Chapter 1
(Completely revised)

VALIANT – ALL MARKS

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LIST OF ILLUSTRATIONS

Introduction

1. Valiant aircraft are identical in regard to seating arrangements for the crew. The pilot and co-pilot are provided with ejection seats arranged side by side in the cockpit and rear crew members sit facing aft on static (non-ejection) seats arranged athwartships.

2. The aircrew equipment assemblies for the two ejection seats are identical; only one assembly will therefore be dealt with, the instructions being applicable to each. Similarly, the aircrew equipment assemblies for rear crew seats are identical and the instructions will apply for all three.

EJECTION SEATS

Composition of the assembly

3. The aircrew equipment assembly for each pilot consists of the following items:-

Ejection seat	Mk. 3A
Safety harness	Type ZF
Parachute assembly	Back Type Mk. 9
Personal survival pack	Type Q
Emergency oxygen set (attached to cushion)	Mk. 4A
Flying clothing	Sect. 1 refers.

The Mk. 3A ejection seat

4. The Mk. 3A ejection seat is ejected from the aircraft by means of a cartridge operated gun and it slides in a guide rail attached to the airframe structure. The seat incorporates a Type ZF safety harness, headrest, leg restraint cords, parachute pack container and a seat pan which houses a personal survival pack and emergency oxygen cylinder attached to the parachute cushion. Fully automatic facilities are provided to separate the occupant from the seat after ejection, and to open his parachute after separation.

5. The leg restraint cords are designed to ensure that the occupant's legs are drawn back to the seat pan and restrained there during ejection, thereby preventing injury due to flailing.

6. The seat is adjusted for height by a lever at the port side (pilot) and the starboard side (co-pilot) of the respective seat. The knob in the end of the lever must be depressed before the seat can be moved. A safety harness 'go forward' lever is mounted on the same side above the height adjustment lever, i.e. on the port side for the pilot's seat and on the starboard side for the co-pilot's seat. Each seat is fitted with retractable armrests.

7. Two firing handles are fitted to each seat. The main handle projects from the front of the drogue container and has an integral face screen; the alternative firing handle is located on the front of the seat pan and is for use when the occupant is unable to reach the main firing handle – e.g. when subjected to high G forces. As the seat is ejected, all connections to the aircraft are broken and the emergency oxygen is turned on automatically.

8. A manual override control (D-ring) is provided to isolate the parachute automatic withdrawal device, should the need arise to make (a) a manual bale-out from the aircraft or (b) a manual separation from the seat after ejection.

9. Information concerning the Mk. 3A ejection seat will be found in A.P.4288, Vol. 1. Information concerning the parachute assembly will be found in A.P.1182A, Vol. 1 and the survival pack is dealt with in A.P.1182C, Vol. 1. Information concerning flying clothing will be found in A.P.1182E, Sect. 1, and in Sect. 1 of this publication.

Sequence of events during ejection

10. The following is the normal sequence of events.

After the canopy has been jettisoned and the firing handle pulled:–

(1) The leg restraint cords tighten until the rivets shear in the dead eyes securing the cords to the floor.

(2) The time-delay mechanism for the drogue gun is actuated.

(3) The time-delay mechanism for the barostatic time-release unit is tripped.

(4) The main oxygen hose is disconnected and the Mic/Tel lead disconnected at the rear of the seat.

(5) The emergency oxygen supply is turned on.

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

(6) After ½ sec. the drogue gun fires and the drogue stabilizes the seat. If the ejection occurs at a high altitude the seat will eventually fall almost vertically with the occupant restrained by his safety 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 oxygen from the emergency cylinder carried under the parachute harness cushion.

(7) After an appropriate delay the occupant is released from the seat and the parachute opens automatically. The delay is 1.25 sec. after ejection at 10,000 ft. or below; at high altitude the 1.25 sec. delay does not start until the seat has descended to 10,000 ft.

EQUIPPING THE EJECTION SEATS

Connections to the aircraft

11. With the seats installed in the aircraft the following items are connected into the airframe.

(1) Mic/Tel lead Push/Pull connection.

(2) Static rod from the drogue gun.

(3) Static rod from the barostatic time-release unit.

(4) Static line from the emergency oxygen cylinder operating head.

(5) Main oxygen supply hose.

(6) Leg restraint cords.

Equipping the seat

12. Ensure that the seat has been made safe for servicing in accordance with current instructions, then proceed as described in para. 13.

13. The following procedure is to be used when equipping the seat: refer to fig. 1 and 2 as necessary: –

(1) Place the personal survival pack in the seat pan, ensuring that the lowering line emerges on the left-hand side of the seat pan on both seats.

(2) Check that the bottom edge of the apron is clipped to the lower extension of the parachute container. Pull upwards on the apron to tension it.

(3) Ensure that the seat cushion and back pad are attached securely to the parachute harness. Place the seat cushion on top of the survival pack with the emergency oxygen cylinder lying in front of the survival pack and level with the front of the seat. The emergency oxygen cylinder is positioned so that the operating head is to the left for the pilot's seat and to the right for the co-pilot's seat.

(4) Place the parachute pack in its container ensuring that the bottom edge is correctly located behind the corner plates.

(5) Connect the parachute withdrawal line coupling.

(6) Push the parachute pack fully home into the container and fit the restraining straps into the clips at each side.

(7) Pass the emergency oxygen supply tube through the two webbing tunnels on the right or left-hand side strap of the parachute harness, as applicable. Pass the operating cable through the lower tunnel only in each instance.

