

◀ CONTROL RODS AMENDED AND NOTE ADDED AT DETAIL A ▶

**RESTRICTED**

## DESCRIPTION

## General information

1. The canopy, which is hinged to the rear on bolts secured in the spine structure, is mechanically locked, and hydraulically actuated, and can be jettisoned by a cartridge-operated firing unit. Provision is also made for stand-by opening of the canopy, without resorting to jettison action, in hydraulic or electrical failure. Safety features incorporated in the design of the operating mechanism ensure that the canopy is unlocked before the hydraulic control can be operated. Cockpit pressurization is maintained by a hollow rubber seal around the windscreen arch and the cockpit sill which, when the canopy is locked, is inflated with air ducted from the main air system (Chap. 8C). For descriptive purposes the operating mechanism is sub-divided into locking, actuating, and jettisoning mechanisms.

## Canopy (fig.1)

2. The canopy consists of a metal frame containing two double-skinned transparent side-panels and, at the top, a glass clear-vision panel. Two hinge arms (fig.2), bolted to the canopy top member, extend aft and incorporate built-in release mechanisms. Each release mechanism consists of a hook which grips the canopy hinge bolt steel bush under pressure applied from an eccentrically-mounted catch. The adjustment is locked by a tab on the eccentric engaging one of seven radial slots in the hinge arm.

3. Two rollers carried by bolts passing through the rear side-castings are engaged by locking hooks on the fuselage structure (para.5) to lock the canopy. Additional locking facilities are provided by shoot bolts carried on control rods extending along each canopy side member. These rods, which are spring-loaded towards the unlocked position, have yokes at the aft end which are

engaged by the locking hooks (detail B), to cause the shoot bolts to enter, or withdraw from, holes in brackets on the windscreen arch.

4. Striking blocks, formed on the rear side castings, are contacted by the canopy jettisoning jack pistons to lift the canopy during jettisoning (para.19).

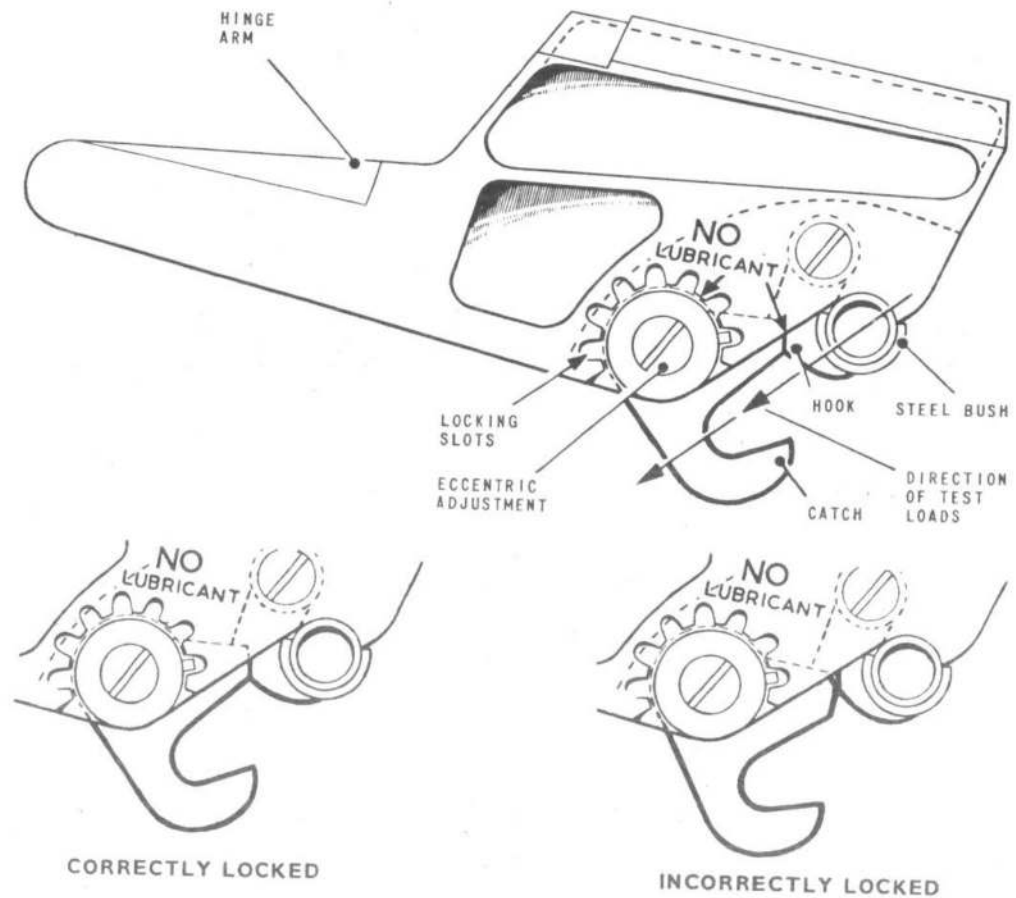


Fig. 2. Hinge arm

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- 1 REDUCTION LEVER
- 2 INTERNAL JETTISONING HANDLE
- 3 INTERNAL STAND-BY HANDLE
- 4 JETTISONING CABLE
- 5 GAS TUBES
- 6 CANOPY JETTISONING JACK (STBD.)
- 7 LOCKING HOOK (STARBOARD)
- 8 LOCKING LINK (STARBOARD)
- 9 MICROSWITCH
- 10 CANOPY FIRING UNIT
- 11 DAMPER UNIT
- 11A DAMPER UNIT LEVER
- 12 CANOPY HINGE RELEASE CAMSHAFT
- 13 CANOPY HINGE ARM
- 14 PULLEY GUARD
- 15 CANOPY JACK
- 16 LEVER SPOOL
- 17 CRANKED LEVER
- 18 EXTERNAL LOCKING HANDLE
- 19 EXTERNAL SWITCH
- 20 EXTERNAL STAND-BY HANDLE
- 21 EXTERNAL OPERATING LINK
- 22 TORQUE SHAFT (FIG. 5)
- 23 MICROSWITCH
- 24 LOCKING LINK (PORT)
- 25 INTERNAL OPERATING LINK (UPPER)
- 26 LOCKING HOOK (PORT)
- 27 DISTANCE TUBE ON HOOK SHAFT
- 28 CANOPY JETTISONING JACK (PORT)
- 29 INTERNAL OPERATING LINK (LOWER)
- 30 INTERNAL CONTROL HANDLE
- 31 EXTERNAL JETTISONING CABLE

