

Chapter 6

(Cancelled. ALLS)

EJECTION SEATS, TYPE 3LS/1 AND 3LS/2, Mk. 1

LIST OF CONTENTS

	Para.		Para.
<i>Introduction</i>	1	<i>Examining the harness release mechanism</i> ...	39
General description	3	<i>Packing the face screen</i>	40
<i>Safety precautions</i>	11	<i>Examining the leg restraining device</i> ...	41
Common components	13	<i>Testing the leg restraining cords</i> ...	42
<i>Ejection gun</i>	14	<i>Changing the webbing in the 25G beam</i> ...	43
<i>Drogue gun</i>	16	<i>Removing the P.E.C.</i>	44
<i>Barostatic time-release unit</i>	17	<i>Fitting the P.E.C.</i>	45
<i>Drogue assembly</i>	18	<i>Testing the harness release and leg restraining mechanism</i>	46
<i>Canopy jettison and time-delayed firing unit</i> ...	19	<i>Adjusting the harness release and leg restraining mechanism</i>	47
<i>Personal equipment connector</i>	20	<i>Adjusting the manual release lever</i> ...	48
<i>Hymatic valve</i>	21	<i>Synchronising the seat locks</i>	49
Seat structure	22	<i>Adjusting the P.E.C. release</i>	50
<i>Release linkage</i>	27	<i>Adjusting the leg restraining cord release mechanism</i>	51
<i>Leg restraining device</i>	30	<i>Functional check of the mechanism</i> ...	52
Guide rail	31	<i>Servicing the taper plug assemblies</i> ...	53
Servicing		<i>Connecting the drogue withdrawal line</i> ...	54
<i>Common components</i>	33	<i>Servicing the 2 to 1 reduction gear</i>	
<i>Servicing the seat structure</i>		<i>To dismantle the assembly</i>	55
<i>To remove the seat pan</i>	34	<i>To examine the components</i>	56
<i>To dismantle the seat raising mechanism</i> ...	35	<i>To assemble the components</i>	57
<i>To examine the seat raising mechanism</i> ...	36		
<i>To assemble the seat raising mechanism</i> ...	37		
<i>To fit the seat pan</i>	38		

LIST OF ILLUSTRATIONS

	Fig.		Fig.
<i>Type 3LS/1, Mk. 1 ejection seat</i>	1	<i>Details of go-forward control</i>	7
<i>Seat structure</i>	2	<i>Folding the face screen</i>	8
<i>Details of seat raising mechanism</i>	3	<i>Changing harness webbing</i>	9
<i>Details of armrest</i>	4	<i>Marking the quadrant</i>	10
<i>Details of harness release mechanism</i>	5	<i>Connecting the drogue withdrawal line</i> ...	11
<i>Details of 25G beam</i>	6	<i>Details of 2 to 1 reduction gear</i>	12

Introduction

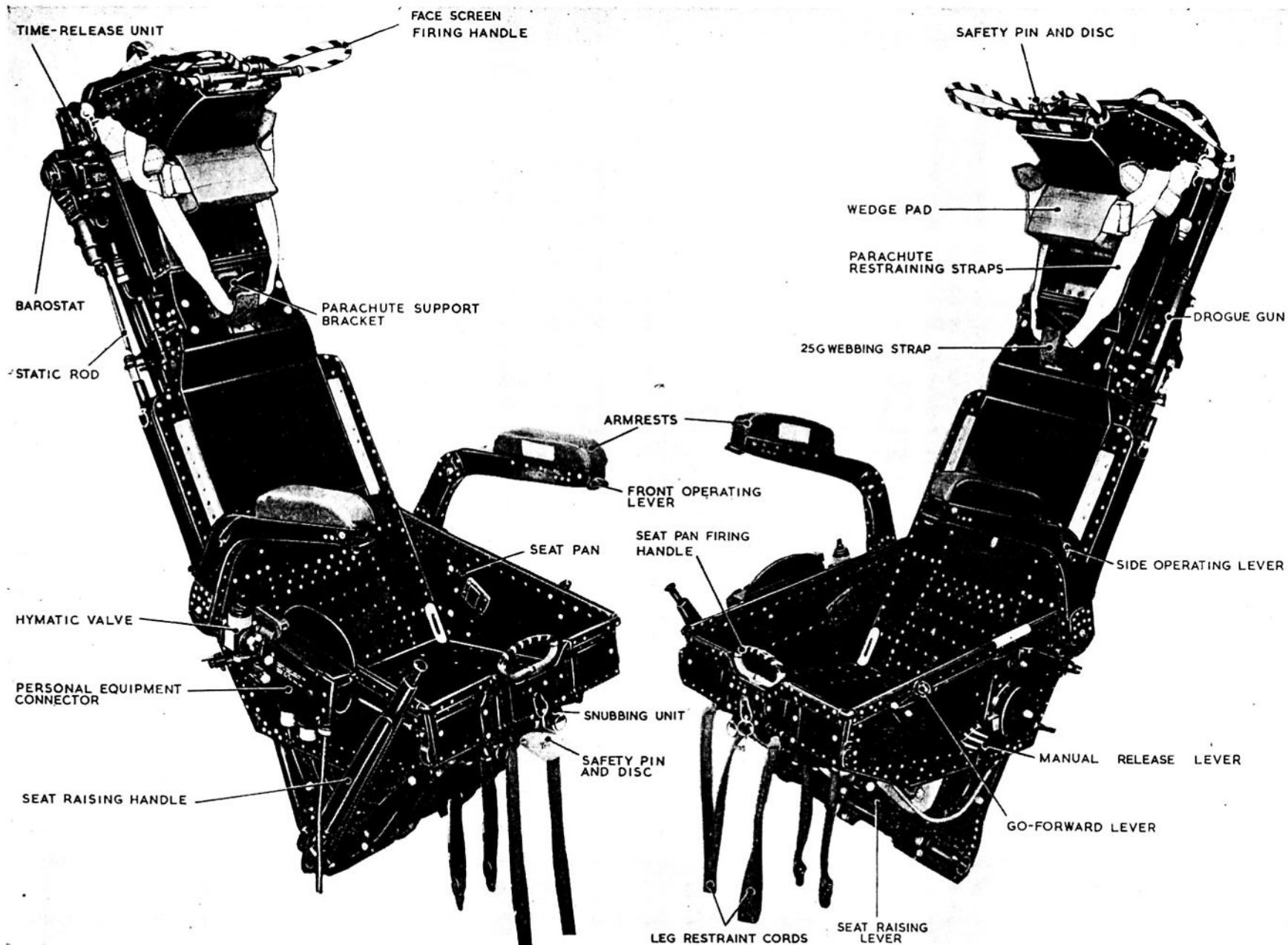
1. The Type 3LS/1, Mk. 1 and 3LS/2, Mk. 1 ejection seats (Ref. No. 27L/50095 and 50097 respectively) are installed in the Victor B Mk. 2 aircraft.

2. The two seats are basically similar but handed in respect of the seat raising handle being on the inboard side in each instance, therefore only the Type 3LS/1, Mk. 1 will be dealt with in this chapter.

RESTRICTED

RESTRICTED

Fig. 1. Type 3LS/I, Mk. 1 ejection seat



GENERAL DESCRIPTION

3. The seat structure complete with seat pan (fig. 1) slides during ejection on four rollers in a guide rail bolted to the aircraft structure. It is propelled by the cartridge operated ejection gun which is located within the hollow guide rail.

4. The canopy is jettisoned, the control column retracted and the ejection gun is fired by the action of pulling down the firing handle situated at the top of the drogue container. This handle draws out from the drogue container a flexible screen which covers the occupant's face and protects it from the effects of the airstream. It also holds his head back against the headrest pad and so prevents it from jerking forward during ejection. Spring-loaded plungers prevent the face screen from being sucked out of its compartment by the airstream should the canopy be unlocked during flight. Attached to the face screen is a bifurcated cable and two links connected to the canopy jettison and time-delayed firing unit. When the face screen is pulled right down over the face, the cable withdraws the sears from the canopy jettison and control column retraction firing units and the cartridges are fired; at the same time the cable operates the time-delay mechanism trip lever and, 1 sec. after the restrictor pin is removed by the jettisoned canopy, the ejection gun is fired. The face screen and firing cable are proportioned in such a manner that the firing units will be operated whether the occupant is wearing a protective helmet or not.

5. The seat pan accommodates a personal survival pack containing a dinghy and other items of survival equipment and can be adjusted for height by a hinged handle on the starboard side of the seat structure. The seat pan moves relative to the headrest and can thus accommodate different body lengths, at the same time ensuring that the occupant's head is always correctly located whatever the position of the seat pan. Whilst adjusting the seat pan the weight of the occupant is counter-balanced by two elastic cords (fig. 2). Borne on the front of the seat pan is a seat pan firing handle which is used only if it is impossible to reach the face screen firing handle, e.g. in conditions of high 'G'. A 2 to 1 reduction gear is incorporated in the system to reduce the load required to operate the seat pan firing handle.

6. A leg restraining device is incorporated to ensure that the occupant's legs are drawn back automatically and restrained close to the seat pan. This provides leg clearance during ejection and also prevents injury from the legs being blown apart by the airstream after the seat has emerged from the cockpit.