(8) Connect the quick-release couplings of the survival pack to the parachute harness.

(9) Fit the sticker straps for the parachute harness into the spring clips on the sides of the seat pan.

(10) Pass the emergency oxygen cylinder operating cable over the safety harness release cable and connect to the gate clamp at the rear (port or starboard side, according to the seat being equipped). Connect the spring clip on the end of the static line to the manual release cable which passes up through the U-tube anchored to the airframe.

14. To safeguard personnel working in the aircraft, re-check that the safety pins are still in their proper positions. These pins are subsequently dealt with as follows:-

(1) *Pre-flight servicing*, before the crew board:-

Remove the safety pin from the sear of the ejection gun and transfer to the main firing handle safety lock.

(2) *After the pilots are strapped in.* Before take-off, remove and stow:-

(a) The main firing handle safety pin.

(b) The alternative firing handle safety pin.

STRAPPING-IN PROCEDURE

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

(1) Check that the safety pins for the main firing handle and alternative firing handle are in position.

(2) Sit in the seat. Put on the leg restraint garters, just below each knee, with the D-rings pointing inwards (if they are not already fitted).

(3) Connect the survival pack lowering line in each seat to the left-hand webbing strap attachment on the life jacket.

(4) Fasten the parachute harness. Fasten the waist belt OVER the lowering line attachment strap on the life jacket. Pass the leg straps over the thighs, through the leg loop and insert the lugs in the quick-release fitting. Pass the shoulder straps UNDER the life jacket stole and insert the lugs in the quick-release fitting. Insert the safety pin clip behind the disc knob.

(5) Fasten the lap straps of the safety harness but do not tighten.

(6) Pass the right-hand leg restraint cord through the LEFT leg garter D-ring and under the left lap strap of the safety harness. Pass the lug of the left shoulder strap of the safety harness through the loop in the end of the leg restraint cord and insert the lug into the safety harness quick-release fitting.

(7) Pass the left-hand leg restraint cord through the RIGHT leg garter D-ring and under the right lap strap of the safety harness. Pass the lug of the right shoulder strap of the safety harness through the loop in the end of the leg restraint cord and insert the lug into the safety harness quick-release fitting.

(8) Adjust the leg restraint cords to allow full simultaneous movement of the control column and rudder pedals.

(9) Tighten the safety harness lap straps. Tighten the shoulder straps.

(10) Put on the flying helmet, oxygen mask and protective helmet (if this has not already been done). Connect the main and emergency oxygen supply hoses to the oxygen mask tube quick-release connector, ensuring that the emergency supply tube passes under the right shoulder strap of the safety harness. Attach the tube locating chain to the D-ring on the life jacket. Connect the Mic/Tel lead.

(11) Adjust the height of the seat; ideally the head should be in the centre of the headrest cushion.

(12) Stretch the arms upwards to check that the firing handle is within easy reach; DO NOT PULL THE HANDLE.

(13) Fasten the chin straps of both helmets, 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 would result in loss of the vital oxygen supply.

(14) With the assistance of a ground crew member ensure that the safety pins are correctly stowed.

EMERGENCIES

16. For drill and procedure to be taken in emergencies refer to Pilot's Notes, A.P.4377A–P.N.

LEAVING THE SEAT AFTER LANDING

17. (1) Remove the firing handle safety pins from their stowages and fit to the main and alternative firing handles.

(2) Disconnect the main and emergency oxygen supply tubes and the Mic/Tel lead.

(3) Release the safety harness, pull out safety pin clip and release parachute harness.

(4) Disconnect the survival pack lowering line and allow it to drape over the left-hand side of the seat pan.

(5) Remove leg restraint cords.

(6) Retract seat armrests. Vacate seat.

STATIC SEATS

Composition of the assembly

18. The assembly consists of the following items: –

A non-ejection seat, adjustable for position on guide rails

Safety harness	Type Z
Parachute assembly	Back Type, Mk. 16
Personal Survival Pack	Type Q
Emergency oxygen set	Mk. 3A
Flying clothing	See Sect. 1, Chap. 1

EQUIPPING THE STATIC SEATS

19. To equip each of the static seats proceed as follows (*fig. 6*): –

(1) Place the personal survival pack in the seat pan, ensuring that the lowering line satchel is at the rear with the lowering line emerging on the left-hand side of the seat pan.

(2) Place the parachute assembly on the survival pack with the parachute pack against the back of the seat. The emergency oxygen cylinder is on top of the parachute pack with the emergency oxygen tube emerging on the right of the occupant at shoulder level. The emergency oxygen release knob is on the right-hand side leg strap of the parachute harness.

(3) Arrange the parachute harness neatly on the seat ready for entry of the occupant.

STRAPPING IN PROCEDURE

20. Strapping in procedure for each crew member is the same and is as follows; refer to fig. 7 and 8 for detail: –

(1) Push the seat away from the bench as far as it will go.

(2) Sit in the seat.

(3) Connect the survival pack lowering line to the left-hand webbing strap attachment on the life jacket so that the quick-release coupling comes just below the parachute harness waist belt.

(4) Fasten the parachute harness. Fasten the waist belt OVER the lowering line attachment strap on the life jacket. Pass the leg straps over the thighs, through their respective loops and insert the lugs in the quick release fitting. Pass the shoulder straps UNDER the life jacket stole and secure them to the quick-release fitting. Insert the safety pin clip behind the disc knob.

