AP 109B-0131-1
(Formerly AP 109B-0131-15F)

EJECTION SEATS
TYPE 4HA AND 4HA(N)/1 AND 2
(MARTIN-BAKER)
(HUNTER T Mk 7 AND T Mk 8 AIRCRAFT)

GENERAL AND TECHNICAL INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence

Sponsored for use in the

ROYAL NAVY by DGA (N)

ROYAL AIR FORCE by D Air Eng 2 (RAF)

Prepared by Martin - Baker Aircraft Co. Ltd., Chalgrove

Publications authority ATP/MOD(PE)

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AP 100N-0101 (RN)
AP 100B-01 Order 0504 (RAF)

AMENDMENT RECORD

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ROYAL NAVY

LETHAL WARNING

1. Modern aircraft have many equipments, e.g. assisted escape systems, explosive release units, high energy igniter units, etc. which, if operated inadvertantly or worked on without due care, can cause loss of life and/or damage to the aircraft. Before anyone enters a cockpit or starts work on an aircraft, the individual himself is responsible for ensuring that:-

(1) All safety devices are correctly fitted.

(2) No units or switches, with which the individual is not fully conversant, are touched.

2. Detailed safety precautions for each type of aircraft will be found in the relevant aircraft servicing schedules.

(Royal Air Force Lethal Warning overleaf)

ROYAL AIR FORCE

LETHAL WARNING

1. The assisted escape system and associated explosive operated jettison mechanisms fitted to aircraft are a potential source of lethal injury to personnel and damage to Government property if inadvertently operated.

2. Safety devices in the form of safety pins, levers and switches are provided for use when the aircraft is on the ground to safeguard against this danger.

3. On entering the cockpit/cabin of an aircraft, it is the responsibility of the individual to be able to recognise the assisted escape system safety devices in that aircraft and to ensure that they are correctly applied at all times in accordance with para. 4 below.

4. Instructions for the correct positioning of the assisted escape system safety devices in each aircraft type and mark are detailed in the Servicing Schedules and Aircrew Manual related to that aircraft.

WARNINGS

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH (COSHH)

THIS PUBLICATION CONTAINS REFERENCES TO THE SUBSTANCES HAZARDOUS TO HEALTH AS LISTED BELOW. BEFORE USING THESE SUBSTANCES:

1. MAKE SURE YOU KNOW THE SAFETY PRECAUTIONS AND FIRST AID INSTRUCTIONS RELEVANT TO THE SUBSTANCE.
2. READ THE LABEL ON THE CONTAINER IN WHICH THE SUBSTANCE IS SUPPLIED.
3. READ THE DATA SHEET APPLICABLE TO THE SUBSTANCE.
4. OBEY THE LOCAL ORDERS AND REGULATIONS.

SUBSTANCE	REFERENCE
1. Oil, OM12	REFER TO JSP(F)395
2. Grease, XG 293	
3. Varnish, pigmented	
4. Lethal voltage	REFER TO AP100D-20

LIST OF ASSOCIATED PUBLICATIONS

Ejection seats Type 4HA and 4HA(N) 1 and 2 Hunter T Mk 7 and T Mk 8 aircraft (Bay maintenance schedules)	AP 109B-0131-5F
Ejection seats Type 4HA and 4HA(N) 1 and 2 Illustrated parts catalogue	AP 109B-0131-3A
Aircrew equipment assemblies Ejection seats Type 4HA 1 and 2 ▶ and 4HA(N)1 and 2 (post mod. PA763 and NSM/Hunter/3093 (RN) ◀	AP 108B-0131-1A
Aircrew equipment assemblies ▶ Ejection seats Type 4HA(N) 1 and 2 (pre-mod PA763 and NSM/Hunter/3093 (RN))	AP 108B-0131-1B
Drogue guns Type 4, 5, 9 to 12, 17 to 24 and 25 ◀	AP 109D-0203-1
Barostatic time-release units	AP 109E-0103-1
Ejection gun and guide rail assemblies	AP 109C-0103-1
Parachute assembly ▶ Type B Mk 39A (Hunter T Mk 8 pre-mod PA763) ◀	AP 108C-0127-12
Parachute assembly ▶ Type B Mk 41A (Hunter T Mk 7 and T Mk 8 (post-mod PA763)) ◀	AP 108C-0150-12
Personal survival pack Type R Mk 1 (Hunter T Mk 7 and 8 aircraft pre-SEM/AAES/037/STC (RAF) and NSM/Hunter/3093(RN))	AP 108E-0503-12
Personal survival pack, Type ZE Mk 2 (Hunter T Mk 7 and 8 aircraft post - ▶ SEM/AAES/037/STC (RAF)and NSM/Hunter/3093 (RN))	AP 108E-0536-12
Ejection seats and associated components - Modifications ◀	AP 109A-0004-2

GENERAL AND TECHNICAL INFORMATION

MODIFICATION RECORD

The following record confirms that this publication incorporates all technical changes necessitated by the modifications listed below. Further information on modification titles, classification categories and Mark applicabilities is given in the relevant equipment publication Topic 2.

EJECTION SEAT

ES 2678, 2773, 2780, 2782, 2806, 2854, 2872, 2890, 2825, 2947, 2961, 2975, 3132. 3144, 3160, 3161, 3165, 3166, 3181, 3210, 3227, 3324, 3335, 3364, 3558, 3912, 3990, 7029, 7034, 7071, 7249.

EJECTION SEAT ASSEMBLY

ESA 26

DROGUE GUN

DG 5

TIME-RELEASE UNIT

TR 1, 3, 10

EJECTION SEATS
TYPE 4HA and 4HA(N)/1 and 4HA(N)/2

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CONTENTS (Continued)

ILLUSTRATIONS

CONTENTS (Contd)

Introductions

1 Two Type 4HA ejection seats (27L/50133) are installed in Hunter T Mk 7, aircraft and they are identical. Information of the Types 4HA(N)1 and 2 ejection seats (27L/50138 and 50139 respectively) will be found in para 41.

Associated equipment

2 The seat embodies the following types of associated equipment, full details of which will be found in their respective air publications:

▶ (1)	Type 4A, Mk 1 ejection gun	AP 109C-0104-1
(2)	Type 11, Mk 1 drogue gun	AP 109D-0203-1
(3)	Type 9, Mk 1 barostatic time-release unit	AP 109E-0103-1
(4)	Type 3, Mk 2 breech type time-delayed ejection gun firing unit	AP 109C-0205-1

WARNINGS...

(1) SAFETY PINS WITH INTEGRAL RED LABELS ARE PROVIDED FOR RENDERING SAFE THE FACE SCREEN FIRING HANDLE, SEAT PAN FIRING HANDLE, GUILLOTINE UNIT, BREECH TYPE TIME-DELAYED EJECTION GUN FIRING UNIT AND THE CANOPY JETTISON FIRING UNIT. THESE PINS MUST BE REMOVED BEFORE FLIGHT.

(2) BEFORE ENTERING THE COCKPIT, OR BEFORE ANY MAINTENANCE IS CARRIED OUT ON OR NEAR THE SEAT, THE SEAT IS TO BE MADE SAFE IN ACCORDANCE WITH CURRENT AUTHORISED PROCEDURES. ◀

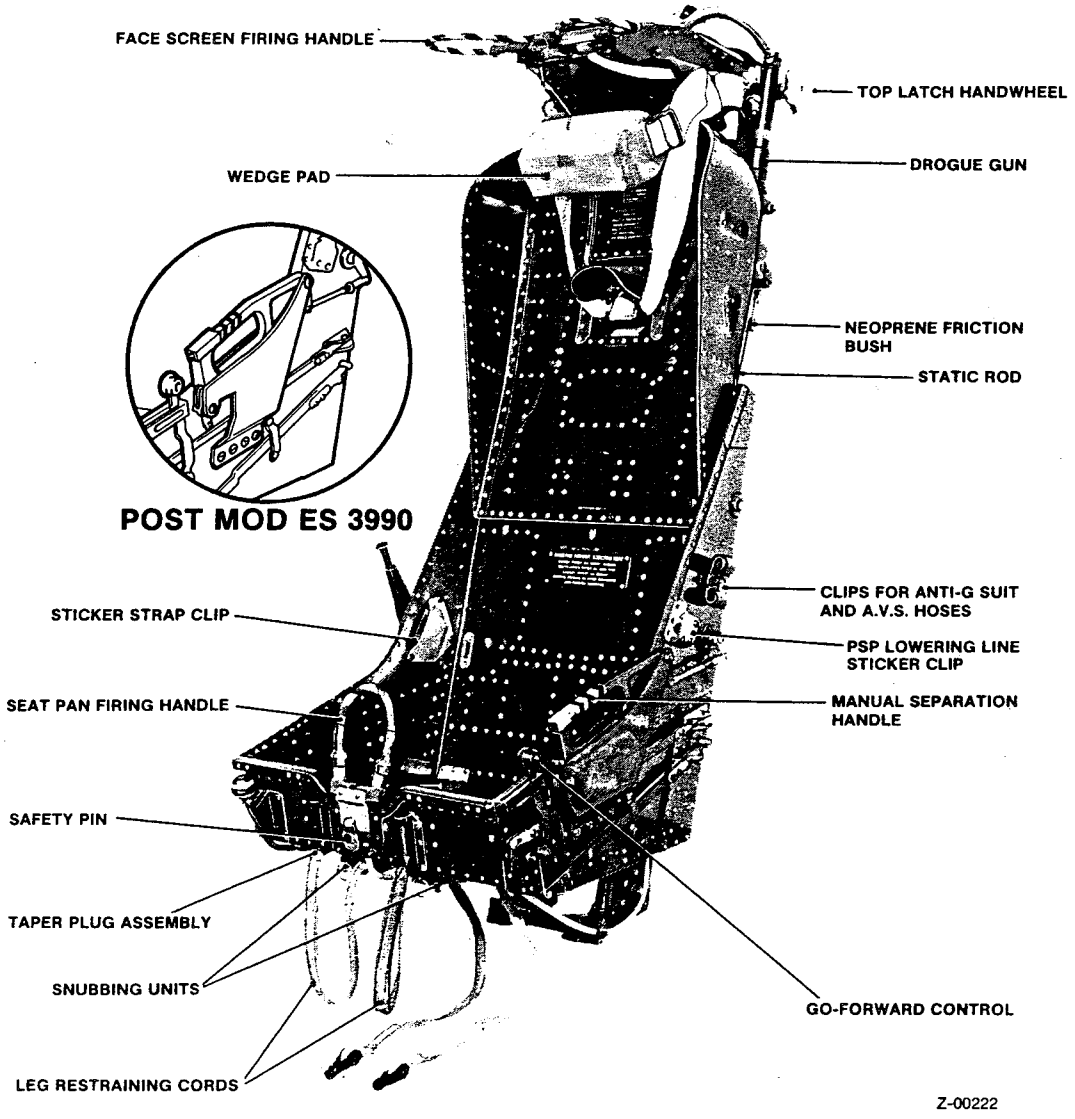

Fig 1 Details of the seat (port)
(Post-mod ES 7071)
▶ (Amended illustration) ◀

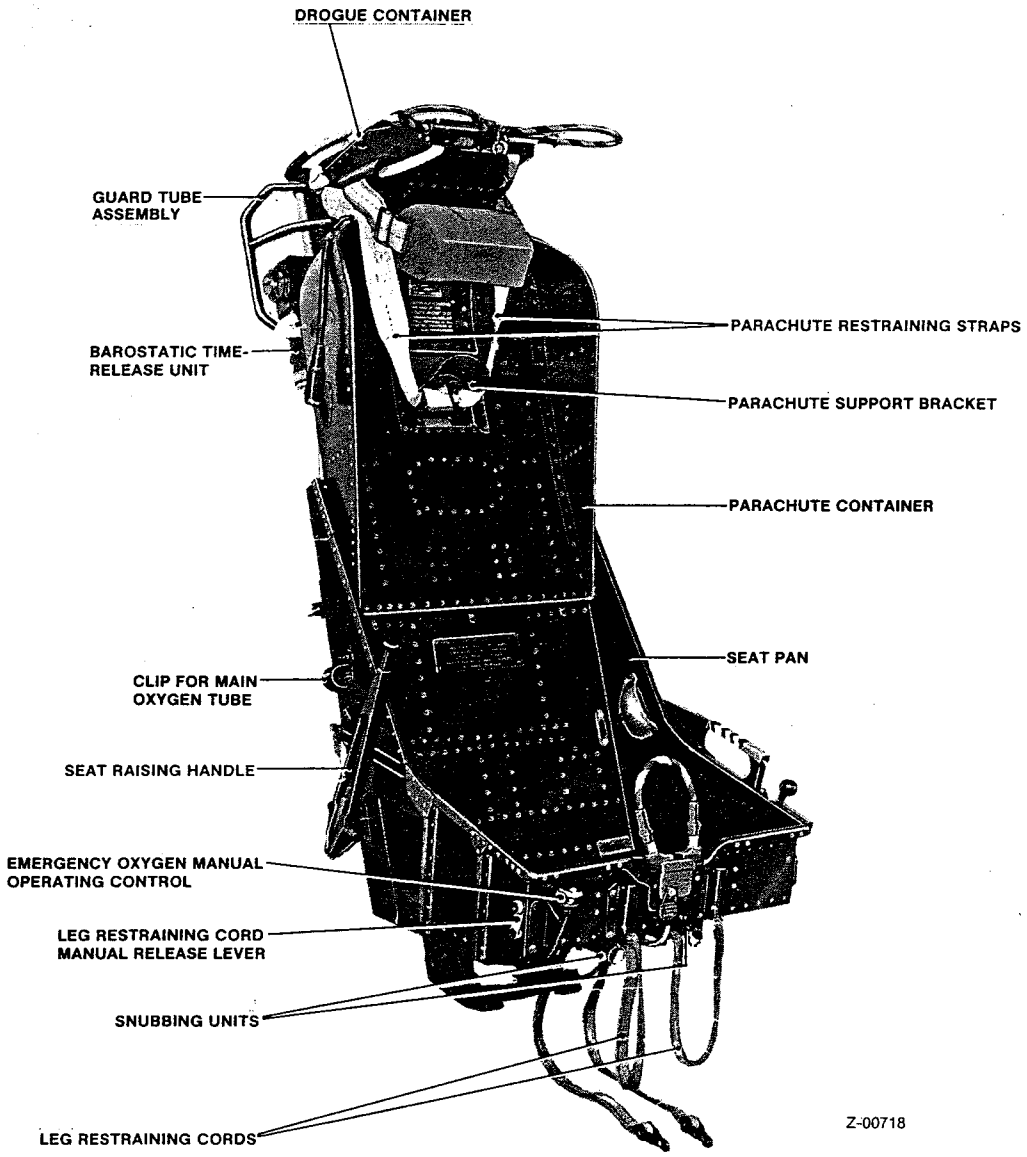

Fig 2 Details of the seat (starboard) (Post Mod ES 7029)

General Description

3 The seat (figs 1 and 2) slides during ejection on three pairs of slippers which are fitted to the inner sides of the main beams and engage in a guide rail which is attached to the ejection gun. The seat is locked in position by a top latch assembly which is attached to the top of the port main beam; the spring-loaded latch plunger protrudes through the top cross-beam to engage with the ejection gun piston.

