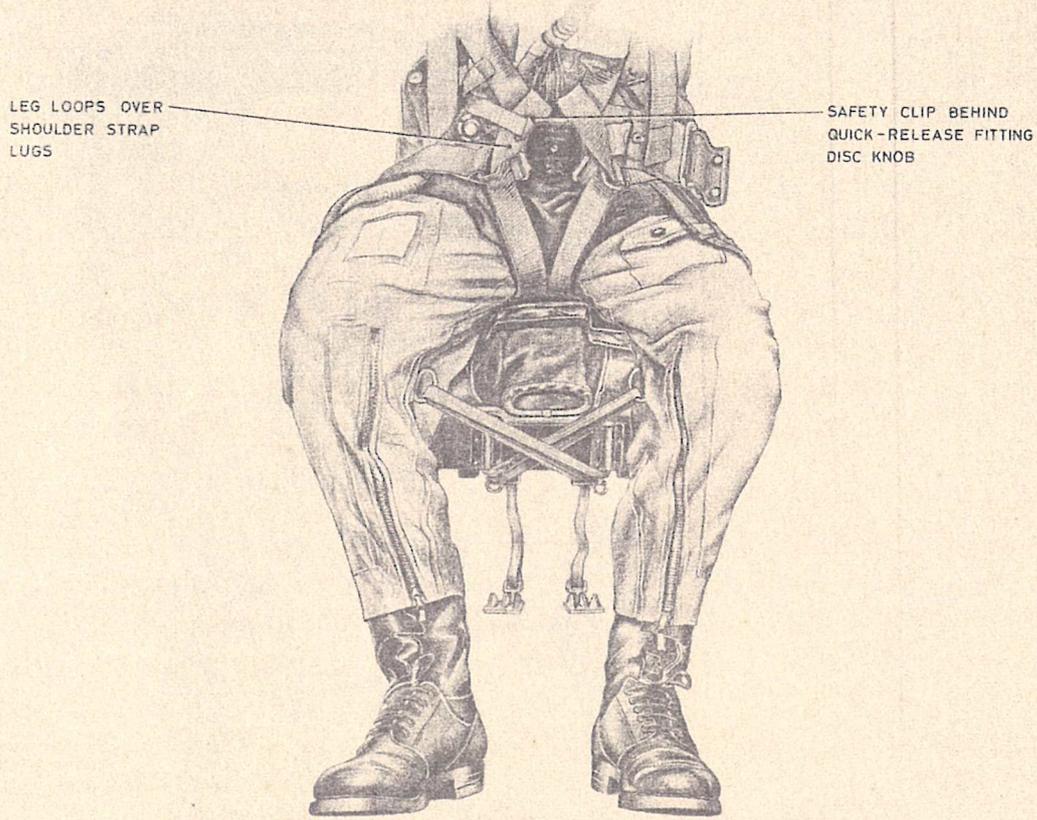


Fig. 8. The ejection seat equipped (2)

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LEG LOOPS OVER
SHOULDER STRAP
LUGS