(5) Connect the quick-release couplings of the survival pack to the parachute harness and tighten the retaining strap. Tuck the surplus lengths of strap into the seat pan.

(6) Fasten and tighten the lap straps of the safety harness.

(7) Put on the flying helmet, oxygen mask and protective helmet (if this has not already been done). Connect the main oxygen supply hose (under the equipment bench) to the oxygen mask tube. Connect the emergency oxygen supply tube. Attach the tube locating chain to the D-ring of the life jacket. Connect the Mic/Tel lead. Adjust the seat position.

(8) Fasten the chin straps of both helmets, fit the oxygen mask and perform pre-flight oxygen check.

EMERGENCIES

21. For drill and procedure to be taken in emergencies refer to Pilot's Notes A.P.4377A–P.N.

LEAVING THE SEAT AFTER LANDING

22. On leaving the seat after flight proceed as follows: –

(1) Disconnect the main and emergency oxygen supply tubes and the Mic/Tel lead.

(2) Release the safety harness, pull out the safety pin clip and release the parachute harness.

(3) Disconnect the survival pack lowering line and allow it to drape over the left-hand side of the seat pan.

(4) Vacate seat.

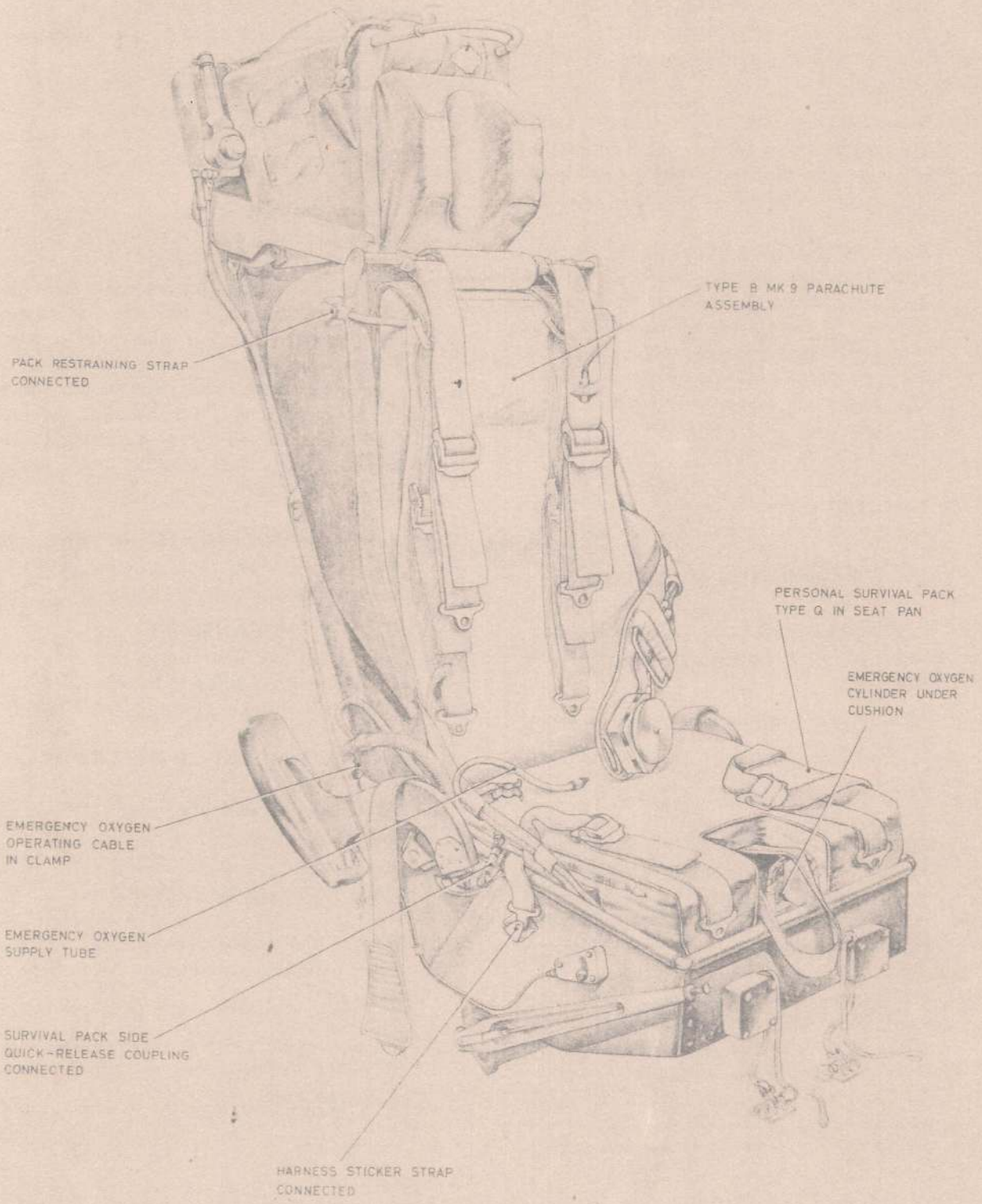

Fig. 1 The ejection seat equipped (1)