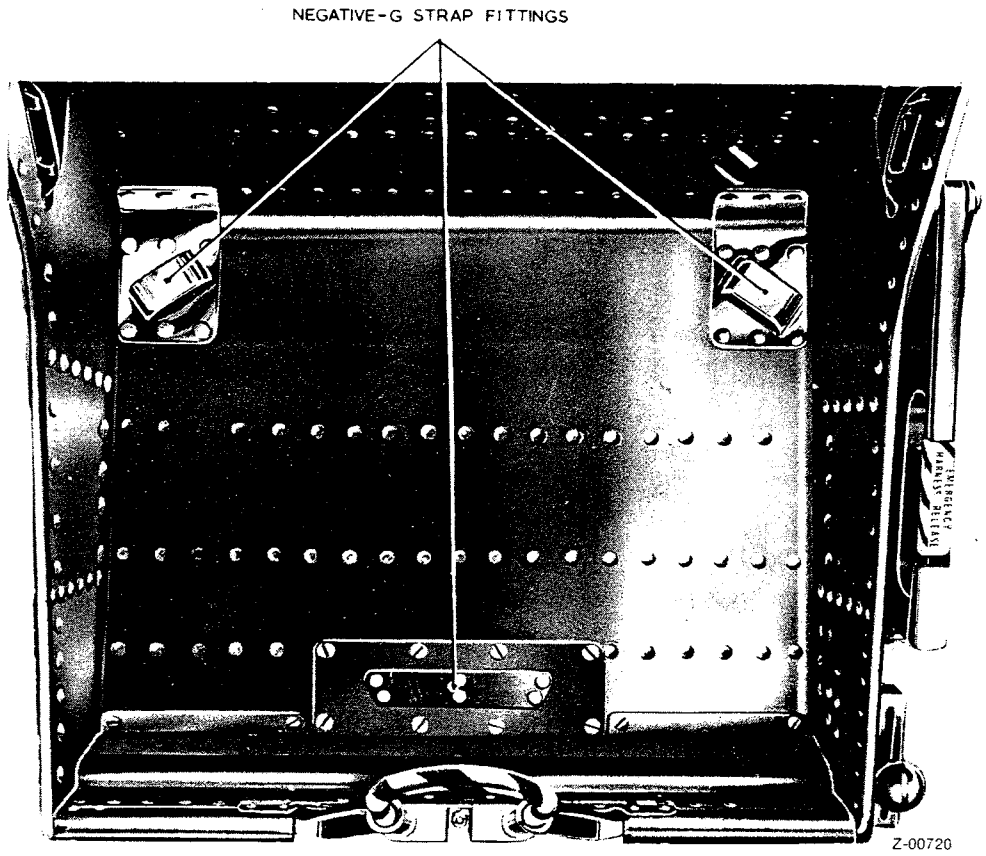

Fig 3 Negative-g fittings

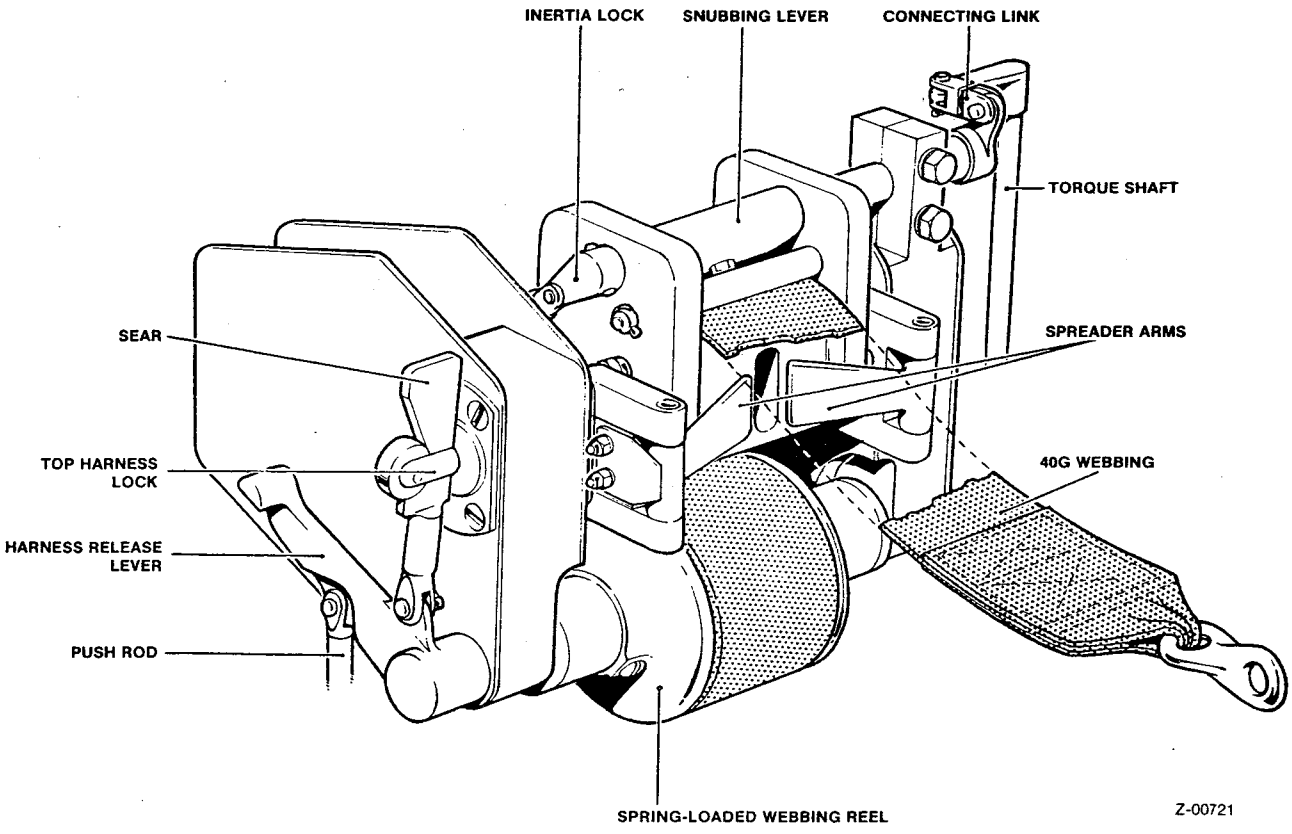

Fig 4 Details of the 40-g beam

4 The canopy is jettisoned and the ejection gun is fired by pulling the face screen firing handle, which is situated immediately above the wedge pad, down over the face. This handle draws from its stowage in the drogue container a flexible screeen which covers the occupant's face and protects it from the adverse effects of the airstream. It also holds his head back and prevents it from jerking forward on ejection; spring-loaded plungers prevent the handle from being drawn out of its stowage by the airstream should the canopy be jettisoned during flight. Attached to the face screen is a bifurcated cable, one leg of which is attached to the sear of the breech type time-delayed ejection gun firing unit, and the other to the cross-shaft of the canopy jettison system.

5 When the face screen has been extracted sufficiently to cover and protect the occupants face, the leg of the cable attached to the cross-shaft initiates the canopy jettison system, at the same time the other leg of the cable withdraws the sear from the ejection gun firing unit, and, after approximately 0.5s delay, the ejection gun is fired and the seat is ejected. The face screen and firing cables are so proportioned that the firing units will be operated whether the seat occupant is wearing a protective helmet or not.

Seat pan adjustment

6 The seat pan accommodates a personal survival pack containing a liferaft and other items of survival equipment and can be adjusted for height by means of a handle situated on the right hand side of the seat structure. The seat pan moves relative to the headrest and can thus accommodate different body lengths, at the same time always ensuring that the occupant's head is correctly located whatever the position of the seat pan.

Seat pan firing handle

7 A seat pan firing handle is fitted to the front of the seat pan and is provided as an alternative method of ejection. The firing cable is routed through a conduit to the 2 to 1 reduction gear mounted on the port main beam, then, through another conduit to the top of the drogue container where the eye-end of the firing cable is passed over the leg of the bifurcated cable of the face screen which is connected to the breech time-delay sear. A safety ▶ pin guide plate is fitted to this handle. Mod ES 7249 introduced a longer handle to the seat pan firing handle. ◀

Leg restraining device

8 A leg restraining device is fitted to the seat to ensure that the occupant's legs are drawn back and restrained against the seat pan: this provides leg clearance during ejection, and also prevents the legs being blown apart by the airstream after ejection.

Negative-g fittings

9 To provide restraint in adverse G conditions, a negative-G strap is fitted to the seat. The strap passes through a bracket on the front of the seat pan where it divides into two and passes through two guide brackets at the rear of the seat pan, to be passed over the lugs of the lower harness and finally secured by the lower harness locks (fig 3). Mod ES 7034 introduced a negative-g strap assembly with a terylene upper attachment strap of reduced width.

Parachute assembly

10 A horseshoe-shaped parachute assembly is supported on a bracket immediately below the drogue container and is held in position by restraining straps, integral with which is a wedge pad for the occupant's head. The lower end of the straps terminate in metal rings which are each retained on a paddle spreader on the 40-G beam: the spreaders are locked in position by the lug of the webbing strap when it is locked by the upper harness lock.

Combined harness

11 The combined harness has a three point attachment to the seat: two locks at the back of the seat pan secure the lap harness, and a third lock in the 40-G beam secures the shoulder harness through a yoke attachment and a looped webbing strap (fig 4). The webbing strap (under the control of the go-forward lever on the port side of the seat pan) enables the occupant to lean forward in the cockpit. An inertia lock (para 36) incorporated in the system ensures that on ejection or crash landing the occupant is retrained in the seat.

Manual separation handle

▶ 12 Pre-mod ES3990. Fitted to the port side of the seat is the manual separation handle, this is provided to allow the occupant to free himself from the combined harness locks and leg retraint taper plug assemblies in the unlikely event of the failure of the automatic facilities on ejection. The handle is normally locked in position by a release lever assembly and it is necessary to depress a small trigger at the end of the handle before it can be operated. ◀

▶ 12A Post-mod ES3990. A manual separation handle is fitted to the port side of the seat pan to enable the occupant to free himself from the seat in the unlikely event of the automatic facilities failing on ejection. Operation of the handle releases the harness locks and leg restraint lines and operates the guillotine system which severs the withdrawal line connecting the drogues to the parachute canopy. ◀

Guillotine unit

▶ 13 Pre-mod ES3990. A guillotine unit (fig 5) is fitted to the port side beam of the seat structure, and has been developed to reduce the number of actions carried out by the occupant in the event of a manually controlled descent through failure of the automatic facilities. The unit is fired by a static cable, attached at one end to the parachute assembly and at the other to the sear of the guillotine unit. ◀

▶ 13A Post-mod ES3990. The guillotine system (fig 5A) comprises a guillotine breech firing unit positioned on the port lower rear of the seat pan connected by a trombone assembly to a guillotine unit mounted on the port side of the drogue container forward of the drogue gun. The guillotine breech firing unit contains a firing pin, a spring and a cartridge, the firing pin being held clear of the cartridge cap and the spring compressed by a wedge shaped sear which is connected by linkage to the manual separation handle. The guillotine unit contains a cutter assembly and the body is recessed to accept the parachute withdrawal line. The line is held in position by a spring loaded guard.

13B When the manual separation handle thumb catch is depressed and the handle raised the sear is withdrawn from the guillotine breech firing unit and the cartridge is fired. The resultant gas pressure passes to the guillotine unit forcing the cutter assembly forward to sever the parachute withdrawal line. ◀

Emergency oxygen system

14 An emergency oxygen system (fig 8) is mounted on the back of the seat pan on the starboard side, and is supplied with sufficient oxygen to sustain the occupant during ejection and before separation from the seat. Provision is made for manual operation of the system by the handle on the front of the seat pan should the main oxygen system fail. The emergency supply is operated automatically upon ejection.

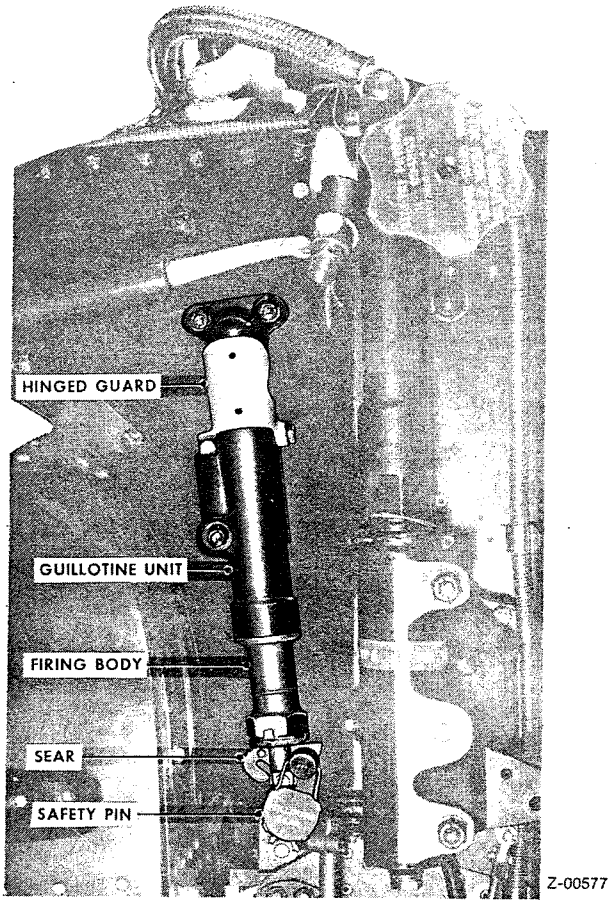

Fig 5 Guillotine unit
▶ (Pre-mod ES3990) ◀

2 to 1 reduction gear

15 Mounted on the port main beam is a 2 to 1 reduction gear (fig 6) and its purpose is to reduce the load required to operate the seat pan firing handle. The assembly consists of a housing containing a large and small pulley and a top cap, the whole being assembled and secured together on a squared shaft which is integral with the large pulley by a 10-32 UNF bolt washer and stiff nut, and a countersunk head 4BA bolt washer and stiff nut. The cables are connected to their respective pulleys by indent pins. The cable from the seat pan firing handle is connected to the large pulley; the cable with the eye-end is connected to the small pulley.

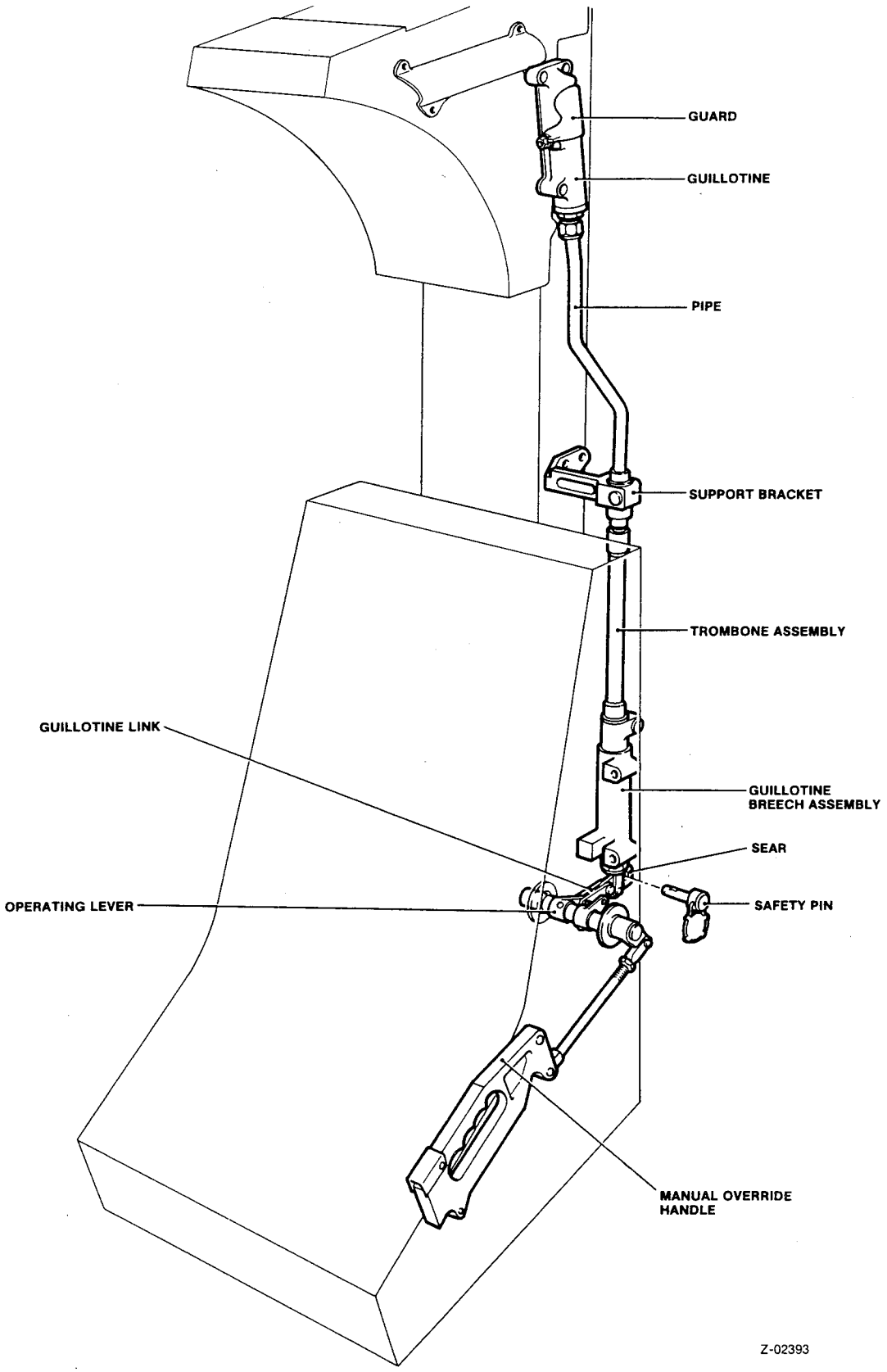

Fig 5A Guillotine system
(Post-mod ES3990)

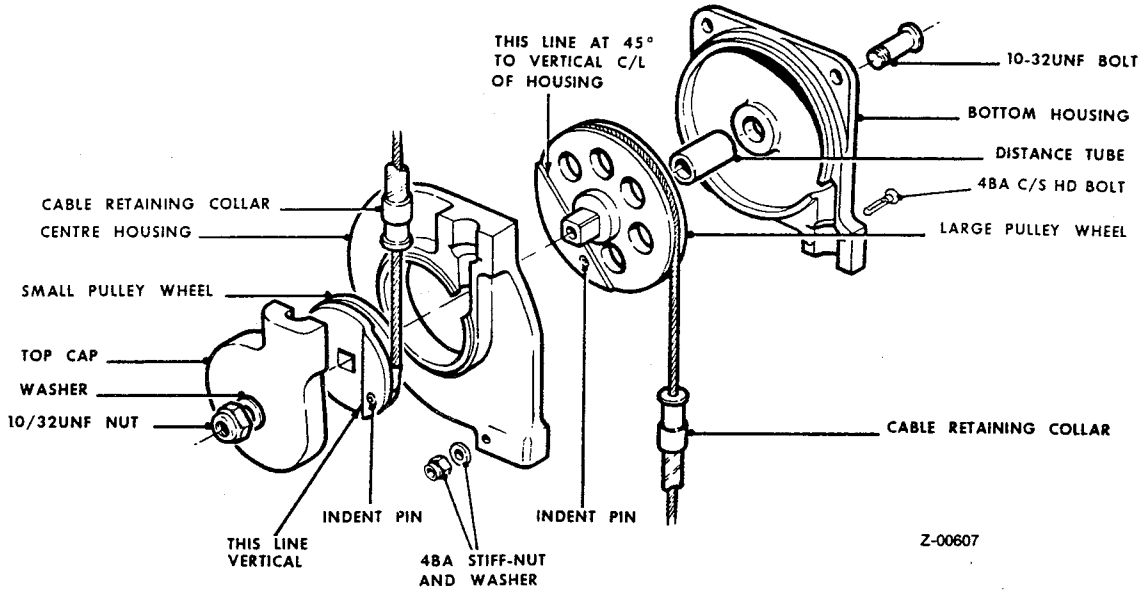

Fig 6 2 to 1 reduction gear

Duplex anti-squid drogue system

16 A duplex anti-squid drogue system (fig 7) is incorporated in the seat, consisting of two drogues, a controller drogue and a main drogue with diameters in the fully developed state of 22 in. and 5 ft. respectively. The controller drogue us connected to the main drogue by nylon tape, and the main drogue is connected to the parachute withdrawal line by nylon shroud lines, the drogue shackle and the drogue to parachute attachment line.

17 The drogue withdrawal line is connected to the apex of the controller drogue canopy and its free end is connected to the drogue gun piston. Part way along the line is a securing pin which retains the four flaps of the drogue container in the closed position.

18 In the centre of the controller drogue shroud lines is an anti-squid line which is made shorter than the shroud lines. This arrangement relieves the shroud lines of the initial shock, so enabling the canopy to develop fully without any danger of squidding, (a condition in which the canopy is fully deployed but will not develop).

