

Chapter 2

SWIFT F.7 AIRCRAFT

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COMPOSITION OF THE ASSEMBLY

1. The aircrew equipment assembly for the Swift F.7 aircraft consists of the following items:—

Ejection seat	Mk. 3G
Safety harness	Type ZF
Parachute assembly	Back type, Mk. 9
Personal survival pack	Type Q
Dinghy	S.S. Mk. 2 or 3
Emergency oxygen set	Mk. 4A
Flying clothing	See Sect. 1, Chap. 1

The Mk. 3G ejection seat

2. The Mk. 3G seat is ejected from the aircraft by a cartridge-operated gun and slides in a guide rail attached to the airframe structure. It incorporates the Type ZF safety harness, headrest, parachute pack container, leg-restraint cords and a seat pan which houses the personal survival pack and the emergency oxygen set.

3. The leg-restraint cords are designed to ensure that the pilot's legs are drawn back to the seat pan and restrained there during ejection, thereby preventing injury due to the legs being blown apart by the air blast.

4. Two firing handles are fitted to the seat. The main one projects from the front of the drogue container and has an integral face-screen which protects the face from the air-blast during ejection. The alternative firing handle is fitted at the centre of the front of the seat pan and is intended for use when the pilot is unable to reach the main firing handle, e.g. when subjected to high 'g' forces. Some aircraft may be fitted with an interconnection between the hood jettison mechanism and the seat firing handles. In this case, the hood is jettisoned immediately either seat firing handle is pulled; one second later, the seat is ejected. The separate hood jettison handle is retained for use when it is desired to jettison the hood without ejecting from the aircraft.

5. The seat is adjusted for height by a lever at the right-hand side of the seat pan; the knob in the end of the lever must be depressed before the seat can be moved. The safety harness forward-release lever is mounted on the right-hand side of the seat pan, the lever being raised to disengage the harness lock.

6. As the seat ascends the guide rail, all connections to the aircraft are broken and the emergency oxygen cylinder is turned on automatically.

7. Fully automatic facilities are provided to separate the pilot from the seat after ejection and to open the parachute after separation. A manual override control is fitted to disconnect the parachute automatic withdrawal device from the seat should the need arise to (a) make a manual bale-out from the aircraft or (b) make a manual separation from the seat after ejection.

8. A full description of the Mk. 3G ejection seat will be found in A.P.4288, Vol. 1.

Connections to the aircraft

9. With the seat installed in the aircraft, the following items are connected to the airframe:—

- (1) *Left-hand side of seat*:—
 - (a) Mic-tel lead.
 - (b) Static rod from the drogue gun.
 - (c) Anti-g suit air supply pipe.
- (2) *Right-hand side of seat*:—
 - (a) Static line from the barostatic time release unit.
 - (b) Main oxygen supply pipe.
 - (c) Static line from the emergency oxygen cylinder operating head.
- (3) *Front of seat*:—
 - (a) Leg-restraint cords.

EQUIPPING THE SEAT

10. The following procedure is to be adopted when equipping the seat; reference should be made to fig. 1, 2 and 3 as necessary:—

- (1) Ensure that the safety pin is in position in the seat at the top of the ejection gun and that the safety pin is fitted in the alternative firing handle. If the interconnected hood jettison and seat firing handle is fitted, additional safety pins should be fitted through the time delay trip lever, the hood jettison seat and the hood jettison handle.
- (2) Place the safety harness shoulder straps over the top of the parachute pack container and ensure that the lap straps are clear of the seat pan.
- (3) Place the personal survival pack in the seat pan ensuring that it is as far to the rear as possible and that the lowering line satchel is to the rear of the pack. The lowering line must emerge from the left-hand side of the satchel and pass OVER the anti-g suit air supply pipe.

(4) Ensure that the bottom edge of the apron is securely clipped to the lower extension of the parachute pack container.

(5) Tension the apron against its clips and insert the parachute pack into its container ensuring that the bottom edge of the pack is securely located behind the corner plates of the container. Before pushing the pack fully home, connect the two halves of the parachutes withdrawal line coupling.

(6) Push the parachute pack fully home into its container and fit the pack restraining straps into the clips on the sides of the container.

(7) Arrange the parachute harness so that the cushion containing the emergency oxygen cylinder is level with the front of the seat pan and is not obstructing the alternative firing handle; the emergency oxygen cylinder fits between the front edge of the seat pan and the personal survival pack. The operating head of the cylinder must be to the right of the seat; the supply pipe must pass through both tunnels on the right-hand side of the parachute harness but the operating cable passes through the lower tunnel only (*fig. 3*).

