

DESCRIPTION

General information (fig.1)

1. The all-metal fuselage is built in two parts, front and rear, joined at frame 25. The basic construction is of transverse frames and part-frames, braced by longitudinal stiffening-members, stringers, and a stressed skin. Lower and upper bays in the fuselage, which are closed by fully-stressed hatches, accommodate No. 1 and No. 2 e.c.u. respectively. One of two interchangeable armament packs is fitted immediately forward of the lower engine bay. Hinged

or removable panels are provided in the skin for access to equipment (Sect. 2, Chap. 4); in high temperature areas the equipment is protected by internal heat shields. The fuselage is divided into five fire zones by firewalls (Sect. 4, Chap. 5); all walls except the forward walls of the two zones 1 are manufactured from titanium.

Front fuselage

2. The frames of the front fuselage are skinned internally and externally, so that the entire structure forms the air-intake duct to the engines; the duct is

divided, at frame 21, to provide a separate intake to each engine. Two longitudinal beams built into, and breaking the continuity of, frames 4 to 12, provide rigid attachments for the nose-wheel strut. The nose-wheel well is formed by the beams and a pylon projecting upwards into the intake duct, and is closed by three mechanically-operated doors. The pylon is constructed of vertical ribs attached to the nose-wheel beams, at the fuselage frame positions, and skinned externally. A conical radar head in the forward end of the intake duct is supported by the pylon.

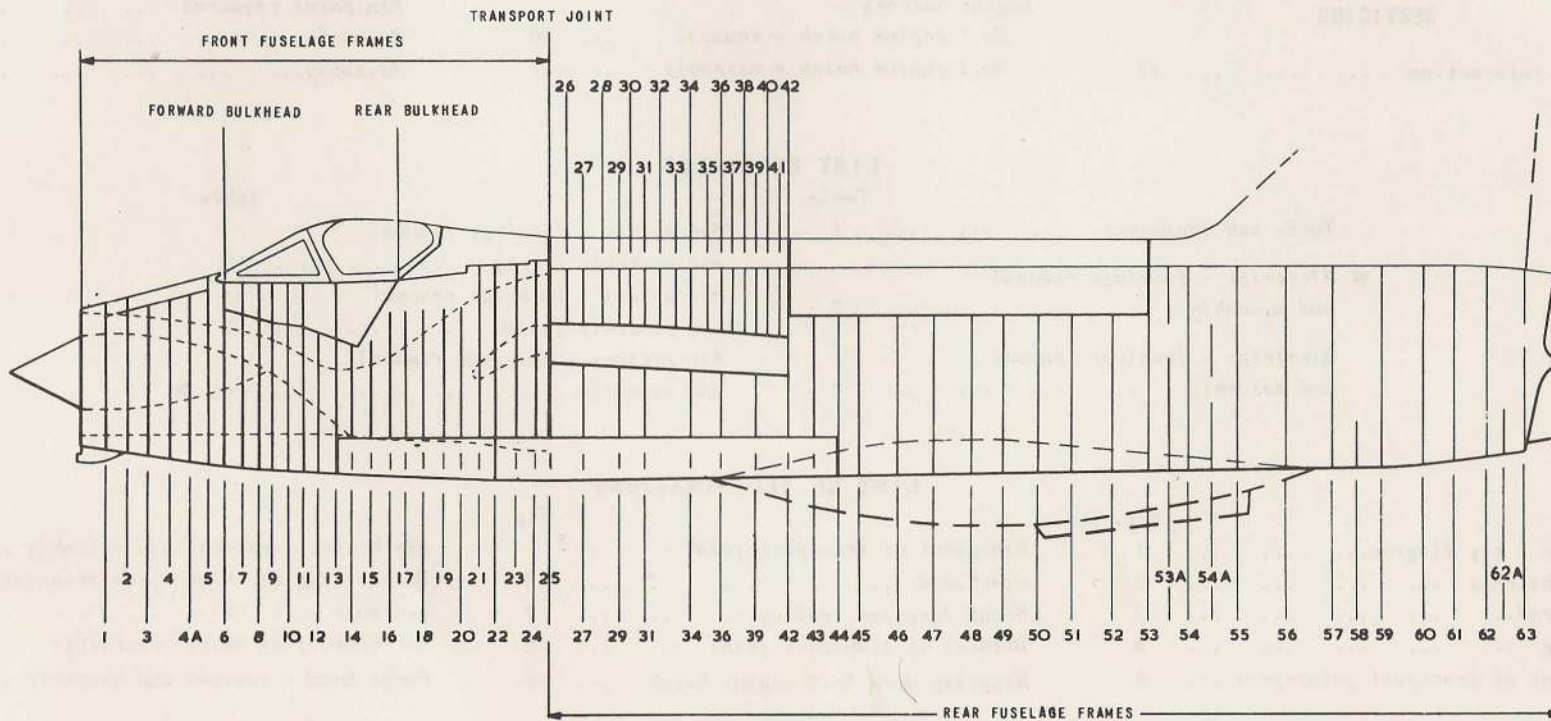


Fig. 1. Fuselage - key diagram

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3. Between frames 6 and 14, the upper skin of the intake duct forms the lower pressure boundary of the cockpit, which is bounded also by front and rear pressure bulkheads, the fuselage side-skins and a transparent canopy. Frames 14 to 25 terminate at longerons extending aft from frame 13. The forward part of the bay so formed accommodates the armament pack; the aft end constitutes the forward end of No. 1 engine bay. Eight angle-plate vortex generators (four-port and four-starboard) are fitted to the internal skin of the intake duct between frames 17 and 18.

Rear fuselage

4. The rear fuselage accommodates both engines and their intermediate and re-heat jet pipes, and carries the dorsal fin, tail plane, and main plane. The main plane is mounted in the mid-position, and is accommodated in a horizontal slot which extends aft from the forward end of the structure to frame 42. Within the fuselage, the closely-spaced frames above the main plane are skinned internally to form the rear end of the intake duct to No. 2 engine, the engine bay being between frames 42 and 53. The floor of the upper engine bay is a titanium firewall which is built on to the frame transverse webs. No. 1 engine bay extends from frame 25 to frame 44 and a titanium firewall, forming the greater part of the bay roof, protects the main plane under-surface. Immediately aft of No. 2 engine bay on either side of the fuselage are the air brakes; these hinge forward to open, and are flush with the fuselage contour when closed. Doors, in the under-surface between frames 60 and

61, close the braking parachute compartment; these doors slide upward to open. The port and starboard components of the tail plane are supported by ball and roller bearings the housings of which are attached to frame 57.

Engine hatches (fig. 2)

General information

5. The engine hatches are constructed from channel-section ribs and stiffeners covered by light-alloy skins. They embody screw-type side and end fasteners, which enter screwed brackets on the engine bay longerons, and the frames flanking the engine bays; No. 1 engine hatch has no fasteners at the forward end. All fasteners are accessible through detachable panels or spring-loaded flaps in the hatch skins; when correctly fitted the panels and flaps lock the fasteners. No. 2 engine hatch is provided with four jacking bolts, one at each corner, by which the hatch may be lifted to align two retractable hinge-bolts, in the hatch end-frames at the port side, with holes in frames 42 and 53. When the hinge bolts are engaged, the hatch may be hinged open with the necessary ground equipment (Sect. 2, Chap. 4).

Side fasteners

6. A typical side fastener comprises a guide-spigot assembly, a hatch bolt and a closing flap. The bolt is inserted through the guide-spigot and screwed into a bracket on the engine bay longeron. Two spring-loaded plungers in the spigot assembly lock the bolt by engaging two of six depressions formed in the bolt shank. The closing flap hinges inwards against the action of a spring, and has

an inner lip which, with the flap closed, is within 0.015 in. of the hatch bolt head and serves as an extra locking device. If the hatch bolt is incorrectly seated, the inner lip of the flap will foul the bolt head and prevent the flap closing.

End fasteners

7. A typical end fastener comprises a threaded guide-spigot, a packing block, a hatch bolt, and a cover plate. The guide-spigot, with the packing block, is screwed into a locating block in the hatch structure, and projects beyond the hatch end-rib to engage a bracket attached to the fuselage frame. The spigot packing-blocks are machined to maintain a 0.12 in. gap between the hatch end-rib and the fuselage frame; they are not interchangeable and each is numbered to correspond with the number on the inner wall of the fastener cavity. The hatch bolt is fitted through the guide-spigot and screwed into the frame bracket; it is locked by a spring on the cover plate which engages serrations around the bolt head. The cover plate is attached to a rib in the cavity by a chain, and is locked by a quick-release fastener.

Radar head (fig. 3)

8. The radar head is constructed in two parts, comprising a light-alloy structure and a fibreglass radome, secured together by an adjustable manacle assembly locked at the base by a toggle fastener. When assembled, the two components are a sealed container for the A.I. equipment. The assembly is a fully