NOTE...  
THE MECHANISM IS  
DEPICTED IN THE  
LOCKED POSITION

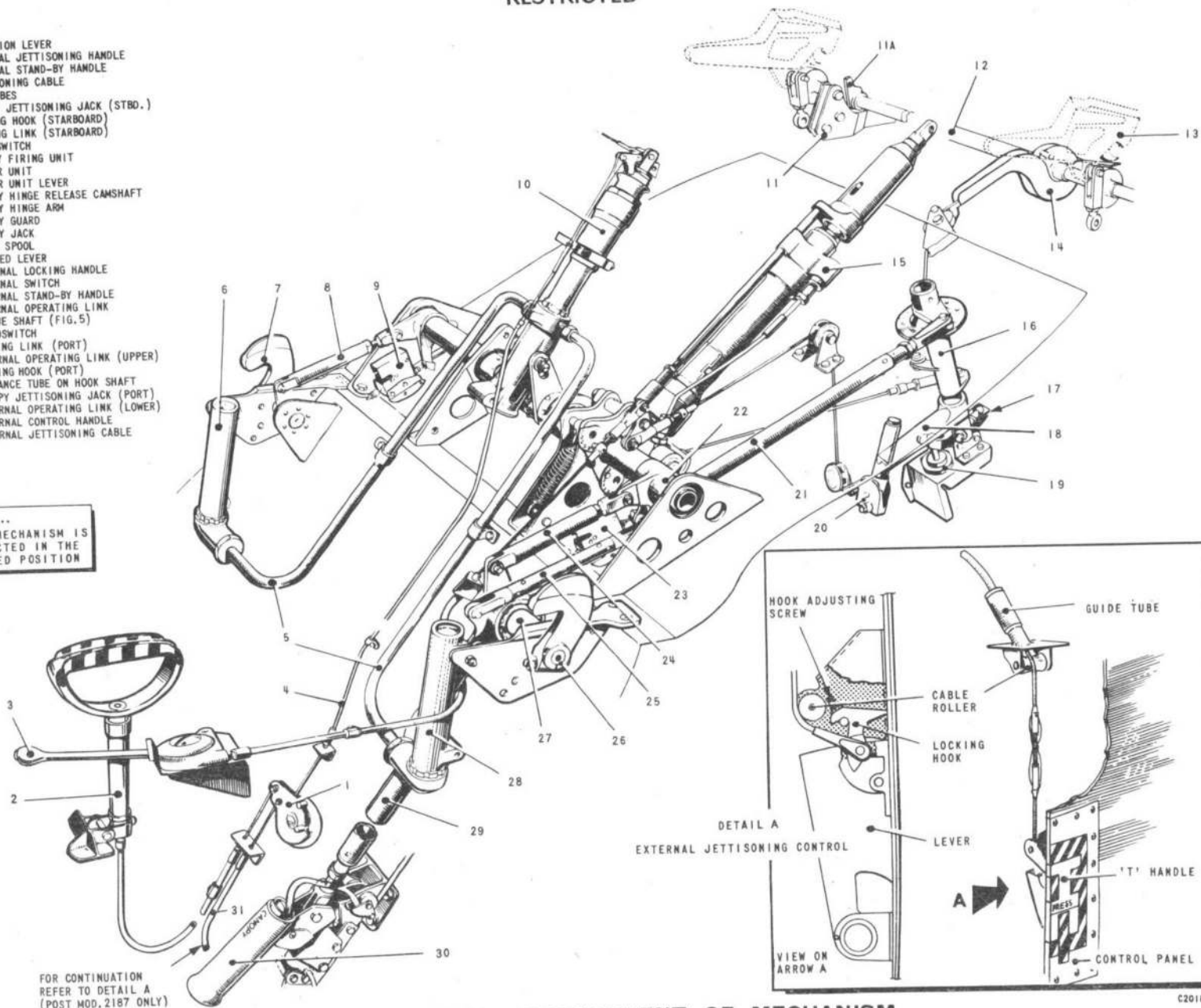


FIG. 3. GENERAL ARRANGEMENT OF MECHANISM

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◀ MOD. 2187 AND ANNOTATIONS ADDED ▶

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NOTE:-  
FOR KEY TO NUMBERS  
REFER TO FIG.3

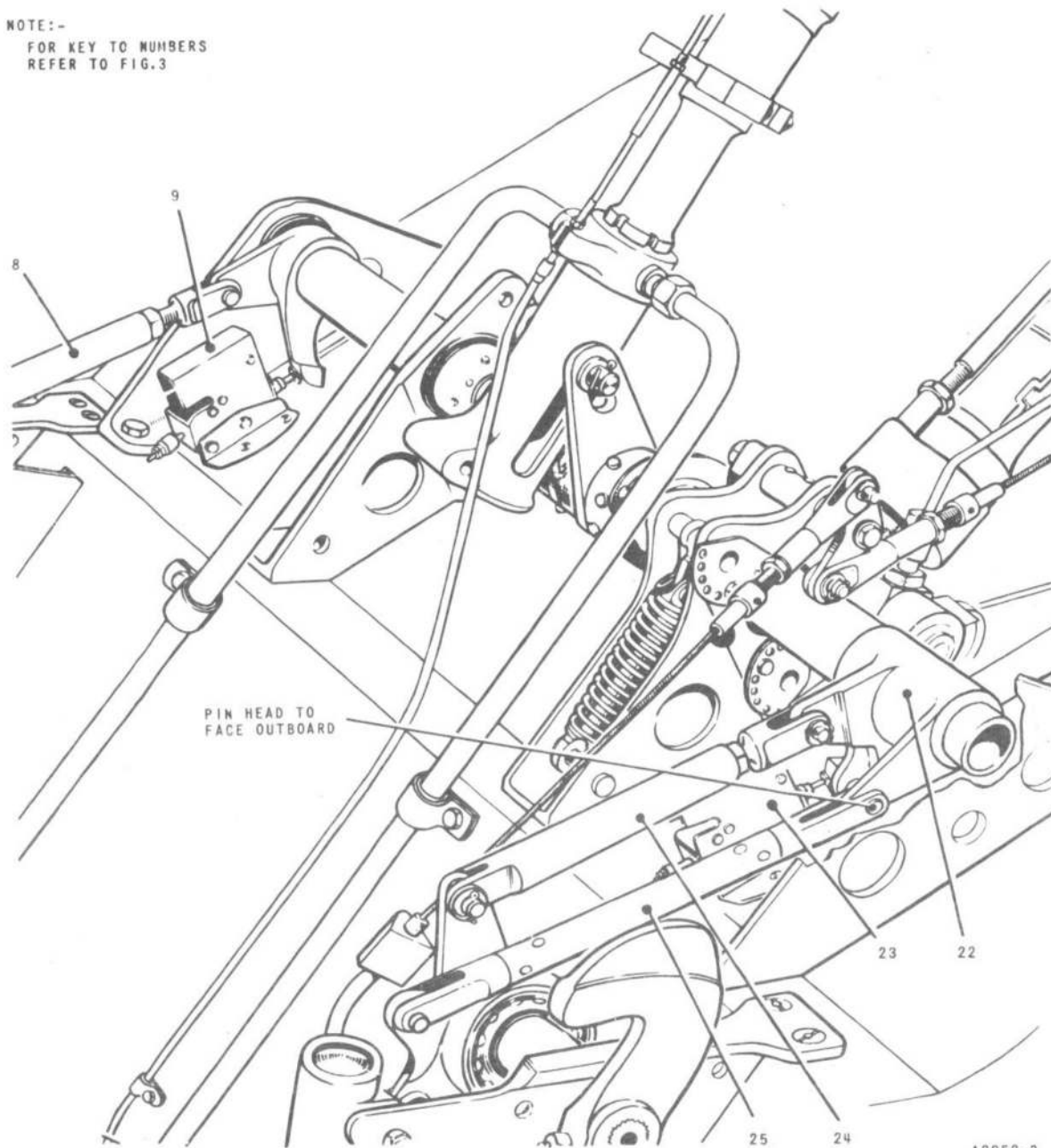


Fig. 4. Torque shaft linkage

### Locking mechanism (fig.3)

#### General information

5. The locking mechanism is based on a torque shaft to which rotary motion can be imparted by the canopy firing unit or, through rod and lever linkages, by either of two interconnected handles, one inside and one outside the cockpit. This motion is used, through additional levers and linkage, to turn the hook shafts and engage or disengage the canopy locking hooks. Visual indication that the canopy is unlocked is given by two lamps, on the E2B compass mounting, which are controlled by two microswitches near the torque shaft. Two mechanical indicators, one on each inside face of the lower canopy frame, are marked CANOPY FREE-LOCKED to show the position of the shoot bolts.

#### Torque shaft (fig.5)

6. The torque shaft is supported in four ball-bearing brackets bolted to the rear pressure bulkhead, and is rotated, during normal operation of the canopy lock mechanism, by movement of either of the two control handles; these are linked to separate control levers formed on a fixed sleeve at the port end of the shaft. The same sleeve also carries a lock lever and a micro-switch striker arm, both of which are duplicated on a second sleeve secured to the starboard end of the shaft. Each lock lever is connected to the associated locking hook shaft, and the two striker arms operate the canopy unlocked warning microswitches. During canopy jettisoning sequence (para.19), the torque shaft is rotated by the

firing unit through a jettisoning lever formed on a third fixed sleeve disposed centrally on the shaft.

7. Movement of the shaft is restricted by two adjustable limit stops, in the port inner bearing bracket, which are contacted by a stop lever on the shaft. Connected between the stop lever and a pin passing through the port inner bearing bracket, is a spring-loaded locking-plunger which is in full compression when the torque shaft is mid-way between

the limit stops, thus ensuring positive location of the shaft in either the locked or unlocked positions. At each side of the jettisoning lever is a jettisoning sleeve (*para. 19*), freely supported on the shaft and having no operational effect on it.

*Internal control handle (fig. 6)*

8. The handle controls the canopy locking mechanism and has an integral three-position switch controlling the

canopy hydraulic system. The hollow handle, mounted in a bracket bolted to the rear pressure bulkhead between the ejection seat and the port console, contains a retractable sleeve which carries the switch. The sleeve is actuated by a cranked lever which transmits motion from a cam follower, bearing on the machined profile of the handle mounting bracket. The sleeve is extended and the switch exposed only when the canopy is unlocked. A sprung protection flap attached to the mounting bracket