SAFETY CLIP BEHIND
QUICK-RELEASE FITTING
DISC KNOB

Fig. 9. Arrangement of leg restraint cords and harness

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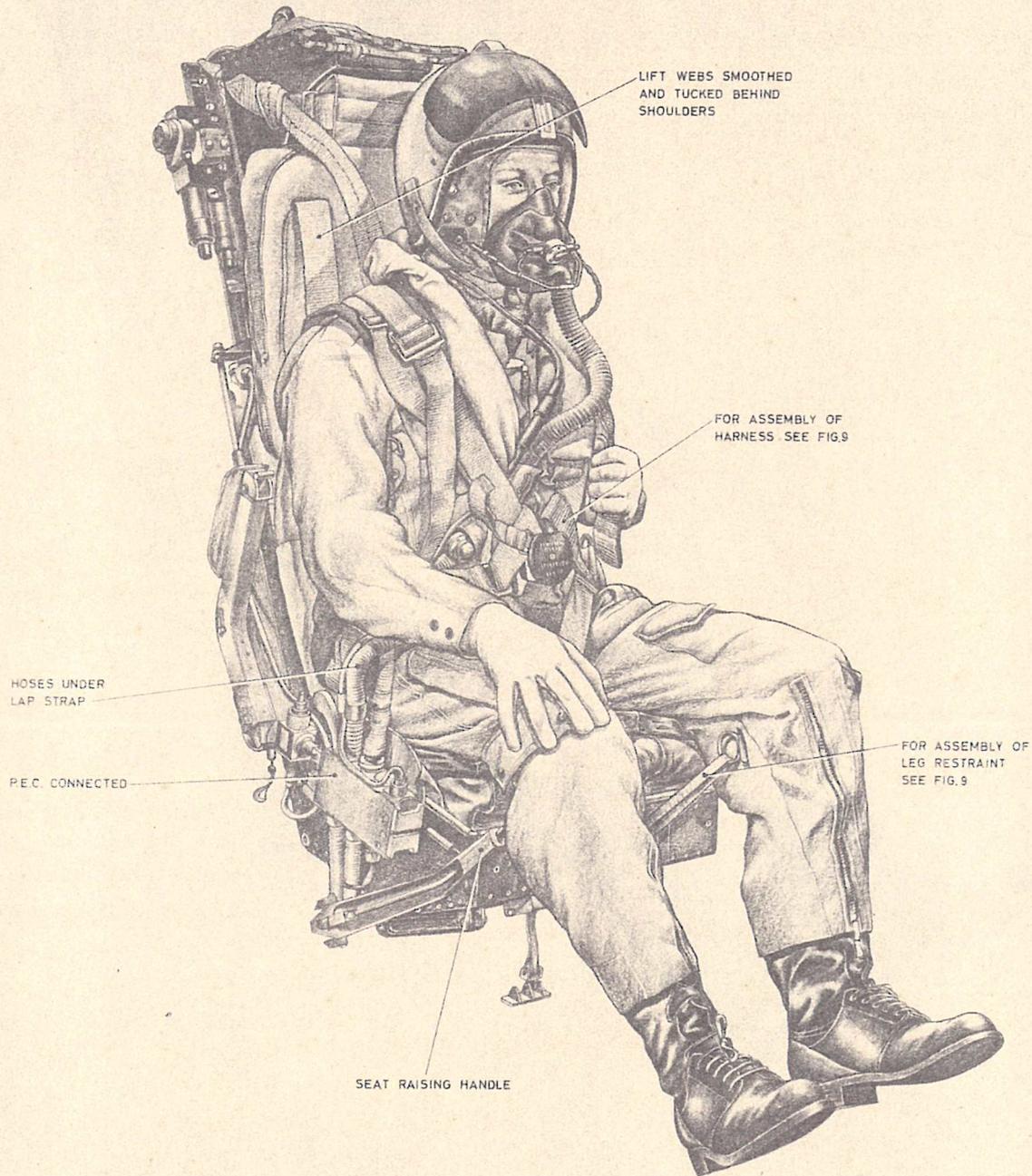


Fig. 10. The ejection seat occupied (1)

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Fig. 11. The ejection seat occupied (2)