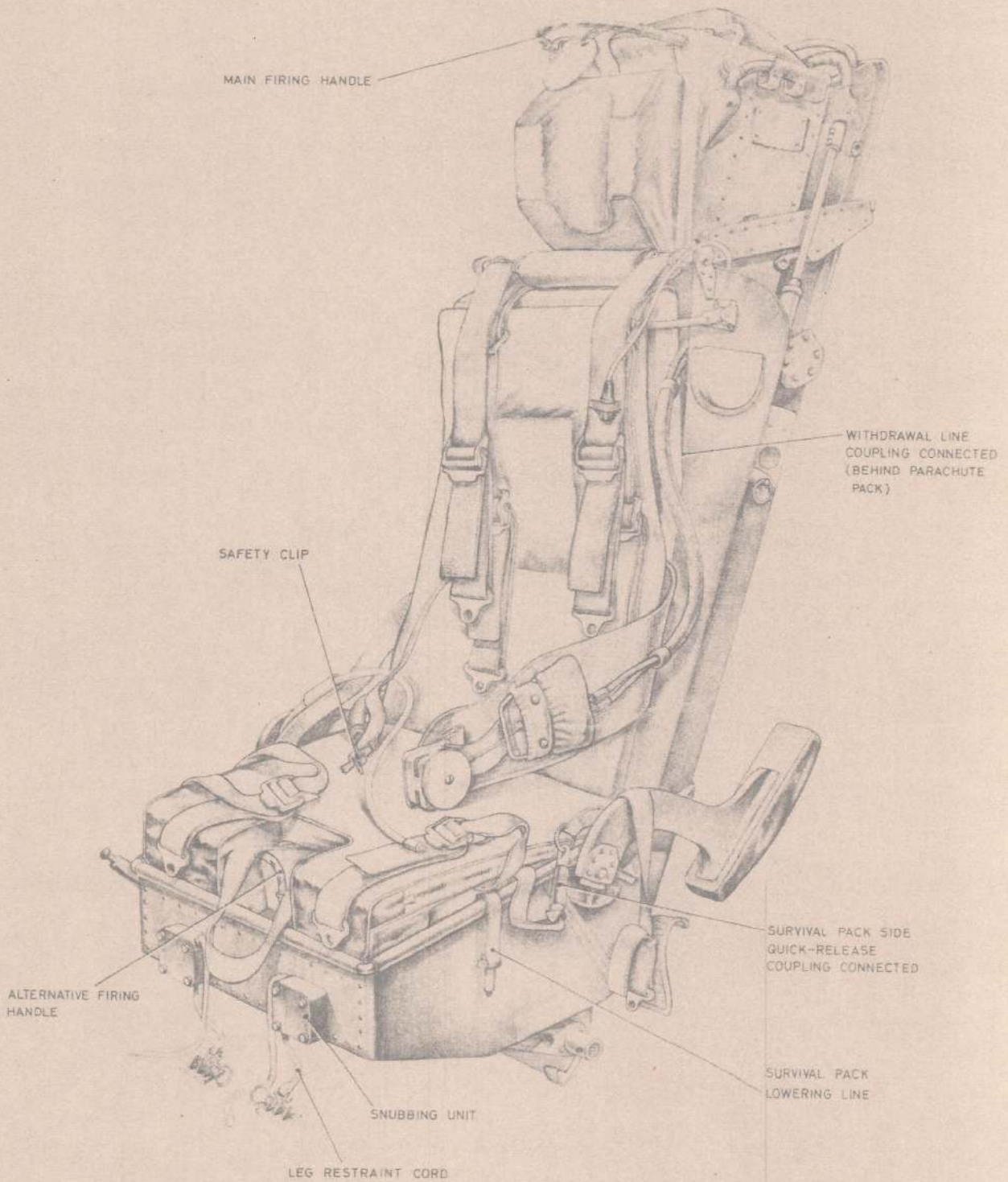

Fig. 2 The ejection seat equipped (2)

