Chapter 1 FUSELAGE

(completely revised)

LIST OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

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. Engines are accommodated in the fuselage, No.1 engine in the lower half of the fuselage, and No.2 engine in the upper half; the engine bays are closed by fully stressed hatches. One of three 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 23, 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.

3. Between frames 6 and 14, the upper skin of the intake duct forms the lower

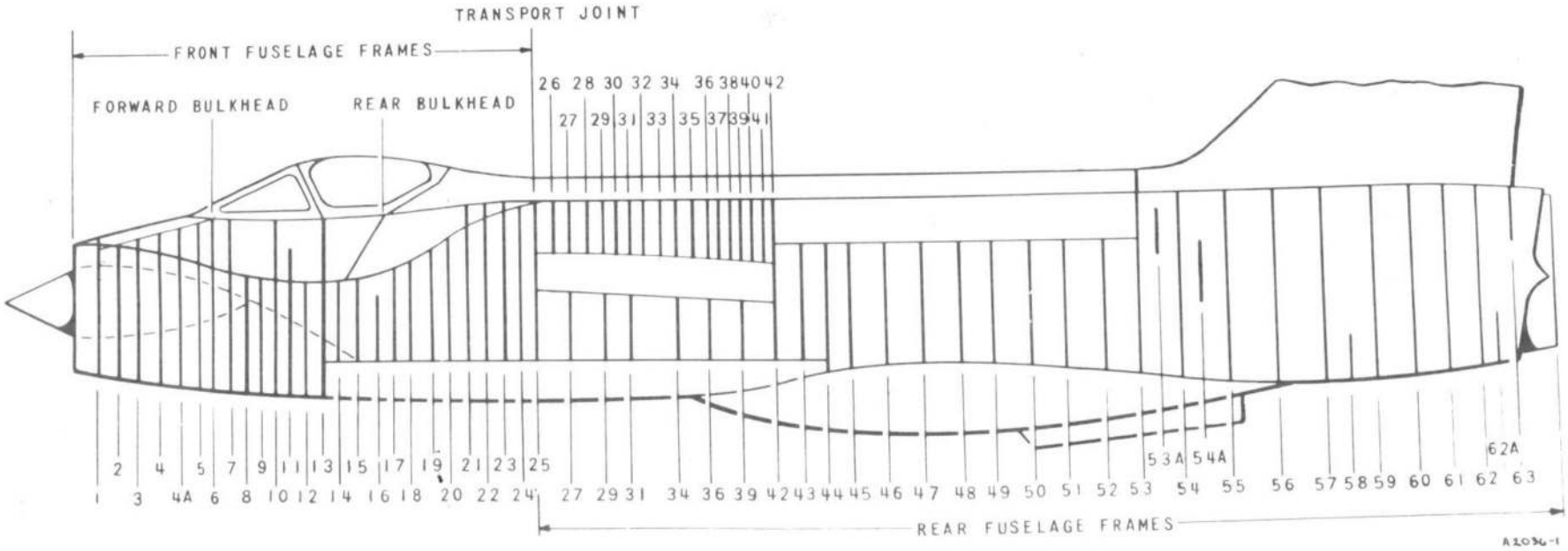
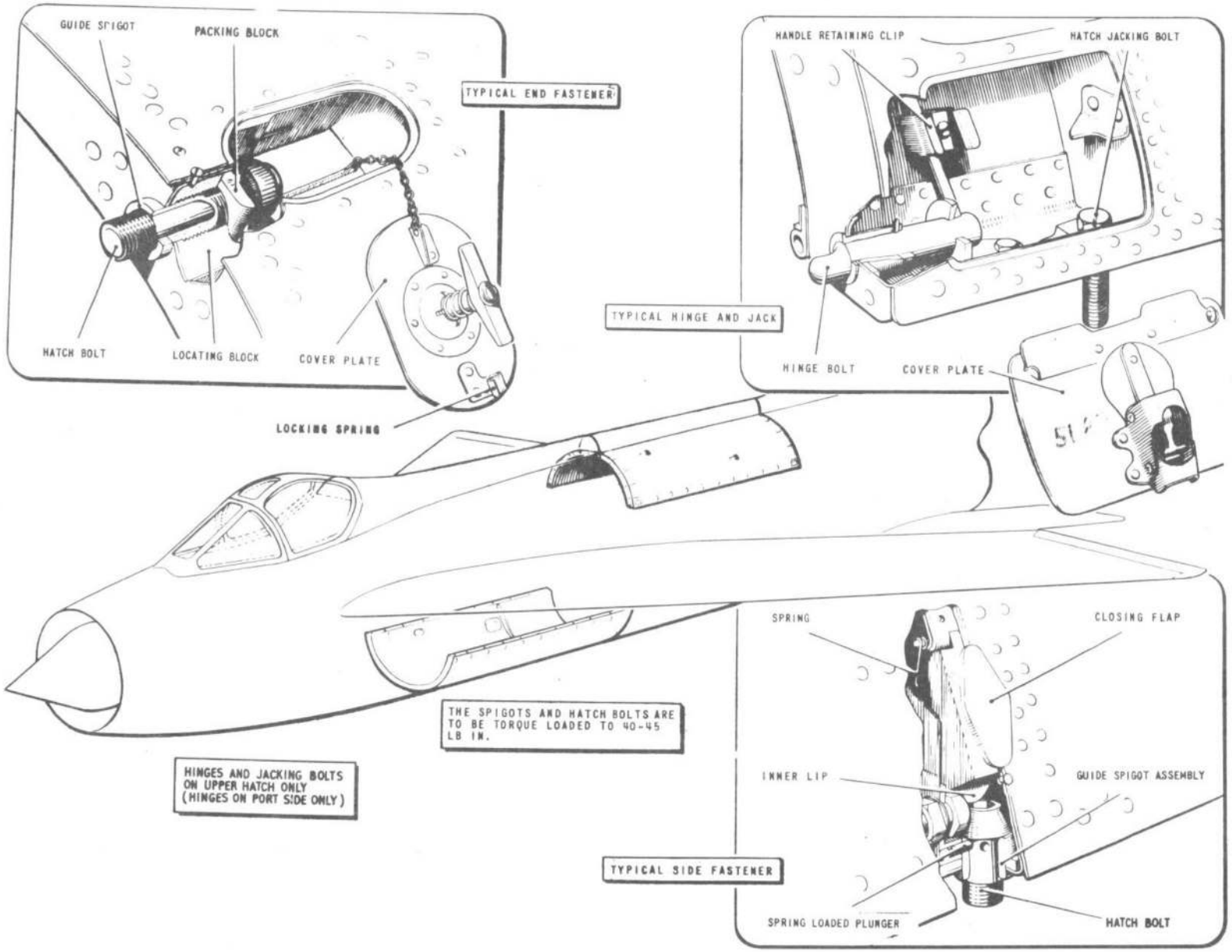


Fig. 1. Fuselage – key diagram



A2037-2

FIG. 2. ENGINE HATCHES

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 the No.1 engine bay.

Rear fuselage

4. The rear fuselage accommodates both engines, and their intermediate and reheat 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 frame 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 from 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 glass cloth radome, secured together by eight quick-release fasteners When assembled, the two components are a sealed container for the A.I. equipment. The assembly is a fully interchangeable package and is removed as a complete unit including the radar equipment.

9. The metal structure consists of 15 frames supporting stressed light-alloy skins. The frames at the aft end are shaped to conform with the wheel recess of the fuselage pylon. Two brackets attached between frames A and B at the top and bottom incorporate anchor nuts

