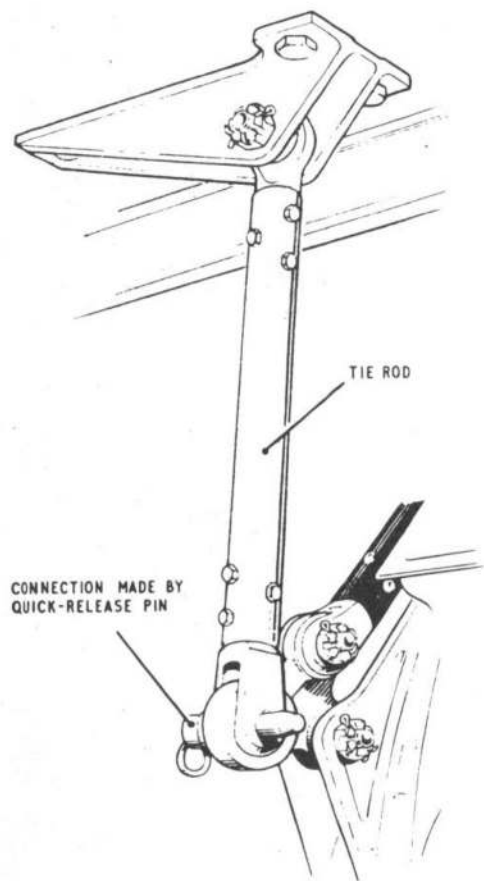
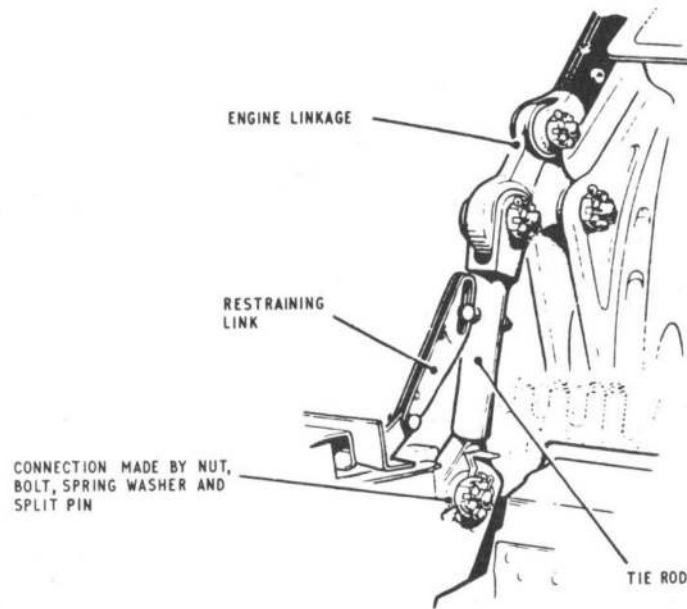


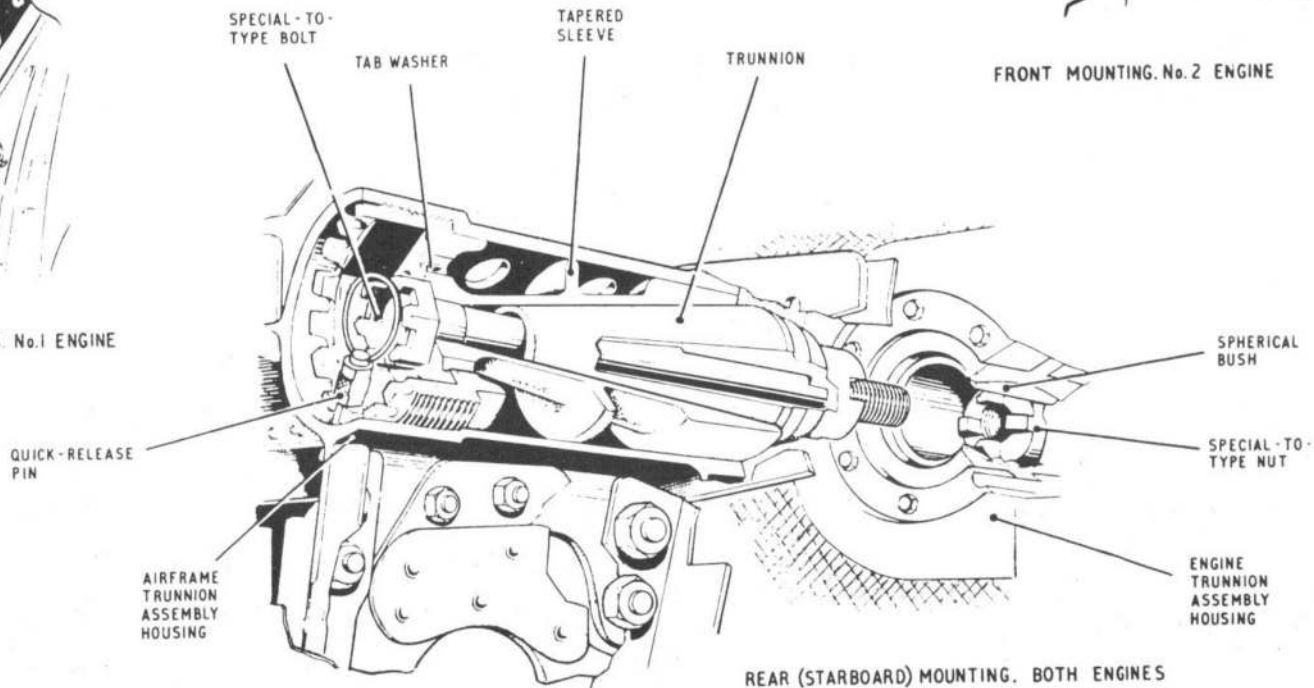
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FRONT MOUNTING No. 1 ENGINE



FRONT MOUNTING No. 2 ENGINE



REAR (STARBOARD) MOUNTING. BOTH ENGINES

FIG. 1. ENGINE MOUNTINGS

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DESCRIPTION

General information

1. The aircraft is powered by two fuselage-mounted, reheat-burning, turbo-jet engines; the lower engine is designated No.1 and is forward of the upper, No.2, installation. Liquid fuel starter systems are fitted. Each jet pipe is in two sections; a reheat section which incorporates a variable-area propelling nozzle, and an intermediate section which is connected to the engine exhaust unit.

2. An air-turbine-driven gearbox, sited remotely from the engines, employs air bled from the engine compressors to drive a.c. and d.c. generators which provide aircraft electrical power. A single control in the cockpit varies the thrust of the appropriate power unit by controlling engine speed through a mechanical linkage, and by selecting any of the four stages of reheat electrically; the throttle linkage also opens and closes the H.P. fuel cocks, and can be operated through a limited range of movement by an electric actuator in the autopilot system. For engine and reheat details refer to A.P. 102C-1523-16A.

Engine mountings*General information*

3. Each engine is supported by two front and two rear mountings which allow for engine expansion and malalignment. No.2 engine hatch must be removed to gain access to the No.2 engine front mountings, but all other mountings are accessible behind detachable panels (Sect. 2, Chap. 4, Table 3).

Front mountings (fig.1)

4. A self-aligning mounting linkage, traversing the top of each engine compressor casing, is connected to reinforced structure in the fuselage by a tie rod at either side. The connection to the tie rod is made by quick-release pins in the No.1 engine installation, and by bolts in the No.2 engine installation.

Rear mountings (fig.1)

5. The port and starboard rear engine mountings are trunnion assemblies which are supported in housings in the fuselage structure; each assembly comprises a hollow tapered trunnion, a tapered sleeve, and a special-to-type bolt. The trunnion is centralized in the housing by the sleeve, and supports the engine by engaging a spherical bush fitted in a housing in the engine combustion-chamber casing. The bolt securing the assembly passes through the sleeve and the trunnion, and screws into a special nut which is fitted inboard of the spherical bush; this nut is free to turn until engaged by a cruciform slot in the end of the trunnion when the latter is inserted through the bush. A tab washer locks the head of the bolt to the sleeve.

6. The starboard trunnion assembly positions the engine, the sleeve being threaded externally to screw into the airframe housing. The sleeve is locked by a quick-release pin which passes through one of fifteen radial slots in the head of the sleeve and one of two holes in the housing. Engine expansion and slight malalignment, respectively,

are allowed for in the port trunnion assembly by the sleeve being free to move axially in its housing, and by the special bolt being of less diameter than the hole through the sleeve.

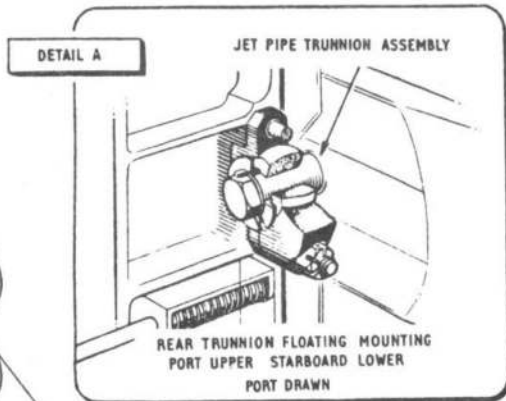
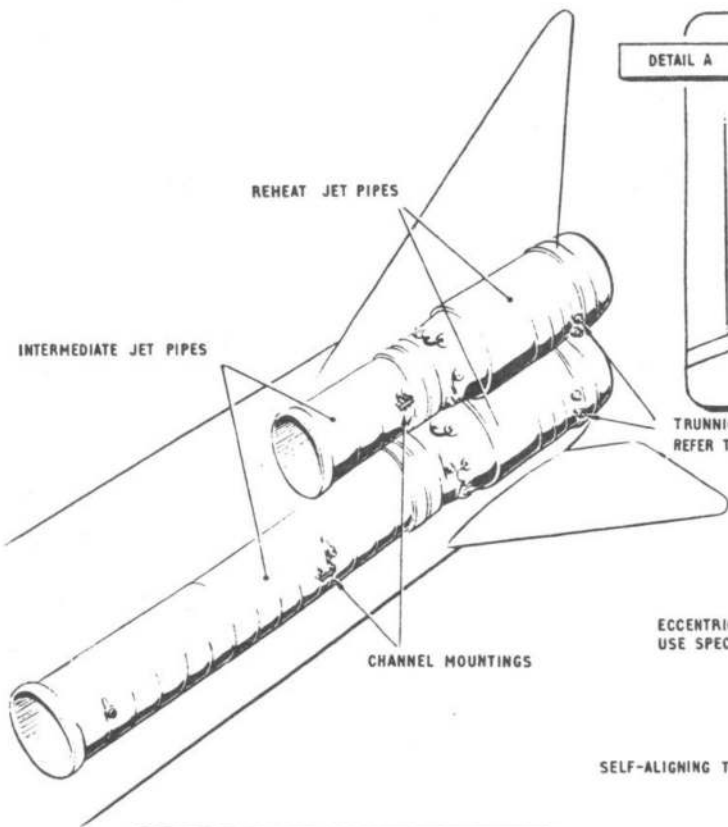
Jet-pipe installation*General information*

7. In each installation, the intermediate and reheat jet pipes form one complete unit when assembled to the aircraft, with seals between the two sections and between the intermediate pipe and the engine. At the engine to intermediate jet pipe joint of both engine installations, an annular shroud is fitted to vent hot gas leaks overboard. The gases flow through a flexible pipe communicating with a hole in the fuselage skin. The jet pipes are supported at the engine and at two further points on each side, the mountings allowing for axial and radial expansion. In the No.2 jet-pipe installation, a locking device at the intermediate pipe/reheat pipe joint (fig. 20, detail A) permits both sections to be handled as one unit for removal or installation. Although very similar, the reheat pipes are not interchangeable.

Front mountings

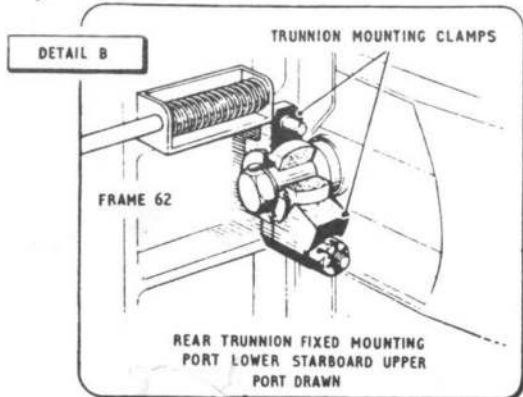
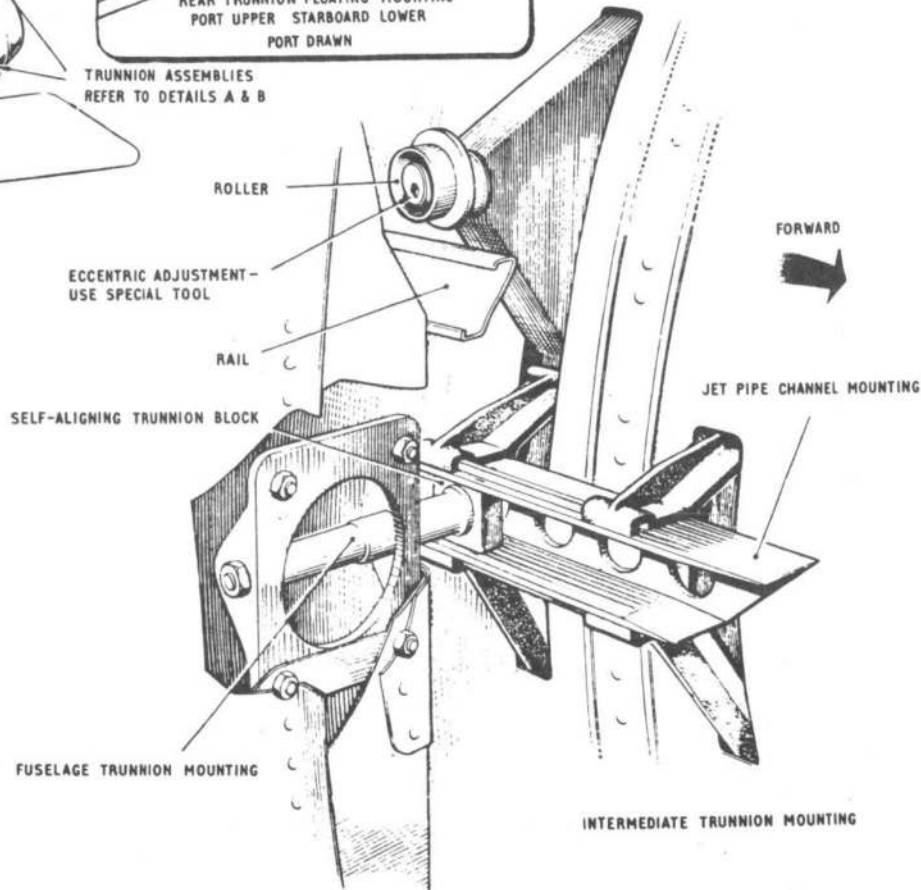
8. The forward ends of the intermediate pipes are supported by the exhaust units of their associated engines. The items are secured together by keep plates (fig. 20, detail C), two to each installation, which grip overlapping flanges on the engine and jet pipe by pressure applied with a castellated nut on each plate. Clearance within the joint permits axial expansion.