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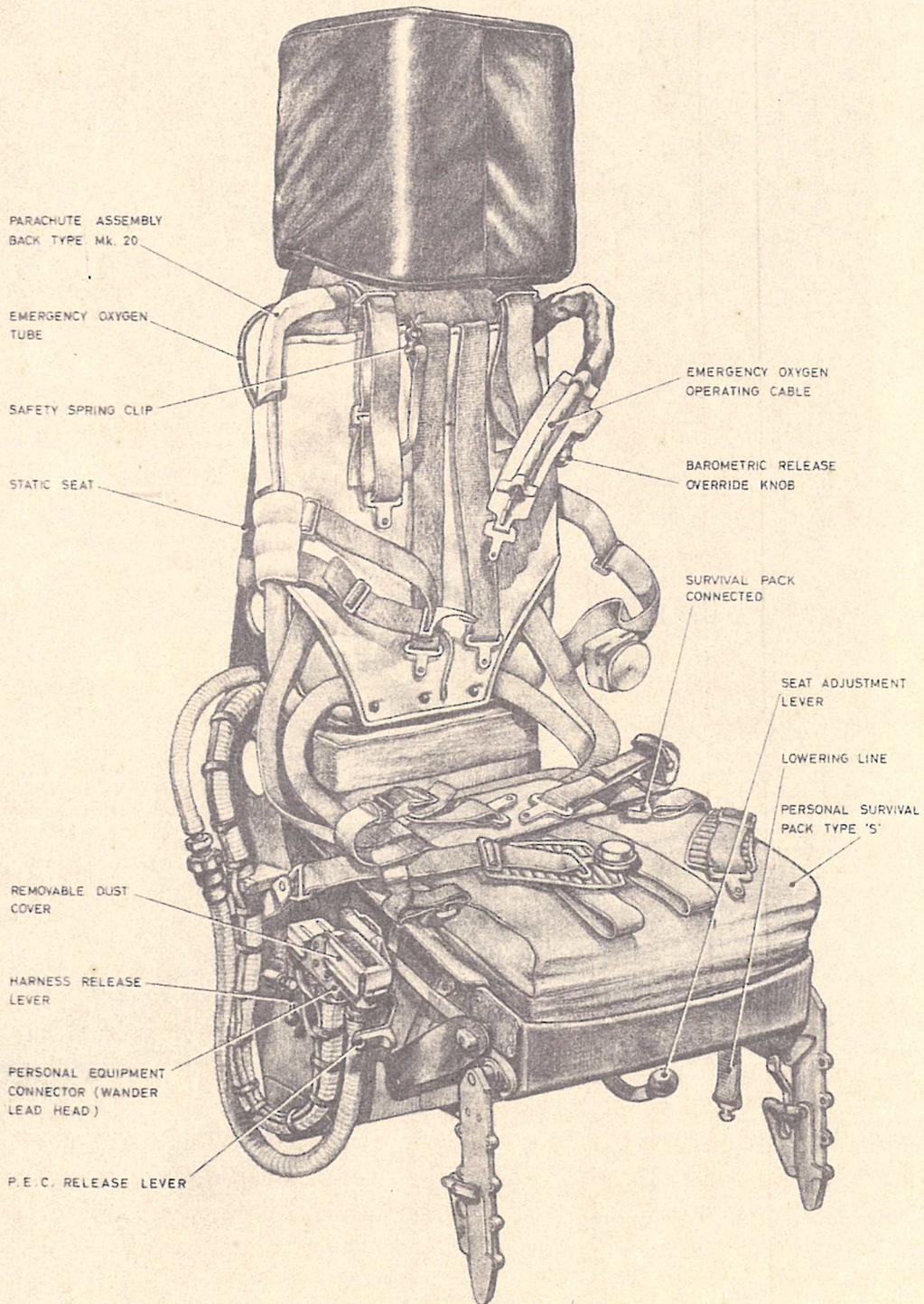