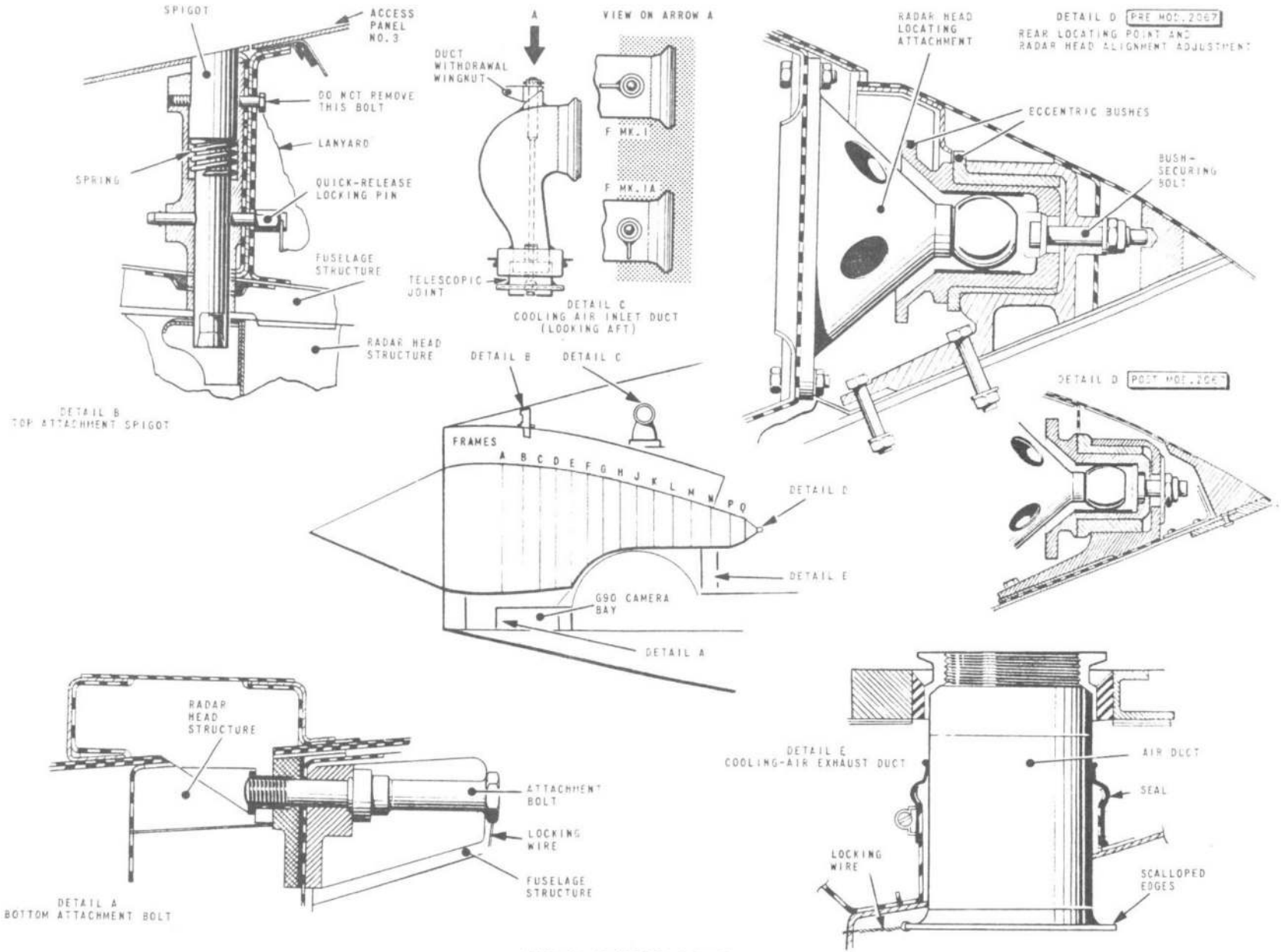


FIG. 3. RADAR HEAD

A2038-2

MOD. 2067 AND DETAIL AMENDMENTS

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 radar head and exhaust air from the heat exchanger enters the nose-wheel well through a detachable outlet pipe.

10. The radar head is secured to the airframe at two points, one at the top and one at the bottom. The top 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 radar head 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 with a bolt, which 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 radar head 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.3)*.

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-1001-5

REMOVAL AND ASSEMBLY

Tools and equipment
12. Refer to Table 1 for tools and equipment used in the following operations.

Front fuselage
Removal (F Mk.1)
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 engines and jet pipes *(Sect.4, Chap.1)*.

(5) Remove the ventral and leading-edge fuel tanks *(Sect.4, Chap.2)*.

(6) Remove junction boxes 7 and 8 as follows:-

(a) Disconnect all plug connectors entering the respective boxes.

(b) Disconnect cable assemblies AS60 (port) and AS70 (stbd.)

(c) Remove the fibreglass conduits.

(d) Remove the box mounting bolts, detach the boxes from the front fuselage, and temporarily secure them to the main plane.

Note...
No internal disconnecting is necessary.

(7) Remove No.1 and No.2 V.H.F. transmitter/receivers (A.P.101B-1001-1B, Sect.6, Chap.2).

(8) Remove the Type 100A inverter (access panels 22P & 22S).

(9) Exhaust the nitrogen pressure from all hydraulic system accumulators. Drain the hydraulic system *(Chap.6)*.

(10) Remove access panel 26S and break down the following:-

(a) Three flying control input rods from the assembly of levers.

(b) Cable assembly 2RM4 from the plug break on frame 23, the clip on frame 24 and the fairlead on frame 25.

(c) Two pitot/static pipe in-line connectors forward of frame 24.

(d) The cabin air pipe at the spill valve outlet.

(11) Remove access panel 26P and break down the following:-

(a) Two engine-control rods at the bolted joints.

(b) I.L.S. connectors 4A, 5A, 13A, 14A, 10A, 9A and 8A from the plug bracket on the aileron idler bracket *(fig.4)*.

(c) Electrical cable 2R255 from the terminal block on frame 25 *(fig.4)*.

(12) Inside No.1 engine bay, on mainplane spar 1 and at the port side of the transport joint, disconnect the hydraulic unions and unclip the pipes indicated *(fig.4)*.

(13) Disconnect the following *(fig.4)*:-

(a) Cable assembly F77 from frame 27.

HYDRAULIC FLUID PIPES-ASSEMBLY

NOTE... The references listed in column 1 are relative only to this illustration

SYSTEM REFERENCE	SYSTEM	PIPING SEQUENCE
H1	NO.2 CONTROLS PRESSURE	EB2.73.2595 (F.MK.1) H1A — EB3.73.927 (F.MK.1A) H1B — EB2.73.6067
H2	NO.1 CONTROLS PRESSURE	EB2.73.2597 (F.MK.1) H2A — EB3.73.921 (F.MK.1A) H2B — EB2.73.2414
H3	SERVICES PRESSURE (CANOPY)	EB2.73.5469 — H3A — EB2.73.5471(F.MK.1) EB3 73 1161(F.MK.1A) H3B — EB2.73.2501
H4	SERVICES PRESSURE	EB2.73.3447 — H4A — EB2.73.3485 — H4B — EB2.73.2481
H5	SERVICES RETURN	EB2.73.2489 — H5 — EB2.73.2445
H6	NO.1 CONTROLS PRESSURE	EB2.73.2459 — H6 — EB2.73.2439
H7	SERVICES SUCTION	EB2.73.6029 — H7 — EB2.73.6031
H8	NO.1 CONTROLS RETURN	H8A — EB2.77.6097 — THERMAL R.V. H8B
H9	SERVICES PUMP PRESSURE	EB2.73.5985 — H9A — EB3.73.5863(F.MK.1) EB3 73 1163(F.MK.1A) H9B — EB2.73.3478
H10	NO.1 CONTROLS PUMP PRESSURE	EB2.73.6541 — H10 — EB2.73.6549
H11	UNDERCARRIAGE UP	EB2.73.5989 OR 6891 — H11 — EB2.73.6051
H12	UNDERCARRIAGE EMERGENCY	EB2.73.6091 — H12 — EB2.73.6057
H13	PORT WHEEL BRAKE	EB2.73.6095 — H13 — EB2.73.6061
H14	UNDERCARRIAGE DOWN	EB2.73.6093 OR 6893 — H14 — EB 73.4525

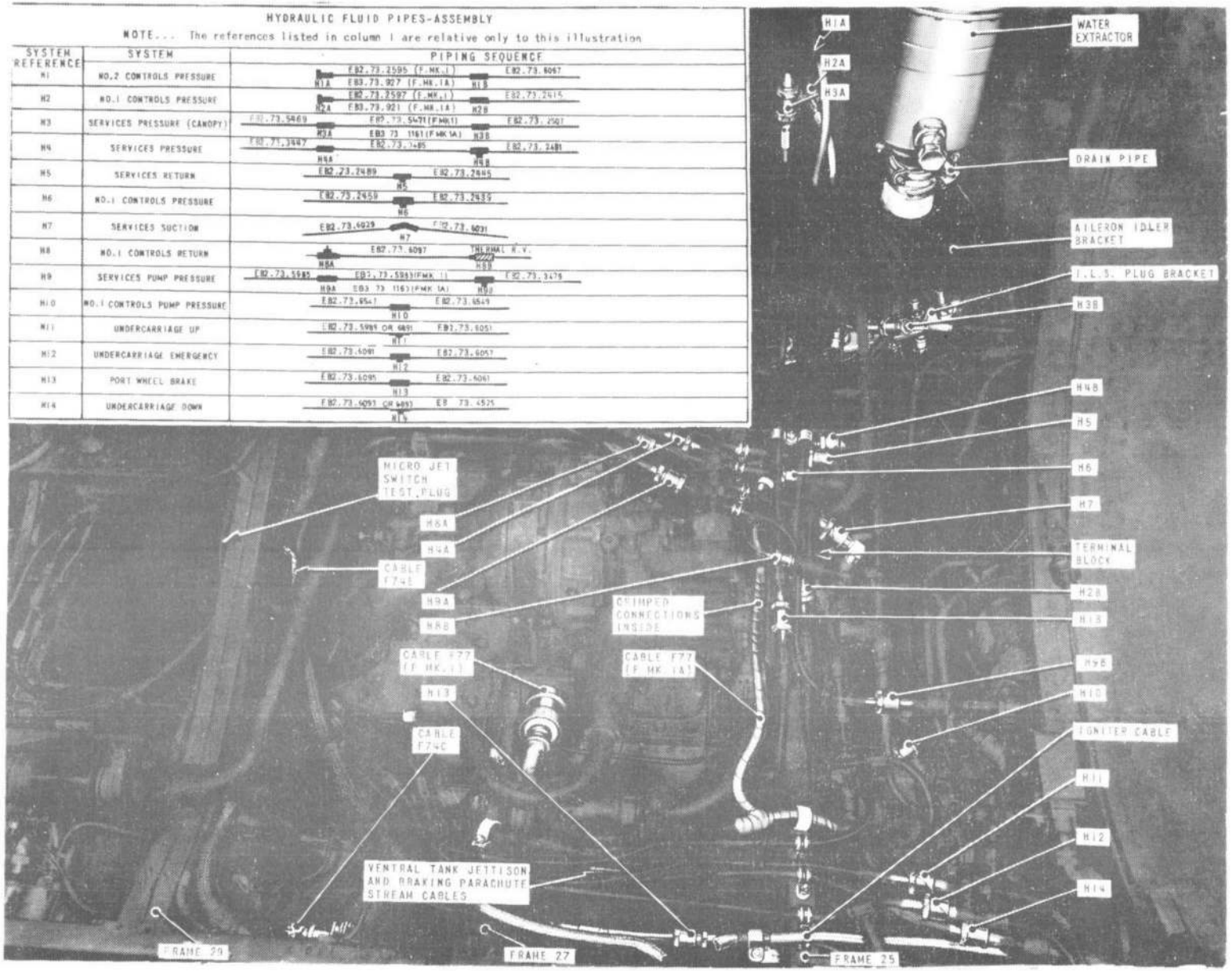


FIG.4. EQUIPMENT AT TRANSPORT JOINT (PORT)

◄ PIPING PART NUMBER AMENDED ►

(b) Cable assembly F74C from the hatch longeron between frames 27 and 29.