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NOTE:-
FOR ATTACHMENT OF JET PIPE FLANGE
TO EXHAUST UNIT FLANGE REFER TO
FIG. 20

TRUNNION ASSEMBLIES
REFER TO DETAILS A & B



RESTRICTED
JET PIPE MOUNTINGS

Intermediate mountings (fig. 2)

9. At frame 53 (No. 1 jet pipe) and frame 55 (No. 2 jet pipe) port and starboard trunnions support the aft ends of the intermediate pipes, and take the weight of the forward ends of the reheat pipes when these are assembled. Each trunnion carries a rectangular steel block mounted on a spherical bush; the block engages a short channel section supported by brackets on the intermediate pipe. Clearance is provided for radial expansion of the pipe.

Rear mountings (fig. 2)

10. Trunnions, integral with the reheat pipes, carry spherical bushes which are gripped by clamps bolted on the aft face of frame 62. The No. 1 jet-pipe starboard trunnion and the No. 2 jet-pipe port trunnion are of increased length and permit radial expansion of the jet pipe by being free to move through the spherical bush.

Jet-pipe handling

11. To facilitate jet pipe removal and installation, both intermediate and reheat pipes are fitted with eccentrically-mounted rollers (*fig. 2*) which may be lowered to register with rails in the fuselage, thus providing support for the jet pipes during handling operations. The rails for No. 1 jet pipe extend almost the full length of the installation, but the length of rail for No. 2 jet pipe is restricted by the position of equipment in the fuselage. To assist in aligning No. 2 jet pipe to the engine, therefore, a short rail in the fuselage upper structure (*fig. 20, detail B*) is used with a ground handling link to

support the forward end of the jet pipe; the link is also used during engine removal and installation.

Engine controls*General information*

12. The mechanical linkage from the cockpit engine control unit to the single H.P. cock and throttle valve lever on each engine, consists of conventional control tubes, levers, and Teleflex cables; there is a separate linkage to each engine. The two linkages are moved simultaneously by the autopilot throttle-servo actuator during auto-I.L.S. approaches when the actuator is connected to the control run by engagement of a manually-operated clutch; in an emergency, the clutch may be overridden by direct movement of the control unit handles. Rigging-pin locations are provided throughout the linkage. Reheat is selected or cancelled by microswitches which are operated at different settings of the control unit handles. Although minimum reheat can be selected only when the appropriate engine is running at maximum rev/min, the arrangement of the microswitches allows reheat to remain lit until engine speed drops to approximately 90 per cent rev/min when thrust is being reduced.

Engine control unit (fig. 3)

13. The engine control unit is mounted on the port console and combines the control of H.P. cocks, engine throttles and reheat, through two sliding handles, one for each engine, which are moved forward to increase engine power output. There is no impediment to forward-movement of the handles except for a slight

resistance at the reheat 'gate'. During aft movement, however, the handles are arrested at certain positions by a series of limit stops. Up to the reheat 'gate', frictional resistance to movement is applied by the airframe linkage. In the reheat section, where the linkage is inoperative, artificial friction is applied by a friction damper in the forward section of the unit; the pilot has no control over the damper setting, which is adjusted during engine controls rigging.

Limit stops

14. Adjustable stops in the engine control unit are located at the rearward limit of reheat hold-in (*para. 12*), and at the fast-idling, IDLING and H.P. COCKS CLOSED positions. Both reheat hold-in and fast-idling stops may be released by a mechanical trigger on No. 2 engine handle, whilst a second trigger, on the side of the unit, will release the idling stops for shut-down purposes. The trigger on No. 2 engine handle releases both reheat stops simultaneously, but individual stops may be released by depressing the appropriate one of two spring-loaded ramps located between the handle slots.

Shut-down stop

15. To prevent inadvertent shut-down of No. 2 engine, a fixed stop (Mod. 4189), incorporating a stop pad and a release button, is fitted to the fast-idling stop.

Control handles

16. No. 1 engine handle is a simple hand grip; No. 2 engine handle embodies an R/T transmitter button, the air-brake

switch, and the twist grip controller for the pilot's attack sight.

Throttle-servo clutch (fig.4)

17. The clutch comprises three separate levers, and a manual operating device, all mounted on a common shaft supported in a bracket; the complete assembly is secured in the structure of the port console. Two of the levers, one for each engine, are connected in the airframe throttle linkage and each carries one of two male clutch components. The third lever is interposed between the engine levers, and is connected to the servo actuator; this lever incorporates the female component of the clutch.

18. When the clutch is disengaged, the engine levers are free to pivot on the shaft during normal operation of the engine control handles. Clutch engagement is effected by rotating the control knob in a clockwise direction; this rotates a cam to bring the clutch faces into contact with each other, thus linking the servo actuator to the throttle levers on the engine. Belleville washers govern the overriding force required on the throttle control handles.

Accessory drives

Hydraulic pumps

19. Hydraulic pressure for the flying controls and services is supplied by four pumps, two on each engine. The pumps are mounted on either side of the external wheelcase on the port side of the compressor casing, and are secured by quick-release clamps supplied with the engine.

Engine starting

20. Engine starting is effected by the Plessey system of starting using iso-propyl-nitrate fuel in conjunction with high energy ignition. Details of this system are given in Chap.1A which should be read in conjunction with A.P. 103D-0208-16. Further information can be found in Sect.6, Chap.7 of this publication along with the relevant circuit and routing diagrams. The airframe components of the I.P.N. starting system are mounted beneath the fuselage spine fairing which hinges to starboard for access.

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.

Lubrication

21. The nomenclatures, reference numbers and N.A.T.O. code numbers of the lubricants referred to are given on the back of the Contents marker card at the front of this book. Ball bearings in the

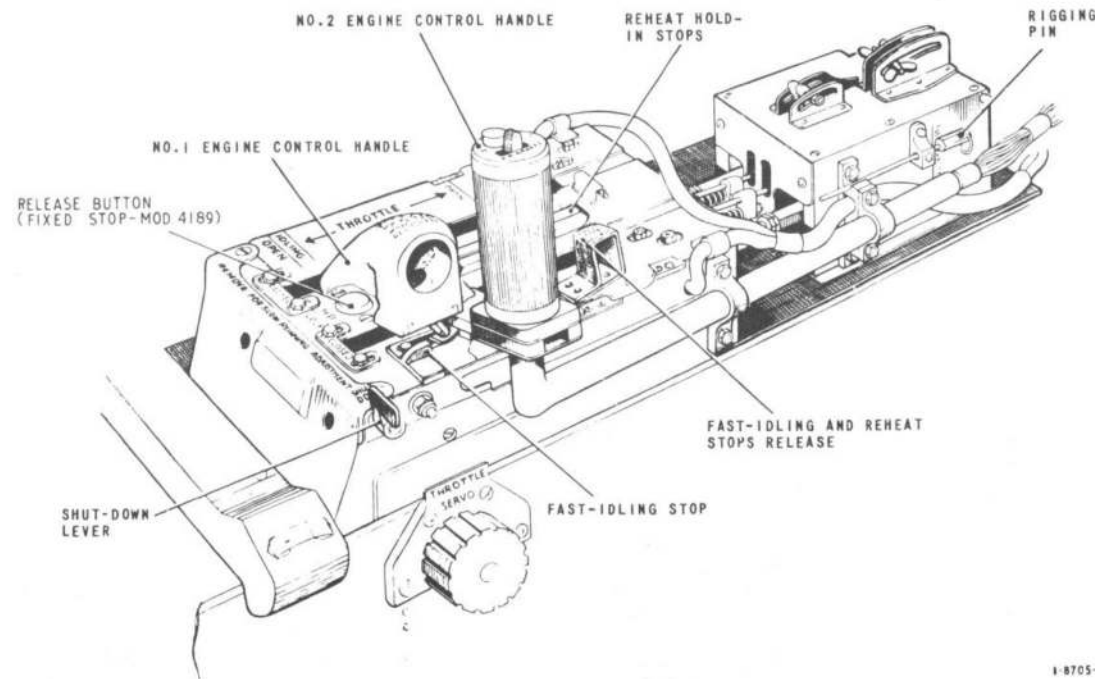


Fig. 3. Engine control unit

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assemblies are pre-packed with grease and do not normally require attention; it is generally necessary to dismantle the assemblies to renew the lubricant. Oil, where specified, is to be used sparingly. All control rods are designed to run dry in their roller guides and are not to be lubricated. The Teleflex controls are lubricated during assembly with grease XG-315.

Tools and equipment

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

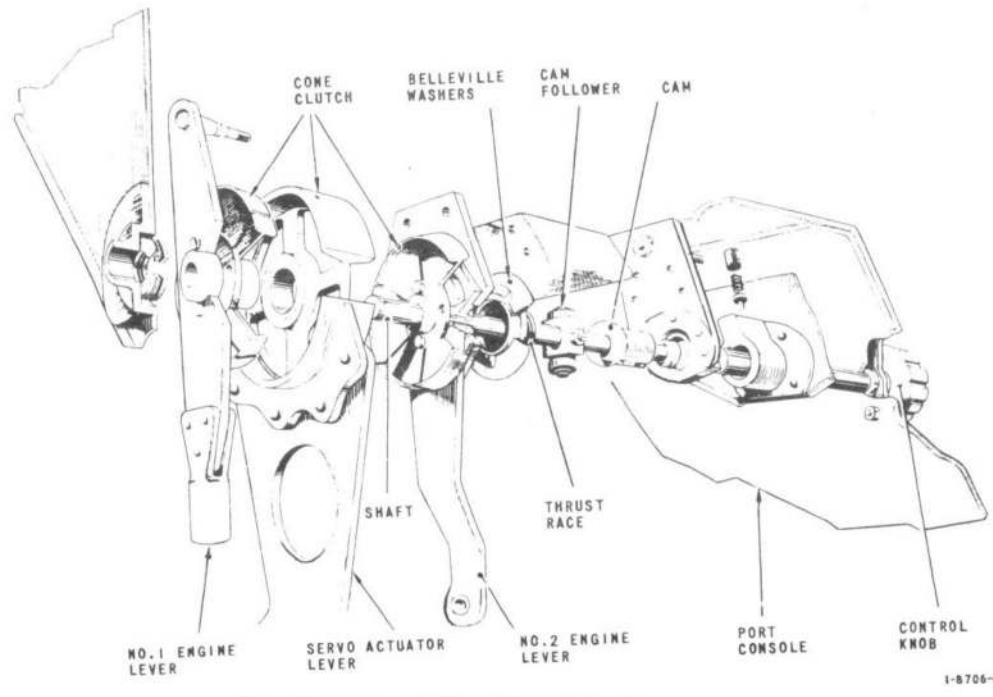


Fig. 4. Throttle-servo clutch

Engine controls rigging following engine installation (fig.6)

23. To rig the engine controls:-

- (1) Ensure that the airframe linkage is disconnected at the appropriate engine.
- (2) Set the engine control handles to the reheat gate, and insert rigging pin Ref.No.26DK/95457 through the forward component of the control unit to engage both engine levers. (The pin is stowed on the side of the forward component.)
- (3) Fit the engine throttle setting

quadrant to the fuel flow control unit (F.C.U.) on the appropriate engine, as follows (detail B):-

- (a) Attach the degree plate to the spring housing, using the bracket and two setscrews.
- (b) Check the throttle and H.P. cock lever on the F.C.U. for freedom over its full range of movement. Move the lever to the shut-off position, i.e. fully upwards.
- (c) Attach the pointer to the throttle lever, using the setscrew. Adjust the pointer to register against 0 deg on the scale, and tighten the set screw.

(4) Move the throttle lever on the F.C.U. to its maximum open position (fully down) and then move it back until the airframe link can be temporarily connected. Check that the pointer registers against a figure of not less than 83 deg on the quadrant. If necessary, adjust the link to obtain this minimum setting and lock the adjustment.

(5) Remove the rigging pin from the engine control unit and select maximum reheat. Check that the lever on the F.C.U. moves towards, but does not contact, the maximum open stop.

(6) Disconnect the airframe link from the F.C.U. lever and move the lever upwards to the slow-running detent. This position is felt as a slight resistance to movement.

(7) Remove the cover from the aft end

of the engine control unit, unlock the slow-running stop and screw it away from the associated control handle.

(8) Move the control handle aft until the last airframe link can be connected to the F.C.U. lever without disturbing the lever setting. Secure the airframe link with its nut and a new split pin.

(9) Screw up the slow-running stop to contact the control handle, lock the stop and fit the access cover.

(10) Operate the shut-down lever of the engine control unit and move the control handle back against the H.P. COCKS CLOSED stop. Check that the pointer registers against 0 deg on the quadrant. If it does not, adjust first on the H.P. COCKS CLOSED stop so that the F.C.U. lever contacts its stop before the control handle reaches the H.P. COCKS CLOSED stop. If further adjustment is necessary, adjust the airframe link to the F.C.U. and afterwards ensure that the pointer reads not less than 83 deg at the maximum cold thrust setting.

Note...

If the correct adjustment given above cannot be obtained, make a full rigging check (para. 24) and afterwards repeat the above checks.

(11) At frame 29 (port side, access panel 45P), check that No.1 engine throttle control rod bearing sleeve is set as in fig.7, detail G. If necessary, reset the bearing sleeve and relock it, using a new grubscrew, afterwards locking the grubscrew by centre popping.

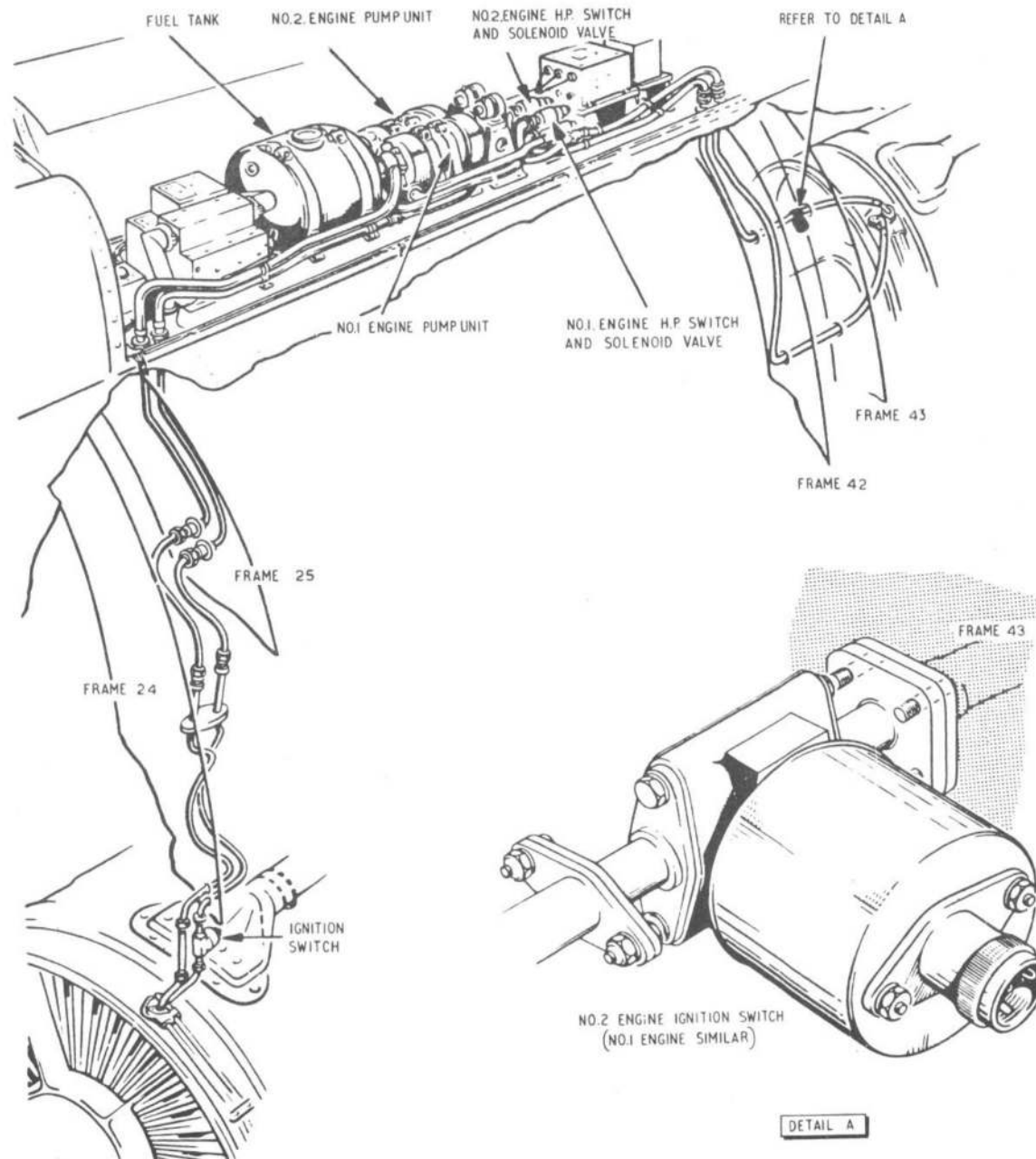


Fig. 5. Arrangement of engine-starter system

(12) Inspect all other adjustments for correct locking.