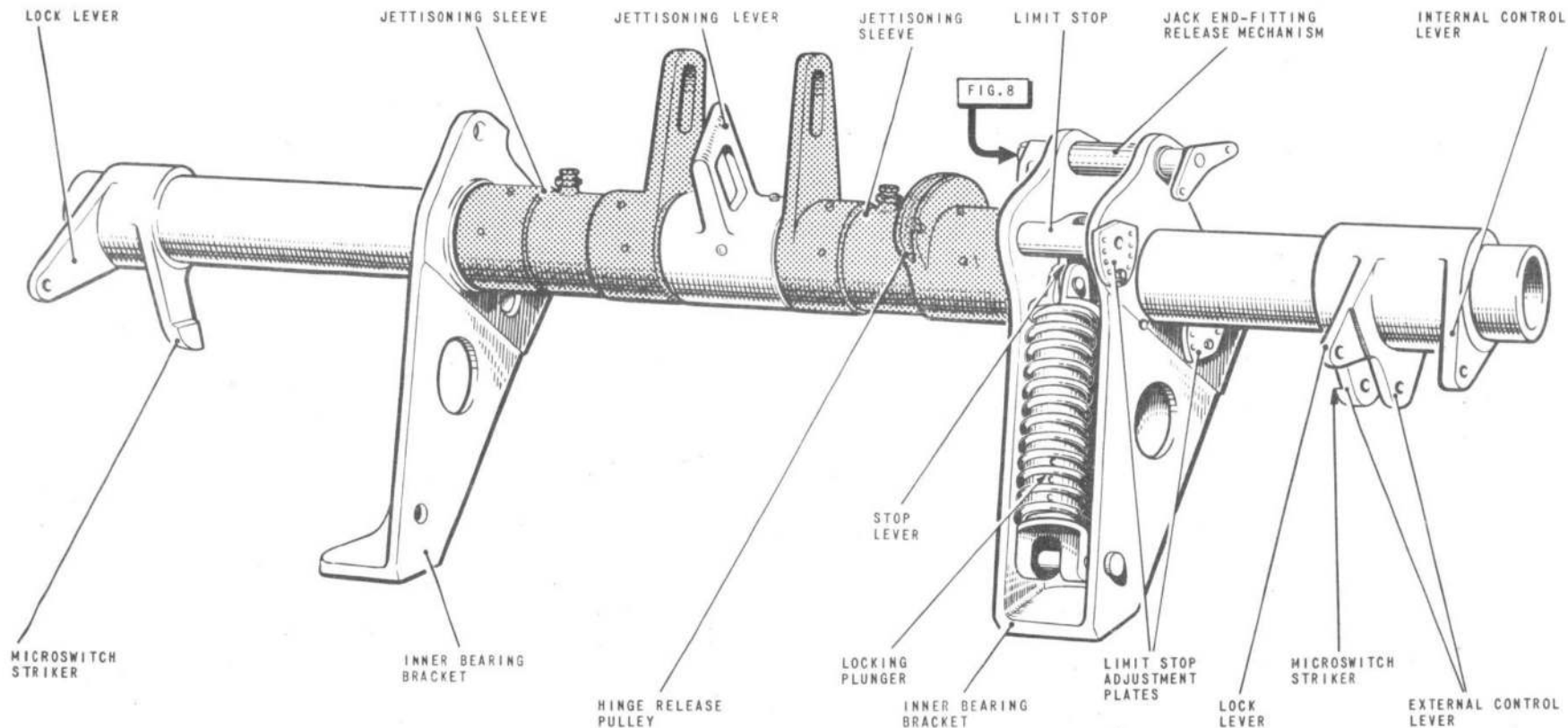


Fig. 5. Torque shaft

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below the limit stop prevents ingress of dirt to the control mechanism.

#### External controls

9. The external controls are accessible through a detachable panel in the port side of the spine, immediately behind the cockpit. They consist of a handle, fixed to the lower end of a shaft passing

through the pressure bulkhead, and a control switch for the hydraulic selector. The upper end of the shaft carries a lever and link by which rotary motion applied to the handle is transmitted to the external control lever on the torque shaft. The switch is mounted on the structure near the lower end of the shaft, with the switch dolly between

the fork arms of a spring-loaded cranked lever. Operation of the cranked lever is controlled by a pin in the shaft, and is such that the switch can be operated only when the canopy is unlocked.

#### Actuating mechanism

##### General information

10. The canopy is raised or lowered by a hydraulic jack connected between the torque-shaft port inner bearing bracket and a bracket on the canopy. The jack is powered by the services system, through an electro-hydraulic selector controlled by either of two switches (para.8 and 9). The control switches are spring-loaded to the off position so that any intermediate position of the canopy, between fully open and fully closed, may be selected. When a selection is made, an electric buzzer, mounted on the d.c. relay box, is energized so that any movement of the canopy is accompanied by an audible warning (Sect.6, Chap.12). For jettisoning or stand-by opening, the jack incorporates a device by which the end-fitting may be detached.

##### Jack

11. Hydraulic pressure is admitted to the jack through a swivel coupling embodying two attachment plates through which the jack is bolted to the torque shaft bracket. Guides formed on the jack body carry a pushrod for cocking the end-fitting release mechanism. The end-fitting (fig.7) has a reduced diameter, which slides inside the ram extension, and a peripheral groove in the large diameter. A four-segment spring-claw, screwed to the ram extension,

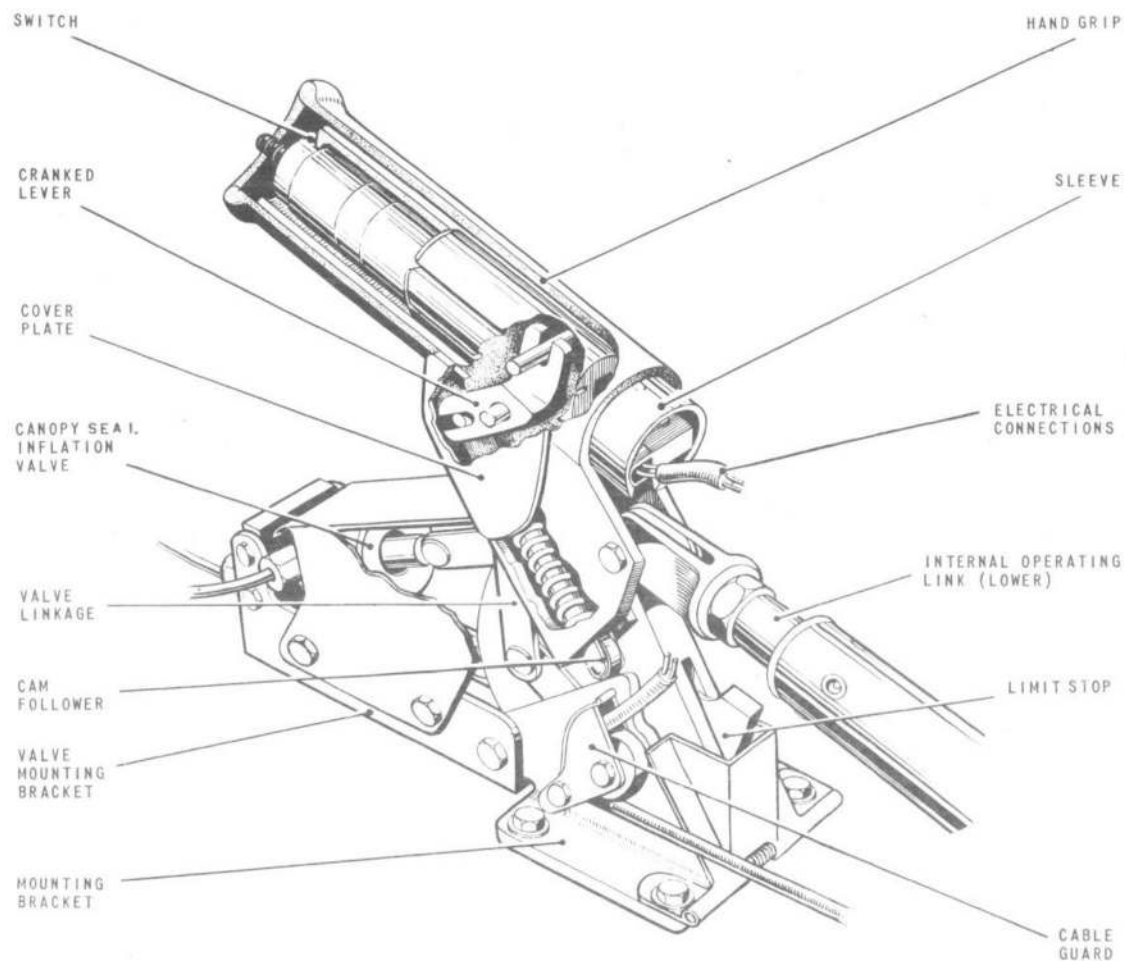


Fig.6. Internal control handle

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engages the groove and is held in engagement by a spring-loaded housing, preventing the end-fitting being withdrawn. A pin through the ram extension engages two slots in the housing, and fastens the two components together. The slots permit limited axial movement of the housing relative to the ram. For further details refer to A.P.1803F, Vol.1, Book 2, Sect.9, Chap.4.

*Jack end-fitting release (fig.7 and 8)*

12. A cam in the torque shaft bearing bracket is rotated, by the jettisoning system or stand-by system, to lift the pushrod which, providing that the jack is fully retracted, contacts the housing and slides it up the end-fitting against spring pressure. After sufficient movement of the housing, the spring claw is freed of restraint. If an axial load is then applied to the end-fitting from the canopy, either manually or by the jettisoning jacks, the claw segments are deflected outward by the sloping faces of the peripheral groove, releasing the end-fitting from the ram. The claw recovers its shape after the end-fitting has left the jack.