(c) Cable assembly F74E complete with the microjet switch test plug from the aft face of frame 29.

(d) Unclip the port igniter cable from frames 23 and 25.

(14) Disconnect the ventral tank jettisoning and braking parachute stream cables above the hatch longeron near frame 25, and release them from the fairlead on the frame *(fig.4)*.

(15) Remove the following air system components *(fig.5)*:-

Note...
Items (a), (b) and (c) may be removed as an assembly.

(a) Hot-air branch pipe.

(b) Constant-flow valve (disconnect electrical cable).

(c) Constant-flow valve outlet pipe.

(d) Three sections of the temperature control by-pass pipe.

(e) Guided weapons pack heating pipe.

(16) Disconnect the following electrical and wireless components on the starboard side of No.1 engine bay *(fig.5)*:-

(a) Cable assemblies F81, F70, AS13, AS12, F78 and F76 at the plug bracket between frames 25 and 27.

(b) Cable assemblies F16, F79, F80 and F93 at the plug bracket on frame 27.

(c) Cable assembly F100 from the plug bracket on frame 29.

(d) Cable assembly F101 from the plug bracket between frames 29 and 31.

(e) Cable assemblies AS24, AS25, AS26, and F151 at the plug-breaks between frames 25 and 26.

(f) Cable assemblies F131A and F131B from the temperature control valve actuator and the follow-up resistor respectively.

(g) Cable assembly F142 from the air shut-off cock actuator *(fig.5)*.

(h) Cable assembly F214 at the in-line crimps aft of frame 25. Ensure correct identification of the severed cores for subsequent re-crimping.

(j) Cable assembly F252 at the in-line crimps between frames 27 and 29. Identify the individual cores after cutting.

(k) Cable assembly F28 from the terminal block on frame 29.

(l) Unclip the starboard igniter cable from frame 22 and between frames 23 and 25.

(m) V.H.F. connectors 12 and 13 at the in-line couplings between frames 25 and 27.

(n) I.F.F. connectors IF2 and IF4 at the in-line couplings between frames 25 and 27.

(17) Disconnect the services hydraulic pressure pipe at frame 23 and the in-line coupling aft of frame 25; release the pipe clips and remove the pipe.

(18) Disconnect the canopy hydraulic pressure pipe, at the in-line coupling on frame 27 and at the special banjo aft of the front fuselage systems accumulator. Release the pipe clips and remove the pipe.

(19) Uncouple the starboard brake pressure pipe on the engine hatch longeron.

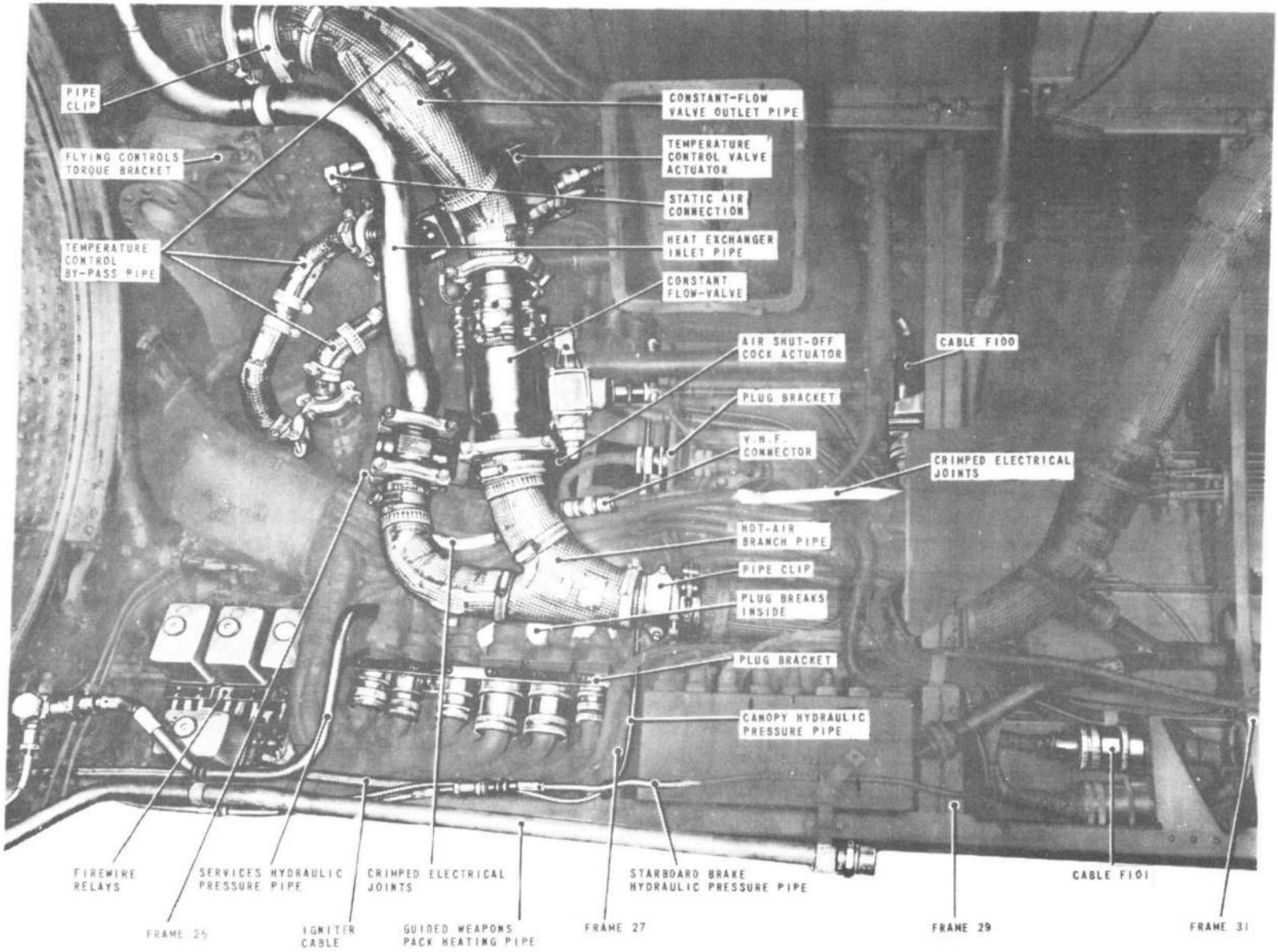
(20) Disconnect and remove the following pitot and static pipes from the starboard side of No.1 engine bay:-

(a) The short bent static pipe aft of the flying controls torque brackets *(fig.5)*.

(b) The short sections of the pipes disconnected in operation 10(c) after uncoupling aft of frame 25 and releasing the clips.

(21) Remove the Firewire relays *(fig.5)* from their bases. Unbolt the bases, without detaching the cables, and identify them according to their positions engraved on the mounting plate. Secure the bases to some convenient point in the rear fuselage with adhesive tape ensuring that their weight is not supported by the cables.

(22) Remove the Firewire relays mounting plate.



A2040-1

FIG. 5. EQUIPMENT AT TRANSPORT JOINT (STARBOARD)

(23) Remove the water extractor as follows:-

(a) Disconnect the drainpipe *(fig. 4)*.

(b) Release the pipe clamps at each end.

(c) Remove the quick-release pins from the two tension straps and lift the water extractor upwards through the duct division.

(24) Open the spine fairing aft of the transport joint, and access panel 31S. Disconnect the following electrical components *(fig.6)*:-

(a) Cable assemblies U29 and U32 from the fuse blocks on frame 25 (F251 may be left connected).

(b) Cable assemblies U85A, U85B, U83 and U84 at frame 25.

(c) Cable assemblies F251B, R200B, R101C, U91 and U83A from the terminal block on frame 25.

(d) Cable assembly U60 (battery cables) from frame 25 by removing the fairlead and withdrawing the cable aft.

(e) Cable assembly U28 by disconnecting XA, XB and XC from the a.c. fuse and relay box terminals. Release the cable from the fairlead on frame 25 and withdraw it aft.

(f) Cable assembly F215B (cores VA17 and VA18) from the relay at frame 29. Release the strapping attaching the cable to the rear fuselage looms.

(g) D.C. positive busbar at frame 25.

Note...
Pre Mod.402 two busbars are fitted.

(25) Disconnect I.F.F. connector 46 (upper aerial) from the aft face of the aft pressure bulkhead (near Bung 1). Unclip the connector from the looms in the radio compartments and remove the fairlead on frame 25; withdraw the connector aft from the front fuselage.

(26) Disconnect TACAN connector 7A from frame 25 in the spine.

(27) Remove the access panels around the transport joint, inside No.2 engine intake duct, and access panels 32P and S.

(28) Uncouple the starter fuel and air pipes in the spine and at the pipe couplings in frame 25. Release the saddle block on stringer 3 and remove the pipes.

(29) Unscrew the starter pipe couplings from the aft face of frame 25.

(30) 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 No.1 engine mounting trunnions.

(31) Position the 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.

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

(33) 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)*.