19 Attached to the drogue to parachute attachment line are the two pins which retain the face screen tapes and the wedge pad retaining straps to the side of the drogue container. A screw coupling, for connecting to the parachute withdrawal line, secured to the end of the drogue to parachute attachment lines completes the assembly. ◀

Drogue gun

20 The drogue gun is fitted to the port side of the seat structure and is operated by a telescopic rod, one end of which is attached to the sear and the other end to a bracket fitted to a cross beam on the ejection gun. When the seat commences to rise the static rod withdraws the sear and sets the time-delay mechanism into operation; after approximately 0.5s. delay the gun fires and the piston is ejected carrying with it, the drogue withdrawal line, container flap securing pin and the controller drogue from the drogue container. The controller drogue extracts the main drogue and the two combine to retard and stabilize the seat until safe separation from the seat by the occupant is possible. A neoprene friction bush is fitted to the telescopic static rod to prevent any possible hair-trigger condition, and subsequent risk of the gun being inadvertently fired through the sear being partially withdrawn by the downward movement of the outer tube when the static rod is disconnected from its bracket.

Barostatic time-release unit

21 Secured to the starboard side of the seat structure is the barostatic time-release unit which is provided to operate the automatic release of the drogues from the scissor shackle, and the freeing of the combined harness and leg restraint cords at approximately 10,000 ft. and below. Above this height the unit is prevented from functioning by the barostat. For ejection at high speed a G-controller switch is fitted to the unit; this will delay the operation of the barostatic time-release unit until the forward speed of the seat and occupant has been sufficiently reduced to ensure safe parachute deployment. The barostatic time-release unit is operated by a telescopic static rod similar in design to that used with the drogue gun; one end of the rod is attached to the firing pin of the unit and the free end is connected to a bracket attached to the cross-beam fitted to the ejection gun. ▶Modification ES 7029 introduced a tubular guard around the time-release unit in order to prevent fouling of the drogue lines during parachute deployment.◀

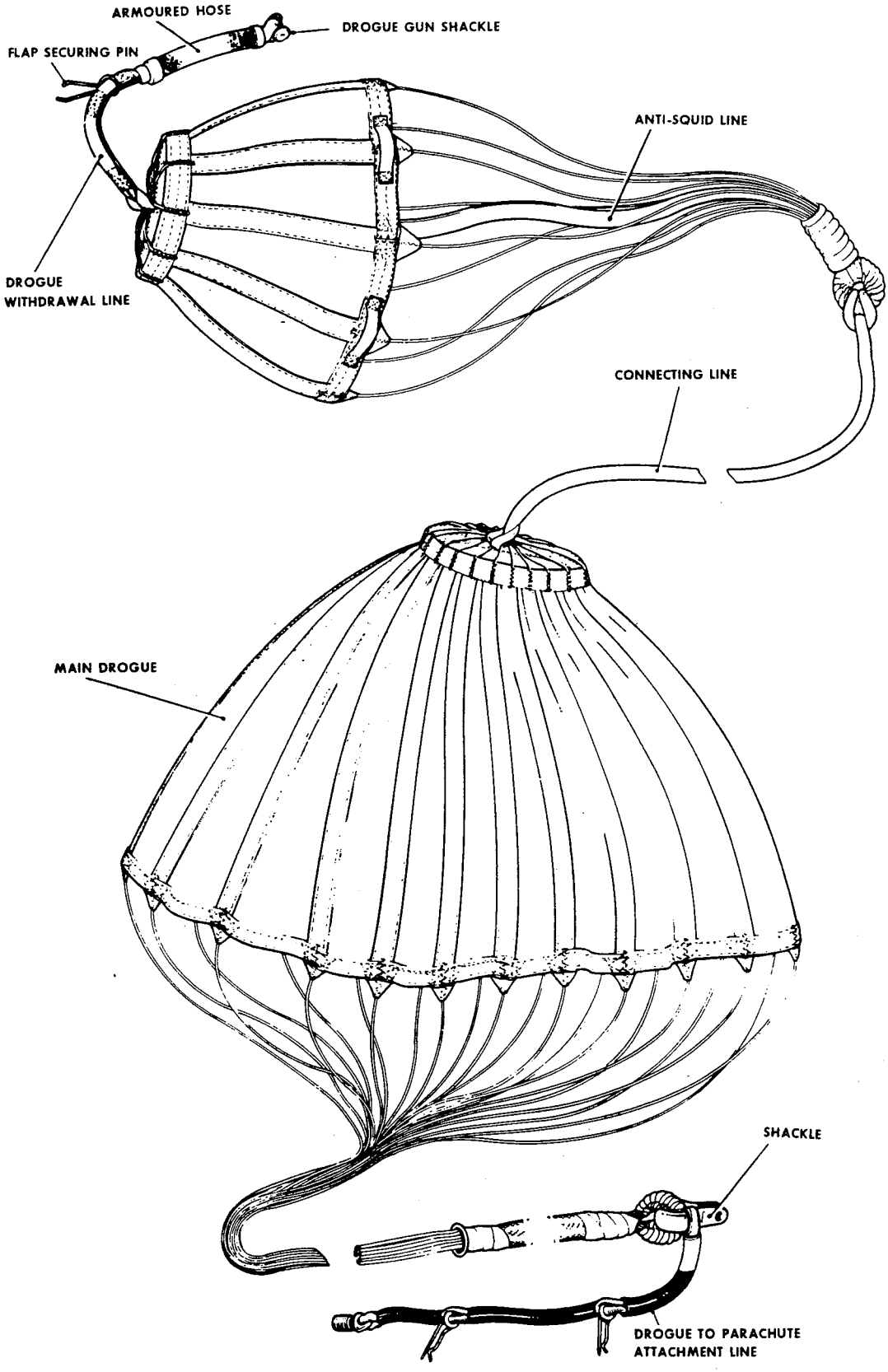

Fig 7 Duplex anti-squid drogue assembly
(Drogue to parachute attachment line amended)

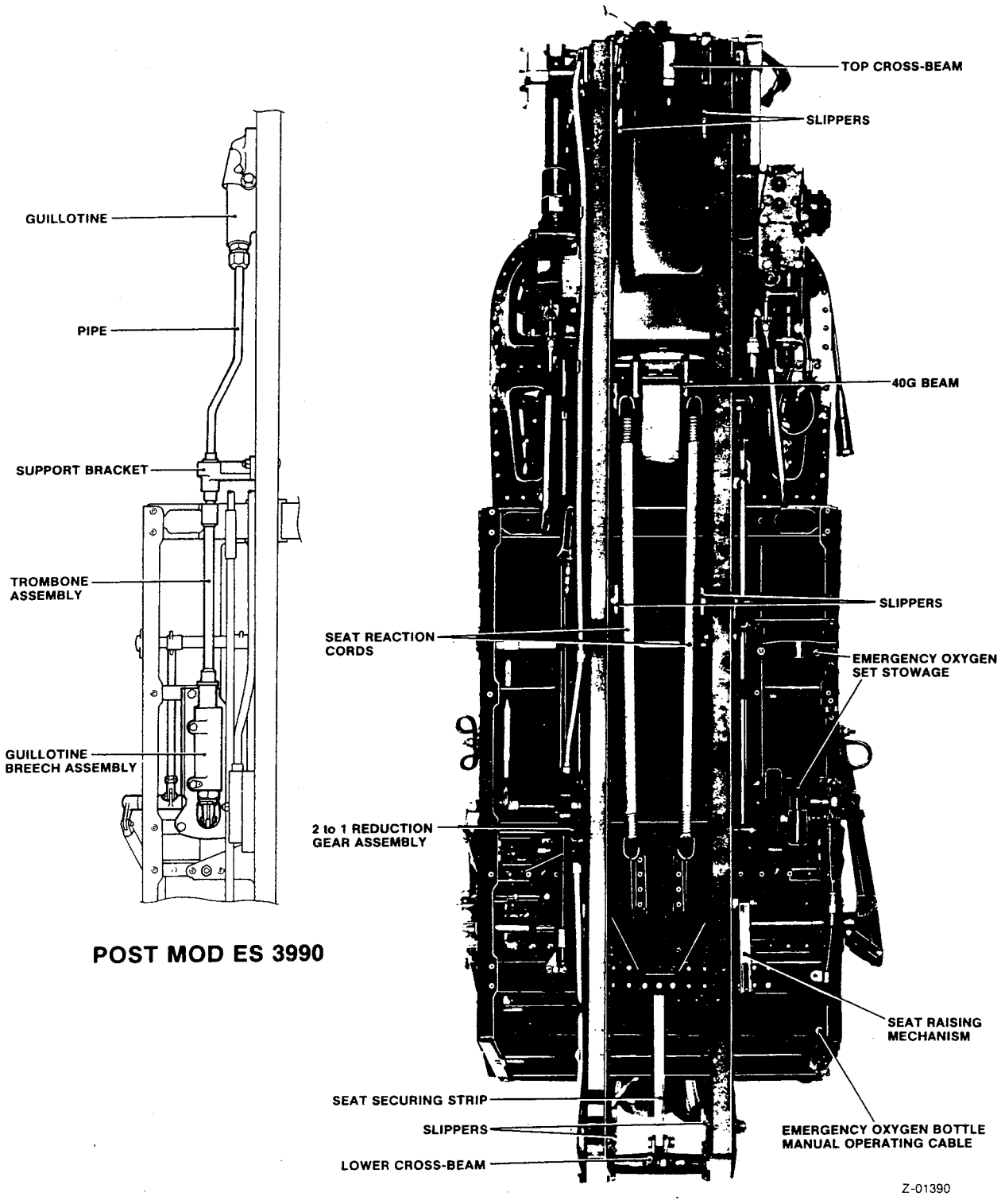

Fig 8 Seat structure
(Amended illustration)

22 The telescopic static rod incorporates a neoprene friction bush similar to that fitted to the drogue gun static rod.

EJECTION GUN AND GUIDE RAIL ASSEMBLY

23 The ejection gun which provides the power for the ejection of the seat and the occupant from the aircraft has a stroke of 72.75 in. and an ejection velocity of 80 ft. per sec. The explosive is contained in three cartridges, i.e., one primary cartridge and two secondary cartridges.

24 The assembly consists of three telescopic tubes, the outer cylinder tube is attached to fittings in the aircraft. The inner tube is attached at its upper end to the top cross-beam of the seat structure by the top latch plunger, and the intermediate tube is between the two; its purpose being to lengthen the stroke and offer restraint against bending loads imposed on the gun during ejection. The inner piston tube contains at its upper end a breech into which is fitted a breech type time-delayed ejection gun firing unit with a delay of approximately 0.5 s. The outer cylinder tube contains the housings for the secondary cartridges, and, riveted to brackets attached to the tube are two guide rails. A cross-beam secured to the outer cylinder carries the two attachment brackets for the drogue gun and barostatic time-release unit static rods.

Seat structure

25 The seat structure (fig 8) is made almost entirely of light alloy. The main frame is built up from the pair of side beams bridged by two cross-beams; the top cross-beam receives the thrust of the ejection gun inner piston and carries the scissor shackle, and secured to the lower one is the seat securing strip. The base of the structure carries the seat raising mechanism, and the slippers which engage the guide rail are fitted on the inner face of each side beam. The front of the structure carries the drogue container, the parachute container, 40-g beam and the seat pan.

26 The seat is secured to the ejection gun by the top latch assembly which is bolted to the top of the port main beam. The assembly consists of a housing containing a spring-loaded plunger one end of which is shaped to engage the ejection gun inner piston, the other end is threaded to accept the top latch handwheel. Passing through the centre of the latch plunger is a spring-loaded indicator spigot. The upper ends of the ejection gun cylinder and inner piston are machined to receive the latch plunger. When the ejection seat is fitted to the ejection gun the plunger passes through the top cross-beam to engage with the latch recess of the inner piston. Indication that the latch plunger is in correct engagement with the ejection gun is shown when the indicator spigot is flush with the threaded end of the latch plunger and the plunger is level with or slightly below the housing face.

WARNING...

FAILURE TO ENSURE CORRECT ENGAGEMENT OF THE TOP LATCH PLUNGER, COULD DURING CERTAIN MANOEUVRES, RESULT IN THE SEAT AND OCCUPANT MOVING UP THE GUIDE RAIL WITH POSSIBLY DISASTROUS RESULTS.

The seat pan

27 The seat pan is secured to the seat structure by upper and lower brackets fitted to runners contained in the front face of the main beams and is supported by the seat raising lever. The weight of the occupant is counter-balanced by two elastic seat reaction cords. Two spring clips to accommodate the harness sticker clips and three brackets to retain the negative-g strap are fitted inside the seat pan. Attached to the starboard side is the leg restraint lines manual release lever, to the front face the emergency oxygen manual control and to the port side the go-forward control, the manual separation handle and a single sticker clip introduced by Mod ES 7071 into which the lug of the PSP lowering line (Post-mod SR 592) is connected.

Seat raising mechanism

28 The raising mechanism (fig 9) is operated by the seat raising handle which is secured to the countershaft. Depressing the trigger operates a bell-crank lever, which through a connecting rod withdraws a plunger from the seat securing strip. The weight of the seat is now supported by the seat raising lever and the two elastic seat reaction cords; the seat pan is now free to be raised or lowered by the seat raising handle. Seven positions are provided by holes in the seat securing strip giving a seat pan travel of 6 in. When the desired position has been reached release of the trigger control will allow the spring-loaded plunger to locate in the nearest hole in the seat securing strip.

Leg restraint system

29 The leg restraint system consists of leg restraining cords, two snubbing units, two taper plug assemblies and a pair of leg restraint garters which are part of the flying clothing.

30 The leg restraint cords pass through the snubbing units which are fitted to the underside of the seat pan. Each snubbing unit is similar but handed and consists of a casing, a snubbing lever, a spring tube and a release ring. The design of the unit permits the leg cord to pass freely downwards but prevents any upward movement. During ejection the cords which are anchored to the floor of the aircraft pull the occupants legs back towards the seat pan. The lower ends of the cords terminate in brackets and rollers; the rollers are held into the brackets by rivets which have a shear strength of approximately 400 lb; the brackets are attached to the floor anchorages by quick-release pins. The upper ends of the cords terminate in fittings which engage in the taper plug assemblies fitted to the front of the seat pan. Each assembly has a spring-loaded plunger to retain the cord end fitting.

31 A torque shaft assembly carried in bearings on the front of the seat pan has two small levers to raise the plungers of the taper plug assemblies against spring tension to free the ends of the leg retaining cords. The torque shaft assembly is connected with the harness release mechanism (fig 10) by a bell-crank lever and link plate assembly. A manually operated lever on the starboard side of the seat pan is directly connected to the torque shaft (fig 10) and operation of the lever will rotate the shaft to free the leg cords when the seat occupant wishes to leave the aircraft after flight.

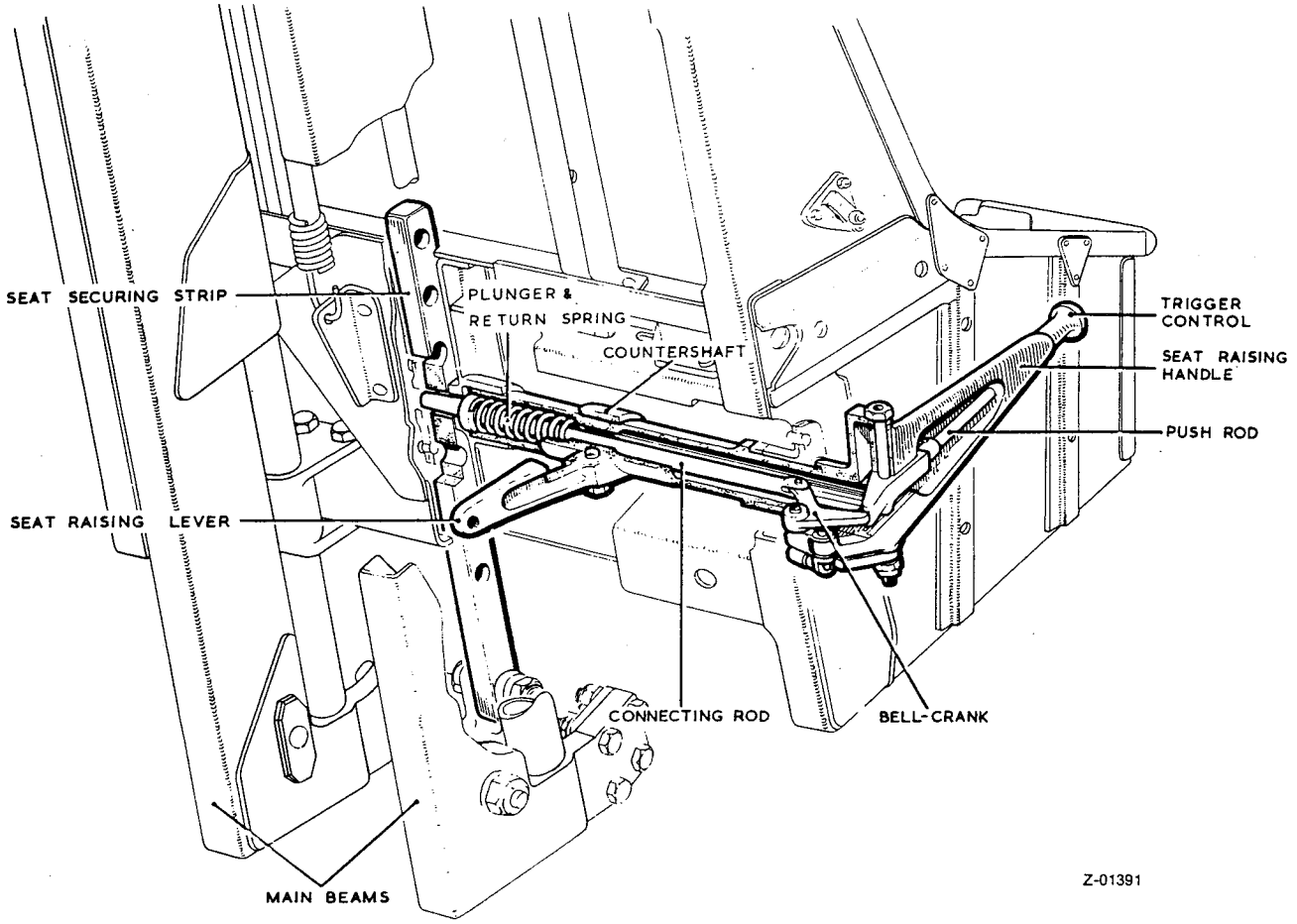

Fig 9 Seat raising mechanism

Drogue container

32 The drogue container is a riveted metal box mounted at the top of the seat structure. The face screen firing handle is housed at the front of the container and is retained by two spring-loaded plungers. The face screen is secured to the container by two nylon tapes, which pass through channels mounted on the sides of the container, and are then secured by the same pins that secure the retaining straps for the wedge pad and the parachute restraining straps. The securing pins are withdrawn by the drogue to parachute attachment line after the scissor shackle has been opened. The drogues are stowed in a separate compartment at the rear of the face screen stowage. The drogue compartment contains a nylon sleeve for the protection of the main drogues and the top of the container is closed by four retaining flaps which are threaded on to a wire loop in a pre-determined order and locked by a wire pin fitted part way along the drogue withdrawal line. For ease of replacement the protective sleeve is secured to the drogue container by a series of special nuts, bolts and washers.

