

Chapter 3

SEAT STRUCTURE AND GUIDE RAIL

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SEAT STRUCTURE

1. The seat structure (*fig. 1*) is made entirely of light alloy. The main frame is built up from a pair of side beams connected at the top by a cross-beam which receives the thrust of the ejection gun piston, and at the bottom by a distance tube through which passes the countershaft carrying the seat raising levers and handle.

2. Each side beam carries at its lower end two of the rollers which engage with the guide rail. The upper rollers leave the top of the guide rail at the moment the piston tube emerges from the cylinder tube at the end of the ejection stroke.

3. The seat pan (*fig. 2*) is supported on the seat raising levers and restrained at its upper corners by two blocks which slide in guides machined in the side beams. The sides of the pan are shaped to form thigh guards which both restrain the occupant's knees from contact with the aircraft structure during ejection and also prevent his legs from being injured by being blown apart by the air pressure on emerging from the cockpit. The weight of the occupant is counterbalanced by two direct acting compression springs (*fig. 3*). The thigh straps of the safety harness are attached to the pan; in addition, on each side of the pan is a thin tube to house an elastic cord which is attached to the thigh straps. This elastic cord is to retain the loose straps of the harness close to the seat when not in use, and thereby prevent damage to any adjacent controls or instruments which might occur if the straps were free to be thrown about. The front edge of the seat pan incorporates a sanitary tube clip, and the sides have key-hole slots machined in them to contain the aircraft control locking device.

4. The ejection footrests are mounted on telescopic tubes and are spring-loaded so that they remain in contact with the aircraft floor whatever the position of the seat pan. Each spring housing is secured to the front edge of the seat pan and braced by a short strut at the bottom of the pan. As there is a slight fore-and-aft movement of the footrests when the seat pan is raised or lowered, a small roller is fitted at the lower end of each outboard telescopic tube to ensure that this action shall be smooth.

5. The seat raising mechanism (*fig. 4*) is operated by a handle on the starboard side of the seat. The trigger control, by means of the sear and the roller displaces axially the sear bar, which in turn withdraws the pair of spring-loaded plungers from engagement with the quadrants and allows the seat raising levers attached to the countershaft to be rotated by the seat raising handle. Release of the trigger control allows the plungers to engage the nearest holes in the quadrants and lock the mechanism in the desired position. Five positions are provided, with a total adjustment of 4 in.

6. The parachute container (*fig. 5*) is a riveted sheet metal box hinged at its lower edge to a pair of brackets bolted to the seat beams. The hinge is formed by spring-loaded plungers which are freed by pulling the withdrawal knobs. The container supports the weight of the parachute during flight and takes sideways loads. The parachute lifts easily out of the container when the occupant leaves the seat. The upper edge of the container is secured to a pair of telescopic radius arms, the body of each of which is pivoted to the seat beam, and the sliding member to the container upper edge. This latter