(34) Remove five bolts, nuts, washers and one tapered packing from each engine hatch longeron aft of the transport joint *(fig.8, detail C)*.

(35) Seperate frames 25A and 25B by removing 107 securing bolts, and nuts and washers where fitted *(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 32P and S.

(36) 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.

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

(38) Lower the trolley beams until the tie bar assembly can be attached, by means of its captive bolts, to the arm-

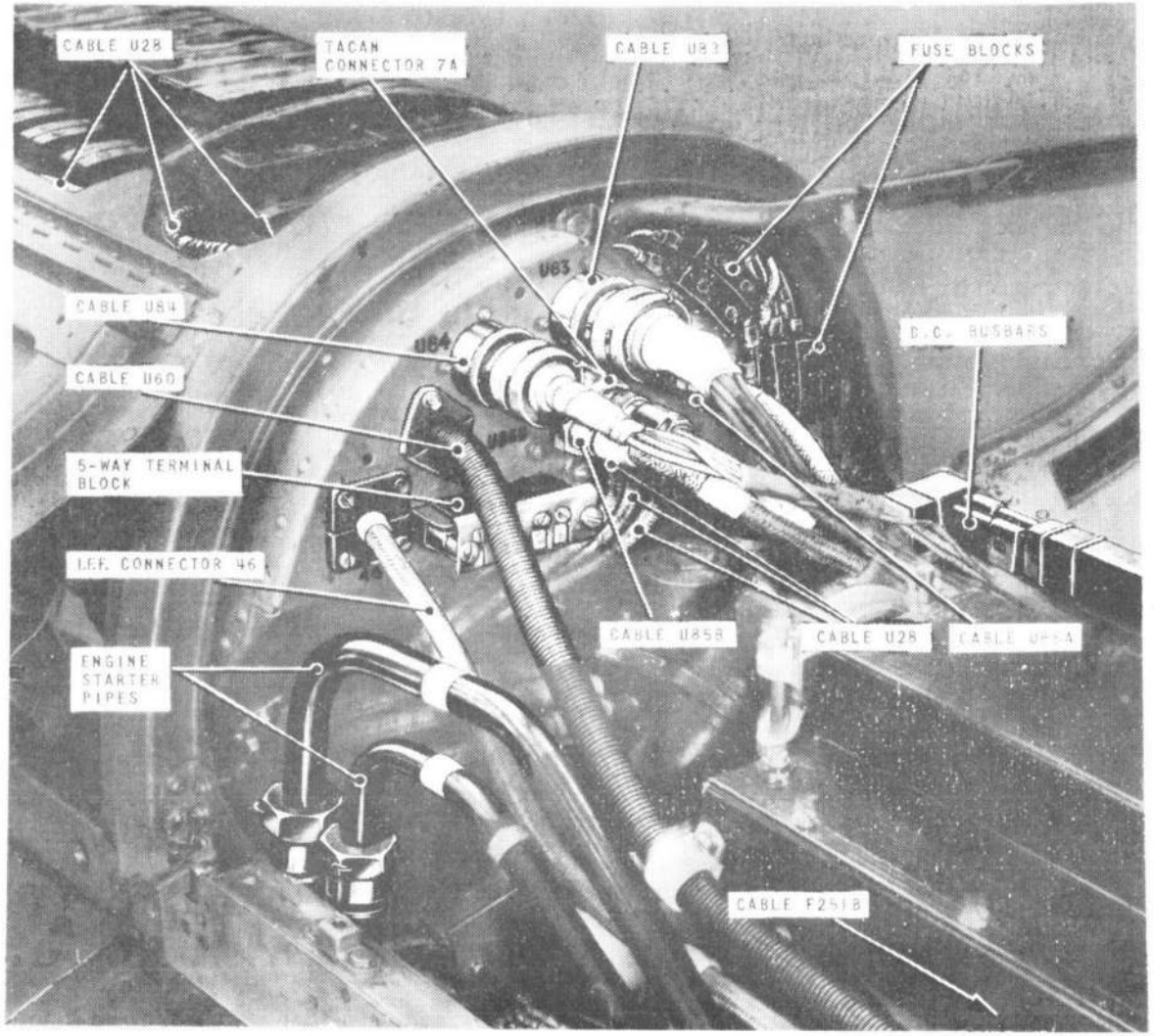


Fig.6. Equipment at transport joint (spine)

ament pack attachments at frame 14. The tie rods are adjustable to facilitate this operation.

Removal (F Mk.1A)

14. To remove the front fuselage:-

(1) Refer to para.13 and carry out operations (1) to (6) and (9) to (12) inclusive.

(2) Remove the U.H.F. stand-by T/R, the V.P. R/F unit, the V.P. A/F unit and the U.H.F. T/R unit from the spine compartment behind the cockpit.

(3) Remove the Type 100A inverter.

(4) Cut the cores of electrical cable F77 at the crimped joints on frame 25A, at the port side of No.1 engine bay *(fig.4)*, after ensuring correct core identification for subsequent reassembly.

(5) Refer to para.13 and carry out operations (13) (b, c and d), (14) and (15).

(6) Remove the forward section of the starboard external duct and expose the crimped connections on all cable assemblies. Sever the cores as close to the crimps as possible after ensuring positive identification for subsequent reassembly.

(7) Disconnect cable assembly F252 at the crimped connections near frame 25 at the starboard side of No.1 engine bay.

(8) Disconnect cable F28 from the terminal block between frames 27 and 29 (starboard).

(9) Disconnect cables F131A and F131B from the temperature control valve actuator *(fig.5)*.

(10) Disconnect cable F142 from the air shut-off cock actuator *(fig.5)*.

(11) Unclip the starboard igniter plug cable at frame 22 and between frames 23 and 25.

(12) Disconnect I.F.F. connectors IF2 and IF4 at the in-line crimps at frame 25 (starboard).

(13) Disconnect A.I. cables 3A17 and 3A19 at the in-line crimps at frame 25 (starboard).

(14) Refer to para.13 and carry out operations (17) to (26) inclusive.

(15) Unclip the U.H.F. Homer port and starboard azimuth aerial connectors inside the front fuselage spine compartment, remove the fairlead on frame 25 and withdraw the connectors from the front fuselage.

(16) Refer to para.13 and carry out operations (27) to (38) inclusive.

Assembly (F Mk.1 and F Mk.1A)

15. To assemble the front fuselage:-

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

(2) Apply jointing compound Ref.No. 33H/2203813 to the mating faces of frames 25A and 25B.

(3) Detach the wing landing angles from frames 25A *(fig.8, detail B)* and attach them to the main plane top skin using the bolt plates removed in para.13 (33) *(fig.8, detail B)*. Use jointing compound Ref.No.33H/2203813 on all mating faces.

(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 *(fig.8)*.

(6) Inspect the abutment of the wing landing angles 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 Ref.No.26DK/20267.

(7) Secure the wing attachment angles 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 trunnions.

(10) Assemble the systems and major components by reversing the dismantling sequence *(para.13 operations (1) to (29) for F Mk.1)* or *(para.14 operations (1) to (15) for F Mk.1A)*.

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 as follows:-

(a) Uncouple the flexible pipe from the starter system low pressure switch (access panel 26P).

(b) Using a locally-manufactured reducing adapter, incorporating a ¼ in. B.S.P. inner sleeve at one end and a ½ in. B.S.P. outer sleeve at the other, connect the reheat fuel pipe test rig (Sect.4, Chap.1) to the switch. Substitute a 0-1500 lb/in² rig pressure gauge for the existing 0-600 lb/in² gauge.

(c) Blank off the fuel pipe at frame 25 in the spine (fig.6).