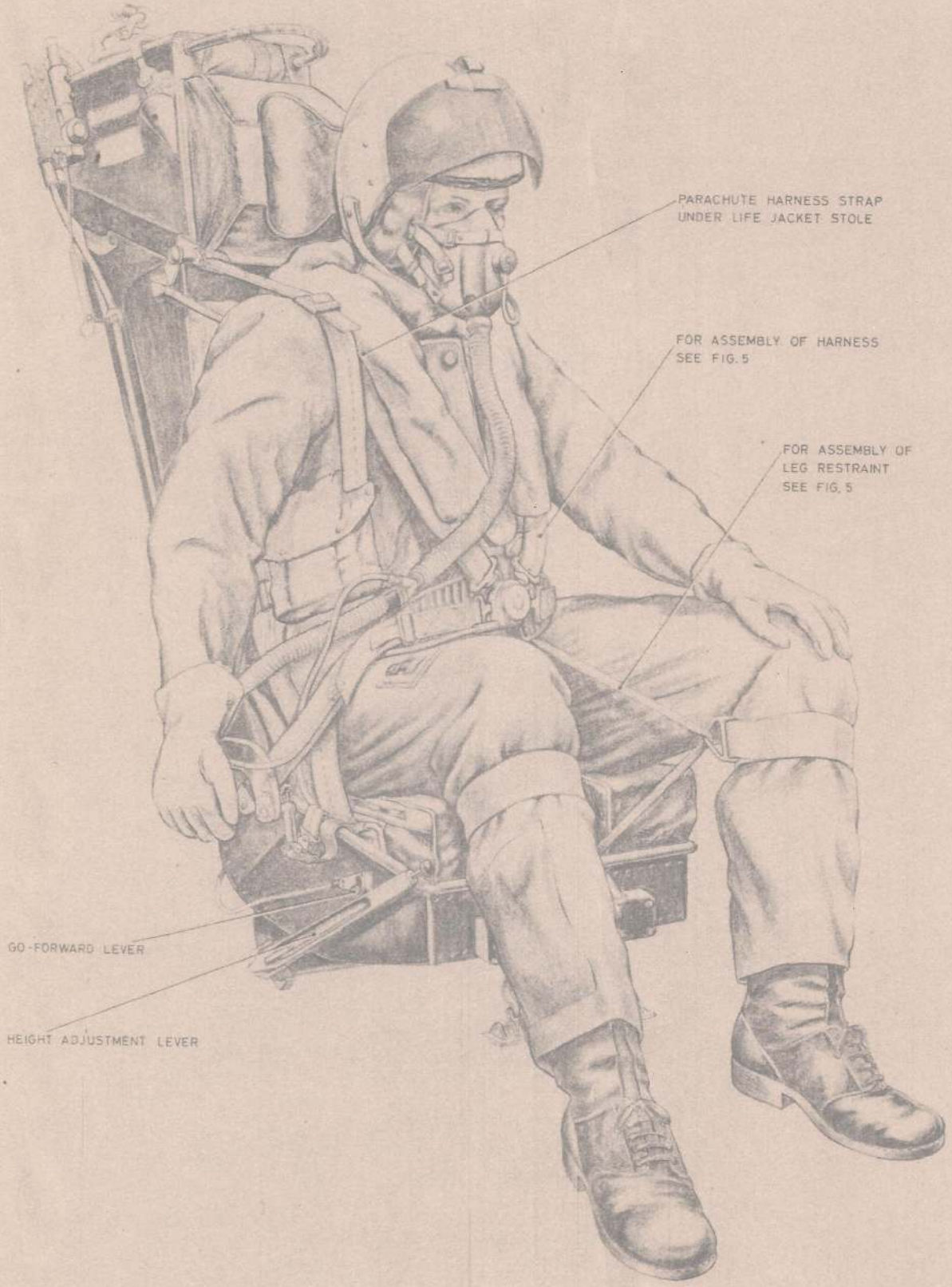

Fig. 3 The ejection seat occupied (1)

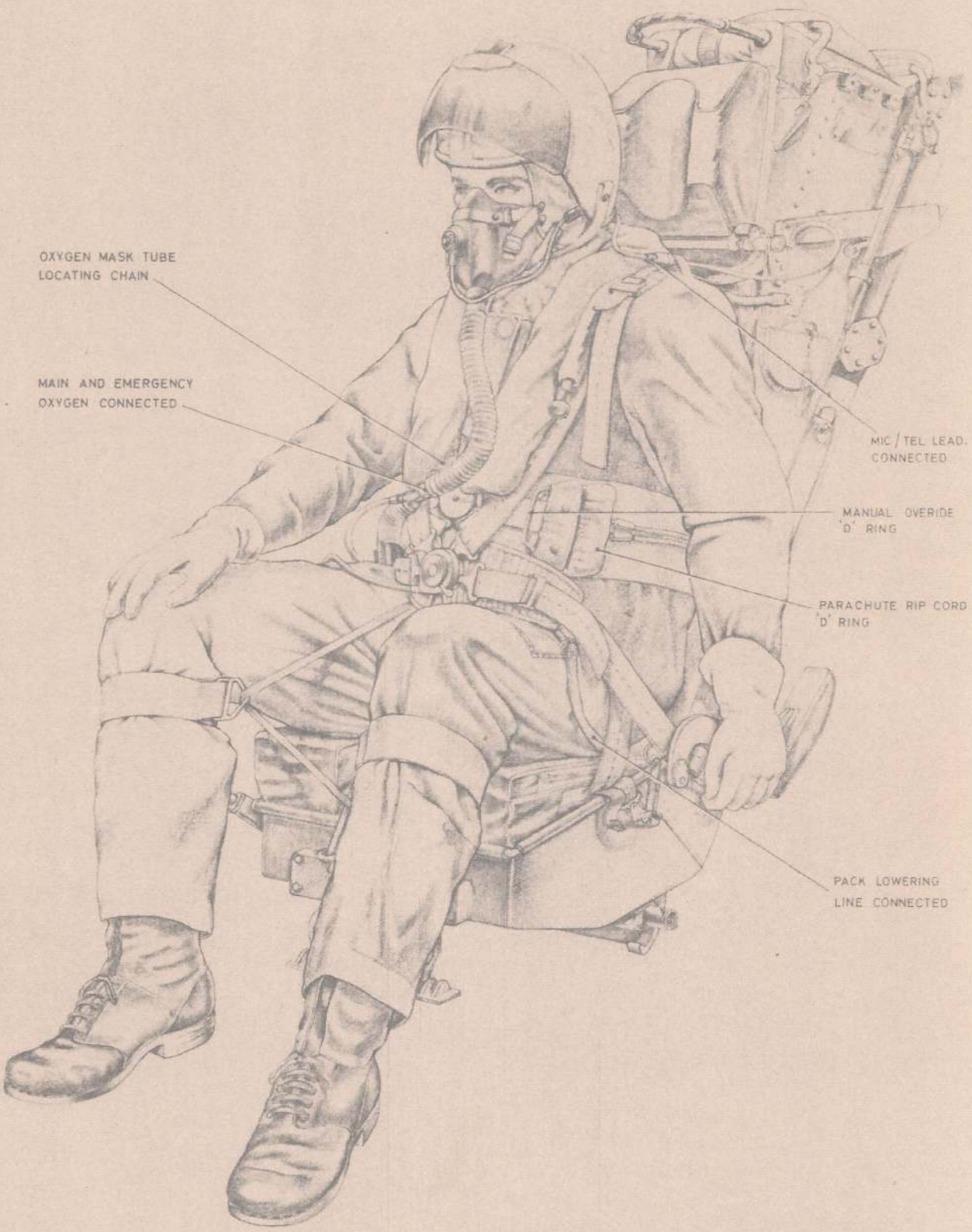

Fig. 4 The ejection seat occupied (2)