7. A horseshoe-shaped parachute assembly is supported on a bracket immediately below the drogue container and is held in position by the two restraining straps, integral with which is a wedge pad for the occupant's head. The lower

end of the straps terminate in metal end rings which are located on the webbing lug which engages a plunger in the 25G beam. The upper end of the straps are passed through the buckles of the short restraining straps and attached to the buckles of the headrest pad.

8. The starboard side of the seat pan carries the seat portion of the personal equipment connector (P.E.C.) which is interconnected with the leg restraining mechanism.

9. The automatic system comprises a barostatic time-release unit which controls the opening of the scissor shackle at the top of the seat structure and also operates the linkage which frees the harness, leg restraining cords and the man portion of the P.E.C.

10. The Mk. 8D emergency oxygen set is mounted in brackets at the rear of the seat pan on the starboard side, and the Hymatic valve is immediately behind the P.E.C. The manual control is mounted on the aircraft floor inboard of, and adjacent to, the seat.

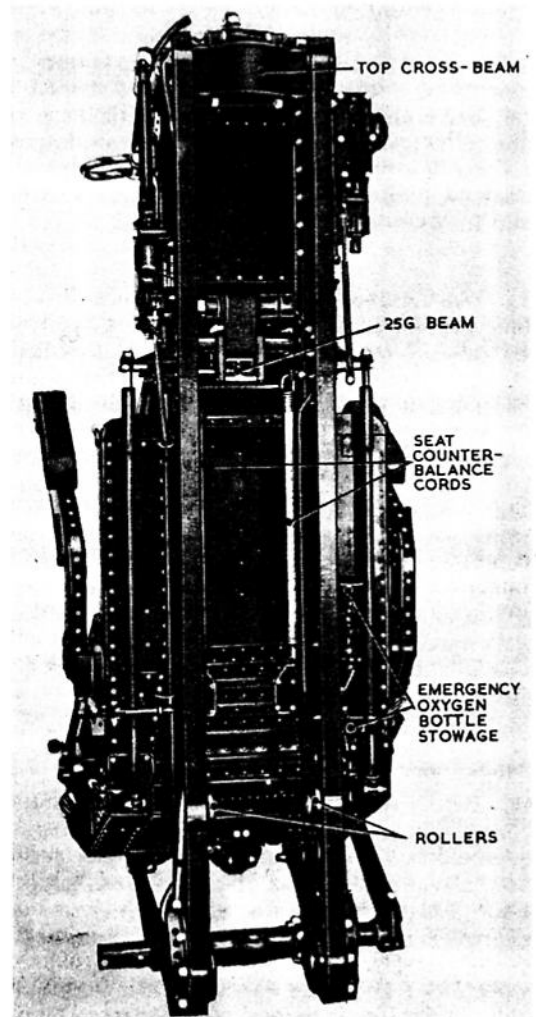


Fig. 2. Seat structure

RESTRICTED

Safety precautions

11. Two red warning labels carrying safety pins are provided. The first carries four pins; one of the pins is used, when necessary, to render the face screen firing handle safe against inadvertent withdrawal, or all four pins are used to render the ejection gun firing body and the canopy jettison and time-delayed firing unit safe. The second carries one safety pin for locking the seat pan firing handle.

12. Before entering the cockpit, or before any work is commenced on or near the seat, the appropriate safety precautions are to be applied in accordance with current instructions.

COMMON COMPONENTS

13. These components are fully described in A.P.4288A, Vol. 1, but the general details are included in this chapter for guidance.

Ejection gun

14. The Type 3C, Mk. 1 ejection gun has a stroke of 72 in. with an ejection velocity of 80 ft. per sec. and consists of three telescopic tubes. The outer or cylinder tube is attached at its lower end to the bottom mounting block fitted in the guide rail and the inner or piston tube is attached at its upper end to the top cross-beam of the seat frame; the intermediate piston tube is situated between the other two and its purpose is to lengthen the stroke and to offer restraint against bending loads imposed on the gun by the airstream. The explosive is contained in five cartridges; a primary cartridge and four secondary cartridges.

15. At the upper end of the inner piston tube is a breech containing the firing body and the primary cartridge. When the firing handle is pulled the canopy jettison and time-delayed firing unit is operated, it retracts the control column, jettisons the canopy and, 1 sec. after the restrictor pin is removed by the jettisoned canopy, the articulated link withdraws the sear from the ejection gun firing body. The movement of the sear first compresses the firing pin spring and then releases the firing pin to strike the percussion cap of the primary cartridge. The gas pressure frees a release piston and the two piston tubes are propelled upwards, so uncovering two pairs of ports in turn so that the secondary cartridges are ignited by the flame of the primary cartridge.

Drogue gun

16. The Type 4 drogue gun is mounted on the port side beam of the seat structure and consists of a time-delay mechanism, a barrel and a piston. As the seat ascends the guide rail during ejection, a static rod withdraws a sear and the time-delay mechanism is tripped. After 0.5 sec. delay, a small cartridge is detonated, the gas pressure propels the piston upwards, shearing a split pin which holds the piston in the barrel, and the piston is ejected. Attached to the upper end of the piston is the drogue withdrawal line.

Barostatic time-release unit

17. The barostatic time-release unit, Type 5, Mk. 1, is mounted at the top of the starboard seat beam and its purpose is to free the drogues from the scissor shackle and also release the combined harness. As the seat ascends the guide rail during ejection, a static rod withdraws a firing pin and a time-delay mechanism commences to function provided ejection has occurred below barostatic capsule operating height. Above this height a barostat remains in engagement with the train of gears and prevents the mechanism from operating until this height is reached. The mechanism provides a delay of 1.25 sec., but a G controller switch is incorporated which delays the operation still further if the speed at the time of ejection is too high for safe parachute deployment.

Drogue assembly

18. This assembly when developed first checks the forward speed of the seat and then stabilizes the seat and occupant. It consists of a controller drogue with a diameter of 22 in. and a main drogue 5 ft. in diameter. The controller drogue is connected to the main drogue by nylon tape and the main is connected to the drogue shackle by nylon shroud lines.

Canopy jettison and time-delayed firing unit

19. This unit provides the power for jettisoning the canopy and operating the control column snatch unit. It also incorporates a time-delay mechanism which fires the main ejection gun approximately 1 sec. after the restrictor pin has been removed by the jettisoned canopy. The firing and time-delay mechanisms are contained in separate compartments within a casing which is mounted at the top of the guide rail. When the firing handle is pulled for the purpose of ejection, the firing cable withdraws both sears and initiates the time-delay mechanism simultaneously. The gas from the canopy jettison cartridge is fed away to the canopy jettison jacks and the gas pressure from the breech unit forces the piston in the piston unit forward. This induces tension in the cable which therefore operates the control column snatch unit.

Personal equipment connector

20. The purpose of this unit is to enable the occupant to connect and disconnect his personal services to and from the aircraft supply in one action in each instance. It consists of three components: a seat portion, a man portion which is fitted to the flying clothing and an aircraft portion which disconnects automatically on ejection.

Hymatic valve

21. The Hymatic valve, Type RV51/2 is provided to control the pressure of oxygen supplied from the continuous-flow type emergency oxygen system for pressure breathing. It performs this function by providing for the outward relief of excess pressure and inward venting when the pressure in the system drops. A non-return valve isolates the emergency oxygen system (when not in use) from the normal oxygen supply.

RESTRICTED

SEAT STRUCTURE

22. The seat structure is made almost 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 cross-shaft through which passes the countershaft carrying the seat raising levers and handle. Each side beam carries at its lower end two of the rollers which engage with the guide rail. The upper rollers leave the guide rail at the moment that the ejection gun intermediate piston tube reaches the end of its stroke.

23. The seat raising mechanism (*fig. 3*) is operated by the seat raising handle; this is hinged and spring-loaded sideways against the side of the seat to reduce the overall width. Depression of the trigger control, through the sear lever and connecting link, displaces axially the sear bar. This causes rollers on the pair of spring-loaded plungers to ride up the ramp faces and withdraw the plungers from engagement with the quadrants. Rotation of the countershaft by the handle then raises or lowers the seat, the weight being counter-balanced by the elastic cords. Release of the trigger control allows the plungers to engage the nearest hole in the quadrants and so lock the mechanism in the desired position. Seven positions are provided, with a total adjustment of 6 in. The seat pan is supported on the seat raising levers and restrained at its upper corners by two spring-loaded plungers which slide in guides machined in the side beams.

24. Two independent armrests are provided at the rear of the seat pan each of which can be retracted freely but, by operating either of the levers (*fig. 4*) one of four forward positions can be selected. Movement of an operating lever is transmitted by the operating rod to a bell-crank lever and thence by means of a connecting rod to a locking plunger. The plunger is spring-loaded and can engage one of the four segments machined in the inside face of a semi-circular quadrant on the seat pan. The bottom surface of the plunger is bevelled to provide free retraction to the rear position.