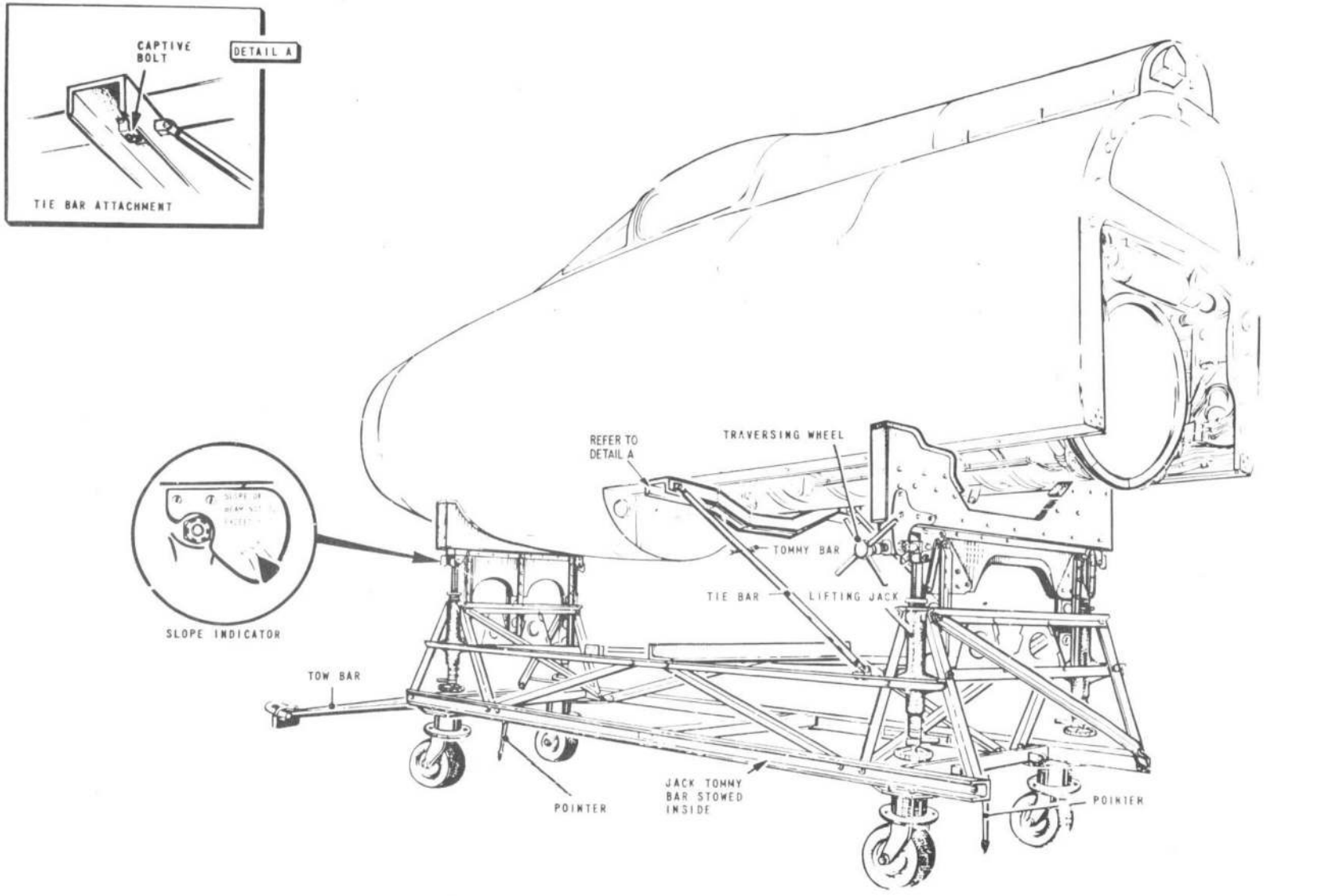
WARNING

Starter fuel must not be used in operation (d).

(d) Using clean kerosene, pressurize the pipe to 900 lb/in² and examine the pipe coupling through frame 25 for leakage.

(e) Remove the test equipment, unblank the pipe and flush it through with clean starter fuel.

(f) Connect and wire-lock the pipes in the spine and the flexible pipe to the switch.



I-8257-I

FIG. 7. FRONT FUSELAGE TROLLEY

(11) Prime and bleed all the hydraulic systems and carry out functional tests *(Chap.6)*.

(12) Carry out electrical functioning tests *(A.P.101B-1001-1B or 1C, Sect.6)*.

(13) Carry out radio and radar function tests *(A.P.101B-1001-1B or 1C, Sect.8 and 9)*.

(14) Carry out pitot and static leakage tests *(A.P.101B-1001-1B or 1C, Sect.7)*.

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

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

(17) Check the operation of the parachute stream and ventral tank jettisoning controls.

(18) Carry out the air systems test *(Chap.8)*.

Slinging *(fig.9)*

Front fuselage

16. 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 as follows:-

17. 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.

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

Rear fuselage

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

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

Tail planes *(Chap.3)*.

Fin and rudder *(Chap.3)*.

Braking parachute *(Chap.13)*.

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

20. 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.

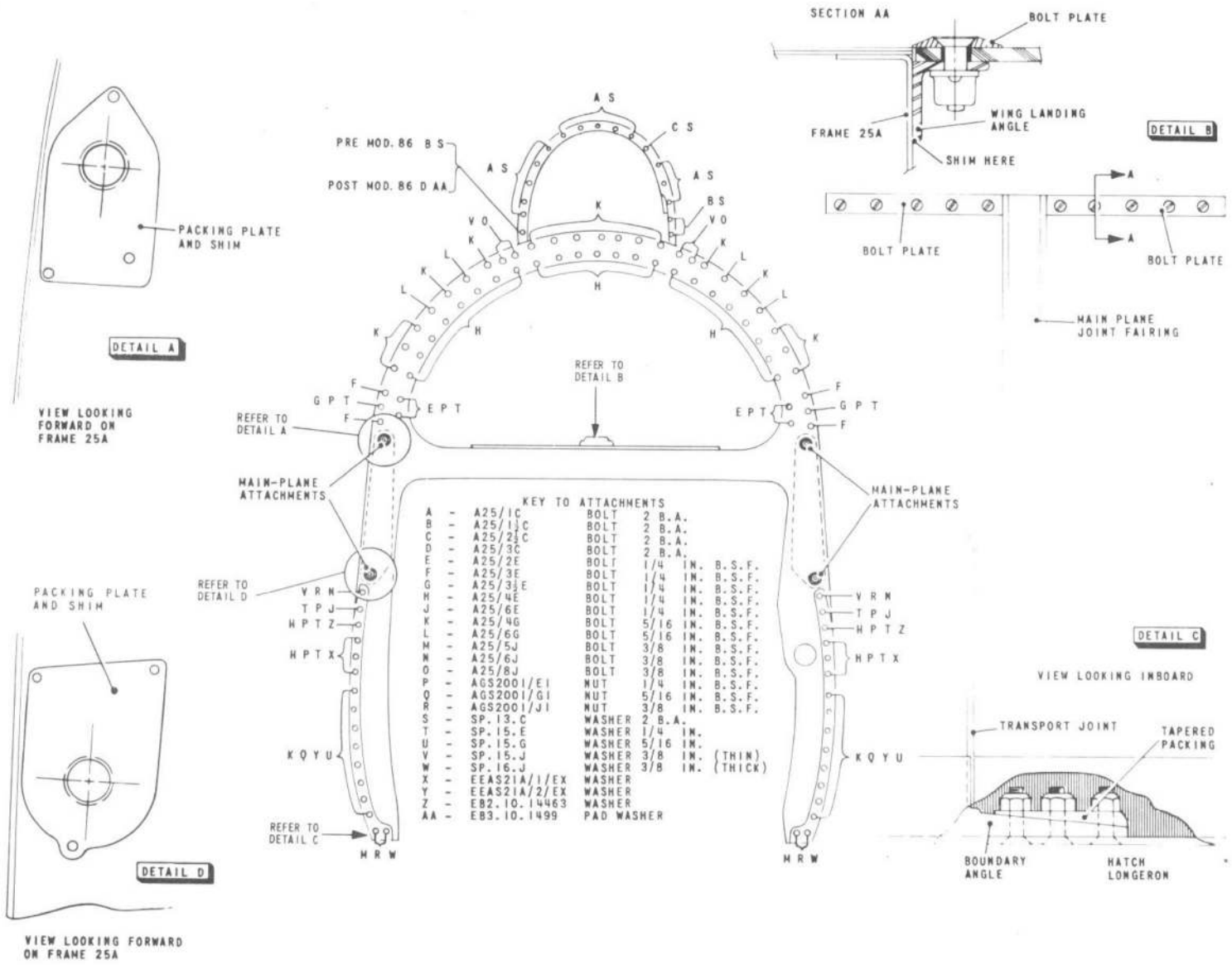
21. To assemble the rear fuselage sling:-

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

(2) Secure the formers to frame 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.



KEY TO ATTACHMENTS

A	A25/1C	BOLT	2 B.A.
B	A25/1½C	BOLT	2 B.A.
C	A25/2½C	BOLT	2 B.A.
D	A25/3C	BOLT	2 B.A.
E	A25/2E	BOLT	1/4 IN. B.S.F.
F	A25/3E	BOLT	1/4 IN. B.S.F.
G	A25/3½E	BOLT	1/4 IN. B.S.F.
H	A25/4E	BOLT	1/4 IN. B.S.F.
J	A25/6E	BOLT	1/4 IN. B.S.F.
K	A25/4G	BOLT	5/16 IN. B.S.F.
L	A25/6G	BOLT	5/16 IN. B.S.F.
M	A25/5J	BOLT	3/8 IN. B.S.F.
N	A25/6J	BOLT	3/8 IN. B.S.F.
O	A25/8J	BOLT	3/8 IN. B.S.F.
P	AGS2001/E1	NUT	1/4 IN. B.S.F.
Q	AGS2001/G1	NUT	5/16 IN. B.S.F.
R	AGS2001/J1	NUT	3/8 IN. B.S.F.
S	SP.13.C	WASHER	2 B.A.
T	SP.15.E	WASHER	1/4 IN.
U	SP.15.G	WASHER	5/16 IN.
V	SP.15.J	WASHER	3/8 IN. (THIN)
W	SP.16.J	WASHER	3/8 IN. (THICK)
X	EEAS21A/1/EX	WASHER	
Y	EEAS21A/2/EX	WASHER	
Z	EB2.10.14463	WASHER	
AA	EB3.10.1499	PAD WASHER	

FIG.8. DETAILS OF TRANSPORT JOINT

1-8258-1

WARNING

Considerable stress loads are absorbed by the engine hatches. If both hatches are to be removed the aircraft must be fully jacked and trestled (Sect.2 Chap.1). It is permissible however, to remove either hatch without jacking and trestling.

No.1 engine hatch

Note...

If the guided weapon pack is fitted, it will be necessary first to remove the inner fairing at the trailing edge of each missile pylon. This is accomplished by withdrawing the bolt located inside the aperture at the fairing edge.

Removal

22. To remove the engine hatch:-

(1) Position the 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.

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

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

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

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

Note...

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

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

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.*

23. 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 the torque wrench and ratchet spanner Tighten to a torque loading of 40-45 lb ft.

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

(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.