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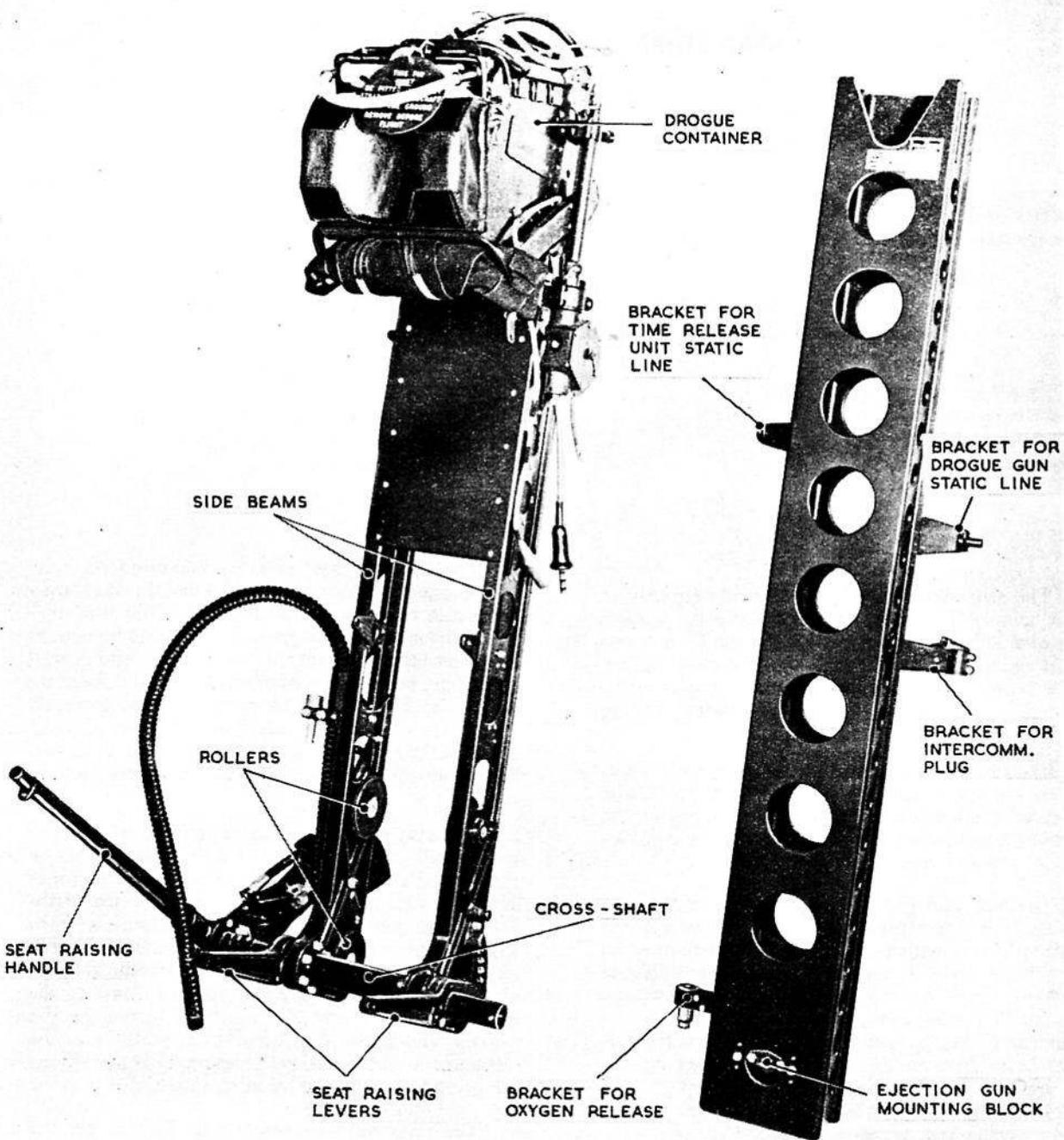


Fig. 1. Seat structure and guide rail

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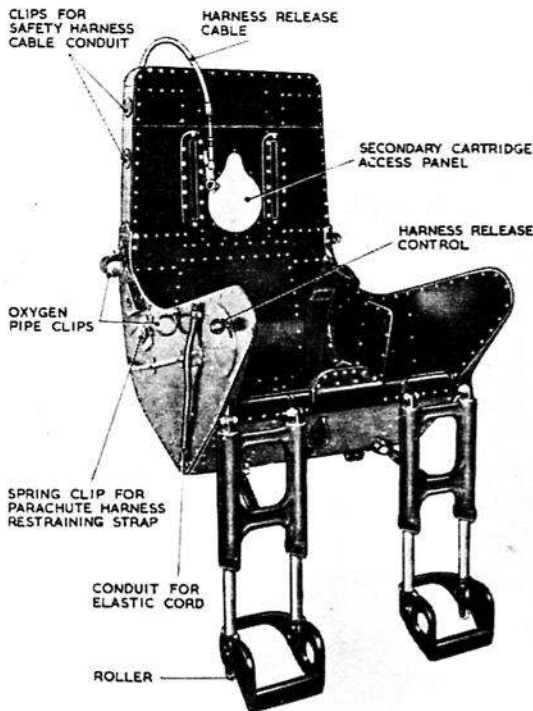


Fig. 2. Seat pan and footrests

point forms the attachment for the shackle for the Type ZF safety harness shoulder strap. Each sliding member has two notches which may engage with the spring-loaded plunger. One of these notches is chamfered on its forward face so that, if the plunger is in it, the seat occupant can return the container to the next position to the rear by leaning back without operating the harness release lever. The spring-loaded plungers are controlled by the levers mounted on the cross-shaft, the starboard lever being operated by the flexible cable from the control lever in the starboard thigh guard.

7. In the position shown in fig. 5, the mechanism is locked right back. The chamfered notch provides a position of restraint against forward movement, and the unchamfered one against backward movement also. With both notches forward of the plunger the sliding member moves freely, but is limited in the forward direction by the retaining screw which butts against the edge of the groove in the sliding member. The parachute container embodies clips for restraining the apron and parachute pack.