(13) At the first subsequent engine ground run, ensure that the controls setting is correct at H.P. COCKS CLOSED, FAST IDLING (No. 2 engine) and THROTTLE OPEN.

(14) On No. 2 engine only, check the adjustment of the FAST IDLING stop which must be set to produce 58 per cent rev/min. The adjustment is made by moving the stop in its slots.

Engine controls rigging - airframe linkage (fig. 7)

24. After breakdown of engine controls other than disconnection of the airframe linkage at the engine, or if correct adjustment cannot be achieved following engine installation (para. 23), the complete control run to the engine must be checked for correct rigging using rigging pin Ref. No. 26DK/95127. The check points are detailed in the illustration, and should be checked in sequence, commencing at the cockpit and working aft.

Reheat microswitch adjustment

25. The adjustment is described in A.P. 101B-1001-1B, Sect. 6, Chap. 7. After adjustment, make the following checks:-

(1) Position the aircraft for reheat running (Sect. 2, Chap. 2).

(2) Start both engines and run No. 2 engine at 50 per cent rev/min.

(3) Move No. 1 control handle forward into the reheat section. Upon overcoming

the gate stop, reheat should ignite and, after a short delay, the nozzle position indicator should move to the minimum reheat position.

(4) Continue moving the handle forward in ½ in. steps. After the first step, 1st intermediate reheat should be obtained with the appropriate nozzle opening. Similarly the 2nd intermediate and maximum reheat stages should occur at 1 in. and 1½ in. of forward movement respectively.

(5) Cancel reheat on No. 1 engine and reduce rev/min to 50 per cent, then repeat operations (3) and (4) with No. 2 control handle to check No. 2 engine microswitch settings.

Reheat-hold-in adjustment (fig. 6)

26. The adjustment is described in A.P. 101B-1001-1B, Sect. 6, Chap. 7.

Control unit friction-damper adjustment (fig. 6)

27. The levers for this adjustment are moved forward to increase damping, or aft to decrease damping, until the loading, measured at the appropriate control handle with a spring balance, is between 4 and 6 lb. It is important that the loading on both handles is equal.

Reheat fuel pipe leakage test

Pre Mod. 1577

28. To test for leakage in the flexible fuel pipe:-

(1) Ensure that the fuel supply pipe is securely attached to the reheat pipe adapter.

(2) Screw the test valve on the adapter fully in.

(3) Connect the fuel pressurizing rig (fig. 8) to the test connection on the adapter.

(4) Remove the blanking cap from the bleed point of the associated reheat fuel pumps; a small quantity of fuel should flow out. The bleed point is on the outboard side of the fuel outlet casting and is accessible beneath access panels 41P and 57P for No. 1 and No. 2 engines respectively.

(5) Connect a suitable drainpipe to the bleed point.

(6) Open the cock on the pressurizing rig and pressurize the system slowly up to 50 lb/in². Check that no fuel drains from the bleed point on the fuel pumps.

Note...

If fuel does drain from the bleed point, the non-return valve is unserviceable and the fuel pump must be replaced (Sect. 4, Chap. 2).

(7) If no fuel appears at the bleed point, increase fuel pressure to 600 lb/in² and inspect the flexible pipe joints for leakage.

(8) Release the pressure and unscrew the test valve to its normal position.

(9) Apply 600 lb/in² pressure with the ground rig and close the cock on the rig. Check that no pressure drop occurs over a period of 5 minutes.

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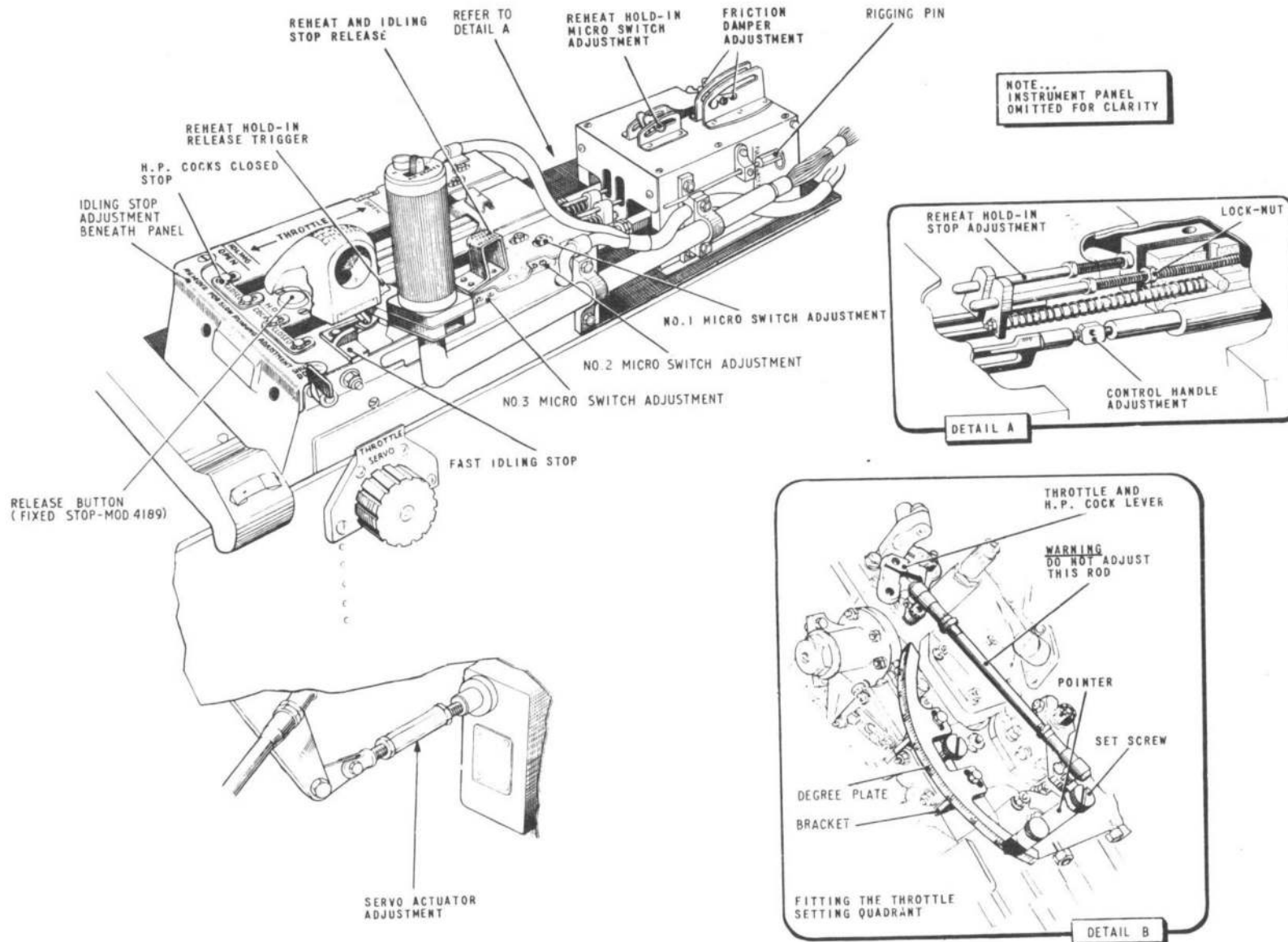


FIG.6. ENGINE CONTROLS RIGGING (I)

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Post Mod. 1577

29. To test for leakage in the flexible fuel pipe and bleed return pipe:-

(1) Carry out the operations listed in para. 28(1) to (3) inclusive.

(2) Disconnect the bleed pipe from the associated reheat fuel pump; a small quantity of fuel should flow out. The bleed pipe connection is on the outboard side of the fuel outlet casting and is accessible beneath access panels 41P and 57P for No. 1 and No. 2 engines respectively. Blank off the bleed pipe.

(3) Connect a suitable drainpipe to the bleed pipe connection on the reheat fuel pump.

(4) Disconnect the bleed return pipe to the port fuel tank at the non-return valve, accessible beneath access panel 122P, and blank off the pipe.

(5) Open the cock on the pressurizing rig and pressurize the system slowly up to 50 lb/in². Check that no fuel drains from the pump bleed pipe connection. Release the pressure.

Note...

If fuel does drain from the bleed pipe connection, the pump non-return valve is unserviceable and the fuel pump must be replaced (Sect. 4, Chap. 2).

(6) Disconnect the non-return valve, Part No. 9811245/1B from the respective restrictor, Part No. EB2.57.2319, and blank off the restrictor. The non-return valves (for No. 1 and No. 2 systems) are

located, on the port side, in No. 1 intermediate jet pipe bay, between frames 47 and 49.

(7) Pressurize the system slowly up to 50 lb/in²; then increase the pressure to 600 lb/in², and close the cock on the rig. Check that no pressure drop occurs over a period of 5 minutes. If no leak occurs, release the pressure.

(8) Reconnect the non-return valve to the respective restrictor and repeat operation (5).

(9) Reconnect the bleed pipes disconnected in operations (2) and (4).

(10) Carry out a reheat ground run and inspect for fuel leakage at the reheat pump pipe connection (access panels 41P and 57P) and the pipe connection to the non-return valve (access panel 122P).

Engine starter system testing

30. Prior to making any tests of the I.P.N. system involving the use of Kerosine, the pump units, located in the rear fuselage spine, must be replaced with slave pumps. The pump units must be refitted prior to making checks using iso-propyl-nitrate.

REMOVAL AND ASSEMBLY

Precautions

31. The following precautions are to be observed before and during removal and assembly operations:-

(1) Ensure that the aircraft battery

is isolated, and that all external electrical supplies are disconnected.

(2) Blank off all pipes and electrical connections immediately they are disconnected.

(3) Jack and trestle the aircraft fully (Sect. 2, Chap. 4) before removing more than one engine hatch.

(4) Trestle the aircraft at frame 59 before removing No. 1 engine or fitting the jet pipe handling cradle.

(5) Ensure that the fuel cocks are closed before removing either engine.

(6) Ensure that hydraulic servicing trolleys are not running, and that the tail-plane accumulators are discharged, before removing or assembling a jet pipe.

(7) Ensure that the bulkhead sealing ring is not damaged when the intermediate jet pipe is separated from, or connected to the engine exhaust unit. If the joint in the sealing ring is conveniently positioned (at 6 o'clock, No. 1 installation, or at 12 o'clock, No. 2 installation) a seal joint guard, locally manufactured from sheet metal, can be interposed between the seal joint and the jet pipe.

(8) Ensure that the intermediate jet pipe keep plates are fitted correctly (refer to fig. 20 - detail C). Incorrect fitting will prevent the heat shield sections from seating on the braided seals and result in hot gas leakage.

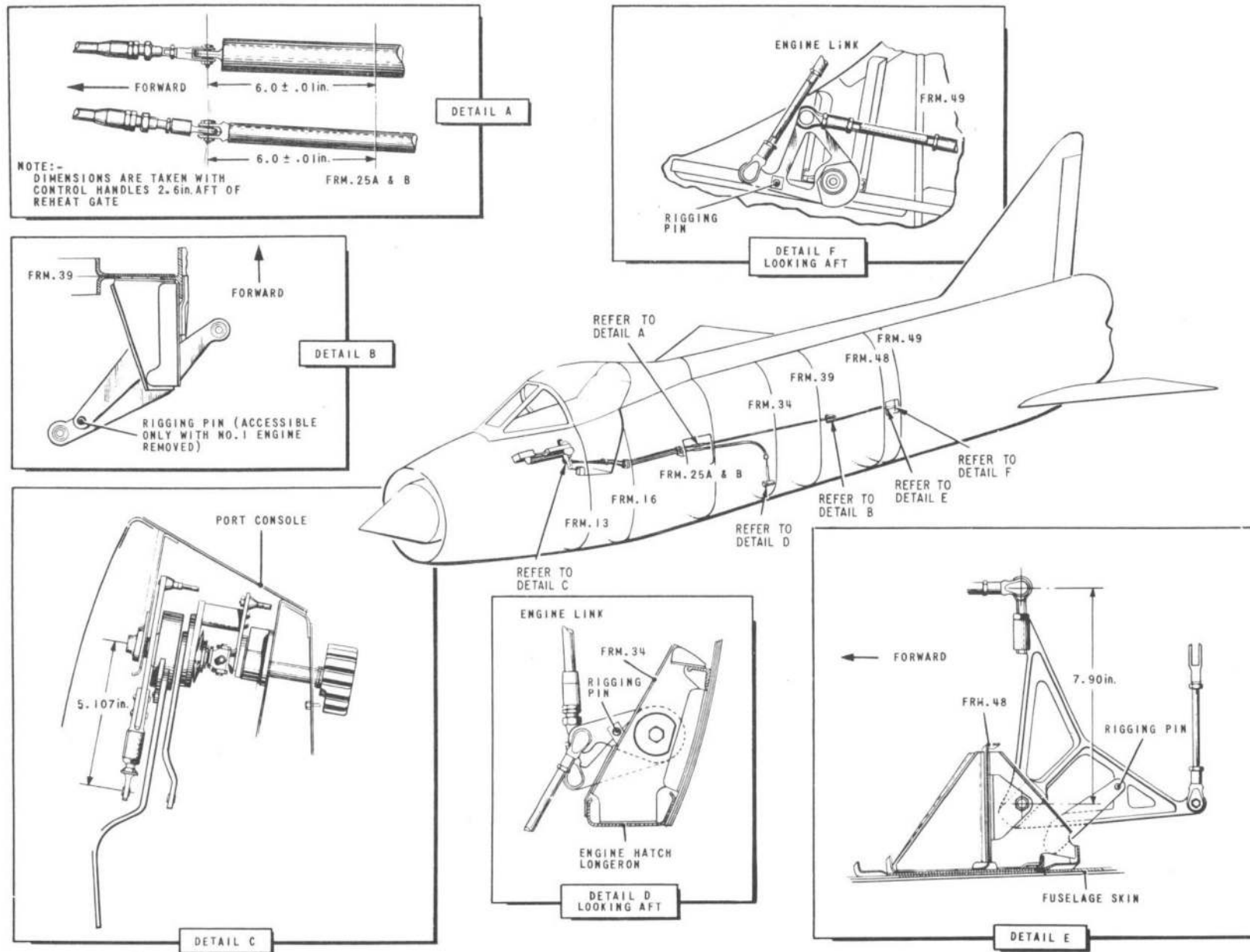


FIG. 7. ENGINE CONTROLS RIGGING (2)

No. 1 E.C.U.*Equipment required*

32. Refer to Table 1. Assemble the relevant ground equipment.

Removal (fig.9 and 10)

33 To remove No.1 E.C.U.:-

(1) Ensure that the necessary precautions (para.31) are being observed.