(8) Connect the survival pack quick-release couplings to the parachute harness and tuck the couplings between the pack and the sides of the seat pan.

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

(10) Pass the emergency oxygen cylinder operating cable OVER the safety harness automatic release cable and connect the knurled and screwed union on the cable to the corresponding union on the anchor section of the static line at the rear of the right-hand side of the seat pan. Engage the end fitting of the operating cable housing with the anchor socket and connect the anchor hook to the static line-cum-manual operating cable. Remove and retain the safety pin from the emergency oxygen cylinder.

(11) Ensure that the main oxygen supply pipe is connected at the right-hand side of the seat.

(12) Ensure that the anti-g suit air supply pipe passes through the loop in the left-hand lap strap of the safety harness.

(13) Place the leg-loop of the parachute harness between the right-hand side of the alternative firing handle and the seat cushion (*fig. 2*).

(14) Remove the safety pin from the ejection gun seat (and time delay trip lever and hood jettison seat, if fitted) and fit it through the safety strap of the main firing handle.

STRAPPING-IN PROCEDURE

11. Prior to climbing into the aircraft, check the life jacket to ensure that the strap which carries the lowering line attachment is fully extended.

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Then proceed as follows, referring to fig. 3, 4 and 5 for detail :—

- (1) Check that the safety pins are in position in the safety straps of the main and alternative firing handles.
- (2) Sit in the seat.
- (3) Fasten the leg-restraint garters just below each knee, ensuring that the D-rings are to the inside rear.
- (4) Connect the survival pack lowering line to the fitting on the life jacket, ensuring that the line passes OUTSIDE the lower left-hand strap of the parachute harness.
- (5) Connect the anti-g suit air supply pipe to the fitting on the anti-g suit, ensuring that the pipe passes OUTSIDE the survival pack lowering line.
- (6) Fasten and tighten the parachute harness, ensuring that the shoulder straps pass under the folds of the life jacket stole. Check that the leg-loop of the harness does NOT pass through the alternative firing handle. Ensure that the quick-release fitting is set to the locked position and then fit the safety clip.
- (7) Fasten the lap straps of the safety harness but do not tighten them.
- (8) 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.
- (9) 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.
- (10) Tighten the lap straps of the safety harness ensuring that the quick-release fitting is positioned as low as possible against the body and that it is not covering the parachute harness quick-release fitting.
- (11) Tighten the shoulder straps of the safety harness.
- (12) Adjust the leg-restraint cords in the snubber units to allow full simultaneous movement of control column and rudder pedals.
- (13) Put on the Type F and protective helmets, connect the mic-tel lead and fasten the chin straps of both helmets.

Note . . .

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

- (14) Connect the main oxygen supply pipe to the oxygen mask tube and adjust the pipe in its clip on the safety harness lap strap to allow full and free movement of the head.
- (15) Pass the emergency oxygen supply pipe under the right shoulder strap of the safety harness and connect it to the oxygen mask tube.
- (16) Connect the oxygen mask tube locating chain to the D-ring on the life jacket.
- (17) Adjust the height of the seat so that the head is correctly located at the centre of the head rest and check that the main firing handle can be reached with both hands together. DO NOT displace the handle from its stowage.
- (18) Remove the safety pin from the alternative firing handle and hand it to the ground-crew member who, having removed the pin from the main firing handle, stows BOTH pins in the stowage on the left-hand side of the parachute pack container.

Note . . .

If no ground crew member is available, the pilot MUST remove the pins from the firing handles and fit them into their stowage prior to entering the cockpit.

- (19) Remove the safety pin (if fitted) from the hood jettison handle and place in its stowage.

NORMAL EXIT FROM THE AIRCRAFT

12. The following sequence should be used when leaving the aircraft after landing.

- (1) The ground crew member removes the ejection seat safety pins from their stowage, fits one through the main firing handle safety strap, and hands the other to the pilot who fits it through the alternative firing handle safety strap.

Note . . .

If no ground-crew member is available, the pilot MUST fit both the safety pins prior to leaving the aircraft.

- (2) Remove the hood jettison handle safety pin (if fitted) from its stowage and fit it through the handle.
- (3) Disconnect the main and emergency oxygen supply pipes from the oxygen mask tube.
- (4) Disconnect the mic-tel lead.
- (5) Release the safety harness and return the quick-release fitting to the locked position.
- (6) Remove the safety clip from the parachute harness quick-release fitting, release the harness and return the quick-release fitting to the locked position.