8. The drogue container (fig. 6) is a riveted sheet metal box mounted at the top of the seat frame. A leather covered headrest pad is secured to the front of the container by two pins which are withdrawn by the lifting lines after the scissor shackle has opened. The firing handle is attached to the front edge of the face screen. The face screen, which is normally retained folded in the front compartment of the drogue container, is made of lined canvas and is specially shaped to protect the user's face from

the air stream and to provide support for the head. The face screen is designed to accommodate a protective helmet. The firing cable is attached to the centre of the face screen by a sewn nylon cord loop and then passes through a conduit to the ejection gun firing mechanism. This conduit prevents the cable from being pulled inadvertently and so firing the gun.

9. The top of the drogue container is closed by four fabric flaps which normally retain the drogue. They are numbered 1 to 4 in the order starboard, port, rear, front.

Barostatic time-release unit

10. This unit (fig. 7 and 8), mounted at the top of the starboard side beam, is designed to facilitate release of the drogue connection from the seat shackle and to release the safety harness. It incorporates three spring-loaded plungers, two of which serve to actuate the previously mentioned releases. The third one, which is independent of the other two, embodies a rack which is in engagement with a train of gears. This train of gears is regulated by an escapement and star wheel which

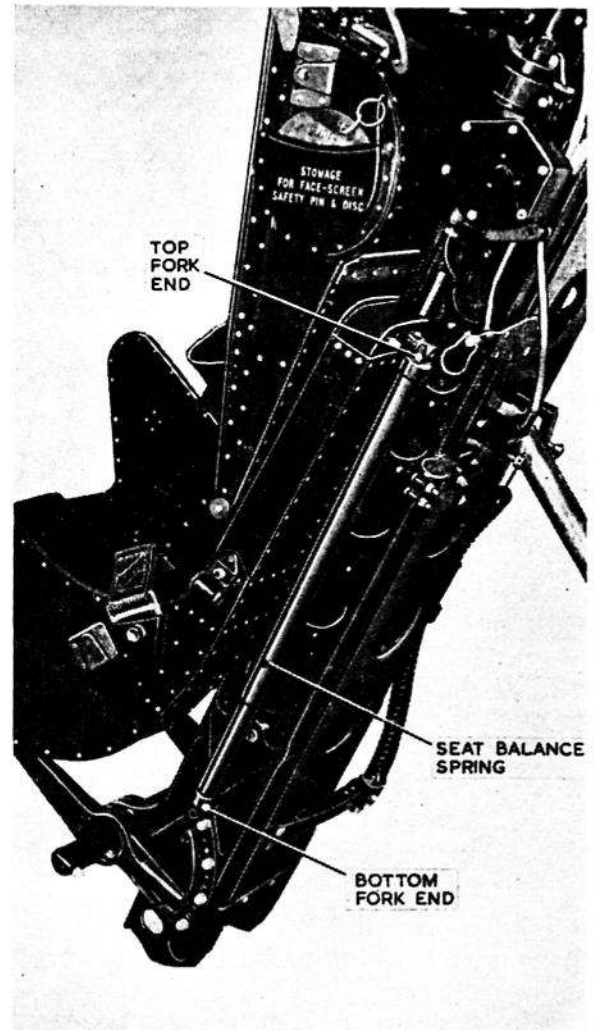


Fig. 3. Seat balance spring

(A.L.24, Oct. 56)