(2) Remove the engine hatch (Sect.3, Chap.1).

(3) Disconnect the 24-volt supply to the high-energy ignition units on the duct access panel (fig.11).

(4) Disconnect the high-tension leads from the ignition units.

(5) Remove the lower half of the air intake duct-to-engine sealing ring housing (fig.11) by unscrewing the special bolts; use the special key.

(6) Remove the duct access panel by withdrawing six bolts (fig.11).

Note...

The panel is located by two dowels which engage holes in frame 21.

(7) Fit the engine air intake blanking panels.

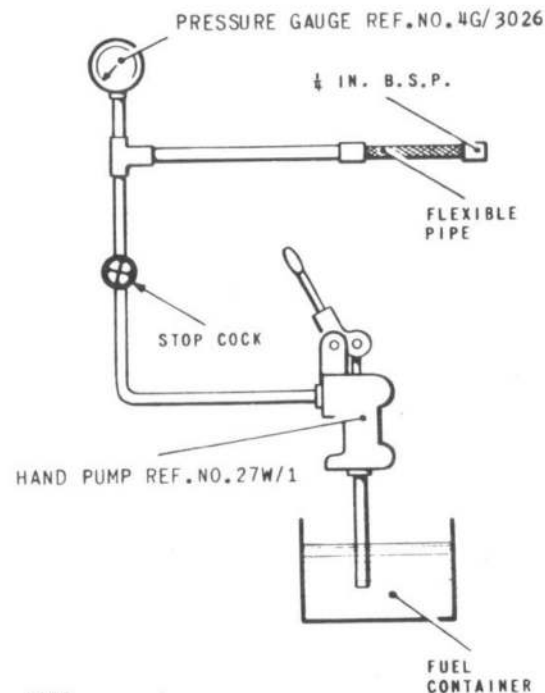
(8) Remove the starter motor domed fairing by unfastening the quick-release toggles, rotating the fairing a few degrees counter-clockwise, and withdrawing it forward.

(9) Remove the flexible vent pipe, be-

tween the overboard vented heat shield at the exhaust unit and the fuselage skin adapter, by unfastening the two quick-release clamps (fig.9, detail F).

(10) Release the four fasteners securing the two sections of the overboard vented heat shield together, and detach the bottom section. Remove the top section by sliding it around the engine towards the port side.

(11) Detach the keep plates (fig.20),



NOTE...
THE STOP COCK MUST BE ABLE TO
MAINTAIN 600 LB/IN² PRESSURE

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Fig. 8. Reheat fuel pressure testing rig.

and substitute the two divorcing tools, positioning them so that the flanged ends of the tool travellers abut the aft face of the flange on the engine exhaust unit. Using a suitable spanner, rotate the pinions of the tool to separate the jet pipe from the engine.

(12) Disconnect the starter motor igniter leads on the engine extension (fig.10, detail D).

(13) Disconnect the starter overspeed cable (fig.9, detail C).

(14) Disconnect the starter motor air and fuel pipes (fig.9, detail C).

(15) Disconnect the servo bleed pipe at the reheat control unit (fig.9, detail A).

(16) Disconnect the hydraulic pump hoses at the fuselage connections (fig.9, detail D) and the drainpipes at the pumps.

(17) Disconnect the air ducts from the engine non-return valves using, on F Mk.1 aircraft only, the special spanners.

(18) Disconnect the air supply pipe to the reheat pump (fig.9, detail H).

(19) Disconnect the three engine-electrical-services cables (fig.9, detail B).

(20) Unscrew the auxiliary air system supply pipe using the special spanner (fig.9, detail E).

(21) Disconnect the engine wheelcase

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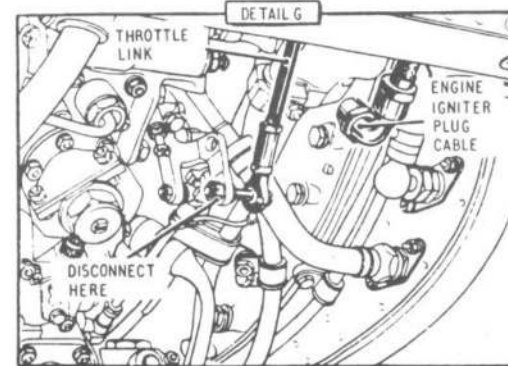
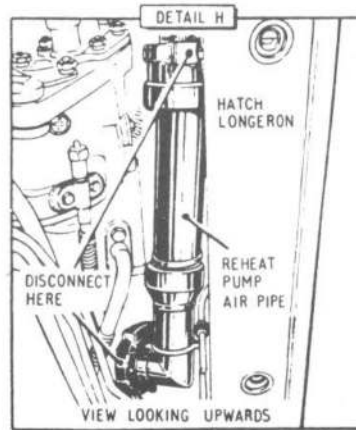
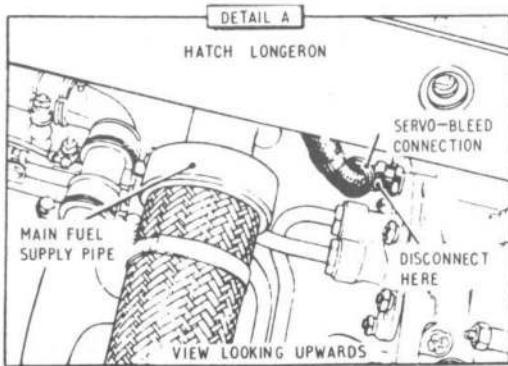
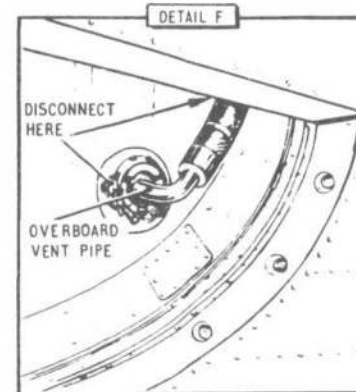
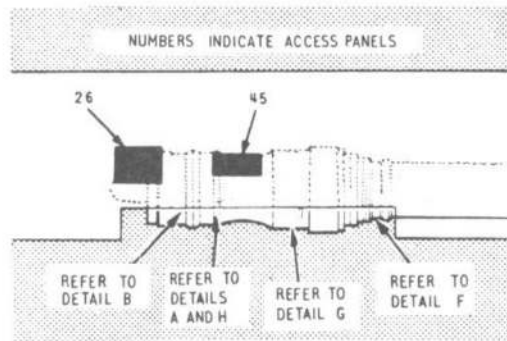
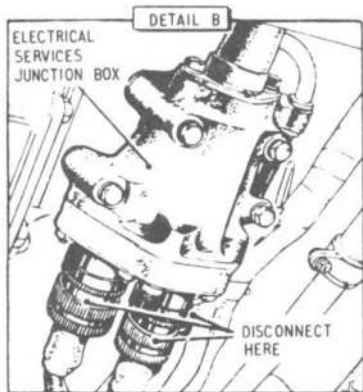
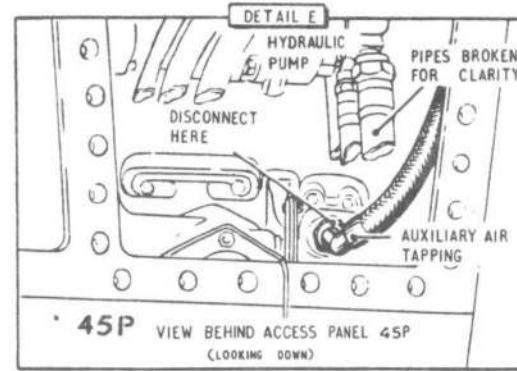
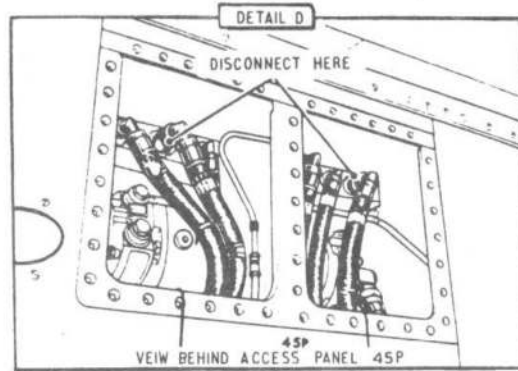
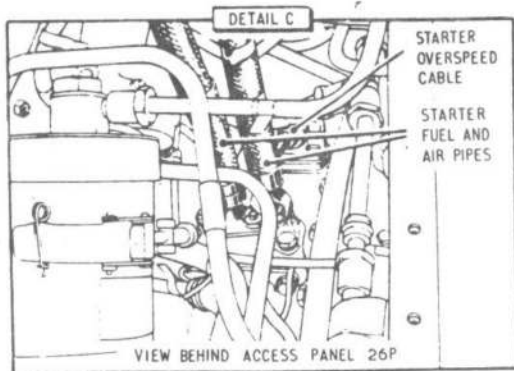


FIG.9. No.1. E.C.U.—REMOVAL AND ASSEMBLY (1)

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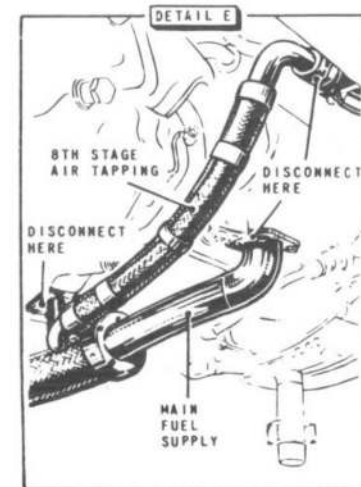
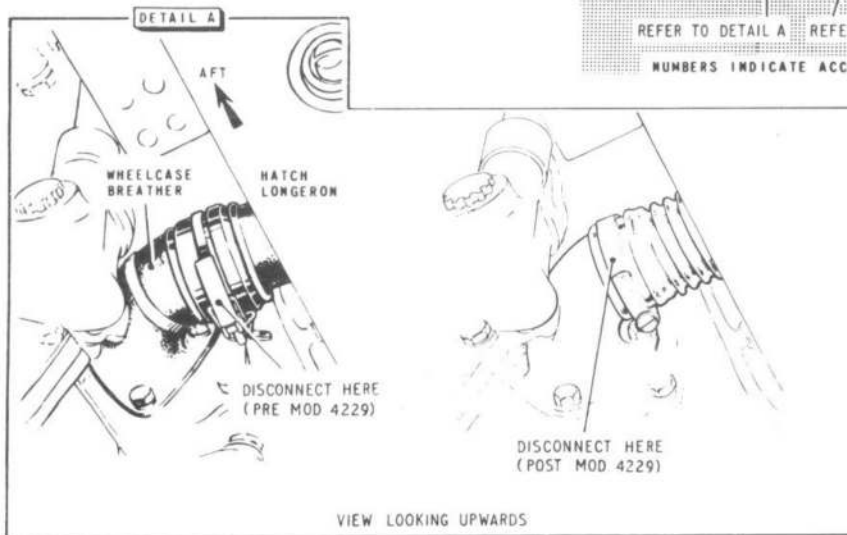
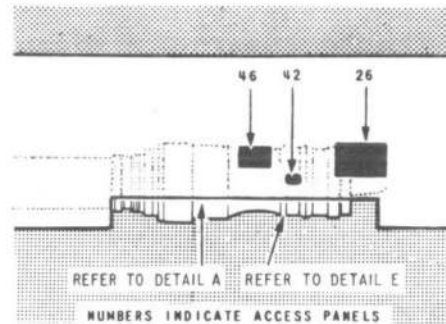
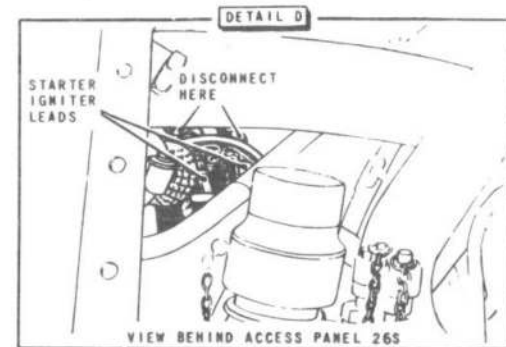
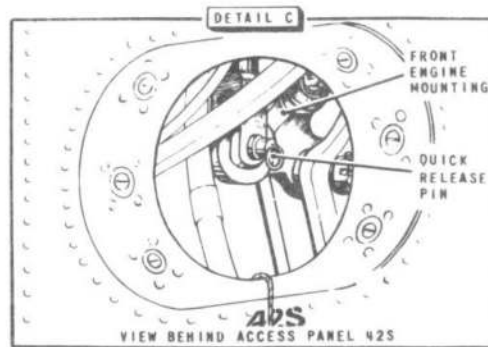
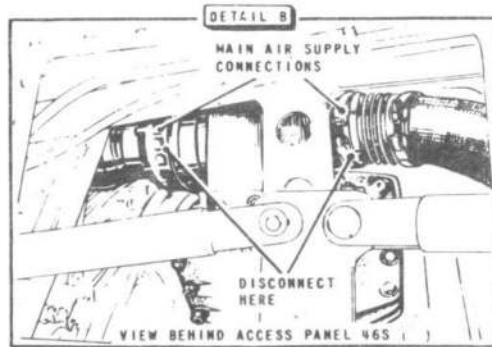


FIG. 10. NO.1 E.C.U.-REMOVAL AND ASSEMBLY (2)

breather pipe at the engine, and withdraw the pipe (fig.10, detail A).

(22) Disconnect the engine throttle control rod at the fuel flow control unit (fig.9, detail G).

(23) Remove the engine fuel supply flexible hose by disconnecting at the engine and the fuselage duct (fig.10, detail E).

(24) Disconnect the guided weapon pack hot air tapping at the 8th compressor stage and at the fuselage union on the starboard hatch-longeron (fig.10, detail E).

(25) Disconnect the high-tension leads to the port and starboard igniter plugs (fig.9, detail G).

(26) Secure the forward and aft hoist support beams to the hatch fastener nuts at frames 27 and 29, and frames 36 and 39, respectively, on each hatch longeron (fig.12, detail A).

(27) Mount the engine hoisting cradle on the engine handling trolley and position the assembly beneath the engine.

(28) Fit a hoist to each support beam, and enter the ball-end of each cable into the appropriate cradle attachment; lock the ball ends with the quick-release pins (fig.12, detail B).

(29) Raise the cradle to the engine and secure it, at the aft end, to the brackets located below the rear engine mountings. Continue winding until the overload device on each hoist slips.