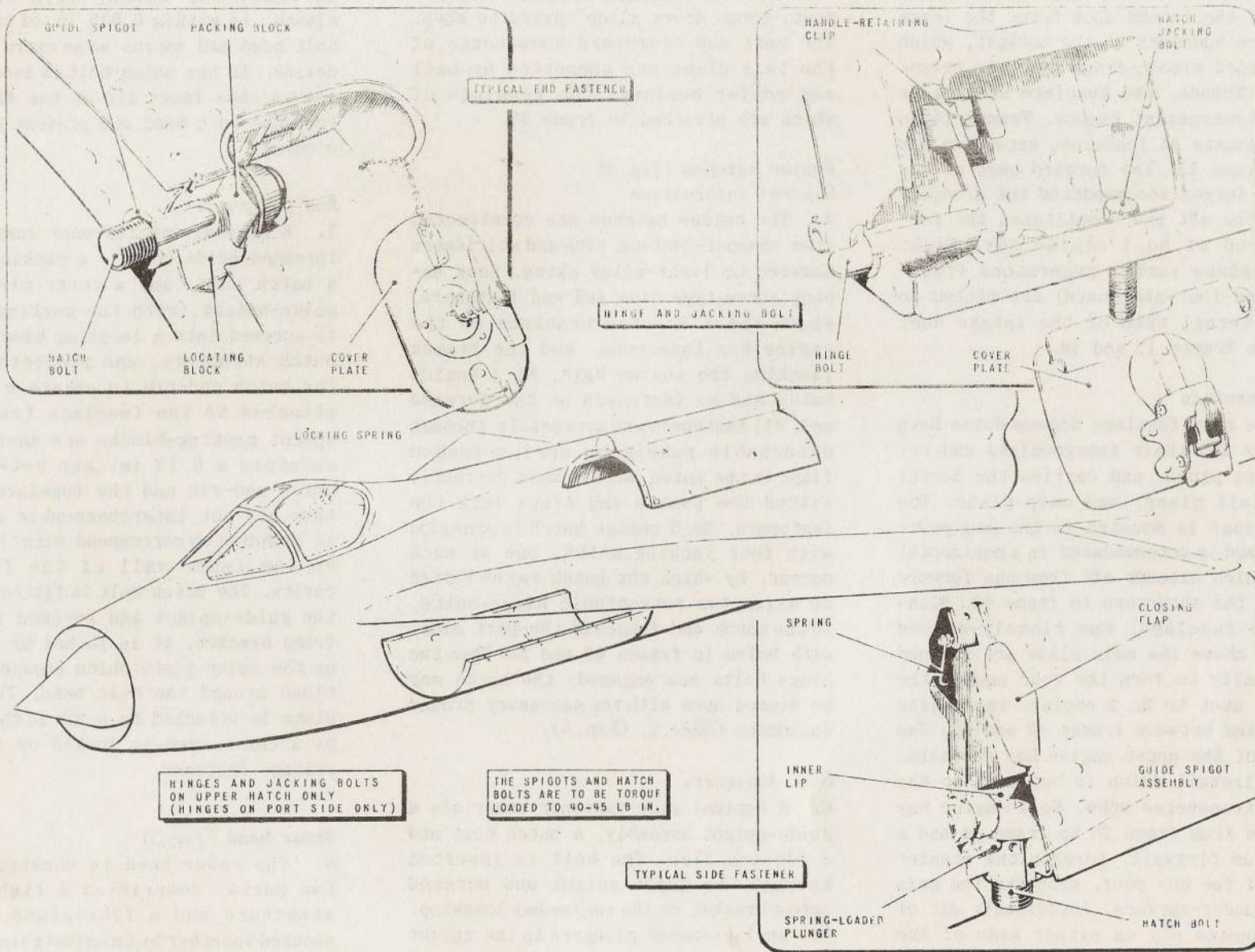


FIG. 2. ENGINE HATCHES

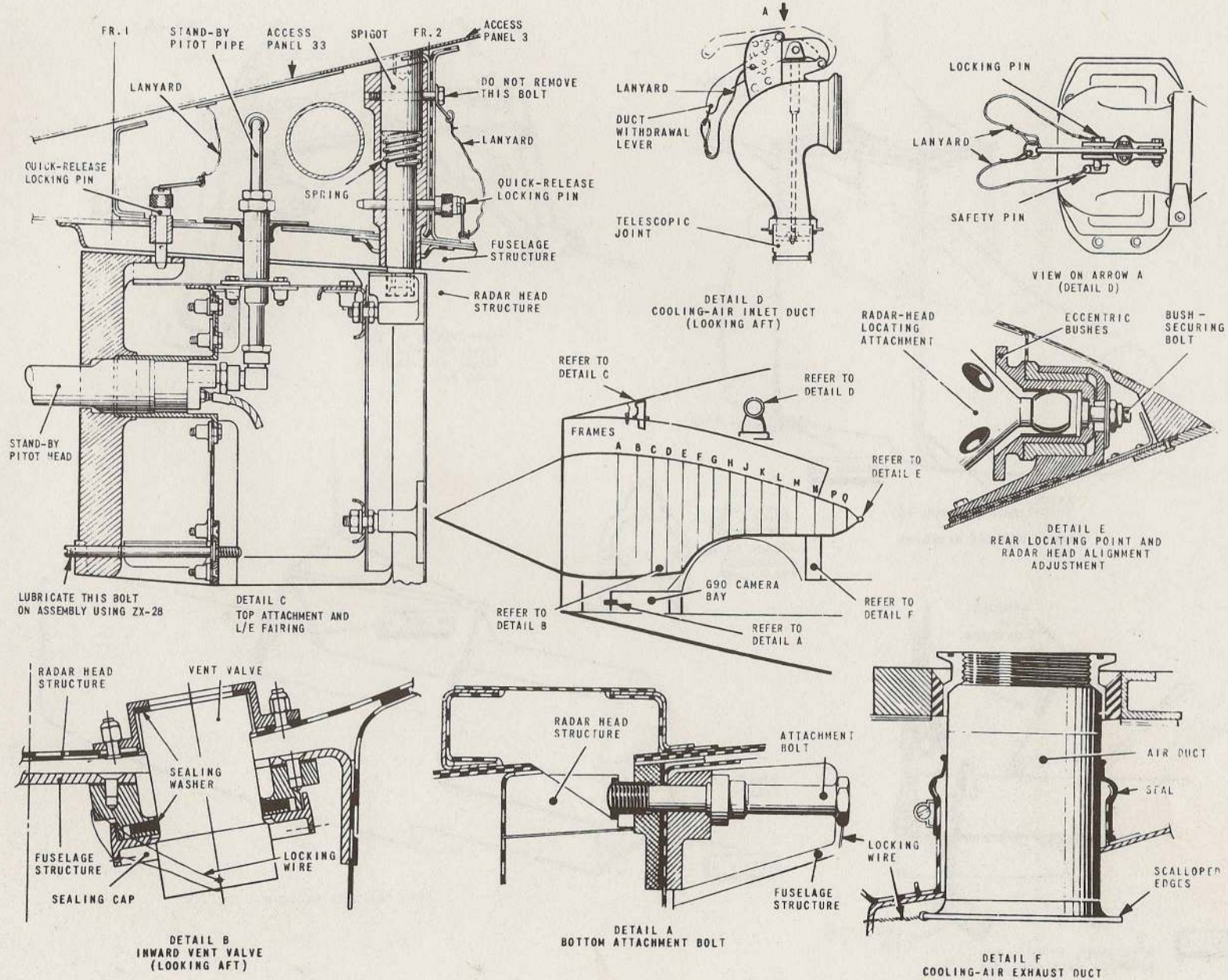


FIG. 3. RADAR HEAD

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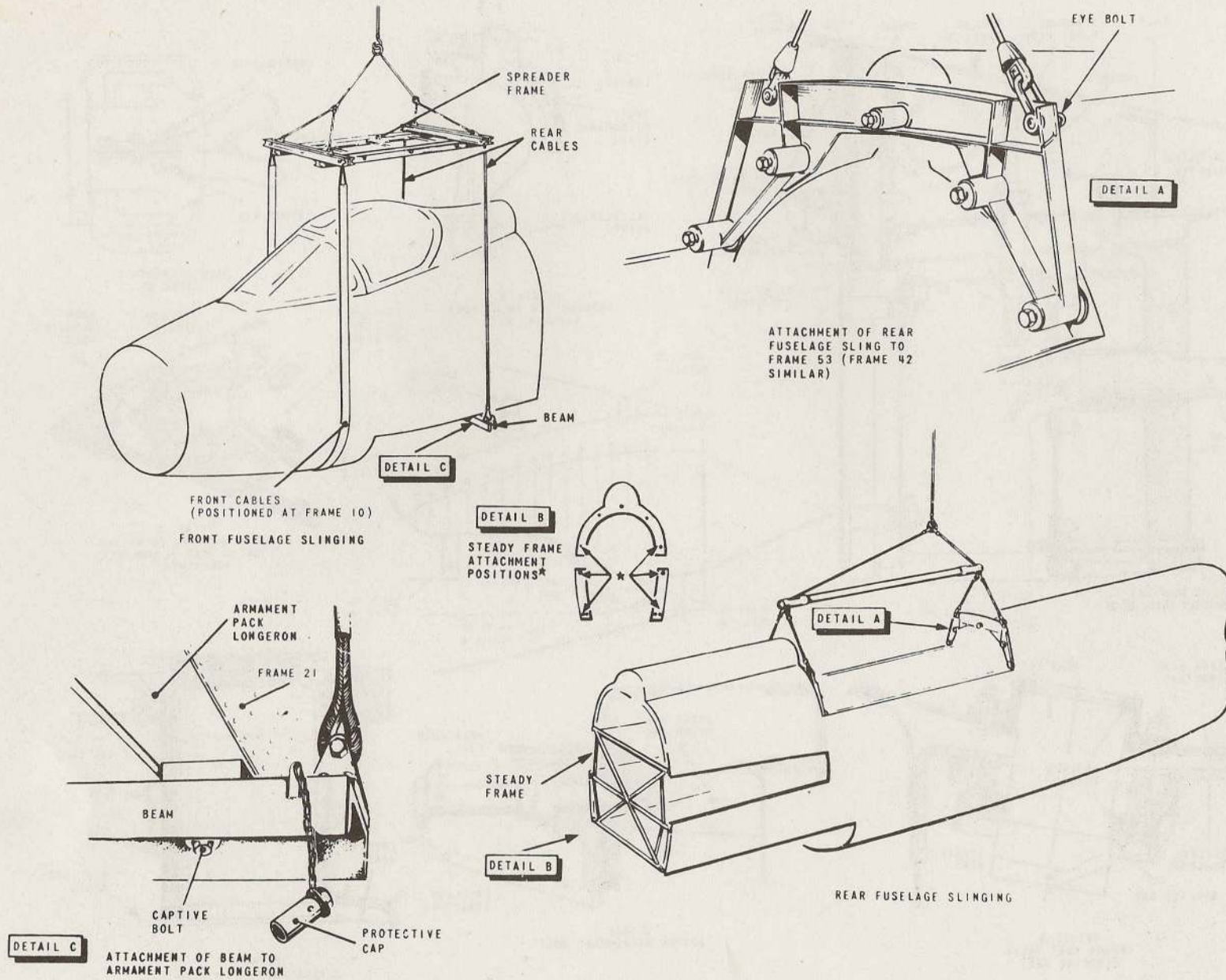


FIG. 4. SLINGING

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interchangeable package and is removed as a complete unit including the radar equipment.

9. The metal structure consists of 15 frames supporting stresses light-alloy skins. The frames at the aft end are shaped to conform with the wheel recess of the intake pylon. Two brackets attached between frames A and B at the top and bottom incorporate anchor nuts to which the A.I. equipment is attached. A vertical strut built on top of the structure has, on its top surface, seven electrical sockets, a pipe connection for pressurizing air, and the cooling air supply duct. The supply duct conveys air to a heat exchanger mounted in the aft end of the structure and exhaust air from the heat exchanger enters the nose-wheel well through a detachable outlet duct. The strut leading edge is formed by a detachable fairing incorporating Spraymat electrical surface heaters (Sect.6, Chap.6) and a stand-by pressure head (Sect.7, Chap.5). On the top surface of the fairing is a pipe connection for pitot air pressure. A spring-loaded valve incorporating a push-button, located between frames B and C on the port side, provides for manual release of system air pressure during servicing. A threaded housing, attached to the inner face of the skin between frames D and E, provides for the attachment of an inward vent valve (Chap.8B), accessible through the top forward end of the nose-wheel well.

10. The radar head is secured to the airframe at three points, two at the top and one at the bottom. The top forward

attachment is made by a quick-release locking pin, accessible through access panel 33, entering a reinforced hole in the strut leading edge (para.9). The top rear attachment is made by a spring-loaded spigot which slides in a housing on fuselage frame 3. The bolt enters a reinforced hole in the top of the strut and is locked flush with the fuselage skin by a quick-release pin; the pin is accessible in the forward equipment bay (access panel 3). The lower attachment is made by a shouldered bolt which carries two special washers held in position by a spring clip. The bolt enters a bracket on frame B through a hole in fuselage frame 3; the head of the bolt is visible inside the G90 camera compartment at the forward end of the nose-wheel well. The aft end of the structure incorporates the male portion of a ball-and-socket joint, the socket portion being built into the intake pylon. The socket is adjustable for correcting radar head alignment (Sect.5, Chap.8).

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.

General information

11. Servicing is normally confined to the inspections detailed in A.P.101B-1003/6-5.

REMOVAL AND ASSEMBLY

Tools and equipment

12. For tools and equipment used in the following operations refer to Table 1.

Front fuselage

◀ Removal

13. To remove the front fuselage:-

- (1) Jack and trestle the aircraft (Sect.2, Chap.4).
- (2) Remove the ground lock from the nose undercarriage and retract the strut.
- (3) Remove the main and emergency batteries.
- (4) Remove the ventral tank (Sect.4, Chap.2).
- (5) Remove the engine and jet-pipes (Sect.4, Chap.1).
- (6) Remove the leading-edge fuel tanks (Sect.3, Chap.2).
- (7) Disconnect the electrical, wireless and radar looms at the crimps and remove the plugs and sockets as indicated in Tables 2 and 3.
- (8) Remove sufficient clips to allow the looms and cable assemblies enough freedom when the fuselage is separated.
- (9) Drain the hydraulic system (Sect.3, Chap.6).
- (10) Disconnect and remove the hydraulic pipes and unions as indicated in Tables ▶

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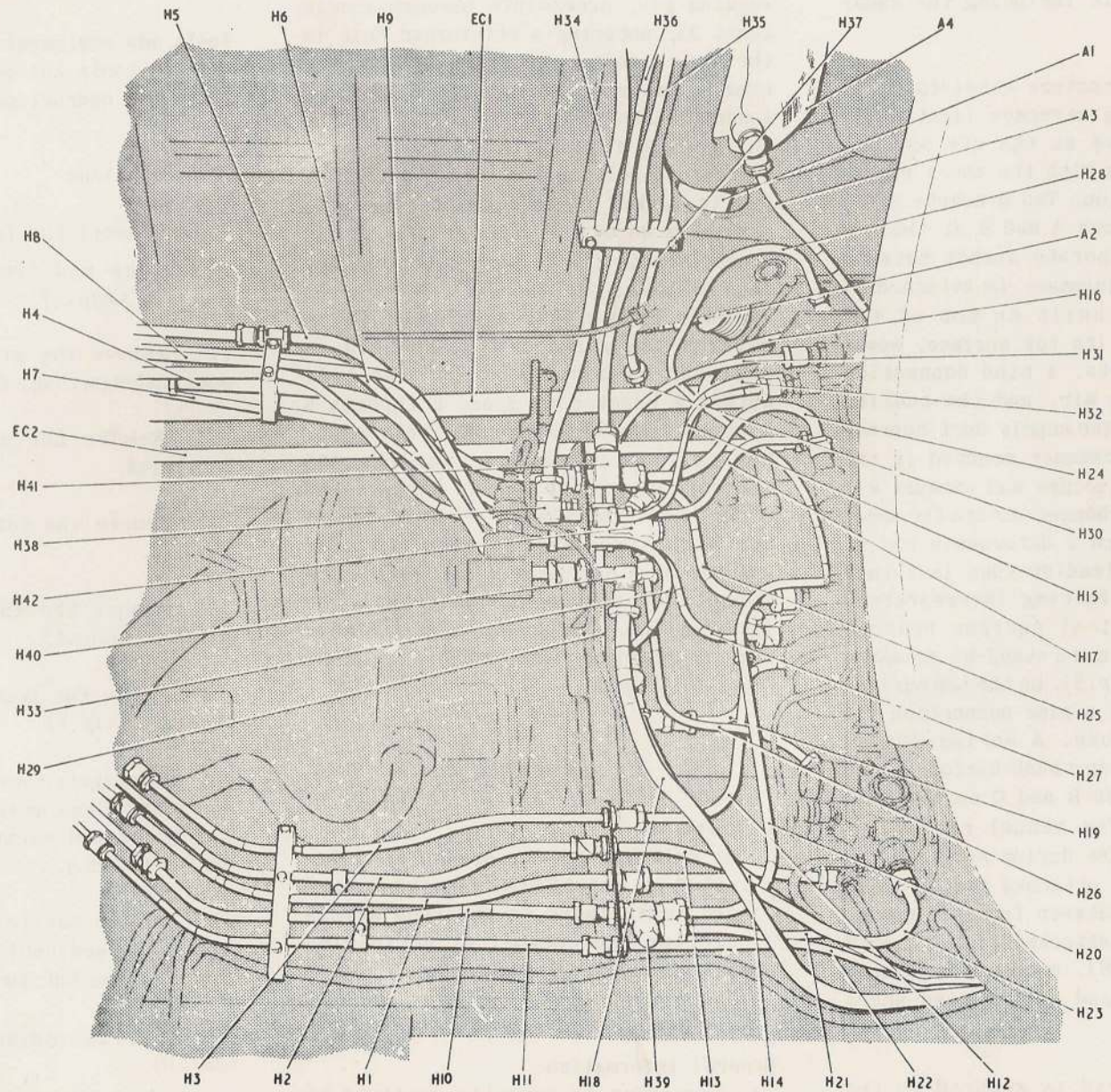


FIG. 5. EQUIPMENT AT TRANSPORT JOINT - PORT

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◀ 4 and 5, referring to fig.5 and 6 for location.

(11) Disconnect and remove the air system pipes and components as indicated in Table 6 referring to fig.5 and 6 for location.

(12) Disconnect the flying control rods (FC1 and FC2 on fig.6) at the torque shaft and lever assembly, and at the aft end. Slide each rod towards the aft end of No.1 engine bay clear of the transport joint.

(13) Disconnect the flying control rods from the front fuselage and wings at the torque shaft and lever assembly (FC3, fig.6).

(14) Disconnect and remove the torque shaft lever assembly from its bracket.

(15) Remove the port and starboard aileron control rods located above spar 1.

(16) Disconnect and remove the aileron control rod from the idler lever assembly located between frames 24 and 25 port.

(17) Secure the idler lever assembly so that it does not foul the fuselage when the front fuselage is removed.

(18) Disconnect the engine control rods (EC1, EC2 on fig.5) at each end and slide them towards the aft end of No.1 engine bay clear of the transport joint.

(19) Remove the pitot and static pipes located between frames 24 and 25 starboard.

(20) Remove the pitot and static pipes located between frames 24 and 25 in the upper centre fuselage.

(21) Disconnect the parachute stream cable at frame 24 port.

(22) Disconnect and remove the starter system fuel and air pipes located between frames 24 and 25 (port upper) and between frames 25 and 26 in the spine.

(23) Assemble an attachment beam to a No.7 universal jacking trestle (A.P. 1464G, Vol.1) and position the assembly to support the rear fuselage through the No.1 engine mounting trunnions.

(24) Position a front fuselage trolley beneath the front fuselage (fig.7) with the tow bar facing forward, and raise the beams to support the fuselage at frames 17 and 22. Ensure by reference to the slope indicators, that neither beam has a slope greater than 5 degrees.

(25) Detach the spine fairing forward stay from frame 25.

(26) Remove the two bolt plates from the main plane top surface along the transport joint inside No.2 engine intake duct (fig.8, detail B).

(27) Remove the five bolts, nuts, washers, and one tapered packing from each engine

hatch longeron aft of the transport joint (fig.8, detail C).

(28) Remove the 111 securing bolts, nuts, and washers holding frames 25A and 25B together (fig.8).

Note...

Access to the forward end of the four bolts immediately above the main plane at each side is gained through access panels 19P and S.

(29) Remove the four large bolts, nuts, and washers which secure the front fuselage to the main plane forward attachment brackets (fig.8). The top bolts are accessible behind panels 32P and S.

(30) Remove the jack from the nose jacking point and manoeuvre the trolley containing the front fuselage away from the rear fuselage.

(31) Lower the trolley beams until the tie-bar assembly can be attached, by means of its captive bolts, to the armament pack attachments at frame 14. The tie-rods are adjustable to facilitate this operation.

Assembly.

14. To assemble the front fuselage:-

(1) If a new main plane is being fitted refer to A.P.101B-1000-6 for shimming operations.

(2) If the existing main plane is being refitted apply jointing compound Ref.No. ▶

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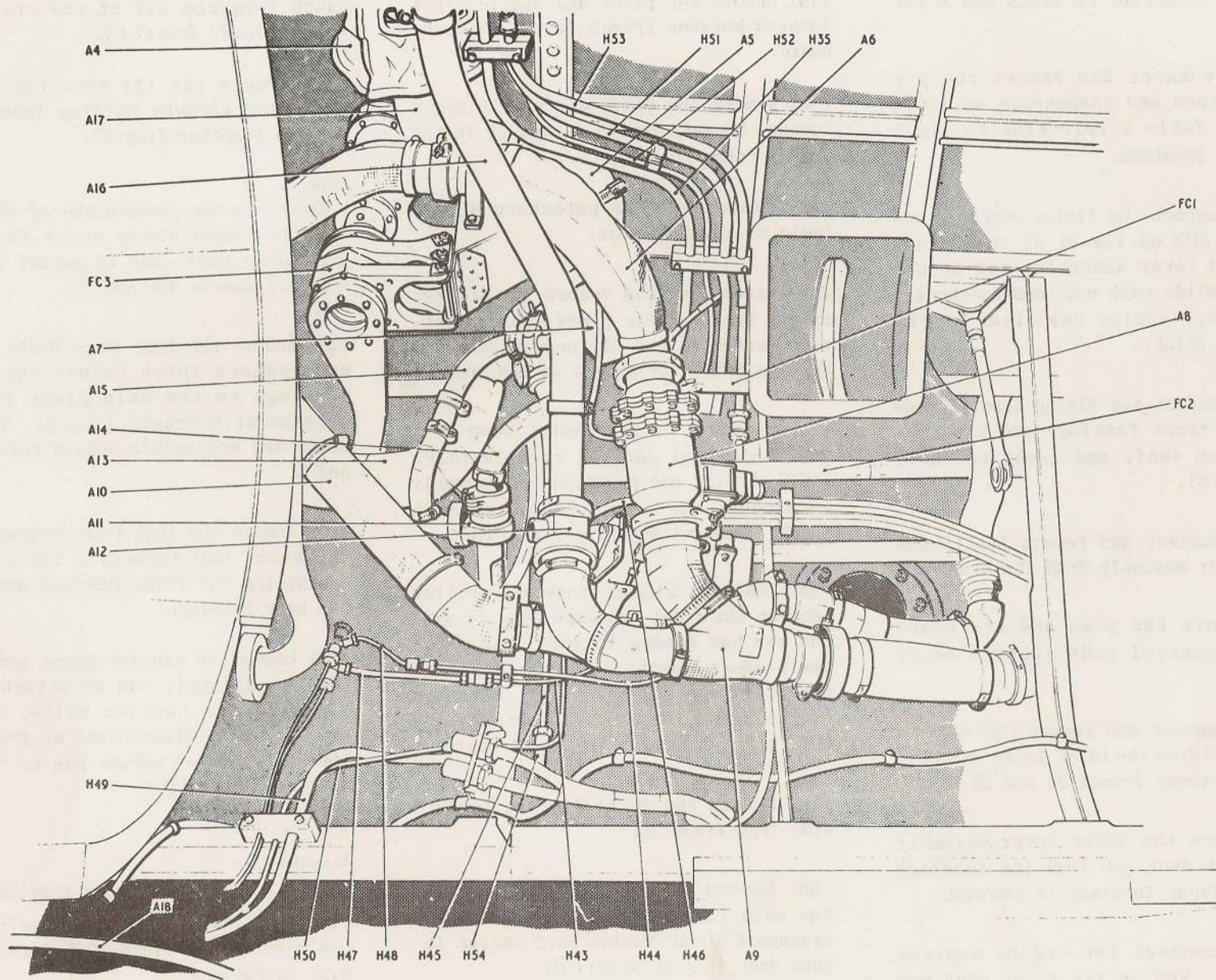


FIG. 6. EQUIPMENT AT TRANSPORT JOINT - STARBOARD

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◀ 33H/132 to the mating faces of frames 25A and 25B.