Harness release mechanism

33 The combined harness has a three point attachment to the seat; two locks in the seat pan secure the lap straps and a third lock in the 40-g beam secures the shoulder straps by means of a yoke and looped webbing strap (fig 4). One end of the webbing is connected to the spring-loaded reel, and the other end passes through a snubbing unit, through the harness yoke and is secured by the top harness lock. The snubbing lever prevents any forward movement of the webbing unless release is effected by operating the go-forward lever. The spring-loaded reel keeps the webbing under tension and takes up the slack as the occupant leans back.

Release linkage

34 Details of the release linkage are shown in fig 10. It consists basically of a harness release lever carrying a sear, and a pad which receives the downward thrust of the harness release plunger of the time-release unit. Part way along the lever is a push-rod which transmits the thrust to a parallel-motion which rotates a torque shaft. This shaft carries two push-rods which operate the lower harness locks through bell-cranks. The port bell crank is so shaped that the lower portion accommodates the leg restraining cord release control.

35 When the barostatic time-release unit is operated by the static rod, the descending harness release plunger strikes the pad at the end of the lever, which withdraws the upper harness lock, actuates the linkage and simultaneously frees the lower harness locks and the leg restraining cords.

Inertia lock and go-forward control

36 With the go-forward lever in a certain position the seat occupant is allowed complete freedom of movement forwards and backwards; the system however locks immediately upon ejection or severe deceleration.

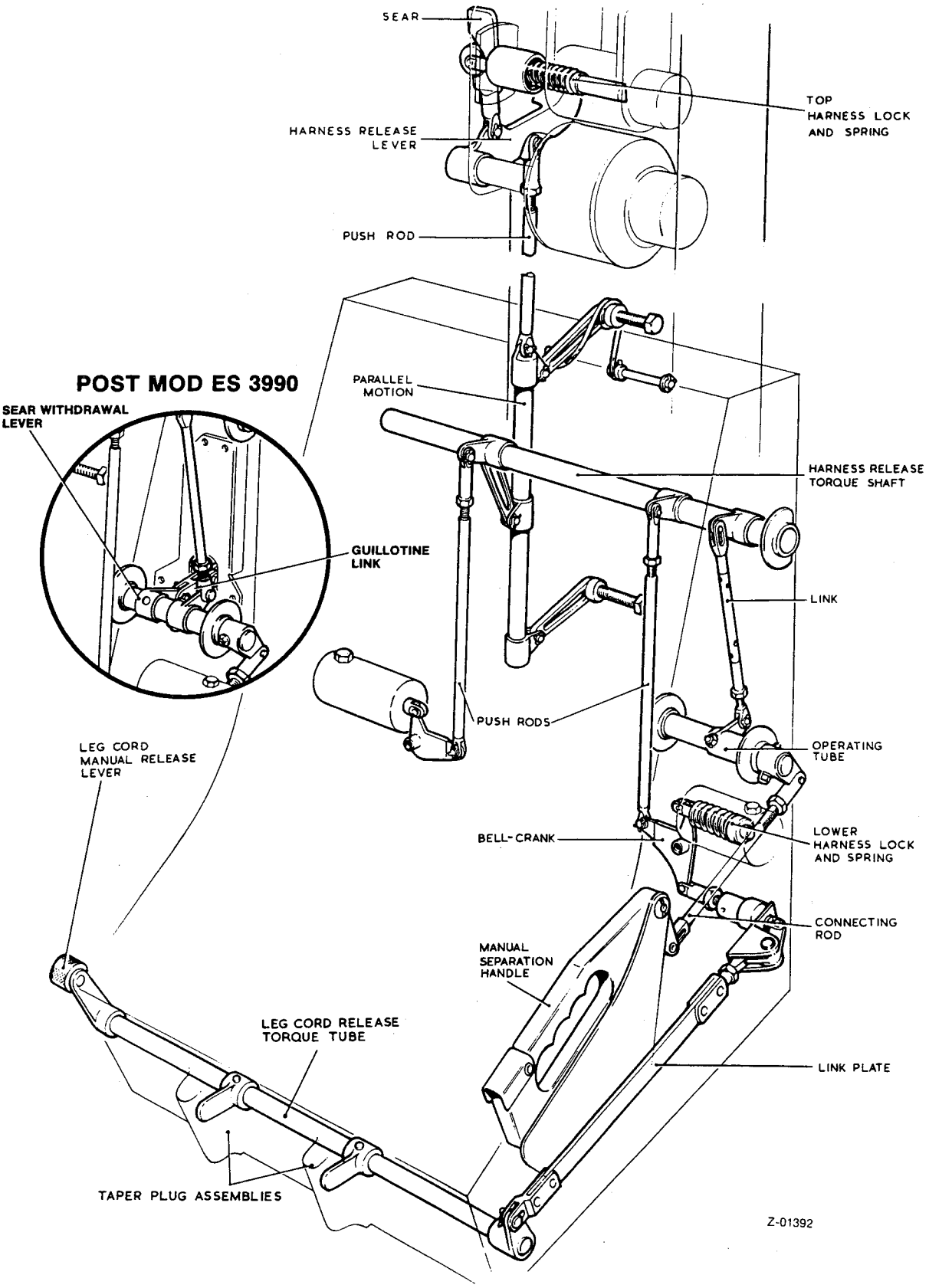

Fig 10 Harness release linkage
▶ (Amended illustration) ◀

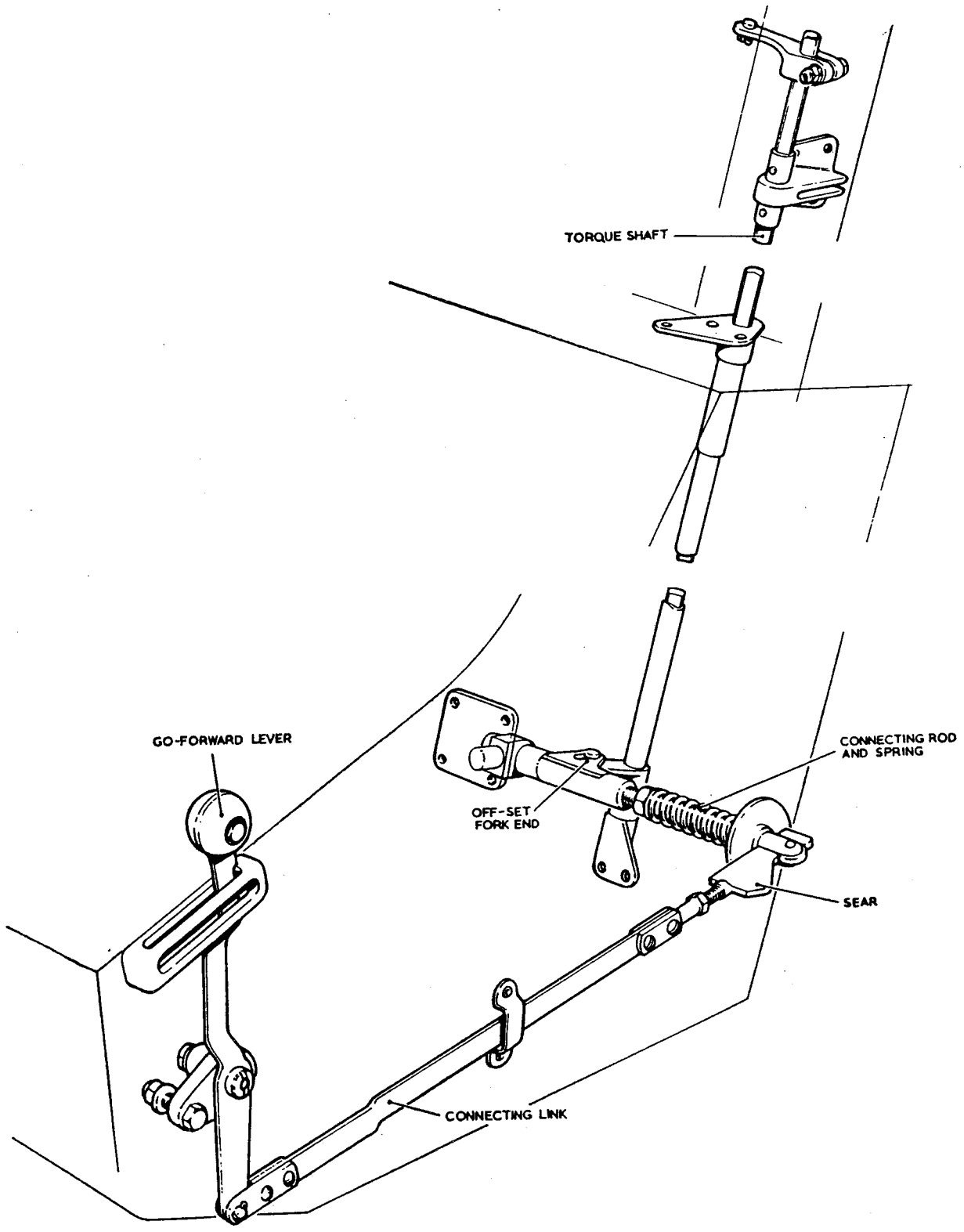

Fig. 11. Go-forward control

37. This has been achieved by fitting a small spring-loaded stop at the end of the snubbing lever shaft. The go-forward control box (fig. 11) has also been altered to provide an additional feature. When the control is moved right forward and then returned to the centre position, the snubbing lever is rotated free of the webbing and is maintained in this position by the inertia stop, which is now in a slightly over-centre position. Hence the webbing strap may be withdrawn or returned to the reel at will.

38. Immediately the seat is subjected to deceleration or vertical forces (as would happen during ejection or in a crash landing) the weight and momentum of the snubbing lever overcome the inertia stop and the lever returns to the locked position. At any time the occupant wishes he can

operate the go-forward control to the rear position, whereupon the webbing is locked in the normal manner.

SAFETY PRECAUTIONS

39 The safety precautions concerning ejection seats are referred to in the warning preceding para 3 and detailed in AP 109B-0131-5F and relevant Naval Publications.

QUICK-RELEASE CONNECTIONS

40 When the seat is ejected, the various personal services disengage automatically at quick-release connections, further quick-release connections are provided for disengaging these services when the occupant wishes to leave the aircraft after flight.

TYPES 4HA(N)-1 and 4HA(N)-2 EJECTION SEATS

INTRODUCTION

41 Two ejection seats are fitted to the Hunter T Mk 8 aircraft; the Type 4HA(N)/1 is installed in the starboard position and the Type 4HA(N)/2 in the port position. The seats are identical except for the position of the transmission trip lever for the auto-tone unit. The Type 4HA(N) ejection seats differ from the Type 4HA ejection seat only in the following:

(1) Drogue gun, Type 12, Mk 1, AP 109D-0203-1.

(2) The main beams have a transmission trip lever for the auto-tone system fitted to the top of the port beam for the Type 4HA(N)/1 seat, and to the top of the starboard beam for the Type 4HA(N)/2 ejection seat.

(3) The emergency oxygen bottle upper hinged clamp has the clamp locking nut on the outboard side.

(4) The drogue gun trip rod anchor bracket has been re-designed to allow insertion of the quick-release pin from the front.

(5) Decals are fitted to the drogue container indicating the position of the seat in the aircraft.

MAINTENANCE

NOTE...
Details of lubricants to be used and their correct application will be found in AP 109A-0100-6, Leaflet A4.

SEAT PAN RAISING MECHANISM

Checking seat pan vertical movement

42

CAUTION...
The seat raising mechanism must not be operated with the manual separation control in the UP (operated) position.

Note...
Due to manufacturing tolerances it is not possible to eliminate ALL vertical movement of the seat pan.

(1) With the seat pan raising mechanism in the locked position, check for vertical movement of the seat pan where the seat pan runner tubes pass through the seat pan brackets. Carry out the check with the seat pan adjusted to each position.

(2) If what is considered to be excessive vertical movement is found, carry out the following procedure to eliminate worn components:

(a) Lock the seat pan in the position where vertical movement has been found.

(b) Refer to fig 11A and ascertain whether the clearance at 'A' exists.

(c) If a clearance exists and seat pan vertical movement is considered excessive, wear is most likely to be present in the seat securing strip, Pt No MBEU 5210, plunger holes.

Note...
Replacement of the seat securing strip in sub-para (d) may reintroduce the clearance at 'A' but excessive seat pan vertical movement will not be eliminated if the plunger housing is worn.

(d) If a clearance at 'A' does not exist and seat pan vertical movement is considered excessive, wear is most likely to be present in the seat securing strip, Pt No MBEU 5210, plunger holes and/or the plunger housing, Pt No MBEU 5089.

(3) If after replacement of the seat securing strip, Pt No MBEU 5210, the clearance at 'A' exists and excessive seat pan vertical movement is still present, the seat/seat pan should be returned to the manufacturer, when spares and operational commitments permit, for replacement of the plunger housing.

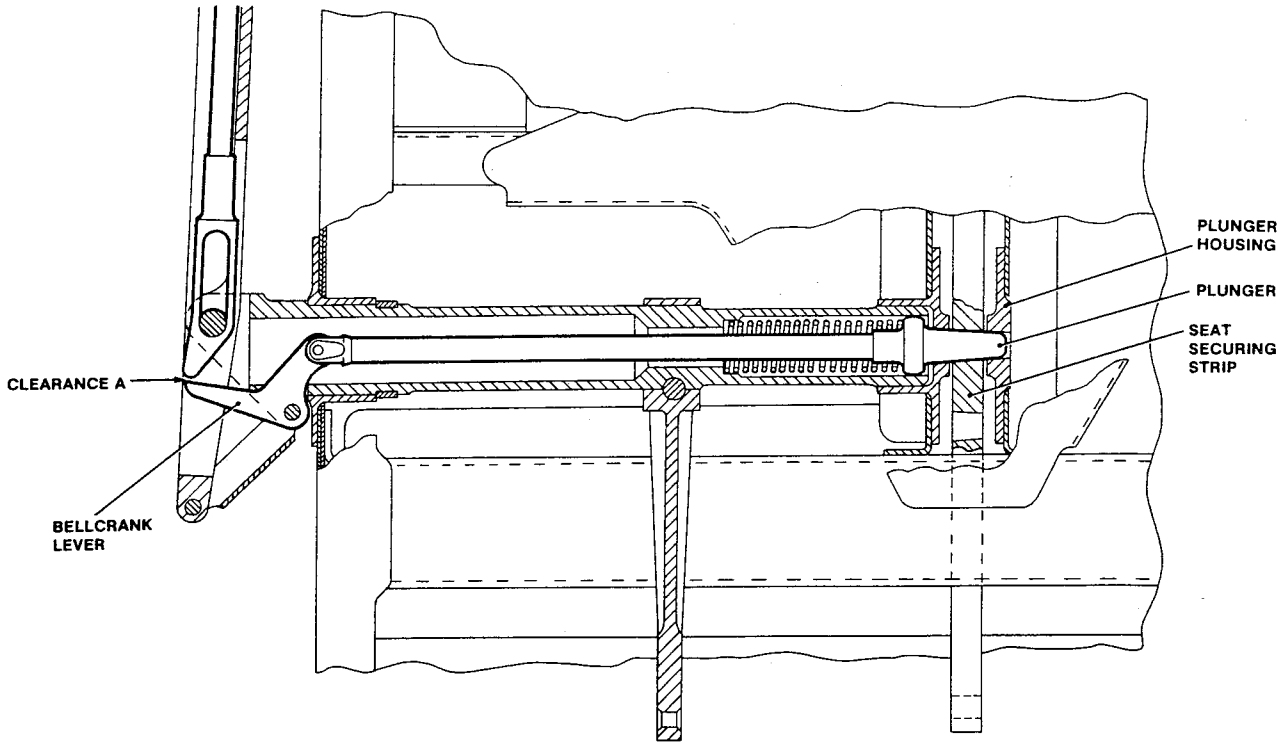

Fig 11A Checking seat pan movement

CAUTION...
The seat raising mechanism must not be operated with the manual separation control in the UP (operated) position.

TO REMOVE THE SEAT PAN

▶ 42A

42A.1 Remove the mic/tel lead from the cleats on the parachute container.

42A.2 Ensure that the elastic retention cords are disconnected from the drogue gun and the barostatic time-release units static rods.

42A.3 Remove the nuts and bolts securing the parachute container to the upper and lower brackets; remove the container from the seat structure.

42A.4 Disconnect the parallel-motion push rod from the harness release lever and remove the parallel-motion from the starboard main beam. ◀

42A.5 Slacken the nut and bolt securing the top lever to the torque shaft. Allow the torque shaft to drop into the torque tube, removing the spacer as it becomes free.

▶ 42A.5A Post-mod ES3990 only. Remove the split pin and SP4 pin securing the outer tube of the trombone assembly to the guillotine breech assembly and withdraw the tube from the guillotine breech. ◀

42A.6 Remove the leg restraining cord torque tube cover plate from the inside of the seat pan.