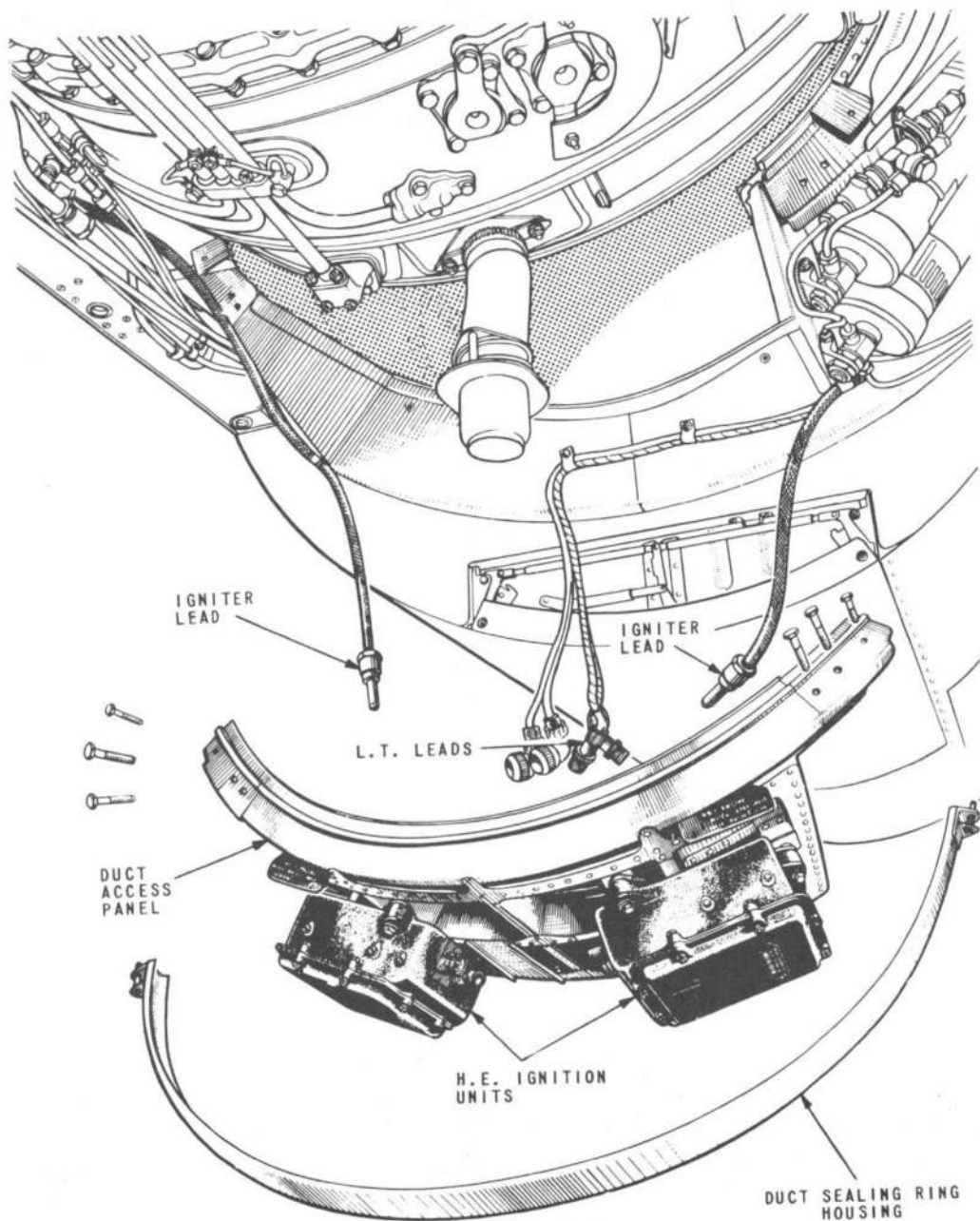


Fig.11. Duct access panel - removal and assembly

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(30) Remove the quick-release pins from the forward engine mountings (*fig.10, detail C*).

(31) Dismantle the rear mountings as follows (*fig.1*):-

(a) Remove the locking pin from the starboard trunnion.

(b) Straighten the tab washers locking the mounting bolts, and remove the bolts, using a tube spanner.

(c) Withdraw the tapered sleeves, using, on the starboard mounting only, a key with a 1 in. Whitworth socket and ratchet handle.

(d) Withdraw the trunnion, using an extractor.

Note...

In preparation for the installation of the replacement E.C.U., the following treatment should be given to the trunnion and housings:-

1. Apply D.T.D.900/4648 lubricant to the trunnion sleeves, at the shaded areas indicated in *fig.13*.

2. Apply similar lubricant to the trunnion housing bores over a length of 4 in. inboard from the fuselage skin. Leave the lubricant to dry for not less than 30 minutes.

(32) Adjusting the lateral trim as necessary to avoid fouling, lower the engine and cradle on to the trolley.

Preparation of replacement E.C.U. (fig.14)

34. To prepare the replacement E.C.U.

for installation, the following items will be required from the E.C.U. removed from the aircraft. The drain adapter plates must be fitted horizontally.

(1) The main air system non-return valve. Assemble, using new locking strips (*detail A*).

(2) Hydraulic pumps (*detail B*).

Note...

Smear the splines with grease XG-284 before fitting the pumps.

(3) Auxiliary air system supply pipe adapter (*detail C*). Use jointing compound Ref.No.34B/29B for sealing the joint.

(4) Compressor seal vent output adapter (*detail D*).

(5) Fuel control unit drain (*detail E*).

(6) Oil cooler drain (*detail F*).

(7) Combustion chamber drain (*detail G*).

(8) Jet pipe joint drain; use bolts and spring washers on replacement E.C.U. (*detail H*).

(9) Engine air intake blanking panels.

Assembly (fig.9 and 10)

35. With the engine in the correct state of preparation (*para.34*) and mounted in the handling trolley:-

(1) Ensure the necessary precautions (*para.31*) are being observed.

(2) Tie back loose electrical leads

and flexible hoses in the engine bay, and examine the bay for cleanliness.

(3) Remove the starter motor domed fairing.

(4) Position the engine below the engine bay and fit the hoists (*para.33 and fig.12*).

(5) Raise the engine and cradle, adjusting the lateral trim as necessary, and align the rear mounting trunnion housings.

(6) Assemble the rear mountings, after ensuring correct lubrication (*para.33 (31) note*), as follows:-

(a) Insert each trunnion into its fuselage housing and, using the trunnion spanner, engage the slots in the trunnion with the nut in the engine housing.

Note...

The trunnion sleeves for the starboard mountings of the respective engines differ because of a necessity to take up 0.075 in. malalignment of the No.1 engine. Fit sleeves only as follows:-

No.1 engine: trunnion sleeve Ref. No.26DK/10021, Pt.No.EB2.11.17515.

No.2 engine: trunnion sleeve Ref. No.26DK/2730, Pt.No.EB2.11.16617.

(b) Fit the starboard tapered sleeve over its trunnion and screw it tight, using a key with a 1 in.

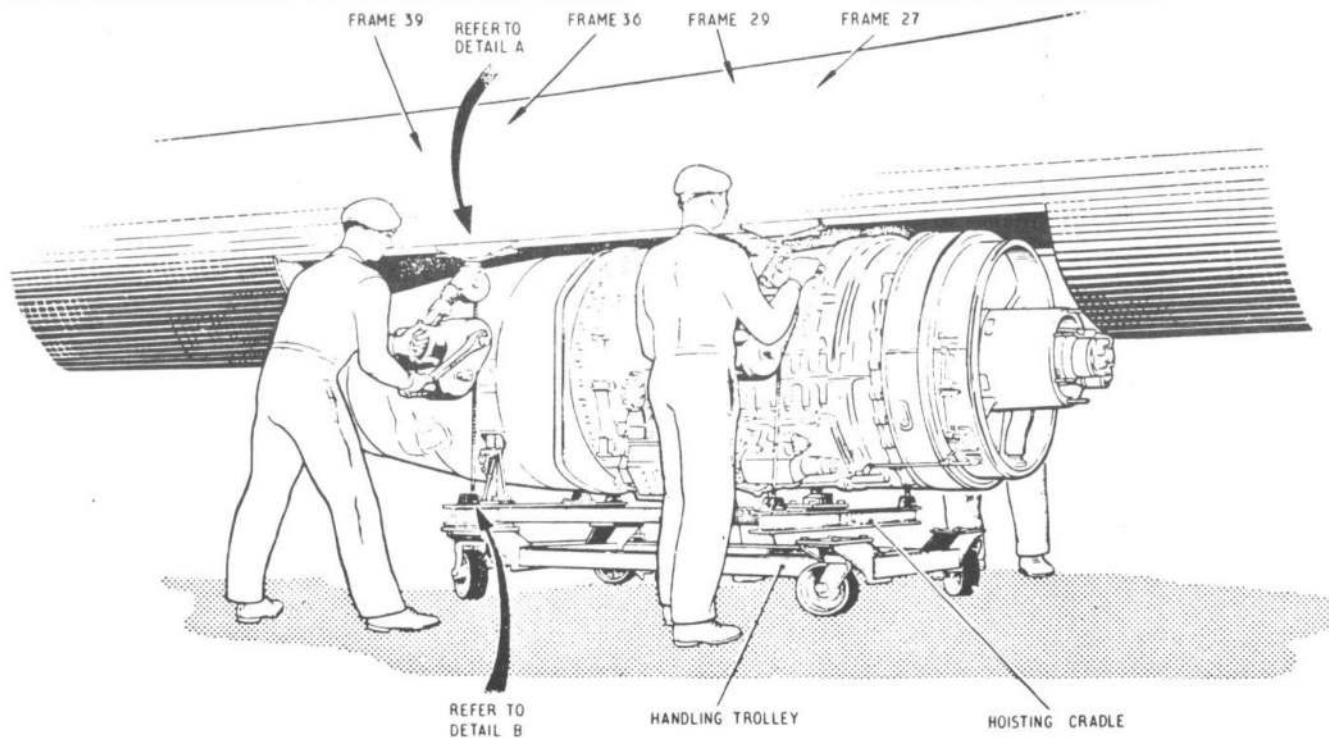
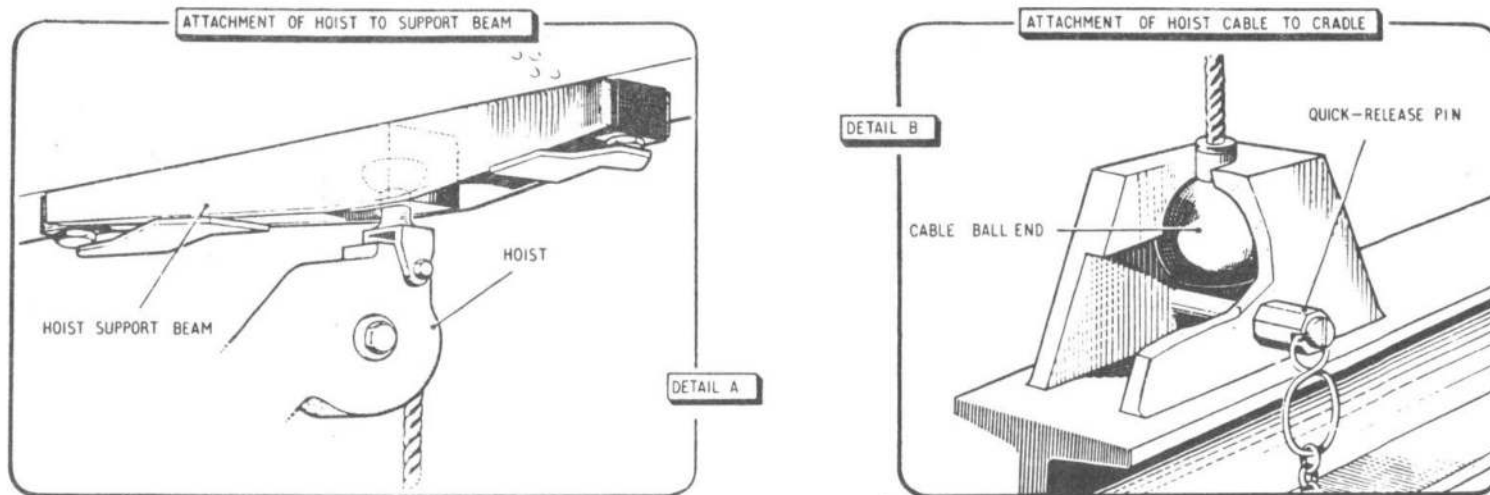


FIG. 12. No. 1. E.C.U. REMOVAL AND ASSEMBLY EQUIPMENT

Whitworth socket and ratchet handle. Insert the quick-release pin through one of the notches in the sleeve and a corresponding hole in the housing (fig.1). The sleeve may be unscrewed by the minimum amount necessary to achieve this.

(c) Fit the sleeve over the port trunnion.

(d) Fit the port and starboard trunnion bolts, flanged bolt to port, using new tab washers; tighten the bolts with the special spanner.

(e) Check for correct engagement of the starboard trunnion (fig.15).

(7) Insert the quick-release pins in the forward mountings (fig.10, detail C).

(8) Remove the quick-release pins securing the cradle, and lower the cradle on to the trolley. Dismantle the hoists and remove the support beams from the hatch longerons and stow them on the trolley.

(9) Connect the engine fuel supply hose, ensuring that the seal is correctly seated in the engine flange (fig.10, detail E).

(10) Connect the 8th-stage compressor tapping for guided weapon pack heating (fig.10, detail E).

(11) Fit the wheelcase breather pipe into its fuselage component and connect it to the engine (fig.10, detail A).

(12) Fit the auxiliary air system connector (fig.9, detail E).

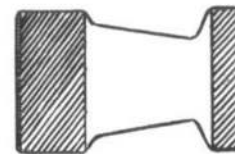
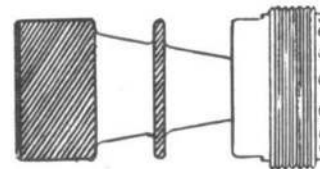
(13) Connect the reheat fuel pump air supply pipe, ensuring that the seal is correctly seated (fig.9, detail H).

(14) Lubricate the threads of the air system non-return valve housing (Sect. 3, Chap.8A), replace the washers, and connect and lock the pipe (fig.10, detail B).

(15) Connect the hydraulic hoses to the fuselage connections and the drainpipes to the pumps (fig.9, detail D).

(16) Connect the servo bleed pipe to the reheat control unit (fig.9, detail A).

(17) Connect the engine electrical cables to the junction (fig.9, detail B).



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Fig. 13. Trunnion-sleeve lubrication

(18) Connect the starter motor fuel and air pipes; use new tab washers (fig.9, detail C).

(19) Connect the starter motor igniter cables to their respective points on the engine intake extension (fig.10, detail D).

(20) Connect the starter overspeed cable (fig.9, detail C).

Note...

Before connecting the jet pipe to the engine exhaust unit (operation (21)) the sealing ring joint must be secured in the unexpanded position with a short length of adhesive tape. This will prevent displacement of the sealing ring when the connection is made.

(21) Attach the divorcing tools to the keep plate attachment flanges with the flanged ends of the travellers hooked around the front face of the engine exhaust unit flange. Rotate the pinions of the tools to pull the jet pipe forward until it surrounds the exhaust unit, and fit and secure the keep plates.

(22) Assemble the hot-air ventilation shroud and connect the flexible pipe.