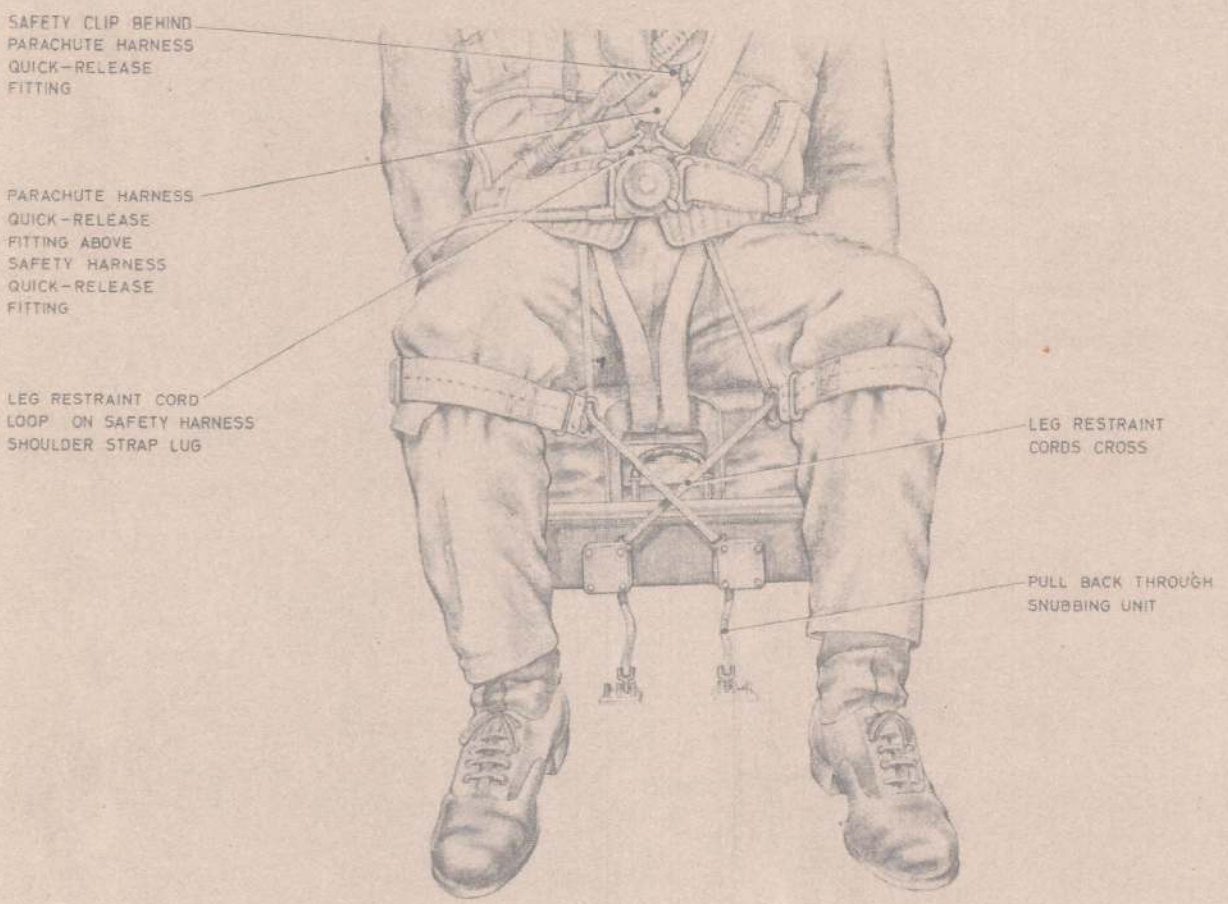

Fig. 5 Assembly of leg restraint cords and harness