- (7) Disconnect the anti-g suit air supply pipe and fit the blanking plug into the end of the pipe.
- (8) Disconnect the survival pack lowering line from the life jacket and drape it over the left-hand side of the seat and over the anti-g suit air supply pipe.
- (9) Remove the leg-restraint garters and stow them securely in the cockpit.
- (10) Stand up and climb out of the aircraft.

FORCED LANDING

13. During a forced landing, the aircraft should be handled in accordance with Pilot's Notes, A.P.4348G-P.N.

The following actions must also be carried out:—

- (1) *Before touch-down*:—
 - (a) When below 10,000 ft., disconnect the main and emergency oxygen supply pipes from the oxygen mask tube.
 - (b) Disconnect the anti-g suit air supply pipe.
 - (c) Disconnect the lowering line from the life jacket.
 - (d) Release the parachute harness.
 - (e) TIGHTEN THE SAFETY HARNESS AND LOCK IT IN THE REAR POSITION.
- (2) *After touch-down*:—
 - (a) When the aircraft has stopped, release the safety harness and vacate the cockpit as quickly as possible.
 - (b) If, after a reasonable time, there are no signs of fire, return to the aircraft and INSERT THE EJECTION SEAT SAFETY PIN IN THE HOLE IN THE EJECTION GUN SEAR.

Abandoning the aircraft

14. When it becomes necessary to abandon the aircraft, the normal method is by ejection, followed by automatic separation from the seat and automatic withdrawal of the parachute. However, the possibility of the seat failing to eject must be borne in mind, although this will almost certainly be due to the use of an incorrect technique rather than failure of the seat itself. Similarly, the possibility of failure of the mechanism for automatic separation and parachute withdrawal must be considered. The following paragraphs give the sequence of actions to be carried out in each case.

Note . . .

In each case, the aircraft should be handled in accordance with Pilot's Notes.

Ejection

15. The ejection seat is provided with an alternative firing handle at the front of the seat pan. This handle is intended for use only when circumstances (such as high 'g' loading) prevent the use of the normal firing handle. When the alternative handle is used, it is imperative that the head be pressed well

back against the head rest, otherwise serious injury can result. Furthermore, as no face-screen is used with this handle, the face is exposed to the air-blast on ejection. The visor, therefore, should be lowered or the eyes closed tightly when the alternative handle is used.

Note . . .

Some aircraft may be fitted with an interconnection between the hood jettison unit and the ejection seat firing handles. In this case, the hood is jettisoned immediately either seat firing handle is pulled; one second later, the seat is ejected.

16. To eject from the aircraft, proceed as follows:—

- (1) Set the parachute pack container fully back.
- (2) Withdraw the feet from the rudder pedals and, at the same time, grasp the seat main firing handle with both hands, palms facing aft and elbows as close together as possible.
- (3) Pull the firing handle and the attached face screen down firmly over the face, keeping the head pressed back into the headrest. IT IS MOST IMPORTANT THAT THE HANDS ARE KEPT CLOSE TO THE CHEST DURING THE LAST PART OF THIS MOVEMENT; if the handle is merely pulled out horizontally, the seat may not operate.

Sequence of events during ejection

17. As the seat ascends the guide rail, the following sequence occurs:—

- (1) The leg-restraint cords tighten until the rivets in the fittings securing them to the aircraft shear at a lead of approx. 400 lb.
- (2) The time delay mechanism for the drogue gun is actuated, the gun being fired after $\frac{1}{2}$ sec.
- (3) The time delay mechanism for the barostatic time release unit is actuated. If ejection takes place above 10,000 ft., the barostat prevents automatic separation taking place until 3 sec. after that height is reached; if below 10,000 ft., automatic separation should occur 3 sec. after ejection, followed immediately by parachute withdrawal. If mod. No. Ejection Seat 491 is embodied, the delay is reduced to 1.25 sec. in each case.
- (4) The emergency oxygen cylinder is turned on, whether required or not.
- (5) The main oxygen supply pipe is disconnected.
- (6) The mic-tel lead is disconnected at the rear of the seat.

18. If the parachute fails to open after separation, lift the flap over the parachute rip-cord D-ring, grasp the D-ring in the right hand and, having checked any somersaulting, pull it across the body. For control of the parachute during descent and landing, refer to Sect. 1, Chap. 3.