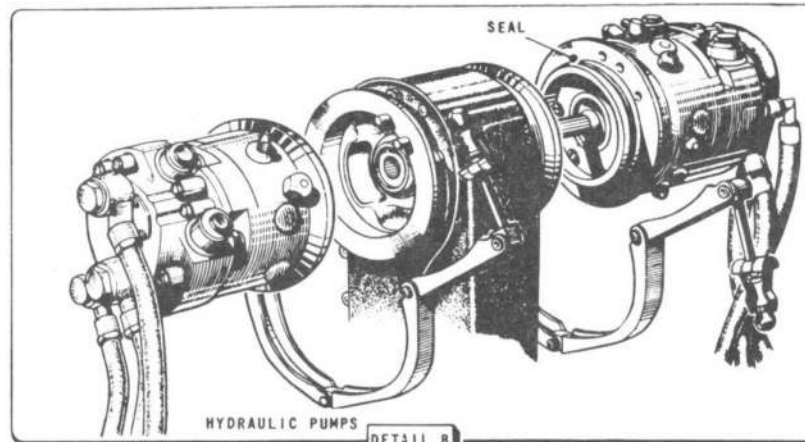
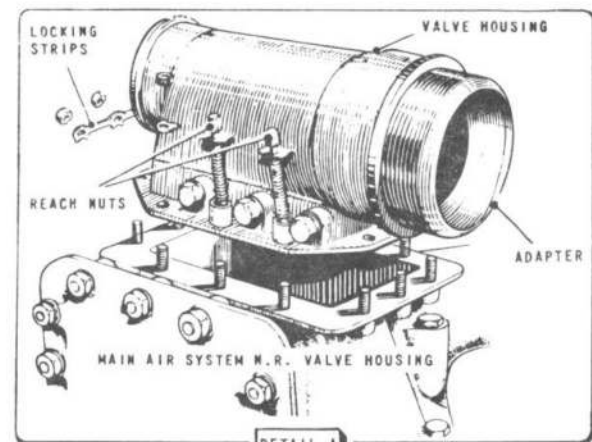
(23) Fit the starter motor domed fairing, ensuring positive engagement of the locating pin.

(24) Remove the air intake blanking panels.

(25) Refit the duct access panel.

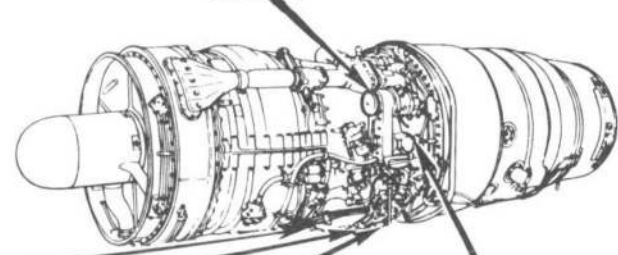
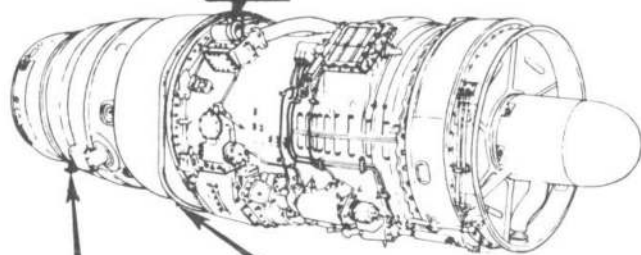
(26) Fit the lower half of the air in-

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DETAIL A

DETAIL B



DETAIL H

DETAIL G

DETAIL F

DETAIL E

DETAIL D

DETAIL C

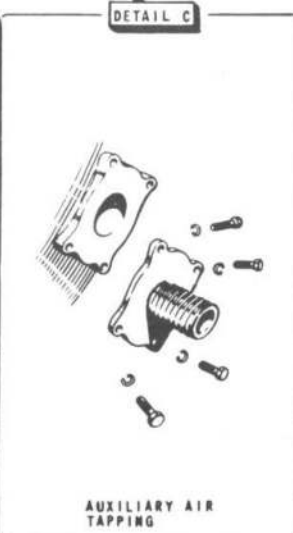
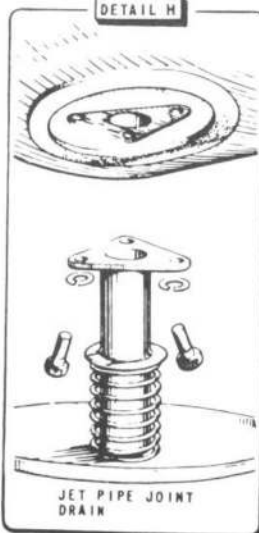
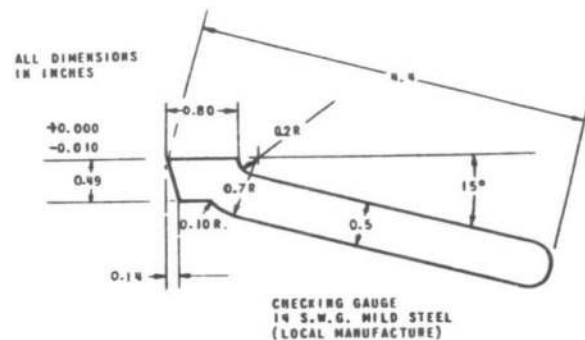
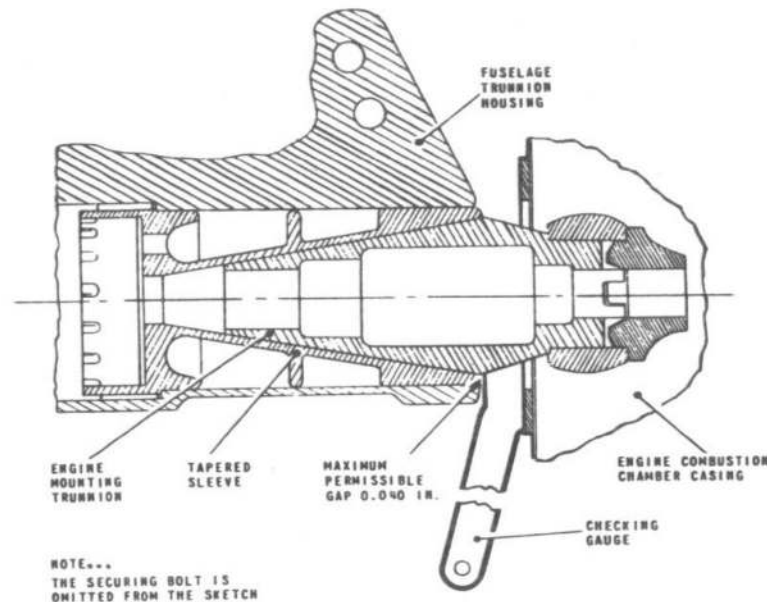


FIG.14. NO.1 E.C.U.- PREPARATION

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Fig.15. Checking rear mounting-trunnion engagement

take sealing ring housing, using the special tool.

Note...

One flange on the channel section of the housing is thinner than the other. The thin flange should face forward and engage the groove in the duct access panel rib.

(27) Connect the high-tension leads to the engine igniter plugs and to the high-energy ignition units (fig.9, detail G).

(28) Fit the overboard vent pipe (fig.9, detail F), and tighten the two quick-release clamps.

(29) Connect the 24-volt leads to the high-energy ignition units.

(30) Carry out the engine controls rigging checks (para.23).

(31) Carry out the starter system fuel priming and 'fail safe' checks (A.P.1181B, Vol.1, Sect.3, Chap.2).

(32) Fit the engine hatch (Sect.3, Chap.1).

No.2 E.C.U.*Equipment required*

36. Refer to Table 1. Assemble the relevant ground equipment:-

Removal (fig.16 and 17)

37. To remove No.2 E.C.U.:-

(1) Ensure that the necessary precautions (para.31) are being observed.

(2) Remove the engine hatch (Sect.3, Chap.1)

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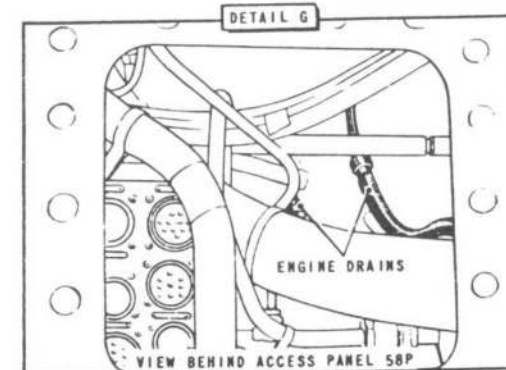
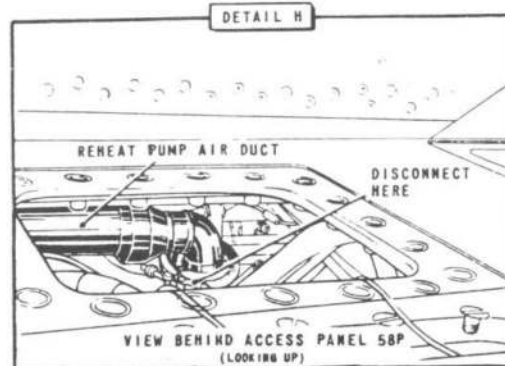
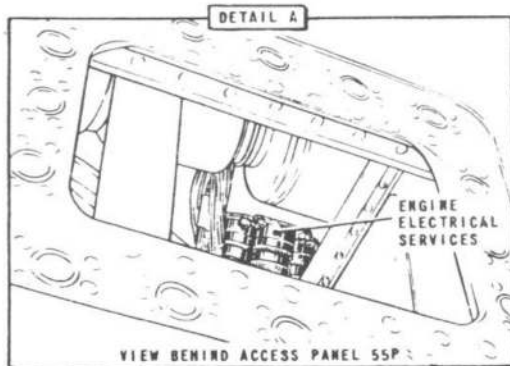
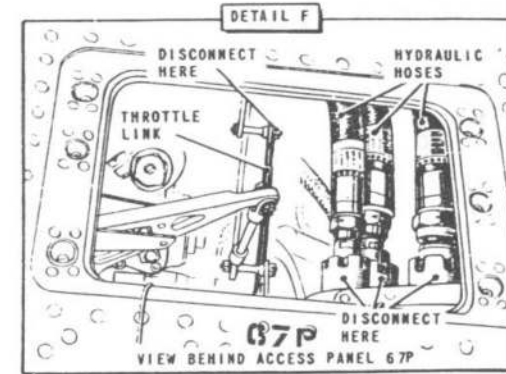
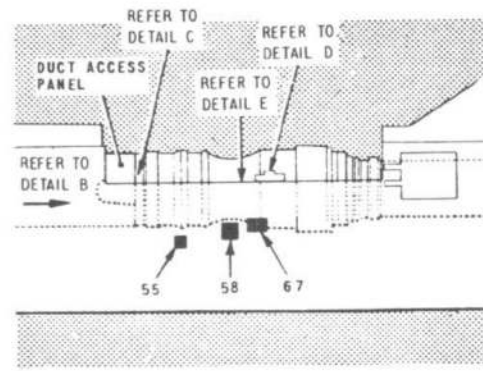
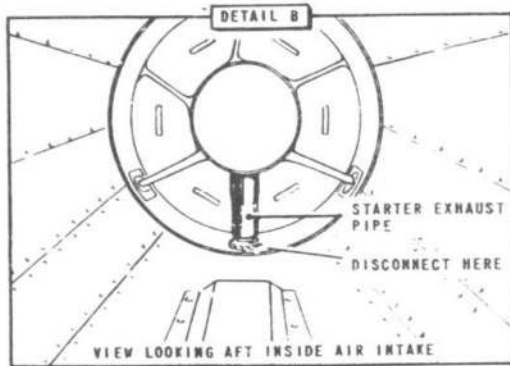
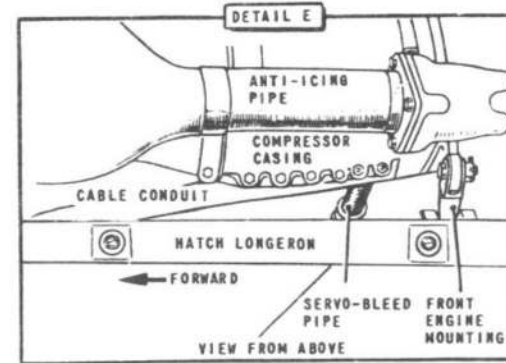
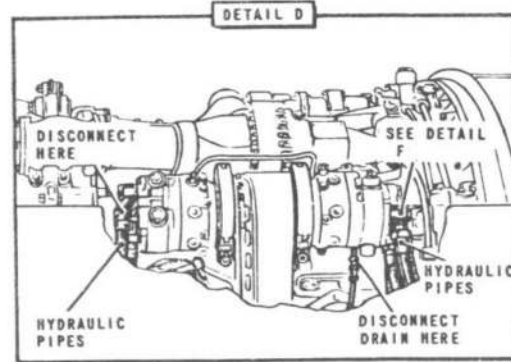
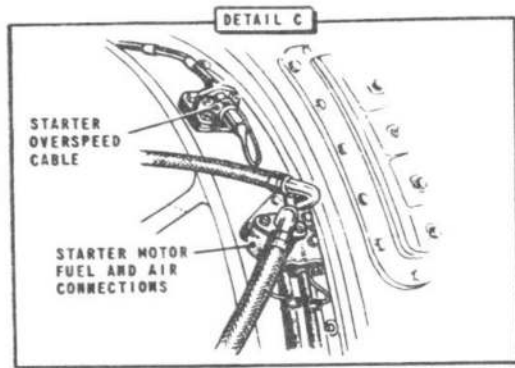


FIG.16. No.2. E.C.U.-REMOVAL AND ASSEMBLY (1)

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(3) Remove the upper half of the air intake duct sealing ring housing, using the special key.

(4) Remove the duct access panel, which is located by two dowels in the forward member and secured by six bolts. This is similar to that shown in fig. 11 except for the ignition units.

(5) Fit the engine air intake blanking panels.

(6) Disconnect the starter motor fuel and air pipes at frame 43.

(7) Disconnect the starter motor ignition leads and overspeed switch cable at their respective points (fig. 17, detail E and fig. 16, detail C respectively).

(8) Remove the air pipe between the engine non-return valve and the main air duct (fig. 17, detail D and F); use the special spanner.

(9) Disconnect the engine fuel supply hose at the engine adapter (fig. 17, detail G).

(10) Disconnect the engine throttle control rod at the fuel flow control unit (fig. 16, detail F).

(11) Disconnect the forward hydraulic pump hoses at the pump (fig. 16, detail D) and the aft pump hoses at the fuselage couplings (fig. 16, detail F).

(12) Disconnect the aft pump drain at the intermediate union between the pump and the fuselage (fig. 16, detail D).

(13) Disconnect the air supply pipe to the reheat fuel pump at the air shut-off cock (fig. 16, detail H).

(14) Remove the engine wheelcase breather pipe by dismantling the quick-release clamp and withdrawing the pipe outward from the fuselage adapter (fig. 17, detail C).

(15) Unscrew the auxiliary air system supply flexible pipe from the engine adapters (fig. 17, detail C).

(16) Disconnect the servo-bleed pipe at the fuselage union (fig. 16, detail E).

(17) Disconnect the engine electrical services cables at the junction box on the compressor casing (fig. 16, detail A).

(18) Disconnect the H.T. cable from the starboard igniter plug (access panel 60S) using the special spanner.

(19) Disconnect the flexible drainpipe from the fuel flow control unit at the fuselage union (fig. 16, detail G).

(20) Disconnect the oil cooler flexible drainpipe at the fuselage union (fig. 16, detail G).

(21) Disconnect the jet pipe joint flexible drain at the bracket on the starboard side of frame 53 (fig. 17, detail A) and secure it to the overboard vented heat shield with adhesive tape, avoiding acute bends.

Note...

Use two spanners for disconnecting the pipe.

(22) Remove the access panel in the frame diaphragm at the top of frame 53.

(23) Fit the handling link to the rail on stringer No. 1 and connect it to the intermediate pipe (fig. 20, detail B). Adjust the turnbarrel until the link supports the intermediate jet pipe.

(24) Unscrew the clamp bolts of the stiffened ring at the intermediate-reheat jet pipes joint by not more than 9 turns (access panel 74P and 74S).

Note...

After the embodiment of the Rolls-Royce modification which introduces captive clamp bolts, the limitation on the unscrewing of these bolts is not applicable.