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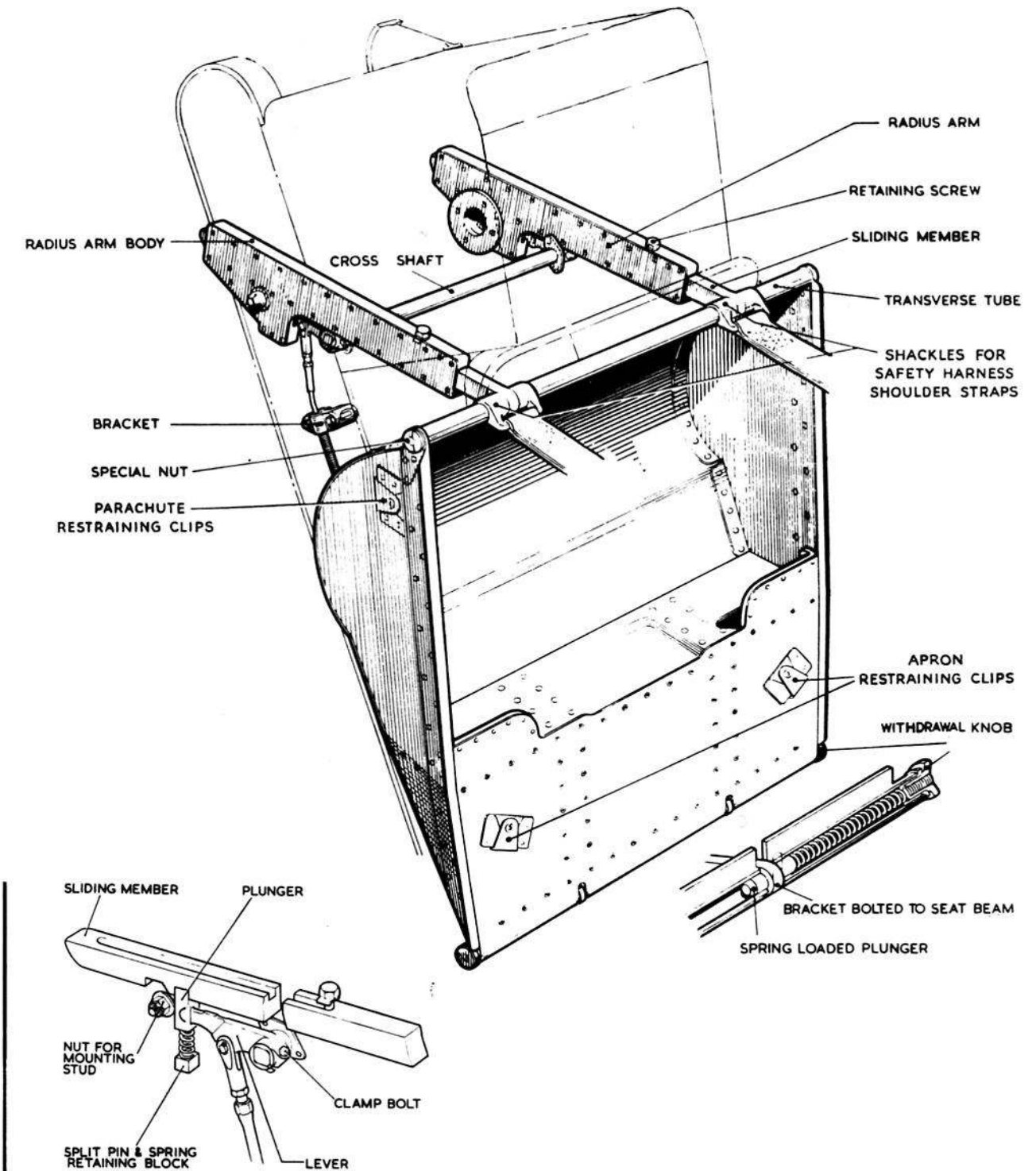


Fig. 5. Parachute container

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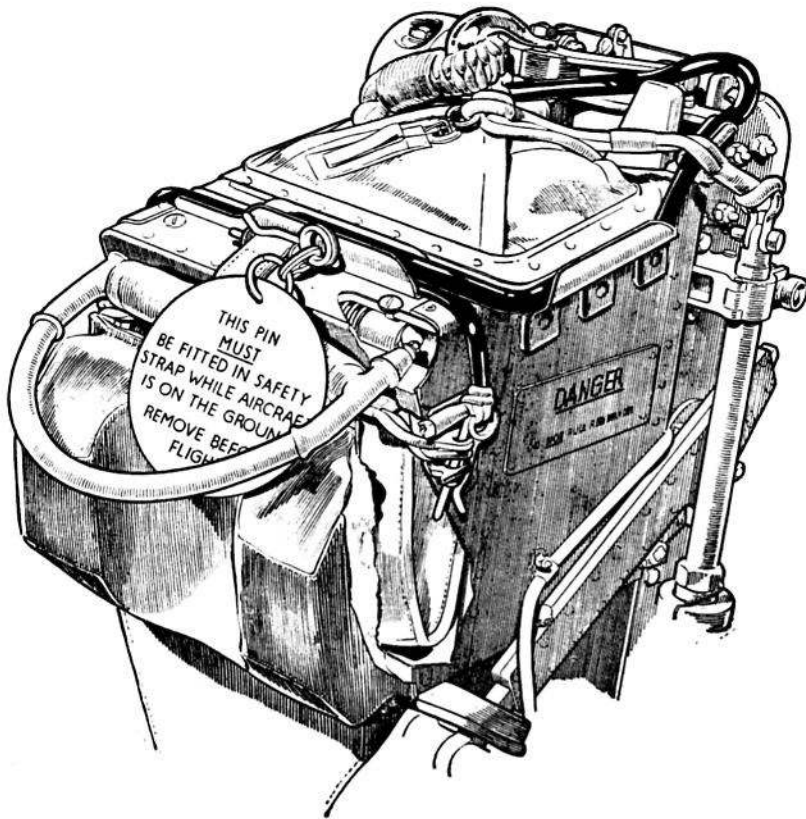