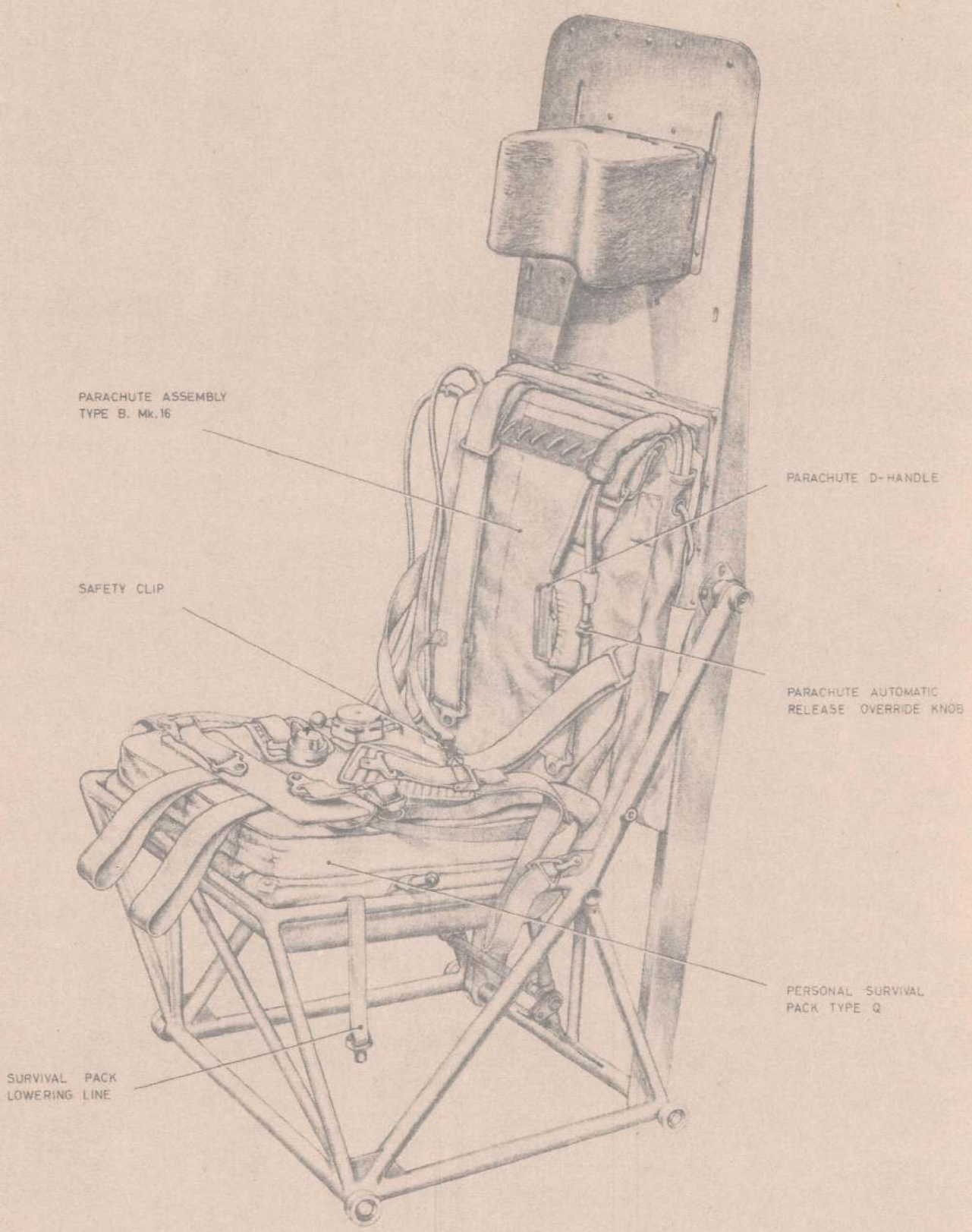

Fig. 6 The static seat equipped

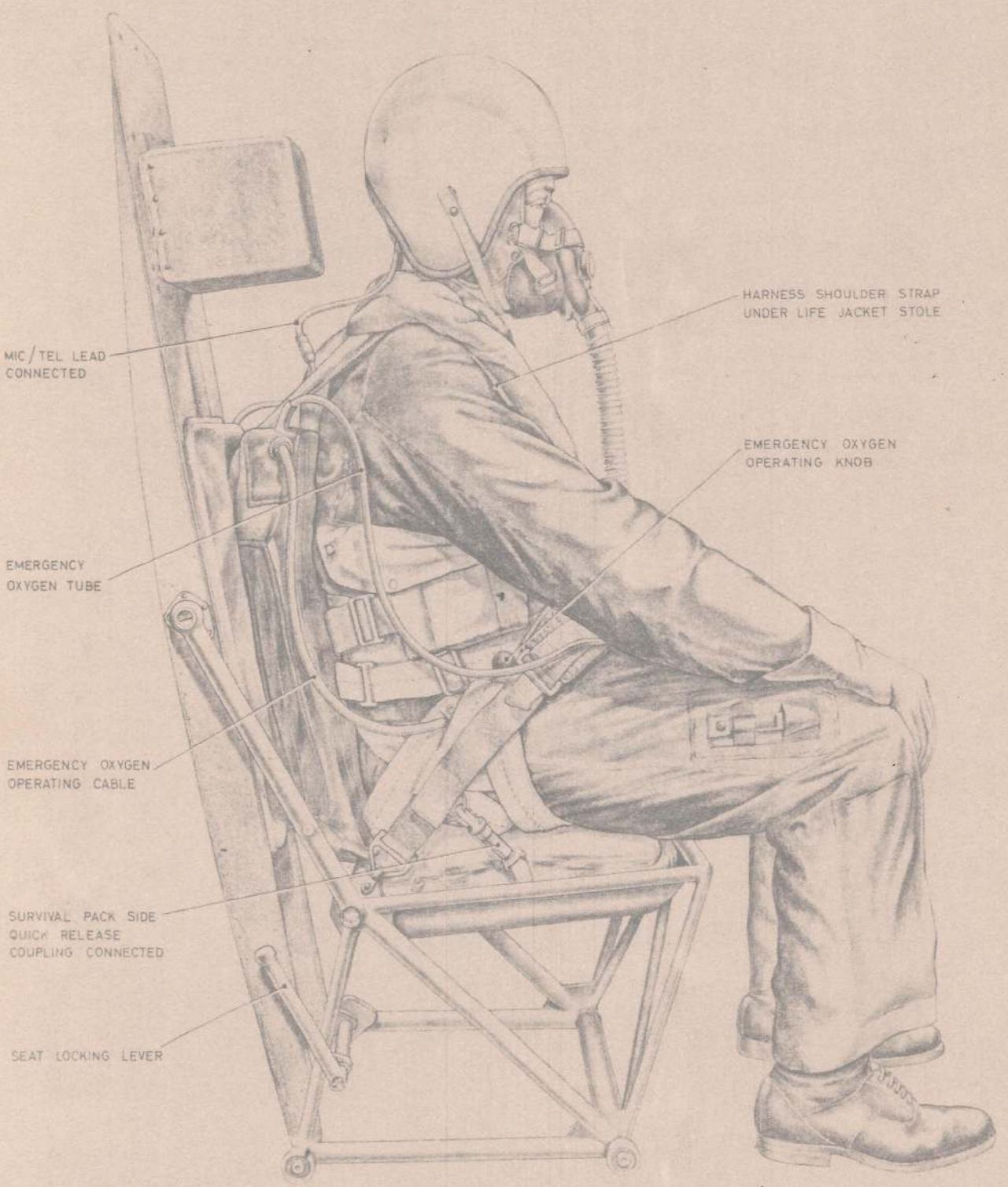