25. The drogue container is a riveted sheet metal box mounted at the top of the seat structure. The face screen firing handle is fitted to the front edge of the container and is retained by two spring-loaded plungers. The face screen is retained in its own compartment in the container by two nylon cords which pass through conduits and are secured at the rear by two pins. These pins are withdrawn by a lifting line after the scissor shackle has opened, so freeing the face screen, firing handle and parachute restraining straps. The drogues and shroud lines are stowed in a separate compartment at the rear of the face screen.

26. The top of the drogue container is closed by four fabric flaps which normally retain the drogues in their stowage. They are threaded on to a cone in a pre-determined order and locked by a pin which is fitted part-way along the drogue withdrawal line. A No. 8 thread safety tie prevents inadvertent withdrawal of the locking pin.

Release linkage

27. When the time-release unit is tripped the descending harness release plunger strikes a pad at the end of the harness release lever (*fig. 5*) which, in rotating downwards, operates the linkage; simultaneously the scissor shackle is freed and so releases the lifting line which in turn frees the parachute restraining straps and the face screen. The vertical link of the mechanism embodies a slot and, as the link descends, it withdraws the harness restraining plunger and also actuates a bell-crank lever which transmits the motion to a pair of torsion bars which frees the man portion of the P.E.C., the leg restraining cords and operates the seat pan locks. A manual release lever on the port side of the seat pan is coupled with this linkage.

28. The harness release mechanism with some details of the linkage is shown in *fig. 6*. The end of the webbing with its lug is held by a locking plunger and the other end of the strap passes over a roller, over a snub lever and round a spring-loaded drum. The webbing strap is locked by the radiused top of the spring-loaded snub lever in the forward direction, but is free to pass to the rear under the action of the spring-loaded drum. The go-forward lever (*fig. 7*) on the port side of the seat pan enables the occupant to free the snub lever and to lean forward in the cockpit; the webbing returns automatically to the rearmost position and remains locked when the occupant leans back.

29. The release linkage is connected to the seat portion of the P.E.C. in such a manner that whenever the manual release lever is used (or the linkage is operated by the time-release unit after ejection) the man portion of the P.E.C. and the leg restraining cords are freed automatically.

Leg restraining device

30. The leg restraining cords pass through snubbing units on the underside of the seat pan. The lower ends of the cords are anchored to the aircraft floor and the upper ends terminate in fittings which engage in two taper plug assemblies. Each assembly contains a spring-loaded plunger specially shaped to retain the fittings at the ends of the cords. A torque tube assembly carried in bearings on the front of the seat pan has two small levers to raise the plungers against the spring tension to free the ends of the leg restraining cords. The torque tube assembly is interconnected with the release mechanism by a rod connected to a bell-crank; it is also connected with the seat portion of the P.E.C.

RESTRICTED

RESTRICTED

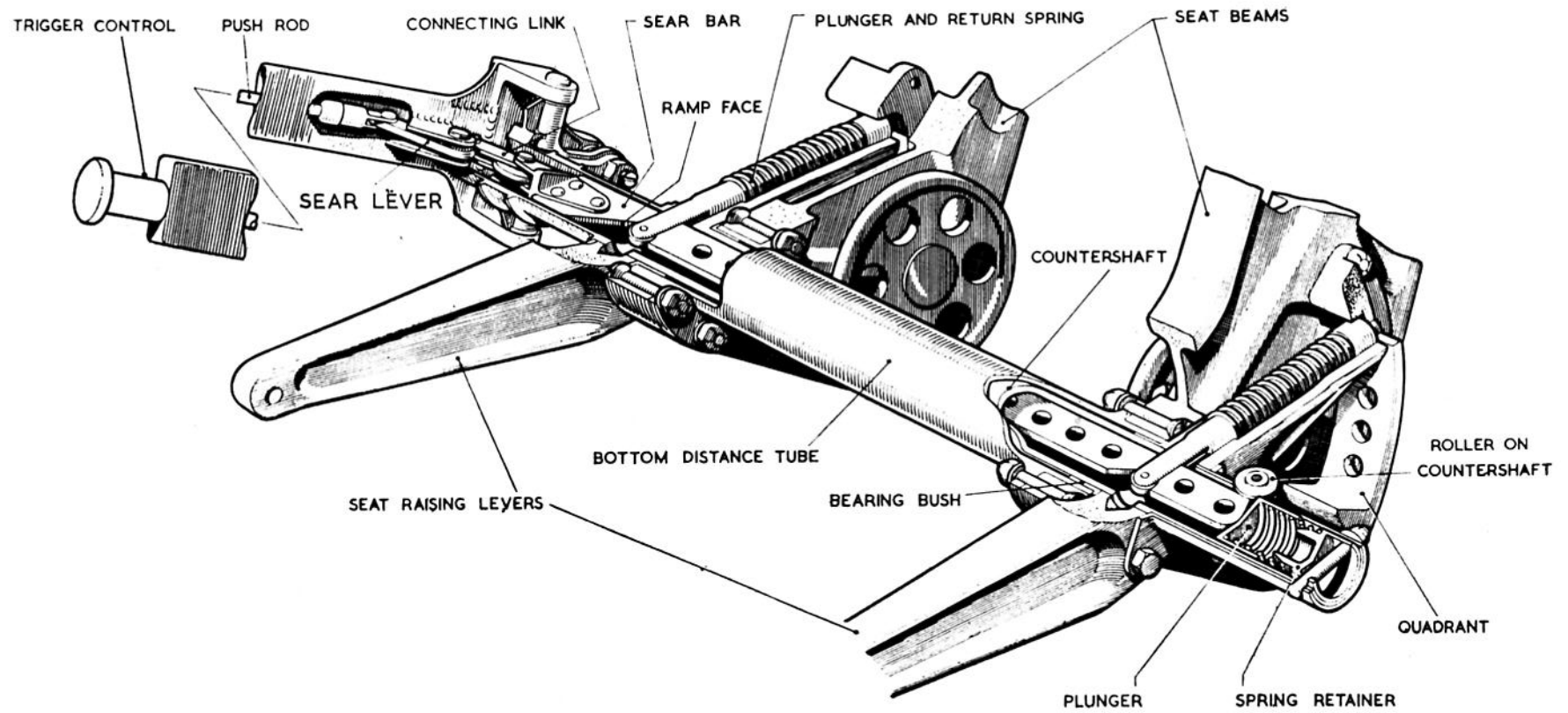


Fig. 3. Details of seat raising mechanism

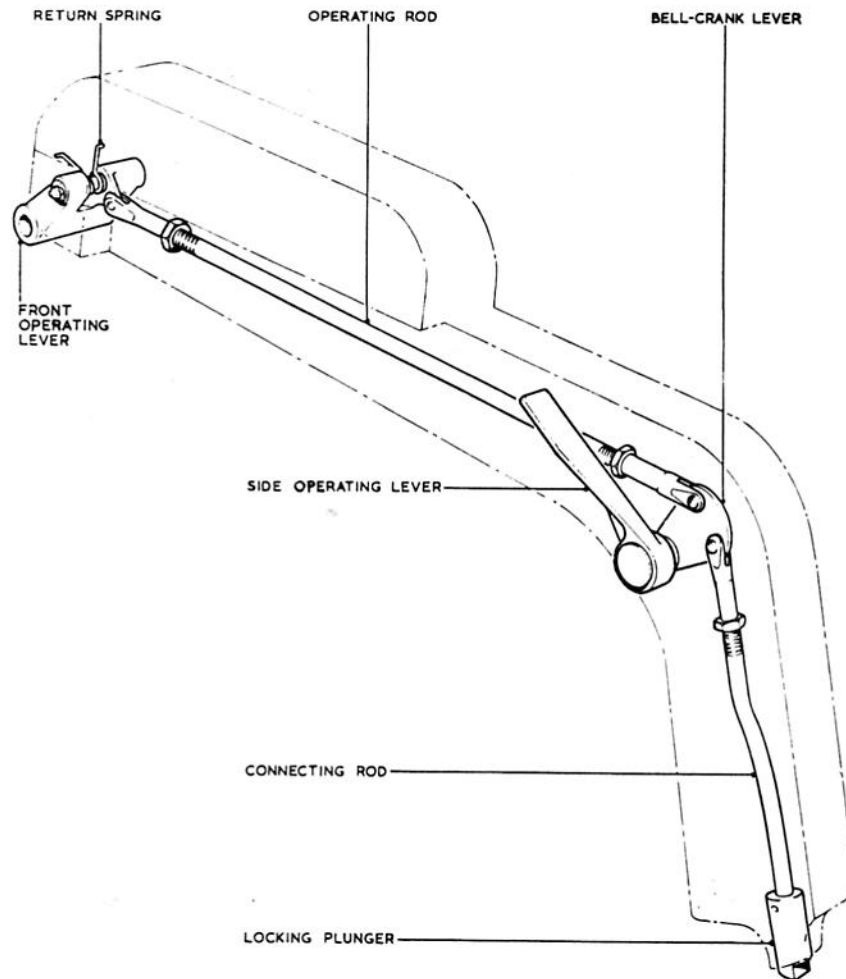


Fig. 4. Details of armrest

GUIDE RAIL

31. The guide rail consists of a single extrusion bolted to the aircraft structure. Built into it towards its lower end is a block which receives the thrust of the ejection gun cylinder and incorporates the bottom latch which retains the cylinder tube. The slots in the upper end of the guide rail receive the seat cross-beam and restrain the forward impulse of the seat in the event of a crash landing. The upper rear face of the guide rail is shaped and drilled to accommodate the canopy jettison and time-delayed firing unit.