Fig. 6. Drogue container

in turn is governed by a barostat. A short static line to actuate the mechanism is connected to a bracket on the guide rail.

11. The barostat control remains in engagement with the star wheel, thus preventing automatic release from the seat, until a safe altitude is reached, i.e., where the effects of anoxia and low temperature have negligible effect upon the seat occupant; this is approximately 10,000 ft. On reaching this altitude, the restraint imposed on the star wheel and consequently the time-release mechanism is removed, thus allowing it to function in the normal manner and effect release of the occupant from the seat.

Operation

12. As the seat begins to leave the aircraft, the static line extracts the seat from the release plunger which then disengages from the spring-loaded primary plunger. The primary plunger commences to rise under the spring pressure; this movement is regulated by the pinion, part of a train of gears terminating in an escapement, in mesh with the rack. After a three seconds delay, immediately the rack overruns the pinion, a bell

crank lever, sliding in a groove in the rack, locates itself in a slot and, as the plunger extends freely, rotates. This movement enables the secondary plunger under spring pressure to descend; in so doing it removes restraint on the scissor shackle by virtue of the restraining plunger being free to move outwards as indicated by the arrow in fig. 8. The shackle opens and releases the drogue shackle from the seat structure.

13. The downward movement of the secondary plunger frees a pivot which is enabled to rotate under spring pressure. This in turn releases the harness release cable plunger which is allowed to rise under the action of its spring. The plunger is connected by a cable to a lever on the safety harness quick-release fitting which is then freed.

GUIDE RAIL

14. The guide rail (fig. 1) consists of a single extrusion bolted to the aircraft structure and normally it should not be necessary to remove it. Built into it towards its lower end is a block which receives the thrust of the ejection gun cylinder and

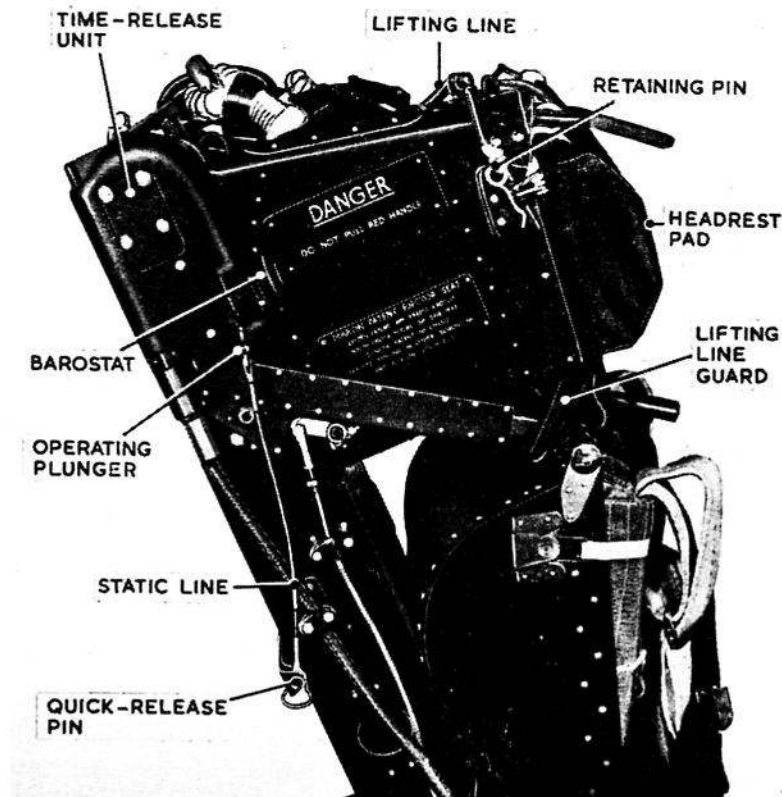


Fig. 7. Barostatic time-release unit

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incorporates the bottom latch which retains the cylinder tube. The slots in the upper end of the guide rail receive the cross-beam and restrain the forward impulse of the seat in the event of a crash landing.