(3) Detach the wing landing angle longerons from frame 25A (fig.8, detail B) and attach them to the main plane top skin using the bolts removed in para.13 (26) (fig.8, detail B). Use jointing compound Ref.No.33H/132 on all mating surfaces.

(4) Offer up the front fuselage to frame 25B and fit and secure the main plane attachment bolts.

(5) Fit and secure the transport joint bolts, positioning them as detailed in fig.8.

(6) Inspect the abutment of the wing landing angle longerons to frame 25A, from inside No.2 engine intake duct. If clearance is noted measure the gaps and pack them to a maximum of 0.050 in. with special-to-type shims, Part No. EB2.10.13489.

(7) Secure the wing attachment angle longerons to frame 25A using the bolts removed in operation (3).

(8) Position the standard jack at the nose jacking position and raise it to support the fuselage (Sect.2, Chap.4).

(9) Remove the front fuselage trolley and the trestle at No.1 engine mounting trunnion.

(10) Assemble the systems and major components by reversing the dismantling

sequence (para.13, operations (2) to (22)).

Note...

When fitting the starter fuel and air pipes, insert the sealing washers, and screw in the pipe couplings to a torque loading of not more than 100 lb in. Before fitting the duct access panels, pressure test the fuel pipe to a pressure not exceeding 600 lb/in², using a hand pump and container which will hold a minimum of 4 gallons of kerosene. Examine the pipe coupling through frame 25 for leakage.

CAUTION

Starter fuel must not be used for this operation.

After testing, remove the test equipment and flush the pipe through with clean starter fuel. Finally, connect and wire-lock the pipes involved.

(11) Bleed all the hydraulic systems and carry out functional tests (Chap.6).

(12) Carry out electrical functioning tests (Sect.6 and 7).

(13) Carry out wireless and radar function tests (Sect.8 and 9).

(14) Carry out pitot and static leakage tests (Sect.7).

(15) Check the flying controls rigging (Chap.4).

(16) Check the engine controls rigging (Sect.4, Chap.1).

(17) Carry out the air systems tests (Chap.8).

(18) Check the operation of the parachute stream controls.

(19) Carry out an airframe symmetry check (Sect.2, Chap.4). ▶

Slings (fig.4)

Front fuselage

15. After removing the radar head (para 31), retracting the nose undercarriage, and closing and locking the canopy, the front fuselage can be slung in its fully-equipped state by the method described in para.16.

16. To attach the sling:-

(1) Fit the felt sleeve to the front cables.

(2) Detach the lower beam from the rear cables, and release one end of the front cables from the spreader frame.

(3) Remove the protective caps from the captive bolts in the beam.

(4) Position the steady pads on the beam against the armament pack longerons at frame 21 and screw the captive bolts into the pack attachment positions (detail C).

(5) Place the sling pick-up ring over the crane snatch-block and position the sling above the fuselage.

(6) Secure the rear cables to the beam and adjust the position of the crane so that they are vertically disposed.

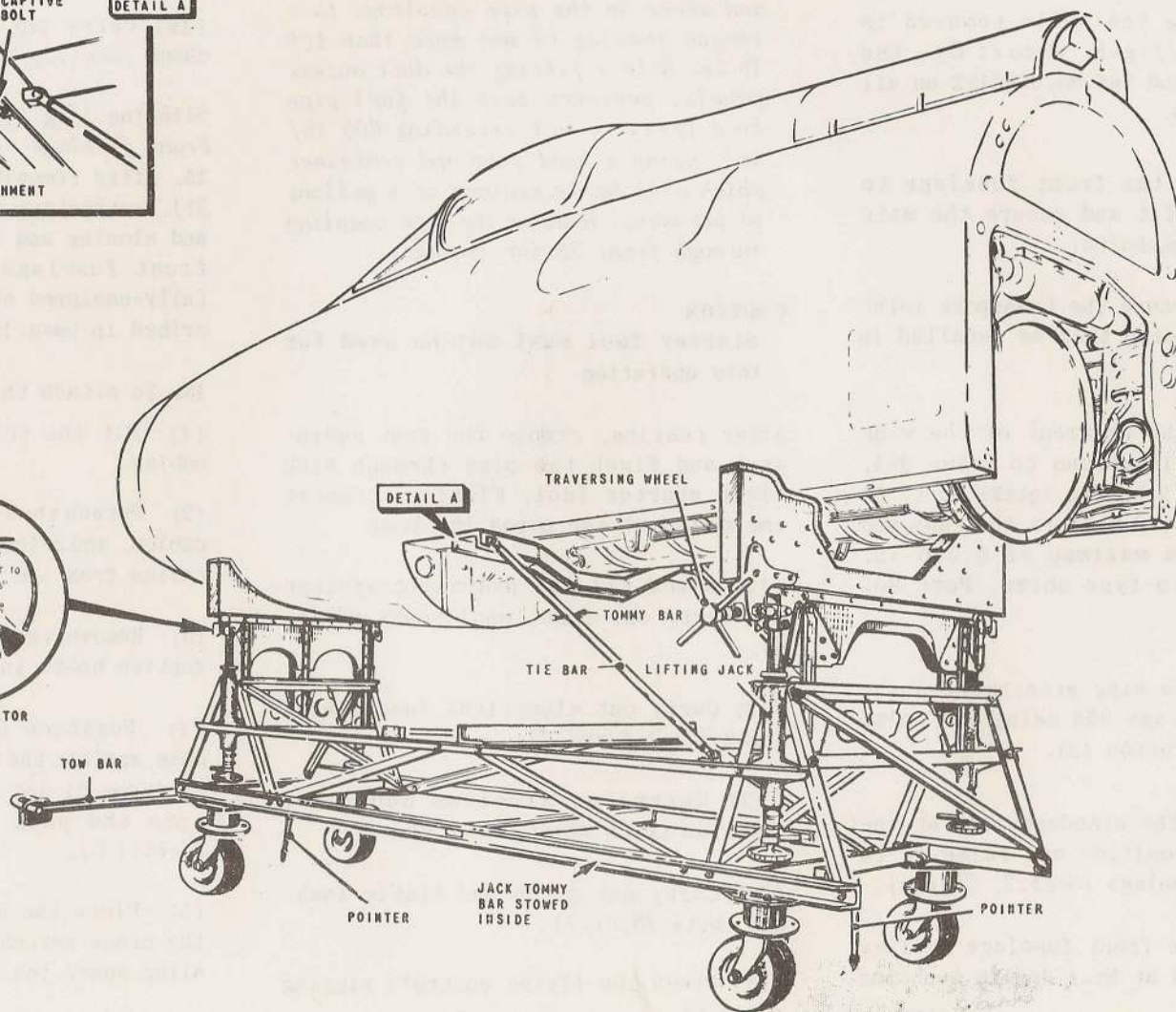
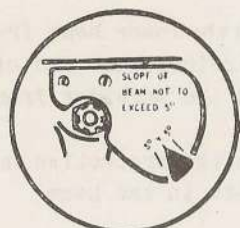
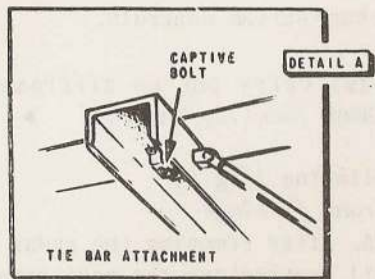


FIG. 7. FRONT FUSELAGE TROLLEY

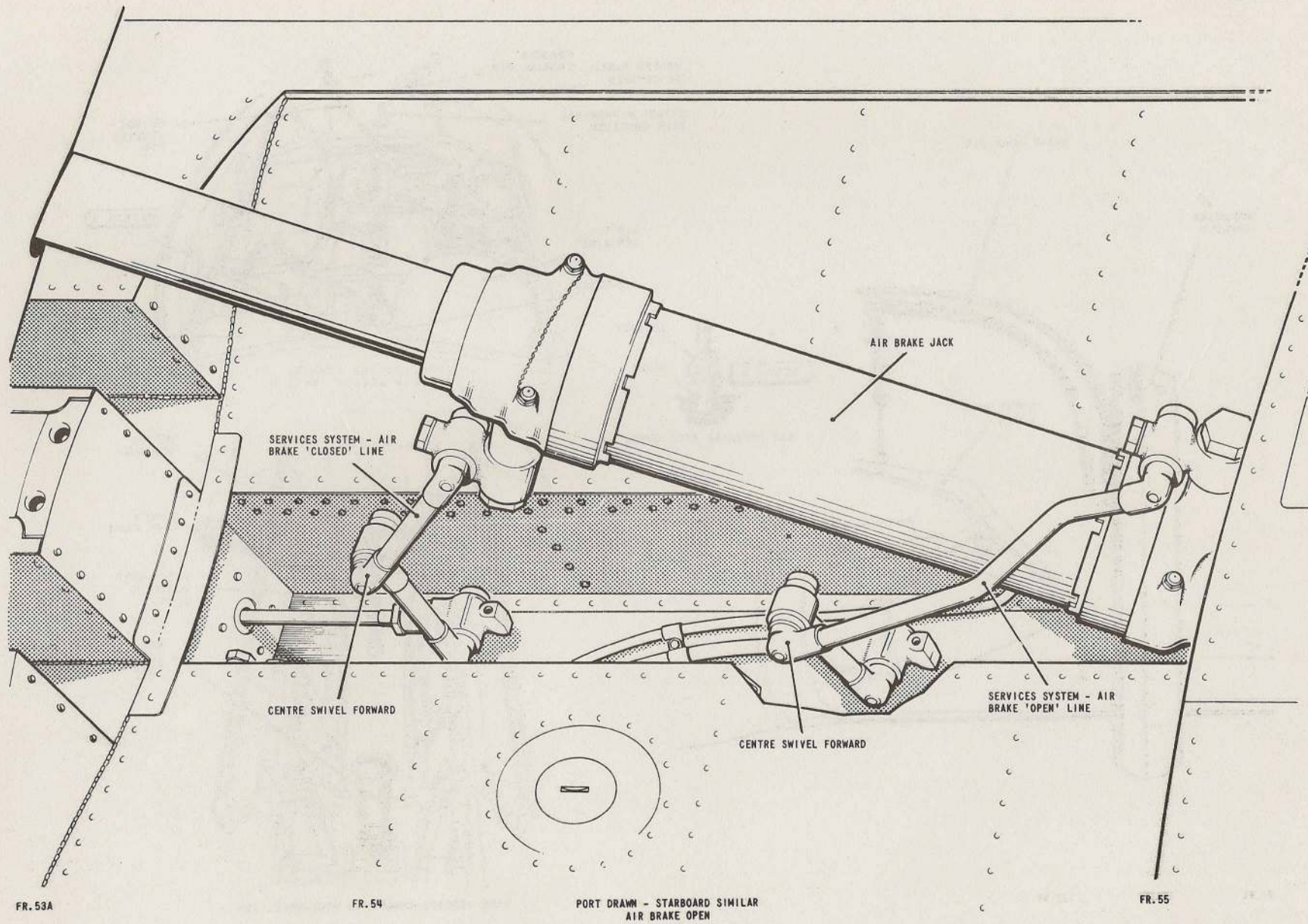


FIG. 8. AIR-BRAKE JACK SWIVEL COUPLINGS

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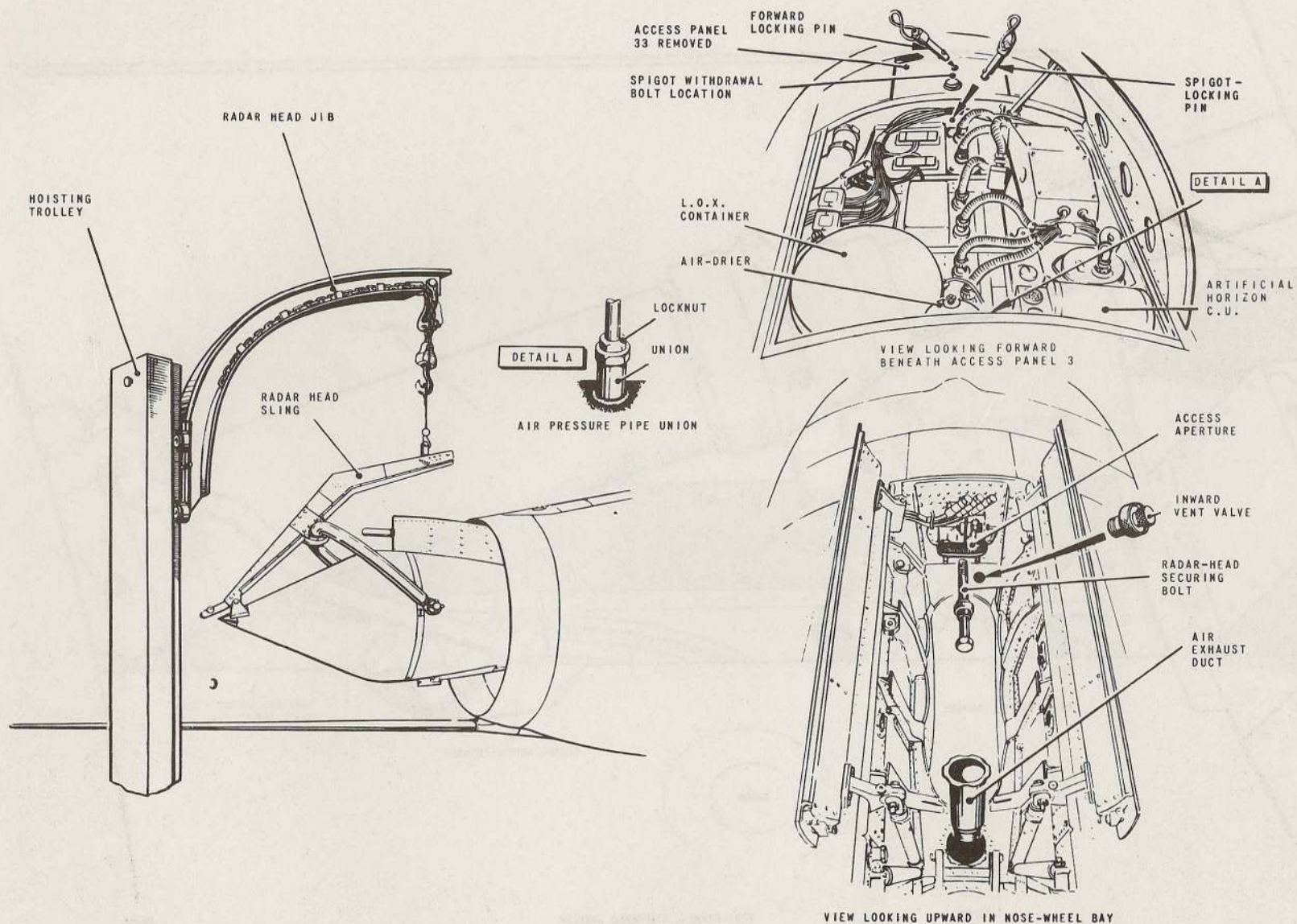


FIG. 9. RADAR HEAD - REMOVAL AND ASSEMBLY

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(7) Position the front cables around the fuselage at frame 10 and secure the free end of the spreader frame. The fuselage is now ready for slinging.

Rear fuselage

17. The rear fuselage is lifted, using a sling, after removing the following items:-

E.C.U. and jet pipes (Sect.4, Chap.1)

Tail planes (Chap.3)

Fin and rudder (Chap.3)

Braking parachute (Chap.13)

A steady frame must always be fitted to frame 25B to prevent distortion of the fuselage during slinging operations.

18. To assemble the steady frame (detail B):-

(1) Remove the securing bolts from the frame.

(2) Position the steady frame against frame 25B, with the parallel bars horizontal, so that the holes in the ends of the middle beam are aligned with two 3/8 in. dia. holes immediately below the main-plane slots. Fit the bolts, nuts and washers.

(3) The remaining four holes will correspond with further holes in frame 25B. Fit the appropriate bolts, nuts and washers to complete the attachment of the steady frame.

19. To assemble the rear fuselage sling:-

(1) Detach the two formers from the sling by withdrawing four eye-bolts (detail A).

(2) Secure the formers to frames 42 and 53 respectively by engaging the captive bolts with the engine-hatch fastener nuts.

(3) Place the sling pick-up over the crane snatch-block and position it above the fuselage, with the long cable forward.

(4) Secure the sling to the formers with the four eye-bolts. The fuselage is now ready for lifting.

Engine hatches

CAUTION

Considerable stress loads are absorbed by the engine hatches. If both hatches are to be removed the aircraft must either be fully jacked and trestled (Sect.2, Chap.4), or have jury strut 26DK/95873 fitted in lieu of No.2 engine hatch. It is permissible to remove one hatch without resorting to the above.

No.1 engine hatch - removal

20. To remove the engine hatch:-

(1) Remove the inner fairing at the trailing edge of each missile pylon (Sect.5, Chap.7).

(2) Remove the ventral tank (Sect.4, Chap.2).