*Stand-by opening*

13. In hydraulic or electrical failure conditions, the canopy may be opened by operating either of the two stand-by handles connected by cables to the jack end-fitting release mechanism (fig.3) to free the canopy from the jack, and subsequently operating either of the two canopy control handles to withdraw the shoot bolts. The canopy may then be

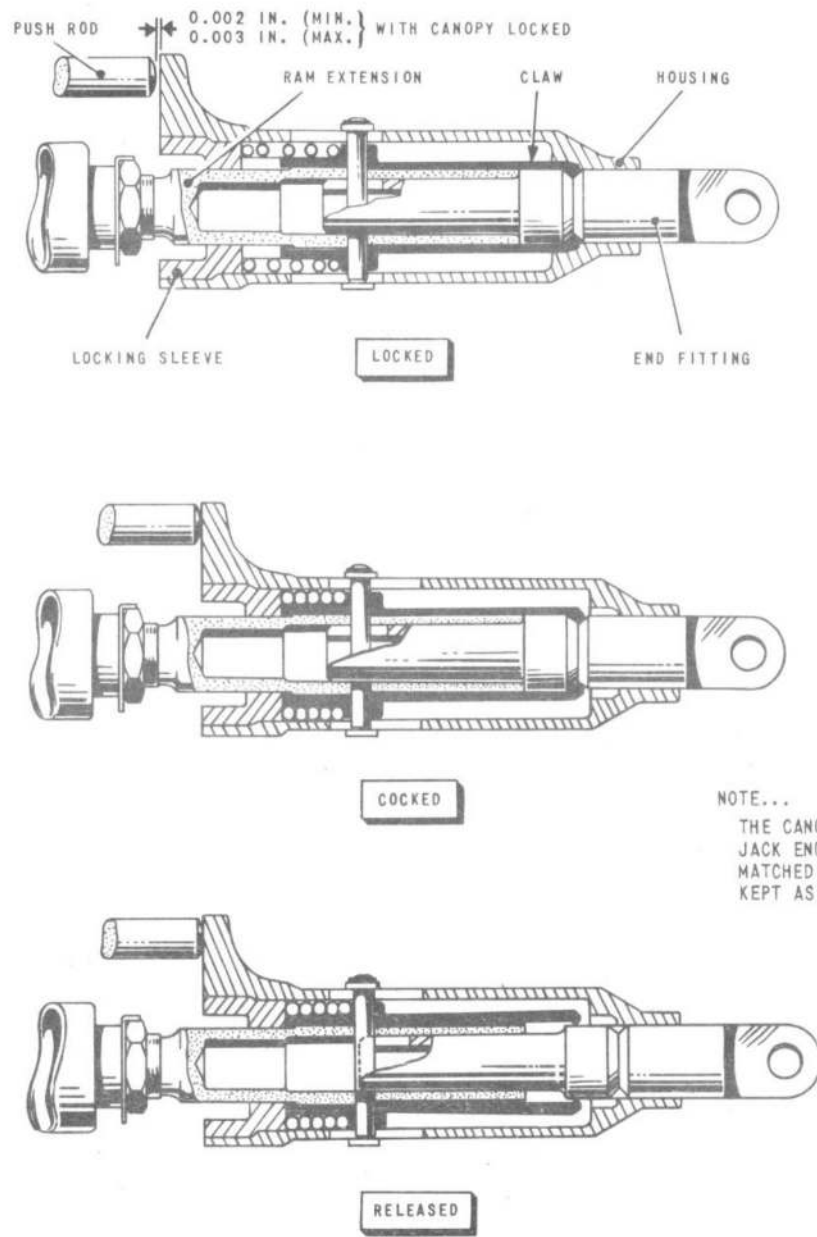


Fig.7. Jack end-fitting release

pushed or pulled open as the case may be. The handles, situated one beneath the port cockpit sill, and one near the external control handle, are prevented from returning to normal after operation by spring-loaded pawls, which may be released by depressing a plunger in the end of each handle. The external stand-by handle is secured to the structure with thin locking wire to provide an indication if the handle has been operated. The jack-end fitting must be reset before subsequent flight (para.34) and before resetting a control handle.

#### Jettisoning mechanism (fig.3)

##### General information

14. The canopy is jettisoned by a firing

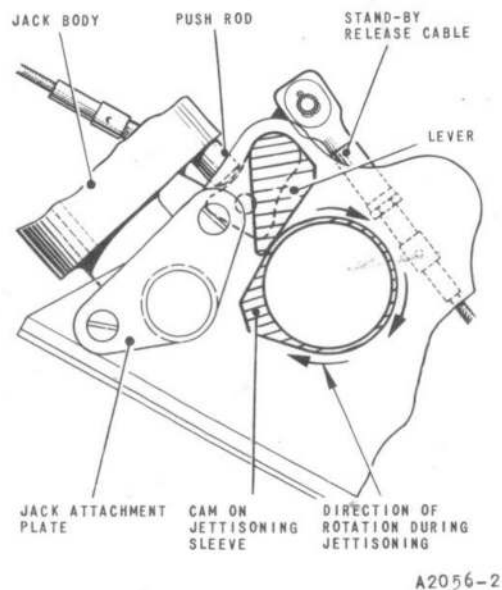


Fig.8. End-fitting release during jettisoning

unit, bolted to the ejection seat gun, which acts through mechanical linkages to unlock the canopy, release the jack end-fitting, and cock the canopy hinge release mechanism. The firing unit also extends two jettisoning jacks which lift the canopy to a position where the airstream can carry it clear of the aircraft.

##### Internal controls

15. The canopy jettisoning controls inside the cockpit consist of a spade-grip handle interconnected, by two Bowden-type cables and a reduction lever, to the firing unit sear. The handle is mounted on the cockpit floor to the left of the pilot's seat and the reduction lever on the pressure bulkhead. Movement of the lever is restricted to 90 deg by a limit stop in the base.

##### External controls (post Mod.2187)

16. The controls consist of an external jettisoning-control interconnected by a Bowden-type cable to the outboard pin of two in the reduction lever (para.15). The control panel, located on the port side of the fuselage between frames 13 and 14, incorporates a lever connected to a T-shaped handle and a locking device to retain both the lever and handle in the unoperated position. Depressing the section of the T marked PRESS, unlocks the lever and handle by tripping a hook engaging a catch on the inner face, and simultaneously cocking the handle outboard enabling it to be gripped manually. The cable from the lever passes over two rollers, located on the panel and the lower face of the

fuselage upper-web respectively, then enters the cockpit pressurized area (Chap.8B) through a flanged guide-tube incorporating an air-tight seal.

##### Firing unit

17. The firing unit embodies a chamber containing a piston, a percussion cartridge, and a removable firing pin assembly. The firing pin is held in the cocked position by a sear, connected by cables to the ejection seat firing handles and to the internal and external jettisoning handles. An extension of the piston passes through the lower end of the firing chamber, into a slotted sleeve, and almost touches the jettisoning lever of the torque shaft when the canopy is locked. A transverse pin in the end of the piston extension passes through two rollers located in the slots of the sleeve to engage the jettisoning sleeves on the torque shaft. Two ports in the firing chamber are connected by pipes to the port and starboard canopy jettisoning jacks mounted on the cockpit sides. Further details of the firing unit and jettisoning jacks are given in A.P.109A-0001-1, Sect.5, Chap.10.

##### Hinge-release mechanism (fig.9)

18. The release mechanism consists of two spring-loaded links, mounted in the spine structure aft of the cockpit, which are in contact with the cams of a camshaft fitted transversely in two diaphragms in the spine. The camshaft embodies a fixed pulley which is connected, by cables via a lever spool on the external control shaft and fairlead pulleys, to a similar pulley on the

torque shaft port jettisoning sleeve (fig.5). A small lever on the camshaft prevents it overriding by engaging a damper unit bolted to the starboard diaphragm. The spring-loaded links are set during assembly of the mechanism to allow a 12 deg release angle, and should not be altered.

#### Operation

19. When the firing unit sear is withdrawn, the cartridge is fired and expanding gases drive the piston down the firing chamber. The end of the piston, acting on the jettisoning lever, rotates the torque shaft to unlock the canopy, and at the same time the jettisoning sleeves are rotated by the transverse pin (para.17). The port jettisoning sleeve applies a pull to the cables (para.18) to rotate the hinge camshaft, pushing the release links into contact with the canopy hook catches (fig.9) and also, through a cam and lever (fig.8), rotates the cam of the jack end-fitting release mechanism (para.12). When the piston has travelled sufficiently to perform these operations, it uncovers the ports in the cylinder walls (para.17), and the remaining gas pressure passes to the canopy jettisoning jacks. The jack pistons are then driven upwards against the canopy striking blocks, lifting the canopy to a position where the airstream becomes effective. When the canopy has pivoted through 12 deg, the links of the hinge-release mechanism withdraw the hook catches and free the hinges from the aircraft (fig.9) allowing the canopy to be carried away by the airstream.