42A.7 Remove the seat pan firing handle from the firing cable.

42A.8 Remove the firing cable conduit clamp from the front of the seat pan and withdraw the conduit through the hole in the underneath of the seat pan.

42A.9 Ensure that the seat pan is in the top position and disconnect the seat reaction cords.

42A.10 Disconnect the seat raising lever from the link.

42A.11 Remove the bolt securing the seat securing strip to the bottom cross-beam. Depress the seat raising handle trigger control and withdraw the securing strip upwards out of the seat pan.

42A.12 Remove the nuts and bolts securing the seat pan to the upper and lower runners.

42A.13 Remove the seat pan from the seat structure.

TO DISMANTLE THE SEAT RAISING MECHANISM

43

43.1 Remove the SP4 pin which connects the seat raising lever to the link.

43.2 Remove the bolt which locates the split collar on the seat raising mechanism countershaft and slide the countershaft outwards as far as it will go.

43.3 Remove the taper pin which secures the seat raising lever to the countershaft and slide out the seat raising mechanism.

TO ASSEMBLE THE SEAT RAISING MECHANISM

44

44.1 Slide the assembly into position and secure the seat raising lever with the taper pin and nut.

44.2 Fully locate the assembly in the seat pan and fit the bolt which secures the split collar to the countershaft.

44.3 Connect the seat raising lever to the link.

44.4 Test the mechanism for correct functioning.

TO FIT THE SEAT PAN

45

45.1 Place the seat pan on the seat structure and secure it to the upper and lower runners.

45.2 Depress the trigger control of the seat raising handle and insert the seat securing strip. Attach the strip to the bottom cross-beam.

45.3 Connect the seat raising lever to the link.

45.4 Ensure that the seat pan is in the top position and connect the seat reaction cords.

45.5 Route the seat pan firing cable conduit through the hole in the underside of the seat pan and secure it to the front of the seat pan with the clamp.

▶ 45.6 Refit the seat pan firing handle to the firing cable.

45.7 Replace the leg restraint cord torque tube cover plate.

45.8 Withdraw the torque shaft from the torque tube and pass it through the bracket and spacer and secure it to the top lever.

45.9 Post-mod ES3990 only. Remove the O-seal from the lower end of the trombone tube. Lubricate and fit new O-seal.

45.10 Post-mod ES3990 only. Extend the trombone assembly outer tube and insert the lower end into the guillotine breech assembly. Secure with SP4 pin and split pin.

45.11 Refit the parallel motion to the starboard main beam and the push rod to the harness release lever.

45.12 Refit the parachute container to the seat structure and the mic/tel lead to the container. ◀

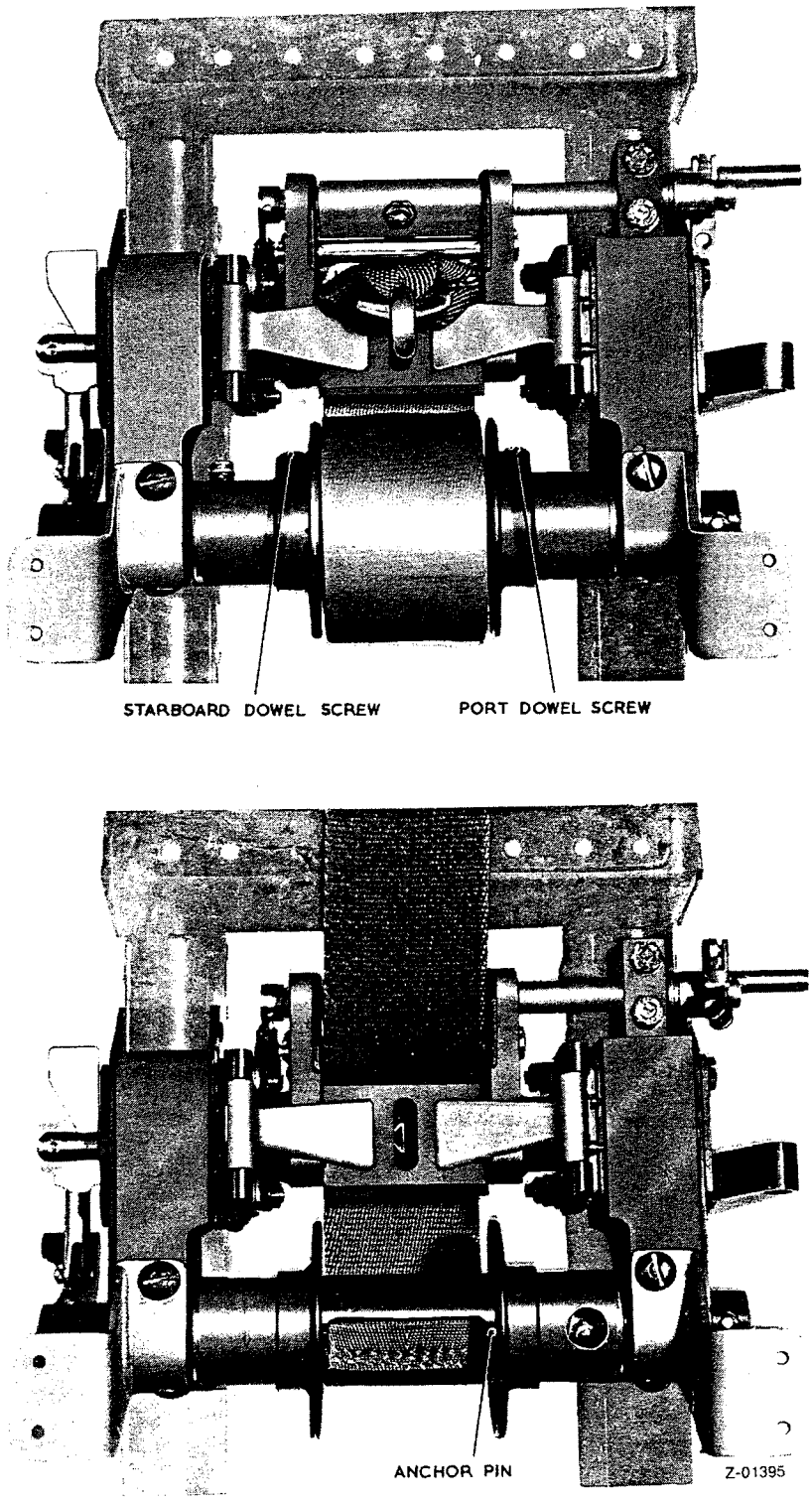

Fig 12 Changing the 40-g webbing

▶ TO CHANGE THE 40-G WEBBING

46

46.1 Remove the parachute container.

46.2 Operate the go-forward control and fully withdraw the webbing to expose the anchor pin (fig 12).

46.3 Whilst maintaining the spring tension on the webbing drum remove the dowelled screw which retains the port flange and slide the flange to one side.

46.4 Remove the anchor pin from the drum and allow the drum to unwind.

46.5 Remove the webbing from the 40-g beam and fit new webbing. Fit the anchor pin to the webbing.

46.6 Fully wind webbing drum and allow it to ease back a half turn. If the anchor pin recess is not accessible allow the drum to ease until the recess is accessible.

46.7 Fit the anchor pin to the webbing drum and refit the port flange and dowelled screw. Allow the webbing to wind in.

46.8 Operate the go-forward control and fully withdraw the webbing; ensure that there is between a half and one and a half turns loading still available on the webbing drum.

46.9 Move the go-forward control to the forward position and allow it to return to the centre position. Ensure that the webbing is free to move in both directions and that the snub lever is lifted clear of the webbing. If the lever is not lifted clear, disconnect the connecting link from the torque shaft and screw in the adjustable end of the link, a half turn at a time until the snubbing lever is lifted clear. Re-connect and lock the connecting lever to the torque shaft. Set the control to the rearward position.

46.10 Move the go-forward control from the rear position directly to the centre position. Pull hard on the 40-g webbing strap and, at the same time, ensure that there is a minimum clearance of 0.005 in. between the 'dog' on the snubbing lever shaft and the 'dogs' on the shaft operating lever (fig 13). Adjust as necessary on the connecting link.

46.11 Fully withdraw the webbing; release the go-forward control and ensure that the webbing is free to wind back on the drum but that the snubbing lever restrains any forward movement.

46.12 Refit the parachute container assembly.

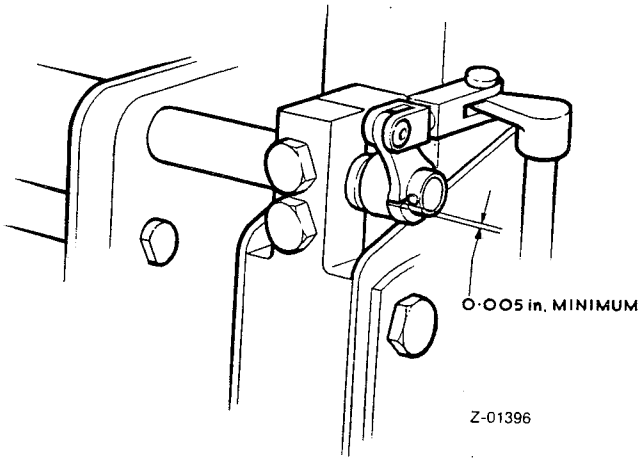

Fig 13 Checking the clearance of the snubbing lever linkage

TO SERVICE THE TAPER PLUG ASSEMBLIES

47

47.1 Remove the leg cord release torque tube cover plate from the inside of the seat pan.

47.2 Remove the taper plug assemblies from the front of the seat pan.

47.3 Remove the springs and plungers from the housings.

47.4 Clean and examine the assemblies for damage and corrosion. Lightly lubricate.

47.5 Replace the plungers and springs in the housings.

47.6 Coat the bearing surfaces with pigmented varnish (Ref. No. 33H/2202110) and refit the assemblies to the seat pan.

47.7 Refit the cover plate to the inside of the seat pan.

TESTING THE HARNESS RELEASE AND LEG RESTRAINING CORD RELEASE MECHANISM

48 The tests as detailed are to be carried out with the seat pan in the top position and the repeated with the pan in the bottom position, ensuring in each case that the release mechanism operates smoothly and without any signs of binding.

▶ NOTE...
The following equipment is required:

48.1 Two harness buckles attached one at each end of a 3 ft. length of suitable cord or tape. If spare buckles are not available two copies of the appropriate buckle are to be manufactured locally.

48.2 Feeler gauges.

48.3 Cartridges, guillotine No 1 Mk 2 insert drill modified as detailed in para 49A.1.

49 Pre-mod ES3990. The test for release sequence is done in the first instance by operating the manual separation handle, and, due to the loss of motion in the various linkages, the stage of the mechanism furthest from the manual separation handle is at a mechanical disadvantage. The farthest stage of the mechanism is the leg restraint cord release which should occur first. A light pull only is to be exerted on the harness locks during the test, otherwise a false reading may be obtained. The test of the mechanism is to be done as follows:

49.1 Ensure that the manual separation handle is in the down 'LOCKED' position.

49.2 Check the clearance between the harness locking plungers and their housings using feeler gauges; the clearances are to be:

Upper lock, 0.0 to 0.010 in.
Lower lock, 0.000 in. to 0.015 in.

49.3 Insert the cones of the leg restraining cords into their housings on the seat pan and ensure that they are securely held.

49.4 Fit the harness buckles to the lower harness locks and ensure that they are securely held.

49.5 Operate the go-forward control and pull out the webbing strap, pass it round the harness buckle cord and insert the lug into the upper harness lock; ensure that the lug is securely held.

49.6 Hold the cord so that there is an even LIGHT tension on the three harness locks, and operate the manual separation handle slowly until the first lock releases the harness buckle.

49.7 Check that the leg restraining cords are released.

49.8 Continue operating the manual separation handle until the remaining harness locks are released.

NOTE..
The leg restraint lines are to release before or at the same time as the first of the lower harness locks. In the ideal condition the three harness locks should release together, but a small delay is acceptable between releases. The top harness lock however is to be the last to release.

▶ 49.9 Check that all releases have occurred with the manual separation handle in the position shown in fig 14.

49.10 Operate the manual separation handle fully and ensure that the harness locking plungers are fully withdrawn into their housings.

49.11 Position the manual separation handle in the down 'LOCKED' position and insert the cones of the leg restraining cords into their housings; ensure that the cones are securely held.

49.12 Press upwards on the cones and observe that the tension of the locking plungers can be felt.

49.13 Operate the manual separation handle; insert the cones into their housings and attempt to engage the locking plungers by pulling out the cones in an upward direction.

NOTE...
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 the test, push the link plate assembly to the rear; if this action eliminates the catch the mechanism requires adjustment.

49.14 Position the manual separation handle in the down 'LOCKED' position and operate the leg restraining cord release by means of the manual release lever; ensure that the locking plungers are completely withdrawn.

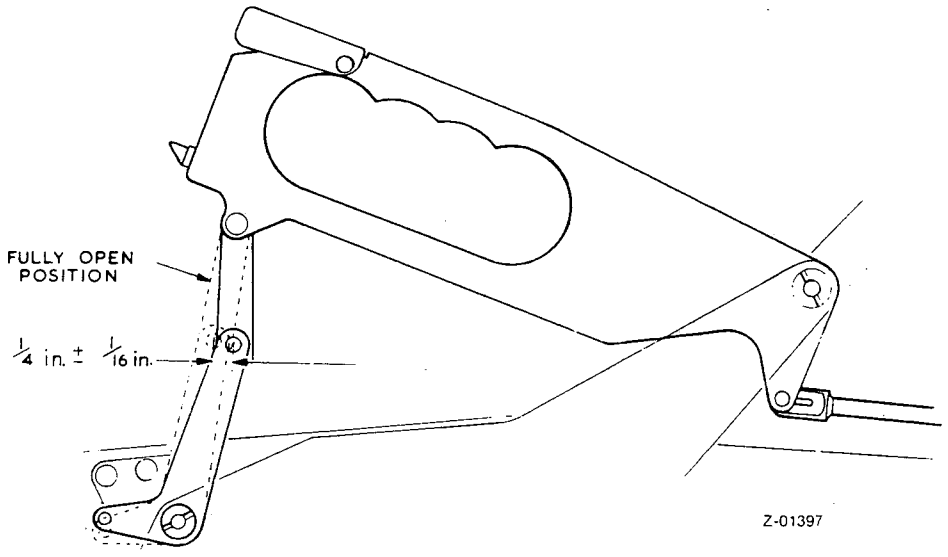

Fig 14 Checking the operation of the manual separation handle (Pre-mod ES3990)

▶ 49A Post-mod ES3990. It is important to ensure that during the tests the release mechanism operates smoothly and without any signs of binding. The test for release sequence is carried out from the manual separation handle and, under ideal conditions, the harness locks should operate simultaneously. This is difficult to achieve however, due to loss of motion in the various linkages. Some delay is therefore permissible between the release of the lower and upper harness locks but this delay must not be excessive and the upper harness locks must always be the last to be released.

49A.1 Drill out a cartridge, guillotine No 1 Mk 2, inert drill (12K/9659142) as follows:

49A.1.1 Locate and centre pop mark the dummy percussion cap.

49A.1.2 Clamp the inert drill cartridge in the vice of a suitable pillar drill and using a 6 mm drill, remove the dummy percussion cap.

NOTES...
1 To avoid the possibility of a loose article hazard, ensure that all of the percussion cap is removed.

2 Do not drill through the brass cartridge case.

49A.1.3 Remove any burrs from the cartridge case and all swarf from inside the cartridge.

49A.2 Ensure that the manual separation handle is in the fully down 'LOCKED' position.

49A.3 Check the clearance between the harness locking plungers and their housings using feeler gauges; the clearances should be:

Upper lock, 0.000 to 0.010 in.
Lower locks, 0.000 to 0.015 in.

49A.4 Insert the leg restraint lines taper plugs into their respective taper plug assemblies and ensure that they are securely held.

49A.5 Fit the lower harness test buckles to the respective locks and ensure that they are securely held.

49A.6 Operate the go-forward control lever and pull out the webbing strap. Pass the strap round the test buckle cord and lock the strap end fitting into the top harness lock. Ensure that the strap is securely held.

CAUTION...
Ensure that the percussion cap of the inert drill cartridge (12K/9659142) has been drilled out as detailed in sub-para 49A.1.

49A.7 Fit the inert drill cartridge in the guillotine breech and refit the firing unit Connect the guillotine link to the sear and remove the safety pin. ◀

▶ 49A.8 Hold the harness test straps so that there is a light even tension on all locks, operate the manual separation handle slowly, the locks should release in the following sequence:

49A.8.1 Leg restraint lines.

49A.8.2 Lower harness locks.

49A.8.3 Upper harness lock.

49A.9 Check that the guillotine sear is completely withdrawn before release of the upper harness lock.

49A.10 Continue to operate the manual separation handle until it is in the fully up position and ensure that all locking plungers are fully withdrawn.

49A.11 Position the manual separation handle in the fully down 'LOCKED' position and insert the taper plugs of the leg restraint cords into their housings and ensure the taper plugs are securely held.

49A.12 Press upwards on the taper plugs and observe that the tension of the locking plungers can be felt.

49A.13 Operate the manual separation handle; insert the taper plugs into their housings and attempt to engage the locking plungers by pulling out the taper plugs in an upwards direction.

NOTE...
The cones may catch on the inside edge of the housings when they are pulled out at this angle. To establish the cause of any catch felt during the test, push the link plate assembly to the rear; if this action eliminates the catch the mechanism requires adjustment.

49A.14 Position the manual separation handle in the fully down 'LOCKED' position and operate the leg restraint cord release by means of the manual release lever and ensure that the locking plungers are fully withdrawn.

49A.15 Remove the inert drill cartridge from the guillotine breech.

49A.16 Disconnect the guillotine sear from the guillotine link and fit the sear to the firing unit. Refit the safety pin.

49A.17 Refit the firing unit to the guillotine breech and connect the sear to the guillotine link. ◀

50 On completion of the tests the release mechanism is to be checked for correct operation by using the barostatic time-release unit as follows:

50.1 Place the seat pan in the bottom position. Ensure that the manual separation lever is in the fully down 'LOCKED' position.