(25) Remove the flexible pipe between the overboard vented heat shield at the engine exhaust unit and the reheat pump exhaust duct (fig. 17, detail B).

(26) Release the four fasteners securing the two sections of the overboard vented heat shield and remove the top half of the shield. Lower the bottom half gently on to the fire floor.

(27) Detach the keep plates (fig. 20, detail C) and substitute the two divorcing tools positioning them so that the flanged ends of the travellers abut the aft face of the flange on the engine exhaust unit. Using a suitable spanner rotate the pinions of the tools to separate the jet pipe from the engine.

(28) Remove the starter motor domed

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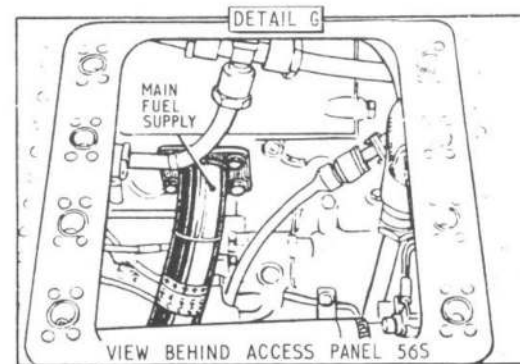
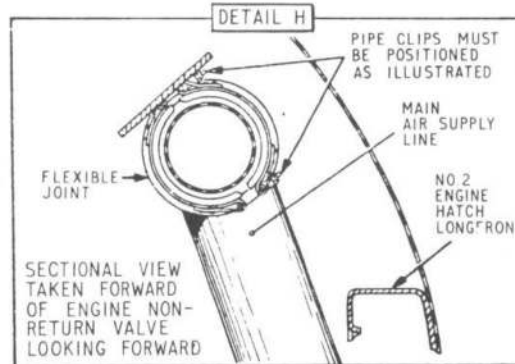
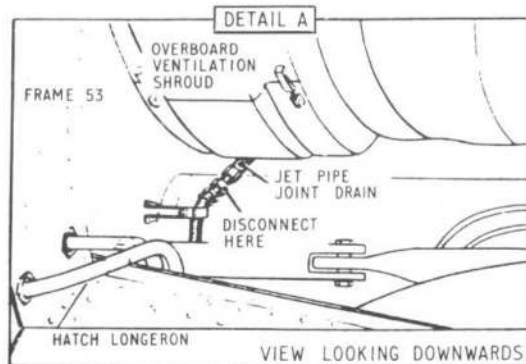
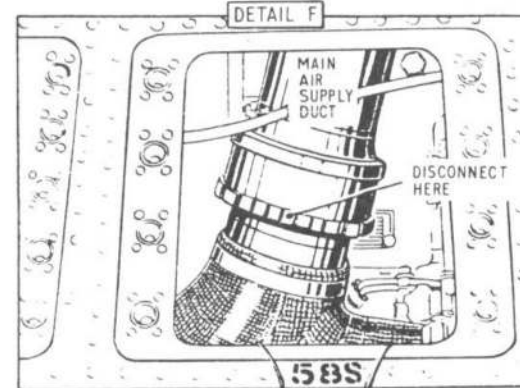
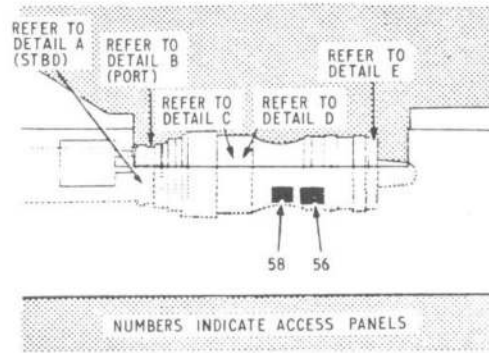
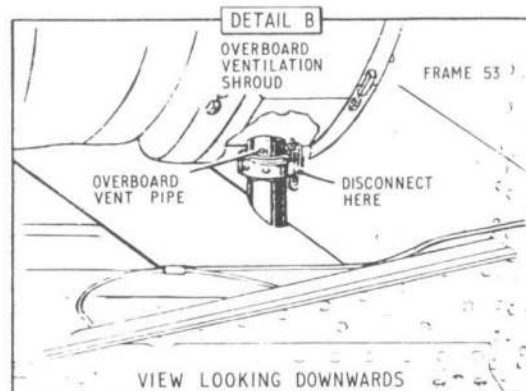
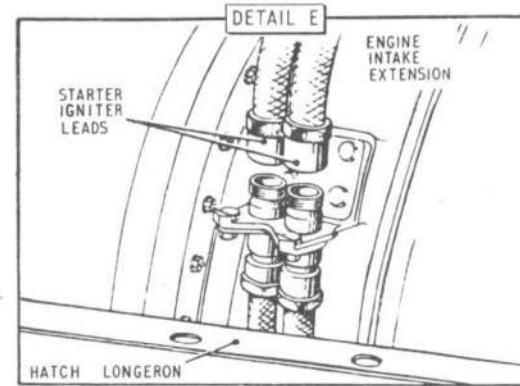
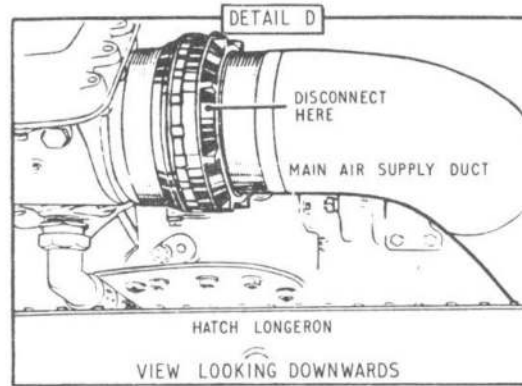
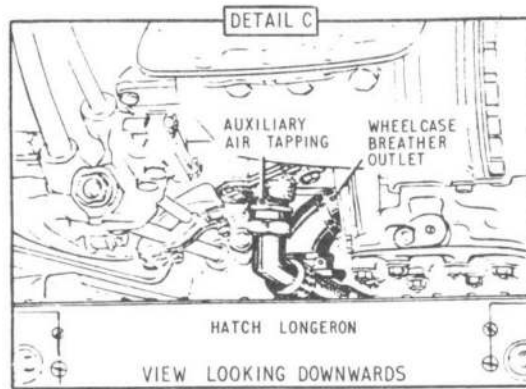


FIG.17. NO.2 E.C.U.- REMOVAL AND ASSEMBLY (2)

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fairing by releasing the toggles, rotating the fairing a few degrees in an counter-clockwise direction, and withdrawing it forward.

(29) Disconnect the starter motor exhaust pipe at the union inside the engine air intake extension, using the special spanner (fig.16, detail B).

Note...

Depress the spanner to release the locking device.

(30) Fit an adapter plate to the slinging attachment at the forward end of the compressor casing with the two quick-release pins.

(31) Set the main pick-up shackle of the universal engine sling to position 15. Hang the pulley block on the hook of the primary lifting gear, and pass the shackle of the engine sling over the hook of the pulley block.

(32) Position the sling over the engine and secure it fore and aft with quick-release pins. Take up the weight of the engine on the pulley block.

(33) Disconnect the forward engine mountings (fig.16, detail E).

(34) Dismantle the rear engine mountings (para.33(31)).

(35) Lift the E.C.U. clear of the engine bay with the block and tackle ensuring freedom of the overboard vented heat shield, and swing it clear of the aircraft. Place the E.C.U. in a stand.

Preparation of replacement E.C.U. (fig.18).

38. Transfer the following items from the E.C.U. removed from the aircraft using, where applicable, the fastenings on the replacement E.C.U.; lock all connections as before:-

(1) Auxiliary air system outlet adapter (detail H).

(2) Compressor seal vent adapter (detail D).

(3) Fuel control unit drain adapter, washer, and flexible pipe (detail E).

(4) Oil cooler drain adapter, washers, and flexible pipe (detail F).

(5) Combustion chamber drain cover and washer (detail G).

(6) Servo-bleed flexible pipe.

(7) Hydraulic pumps, seals, and drain-pipe (detail B) after applying grease XG-284 to the drive splines.

Note...

The clamp fasteners must be positioned at the bottom of the flange with the nut outboard, and must be tightened to a torque loading of 75 lb in.

(8) The flexible drainpipe at the jet pipe joint (detail C).

(9) The main air system non-return valve. Assemble using new locking-strips (detail A).

(10) Engine air intake blanking panels.

(11) Starter motor air pipe, using new tab washers.

(12) Starter motor fuel pipe, after testing to 1640 lb/in², using new tab washers.

Assembly (fig.16 and 17)

39. With the E.C.U. in the correct state of preparation (para.38):-

(1) Ensure that the necessary precautions (para.31) are being observed.

(2) Remove the domed and intermediate section of the starter fairing.

(3) Tie back all loose electrical leads and flexible hoses in the engine bay and examine the bay for cleanliness.

(4) Assemble the slinging and hoisting equipment to the engine (para.37, (30)-(32)).

(5) Position the E.C.U. over the engine bay and, using the pulley block, lower it until the rear mounting housings are aligned, at the same time ensuring that the starter exhaust enters the hole in the air intake extension (fig.16, detail B).

(6) Assemble the rear mountings (para.35, (6)).

(7) Secure the front mountings, bolt heads facing aft.

(8) Dismantle and remove the hoisting and slinging equipment.

(9) Fit the starter motor fairing.

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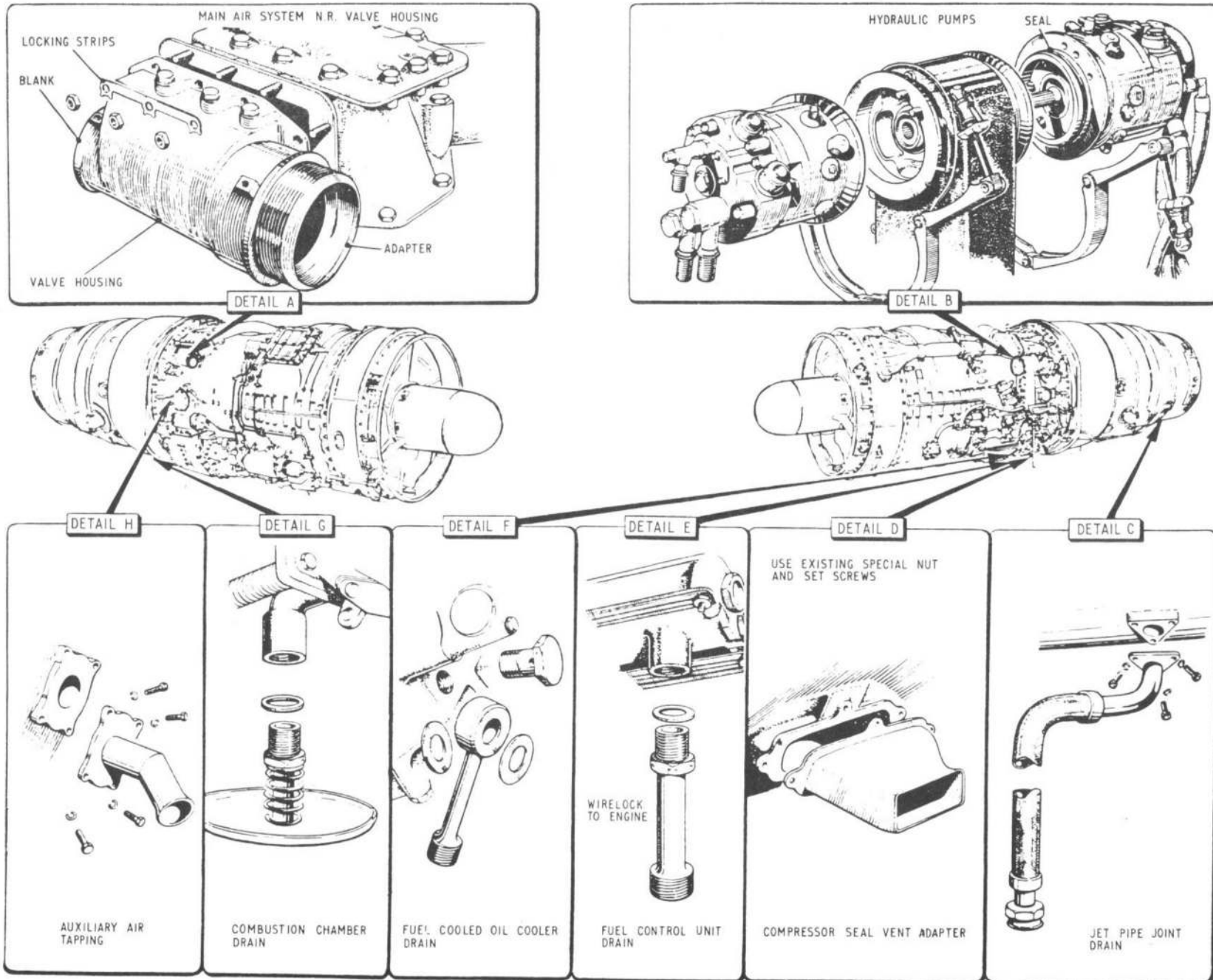


FIG. 18. NO. 2 E.C.U. - PREPARATION

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Note...

Before connecting the jet pipe to the engine exhaust unit (operation (10)) the sealing ring joint must be secured in the unexpanded position with a short length of adhesive tape. This will prevent displacement of the sealing ring when the connection is made.

(10) Attach the divorcing tools to the keep plate attachment flanges with the flanged ends of the travellers hooked around the front face of the engine exhaust unit flange. Rotate the pinions of the tools to pull the jet pipe forward until it surrounds the exhaust unit, and fit and secure the keep plates.

Note...

If the jet pipe will not pass easily over the flange, slacken the starboard engine mounting, fit the jet pipe and re-tighten.

(11) Fit the overboard vented heat shield and the flexible pipe.

Note...

Before finally engaging the heat shield toggle fasteners, check the alignment of the flexible pipe and, if necessary, rotate the shield to ensure correct alignment of the pipe flanges.

(12) Tighten the clamp bolts of the stiffening ring (access panels 74P and 74S).

(13) Disengage and remove the jet pipe handling link, and refit the access panel in frame 53.

(14) Connect the fuel flow control unit flexible drainpipe (fig.16, detail G).

(15) Connect the oil cooler flexible drainpipe (fig.16, detail G).

(16) Connect the starboard igniter plug cable (access panel 60S) using the special spanner (Table 1).

(17) Connect the engine electrical services cables to the junction box (fig. 16, detail A).

(18) Connect the jet pipe joint flexible drain (fig.17, detail A).

(19) Connect the auxiliary air supply between its adapters (fig.17, detail C).

(20) Connect the engine wheelcase breather pipe (fig.17, detail C).

(21) Connect the servo-bleed pipe to the fuselage union (fig.16, detail E).

(22) Connect the reheat fuel pump air pipe to the air shut-off cock (fig.16, detail H).

(23) Couple the hydraulic pump drainpipe to its fuselage component (fig.16, detail D) and connect the flexible hoses (fig.16, detail F).

(24) Connect the hydraulic hoses and the drainpipe to the forward pump.

(25) Connect the engine fuel supply hose (fig.17, detail G).

(26) Fit the air pipe between the engine

non-return valve and the main air duct. Tighten and lock the upper end first (fig.17, detail D and F).

Note...

On F Mk.1A aircraft it is essential that the pipe clamps are positioned as shown in fig.17, detail H.

(27) Connect the starter motor igniter leads (fig.17, detail E) and overspeed switch cables (fig.16, detail C).