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Note . . .

With this assembly, once the parachute has developed, the survival pack should be detached from the parachute harness by disconnecting the side quick-release couplings. The pack is then left suspended from the life jacket by the lowering line which pays-out from its satchel as the pack falls. The descent is thus completed with the survival pack some 15 ft. below the man, in which position it reduces oscillation and minimises the possibility of injury on impact with the ground.

Manual bale-out

19. If the seat fails to eject, a manual bale-out must be carried out as follows:—

- (1) Jettison the hood (if it has not been jettisoned during attempts to eject).
- (2) Disconnect the seat sticker straps from the clips on the sides of the seat pan.
- (3) Disconnect the anti-g suit air supply pipe.
- (4) Pull the manual operating control for the emergency oxygen cylinder.

Note . . .

If time is vital, actions (2), (3) and (4) may be ignored as they should occur automatically when the pilot leaves the seat.

- (5) Disconnect the main oxygen supply pipe from the oxygen mask tube.
- (6) After the aircraft has been rolled into the inverted position, release the safety harness and fall clear.
- (7) Lift the flap over the parachute rip-cord D-ring, grasp the D-ring in the right hand and, having checked any somersaulting, pull the rip-cord across the body. For control of the parachute during descent and landing refer to Sect. 1, Chap. 3.

Manual separation from the seat after ejection

20. If ejection takes place above 10,000 ft., automatic separation will not occur until 3 sec. after the seat has descended to that height; if below 10,000 ft., automatic separation should occur 3 sec. after ejection and be followed immediately by automatic withdrawal of the parachute. If mod. No. Ejection Seat 491 is embodied, the delay is reduced to 1.25 sec. in each case. The approx. time to descend to 10,000 ft. is given in Sect. 1, Chap. 3 to which reference should be made.

21. If, following ejection, it is suspected that the automatic separation mechanism is not functioning, the following action must be taken:—

- (1) Discard the face-screen and disconnect the main oxygen supply pipe from the oxygen mask tube.
- (2) Pull the manual override D-ring on the parachute harness.

- (3) Disengage the seat sticker straps from the clips on the seat pan.

Note . . .

If saving of time is essential, this action may be ignored as the straps should pull free as the pilot leaves the seat.

- (4) Release the safety harness and fall clear of the seat.
- (5) Lift the flap over the parachute rip-cord D-ring, grasp the D-ring in the right hand and, having checked any somersaulting, pull the rip-cord across the body. For control of the parachute during descent and landing, refer to Sect. 1, Chap. 3.

Note . . .

It is vital to concentrate all the faculties on operating the manual override D-ring, releasing the safety harness and on pulling the parachute rip-cord; the seat will probably be spinning and the occupant therefore confused.

DITCHING

22. During ditching, the aircraft should be handled in accordance with Pilot's Notes. The following additional actions are also necessary:—

- (1) Before touch-down:—
 - (a) Check that 100 per cent. oxygen is selected and deflect the emergency toggle switch sideways.
 - (b) Disconnect the emergency oxygen supply pipe from the oxygen mask tube.
 - (c) Disconnect the oxygen mask tube locating chain from the life jacket.
 - (d) Disconnect the side quick-release couplings securing the survival pack to the parachute harness.
 - (e) Disconnect the seat sticker strap at each side of the seat pan.
 - (f) Disconnect the anti-g suit air supply pipe.
 - (g) Pull the override D-ring on the parachute harness. This action is taken so that the parachute pack and harness will be freed from the seat if the need should arise to remove them (see sub-para. 2 (c)).
 - (h) Disconnect the parachute harness.
 - (i) TIGHTEN THE SAFETY HARNESS AND LOCK IT IN THE REAR POSITION.

(2) *After touchdown* :—

- (a) When the aircraft has stopped, disconnect the oxygen mask tube from the main supply pipe, release the safety harness and vacate the cockpit as quickly as possible.
- (b) When clear of the cockpit coaming, inflate the life jacket. If time permits, lift the seat cushion and extract the survival pack. It is probable, however, that the aircraft will sink rapidly; the survival pack can still be recovered as its lowering line is still attached to the life jacket. In this case, however, the whole lowering line (approx. 15 ft.) will pay out before the pack comes to hand.
- (c) If the survival pack becomes entangled in the parachute harness, a strong pull on the lowering line may extract both the survival pack and the parachute assembly from the seat; the pack can then be extricated from the parachute assembly.
- (d) Open the survival pack and inflate and board the dinghy (Sect. 1, Chap. 4 refers).