No.2 engine hatch

Removal

WARNING

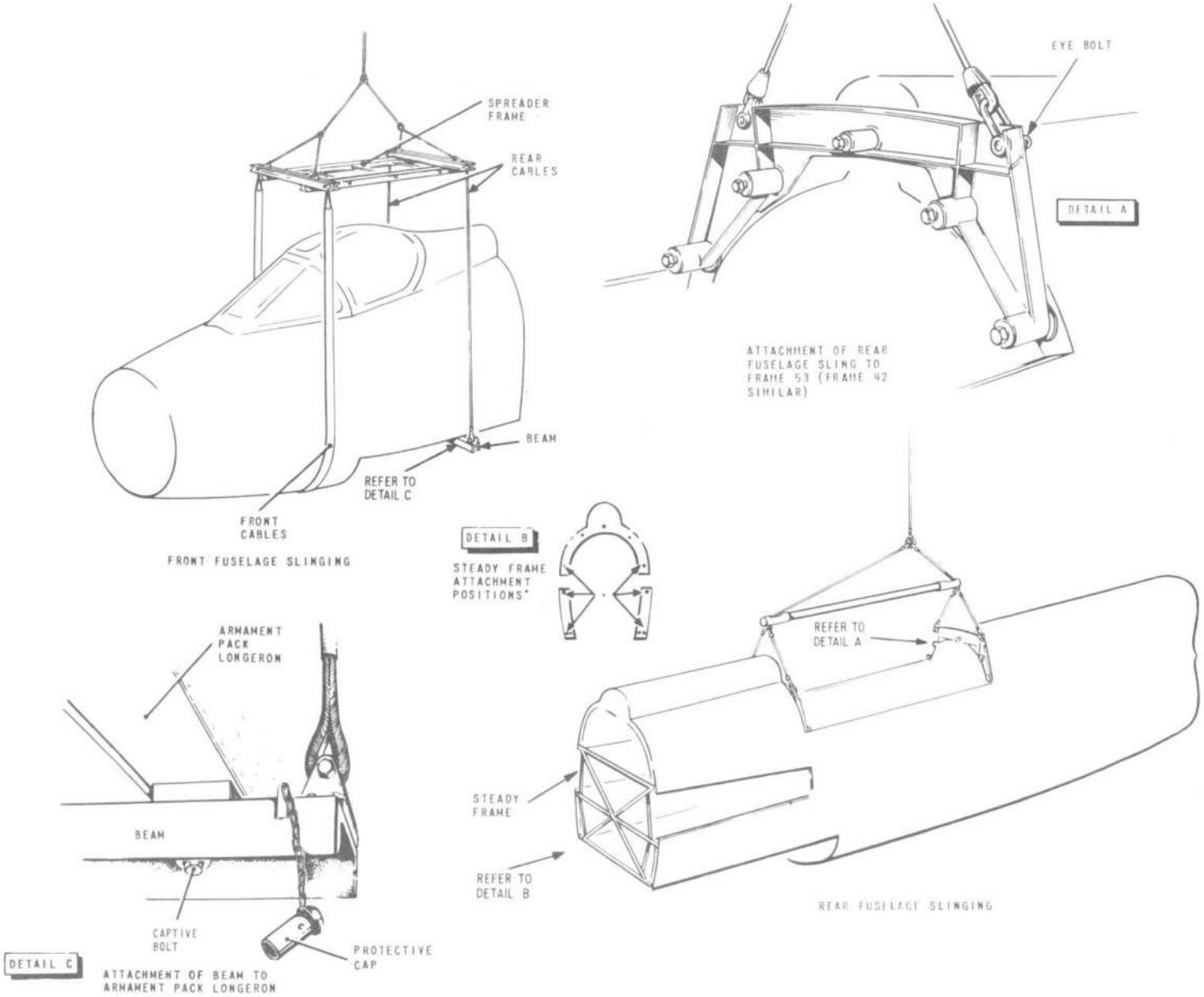
Personnel should observe the H.E. ignition warning on the LETHAL WARNING marker card at the front of this book.

24. To remove the hatch:-

(1) Disconnect the L.T. leads (access panel 67P).

(2) After waiting at least one minute disconnect the H.T. cables from the port igniter plug and the coupling on frame 49 respectively (access panel 67P).