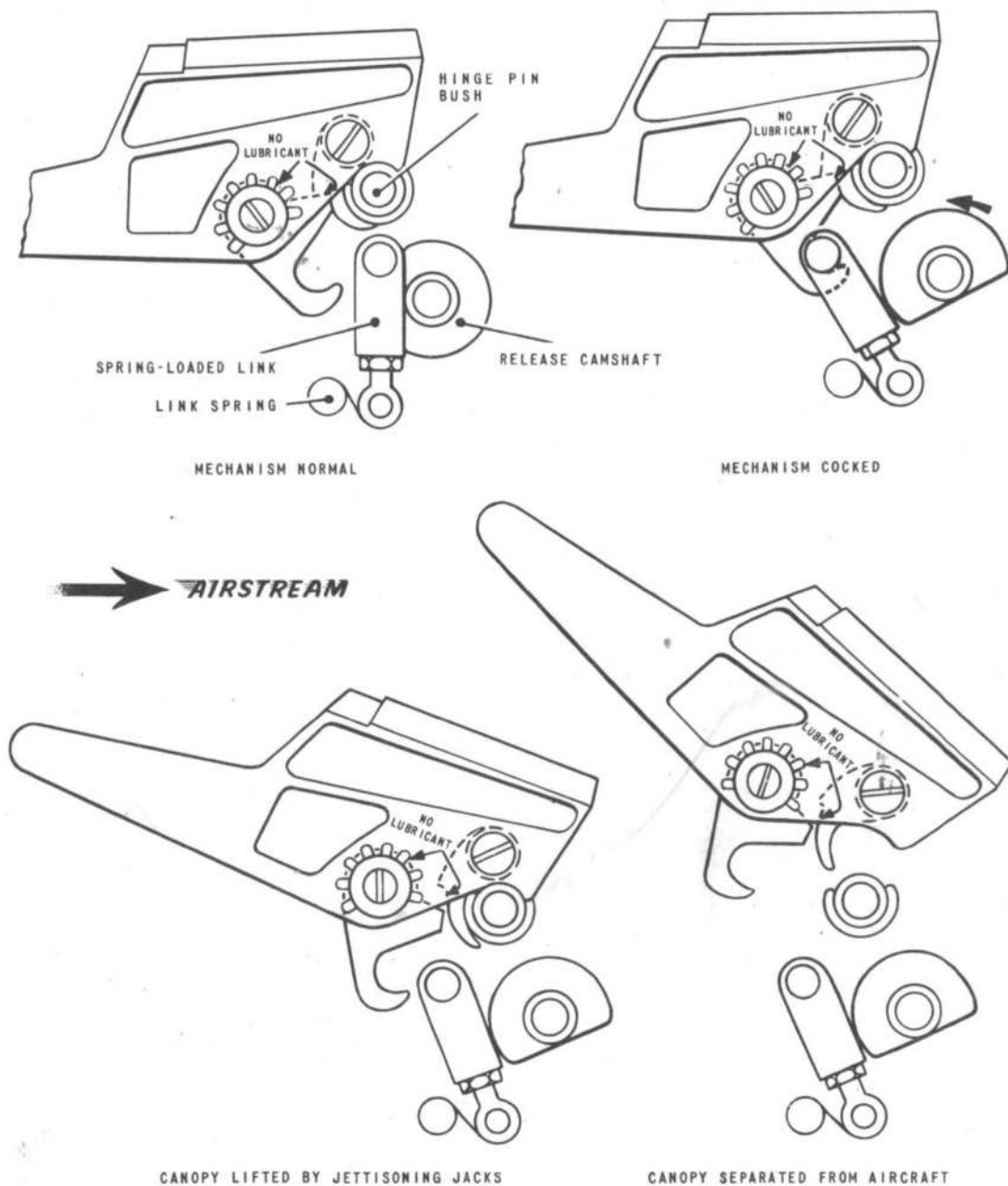


Fig.9. Action of hinge-release mechanism

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## SERVICING

## WARNING

The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cockpit, or performing any operations upon the aircraft.

## Note...

1. All load checks are to be repeated three times.
2. On every occasion that the canopy jack end-fitting release is operated, it is essential that the housing be raised to the highest position during re-engagement of the end-fitting to permit the claw to open. Failure to comply with this precaution will result in severe damaging of the claw. ▶

## General information

20. The servicing described below applies only to mechanical components. For details of hydraulic and electrical components servicing, refer to Chap.6, and Sect.6, Chap.12 and 14, respectively.

## Lubrication

21. Ball bearings, pulleys and moving parts with the exception of the jettisoning sleeves, are lightly coated with anti-freeze grease XG-278 during assembly, and should be similarly treated following breakdown of components. The jettisoning sleeves and cables are provided with grease nipples; the sleeves are to be lubricated with grease XG-278, the cables with grease XG-273 and all pin joints lightly oiled with OX-14.

## Note...

No lubricant is to be applied to the canopy hinge-armhook-and-catch mating surfaces or to the eccentric adjustment. Canopy surfaces, both external and internal, must be kept free of P.R.C. sealant.

## Tools and equipment

22. For tools and equipment used in servicing and removal and assembly operations, refer to Table 1.

Adjusting the jettisoning cables (fig.3)  
23.

- (1) Slacken the two setscrews in the side of the jettisoning handle and turn the adjusting screw, in the top of the handle, to provide some slack in the lower cable.
- (2) Slacken the locknut of the eye-end at the top of the upper cable.
- (3) Withdraw the split pin and remove the shackle pin attaching the eye-end to the sear withdrawal lever.
- (4) Adjust the cable length by rotating the eye-end until, with the reduction lever against its stop and the sear hook pressed firmly against the firing pin roller, the shackle pin will just pass through the eye-end and the sear withdrawal lever. Check the thread for safety, fit a new split pin, and tighten the locknut.
- (5) Check that the distance between the swaged end-fitting and the adjuster barrel is at least half an inch with the cable connected. Adjust the upper cable where necessary.

## Note...

When carrying out operation (5) or when fitting new cables, it may be necessary to take up some of the adjustment on the conduit adjusters. It is essential, however, that the eye-end be in safety at all times.

- (6) Maintaining pressure on the sear, to keep the reduction lever against its stop, adjust the lower cable until all slack is removed. Tighten the setscrews to lock the adjustment.

## Note...

Sub-para.(7), (8), (9), (10) and (12) refer to post Mod.2187 aircraft only.

- (7) Remove the access panel located above the external jettisoning-control panel and the locking wire from the turnbuckle-type adjuster.
  - (8) Adjust the cable length by altering the adjuster until, with the reduction lever against its stop and the external control locked, the cable is just taut. Ensure that the cable is correctly fitted on the rollers.
  - (9) Check the thread for safety, tighten the locknuts and wire-lock the adjuster.
  - (10) Remove any play in the T handle by altering the adjusting screw in the locking hook.
  - (11) Carry out a functioning test (para.35).
  - (12) Refit the access panel.
- Adjusting the jack end fitting release (fig.7)**  
24.
- (1) Close and lock the canopy.

- (2) Pressurize the hydraulic system to 3000 lb/in<sup>2</sup>.
- (3) Slacken the manual release cable by slackening the locknuts and turning the upper cable adjuster.
- (4) Set the cam-operated lever so that it is in contact with the cam face (fig.8).

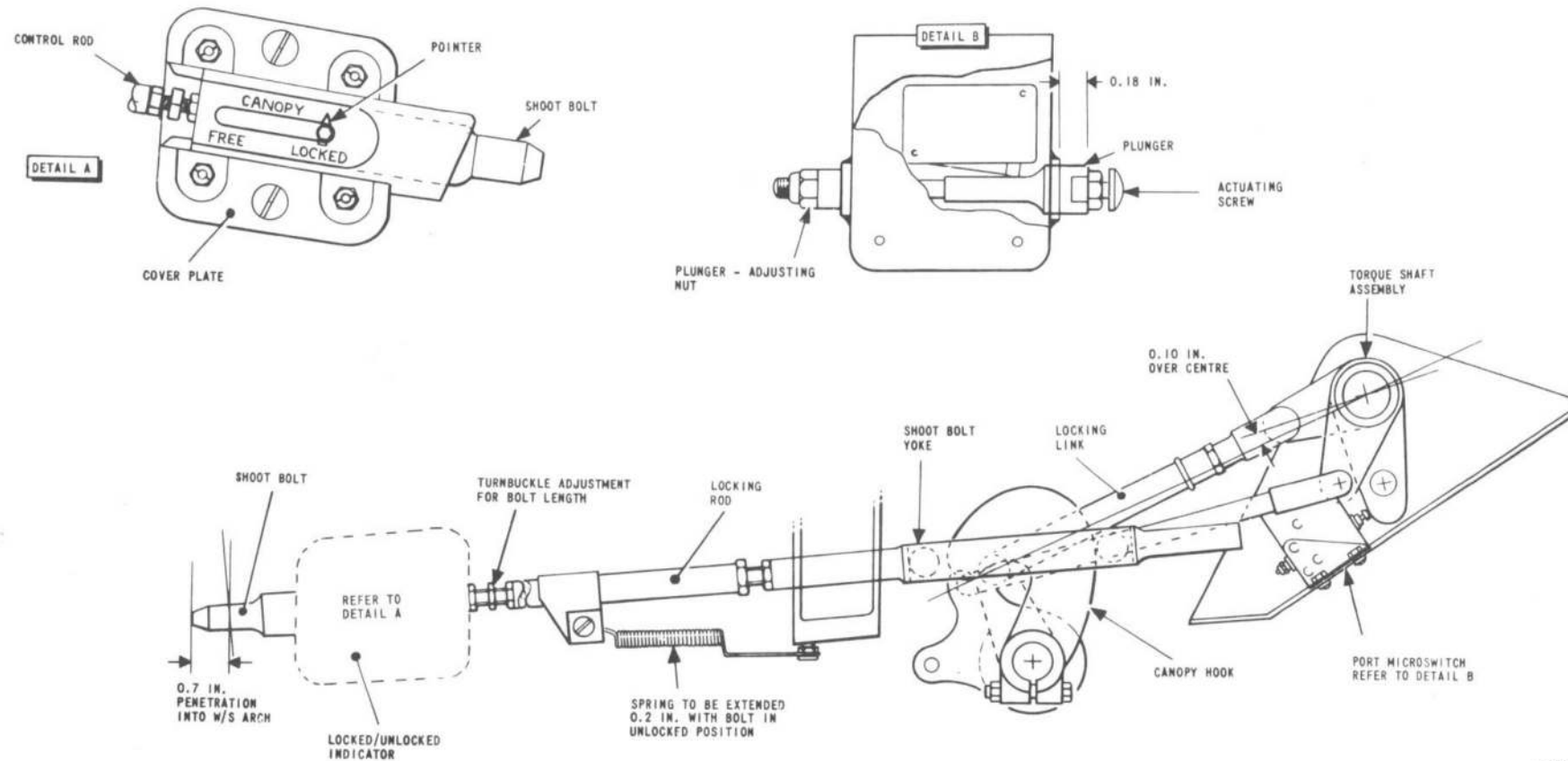
- (5) Holding the pushrod in contact with its operating lever, slacken the locknut and adjust the pushrod until there is a gap of 0.002 to 0.003 in. between the top end of the pushrod and the base of the jack end-fitting.