15. Bolted to the rear of the guide rail are two brackets to which the static lines for the drogue gun and time-release unit are attached by quick-release pins; a third bracket accommodates the intercom. quick-release connection.

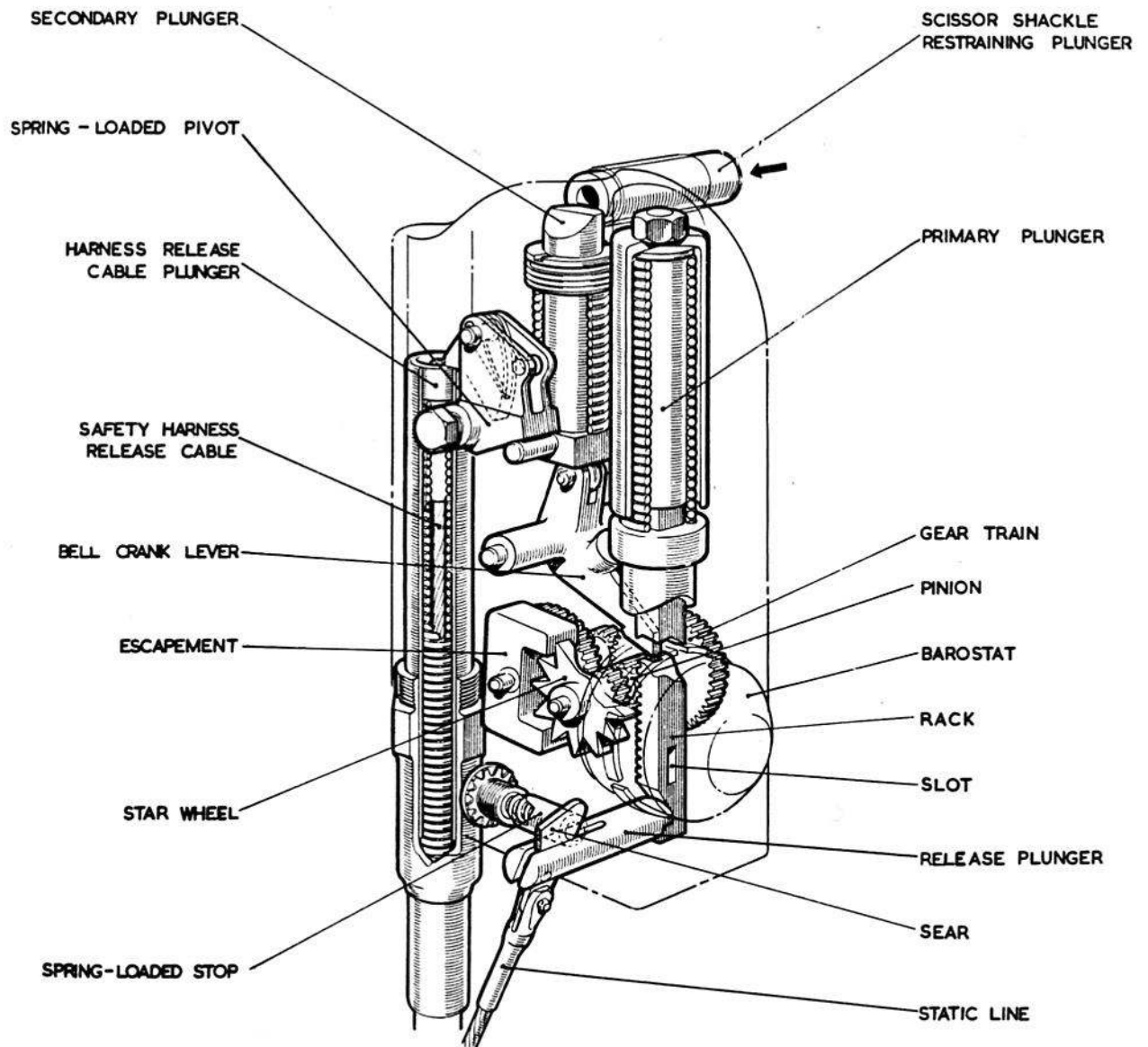


Fig. 8. Details of time-release unit

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