(3) Disconnect the following electrical



1-E259-1

FIG.9. SLINGING

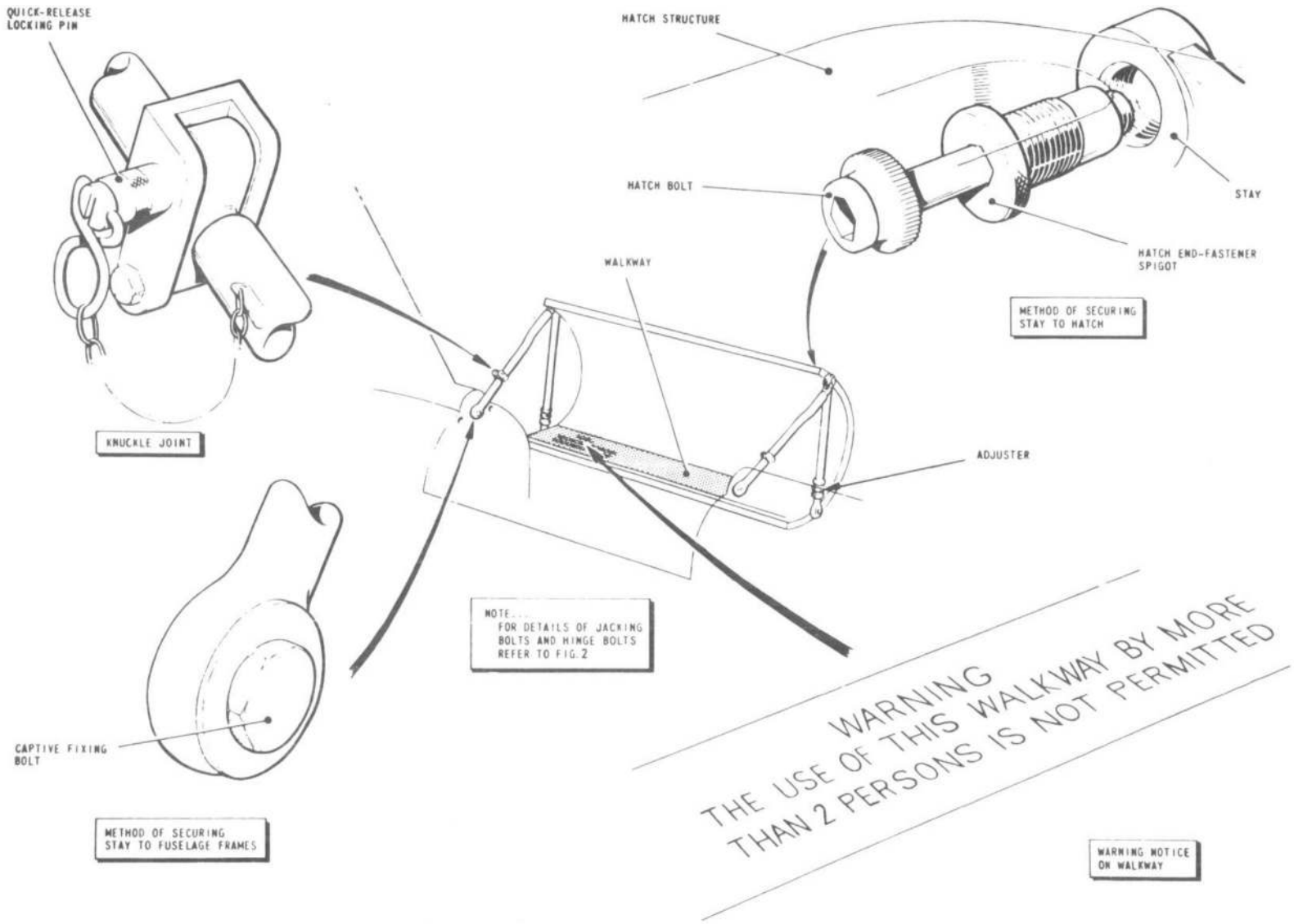


FIG.10 HINGING OPEN No.2 ENGINE HATCH

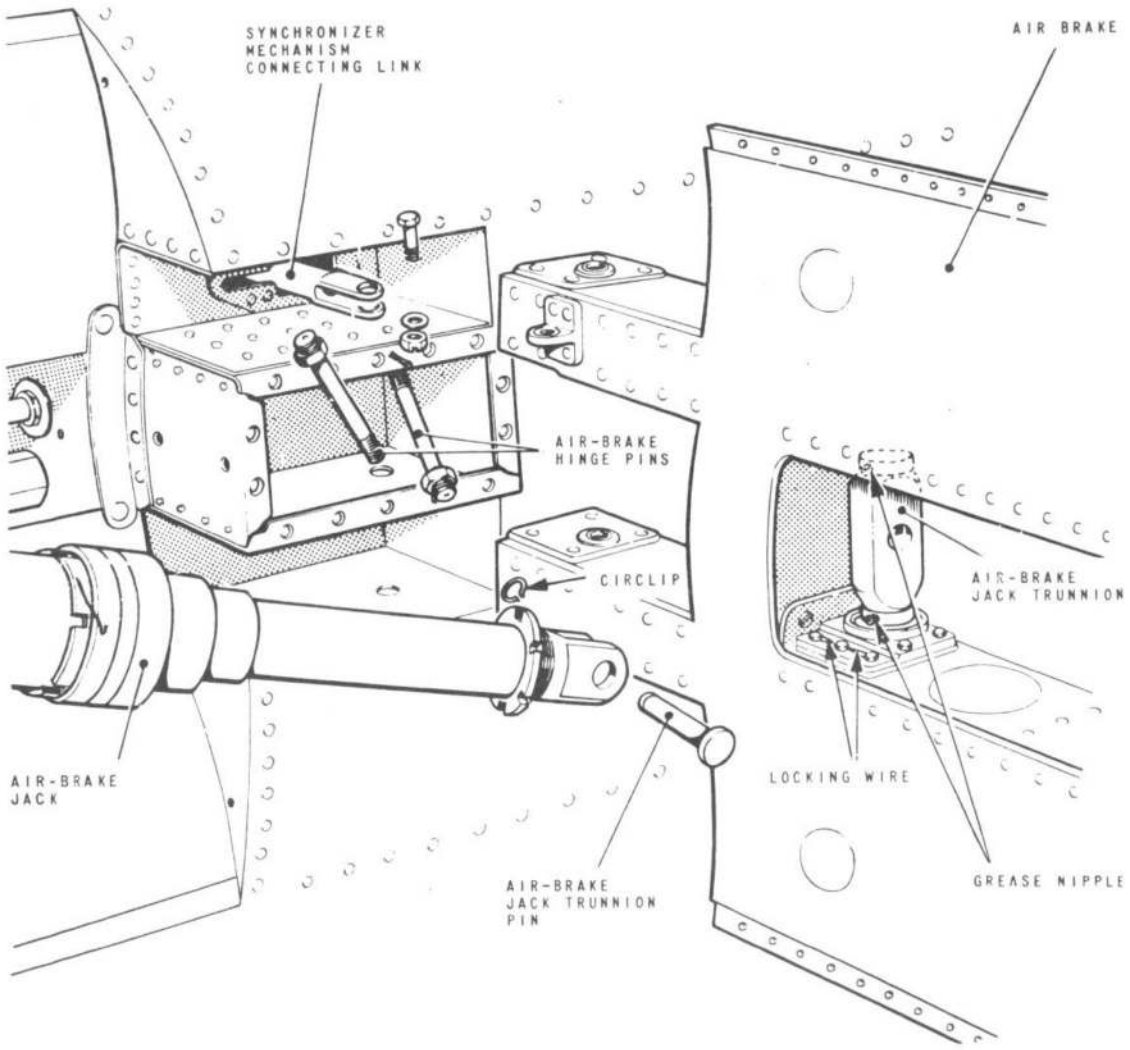


Fig. 11. Air brakes - removal and assembly

cables from the plug panel behind access panel 55P: -

(a) F Mk. 1 aircraft
cables AS50, AS53 and AS56.

(b) F Mk. 1A aircraft
cables AS50, AS53, AS56, A17 and A19.

(4) Disconnect the main battery and stow the connector.

(5) Connect a sling shackle to the slinging point in the spine, and secure it to the crane hook.

(6) Remove panels 68 and 80 to obtain access to the centre end-fasteners.

(7) Refer to para. 22 and repeat operations (2), (3), (4) and (5) in that paragraph.

(8) Lift the engine hatch from the fuselage.

Assembly

25. Refer to para. 23 Notes (1) and (2). To assemble the hatch: -

(1) Fit a sling to the hatch slinging point and lift the hatch to position it on the engine bay longerons, guiding the port and starboard ignition cables into position.

(2) Refer to para. 23 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.

(4) Connect the H.E. ignition leads to the igniter plugs, working through panels 67P and 60S.

(5) Connect the L.T. leads to the H.E. ignition units.

(6) Connect the main battery.

(7) Remove the sling, fit all access panels and check them for security.

Hinging open No.2 engine hatch *(fig.10).*

26. To hinge open the hatch:-

(1) Remove the hatch end and side bolts *(para.23).*

(2) Withdraw the end-fastener spigots.

(3) Raise the hatch evenly with the jacking bolts until the hinge pins can be engaged.

(4) Pivot the hatch upwards to an angle of approximately 70 degrees.

(5) Tighten the guide spigots of the end-fasteners at the hatch corners.

(6) 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.

(7) Remove the quick-release pins from the hinged sections and screw the fixing bolts into any of the three centre attachment holes in frames 42 and 53.

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

(9) Fit the hatch walkway.

Closing No.2 engine hatch

27. To close the hatch reverse the procedure for opening *(para.26).*

Note...

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

Air brakes *(fig.11)*

Removal

28. To remove an air brake:-

(1) Connect a 28V 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.

Assembly

29. To assemble the air brake, reverse the removal procedure *(para.28).*

WARNING

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, reference must be made to fig.13 to ensure correct assembly.

Dismantling air-brake jack trunnion bearings

30. For details of this operation, refer to fig.12.

Radar head

Removal (fig.3 and 14).

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:-

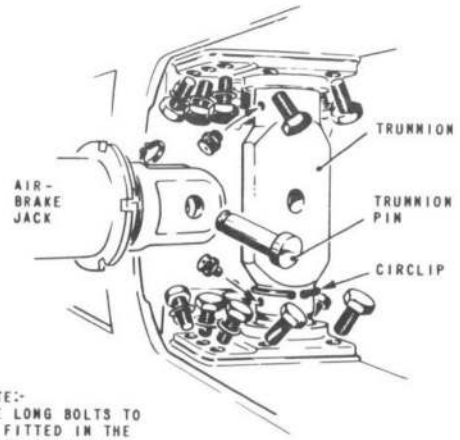
(1) Check that all electrical supplies are disconnected.

(2) Open access panel 3 and remove the 750-litre oxygen cylinder *(Chap.10),* the artificial horizon control unit and its mounting tray, the air drier desiccant container and the pressure-relief valve *(Chap.8B).*

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

(4) Uncouple the seven electrical connections. These are of conventional design prior to Mod.1546 (which introduces re-designed couplings). For post Mod.1546 aircraft:-

(a) Slacken the outer sleeve with the special-to-type spanner and unscrew it from the connector



NOTE:-
THE LONG BOLTS TO BE FITTED IN THE THICK SECTION OF THE PLATES

STAGE 1

(1) EXTEND THE AIR BRAKE AND DISCONNECT THE SYNCHRONISING MECHANISM LINK

(2) DISCONNECT THE JACK FROM THE TRUNNION

(3) REMOVE THE TWO TRUNNION GREASE NIPPLES

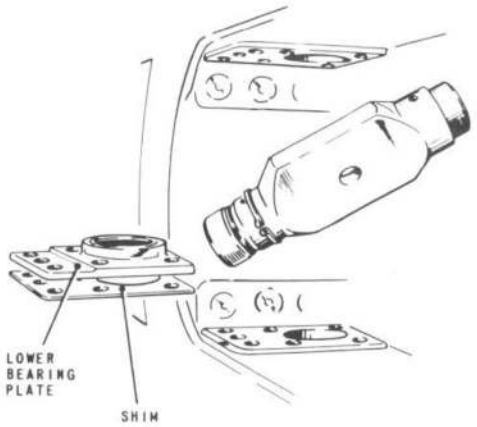
(4) DISENGAGE THE CIRCLIP FROM ITS GROOVE AND SLIDE IT UP THE TRUNNION AS FAR AS POSSIBLE