take up any slack; do not disturb the settings.

- (8) Tighten the locknut on the cable.

Canopy jack eye-end clearances (fig.1)  
25.

- (1) With the jack and its end-fitting adopting a natural line check the



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Fig. 10. Adjusting shoot bolts and microswitches

clearance between the faces of the eye-end fitting and the lugs of the canopy attachment bracket (*detail A*).

(2) If the gap on each side exceeds 0.028 in. proceed as follows:-

(a) Support the canopy.

(b) Detach the jack from the canopy by removing the locking wire, special-to-type nut and  $\frac{1}{4}$  in. bolt.

(c) Fit a shim washer Ref.No.26DK/36047 to each side of the end-fitting and reconnect the jack to the canopy.

(d) Fit and tighten the special-to-type nut and wire-lock.

(3) If the gap on one side exceeds 0.028 in. proceed as follows:-

(a) Support the canopy.

(b) Detach the jack from the canopy by removing the locking wire, special-to-type nut and  $\frac{1}{4}$  in. bolt.

(c) Fit a shim washer Ref.No.26DK/36047 to the side having the greater gap and reconnect the jack to the canopy.

(d) Fit and tighten the special-to-type nut and wire-lock.

#### Hydraulic jack adjustment

26.

(1) Support the canopy.

(2) Disconnect the jack from the canopy.

(3) Retract the jack until the piston bottoms.

(4) Close and lock the canopy.

(5) Straighten the tab washer and slacken the locknut on the jack ram. Adjust the height of the ram until the jack securing bolt will enter the bracket on the canopy and the jack end-fitting. Permissible backlash between canopy and jack is 0.010 in. to 0.015 in.

(6) Tighten the locknut on the jack ram and secure with the tab washer. Fit the nut and split-pin on the jack securing bolt.

#### Checking and adjusting the canopy mechanical locks (*fig.10*)

27.

(1) Check that the torque-shaft over-centre setting is correct (*para.37*).

(2) With the canopy open, check the shoot bolts for full travel and freedom of movement.

(3) Close and lock the canopy.

(4) Ensure that the locking rod is screwed fully home into the yoke and that the locknut and washer are tight.

(5) Check for correct positioning of the locking hooks and the yoke rollers. If necessary adjust on the hook shaft until the hook lies centrally in the yoke.

(6) Check the locking hooks for correct engagement as follows:-

(a) Open the canopy.

(b) Place soft lead foil or Plasticine around the port and star-board rollers in the canopy base, then close and lock the canopy.

(c) Open the canopy and carefully remove the foil or Plasticine from the rollers. Measure the thickness (it is correct at  $0.030 \pm 0.008$  in.) where it has been compressed on the rear face of the roller; the top face of the roller must contact the hook. Adjustment, if necessary, is effected by disconnecting the locking link, slackening the locknut and screwing the end-fitting in or out as required.

#### Note...

*Any adjustment of the locking link will necessitate re-checking the torque shaft over-centre setting (para.37)*

(d) Lock the canopy and check that the shoot bolts enter the windscreen arch to a distance of 0.7 in. and that the indicator pointers line up with the CANOPY LOCKED markings on the cover plates. Adjustment is provided by the turnbuckle at the forward end of the control rods.

(7) Unlock the canopy and check that when the shoot bolts are withdrawn from the windscreen arch, the indicator pointers line up with the CANOPY FREE markings. With the shoot bolts in the unlocked position check the extension of the return springs which should be 0.20 in.; ensure that a minimum clearance of 0.05 in. is maintained between the

stiffnuts of the spring clip assemblies and the surrounding structure.

- (8) Lock the control rod turnbuckles.
- (9) Check for freedom of movement, simultaneous action of the shoot bolts and that the locking hooks are correctly positioned.
- (10) Carry out operating-control load checks (*para.30 and 31*).
- (11) Carry out a functioning test (*Chap.6*).

#### Checking the canopy sealing gap and profile (*fig.1*)

##### 28.

- (1) With the canopy locked, and the cockpit not pressurized, check that the gap between the deflated seal and interference face is maintained at a constant 0.090 in. max. 0.030 in. min.
- (2) Ensure that the distance between outer skins is maintained at 0.05 in. Final trimming is carried out after initial fitting, so that any variation must be traced to a fault.
- (3) Check that the canopy top profile lies 0.15 in. max. to 0.10 in. min. below the windscreen arch when the cockpit is not pressurized.

#### Adjusting the microswitches (*fig.10*)

##### 29.

- (1) Set the canopy locking mechanism to the locked position.
- (2) Adjust the microswitch plunger so

that it protrudes 0.25 in., measured from the plunger face.

- (3) Slacken the locknut and adjust the actuating screw until it is in contact with the face of the striker arm; continue unscrewing the actuating screw until the switch just trips.
- (4) Tighten the locknut on the actuating screw.
- (5) Check that, when locking the canopy, the switches operate and the warning lights are extinguished only when the 0.10 in. over-centre lock is made.
- (6) Check that, when unlocking the canopy, the switches operate and the warning lights illuminate before the over-centre off-set is less than 0.06 in.
- (7) Check that the switches operate simultaneously.

#### Operating-control load checks

##### Internal

##### 30.

- (1) Close and lock the canopy.
- (2) Attach a spring balance to the internal control handle (*fig.3*) and measure the load required to unlock the canopy. This must not exceed 20 lb.

##### External

##### 31.

- (1) Close and lock the canopy.
- (2) Attach a spring balance to the external locking handle (*fig.3*) and measure the load required to unlock the canopy. This must not exceed 20 lb.

#### Jettisoning mechanism functioning test

##### Note...

*The jettisoning unit cartridge must be removed before it is possible to carry out this test.*

##### 32.

- (1) Prepare the canopy for removal in accordance with *para.38 (1) to (8)*.
- (2) Remove the three closing screws in the canopy top member in readiness for fitting the sling.
- (3) Charge the cylinder of the test rig with air to 600 lb/in<sup>2</sup>.
- (4) Remove the primary breech striker mechanism from the jettisoning firing unit, and replace with the test rig adapter. Connect the rig flexible pipe.
- (5) With an assistant occupying the ejection seat and supporting the test rig, operate the hand pump to close, but not to lock, the canopy.
- (6) With an assistant pushing upwards on the canopy, check that there is no extension of the hydraulic jack (air in the system can cause failure of the jack end-fitting release mechanism). If necessary bleed the hydraulic system (*Chap.6*).
- (7) Lock the canopy, checking that the canopy unlocked warning indicators extinguish.
- (8) Operate the jettisoning mechanism by opening the test rig stop-valve.

(9) Check that the canopy shoot bolts are withdrawn and (through access panels 22P and S) that the hinge release camshaft has turned to cock the release links (*fig.9*). Should the camshaft damper lever (*fig.3*) fail to fully enter the damper unit, manually, i.e. not using a tool, rotate the camshaft to achieve this condition.

(10) If the mechanism fails to operate correctly, release the pressure from the firing unit by unscrewing the adapter, and reset the hinge release camshaft and links to normal (*fig.9*) by manually rotating the shaft (accessible through access panels 22P and S) until the aft sides of the links bear on the flats of the cams, before opening the canopy to investigate. Following any adjustment or rectification recommence the test.