(3) Position a handling trolley beneath the fuselage, and raise it to support the hatch.

Note...

The trolley is adjustable for use either with the aircraft on its wheels, or in the trestled position.

(4) Using a spanner, withdraw the side-fastener bolts, commencing at the centre fasteners and working towards the end of the hatch.

(5) Remove the end-fastener cavity cover plates.

(6) Withdraw the hatch bolts, working towards the centre to withdraw the centre bolt last, using a torque wrench and spanner.

(7) With the same spanner, withdraw the end-fastener spigots, working inwards to withdraw the centre spigot last.

Note...

A spigot is free when its head contacts a stop bracket inside the cavity.

(8) Lower the handling trolley cradle containing the hatch, and wheel it away from the aircraft.

No.1 engine hatch - assembly

Note...

1. Before assembling a hatch to the aircraft, inspect the end-fastener packing blocks for cracking, and renew as necessary. The new block must be machined or filed so that it is the same thickness as the block which it is replacing.

2. The fasteners should be only partially tightened until it is ascertained that the hatch is correctly aligned.

21. To assemble the hatch:-

(1) Position the handling trolley containing the hatch and, while raising the trolley jacks, manoeuvre the trolley to align the hatch, taking care that the engine starter exhaust pipe is correctly aligned.

(2) Working from the centre outwards, screw in the end-fastener spigots using a torque wrench and key spanner. Tighten to a torque loading of 40-45 lb ft.

(3) Repeat operation (2) for the side-fastener bolts using a spanner.

(4) Using the torque wrench and key, screw in the end-fastener bolts, working from the centre, outwards. Tighten to a torque loading of 40-45 lb ft.

(5) Fit the end-fastener closing plates and lock them. When correctly locked, the slots in the locking screws are aligned with the vertical indicator lines engraved on each plate.

(6) Check the gap between the hatch rear end-rib and the fuselage; this must be 0.12 in. wide.

(7) Refit the ventral tank (Sect. 4, Chap. 2) and the missile-pylon inner fairings (Sect. 5, Chap. 7).

No. 2 engine hatch - removal

22. To remove the hatch:-

(1) Ensure that all sources of electrical supply are disconnected.

(2) Remove access panels 51A and B (P and S), 68, 80, 121, 55P and 67P, and all hatch-fastener covers.

(3) Remove the two clamp-rings securing the stand-by d.c. generator air-supply pipe.

(4) Remove the fairlead surrounding the supply pipe. Remove the pipe.

(5) After one minute has elapsed, disconnect the two H.T. igniter cables (R66 and R68) and cable assembly H32A, accessible through access panel 67P.

(6) Disconnect cable assemblies AI16, and H50 (access panel 55P).

(7) Attach a lifting beam to the lifting gear. Secure the single cable to the slinging point on the spine and the remaining two cables to the structure at access panels 51A (P and S).

Note...

Alternative shackle positions are provided on the beam for lifting with the stand-by air turbine fitted or removed.

(8) Refer to para. 20 and carry out operations (4), (5), (6) and (7) in that paragraph.

(9) Lift the hatch from the fuselage and place it on suitable trestles.

(10) Seal all electrical and pipe connections to prevent contamination.

(11) Fit the hatch walkway.

No. 2 engine hatch - assembly

Note...

1. Before assembling a hatch to the aircraft, inspect the end-fastener packing blocks for cracking, and renew as necessary. The new block must be machined or filed so that it is the same thickness as the block which is being replaced.

2. The fasteners should be only partially tightened until it is ascertained that the hatch is correctly aligned.

23. To assemble the hatch:-

(1) Sling the hatch and position it on the hatch longerons, guiding the ignition and electrical cables into position (a length of cord tied to the cables and inserted through the access panel apertures will assist this operation).

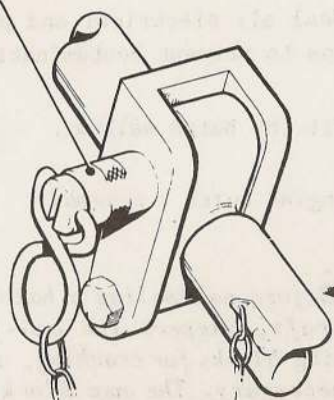
(2) Refer to para. 21 and repeat operations (2), (3), (4) and (5) in that paragraph.

(3) Check the gaps at each end of the hatch; these must be 0.12 in. wide.

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QUICK-RELEASE
LOCKING PIN

HATCH STRUCTURE



KNUCKLE JOINT

HATCH BOLT

WALKWAY

STAY

HATCH END-FASTENER
SPIGOT

METHOD OF SECURING
STAY TO HATCH

ADJUSTER

NOTE...
FOR DETAILS OF JACKING
BOLTS AND HINGE BOLTS
REFER TO FIG.2

CAPTIVE FIXING
BOLT

METHOD OF SECURING
STAY TO FUSELAGE FRAMES

WARNING
THE USE OF THIS WALKWAY BY MORE
THAN 2 PERSONS IS NOT PERMITTED

WARNING NOTICE
ON WALKWAY

FIG. 9. HINGING OPEN NO.2 ENGINE HATCH

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- (4) Connect cables R66, R68 and H32A (access panel 67P).
- (5) Connect cable assemblies AI16, and H50 (access panel 55P).
- (6) Refit the air-supply pipe and secure the fairlead and the clamp rings. Tighten

the rings to a torque loading of 65-70 lb in.

- (7) Carry out electrical functioning tests (Sect.6, Chap.7 and 9).
- (8) Refit the access panels and fastener covers.

◀ Hingeing open No.2 engine hatch (fig.9)

WARNING

Before running the engine with the hatch open ensure that the generator switch, on the starboard console, is selected to NORMAL and the switch guard is in position.

24. To hinge open the hatch:-

- (1) Remove access panels 51A and B (P and S), 68, 80, 121, 123 and all hatch-fastener covers.
- (2) Remove the hatch end and side bolts (para.22).
- (3) Refer to para.22 and repeat operations (3) and (4).
- (4) Withdraw the end-fastener spigots.
- (5) Raise the hatch evenly with the jacking bolts until the hinge pins can be engaged.
- (6) Pivot the hatch upwards to an angle of approx. 70 deg.
- (7) Tighten the guide-spigots of the end-fasteners at the hatch corners.
- (8) Fit the rigid members of the front and rear stays over the four spigots, after adjusting the length to suit, and secure them with hatch bolts.
- (9) Remove the quick-release pins from the hinged sections and screw the fixing

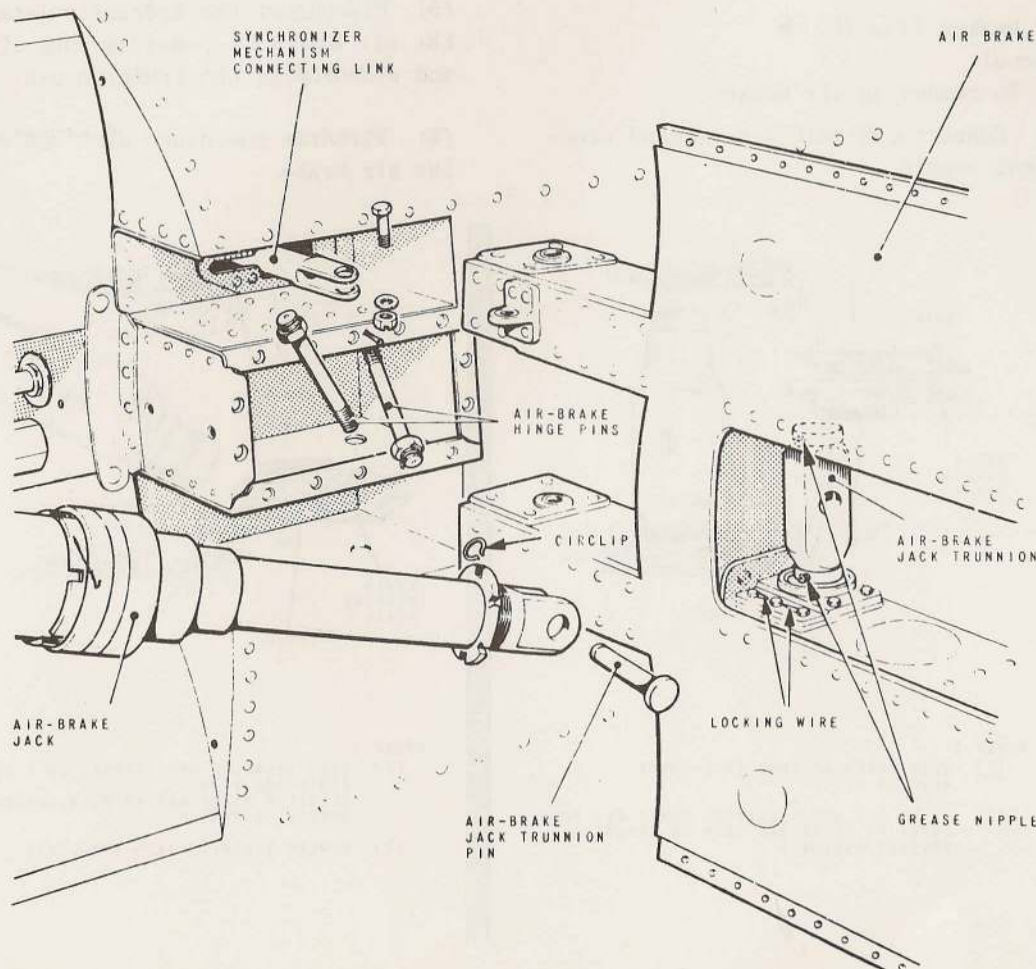


Fig.10. Air brakes - removal and assembly

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bolts into any of the three centre attachment holes in frames 42 and 53.

(10) Raise the hatch until the hinged sections are straight and fit the quick-release locking pins.

(11) Fit hatch walkway.

(12) Seal all pipe connections to prevent contamination.

Closing No.2 engine hatch

25. Closing the hatch is the reverse of the opening procedure (para.24). The

two clamp rings securing the air-supply pipe are to be tightened to a torque loading of 65-70 lb in.

Note...

Withdraw the four spigots before attempting to lower the hatch on to the jacking bolts.

◀ **Air brakes (fig.10)** ▶

Removal

26. To remove an air brake:-

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

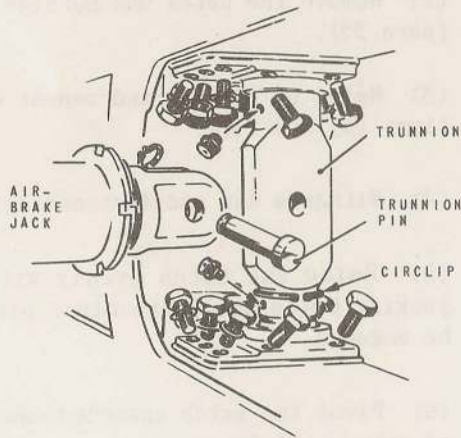
(2) Fit the hydraulic system hand-pump handle (access panel 79P).

(3) Select air brakes OUT and apply hydraulic pressure to extend the air brakes.

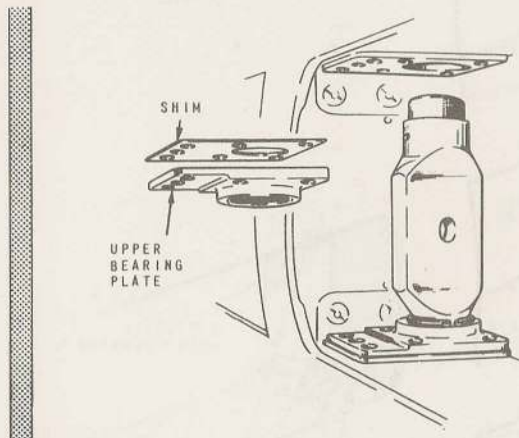
(4) Disconnect the synchronizing mechanism link.

(5) Disconnect the hydraulic jack from the air brake by removing the circlip and withdrawing the trunnion pin.

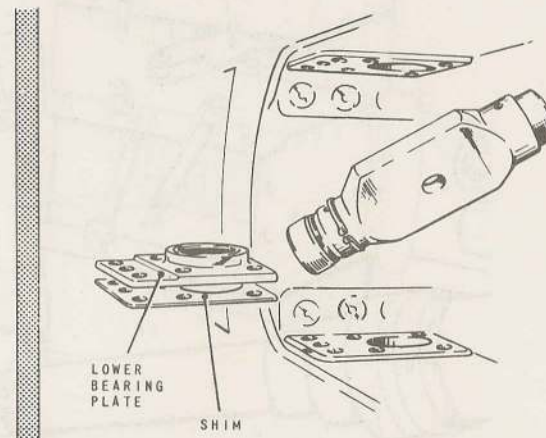
(6) Withdraw the hinge pins and remove the air brake.



- STAGE 1
- (1) EXTEND AIR BRAKE AND DISCONNECT SYNCHRONISING MECHANISM LINK
 - (2) DISCONNECT JACK FROM TRUNNION
 - (3) REMOVE TWO TRUNNION GREASE NIPPLES
 - (4) DISENGAGE CIRCLIP FROM ITS GROOVE AND SLIDE IT UP TRUNNION AS FAR AS POSSIBLE
 - (5) REMOVE SECURING BOLTS



- STAGE 2
- (1) PUSH TRUNNION DOWN INTO LOWER BEARING PLATE
 - (2) SLIDE OUT UPPER BEARING PLATE AND SHIM. IDENTIFY PLATE AND SHIM TO ENSURE CORRECT ASSEMBLY



- STAGE 3
- (1) LIFT TRUNNION AND REMOVE LOWER BEARING PLATE AND SHIM. IDENTIFY PLATE AND SHIM TO ENSURE CORRECT ASSEMBLY
 - (2) REMOVE TRUNNION FROM STRUCTURE

Fig.11. Dismantling air brake jack trunnion bearings

*Assembly***CAUTION**

Do not connect the synchronizing mechanism link before connecting the jack (Chap. 4F).

Note...

If the air brake swivel couplings are at any time disconnected, or if the air brake is disconnected from the jack, reference must be made to fig.12 to ensure correct assembly.

27. To assemble an air brake, reverse the removal procedure (para.26). Lubricate the greasing points (Chap.4F).

Air-brake jack trunnion bearings*Dismantling*

28. Refer to fig.11.

Assembly

29. To assemble the trunnion bearings, reverse the removal procedure (fig.11). When refitting the bearing plates the long securing bolts must be fitted in the thick section of the plates. Lubricate the greasing points (Chap.4F).

Radar head*Equipment required*

30. Refer to Table 1 and assemble the necessary ground equipment.

Removal (fig.3 and 13) ►

WARNING

Prior to removal of the radar head the trestling procedure detailed in Sect.2, Chap.4 must be carried out.

31. To remove the radar head:-

(1) Disconnect all electrical supplies.

(2) Open access panel 3 and remove the centre portion of access panel 33.

(3) Remove the air-drier desiccant container (Chap.8B) and the artificial horizon control unit and its mounting tray.

(4) Disconnect the electrical connections to the L.O.X. container.

(5) Disconnect the air pressurizing pipe after slackening its locknut.

(6) Disconnect the seven electrical connections.

Note...

On no account must the wire-locked bolts securing the four connector-sealing plates be disturbed.

(7) Disconnect the stand-by pitot pressure pipe.

(8) Raise the cooling air duct by removing the locking pin from the lever and its guide, then lifting the lever until the pin hole is aligned with the top hole in the guide, insert the locking pin.

(9) Remove the quick-release locking pin from the forward attachment.

(10) Remove the quick-release locking pin from the aft attachment and ensure that the spigot springs up. If it fails to do so, remove the closing plug screw from the top of the spigot and substitute a 3/8 in. B.S.F. bolt to assist withdrawal.

(11) Close access panel 3.

(12) Remove the G90 camera and its mounting.

(13) Remove the cooling air exhaust duct.

(14) Remove the pressurization inward-valve and sealing cap.

(15) Assemble the lifting equipment and fit the sling to the radar head.

(16) Take the weight of the radar head with the hoist.

(17) Remove the bottom attachment bolt.

(18) Pull the hoisting equipment away from the aircraft at the same time manoeuvring the radar head to facilitate withdrawal.

(19) Lower the radar head and place it on the servicing or storage stand. Remove the sling.

(20) Seal all electrical and pipe connections and all open apertures to prevent contamination.

Assembly

32. To assemble the radar head:-

(1) Ensure cleanliness of all mating surfaces.

(2) Ensure that the P.R.C. sealant on the edges of the pylon fairings is complete.