Fig. 12. The static seat equipped

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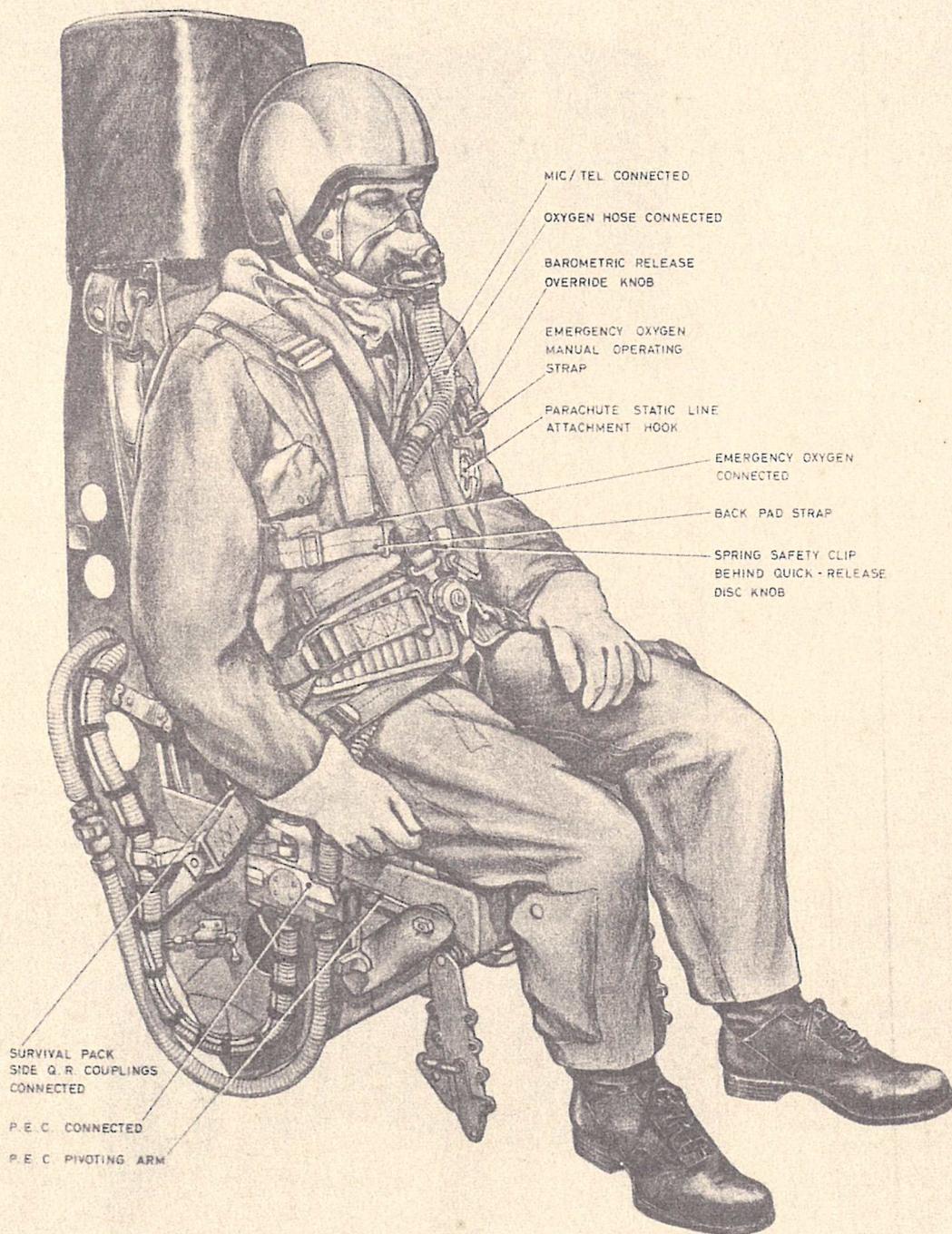


Fig. 13. The static seat occupied (1)

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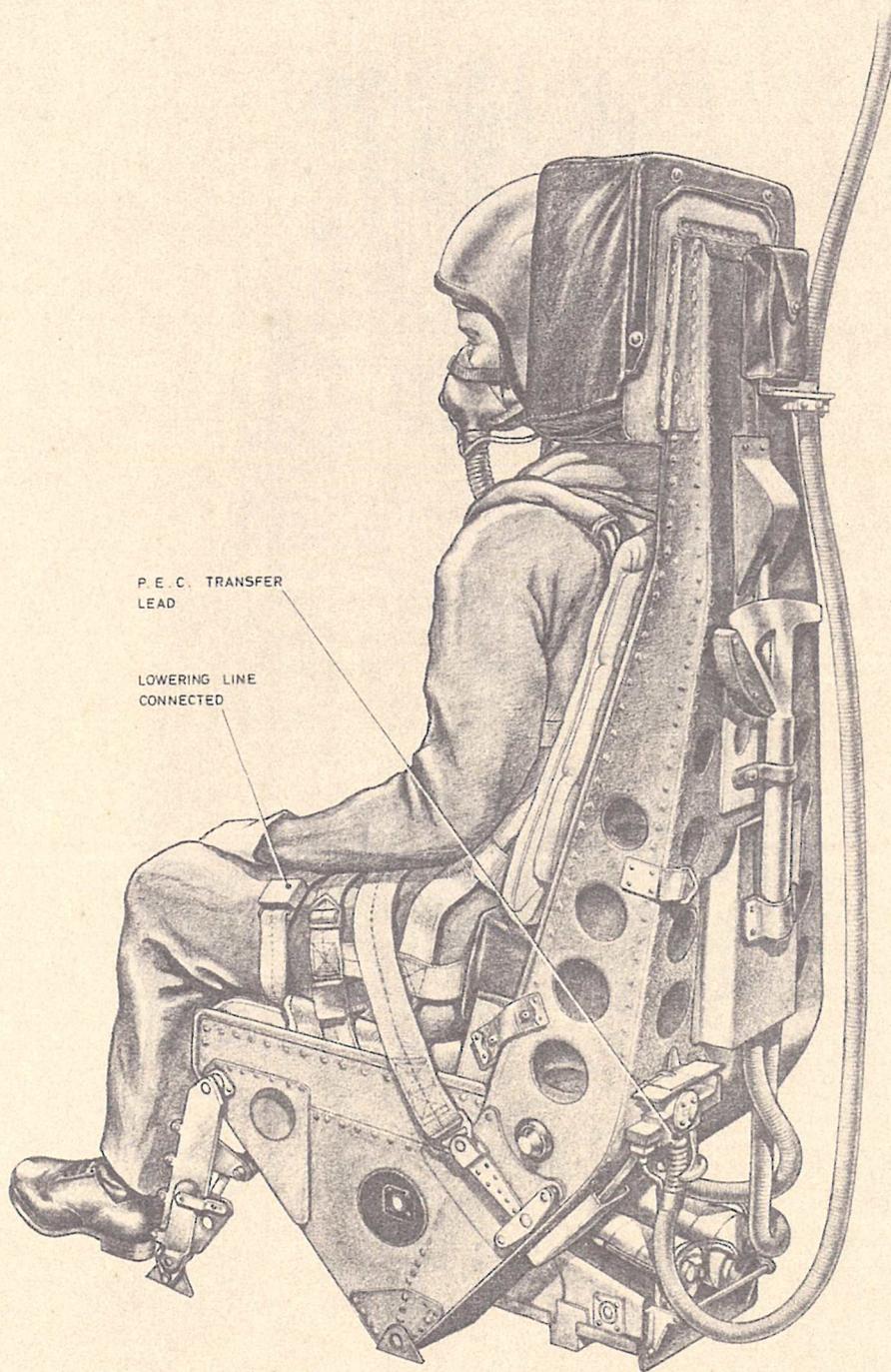