WARNING . . .

If the aircraft dives under the surface before stopping, it is most important that the temptation to fill the lungs to the maximum before disconnecting the oxygen tube is resisted. The escape

sequence is the same as that described above except that if the survival pack becomes entangled in the parachute harness, it may be necessary to jettison the pack by disconnecting the lowering line from the life jacket. This will obviously be a last resort to avoid being dragged down by the aircraft. When clear of the aircraft, the following points MUST be remembered :—

- (1) *It is essential to breathe out on the way to the surface. Whistling throughout the ascent is a good way of doing this.*
- (2) *Every endeavour must be made to regulate the ascent so that the bubbles of exhaled air are not overtaken; this will ensure that the ascent rate is not too high.*
- (3) *The life jacket must be inflated.*
- (4) *It is advisable to remove the oxygen mask when clear of the aircraft.*

Unless these precautions are observed, the lungs may be damaged. Failure to breathe out steadily results in the air in the lungs expanding during the ascent and eventually the lungs will burst; there may be no symptoms of the approaching injury. If the above drill is followed it is possible to escape from a considerable depth; furthermore, there is no desire to breathe in.

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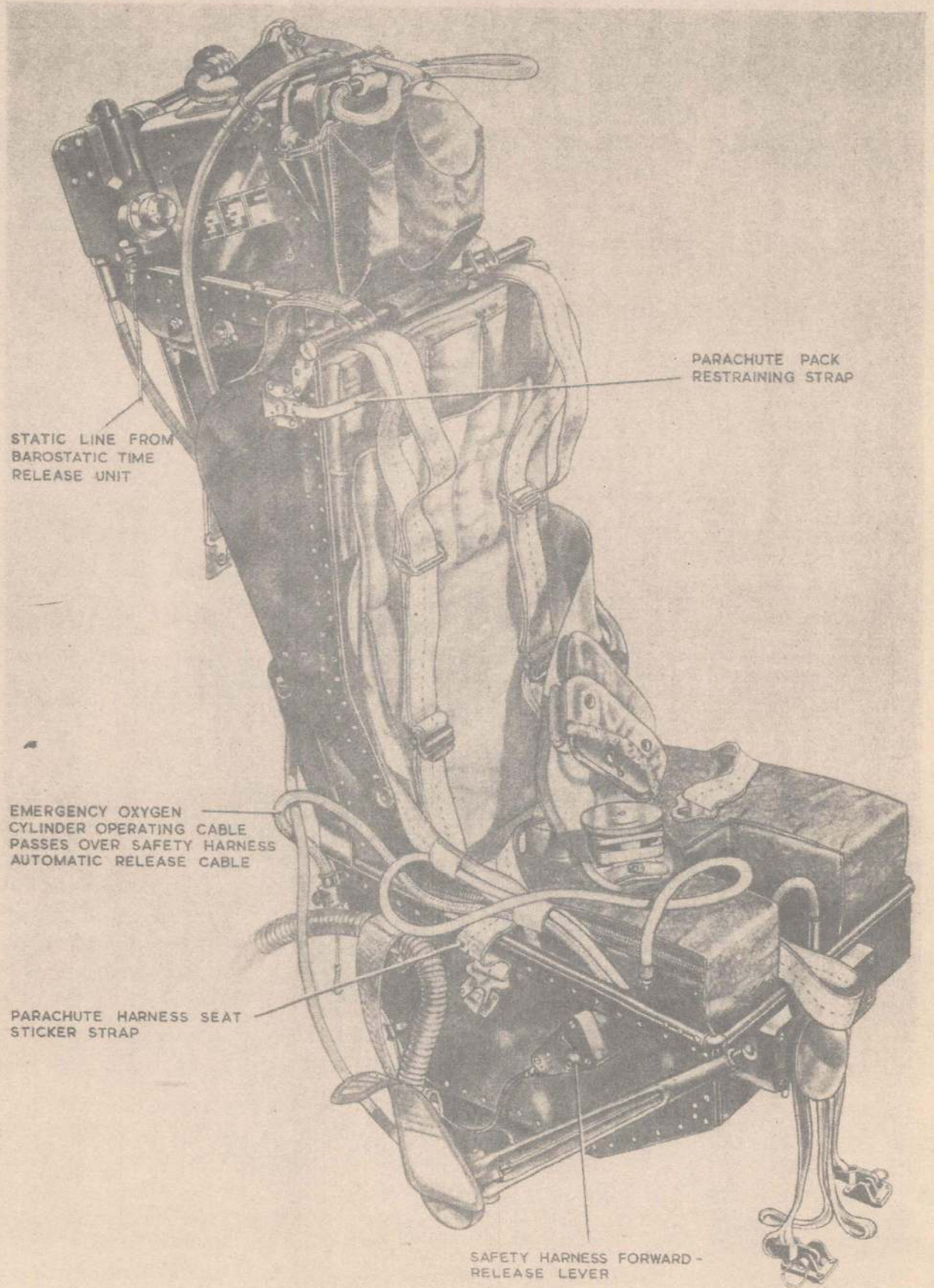