▶ 50.2 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 test 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 taken place automatically and NOT to check the actual release sequence which is applicable to manual operations only.

ADJUSTING THE HARNESS RELEASE MECHANISM

51 The mechanism operates in a series of easily defined stages and the following paragraphs are in the sequence which is to be adhered to when the system is to be adjusted. It is unlikely that the individual harness locks will require adjustment in service, therefore only the leg restraint lines release and negative-g system will normally require adjustment. Whatever stage is being adjusted, the principle of adjusting in sequence applies.

WARNING...
GREAT CARE MUST ALWAYS BE EXERCISED WHEN MAKING THE ADJUSTMENTS DETAILED IN THE FOLLOWING PARAGRAPHS. MAL-ADJUSTMENT COULD HAVE SERIOUS CONSEQUENCES.

NOTE...
1 When carrying out the adjustments the seat pan should be set in the position in which maximum play (or loss of motion) may be observed in the release linkage. This is normally the bottom position but may vary.

2 When one stage requires adjustment, the stage following must be disconnected.

3 The proceeding stages of the mechanism must be fully adjusted before adjusting a later stage.

INITAL ADJUSTMENT OF THE HARNESS LOCKS

52 The upper harness lock is set at the manufacturers to give a clearance of 0.002 in. to 0.010 in. between the end of the locking plunger and its housing; the plunger is to be under tension and this is indicated by the roller over the sear not being free to rotate. The original clearance was from 0.0 to 0.010 in. and seats having no clearance are acceptable. The lower harness locks are adjusted to operate together and the clearance between the locking plungers and their housings is to be from 0.000 in. to 0.015 in. The setting of the individual locks should not require adjustment during service.

SYNCHRONISING THE UPPER AND LOWER BLOCKS

53 When the adjustments in para 52 have been completed, the seat pan is fitted to the main beams and the parallel-motion linkage is connected. The push rod connecting the harness release lever to the parallel motion linkage is adjusted to synchronise the lower locks with the upper lock; the push rod is lengthened to advance to lower locks.

▶ ADJUSTING THE MANUAL SEPARATION HANDLE (Pre-mod ES3990) ◀

54 If the upper and lower harness locks do not operate within the limits given in fig 14, proceed as follows:

54.1 Disconnect the connecting rod from the operating tube.

54.2 Adjust the fork-end of the connecting rod as necessary, a half-turn at a time until all locks operate within the given limits.

54.3 Reconnect the connecting rod to the operating tube.

▶ ADJUSTING THE MANUAL SEPARATION HANDLE (Post-mod ES3990)

54A

54A.1 Ensure that the manual separation handle is in the fully down 'LOCKED' position and disconnect the connecting rod from the operating lever.

54A.2 Ensure that the guillotine breech firing unit and sear is fitted to the guillotine breech and that the guillotine link is attached to the sear.

54A.3 Slacken the locking nut.

54A.4 Adjust the fork-end of the connecting rod as necessary, half a turn at a time, to take up the play in the slotted end. Ensure that there is no tension on the guillotine link. Tighten the locking nut.

ADJUSTING THE HARNESS LOCKS (Post-mod ES3990)

54B

54B.1 Fit the inert drill cartridge in the guillotine breech and refit the firing unit. Connect the guillotine link to the sear and remove the safety pin.

54B.2 Ensure that the manual separation handle is in the fully down 'LOCKED' position and that the guillotine link is attached to the sear withdrawal lever and the guillotine firing unit sear.

54B.3 Disconnect the lower fork end of the link assembly from the operating lever. ◀

▶ 54B.4 Slacken the locking nut and adjust the fork-end to position the upper SP4 pin centrally in the slot of the slotted fork-end.

54B.5 Temporarily assembly the fork-end to the operating lever.

54B.6 Fit the harness buckles to the lower harness locks and ensure that they are securely held.

54B.7 Operate the go-forward control and pull out the webbing strap. Pass the strap around the harness buckle cord and insert the lug into the upper harness lock. Ensure that the lug is securely held.

54B.8 Hold the cord so that there is an even LIGHT load on the three locks. Operate the manual separation handle slowly and check that the guillotine sear is fully withdrawn before the top lock releases. If necessary adjust the lower fork end, half a turn at a time until the correct sequence is obtained.

54B.9 Using a suitable piece of lock wire, check for the presence of thread through the hole in the lower end of the link and tighten the locking nut.

54B.10 Remove the inert drill cartridge. Refit the sear to the guillotine firing unit and refit the firing unit to the guillotine breech. Refit the safety pin.

ADJUSTING THE LEG RESTRAINING CORD RELEASE (Pre-mod ES3990) ◀

55

55.1 Take up approximately half of the amount of adjustment on the link connecting the port bell-crank to the leg restraining cord release mechanism.

55.2 Adjust the link plate assembly to take up the play in the slotted end.

55.3 Ensure that the manual separation handle is in the down 'LOCKED' position. Insert the cones of the leg restraining cords into their housings on the seat pan and ensure that they are securely held.

55.4 Fit the harness buckles to the lower harness locks and ensure that they are securely held.

55.5 Operate the go-forward control and pull out the webbing strap, pass it round the harness buckle cord and insert the lug into the upper harness lock, ensuring that it is securely held.

55.6 Hold the cord so that there is an even light tension on the three locks and operate the manual separation handle slowly until the first lock releases the harness buckle. Observe that the leg restraining cords are released. Adjust the link plate assembly so that the leg restraining cords release before (ideally), or at the same time as the release of the first harness lock. This condition is to be obtained without losing the tension of the locking plunger springs (see sub-para 55.9).

55.7 With the manual separation handle fully operated, insert the cones into their housings and attempt to engage the locking plungers by pulling out the cones in an upward direction.

NOTE...
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 the test, push the link plate assembly to the rear; if this action eliminates the catch, the mechanism requires adjustment. Adjust by screwing up the turnbuckle of the link plate assembly a half turn at a time and recheck.

55.8 Position the manual separation handle in the down 'LOCKED' position and operate the leg restraining cord release by means of the manual release lever; ensure that the locking plungers are completely withdrawn.

55.9 Re-position the manual release lever and insert the cones into their housings. Press upwards on the cones and observe 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. Adjust by unscrewing the turnbuckle of the link plate a half turn at a time until the tension can be felt. Re-check for complete withdrawal of the locking plungers as detailed in sub-paras 55.7 and 55.8.

55.10 On completion of the adjustment to the harness release and leg restraining cord mechanism as detailed in para 51 to 55 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.

▶ ADJUSTING THE LEG RESTRAINING CORD RELEASE (Post-mod ES3990)

55A

55A.1 Take up approximately half of the amount of adjustment on the link connecting the port bell-crank to the leg restraining cord release mechanism.

55A.2 Adjust the link plate assembly to take up the play in the slotted end.

55A.3 Disconnect the guillotine link from the operating lever.

55A.4 Ensure that the manual separation handle is in the down 'LOCKED' position. Insert the cones of the leg restraining cords into their housings on the seat pan and ensure that they are securely held.

55A.5 Fit the harness buckles to the lower harness locks and ensure that they are securely held.

55A.6 Operate the go-forward control and pull out the webbing strap, pass it round the harness buckle cord and insert the lug into the upper harness lock, ensuring that it is securely held. ◀

▶ 55A.7 Hold the cord so that there is an even light tension on the three locks and operate the manual separation handle slowly until the first lock releases the harness buckle. Observe that the leg restraining cords are released. Adjust the link plate assembly so that the leg restraining cords release before (ideally), or at the same time as the release of the first harness lock. This condition is to be obtained without losing the tension of the locking plunger springs, sub-para 55A.10.

55A.8 With the manual separation handle fully operated, insert the cones into their housings and attempt to engage the locking plungers by pulling out the cones in an upward direction.

NOTE...
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 the test, push the link plate assembly to the rear; if this action eliminates the catch, the mechanism requires adjustment. Adjust by screwing up the turnbuckle of the link plate assembly a half turn at a time and recheck.

55A.9 Position the manual separation handle in the down 'LOCKED' position and operate the leg restraining cord release by means of the manual release lever; ensure that the locking plungers are completely withdrawn.

55A.10 Re-position the manual release lever and insert the cones into their housings. Press upwards on the cones and observe 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. Adjust by unscrewing the turnbuckle of the link plate a half turn at a time until the tension can be felt. Re-check for complete withdrawal of the locking plungers as detailed in sub-paras 55A.8 and 55A.9.

55A.11 Re-connect the guillotine link to the operating lever.

55A.12 On completion of the adjustment to the harness release and leg restraining cord mechanism as detailed in para 51A to 55A 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. ◀

FUNCTIONAL CHECK OF THE MECHANISM

56 Whenever the harness release mechanism has been disturbed, e.g., on replacement of the seat pan, the mechanism is to be checked as detailed in para 48, 49 and 50.

RENEWING THE DROGUE PROTECTIVE SLEEVE

57 New drogue protective sleeves as issued by the manufacturers are not provided with attachment holes. To renew a sleeve proceed as follows:

57.1 Remove the unserviceable sleeve from the container, identifying each retaining strip to ensure correct assembly.

57.2 Place each of the retained securing strips over the attachment strips of the new sleeve and use as templates to mark out the position of the attachment holes. Remove the securing strips.

57.3 Bore the holes, heat sealing the fabric using an iron soldering, Instrument, 220/240 volts, 25W (Royal Navy, Ref. 0565/900-5691) fitted with a copper bit, 2 BA clearance (Royal Air Force, Ref. 1B/9005691), fitted with a 3/16 in. copper bit.

57.4 Replace the securing strips in their respective positions on the sleeve attachment strips, clamping the sleeve to the strips using Avdell spring clips (or other suitable clamps). Assemble the sleeve to the drogue container with the flap securing pin pocket facing the front of the headrest and ensuring that the sleeve attachment strips are sufficiently positioned between the container skin and the securing strips.

RENEWING THE DROGUE WITHDRAWAL AND ANTI-SQUID LINES

TO REMOVE THE DROGUE WITHDRAWAL AND ANTI-SQUID LINES

58

58.1 Disconnect the withdrawal line from the drogue gun piston.

58.2 Remove the controller drogue from the drogue container.

58.3 Cut the stitching at the junction of the drogue withdrawal line and the anti-squid line. Pass the withdrawal line through the loop of the anti-squid line and remove the withdrawal line.

58.4 If the withdrawal line is life-expired or unserviceable, cut the stitching securing the spool, remove the spool and slide off the length of armoured hose.

58.5 Pass the anti-squid line down through the shroud lines and separate the anti-squid line from the loop of the controller drogue shroud lines.

TO REFIT THE DROGUE WITHDRAWAL AND ANTI-SQUID LINES

59

59.1 Pass the large loop of the anti-squid line through the loop at the lower end of the controller drogue shroud lines, pass the small loop at the other end of the anti-squid line through the large loop and form a knot as shown in fig 15 (action 1).

59.2 Ensure that the length of armoured hose is free from damage or fraying. Using a suitable length of cord, pull the loop of the withdrawal line through the hose.

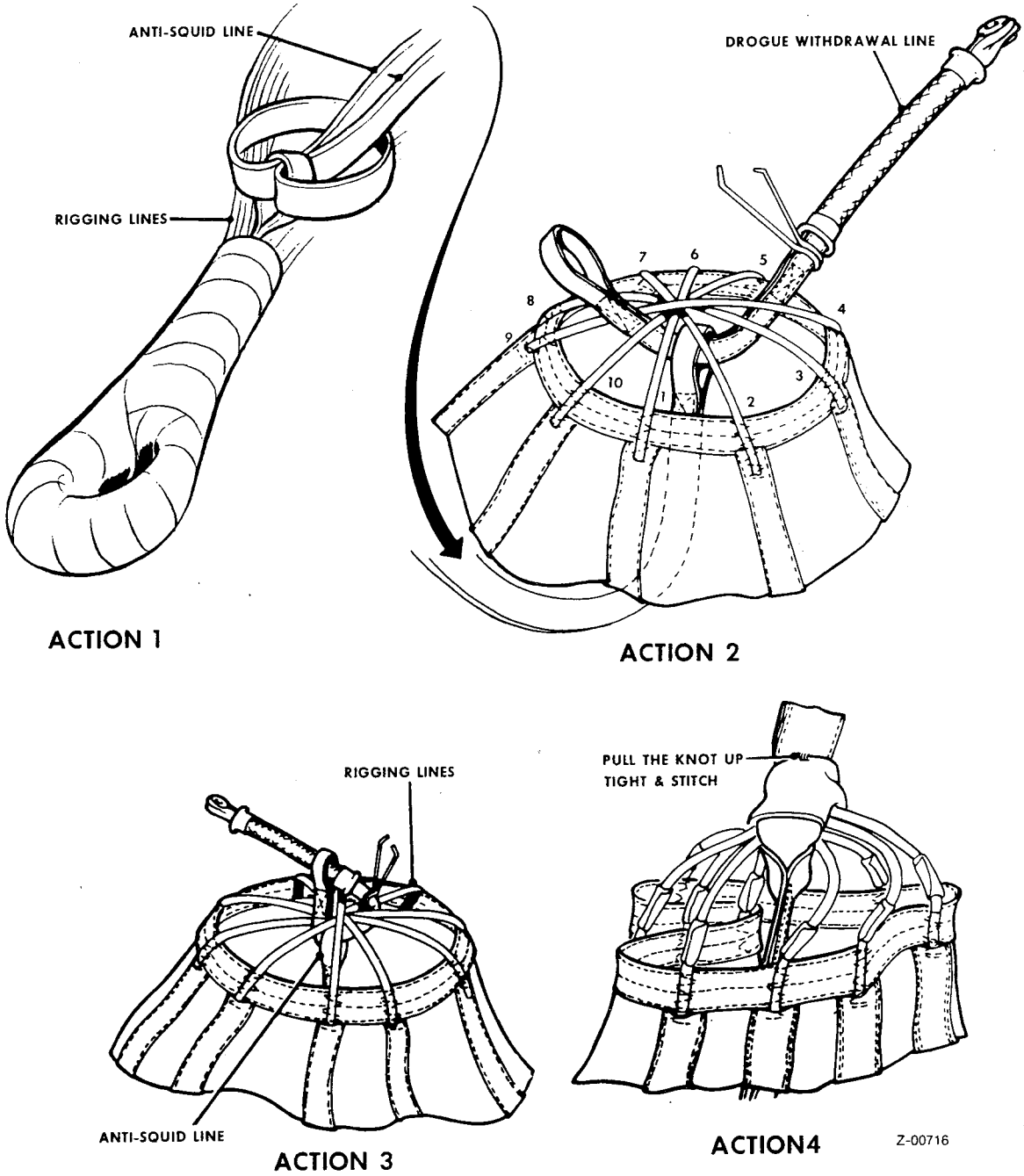

Fig 15 Changing the drogue withdrawal line
(Anti-squid line knot corrected)

59.3 Insert the spool in the loop of the withdrawal line protruding from the length of armoured hose. Compress the hose and secure the spool in position by hand stitching the edges of the loops as close as possible to the spool, using No 35 linen thread (Ref. 32B/1250524).

59.4 Hold the 5ft drogue apex shroud lines centrally so as to form two clear openings diametrically opposed. Pass the drogue withdrawal line loop end in one side of the centrally held apex lines through the loop of the anti-squid line and out of the other side of the centrally held apex lines. Pass the spool end of the withdrawal line back over the top of the shroud lines, through the loop at the other end of the withdrawal line and pull it tight forming a securing knot. Secure the knot by stitching, using No 18 white cotton thread, (fig 15, actions 2, 3 and 4).

59.5 Repack the drogue assembly into the drogue container and connect the withdrawal line to the drogue gun piston.

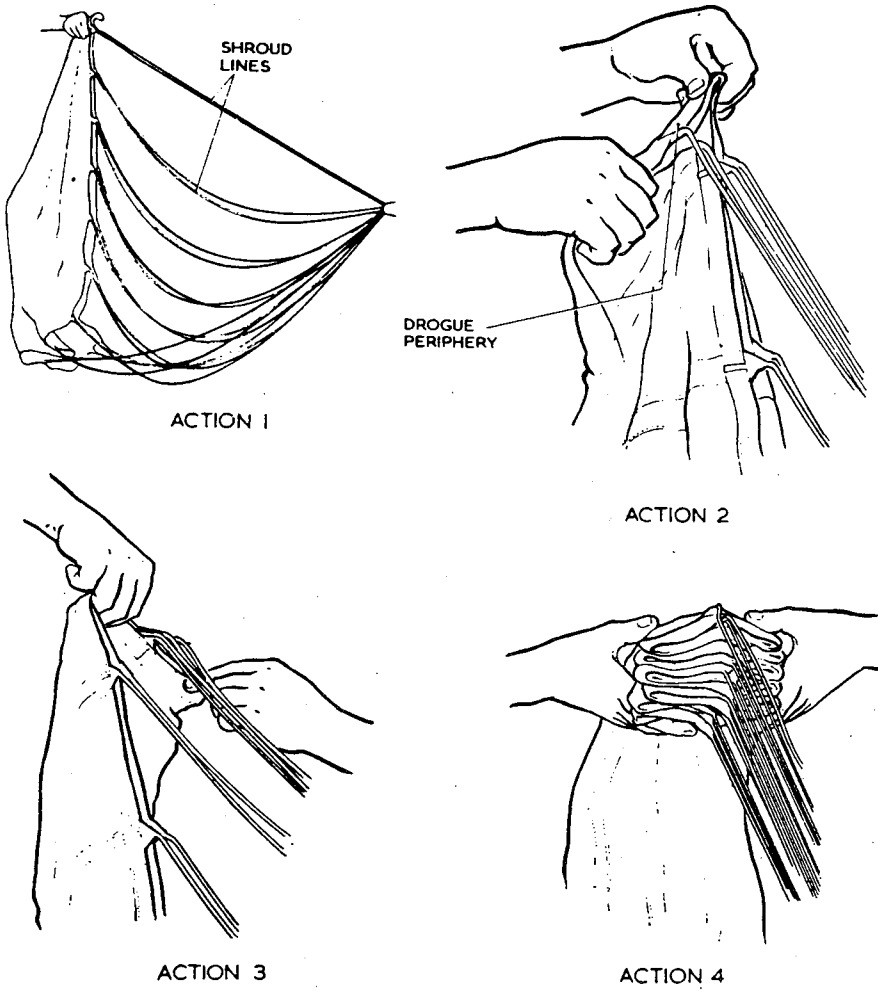

Fig 16 Folding the main drogue

PACKING THE DROGUE ASSEMBLY

TO PACK THE MAIN DROGUE

60

60.1 Open the four flaps of the protective sleeve; roll the sleeve down so that it does not obstruct packing operations.

60.2 Extend the main drogue shroud lines at arms length and ensure that they are not entangled.

60.3 Pair off the shroud lines and fold the drogue into twelve folds (fig 16).

60.4 Bring the drogue to the container but before stowing insert the sleeve protected shroud lines into the rear starboard corner (the one furthest from the drogue gun) and stow the remaining shroud lines down into the container, folding from left to right. Now stow the main drogue periphery first in a series of folds and finishing with the apex of the drogue opened out and laid flat (upper diagram, fig 17). Follow this by stowing the nylon tape in a series of folds running from the front to the back of the container as indicated in the lower diagram of fig 17. Fold over the protective sleeve to enclose the drogue and nylon tape in such a manner that the nylon tape emerges from the starboard corner adjacent to the sleeve protected shroud lines.