(5) REMOVE THE SECURING BOLTS

STAGE 2

(1) PUSH THE TRUNNION DOWN INTO THE LOWER BEARING PLATE

(2) SLIDE OUT THE UPPER BEARING PLATE AND SHIM. IDENTIFY PLATE AND SHIM TO ENSURE CORRECT ASSEMBLY



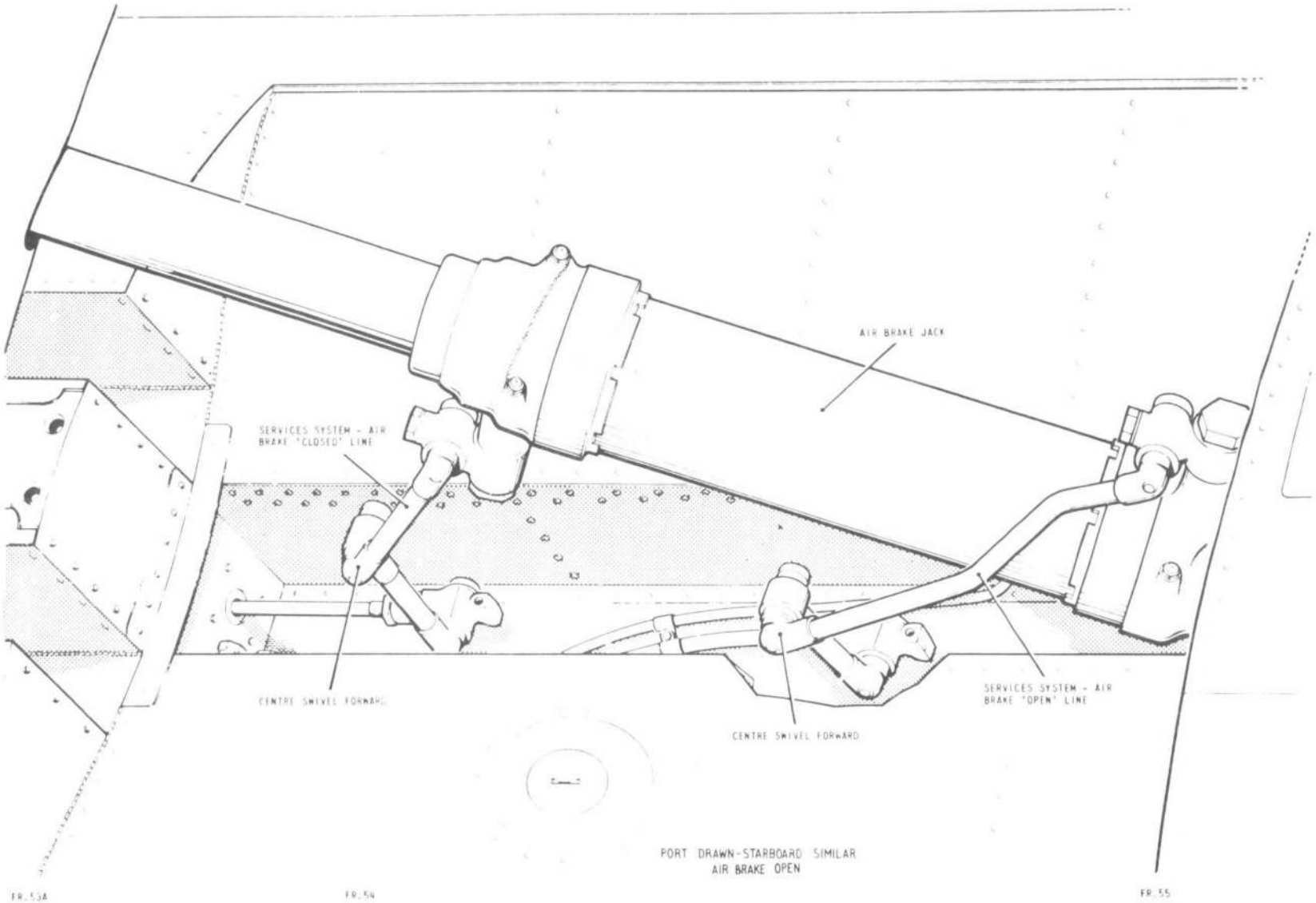
STAGE 3

(1) LIFT THE TRUNNION AND REMOVE THE LOWER BEARING PLATE AND SHIM. IDENTIFY PLATE AND SHIM TO ENSURE CORRECT ASSEMBLY

(2) REMOVE THE TRUNNION FROM THE STRUCTURE

FIG.12. DISMANTLING AIR-BRAKE JACK TRUNNION BEARINGS

I-8262-1



1-8263-1

FIG. 13. AIR BRAKE JACK SWIVEL COUPLINGS

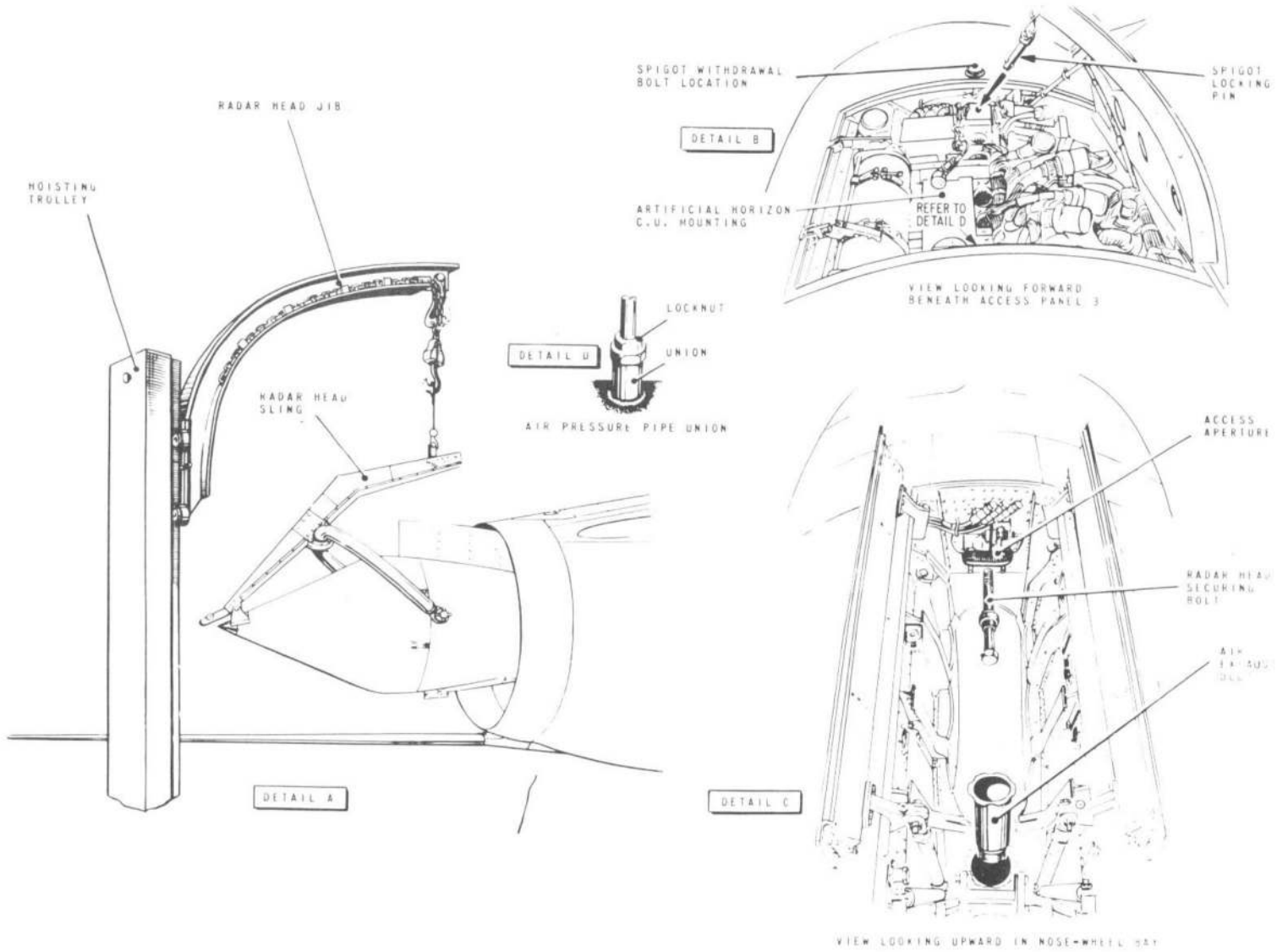


FIG. 14. RADAR HEAD REMOVAL AND ASSEMBLY

complete with outer sleeve and collet.

(b) Slacken the inner sleeve with the same spanner and unscrew it from the radar head. After removal place it in the inner sleeve for safe keeping.

(5) Raise the cooling air duct by rotating the half wingnut to ride up the tapered seating *(fig.3, detail C)*. Retain the wingnut in this position.

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

(7) Close the access panel.

(8) Remove the G90 camera and its mounting.

(9) Unscrew and remove the cooling air exhaust duct.

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

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

(12) Withdraw the bottom attachment bolt using a ½ in. Whit. spanner.

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

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

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

Assembly

32. To assemble the radar head: -

(1) Ensure cleanliness of all mating surfaces.

(2) Disconnect the cooling air inlet duct from the cabin discharge valve *(Chap.8B)*. Apply P.R.C.1221 sealant to the duct telescopic joint sealing panel, allowing the sealant sufficient time to cure to the soft state.

(3) Apply a thin coating of grease XG-287 to the ball joint on the radar head.

(4) Fit the lifting equipment and raise the radar head into alignment with the intake.

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

(6) Remove the sling and lifting equipment.

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

Note...
The duct must be only hand-tightened.

(8) Open access panel 3 and fit the top attachment locking pin.

(9) While the P.R.C.1221 sealant on the duct sealing panel is still in its soft state, re-engage the cooling-air exhaust duct, carefully lowering on to the radar head duct, then remake the connection to the discharge valve.

(10) Connect and lock the pressurizing pipe, and make the electrical connections. Post Mod.1546, assemble the couplings in reverse to the removal sequence *(para.31 (4))*.

Note...
A smear of grease Ref.No.33H/9424829 may be applied to the outside of the electrical plugs to facilitate assembly. Alternative lubricants are not recommended.

(11) Fit the pressure-relief valve, air desiccant container, artificial horizon control unit and its mounting and the oxygen cylinder.

(12) Wire-lock the bottom attachment bolt. Fit the G90 camera and its mounting.

(13) Refit access panel 3.

TABLE 1

Tools and equipment

Ref.No.	Part No.	Description	Application/remarks
26DK/95262	EB4.88.19	Sling, fuselage, nose section	
26DK/95839	EB3.88.235	Trolley, front fuselage	
26DK/95813	EF2.88.1009	Trolley, rear fuselage	
26DK/95021	EB2.88.289	Sling, rear fuselage	
26DK/95301	EB2.88.1278	Stay, No.2 engine hatch, front	
26DK/95105	EB2.88.1277	Stay, No.2 engine hatch, rear	
26DK/95287	EB2.88.4847	Beam, rear fuselage support	Use with No.7 universal jacking trestle
26DK/95112	EB2.88.1753	Walkway, No.2 engine hatch	With e.c.u. installed
26DK/95104	EB2.88.1661	Trolley, No.1 engine hatch	Installation/removal
26DK/95084	EB2.88.2719	Spanner, brace	Engine hatch side bolts
26DK/95364	EB2.88.4347	Key	
26DK/95425	A.1677	Spanner, ratchet, engine hatch bolts	Use with IL/1201252
IL/1201252	–	Spanner, torque, 5-50 lb ft	Engine hatch bolts
26DK/95873	EB3.88.177	Strut, jury	Engine hatch removal
26DK/95244	RRE/835607	Trolley, transit/serv. radar head	
26DK/95184	EB2.88.2627	Cradle, storage, radar head	
26DK/95245	RRE/E835670	Sling, radar head	
26DK/95251	EB2.88.4371	Extractor, radar head	
26DK/95438	EB2.88.6507	Spanner	A1 23 plugs
4GC/6648 or	–	Hoist, servicing multi purpose Mk.1 or Mk.2	
4GC/7994	–		
4GC/6650	–	Jib, No.1	
4GC/4232290	–	Jib, No.4	
26DK/95028	EB2.88.693	Frame, steady, frame 25B	For jurying main fuselage