32. Bolted to the rear of the guide rail are two brackets to which the static rods for the drogue gun and time-release unit are attached by quick-release pins. The brackets incorporate special guards to prevent accidental operation of the units by personnel passing between the pilot's seats on the flight deck of the aircraft. Attached to the rear upper face of the guide rail is the stowage for the P.E.C. dust cover.

SERVICING

Common components

33. At the periodic servicing of the ejection seat, service the ejection gun, canopy jettison and time-delayed firing unit, drogue gun, barostatic time-release unit and drogue assembly in accordance with the instructions issued in A.P.4288A, Vol. 5.

Servicing the seat structure

To remove the seat pan

34. (1) Raise the seat pan to the top position and release the elastic reaction cords.
- (2) Remove the screws which secure the backrest plate.
- (3) Lower the seat pan to the bottom position and slide out the backrest plate.
- (4) Slacken the harness release torque shaft mounting bolt.
- (5) Remove the clamping bolts from the upper levers on the port and starboard torsion bars.

RESTRICTED

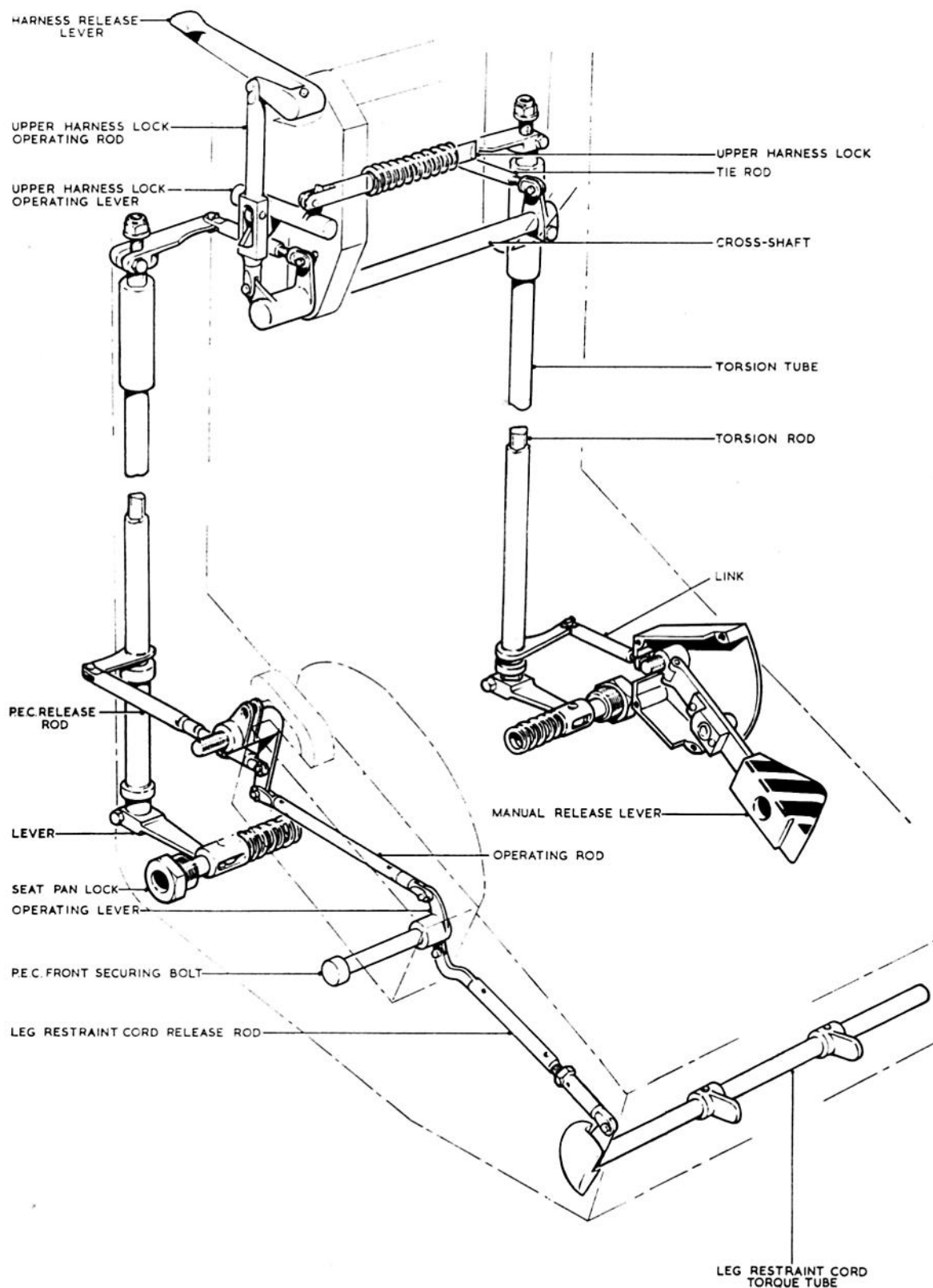


Fig. 5. Details of harness release mechanism

RESTRICTED

- (6) Remove the nuts and special washers; withdraw the port and starboard torsion bars from the main beam brackets and upper levers, ensuring that the bars do not drop back into the torsion tubes.
- (7) Remove the seat pan firing handle from the seat pan firing cable.
- (8) Remove the seat pan firing cable conduit from the seat pan by removing the conduit clamp and the 2 to 1 reduction gear.
- (9) Withdraw the seat pan retaining plungers simultaneously and hinge the seat pan forward.
- (10) Remove the bolts from the ends of the seat raising levers and remove the seat pan, taking care not to bend the harness release torque shaft as it is withdrawn from the torque tube.
- (11) If necessary, separate the armrests from the seat pan by removing the split pins, nuts and washers and withdrawing each armrest from its respective stub-shaft.

To dismantle the seat raising mechanism

35. (1) Remove the 2 B.A. lock-nut and tap out the taper pin from the port end of the countershaft. Remove the spring retainer, spring and plunger.
- (2) Remove the roller from the countershaft fitting. Do not remove the $\frac{1}{4}$ in. B.S.F. bolts from the faces of the seat raising lever bosses.
- (3) Remove the two quadrants by removing the four lock-nuts on each quadrant and depressing the trigger control on the seat raising handle to free the plungers as the quadrants are withdrawn; the four bolts remain in position.

- (4) Remove the seat raising handle by withdrawing the split pin and tapping out the seat raising handle hinge pin.
- (5) Disconnect the sear lever, push up the two plungers simultaneously and pull out the sear bar from the starboard side.
- (6) Remove both plungers and springs and withdraw the countershaft to starboard out of the port seat raising lever and countershaft bearings. If necessary, remove the starboard seat raising lever from the countershaft.

To examine the seat raising mechanism

36. (1) Check that all components are free from corrosion and that all rollers rotate freely without excessive slackness on their pins.
- (2) Check that the sear bar is straight in both planes and that it is free from wear on the ramp faces.
- (3) Check that the locking plungers and springs move freely in their housings in the seat raising levers.
- (3) Check that the locking plungers and springs move freely in their housings in the seat raising levers.

To assemble the seat raising mechanism

Note . . .

Lubricate all parts during assembly with grease XG-275.

37. (1) Pass the shaft (with starboard seat raising lever attached) through the bearing in the side beams, and pass the port seat raising lever (with the countershaft end fitting attached) on to the shaft. Assemble the roller and split pin.