(3) Apply a thin coating of grease

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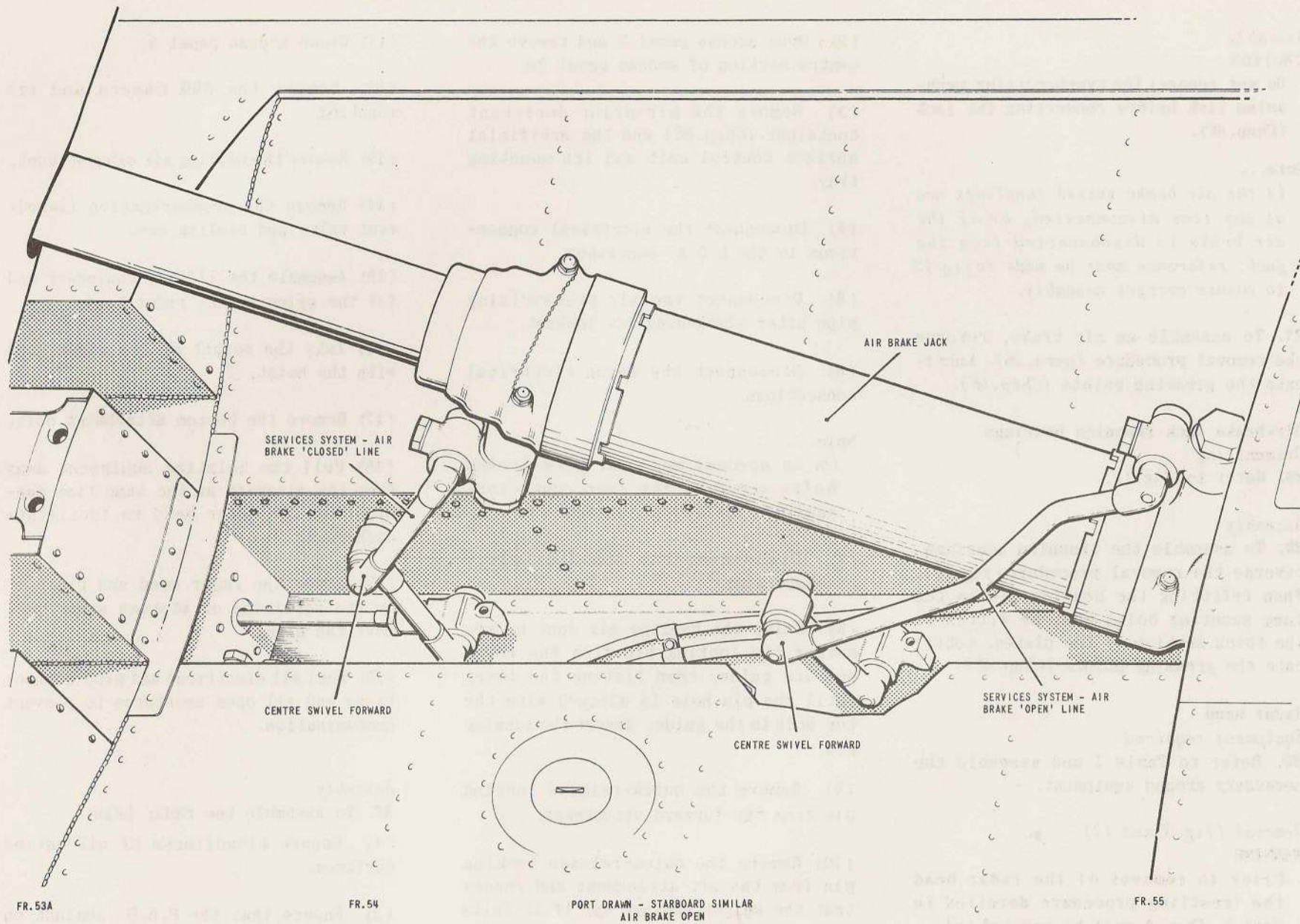


FIG. 12. AIR-BRAKE JACK SWIVEL COUPLINGS

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◀ XG-287 to the ball joint at the rear of ▶
the radar head.

(4) Remove all protective sealing from the electrical and pipe connections and apertures.

(5) Assemble the lifting equipment and fit the sling to the radar head.

(6) Manoeuvre the radar head into position and secure the top and bottom attachments.

(7) Remove the sling and lifting equipment.

(8) Apply grease ZX-28 to the threads of the cooling-air exhaust duct. Fit and wire-lock the duct.

Note...

The duct must be only hand tightened.

(9) Apply grease ZX-28 to the threads of the inward-vent valve and sealing

cap. Fit and wire-lock the valve and cap.

(10) Wire-lock the bottom attachment bolt then refit the G90 camera and its mounting.

(11) Connect the stand-by pitot pressure pipe.

(12) Open access panel 3. Fit the forward and the aft attachment locking pins.

(13) Connect and lock the pressurizing pipe.

(14) Connect the seven electrical connections.

Note...

A smear of grease Ref.No.33H/9424829 may be applied to the outside of the electrical plugs to facilitate assembly.

(15) Re-engage the cooling-air exhaust

duct by removing the lever-locking pin and pushing the lever down as far as possible and inserting the locking pin. On no account must pressure on the lever be relaxed to line up a hole in the guides; if necessary, pressure must be increased to permit the pin to be inserted. Fit the safety pin.

(16) Reconnect the electrical connection to the L.O.X. container.

(17) Fit the air-drier desiccant container and the artificial horizon control unit and its mounting tray.

(18) Carry out a radar head pressurization test (*Chap.8B*).

(19) Carry out a stand-by pitot leakage test (*Sect.7, Chap.5*).

(20) Carry out electrical and radar functioning tests (*Sect.6,7 and 9*).

(21) Refit all access panels.

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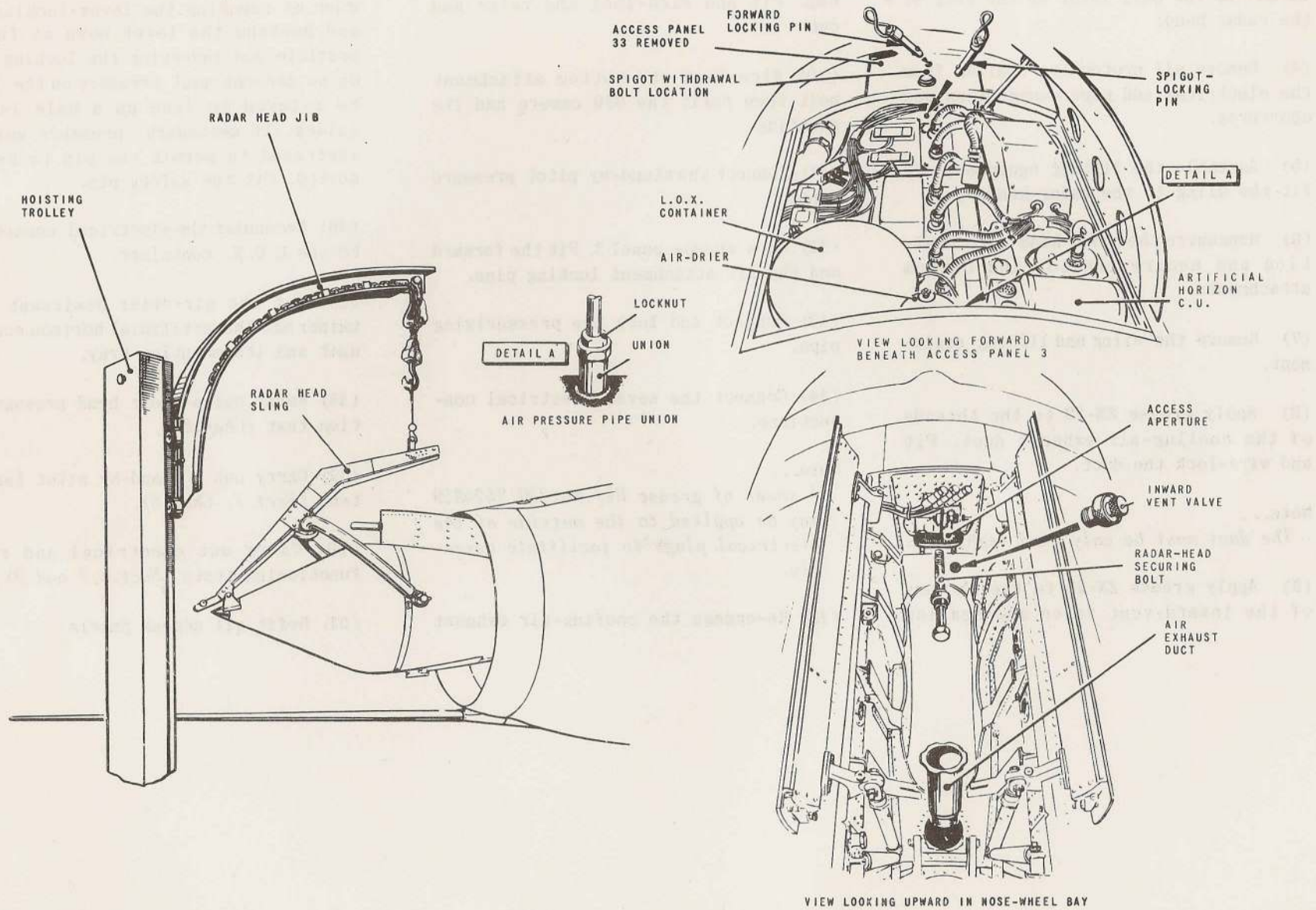


FIG. 13. RADAR HEAD - REMOVAL AND ASSEMBLY

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TABLE 1

Tools and equipment

Ref. No.	Description	Application/remarks
26DK/95262	Sling, fuselage, nose section	
26DK/95839	Trolley, front fuselage	
26DK/95813	Trolley, rear fuselage	
26DK/95021	Sling, fuselage, main section	
26DK/95301	Stay, No.2 engine hatch, front	
26DK/95105	Stay, No.2 engine hatch, rear	
26DK/95435	Beam, lifting, No.2 engine hatch	
26DK/95112	Walkway, No.2 engine hatch	With e.c.u. installed
26DK/95104	Trolley, No.1 engine hatch	Installation/removal
26DK/95084	Spanner, brace	Engine hatch side bolts
26DK/95364	Key	
26DK/95425	Spanner, ratchet, engine hatch bolts	Use with 1L/1201252
1L/1201252	Spanner, torque, 5-50 lb ft	Engine hatch bolts
26DK/95873	Strut, jury	Engine hatch removal
26DK/95244	Trolley, transit/serv. radar head	
26DK/95184	Cradle, storage, radar head	
26DK/95245	Sling, radar head	
26DK/95251	Extractor, radar head	
26DK/95779	Adapter, torque spanner	Radar head manacle fasteners
4GC/6648 or 4GC/7794	Hoist, servicing multi purpose Mk.1 or Mk.2	
4GC/6650	Jib, No.1	
4GC/6673	Jib, No.4	
26DK/95028	Plate, steady, frame 25B	For jurying main fuselage

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TABLE 2

Electrics - fuselage removal and assembly (crimps)

Port Ext. Duct	Stbd. Ext. Duct	Stbd. Ext. Duct	AI23C
<i>Miscellaneous</i>	<i>Miscellaneous</i>	<i>Miscellaneous</i>	
F2 - R2	F1 - R1	(continued)	AI6D - A125C
F5 - R5	F3 - R3	FS4N - FS35	AI6 - A114
F5H - R5H	and/or	FS9D } - FS36	A125 - A115
F6 - R6	F8 - R8	FS4P } - FS36	A13B - A113A
F7 - R7	F8F - R8F	FC8 } - FC41A	A14A - A113B
F9A - R9A	F11 - R11	F743 } - FC41A	A13C - A125B
F13 - R13	F12 - R12	FC19 } - FC41B	A13B - A13A
F13D - R13D	F19 - R19	F744 } - FC41B	A18C - A114A
F14 - R14	F20 - R20	FC22 - FC41C	A18D - A114A
F14C - R14C	F21 - R21	FS18A - FS37	2A16E - A16E
F14E - R14E	F21A - R21A	FS40 - 2FS40	Port Main Plane
F15 - R15	F22 - R22	F175 { F19	2P37G - 2R37G
F15G - R15G	F22C - R22C	{ F27	FS4S - FS25
F16 - R16	F23 - R23	{ F28	
F17 - R17	F24 - R24	{ R175	
F32 - R32	F25 - R25	F255 - R255	
2F37G - 2R37G	F26 - R26		
2F37J - 2R37	F27 - R27		
F15H - R15H	F27E - R27E	1F16A - 1F17A	Stbd. Main Plane
F4C - R15	F28 - R28	◀ ▶	2S38G - 2R38G
F4C - R4C	F28F - R28F		FS4V - FS24
F4 - R4	F31 - R31		
AI25 - AI15	F31H - R31H		
F110E - R110E	2F38G - 2R38G	Note...	
F300 - R15G	2F38J - 2R38J	Cores of these cable assemblies are to be connected	
F151 - R151	F153 - R153	in accordance with the routing diagrams given in	
	F255 - R255	A.P.101B-1003-1B.	
	2FS30 - FS30		
	FS4U - FS31		
	FS4T - FS34		

TABLE 3

**Electrics - fuselage removal and assembly
(plugs, sockets, junction and terminal boxes etc.)**

Spine		Port Main Plane	
F151	- Voltage regulator	<i>Miscellaneous</i>	
F251	- 5 way T.B.	F121	- J.B.No.7*
F153	- Relay	F123	- J.B.No.7
F223	- A/C contactor	F125	- J.B.No.7
U83-F83	- Plug and socket	F219	- J.B.No.7
U84-F84	- Plug and socket	MBL336	- MBK144 Plug and socket
U85	- Plug and socket	MBD10	- MBD144 Plug and socket
		MBH10	- MBH144 Plug and socket
◀ AI 23D ▶		MBJ195	- MBJ144 Plug and socket
AI25E	- Fuseblock, frame 25	MBD333	- MBD145 Plug and socket
ILS		Stbd. Main Plane	
ILS 6	- Plug and socket at localizer marker receiver	<i>Miscellaneous</i>	
ILS 5-5B	- Plug and socket, port wing	F120	- J.B.8
ILS 4-4B	- Plug and socket, stbd. wing	F122	- J.B.8
		F124	- J.B.8
I.F.F.		F220	- J.B.8
IFF 45	- Plug and socket, aerial switch unit	MBD10	- MBD156 Plug and socket
		MBH10	- MBH156 Plug and socket
U.H.F.		MBJ195	- MBJ156 Plug and socket
UHF 7	- Plug and socket, R/F unit, spine	MBL336	- MBK156 Plug and socket
UHF 8	- Plug and socket, R/F unit, spine	MBD333	- MBD157 Plug and socket
			Miscellaneous Cables to be Disconnected
			R35 - Ground supply relay
			R18 - D.C. feeder fuse panel
			R61 - No.1 engine igniter plug
			R60 - No.1 engine igniter plug
			R33 - Engine plugs
			F228 - A.C. fuse and relay box
			U1 - D.C. feeder fuse panel
			R9B - Stand-by generator contactor
			F14B - No.1 engine J.B.
			F14A - No.1 engine J.B.
			F64 - Servo bleed solenoid

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TABLE 4

Hydraulics - fuselage removal and assembly (port)

Pipe assemblies

Rear fuse lage

Fig. 4 Ref.No.	Part No.	Code
H1	EF3. 73. 1675	U/C Down
H2	EF3. 73. 1677	U/C Up
H3	EF3. 73. 1679	Press. Con. 1,
H4	EF3. 73. 1693	Suct. Serv.
H5	EF3. 73. 3431	Ret. Serv.
H6	EF3. 73. 3435	Press. Serv.
H7	EF3. 73. 3437	Press. Serv.
H8	EF3. 73. 3439	Ret. Con. 1
H9	EF3. 73. 3441	Press. Con. 1
H10	EF3. 73. 3457	U/C Emergency
H11	EF3. 73. 4611	Wheel Brake Port

Front fuse lage

H12	EF3. 73. 775	Press. Con. 1
H13	EF3. 73. 781	U/C Up
H14	EF3. 73. 7911	Press. Con. 1
H15	EF3. 73. 793	Ret. Con. 1
H16	EF3. 73. 795	U/C Emergency
H17	EF3. 73. 879	Ret. Serv.
H18	EF3. 73. 893	Suct. Serv.
H19	EF3. 73. 897	Press. Con. 1
H20	EF3. 73. 903	U/C Emergency
H21	EF3. 73. 2777	U/C Emergency
H22	EF3. 73. 2779	Wheel Brake Port
H23	EF3. 73. 2965	U/C Down
H24	EF3. 73. 2967	Press. Serv.
H25	EF3. 73. 2969	Press. Serv.

Pipe assemblies - continued

Front fuse lage

Fig. 4 Ref.No.	Part No.	Code
H26	EF3. 73. 3427	Ret. Serv.
H27	EF3. 73. 3429	Press. Serv.
H28	EF3. 73. 3517	Prot. Unit
H29	EF3. 73. 3557	Press. Con. 2
H30	EF3. 73. 3581	Press. Con. 1
H31	EF3. 73. 4635	Press. Con. 1
H32	EF3. 73. 7371	Ret. Serv.
H33	EF3. 73. 895	Press. Con. 1

Spar 1

Fig. 4 Ref.No.	Part No.	Code
H34	EF3. 73. 2541	Ret. Con. 1
H35	EF3. 73. 2545	Press. Serv.
H36	EF3. 73. 2549	Press. Con. 2
H37	EF3. 73. 3583	Press. Con. 1

Pipe connectors

Rear fuse lage

Fig. 4 Ref.No.	Part No.	Description
H38	EF3. 73. 867	Special Tee piece

Front fuse lage

H39	EF2. 73. 633	Special Banjo Tee assembly
H40	EF3. 73. 859	Special elbow
H41	EF3. 73. 865	Banjo 4 way
H42	EF3. 73. 7369	Banjo Tee sub assembly

TABLE 5

Hydraulics - fuselage removal and assembly (stbd.)