Fig. 1. The seat equipped (1)

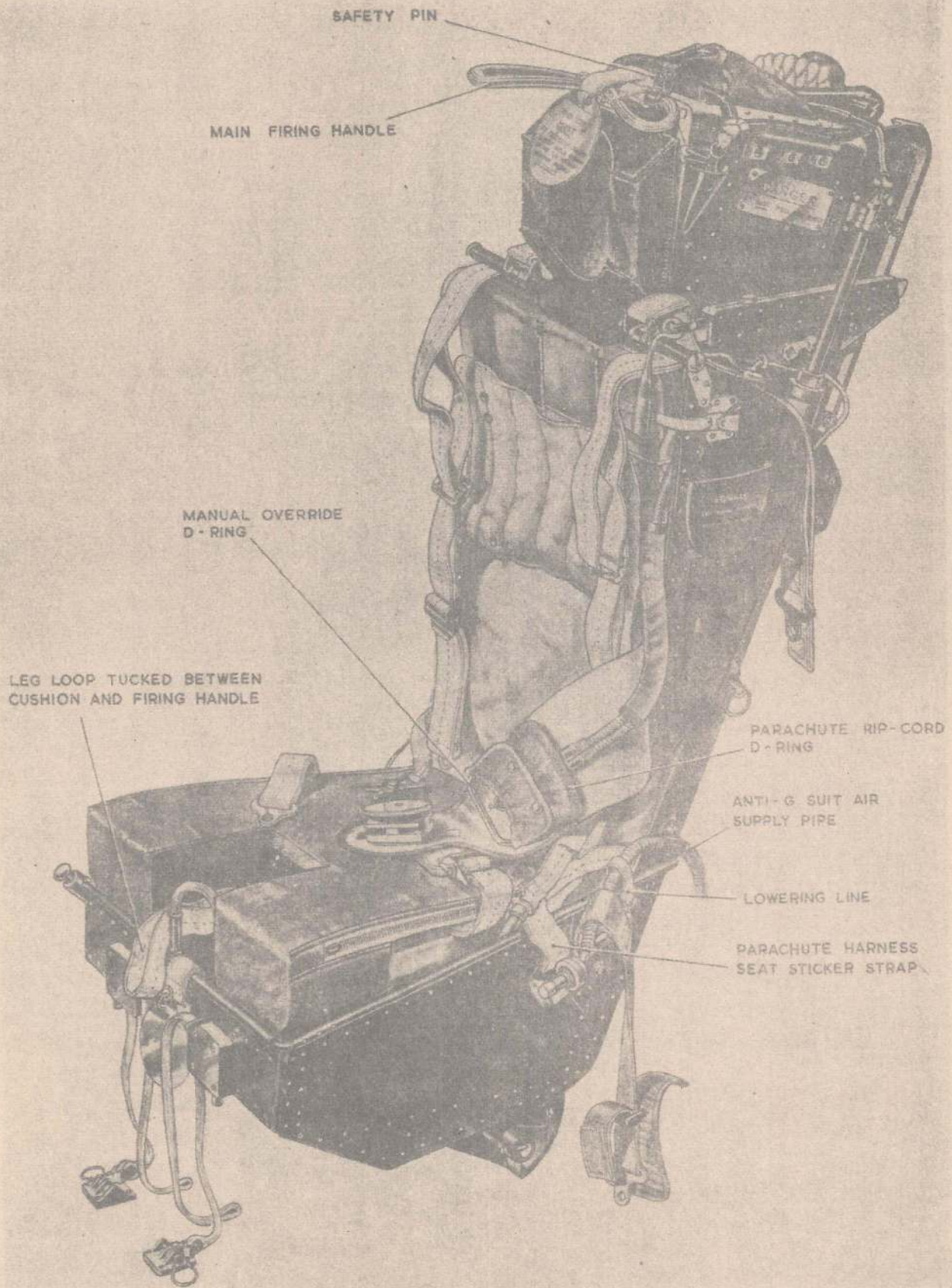


Fig. 2. The seat equipped (2)