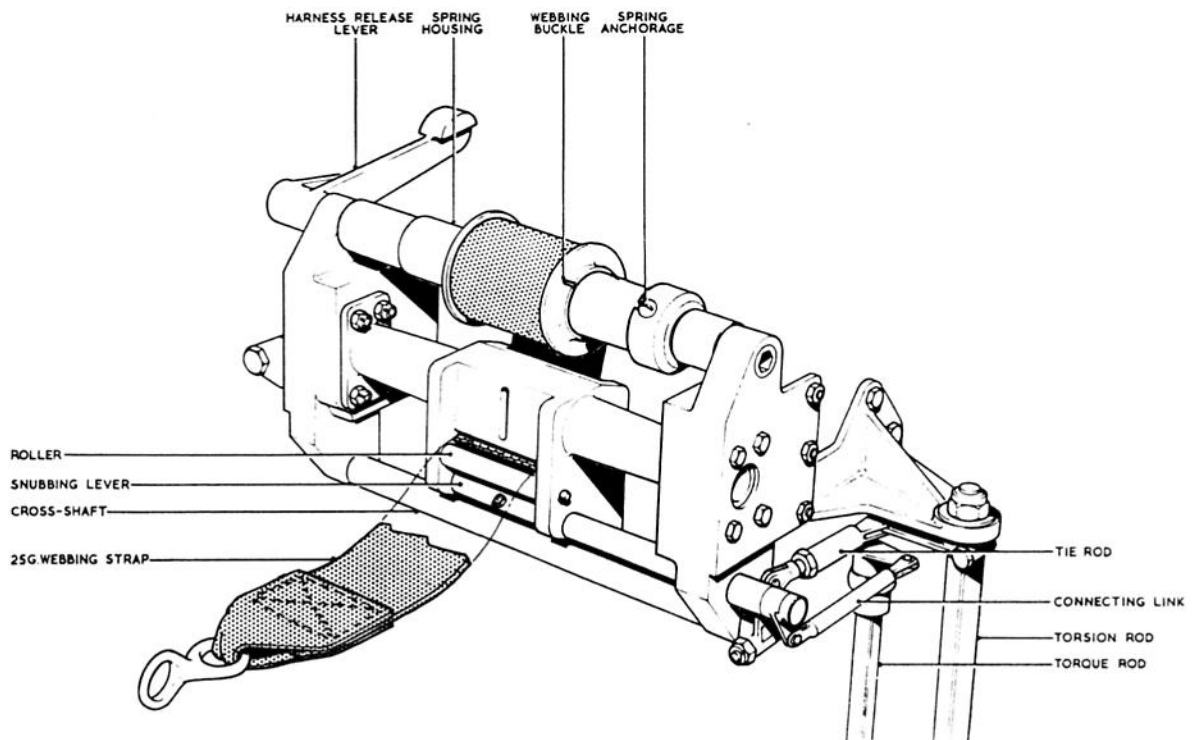


Fig. 6. Details of 25G beam

RESTRICTED

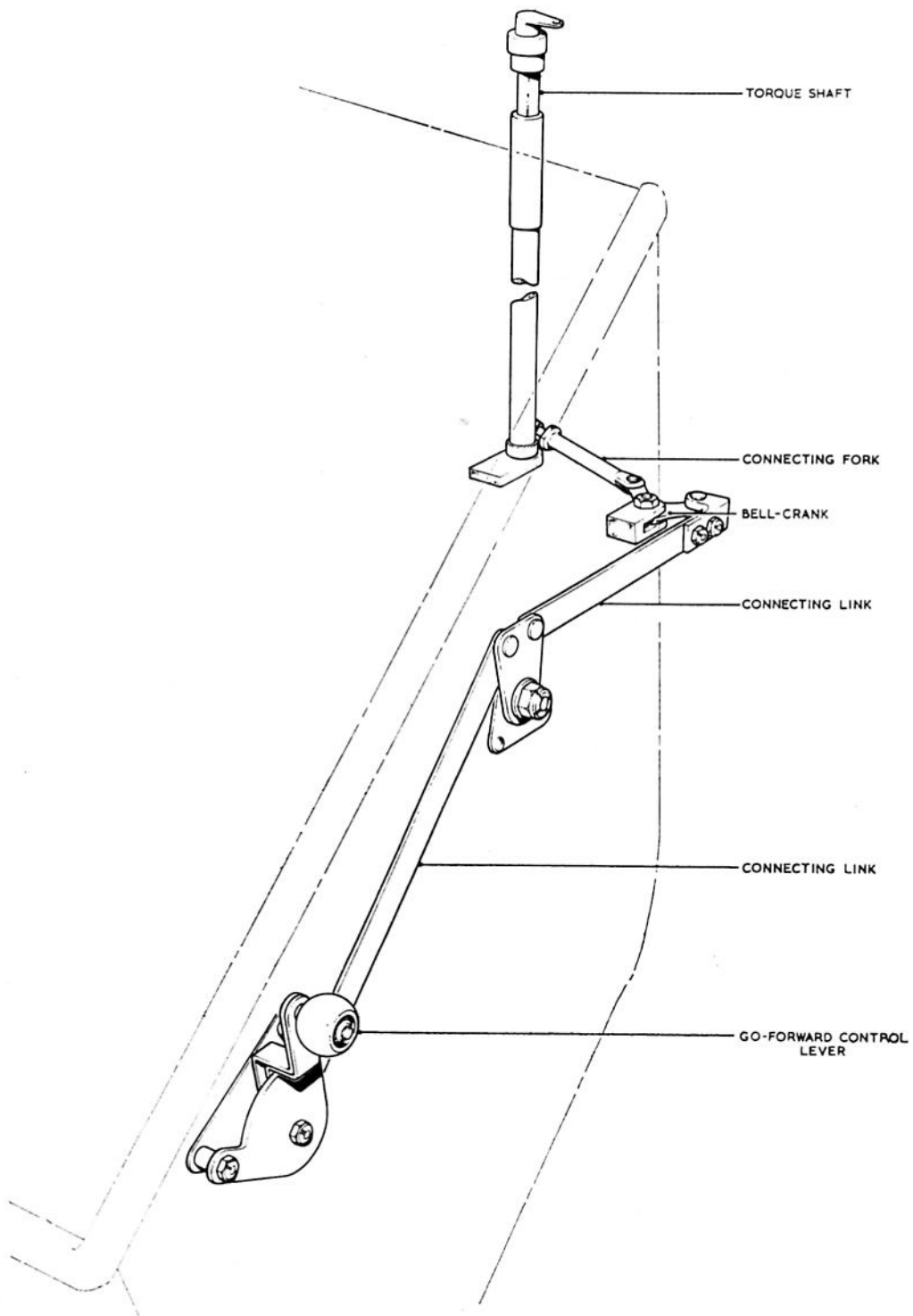


Fig. 7. Details of go-forward control

RESTRICTED

- (2) Insert the locking plungers and springs into the seat raising levers and, whilst depressing each plunger in turn, insert the sear bar into the countershaft passing it through the slots in the locking plungers. Ensure that the end of the sear bar engages the countershaft roller. Connect the sear lever.
- (3) Insert the plunger, spring and spring retainer into the end of the countershaft and fit the taper pin and lock-nut.
- (4) Fit the quadrants and the seat raising handle.

To fit the seat pan

38. (1) Place the seat pan on the seat raising levers ensuring that the harness release torque shaft correctly engages the torque tube. Fit the two bolts which secure the seat raising lever to the seat pan.
- (2) Withdraw the seat pan retaining plungers, hinge the seat pan backwards into position and ensure that the retaining plungers correctly engage the guides in the seat beams.
- (3) Replace the 2 to 1 reduction gear and seat pan firing cable conduit and clamp to the seat pan. Refit the seat pan firing handle.
- (4) Refit the port and starboard torsion bars to the main beam brackets ensuring that each bar is correctly connected with its upper lever. Replace the upper lever clamping bolts and nuts and the torsion bar washers and nuts.
- (5) Tighten the harness release torque shaft mounting bolt.
- (6) With the seat pan in the bottom position, slide the backrest plate into position and fit the securing screws.
- (7) Raise the seat pan to the top position and fit the two elastic reaction cords.
- (8) Check by operation that the seat pan locks in all positions.

IMPORTANT . . .

The seat raising mechanism must NOT be operated with the manual release lever in the UP (operated) position.

Examining the harness release mechanism

39. (1) Examine the upper harness operating rod and cross-shaft linkage, the torsion bars and tubes, the torque bar and tube and the seat pan locks and levers for damage, burring and security of attachment.
- (2) Examine for freedom of movement by operating the go-forward and manual release levers in turn.
- (3) Lightly lubricate moving parts with oil OM-13.

Packing the face screen

40. (1) Fold the face screen into two double folds (one each side) to reduce the width so that the fabric will pass through the slot in the front of the drogue container (centre diagram, fig. 8).
- (2) Insert the face screen into the container and, if the firing cable has been removed from

the container, thread it through the aperture in the front flap, pass it (together with the seat pan firing cable) over the rear flap, under the lines and connect the bifurcated cable and links to their respective sears.

- (3) Pack the face screen into its compartment in a series of double folds approximately the width of the slot. Press well to the rear all the time.

WARNING . . .

Whenever the face screen is re-packed (or the firing cable is connected to the canopy jettison and time-delayed firing unit) ensure that the exposed firing cable is kept as short as possible between the unit and the drogue container, i.e. only leave sufficient cable to reach the unit. If not, there is a serious danger of snagging when the firing cable is pulled, possibly resulting in non-firing of the firing units.

- (4) Press the folds well into the housing with the thumbs and ensure that the forward outer edges of the screen are pressed behind the plunger housings; *this is most important.*
- (5) Insert the locking plungers into their sockets and press home the plungers until they lock in position.
- (6) Check that the rear ends of the nylon tapes are correctly secured by the retaining pins.

Note . . .

The eye ends of the tapes are placed on top of those for the parachute restraining straps.

Examining the leg restraining device

41. (1) With the P.E.C. dust cover fitted, ensure that the cones on the ends of the leg restraining cords lock into their housings at the front of the seat pan.
- (2) Ensure that the cones disengage when the P.E.C. dust cover is removed.
- (3) Examine the cords for fraying and deterioration, particularly at the ends.
- (4) Check the cords for freedom of movement through the snubbing units in a rearward direction but complete restraint in the forward direction.
- (5) Check the snubbing unit release plungers for correct operation.
- (6) Fit the P.E.C. dust cover and engage the leg restraining cord cones in their housings.

Testing the leg restraining cords

42. Suspend each leg restraining cord by one end and attach a dead weight of 5 lb. to the other end, taking care that the load is applied without producing a snatch on the cord. Measure the length of the cord from the centre of the shear rivet at one end to the centre of the fabric loop by which

RESTRICTED

the taper plug fitting is attached to the other end. The length should be 39 in. ± 2 in., and any cords exceeding the upper limit are to be renewed.