Fig. 7 The static seat occupied (1)

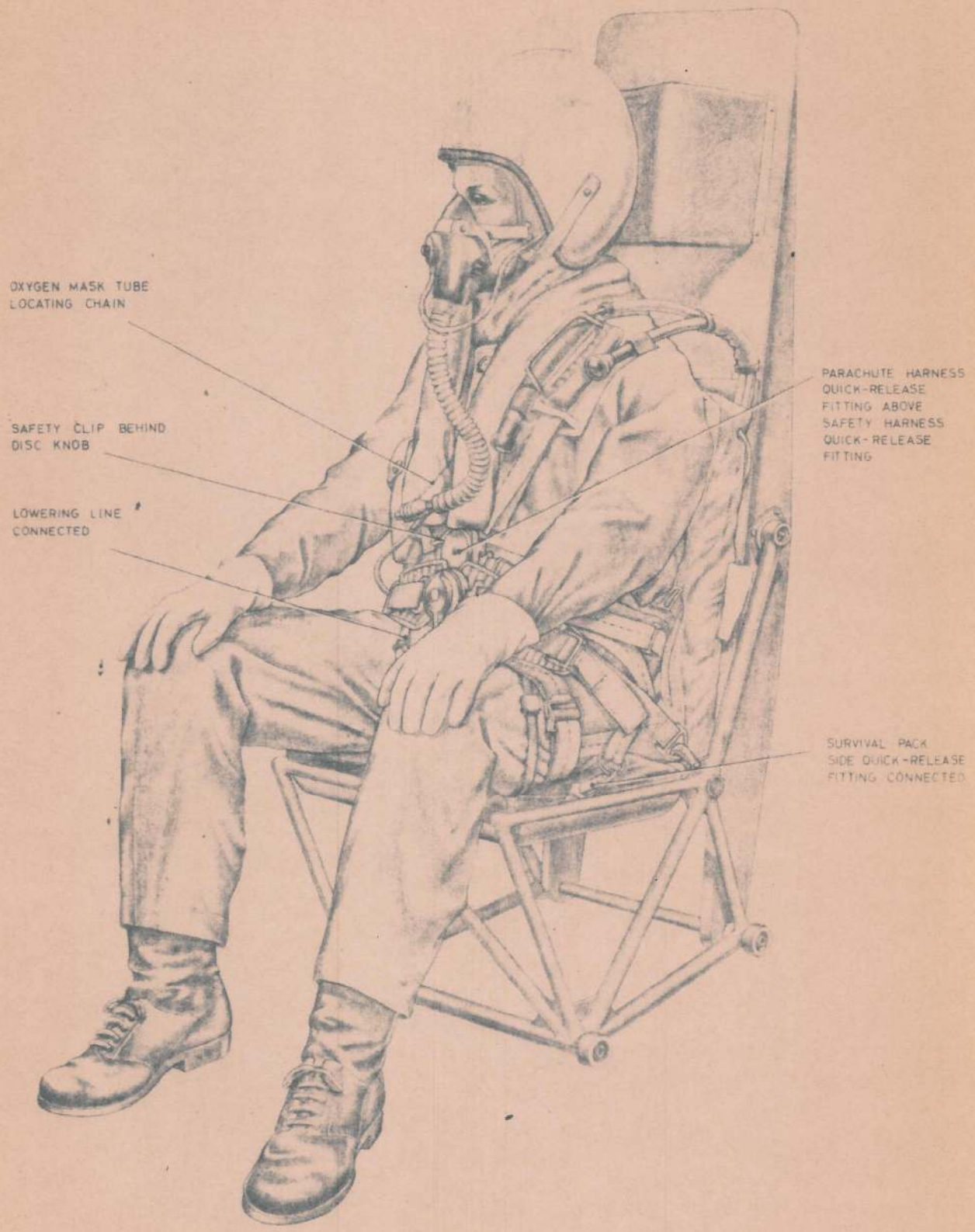

Fig. 8 The static seat occupied (2)