Pipe assemblies			Pipe assemblies - continued		
<i>Rear fuselage</i>			<i>Spar 1</i>		
Fig. 5 Ref.No.	Part No.	Code	Fig. 5 Ref.No.	Part No.	Code
H43	EF3.73.415	Nitrogen	H51	EF3.73.999	Ret. Con.2
H44	EF3.73.417	Nitrogen	H52	EF3.73.2547	Press. Serv.
H45	EF3.73.1153	Press. Serv.	H53	EF3.73.3555	Press. Con.2
H46	EF3.73.7387	Wheel Brake Stbd.			
<i>Front fuselage</i>			Pipe connections		
H47	EF3.73.2811	Nitrogen	<i>Rear fuselage</i>		
H48	EF3.73.2813	Nitrogen	Fig. 5 Ref.No.	Part No.	Description
H49	EF3.73.6937	Press. Serv.	H54	EF3.73.907	Special bulkhead connection
H50	EF3.73.7753	Wheel Brake Stbd.			

TABLE 6

Air systems - fuselage removal and assembly

<i>Port</i>			<i>Starboard</i>		
Fig. 4 Ref.No.	Part No.	Description	Fig. 5 Ref.No.	Part No.	Description
A1	EF2.75.151	Pipe assembly	A5	EF3.75.2317	Pipe
A2*	EF2.75.149	Pipe assembly	A6	EF2.75.531	Pipe
A3	EF3.75.949	Pipe drain	A7	5109.003.000	¾ in. Temperature control valve
			A8	EF2.75.153	Constant-flow valve
			A9	EF2.75.533	Branch pipe
			A10	EF3.75.2987	Pipe
			A11	FF2.75.1935	Reducing valve
			A12	FMP/A/5100	1½ in. shut-off valve
			A13	EF2.75.513	Pipe
			A14	EF2.75.529	Pipe
			A15	EF2.75.515	Pipe
			A16	EF3.75.957	Transfer pipe
			A17	EF2.75.511	Pipe
			A18	EF3.75.3481	Heating pipe

*Disconnect but do not remove. Leave in bracket
EF3.45.609

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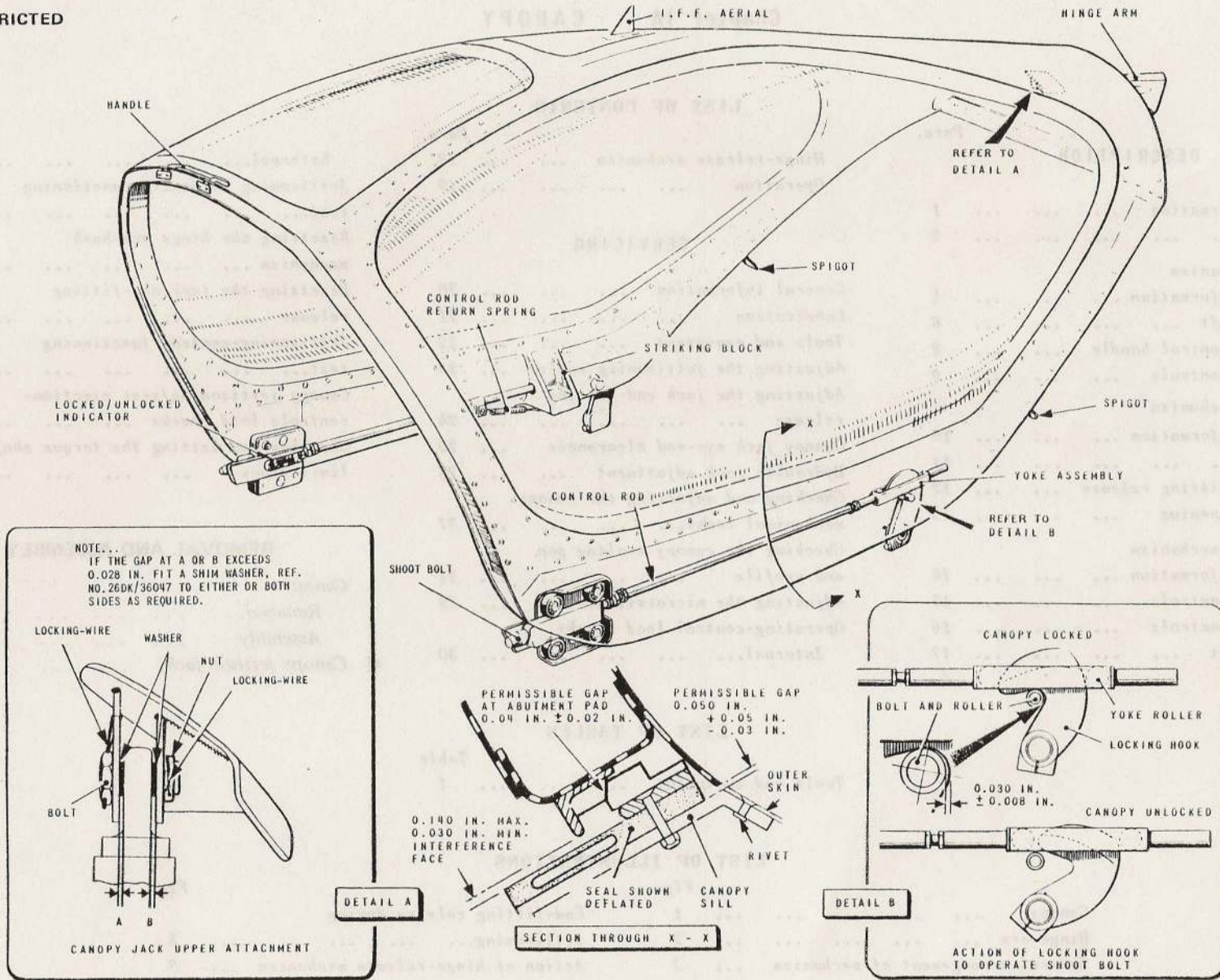


FIG. 1. CANOPY

◀ CONTROL RODS AMENDED AND NOTE ADDED AT DETAIL A ▶

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DESCRIPTION

General information

1. The canopy, which is hinged to the rear on bolts secured in the spine structure, is mechanically locked, hydraulically actuated, and can be jettisoned by a cartridge-operated firing unit. Provision is also made for standby 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).

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

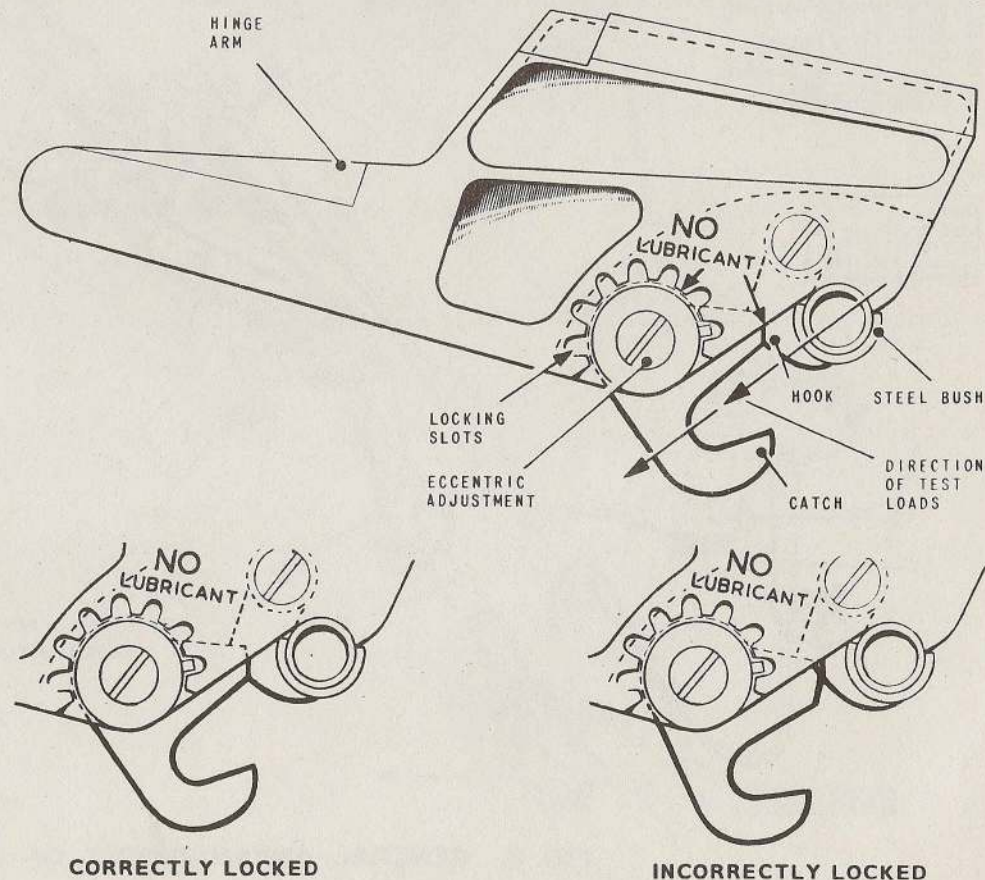


Fig.2. Hinge arm

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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

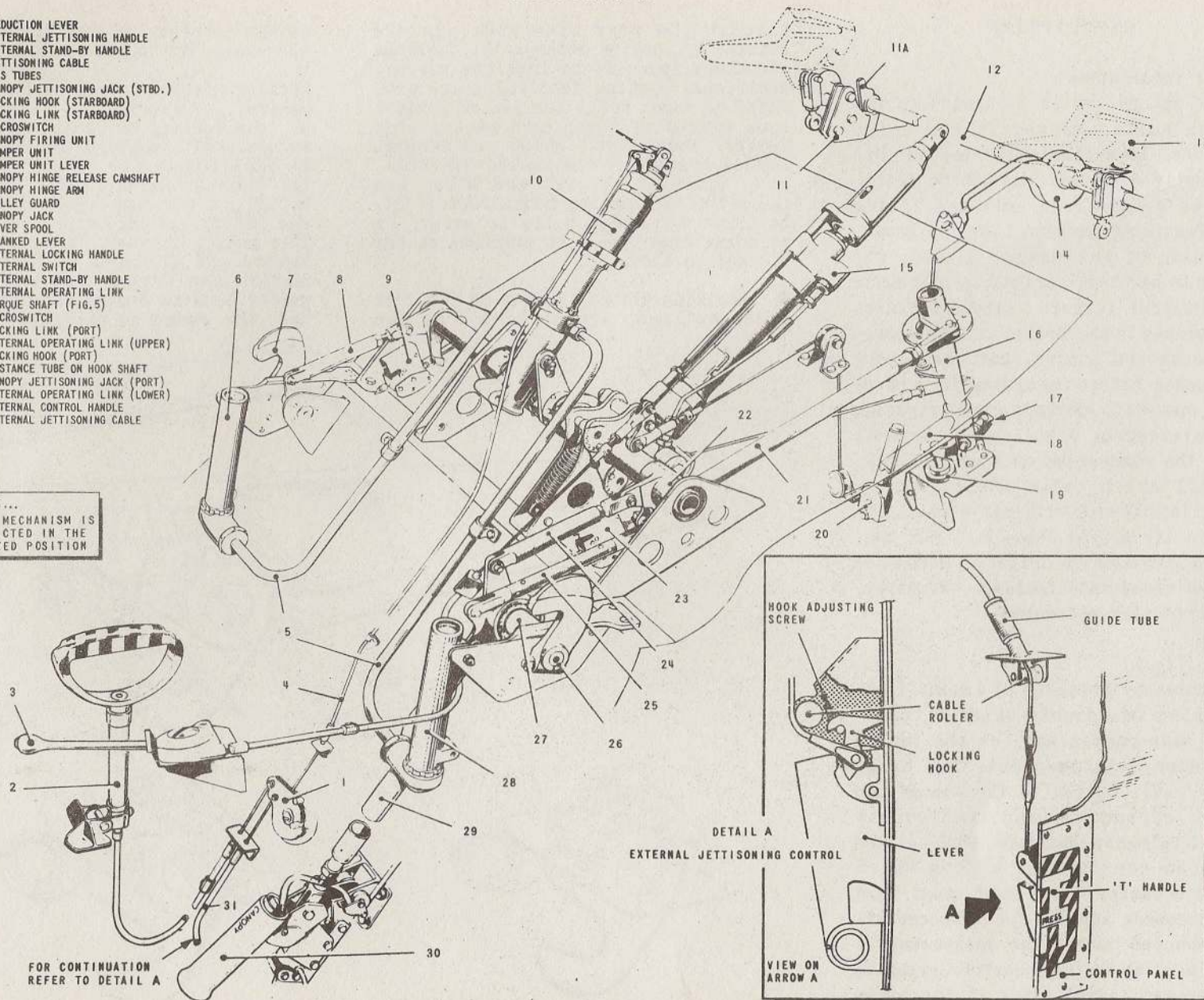


FIG. 3. GENERAL ARRANGEMENT OF MECHANISM

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

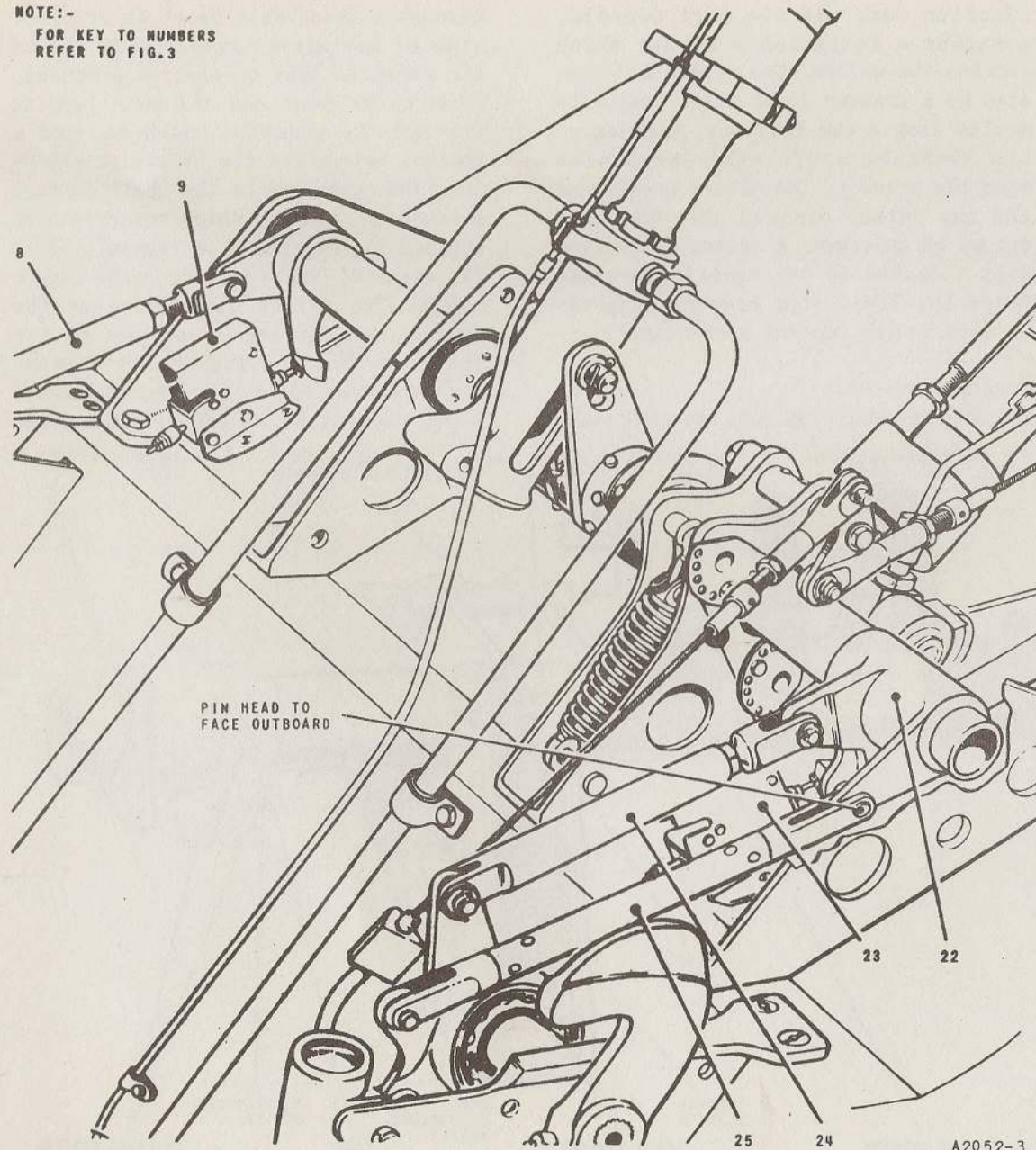


Fig.4. Torque shaft linkage

an illuminated CANOPY indicator on the auxiliary warnings panel (*Sect.1, Chap.1*), and 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 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