Changing the webbing in the 25G beam

43. (1) Lower the seat pan and remove the backrest plate.
- (2) Operate the go-forward lever and pull the webbing out to its full extent.
- (3) Release the anchor buckle (fig. 9) and allow the harness reel to unwind.
- (4) Remove the split pin and withdraw the roller axis pin to its full extent; remove the roller.
- (5) Remove the 4 B.A. taper pin and the SP. 4 pin, withdraw the operating shaft and remove the snubber and spring.
- (6) Remove the unserviceable webbing and insert the new one.
- (7) Replace the snubber, spring and operating shaft.
- (8) Replace the SP. 4 pin and 4 B.A. taper pin.
- (9) Replace the roller and axis pin.
- (10) Fully wind up the harness reel and allow it to unwind between a half and one and a half turns until the anchor buckle slots are accessible.
- (11) Fit the anchor buckle to the reel and allow it to wind in.
- (12) Pull the webbing out to its full extent and ensure that there is at least a half turn pre-loading on the harness reel.
- (13) Ensure that the webbing is free to wind on to the harness reel, but that any forward movement of the webbing is restrained by the snubber.
- (14) Operate the go-forward control and ensure that the snubber is lifted clear of the webbing strap. Adjust as necessary on the adjustable end of the connecting link.
- (15) Replace the backrest plate.

Removing the P.E.C.

44. (1) Ensure that the dust cover is fitted to the P.E.C.
- (2) Remove the nut and washer from the end of the P.E.C. operating lever.
- (3) Remove the two special bolts and the special nut and bolt securing the P.E.C. to the seat pan; remove the P.E.C. from the seat pan.

Fitting the P.E.C.

45. (1) Locate the P.E.C. on the seat pan ensuring that the locating studs are correctly positioned and that the square on the operating lever is correctly engaged with the P.E.C. operating fork lever.
- (2) Replace the special bolt and nut securing the front of the P.E.C. to the seat pan ensuring that the operating rod lever is correctly located on the bolt.
- (3) Replace the two special bolts securing the rear of the P.E.C. to the seat pan and the nut and washer on the operating lever.

Testing the harness release and leg restraining mechanism

Note . . .

- (1) *The following equipment will be required:—Buckles harness (local manufacture), Quantity 2 attached to each end of a 3 ft. length of suitable tape.*
- (2) *It may be found that there are no markings on the quadrant as referred to in sub-para. (1) and elsewhere. If the marks are missing, proceed as follows:—*
 - (a) *Remove the four screws securing the manual release lever quadrant from the INSIDE of the seat pan.*
 - (b) *Remove the nut and washer securing the manual release lever.*

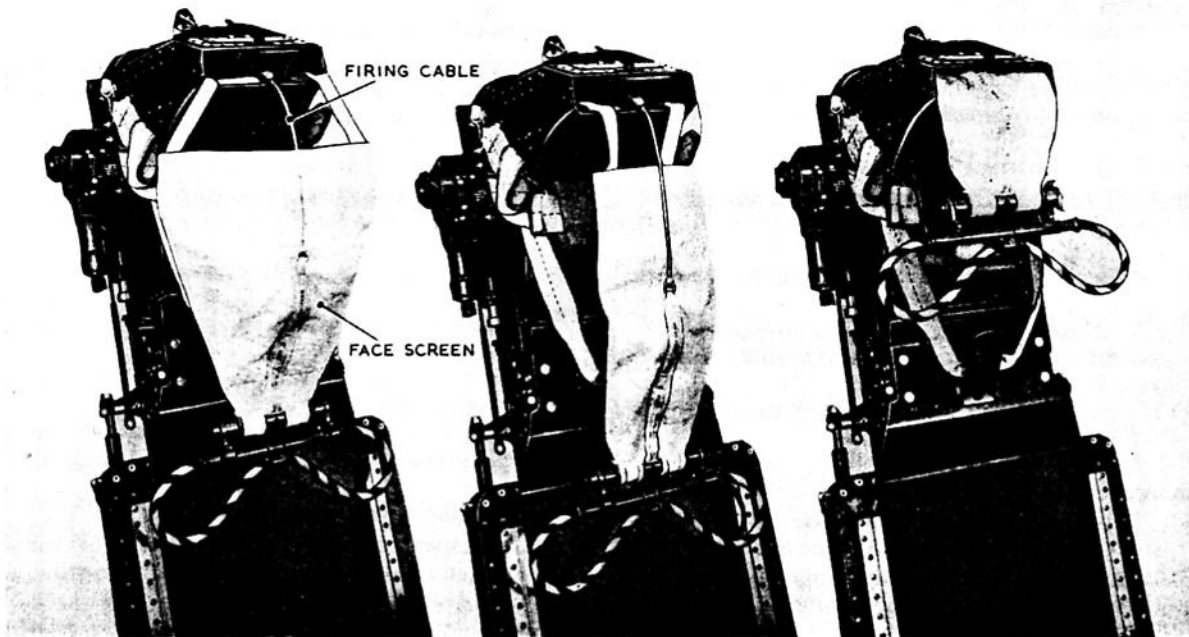


Fig. 8. Folding the face screen

RESTRICTED

August, 1968

AIRCRAFT ASSISTED ESCAPE SYSTEMS
TYPE 3 SERIES EJECTION SEATS

ADVANCE INFORMATION LEAFLET NO. 8/68

Insert this leaflet in A.P.109B-0102-1, Chap. 6 to face para. 46.

TESTING THE HARNESS RELEASE AND LEG
RESTRAINING CORD RELEASE MECHANISM

Note . . .

This A.I.L. supersedes A.I.L. No. 4/68 which is to be removed and destroyed.

1. Para. 46 refers.
2. When carrying out the tests detailed, the P.E.C. gauge top limit, Part No. MBEU/32942 is to be used in lieu of the P.E.C. dust cover. The complete test of the mechanism is to be carried out with the seat pan in the top position and repeated with the pan in the bottom position. Repeat the tests using the P.E.C. gauge, bottom limit, Part No. MBEU/32941. Ensure in each case that the release mechanism operates smoothly and without any signs of binding.
3. On completion of the tests, the release mechanism is to be checked for correct operation by using the barostatic time-release unit as follows:-
 - (1) Ensure manual separate control is fully down and P.E.C. gauge (top limit) fitted to P.E.C.
 - (2) Place the seat pan in the bottom position.
 - (3) Fit a cocking tool to the time-release unit, withdraw the firing pin and allow the mechanism to run out whilst controlling the descent of the harness release plunger with the cocking tool. Ensure that all releases have occurred. Repeat the tests using P.E.C. gauge (bottom limit). Both tests are to be repeated with the seat pan in the top position.

Note . . .

The testing of the release mechanism using the time-release unit is done to ensure that all releases have occurred automatically and NOT to check the actual release sequence which is applicable to manual operation only.

- (4) On completion of the adjustments to the harness release and leg restraining cord release mechanism as detailed in para. 47, the seat pan is to be checked for complete freedom of operation including locking of the pan in the top, centre and bottom positions. Any restriction of movement of the seat pan may be caused by over adjustment of the release linkage resulting in over-tension of the vertical torsion rods within the torsion tubes.

Notes

- (1) The information contained in this leaflet will be incorporated by normal amendment list action in due course.
- (2) If, after receipt of this leaflet, an amendment list with a prior date and conflicting information is received, the information in the leaflet is to take precedence.

- (c) Remove the quadrant and replace the washer and nut.
- (d) Refer to fig. 10 and, using a pencil, mark a line through the centre of the lever axis hole at right angles to the edge of the quadrant AA.
- (e) Mark a second line 1 in. from and parallel to the first line.
- (f) Mark V-notches as shown and mark with suitable white paint.
- (g) Refit the quadrant to the seat pan.

46. (1) Ensure that the manual release lever is in the fully down position and that the gauging lines on the quadrant are clearly visible.
- (2) Fit the harness buckles to the seat pan locks and ensure that they are securely held.
- (3) Fit the dust cover to the P.E.C., insert the cones of the leg restraining cords into their housings on the front of the seat pan and ensure that they are securely held.
- (4) Operate the manual release levers slowly and, at the same time, exert a light pull on the port harness buckle.
- (5) When the port harness buckle has been released, check that the cones of the leg restraining cords have become disengaged and that the leading edge of the manual release lever is within the gauging lines on the quadrant.
- (6) Continue operating the release lever slowly and exert a light pull on the starboard harness buckle.
- (7) When the starboard harness buckle is released, check that the upper seat lock is withdrawn and that the leading edge of the manual release lever is within the gauging lines on the quadrant.
- (8) Continue to operate the manual release lever slowly until the P.E.C. dust cover disconnects from the seat portion, then check that the leading edge of the manual release lever is within the gauging lines on the quadrant.
- (9) Position the manual release lever in the fully down position.

Adjusting the harness release and leg restraining mechanism

WARNING . . .

Great care must always be exercised when making the following adjustments. Maladjustment could result in a serious accident.