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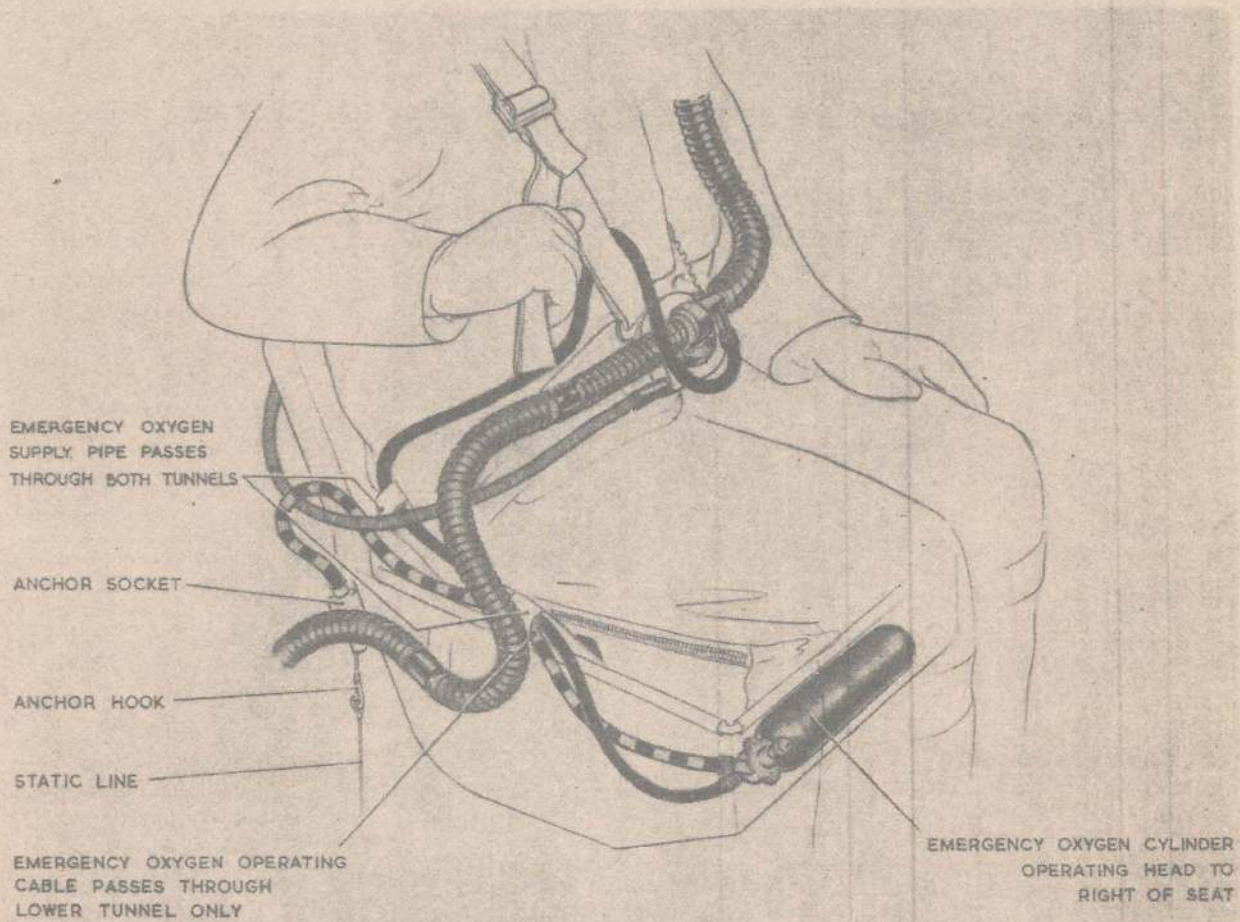
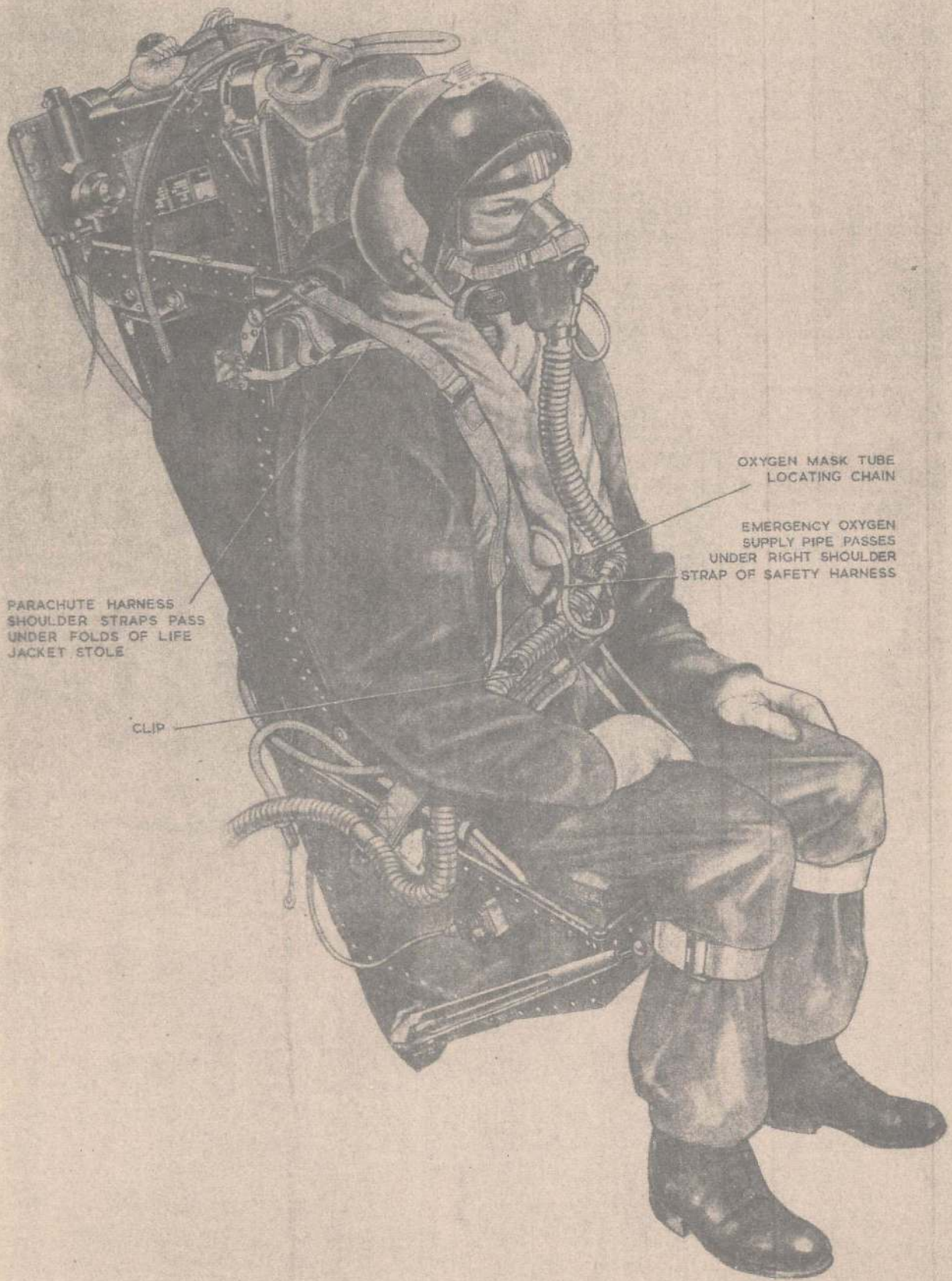


Fig. 3. Arrangement of oxygen pipes on the seat

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PARACHUTE HARNESS
SHOULDER STRAPS PASS
UNDER FOLDS OF LIFE
JACKET STOLE

CLIP

OXYGEN MASK TUBE
LOCATING CHAIN

EMERGENCY OXYGEN
SUPPLY PIPE PASSES
UNDER RIGHT SHOULDER
STRAP OF SAFETY HARNESS

Fig. 4. The seat occupied (1)

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HEAD AT CENTRE OF HEADREST

LEG-RESTRAINT CORDS PASS UNDER SAFETY HARNESS LAP STRAPS

MIC-TEL LEAD AND DROGUE GUN STATIC ROD ATTACHED TO BULKHEAD

BOTH SAFETY PINS STOWED FOR FLIGHT

LEG-RESTRAINT GARTERS

Fig. 5. The seat occupied (2)

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