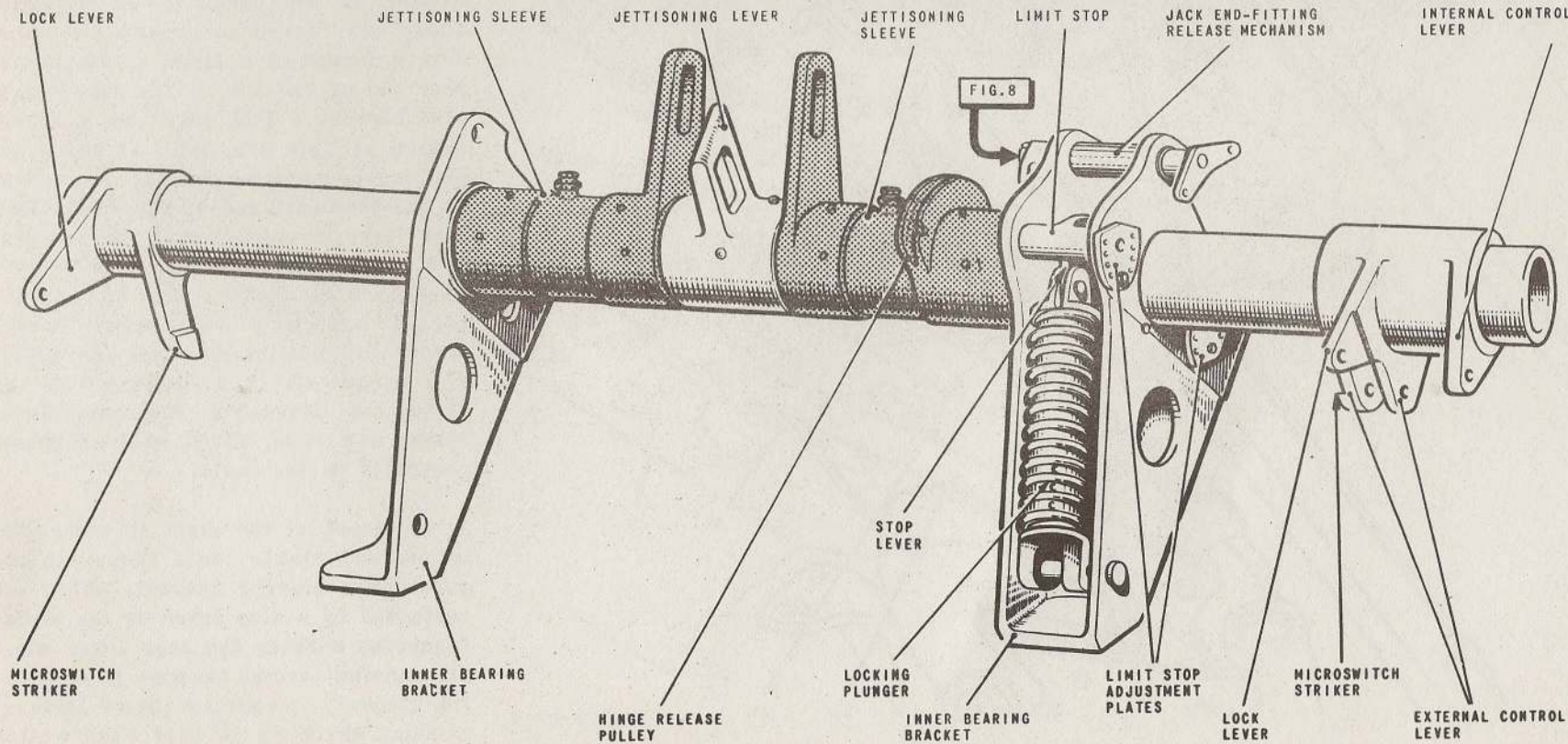


Fig. 5. Torque shaft

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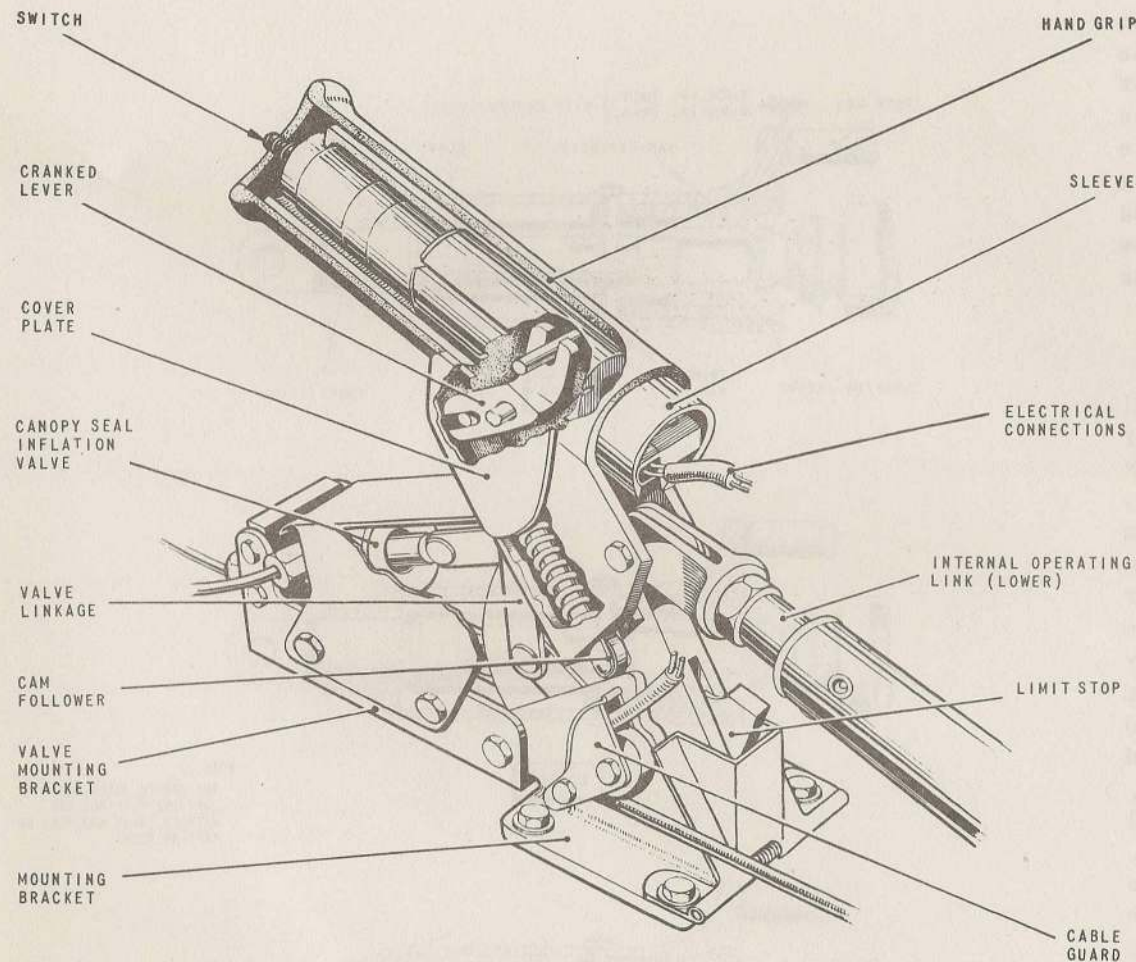


Fig. 6. Internal control handle

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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, 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 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 a case of hydraulic or electrical failure, the canopy may be opened by operating either of the two stand-by handles connected by cables to a canopy 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 pushed or pulled open as the case may be. The handles, situated one beneath the port cockpit sill, and one near the external locking handle, are prevented from returning to normal after operating 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 rring unit, bolted to the ejection seat gun,

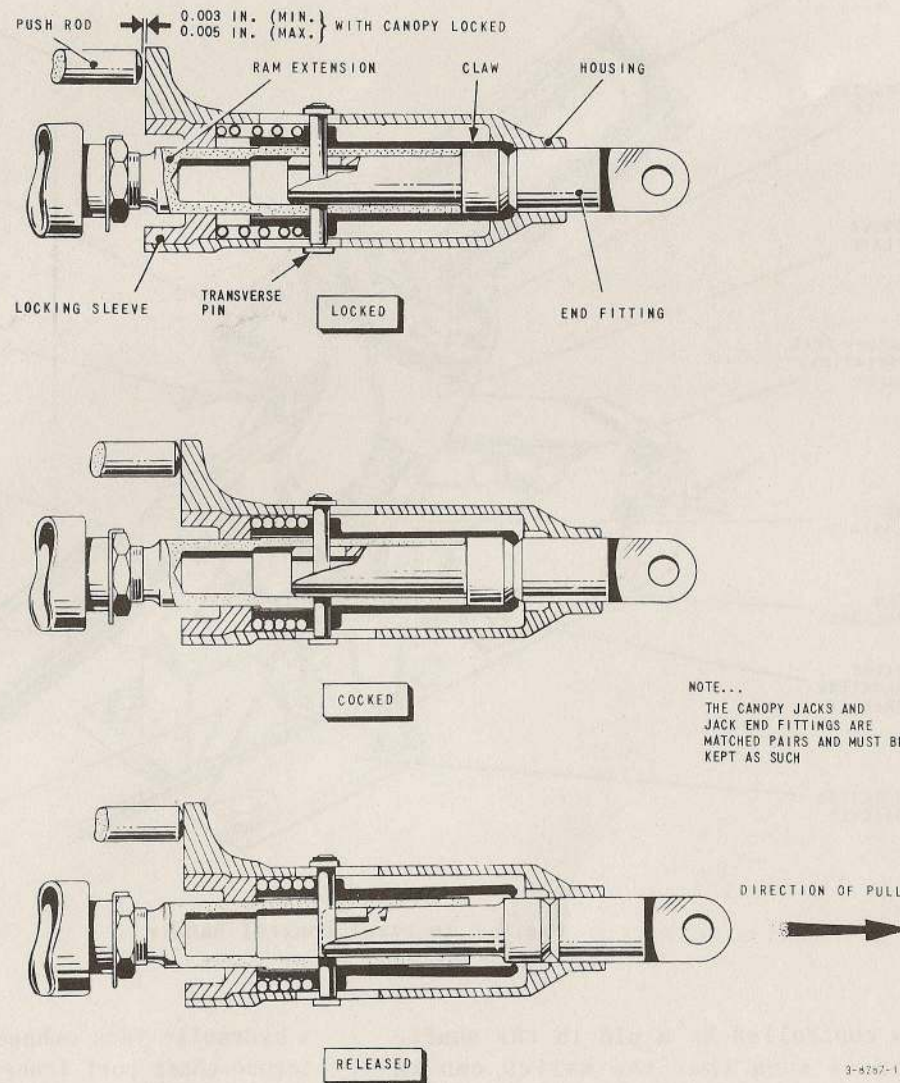


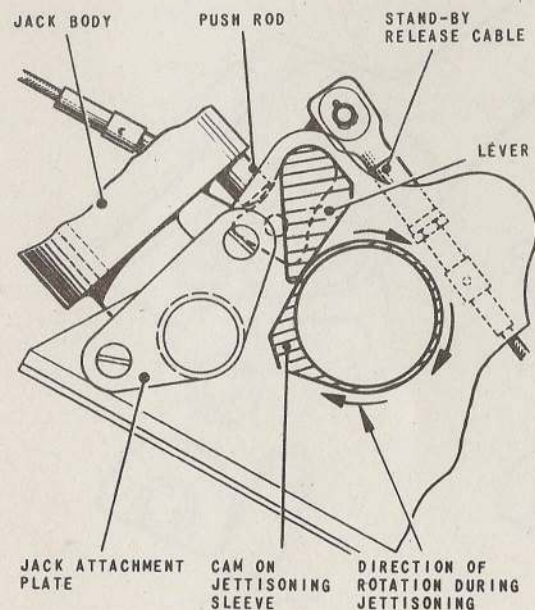
Fig.7. Jack end-fitting release

◆ DIMENSIONS AMENDED ◆

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 air stream 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



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Fig. 8. End-fitting release during jettisoning

lever located on the pressure bulkhead. Movement of the lever is restricted to 90 deg by a limit stop in the base.

External controls

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 canopy 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 wall 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 air stream 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 air stream.

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...

All load checks to be repeated three times.

General information

20. The servicing instructions apply only to mechanical components. For details of hydraulic and electrical components servicings, refer to Sect.3, Chap.6 and Sect.6, Chap.12 and 14 respectively.

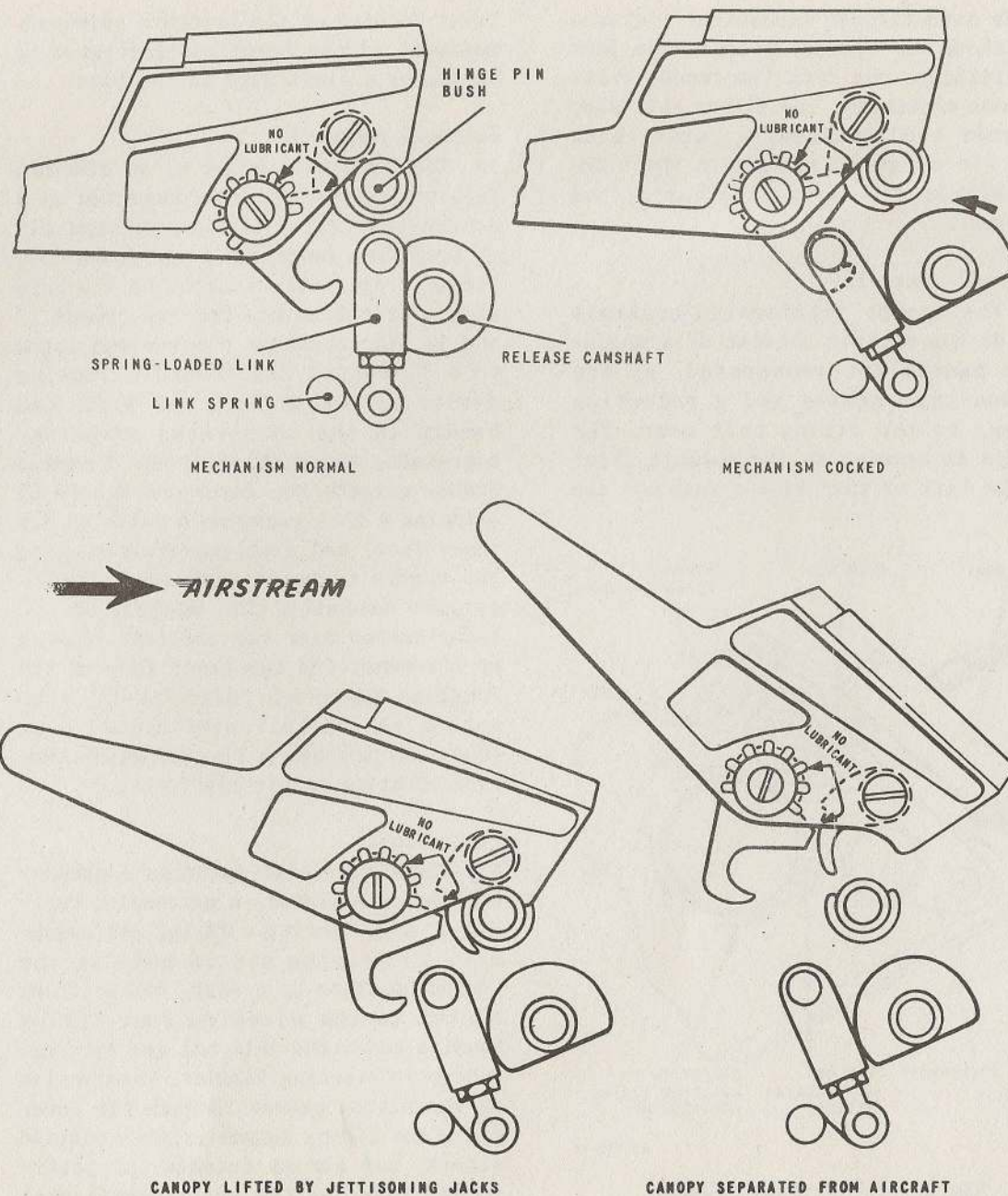


Fig.9. Action of hinge-release mechanism

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Lubrication

21. Details of lubrication are shown in fig.12 and the key to lubricant and application symbols, together with their full designations, are to be found in Leading Particulars.

Note...

No lubricant is to be applied to the

canopy hinge-arm hook-and-catch mating surfaces or to the eccentric adjustment. Canopy surfaces, both external and internal, must be kept free of P.R.C. sealant.