TO PACK THE CONTROLLER DROGUE

61

61.1 Holding the drogue, extend the shroud lines and check that they are not entangled.

61.2 Pair off the shroud lines and fold the drogue into five folds.

61.3 Loop the shroud lines into the container in such a manner that they cover the protective sleeve. Pack the drogue by stowing the periphery of the drogue into the starboard side of the container, fold over to the port side, fold back and open out the apex so that it lies flat (lower diagram, fig 17). The drogue withdrawal line must emerge from the corner nearest the drogue gun and extend sufficiently to expose the flap securing pin.

61.4 Close the starboard, port and rear drogue securing flaps (in that order) ensuring that the wire loop on the starboard flap passes through the eyelets on the port and rear flaps.

61.5 Stow the face screen, thread the firing cable through the aperture in the front flap and place it, together with the seat pan firing cable over the rear flap. Ensure that only sufficient cable is left to reach the ejection gun sear and canopy jettison gun quadrant, otherwise any slack could cause jamming with possible non-firing of the ejection gun. Close the front flap ensuring that the eyelet passes over the wire loop.

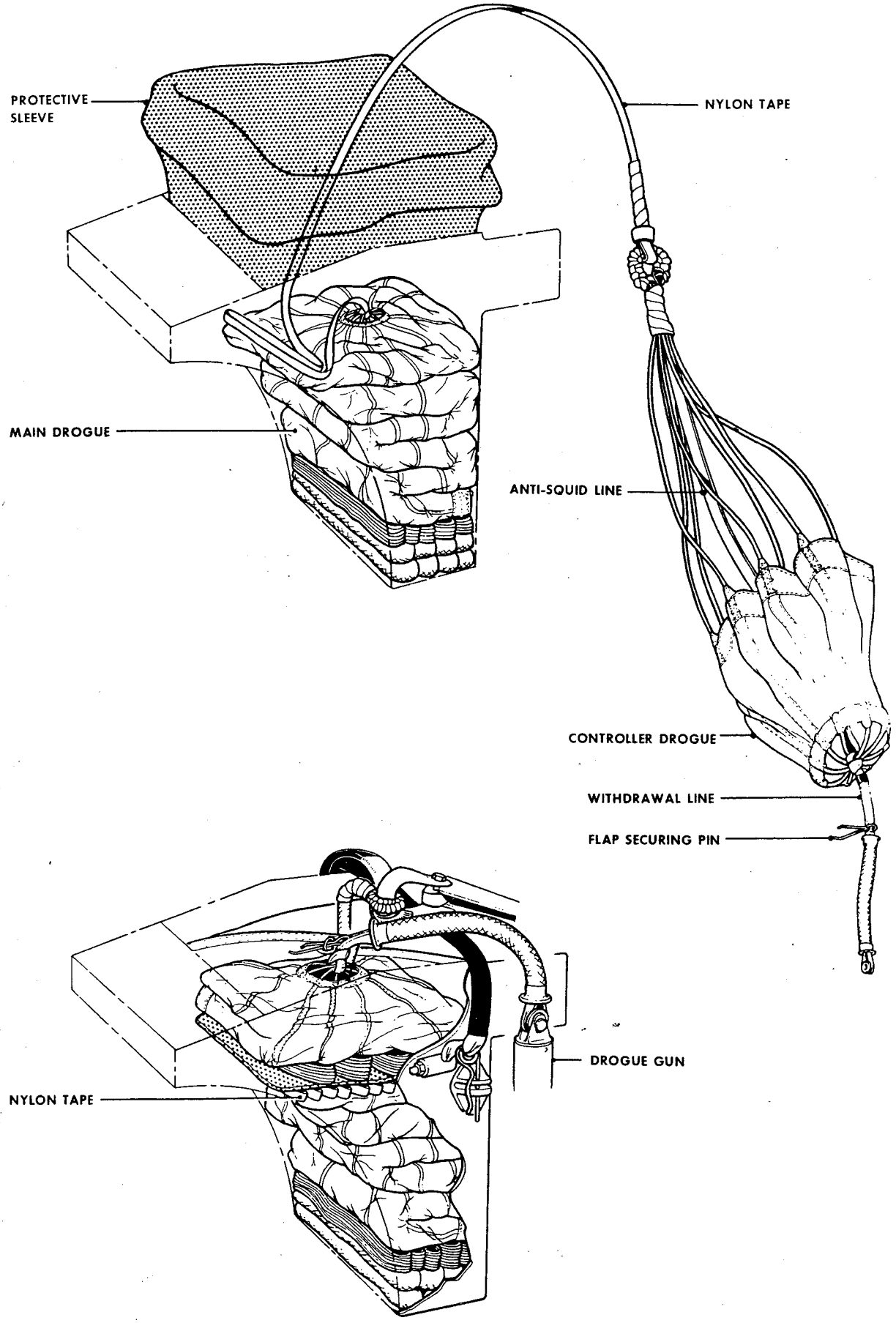

Fig 17 Stowing the drogues

61.6 Insert the flap securing pin through the wire loop and into the fabric sleeve on the front flap. Secure the pin in position by passing a single length of No 8 thread through the ring of the pin and the webbing loop on the front flap (fig 20). Tie off using a reef knot with the loose ends tightly secured by a half hitch around the main thread against each side of the reef knot (inset, fig 20).

Packing the face screen

62

62.1 Fold in the sides of the face screen to reduce the width so that it will pass through the slot in the front of the drogue container (fig 18).

62.2 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.

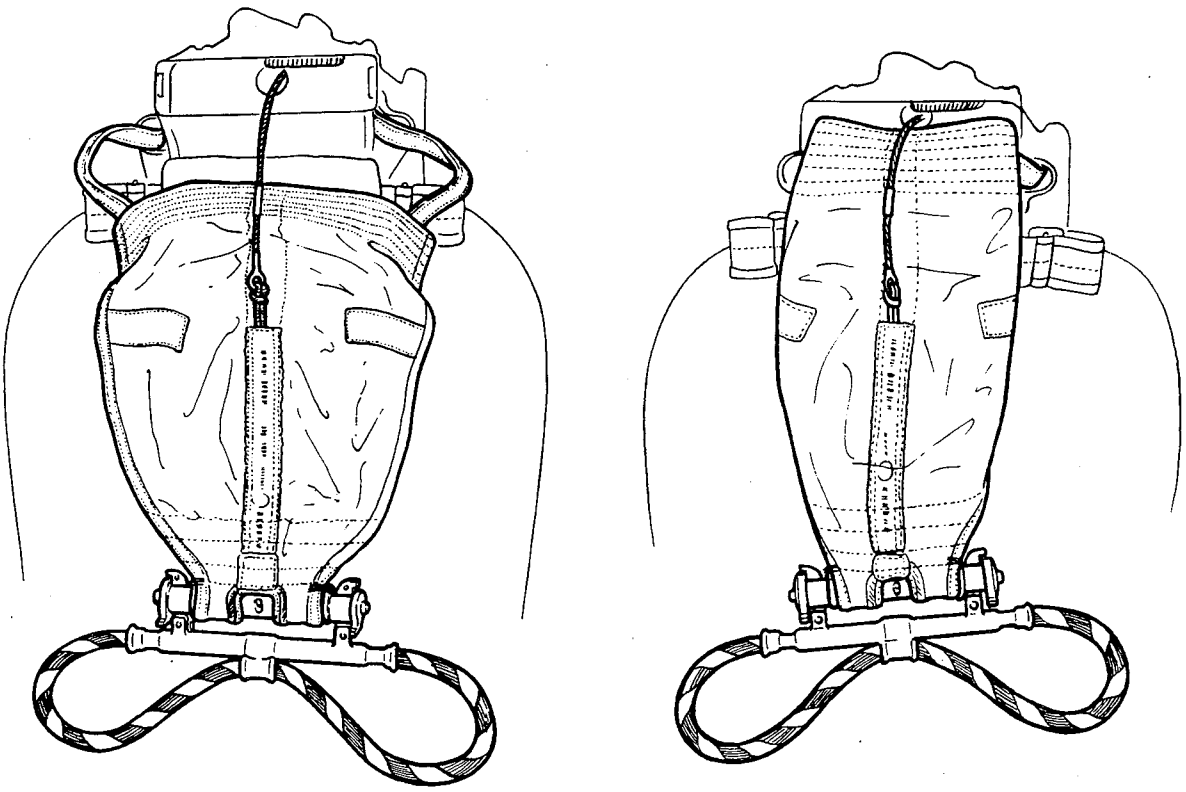

Fig 18 Packing the face screen

WARNINGS...

WHENEVER THE FACE SCREEN IS REPACKED (OR THE FIRING CABLE IS CONNECTED TO THE EJECTION GUN SEAR) ENSURE:

1 THAT THE FIRING CABLE PASSES OVER THE SECTION OF THE DROGUE TO PARACHUTE ATTACHMENT LINE CROSSING THE REAR OF THE DROGUE CONTAINER, AND BENEATH THE SECTION CONNECTED TO THE DROGUE SHACKLE (FIG 21).

2 THAT THE EXPOSED FIRING CABLE IS KEPT AS SHORT AS POSSIBLE BETWEEN THE SEAR AND THE DROGUE CONTAINER, I.E., LEAVE ONLY SUFFICIENT CABLE TO REACH THE SEAR. IF NOT, THERE IS A SERIOUS DANGER OF SNAGGING OF THE FIRING CABLE WHEN THE FIRING HANDLE IS PULLED POSSIBLY RESULTING IN NON-FIRING OF THE EJECTION GUN.

3 THAT THE SEAR OF THE BREECH TYPE TIME-DELAY UNIT HAS BEEN INSERTED WITH THE WEDGE SHAPED END ADJACENT TO THE RECESSED PORTION OF THE GUARD PLATE. INCORRECT FITTING OF THE SEAR CAN CONSTITUTE A HAZARD, NECESSITATING THE REMOVAL OF THE SAFETY PIN TO ATTACH THE FIRING CABLE TO THE SEAR. IF THE SEAR IS FOUND TO BE INCORRECTLY POSITIONED, THE BREECH TYPE TIME-DELAY UNIT AND PRIMARY CARTRIDGE MUST BE REMOVED FROM THE EJECTION GUN BEFORE REMEDIAL ACTION IS TAKEN.

62.3 Press the fold well into the housing and ensure that the forward outer edges of the face screen are pressed behind the plunger housings; this is most important.

62.4 Insert the firing handle plungers into their sockets and press home until the plungers lock into osition.

62.5 Check that the rear ends of the nylon tapes are secured by the retaining pins.

NOTE...

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

Correct routeing of the drogue withdrawal line

63 When the seat is being installed in the aircraft after servicing it is to be ensured that the drogue withdrawal line passes OVER the top of all other lines (fig 19) so that it can withdraw the drogues without entanglement.

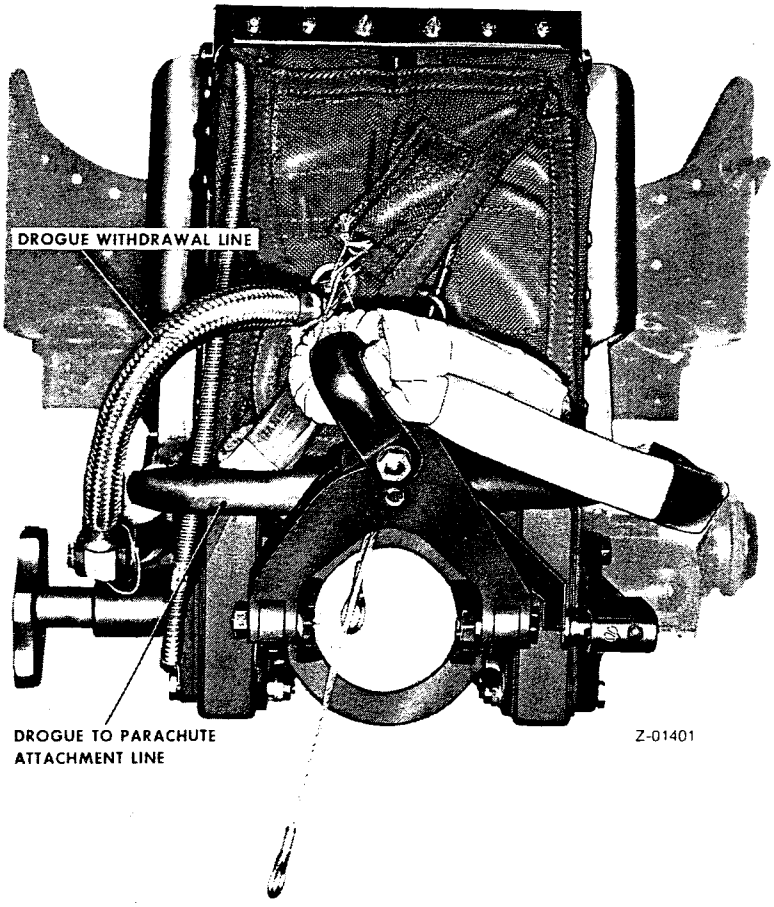

Fig 19 Routeing the drogue withdrawal line

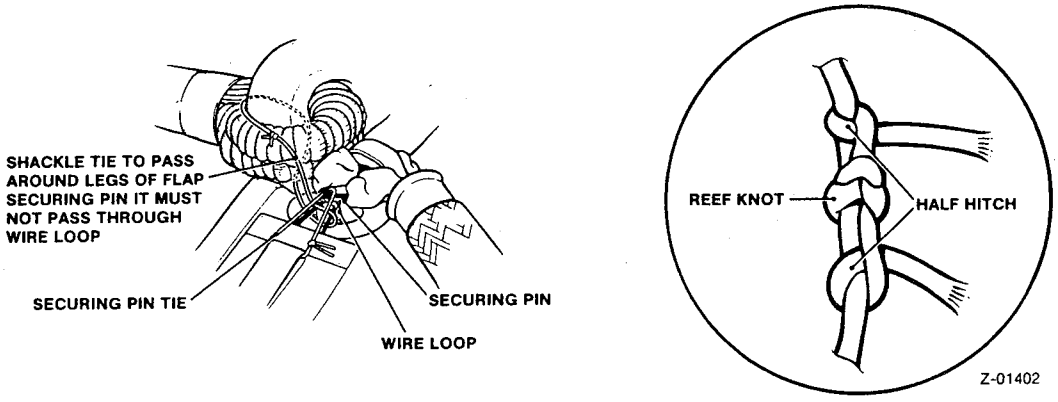

Fig 20 Safety ties

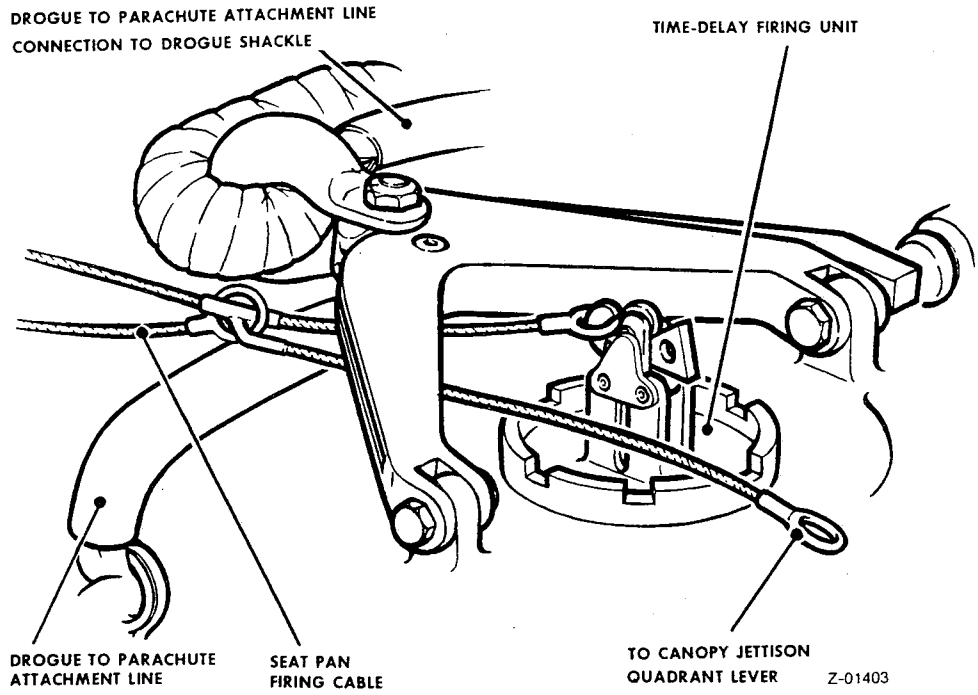

Fig 21 Routeing of the firing cables

SERVICING THE 2 TO 1 REDUCTION GEAR

To dismantle the assembly

64 (1) Remove the assembly from the port main beam.

(2) Remove the 10-32 UNF stiff nut, washer and bolt, and distance tube. Lift off the top cap and remove the small pulley wheel complete with cable.