47. (1) Disconnect the manual release lever assembly link, the P.E.C. release rod, the leg restraint cord release rod and the tie rods connecting the torsion rods to the cross-shaft.
- (2) Make the initial adjustment of the seat pan lower locks as follows:—
- (a) Rotate the vertical torsion tubes at each side of the seat until the seat pan lock lever is on the point of actuating the locking plunger.

- (b) Secure the torsion bar by adjusting and connecting the tie rod (from the lever at the upper end of the torsion bar) to the lever on the cross-shaft.
- (c) Position the manual release lever in the fully down position.

Adjusting the manual release lever

48. With the lever in the fully down position, adjust the assembly link at the slotted end until only slight play is felt.

IMPORTANT . . .

Slight play is necessary when making this adjustment. Should all play be eliminated, the manual release lever when fully operated would cause excessive distortion on the port torsion bar.

Synchronising the seat locks

49. On completing the operations described in para. 47 and 48, refit the test buckles into the lower seat pan locks, refit the end of the 25G webbing strap to the upper seat lock and proceed as follows:—

- (1) Operate the manual release lever and exert a slight pull on the port harness buckle; at the point of its release, check that the leading edge on the release lever is within the gauging marks of the quadrant.
- (2) Continue to operate the lever slowly until the starboard buckle is released, at the same time ensure that the upper seat lock is withdrawn and check that the leading edge of the release lever is within the gauging lines on the quadrant.
- (3) Adjust the lower seat pan locks as detailed in para. 47, sub-para. (2) until the port lock releases slightly before the starboard and upper seat locks.
- (4) Adjust the manual release lever assembly link as necessary.

Adjusting the P.E.C. release

50. (1) Adjust the P.E.C. release rod to connect with the lever at the lower end of the starboard torsion rod and the P.E.C. operating lever.
- (2) Unscrew the rod one turn and connect up.

IMPORTANT . . .

Slight play is necessary when making this adjustment. Over adjustment will cause a condition where the P.E.C. rod will start to disconnect before the mechanism is operated.

Adjusting the leg restraining cord release mechanism

51. (1) Adjust the leg restraint cord release rod to connect the torque tube on the front of the seat pan with the intermediate lever.
- (2) Screw up one turn to eliminate play and connect up.
- (3) Ensure that the manual release lever is in the fully down position and fit the port harness buckle.

RESTRICTED

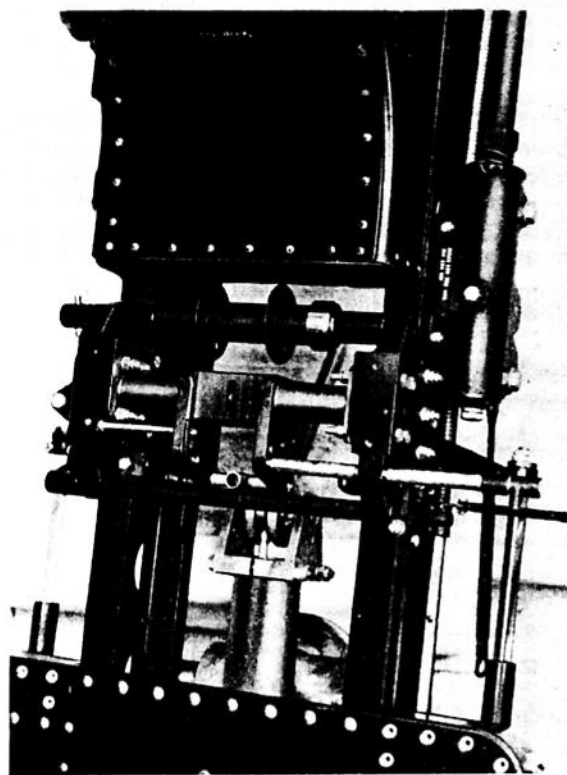
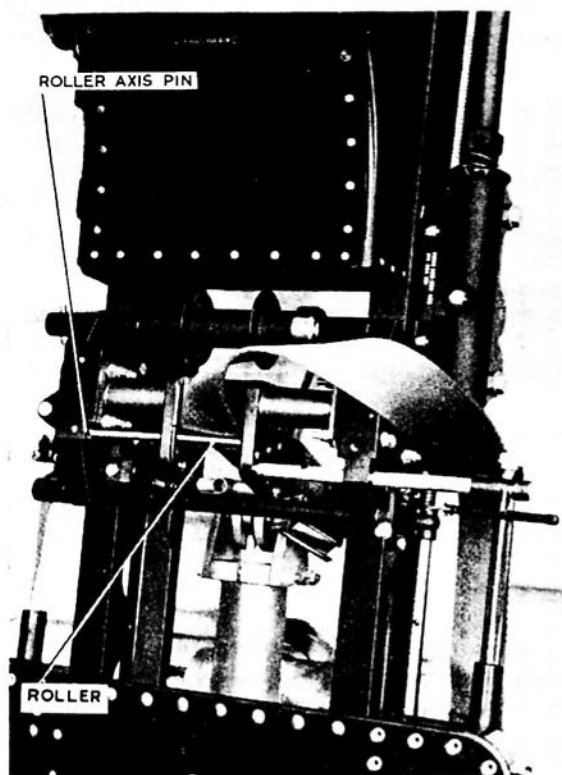
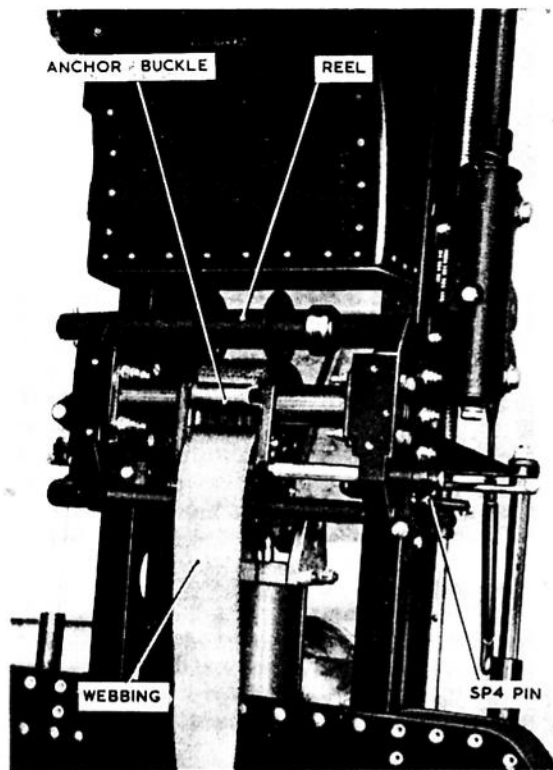
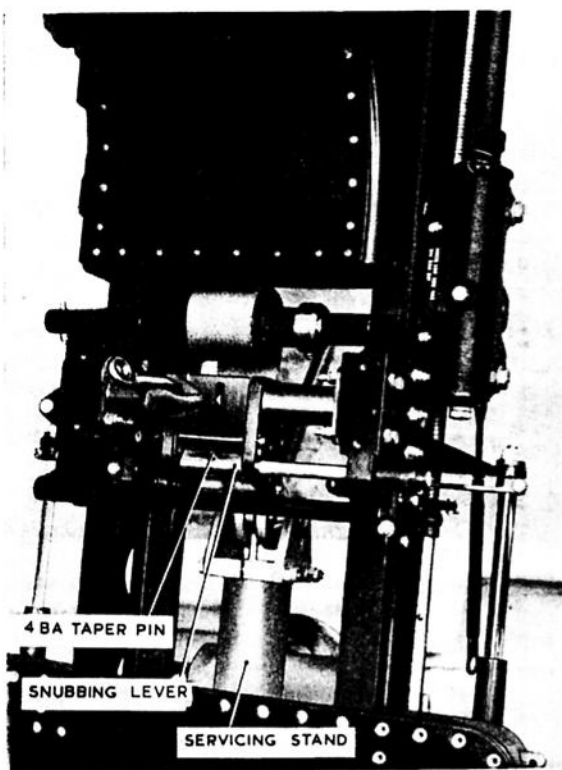


Fig. 9. Changing harness webbing

RESTRICTED

- (4) Fit the P.E.C. dust cover and insert the cones of the leg restraining cords into the housings on the front of the seat pan.
- (5) Operate the lever slowly and observe that the leg restraining cords release before the port seat lock. Adjust the release rod as necessary.
- (6) Replace the manual release lever in the fully down position, fit the P.E.C. dust cover and refit the cones of the leg restraining cords into their housings.
- (7) Remove the dust cover and check that the cones have been released.
- (8) With the dust cover removed, refit the cones into their housings and attempt to engage the locking plungers by pulling the cones out in an upward direction.

Note . . .

- (1) *The cones may catch on the inside edge of the housings when they are pulled out at this angle and, to establish the cause of any catch felt during this test, push the leg restraining cord release rod to the rear; if this action eliminates the catch, the mechanism requires adjustment.*
- (2) *To adjust, screw the fork end of the release rod inwards a half-turn at a time and re-check.*
- (9) Refit the dust cover to the P.E.C. and the cones into their housings. Press upwards on the cones and ensure that the tension of the locking plunger springs can be felt; if the tension cannot be felt, it indicates that the locking plungers have started to operate.
- (10) Adjust by unscrewing the fork end of the release rod one half-turn at a time until the spring tension can be felt. Re-check for the complete withdrawal of the locking plunger on removal of the P.E.C. dust cover as detailed in sub-para. (8).