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 internal jettisoning handle and turn the adjusting screw, in the top

Tools and equipment

22. For tools and equipment used in

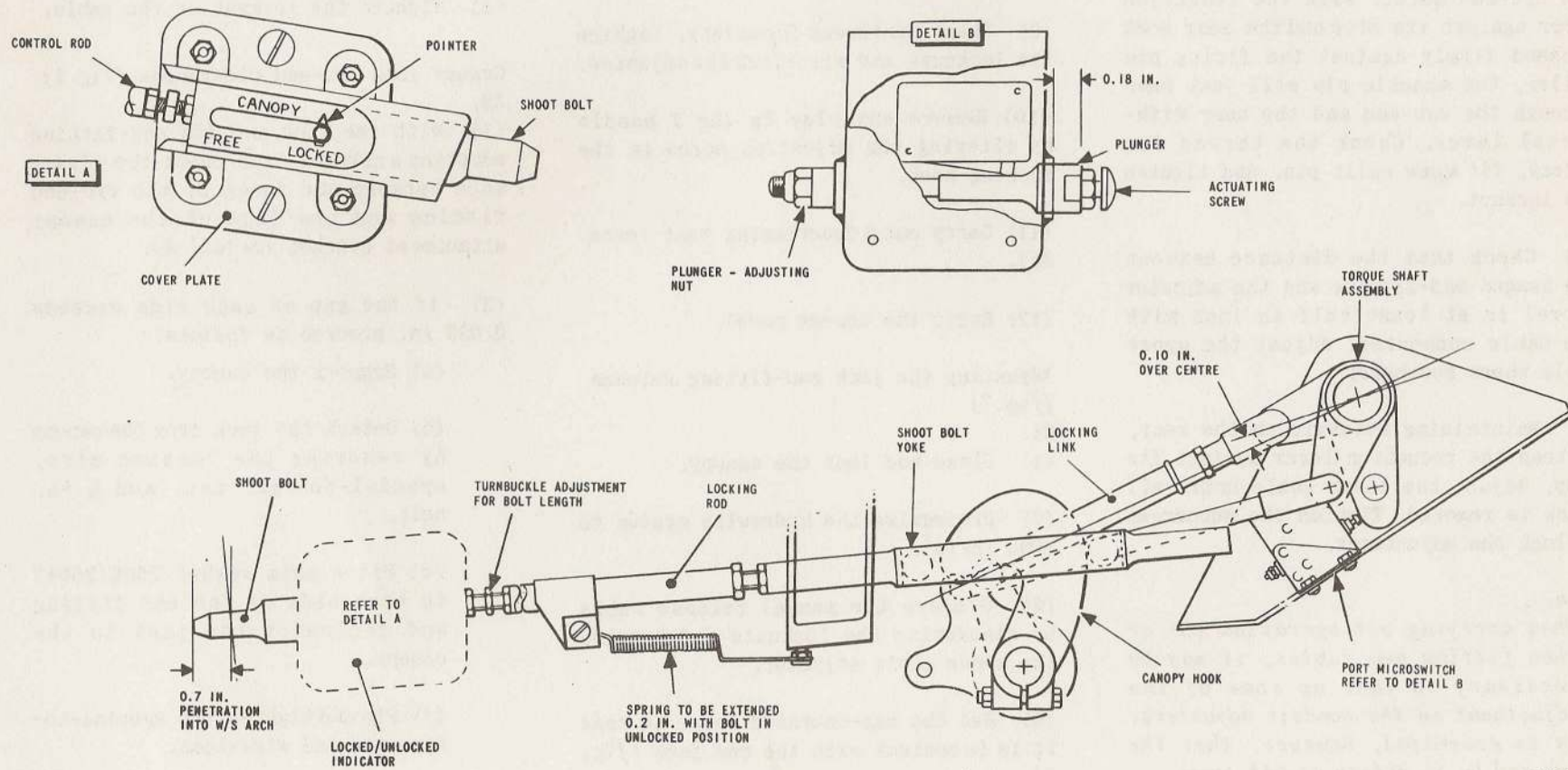


Fig.10. Adjusting shoot bolts and microswitches

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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.

(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...

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.

(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.

Note...

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/in².

(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.

(6) Tighten the pushrod locknut.

(7) Adjust the manual release cable to 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 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 ¼ in. bolt.

(c) Fit a shim washer 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.

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◀ (b) Detach the jack from the canopy by removing the locking wire, special-to-type nut, and 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 and disconnect the jack. ▶

(2) Retract the jack until the piston bottoms.

(3) Close and lock the canopy.

(4) 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.

(5) Tighten the locknut on the jack ram and secure with the tab washer. Fit and wire-lock the jack securing bolt and nut.

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 starboard 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 ± 0.008 in.) where it has been compressed on the rear face of roller; the top face of the roller must contact the hook (detail B, fig.1). Adjustment, if necessary, is effected by slackening the locknut and rotating the adjustable locking link.

Note...

Any adjustment of the locking link will necessitate re-checking the torque shaft over-centre setting (1).

(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 0.2 in.; also ensure that a minimum clearance of 0.05 in. exists between the stiffnuts on 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 0.140 in. max. 0.030 in. min.

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(2) Ensure that the distance between outer skins is maintained at $0.05 \begin{smallmatrix} +0.05 \\ -0.03 \end{smallmatrix}$ 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 0.06 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 0.18 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 and the microswitch just trips; unscrew the actuating screw a further full turn.

(4) Tighten the locknut on the actuating screw.

(5) Check that, when locking the canopy, the switches operate and the warning indicator on the auxiliary warnings panel is extinguished only when the 0.10 ± 0.02 in. over-centre lock is made.

(6) Check that, when unlocking the canopy, the switches operate and the warning indicator is illuminated before a gap of 0.025 in. (0.027 in. max.) between the upper limit-stop and the stop lever on the torque shaft (fig.11, detail B) has been reached.

(7) Check that the switches operate simultaneously, and that the indicator light operates.

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 30 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 40 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/in².

(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 indicator extinguishes.

(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 panel 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 re-commence 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) Re-lock 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 (*fig. 1, detail A*), and $\frac{1}{4}$ in. dia. bolt.

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

(4) Raise the end-fitting housing to its highest position to release the spring claw; hold the housing in this position. Insert the end-fitting in the housing, ensuring that the slots engage the transverse pin correctly. Strike the end-fitting smartly with the palm of the hand to engage the spring-claw. Release the housing.

(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).

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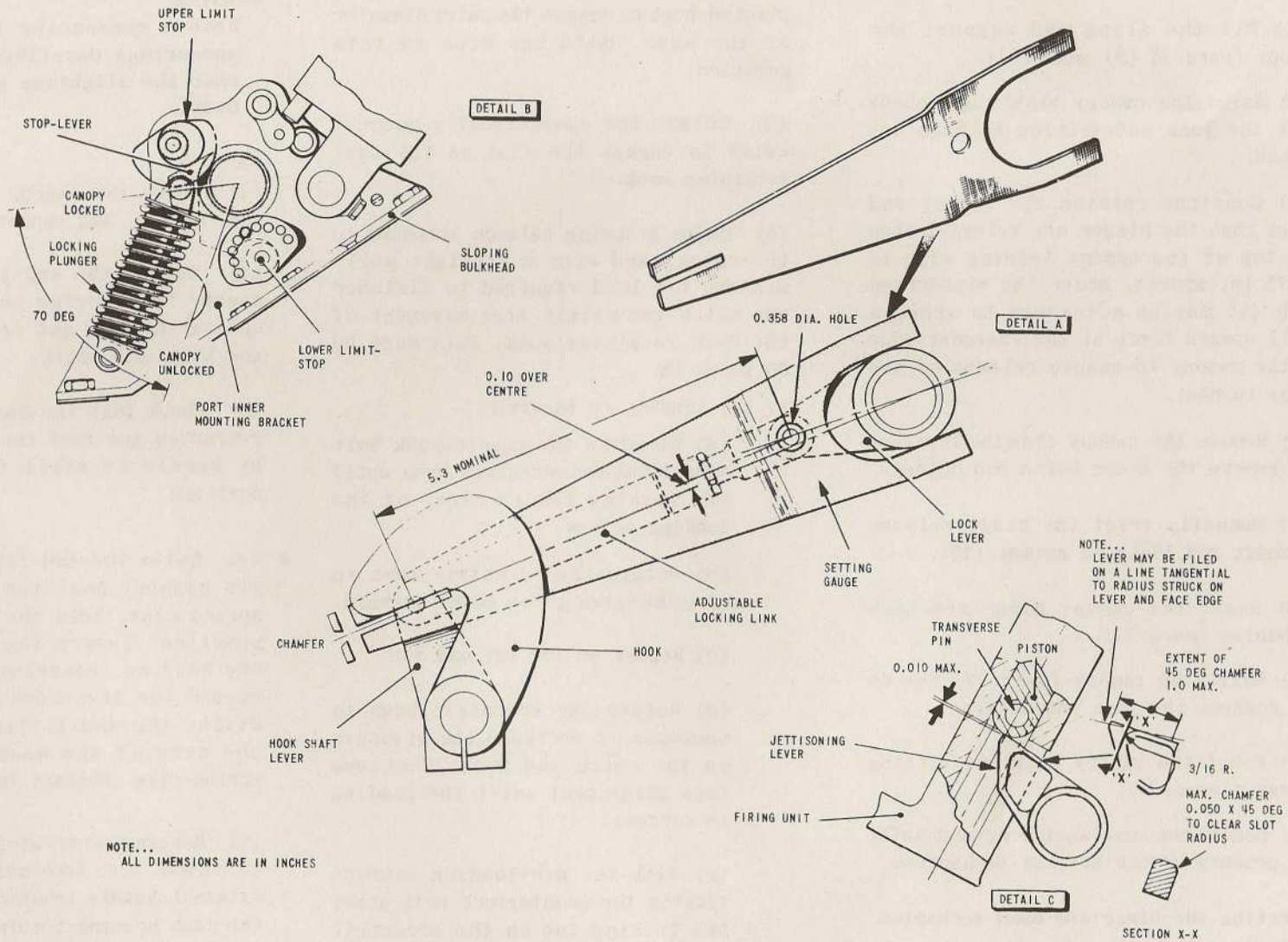


FIG.11. SETTING TORQUE-SHAFT LIMIT STOPS

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

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

(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 light is extinguished.

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

(15) If the external handle has been operated, renew the indicator wire using 28 s.w.g. tinned copper locking wire.

Jettisoning-control functioning test

35.

◀ (1) Remove the reduction lever and disconnect the external jettison cable (items 1 and 31, fig.3). Refit the reduction lever. ▶

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

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

(4) Connect the jettison cable and remove the safety pin.

(5) Attach a spring balance to the internal jettisoning handle and operate the canopy firing unit (ensuring that the sear is pulled clear of the striker mechanism). The load required must not exceed 40 lb.

Note. . .

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

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

◀ (7) Remove the reduction lever and reconnect the external jettison cable, disconnect the internal jettison cable and refit the reduction lever. ▶

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

(9) Attach a spring balance to the external jettisoning handle and operate the canopy firing unit (ensuring that the sear is pulled clear of the striker mechanism). The load required must not exceed 45 lb.

(10) 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).

◀ (11) Remove the reduction lever and reconnect the internal jettison cable. Refit the reduction lever. ▶

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

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

(14) 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 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.

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(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 remove the U.H.F. homer and stand-by equipment, 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 (access 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 connector at the rear pressure bulkhead.

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

(10) Support the canopy, using a hoist and jib, and remove the ¼ in.dia. bolt attaching the canopy jack to the canopy.

(11) Still support the canopy, select canopy CLOSED and fully retract the jack.

(12) With the canopy held approximately half-open, remove the locking wire from the hinge bolts and unscrew the 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 demisting connections to prevent ingress of moisture.

Assembly

Note. . .

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

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39. Assembly of the canopy to the aircraft is the reverse of the removal procedure (para.38). After assembly, carry out the checks described in para.24, 25, 27(9) and (11). If a replacement canopy has been fitted, 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 rear pressure bulkhead using strapping Ref. No.5F/9454141 and studs, Hellerman Ref. No.5F/9138823. The connector should be routed outboard of the starboard flexible de-mist pipe and cleated to the starboard side of the spray pipe, using a minimum of three cleats. Carry out the checks and adjustments described in para.24 to 35 and a cock-

pit pressurization leakage test (Chap.8B).

Note . . .

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

◀ **Canopy jettison jacks**

40. When refitting the canopy jettison jacks, lightly smear the threads of the bottom pipe coupling with grease, XG 287. Connect the union and torque load to 35 lbf/ft (420 lbf/in) using torque wrench Ref. No. 1C/020545 and crow head, 1/2 in, Ref. No.1C/1354292. ▶

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 or 4GC/7994	Hoist	
4GC/6672	Jib	
◀ 1C/020545	Wrench, torque	} Canopy jettison jacks
1C/1354292	Head, crow	
4F/3603	Trolley, hydraulic servicing	} Alternatives
4FE/3761 or 4FE/5147	Trolley, electrical servicing, I.C.E. driven	
4FE/3786 or 4FE/4257	Trolley, electrical servicing, electrically driven	

UK RESTRICTED

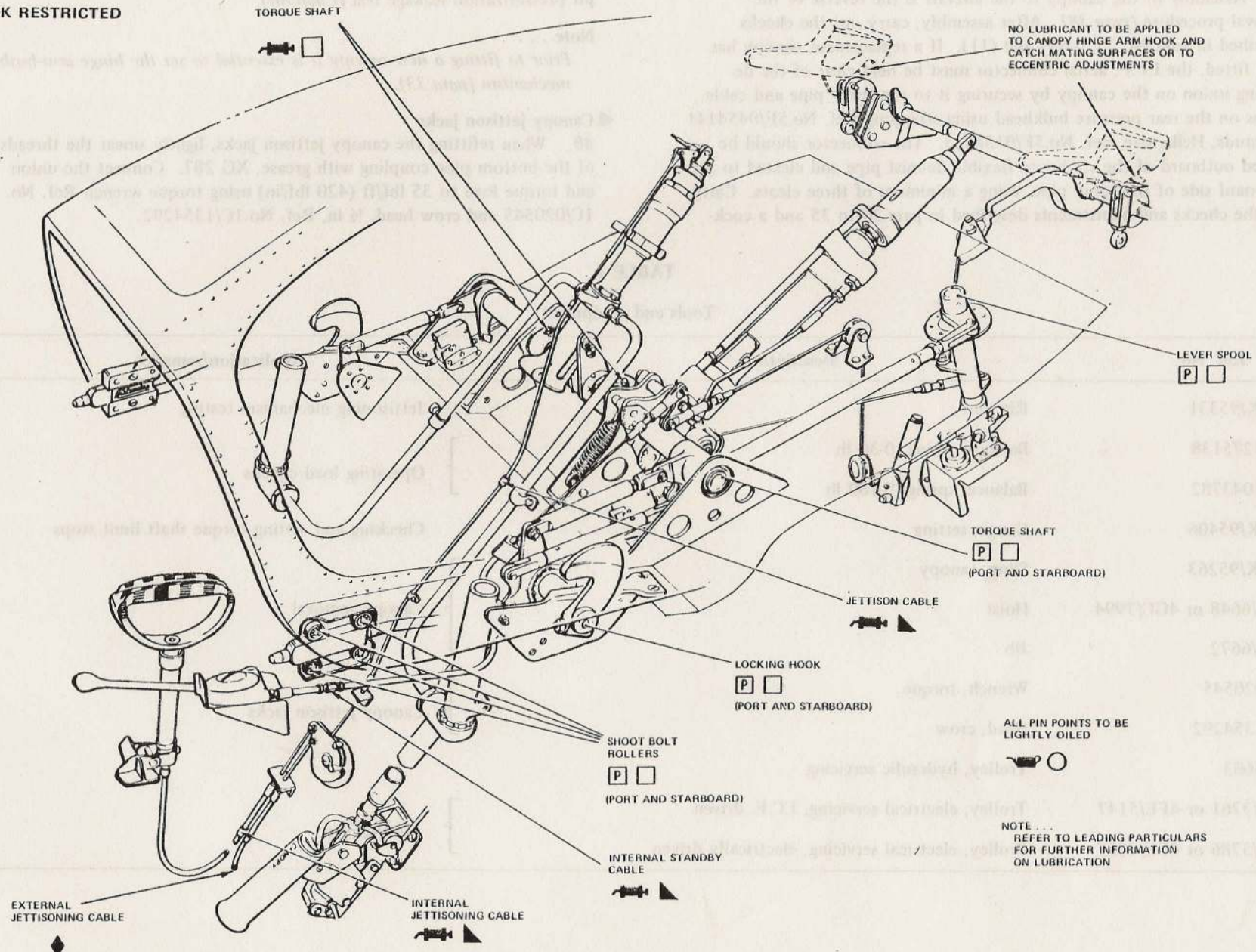


FIG. 12. LUBRICATION POINTS

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