(3) Remove the 4BA stiff nut, washer and bolt. Lift off the centre housing and remove the large pulley wheel complete with cable.

To examine the components

65 (1) Check all the components for damage and corrosion and the firing cables for kinking and fraying.

(2) Ensure that each cable is securely attached to its respective pulley wheel by the indent pins.

To assemble the components

66 (1) Lightly lubricate all parts during assembly.

(2) When assembling, it is essential that the large and small pulley wheels with their respective cables are assembled in correct relationship to each other and to the bottom and centre housings as shown in fig 6. Failure to ensure this will result in difficulty in connecting the cables on installation of the assembly to the seat, and loss of cable travel. Proceed as follows:

(3) Wind the cable around the groove of the large pulley wheel and position the pulley wheel in the bottom housing in the correct relative position as shown in fig 6, i.e. with the straight line on the pulley at 45 degrees to the vertical centre line of the housing and the indent pin positioned as shown, simultaneously engaging the cable retaining collar in its recess in the bottom housing.

(4) Fit the centre housing to the bottom housing, ensuring that the large pulley wheel is not moved and secure the two housings together with the 4BA bolt, nut and washer.

(5) Insert the small pulley wheel and its cable into the centre housing to fit over the square boss of the large pulley wheel ensuring that the small pulley wheel is in its correct relative position as shown in fig 6, i.e. with the straight line on the pulley wheel vertical and the indent pin in the position shown. Engage the cable retaining collar in its recess in the centre housing.

(6) Position the top cap on the centre housing engaging the cable retaining collar in the recess in the top cap. Insert the 10-32 UNF bolt from the rear of the housing; insert the distance tube from the front and secure with the 10-32 UNF nut and washer.

(7) Refit the assembly to the port main beam, and after connecting the cable to the seat pan firing handle and inserting the handle fully into its housing, check that the free length of seat pan firing cable from the cable clamp outer conduit in the head box to the extreme end of the ring is approximately 5.75 in.

FITTING A NEW FACE SCREEN FIRING CABLE

67 To fit a new firing cable to the face screen proceed as follows:

(1) Place the ring of the single swaged end of the firing cable over the face screen loop followed by the black plastic locking ring (Action 1, fig 22).

(2) Thread the free end of the cable through the face screen loop and pull tight (Action 2).

(3) Finally position the plastic locking ring as shown in Action 3.

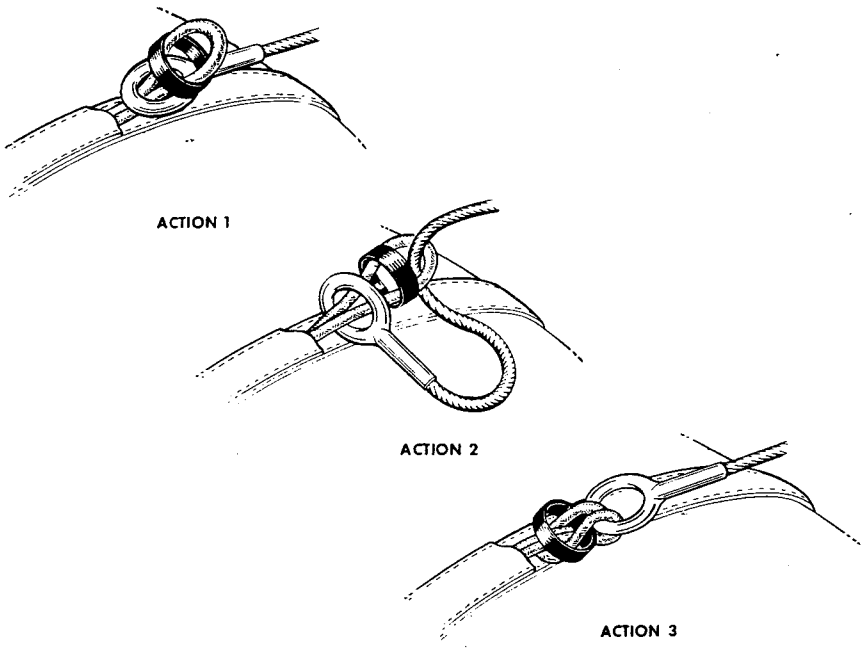

Fig 22 Fitting a new face screen firing cable

SERVICING THE HARNESS REEL ASSEMBLY

TO REMOVE AND DISMANTLE THE HARNESS REEL ASSEMBLY

68

68.1 Remove the webbing strap as detailed in para 46 items (1) to (5).

NOTE...
Remove the spring locating peg with care as the spring is under tension.

68.2 Remove the stiffnut and washer from the spring locating peg and remove the peg.

68.3 Remove the taper pin securing the harness reel shaft port end cap and remove the cap.

68.4 Disconect the sear from the harness release lever, withdraw the harness reel shaft from the starboard side and remove the harness reel assembly.

68.5 Remove the screw securing the torsion spring and end bearing, remove the end bearing, bush and spring.

TO ASSEMBLE AND FIT THE HARNESS REEL ASSEMBLY

69

69.1 Pass a length of cord through the eye at the port end of the torsion spring. Insert the spring into the reel and thread the cord through the locating peg access hole in the reel. Engage the eye at the starboard end of the spring over the end of the reel.

69.2 Assemble the bush and end bearing to the starboard end of the reel, aligning the tapped holes and fit the shakeproof washer, torsion spring and round head screw in that order.

69.3 Position the harness reel assembly between the 40g beam mounting block and insert the shaft from the starboard side. Fit the port end cap and secure with a taper pin, saddle washer and stiffnut.

69.4 Pull on the cord attached to the torsion spring to line up the eye end of the spring with the hole in the shaft. Insert the locating peg, remove the cord and fit a washer and stiffnut.

69.5 Connect the sear to the harness release lever.

69.6 Fit the webbing strap as detailed in para 46 (items (5) to (12).

ATTACHING THE DROGUE AND DROGUE-TO-PARACHUTE ATTACHMENT LINE TO THE DROGUE SHACKLE

70 Pass the drogue shackle through the loop of the drogue-to-parachute attachment line and the eye-end of the main drogue rigging lines. Fit a new bolt through the shackle with the head adjacent to the attachment line, ensuring that the nut will be uppermost when the scissor shackle is closed down on the drogue container flaps. Tighten a new nut onto the bolt and secure by centre punching in three places.

REPLACING THE MAIN DROGUE

71 To remove the main drogue, proceed as follows:

71.1 Remove the nut and bolt from the drogue shackle. Remove the eye-end of the main drogue rigging lines from the shackle.

71.2 Loosen the connecting strop at the eye-end of the controller drogue rigging lines. Pass the controller drogue through the loop of the connecting strop. Remove the controller drogue.

71.3 Pass the free end of the connecting strop through the loop at the apex of the main drogue. Remove the connecting strop.

72 To assemble the main drogue, proceed as follows:

72.1 Hold the twelve apex lines of the main drogue centrally to form two diametrically opposed openings. Pass one end of the connecting strop down through one opening and up through the other. Thread the free end of the strop through the loop and pull tight.

72.2 Pass the loop at the free end of the connecting strop through the eye-end of the controller drogue rigging lines. Work the controller drogue through the loop in the strop, pull tight to form a knot.

72.3 Attach the eye-end of the main drogue rigging lines to the drogue shackle as detailed in paragraph 70.

SERVICING THE MAIN BEAMS ASSEMBLY

Top latch mechanism

73 Using tool Part No J 11741 remove and refit the top latch mechanism as follows:

73.1 Remove the seat structure from the servicing stand. Insert the tool, Part No J 11741 into the top cross beam and position the end plates over the top pair of slippers on the inside faces of the beams (fig 23).

73.2 Using the tool to ease the top latch spring, remove the handwheel. Remove the plunger, spring and tool.

73.3 Examine the housing and plunger for damage, corrosion, scoring and wear. Ensure that the indicator plunger moves freely. Examine the spring for damage, distortion and corrosion. Check the free length of the spring, minimum 3.6 in.

73.4 Lightly lubricate the spring and plunger using grease.

73.5 Place the tool, Part No J 11741 in position and refit the spring and plunger in the housing. Use the tool to compress the spring and refit the handwheel. Screw the handwheel fully home and remove the tool.

73.6 Refit the seat structure to the servicing stand.

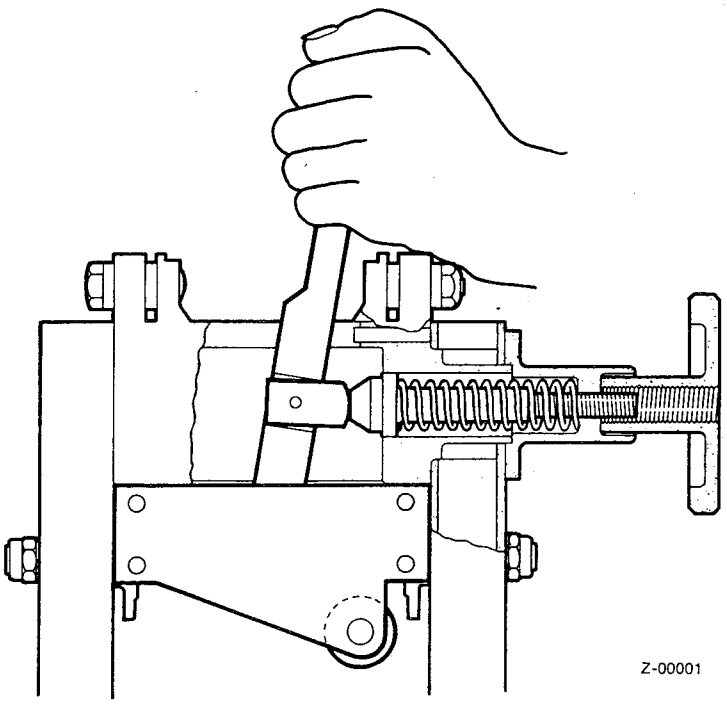

Fig 23 Removing and refitting top latch plunger and spring

Slipper clearances and adjustment

74 Check and adjust slipper clearances as follows:

74.1 Examine the slippers for burrs, scores and corrosion.

74.2 Ensure that all slippers are correctly aligned and that the slipper stiffnuts are torque loaded; top and middle to 250 lbf in., and bottom to 60 lbf in.

74.3 Using a 3-4 in. external micrometer, measure the ejection gun guide rail dimensions at positions X, Y and Z (fig 24).

74.4 Using a 2-8 in. internal micrometer, check that the dimensions across the highest point of each pair of guide rail slippers (fig 24) are:

Top slippers	Dimension X + 0.001 to 0.006 in.
Middle slippers	Dimension Y + 0.006 to 0.012 in.
Bottom slippers	Dimension Z + 0.000 to 0.005 in.

74.5 Adjust the slipper dimensions by fitting or removing shims under the shoulders of the slippers (fig 25). Maintain as near as possible an equal thickness of shims under each slipper of a pair. Shims are supplied in FIVE thicknesses (Table 1).

TABLE 1 SLIPPER CLEARANCE AND ADJUSTMENT SHIMS

Part No	Ref/No	Thickness	Qty
MBEU 15290	27L/4540181	0.002 in.	A/R
MBEU 7187	27L/4527775	0.003 in.	A/R
MBEU 15291	27L/7149891	0.005 in.	A/R
MBEU 15292	27L/7166466	0.010 in.	A/R
MBEU 15293	27L/4540184	0.015 in.	A/R

74.6 Ensure that all slippers are correctly aligned and torque load slipper stiffnuts; top and middle to 250 lbf in., and bottom to 60 lbf in.

NOTE...
If new shims are fitted to the bottom slippers, the stiffnuts should be initially torque loaded to 96 bf in. to form and settle the shims, then backed off and re-torqued to 60 lbf in.

74.7 Fit the ejection gun, ensuring that the slippers are correctly aligned as the gun slides up. Ensure that the gun slides freely, that the guide rails fully locate on the slippers and that the gun fully locates into the top cross beam without the use of undue force during insertion or removal.

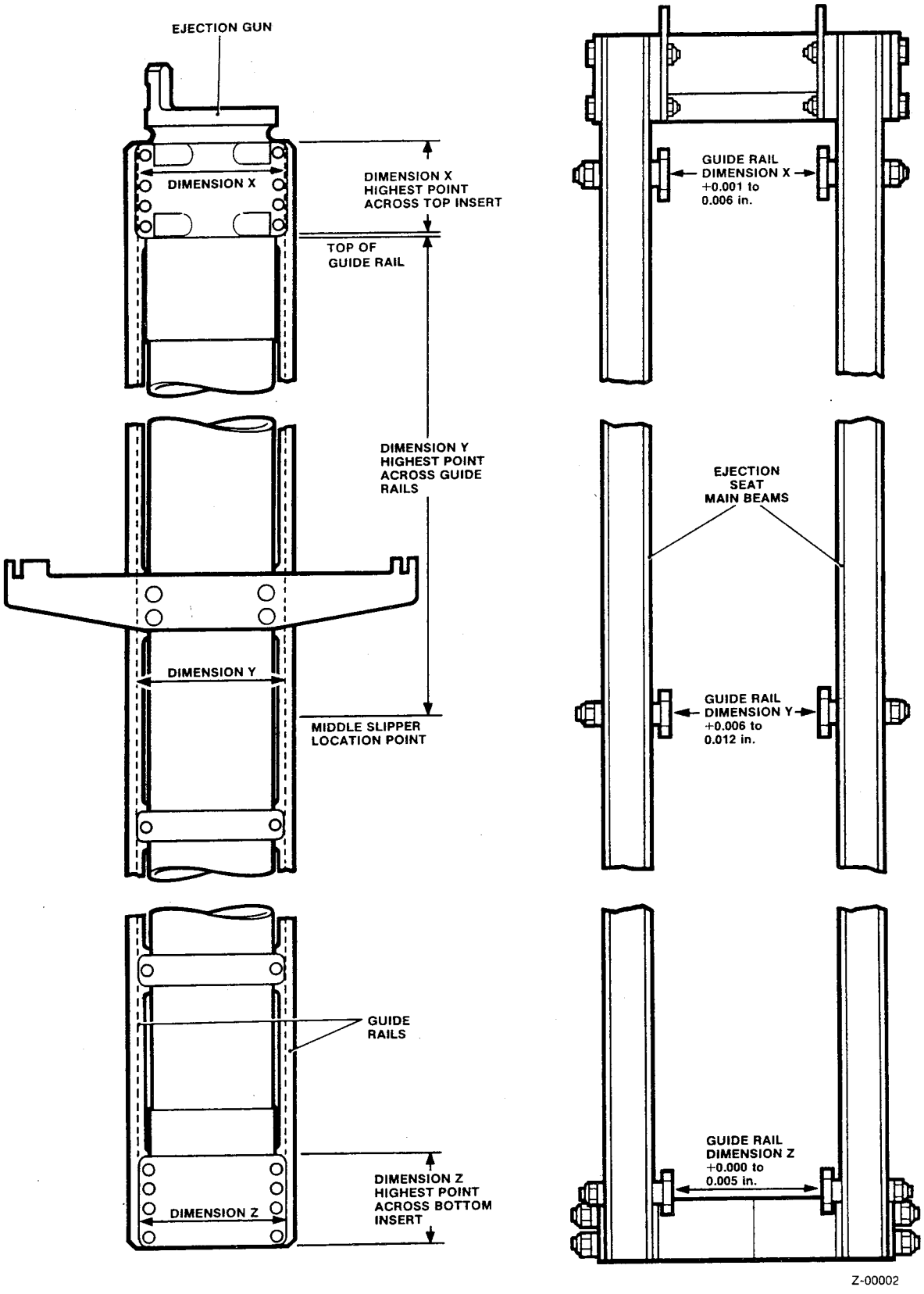

Fig 24 Checking dimensions between the slippers

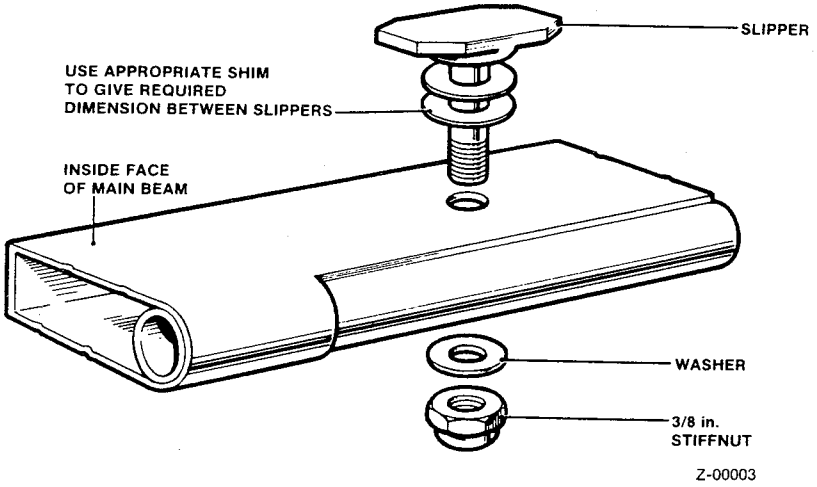

Fig 25 Removing and fitting slippers

(8) Make final adjustments if necessary by transferring shims from one side to the other maintaining the dimensions quoted in para (4).

(9) Lightly lubricate the slippers with grease.

STICKER CLIP PULL-OFF LOAD TESTS

Harness sticker clip pull-off load test

75

75.1 Examine sticker clips and cover plates.

75.2 Insert the lug of the sticker strap into the clip, attach a 0-100 lbf spring balance to the lug and exert a withdrawal load on the spring balance in line with the clip. The load required to remove the lug must be between 20 and 40lb.

75.3 Repeat the test for the other clip.

75.4 Clips with pull off loads above limits may be adjusted by setting the clips.

75.5 Clips with pull off loads below limits are to be replaced.

PSP lowering line pull-off load test

76

76.1 Insert the lug of the PSP lowering line into the lowering line clip, attach a 0-100lb spring balance to the lug and exert a withdrawal load on the spring balance in line with the clip. The load required to remove the lug must be between 50 and 80 lbf.

76.2 Clips with pull off loads above limits may be adjusted by setting the clips.

76.3 Clips with pull off loads below limits are to be replaced.