(11) Fit the sling and support the canopy (*para.38 (9) and (10)*).

(12) Raise the canopy slowly and check that the jack end-fitting becomes detached.

(13) Continue raising the canopy and check that the hinges are released when the top of the canopy leading edge is 11.75 in. approx. above the windscreen arch (it may be necessary to apply a small upward force at the rearmost edge of the canopy to ensure release of the hinge bushes).

(14) Remove the canopy from the fuselage and remove the hinge bolts and bushes.

(15) Manually reset the hinge release camshaft and links to normal (10).

(16) Reset the canopy hinge arm-bush mechanism (*para.33*).

(17) Refit the canopy (*para.39*) but do not connect the jack end-fitting.

(18) Reset the canopy jack end-fitting release (*para.34*).

(19) Remove the test equipment and refit the primary breech striker mechanism.

#### Resetting the hinge arm-bush mechanism (*fig.2*)

33.

(1) Attach a spring balance to the disengaged catch and, with a straight pull, measure the load required to move the catch. This must be 10 to 25 lb.

(2) Place the hinge bush in the profile of the hinge arm and rotate the free pivoted hook to engage the outer diameter of the bush. Hold the hook in this position.

(3) Rotate the eccentrically-mounted catch to engage the flat on the bush retaining hook.

(4) Using a spring balance attached to the catch, and with a straight pull, measure the load required to dislodge the catch and permit free movement of the bush retaining hook. This must be 50 to 90 lb.

If the loading is incorrect:-

(a) Withdraw the countersunk bolt

supporting the eccentric bush until the locking tab is clear of the locking recess.

(b) Rotate the eccentric bush to move the catch pivot point forward.

(c) Repeat as for (2) and (3).

(d) Rotate the eccentric bush to increase or decrease the pressure on the catch and hook. Continue this adjustment until the loading is correct.

(e) With the pre-loading correct tighten the countersunk bolt until the locking tab on the eccentric bush is fully engaged with one of the radial recesses in the hinge arm.

(f) Relock the countersunk bolt by centre-popping.

#### Resetting the jack end-fitting release

##### WARNING

Before commencing the sequence of operations described below, ensure that the alighting gear is selected DOWN.

34.

(1) Raise the canopy manually to its full extent, and support it.

(2) Detach the end-fitting from the canopy by removing the locking wire, special-to-type nut and  $\frac{1}{4}$  in. bolt (*fig.1, detail A*).

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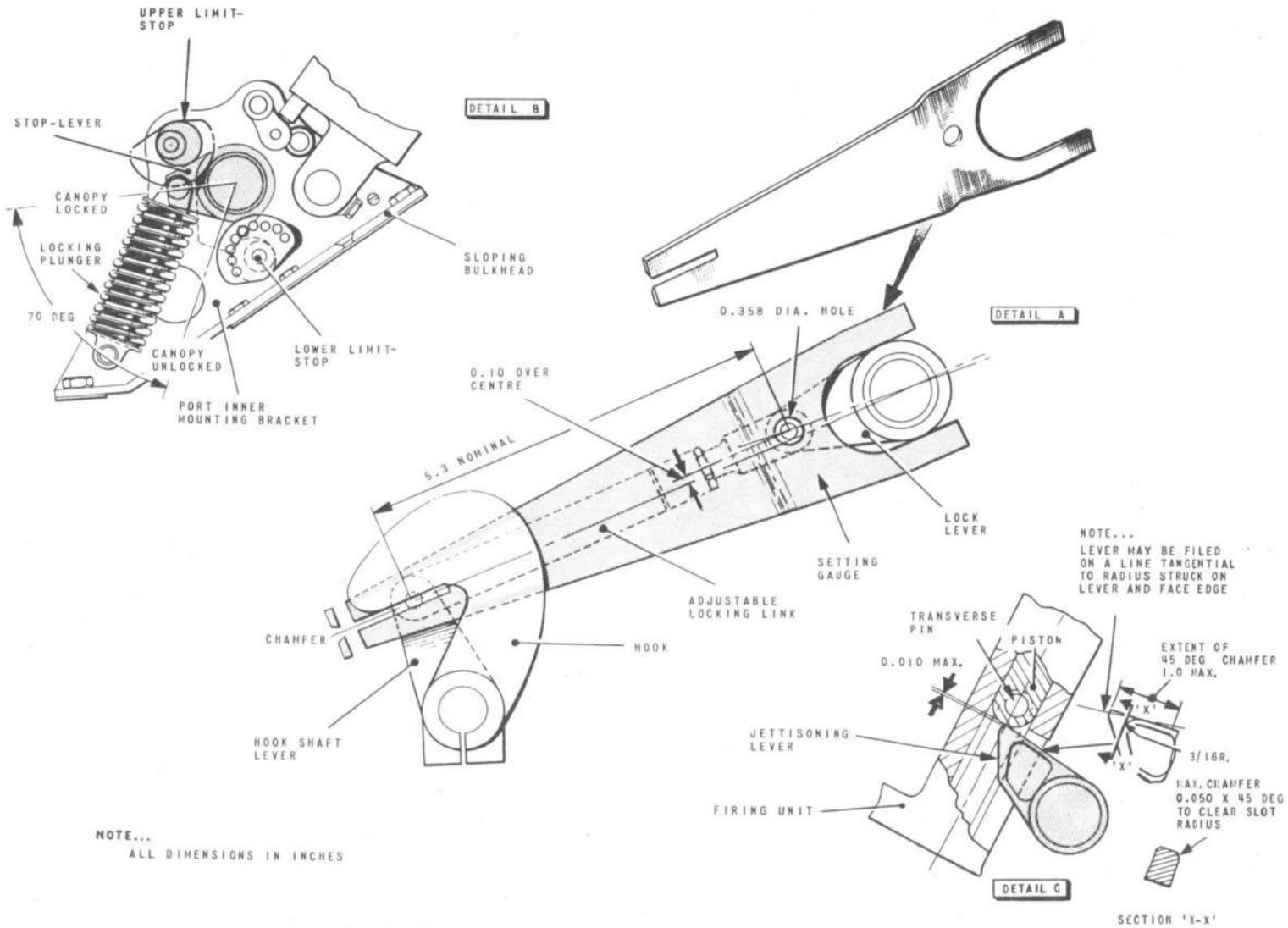


FIG. 11. SETTING TORQUE - SHAFT LIMIT STOPS

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(3) Check that the canopy jack is fully retracted and that the operated standby handle is still in the operated position.

(4) Insert the end-fitting in the jack housing and strike the end smartly with the palm of the hand to engage it in the spring claw.

(5) Return the operated stand-by handle to normal, i.e. internal handle forward, external handle inboard, and check that the jack housing returns to normal.

(6) Connect a 28-volt d.c. ground electrical supply.

(7) Unstow and fit the hydraulic system hand-pump handle (access panel 79P).

(8) Select canopy OPEN and apply hydraulic pressure to extend the jack fully.

(9) Connect the jack to the canopy, fit the attachment bolt and nut and wire-lock the bolt.

(10) Select canopy CLOSED and apply hydraulic pressure to partially close the canopy.

(11) Manually apply a considerable upward force to the leading edge of the canopy and check that the jack end-fitting does not disengage.

(12) Select canopy CLOSED and apply hydraulic pressure to close the canopy fully.

(13) Lock the canopy and check that the locks engage fully and that the indicator lights are extinguished.

(14) Disconnect the electrical supply and return the hydraulic system hand-pump handle to its stowage.

(15) If the external handle has been operated, renew the indicator wire using 28 S.W.G. tinned copper wire.

#### Jettisoning-control functioning test

35.

(1) Remove the primary breech striker mechanism from the canopy firing unit (A.P.109A-0001-1).

(2) Fit a dummy cartridge and refit the striker mechanism.

(3) Connect the jettisoning cable and remove the safety pin.

(4) Attach a spring balance to the canopy jettisoning handle and measure the load required to operate the jettison unit, i.e. pulling the sear clear of the striker mechanism. This must not exceed 30 lb.

#### Note...

*Before pulling the handle fit a temporary lanyard to ensure that the sear does not become a loose item.*

(5) Return the jettisoning handle and the reduction lever to the unoperated position.

(6) Refit the sear to the firing mechanism and reconnect the cable.

#### Note...

*Sub-para.(7) and (8) refer to post Mod.2187 aircraft only.*

(7) Operate the external jettisoning handle and ensure that the sear is pulled clear of the striker.

(8) Return the external handle and the reduction lever to the unoperated position, and check that the external jettison cable (accessible through the access panel above the jettisoning control panel) is correctly fitted on the rollers (fig.3, detail A).

(9) Remove the striker mechanism and the dummy cartridge.

(10) Refit the striker mechanism with the sear fitted.

(11) Refit the safety pin.

#### Canopy jettisoning/seat ejection-controls load checks

36. Refer to A.P.109B-0103-5, Chap.1.

#### Checking and setting the torque shaft limit stops (fig.11)

37.

(1) With the canopy open, set the internal control handle to the canopy locked position.