Fig. 14. The static seat occupied (2)

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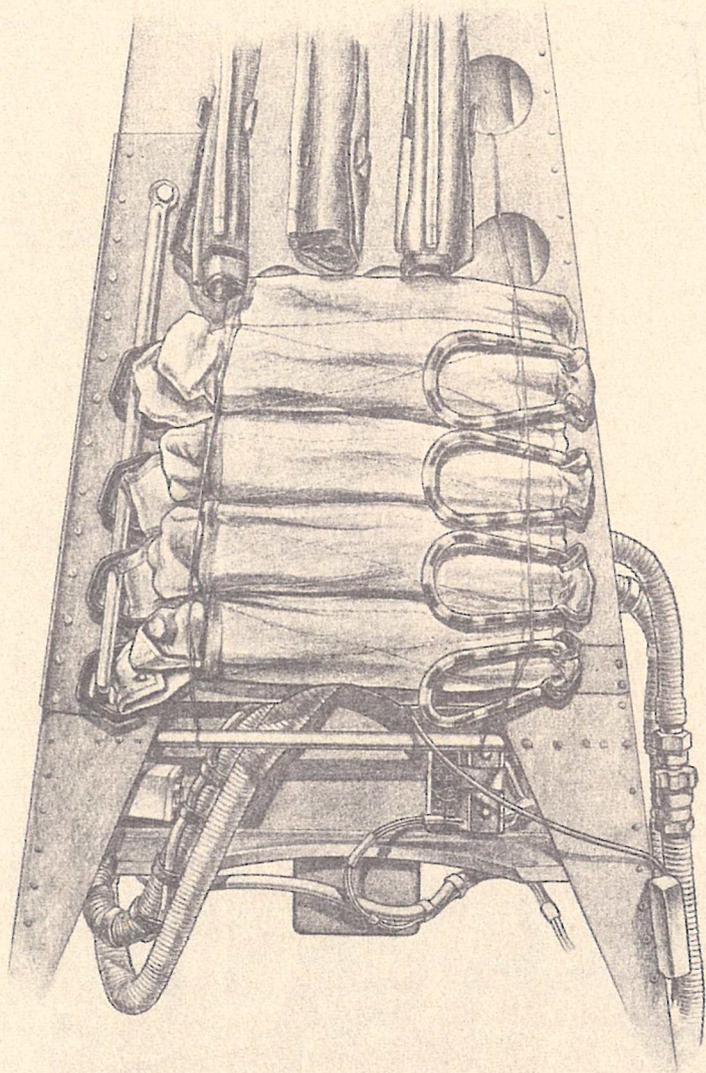


Fig. 15. Static line stowages on centre seat

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