Functional check of the mechanism

52. (1) Ensure that the manual release lever is in the fully down position and fit the harness buckles to the lower seat pan locks, ensuring they are securely held.
- (2) Fit the dust cover to the P.E.C., insert the cones of the leg restraint cords into their housings and ensure they are securely held.
- (3) Operate the manual release lever slowly and, at the same time, exert a light pull on the port harness buckle.
- (4) When the port buckle is released, check that the leg restraining cords have been released and that the leading edge of the release lever is within the gauging marks on the quadrant.
- (5) Continue operating the lever slowly and, at the same time, exert a light pull on the starboard harness buckle; at the moment of its release, check that the upper seat lock has been withdrawn and that the upper edge of the lever is within the gauging lines on the quadrant.

- (6) Continue to operate the lever slowly until the P.E.C. dust cover is released and, at the moment of its release, check that the leading edge of the lever is within the gauging lines on the quadrant.
- (7) Test the action of the leg restraint and release mechanism as detailed in para. 51, sub-para. (6), (7) and (8).

Servicing the taper plug assemblies

53. (1) Remove the taper plug assemblies from the front of the seat pan.
- (2) Remove the springs and plungers from the housings.
- (3) Clean and examine the assemblies for damage and corrosion. Lightly lubricate with grease XG-275.
- (4) Replace the springs and plungers.
- (5) Coat the bearing surfaces using pigmented varnish (Ref. No. 33G/1264) and refit the assemblies to the seat pan.

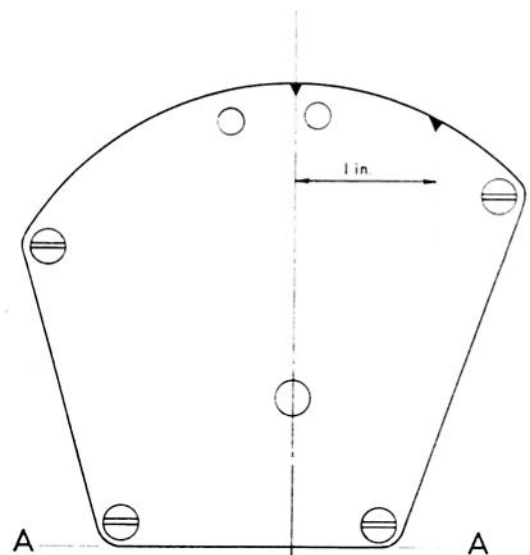


Fig. 10. Marking the quadrant

Connecting the drogue withdrawal line

54. When aircraft servicing is completed and the seat is re-armed make absolutely certain that the drogue withdrawal line passes OVER the link line (fig. 11). This is vital to enable the drogue gun piston to withdraw the drogues without obstruction or entanglement.

Servicing the 2 to 1 reduction gear

To dismantle the assembly

55. (1) Remove the assembly from underneath the seat pan.
- (2) Remove the 2 B.A. stiffnut and washer and lift off the top cap, centre housing, the small pulley wheel and the distance tube.
- (3) Remove the large pulley wheel from the bottom housing.

RESTRICTED

To examine the components

56. (1) Check all the components for damage and corrosion and the firing cables for fraying and kinking.
(2) Ensure that the cables are securely attached to their respective pulley wheels by the indent pins.

To assemble the components

Note . . .

- (1) Lubricate all parts during assembly with grease XG-275.
(2) When assembling ensure that the pulleys and cables are correctly positioned in relation to each other and their respective conduit grooves as shown in fig. 12.

57. (1) Insert the 2 B.A. mushroom-headed bolt into the bottom housing and position the large pulley wheel in the housing, ensuring that it and the cable retaining collar are correctly positioned.
(2) Fit the centre housing to the bottom housing.
(3) Fit the small pulley wheel over the squared shaft of the large pulley wheel; insert the distance tube.
(4) Refit the top cap and replace the washer and the 2 B.A. stiffnut.
(5) Refit the assembly to the seat pan.

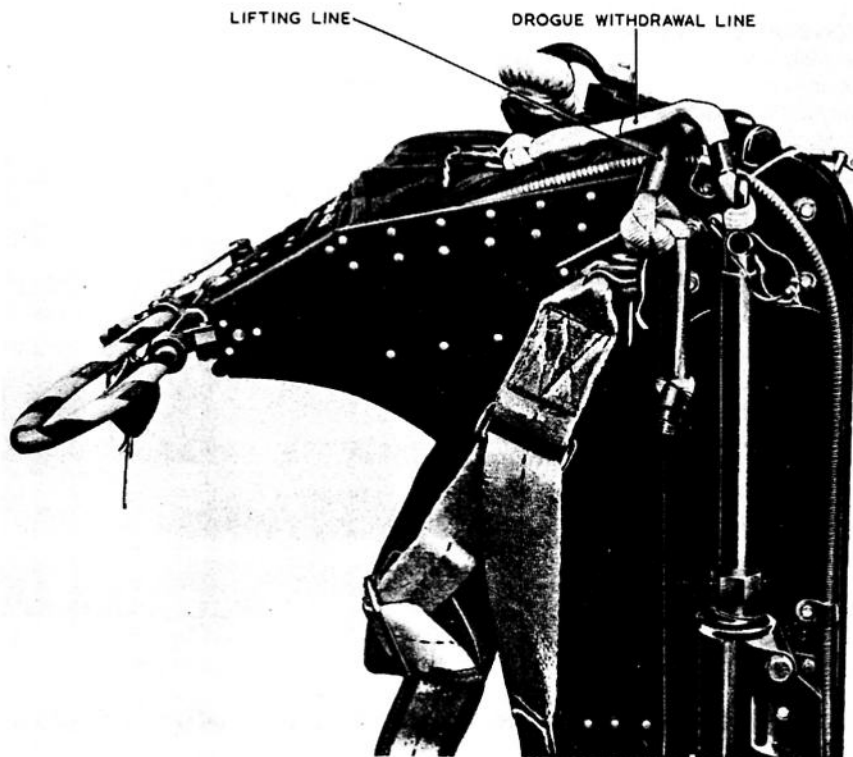


Fig. 11. Connecting the drogue withdrawal line

RESTRICTED

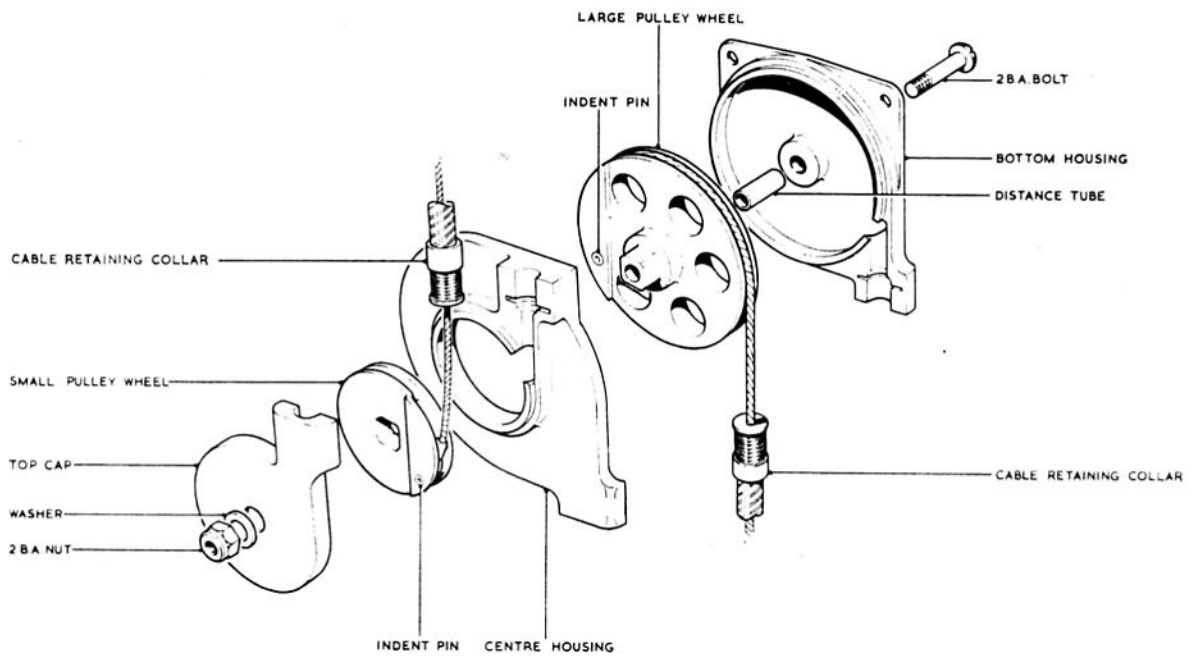


Fig. 12. Details of 2 to 1 reduction gear

RESTRICTED



This file was downloaded
from the RTFM Library.

Link: www.scottbouch.com/rtfm

Please see site for usage terms,
and more aircraft documents.