(2) If the adjustable locking links on the torque shaft have been altered, set

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each link to a nominal dimension of 5.3 in. measured between pin centres.

(3) Position the setting gauge on the outboard side of the adjustable locking link so that the chamfered edges of the slot at the narrow end face inboard (*detail A*).

(4) The 0.10 in. over-centre and the upper limit-stop are set correctly when, with the shaft stop-lever contacting the stop, the aft link pin is lined up with the 0.358 in. dia. hole in the gauge.

(5) Adjust by altering the upper limit-stop as follows:-

(a) Disconnect the lower-internal operating-link from the lever on the hook shaft (*fig.3*). Use the external locking handle when carrying out subsequent operations.

(b) Alter the stop accordingly ensuring that, with the stop lever contacting the stop and the firing-unit piston fully bottomed in the unoperated position, the gap between the jettisoning lever and the piston (accessible through the slot in the aft side of the unit) does not exceed 0.010 in. or that movement of the transverse pin is not restricted (*detail C*). If a replacement shaft has been fitted and the over-centre cannot be obtained by altering the stop, it is permissible to file the jettisoning lever.

(6) Check the torque shaft travel (it

is correct at 70 deg) from the locked position to unlocked. Adjust by altering the lower limit-stop.

(7) Operate the mechanism, checking for fouls and correct functioning.

(8) With the internal control handle in the canopy locked position and the shaft stop-lever contacting the upper limit-stop, adjust the internal operating link so that the pin hole in the fork end lines up with the hole in the operating lever on the hook shaft. Fit and lock the link pin.

(9) Using the internal handle repeat (7) ensuring that the stop lever contacts the stops.

(10) Adjust the microswitches (*para.29*).

(11) Carry out the checks and adjustments described in *para.24, 27 and 30 to 32*.

(12) Carry out a functioning test (*Chap. 6*), checking the canopy seal for correct inflation and deflation (*Chap.8C*).

### REMOVAL AND ASSEMBLY

#### Canopy Removal

#### WARNING

Before commencing the sequence of operations described below ensure that the alighting gear is selected DOWN.

38. To remove the canopy:-

(1) Remove access panels 22P and 22S,

and No.1 V.H.F. set (F Mk.1 pre Mod.177) or U.H.F. homer and stand-by equipment (F Mk.1 post Mod.177 and F Mk.1A), to gain access to the canopy hinge bolts.

(2) Connect a 28-volt d.c. ground electrical supply.

(3) Remove the hydraulic system hand-pump handle from its stowage and fit it to the pump (panel 79P).

(4) Remove the fibreglass panels covering the hinge-arm recesses.

(5) If the canopy is locked, unlock it and select canopy OPEN. Apply hydraulic pressure to raise the canopy to its full extent.

(6) Disconnect the flexible pipes to the canopy air driers at the pressure bulkhead.

(7) Disconnect the ejection seat delay cable by removing the pip pin from the canopy bracket.

(8) Disconnect the I.F.F. aerial cable from the canopy and unstrap it from the de-misting spray pipe.

(9) Fit canopy sling after removing three closing screws in the canopy top member.

(10) Support the canopy, using a hoist and jib, and remove the special-to-type nut, washer and ¼ in. bolt attaching the jack to the canopy.

(11) Still supporting the canopy, select

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canopy CLOSED and fully retract the jack.

(12) With the canopy held approximately half-open, remove the locking wire and unscrew the hinge bolts from the anchor nuts; support the canopy and withdraw the bolts.

(13) Remove the canopy from the fuselage.

(14) Disconnect the electrical supply and remove and stow the hand-pump handle.

**Note...**

*If the canopy is to remain off the*

*aircraft for any length of time, fit blanks to the de-misting connections to prevent ingress of moisture.*

*Assembly*

**Note...**

*Before commencing to refit the canopy ensure that the hinge release cam-shaft and links are set to normal (para.32(10)).*

39. Assembly of the canopy to the aircraft is the reverse of the removal procedure (para.38). The I.F.F. aerial connector must be held clear of the de-

misting union on the canopy by securing it to the spray pipe and cable looms on the aft pressure bulkhead using strapping Ref.No.5F/2279 and studs, Hellerman Pt. No.OP.3255. After assembly carry out the checks described in para.24, 25, 27(9) and (11). If a replacement canopy has been fitted carry out the checks and adjustments described in para.24 to 35 and a cockpit pressurization leakage test (Chap.8B).

**Note...**

*Prior to fitting a new canopy it is essential to set the hinge arm-bush mechanism (para.33).*

TABLE 1

Tools and equipment

Ref.No.	Description	Application/remarks
26DK/95331	Rig, test	Jettisoning mechanism testing
1A/1275138	Balance, spring, 0-30 lb	} Operating load checks
1A/1043782	Balance, spring, 0-100 lb	
26DK/95406	Gauge, setting	Checking and setting torque shaft limit stops
26DK/95263	Sling, canopy	} Canopy removal
4GC/6648	Hoist	
4GC/6672	Jib	
4F/3603	Trolley, hydraulic servicing	} Alternatives
4F/3761 or 4F/4257	Trolley, electrical servicing, I.C.E. driven	
4F/3786 or 4F/4258	Trolley, electrical servicing, electrically driven	

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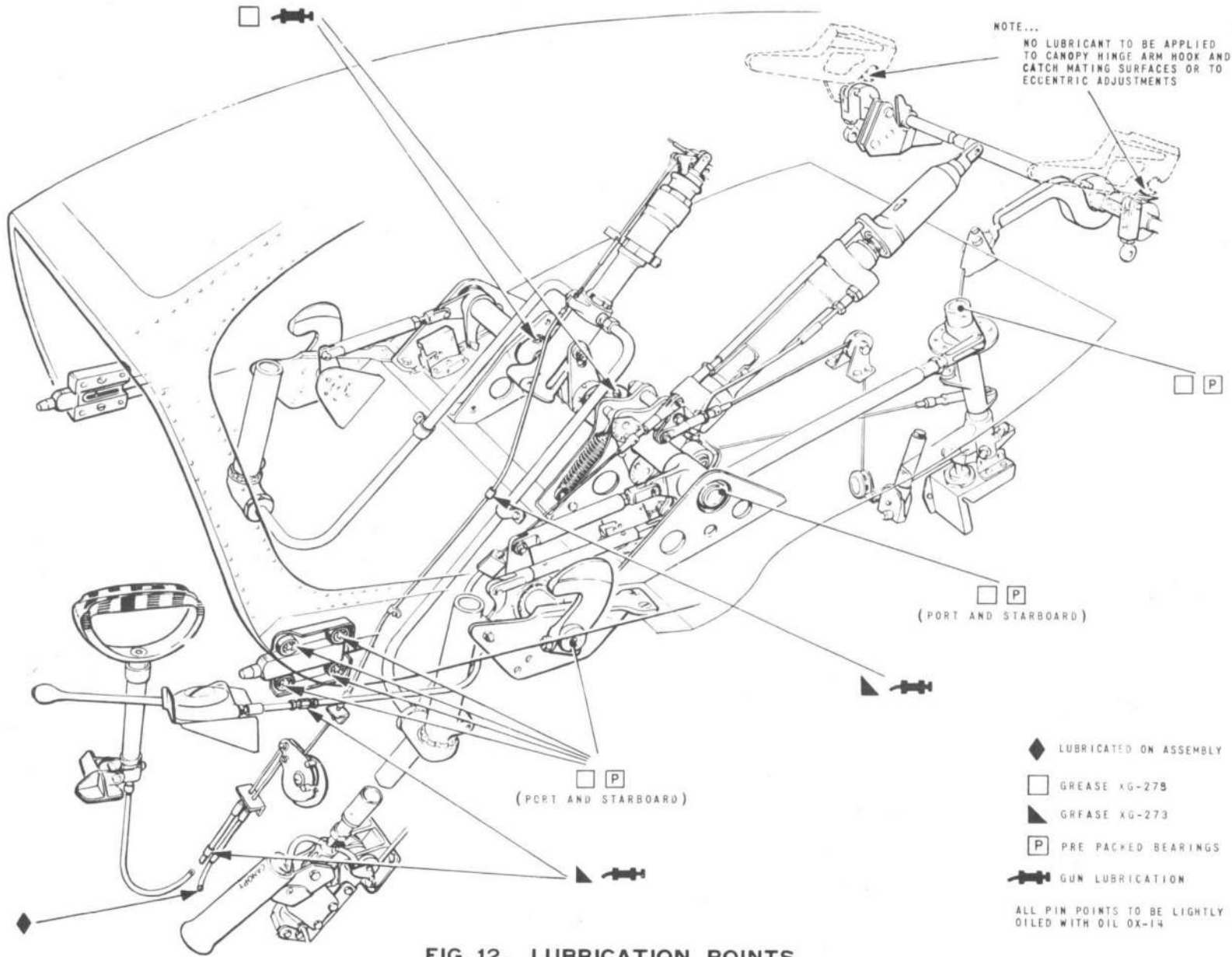


FIG. 12. LUBRICATION POINTS

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