(28) Connect the starter motor fuel and air pipes at frame 43.

(29) Fit the overboard vent pipe (fig.17, detail B).

(30) Remove the engine intake blanks, and fit the duct access panel.

(31) Fit the upper half of the air intake sealing ring housing using the special tool.

Note...

One flange on the channel section of the housing is thinner than the other. The thin flange should face forward and engage the groove in the duct access panel rib.

(32) Carry out the engine controls rigging checks (para.23).

(33) Carry out the starter system fuel priming and 'fail safe' checks (A.P. 1181B, Vol.1, Sect.3, Chap.2). Measure the drained fuel in the collector bottle.

(34) Fit the engine hatch (Sect.3, Chap.1).

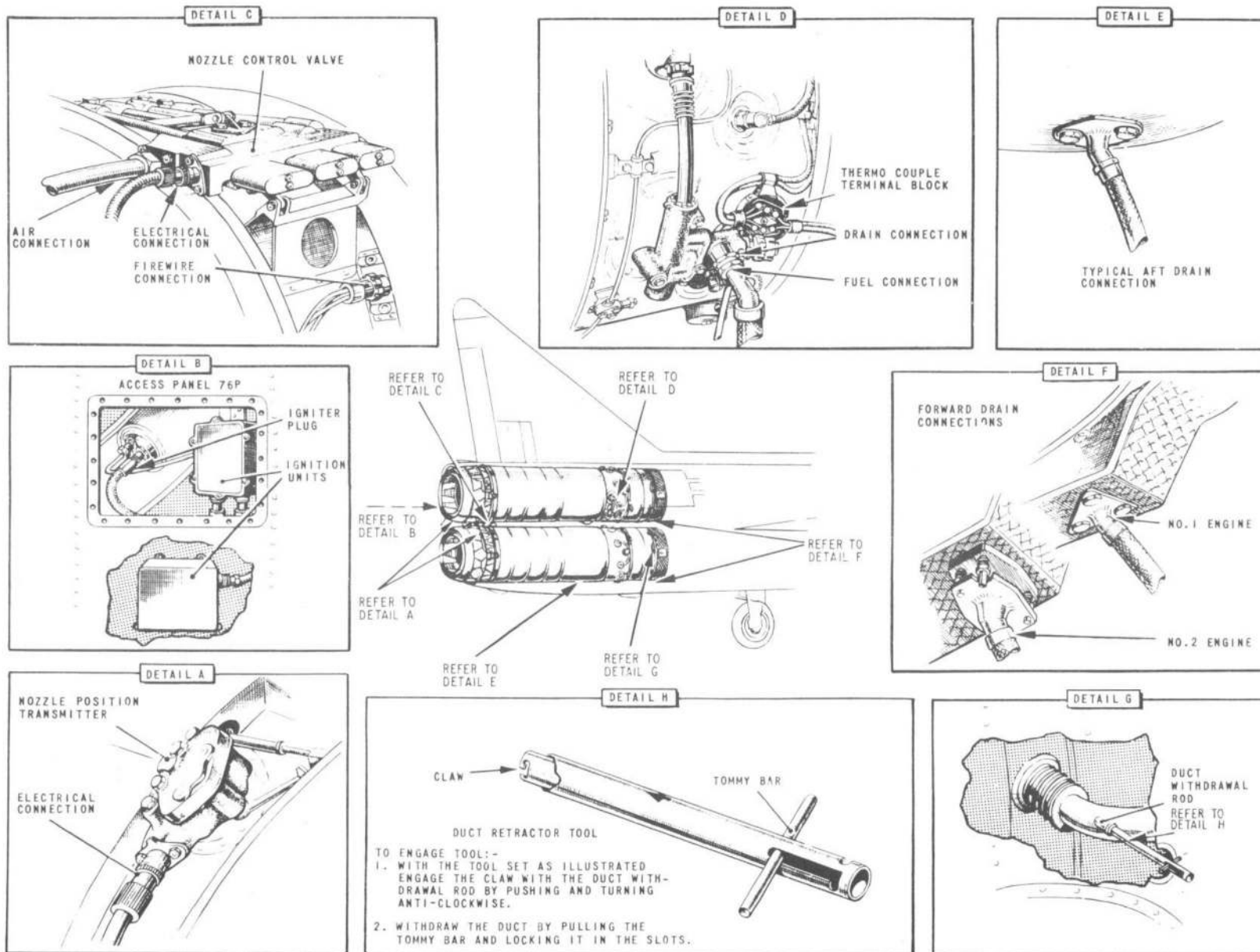


FIG.19. CONNECTIONS TO JET PIPE



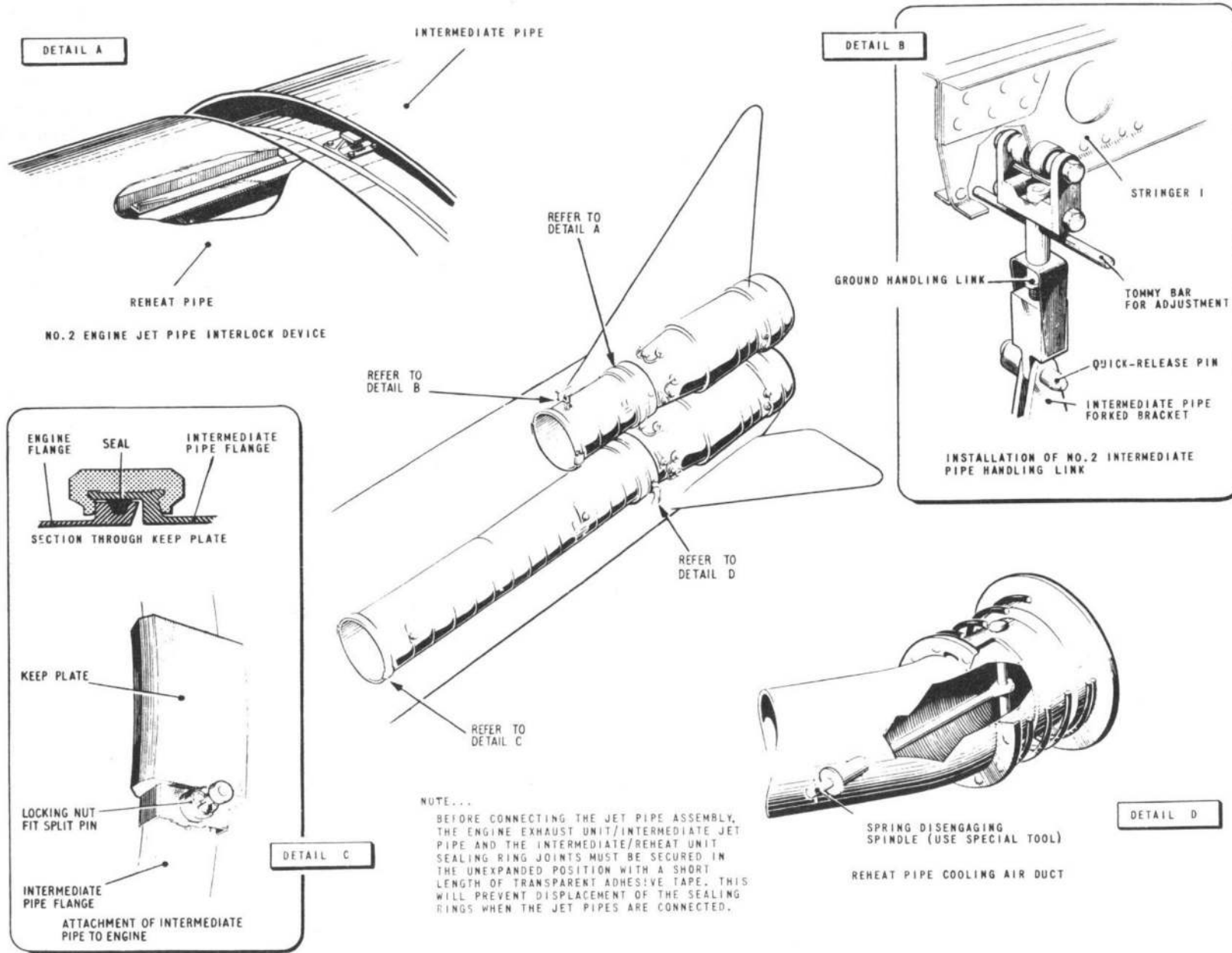


FIG. 20. JET PIPE-REMOVAL AND ASSEMBLY (I)

the fuselage on to the cradle until it is up against the rear fixed stops; fit the forward intermediate pipe stops. Disconnect the cradle at the attachment brackets, and lower the pipe and cradle on to a transportation stand. Remove the stops and roll the cradle off the pipe.

Assembly (fig.19, 20 and 21)

42. To install No.1 intermediate and reheat pipes:-

Note...

Before connecting the jet pipe assembly, secure the sealing rings of the exhaust unit/intermediate and the intermediate/reheat unit jet pipes, in the unexpanded position and with their joints uppermost, with a short length of transparent adhesive tape, to prevent displacement of the rings during installation.

(1) Ensure that the necessary precautions (para.31) are being observed.

(2) Adapt the jet pipe cradle to receive a No.1 jet pipe (fig.22), set the cradle rails to the narrow position (fig.21, detail B) and, with the intermediate pipe on a transportation stand, draw the cradle over the aft end of the pipe. Fit the forward intermediate pipe stops and set the pipe rollers to their lowest position.

(3) Lift the cradle and pipe to the fuselage, and secure the cradle to the attachment brackets on frame 62 (fig.21, detail A). Align the cradle rails with the fuselage rails.

(4) Remove the stops and roll the pipe

into the fuselage; guide the self-aligning trunnion blocks into the jet pipe channels, and align the jet pipe flange with the engine exhaust unit flange. Refer to para.35(21) and secure the intermediate jet pipe to the engine and fit the overboard vented heat shield.

(5) Remove the cradle and adjust the rails to the wide position. With the reheat pipe on a transportation stand, draw the cradle over the rear end of the pipe until the rear rollers are running on the rear section of rails; adjust the forward section of rails to the narrow position to receive the front rollers. Fit the forward reheat pipe stops.

(6) Lift the cradle to the fuselage and attach it to the brackets on frame 62. Align the cradle rails with the fuselage rails and remove the forward stops.

(7) Roll the reheat pipe forward until the front rollers are on the fuselage rails, reposition the forward section of the cradle rails to the wide position and continue rolling the reheat pipe until the rear trunnions are positioned on their mountings on frame 62.

(8) Reassemble the rear trunnion mounting half clamps (fig.2, detail A).

(9) Raise the intermediate pipe rollers and the reheat pipe front rollers (fig.2).

(10) Remove the cradle and the cradle attachment brackets.

(11) Connect the reheat fuel supply pipe

and drainpipe (fig.19, detail D; access panel 76S).

(12) Connect both forward and aft reheat fuel drain connections (fig.19, detail E and F; access panels 72S and 76S).

(13) Connect all electrical and Firewire cables (fig.19, details A, B, C and D).

(14) Release the port and starboard cooling air ducts and remove the retractors (fig.19, details G and H).

(15) Connect the compressor air pipe to the nozzle control valve (fig.19, detail C).

(16) Carry out the fuel pipe pressure test (para.28 or 29, as applicable).

(17) Check that all connections are correctly made and, where applicable, locked.

(18) Fit all skin access panels and No.1 engine hatch.

No.2 jet pipe

Equipment required

43. Refer to Table 1. Assemble the relevant ground equipment.

Removal (fig.19, 20 and 21)

44. To remove No.2 intermediate and reheat pipes:-

(1) Ensure that the necessary precautions (para.31) are being observed.

(2) Remove No.2 engine hatch (Sect.3, Chap.1).

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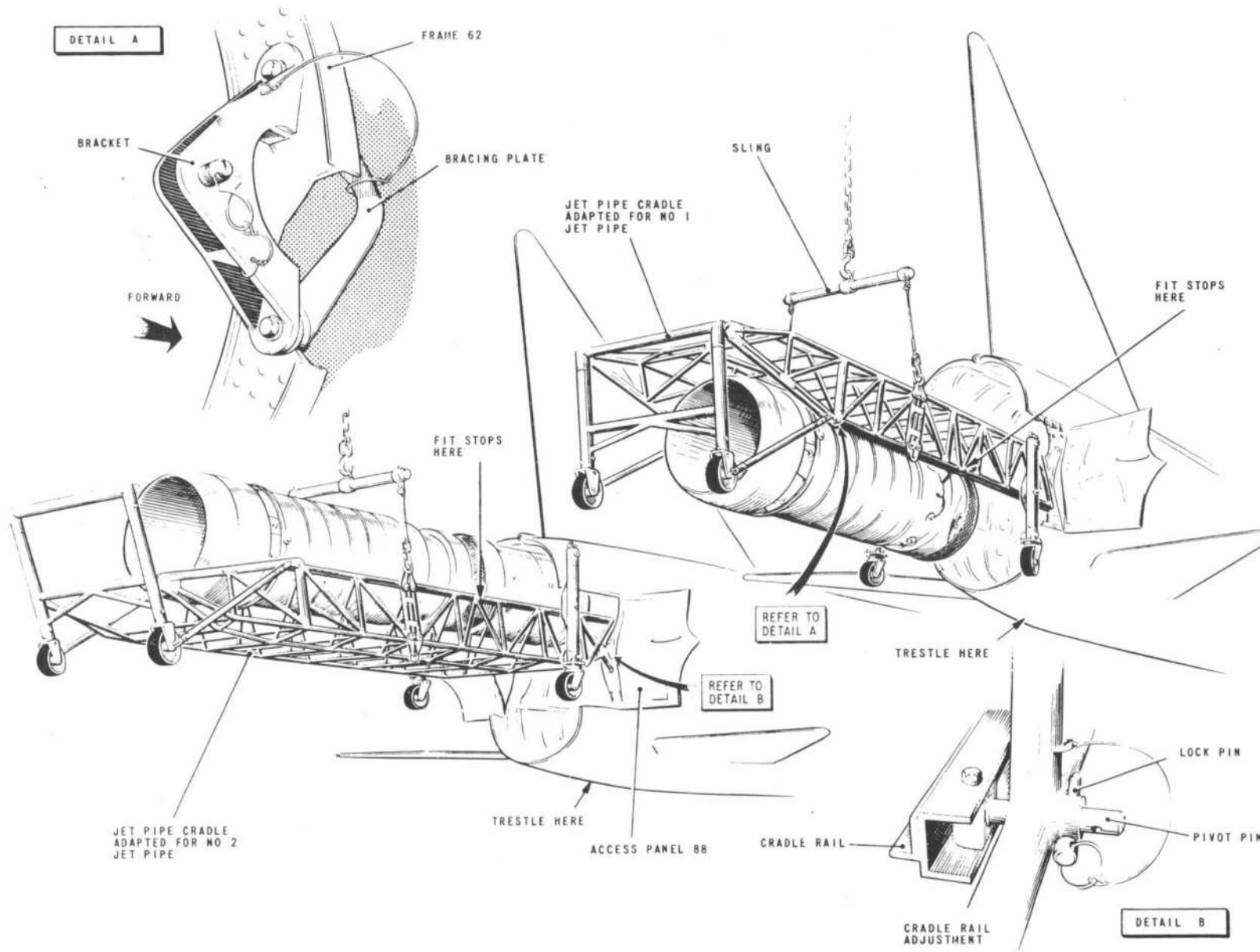


FIG. 21. JET PIPE -REMOVAL AND ASSEMBLY (2)

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(3) Disconnect the forward and aft fuel drain hoses from the reheat pipe (fig. 19, details E and F; access panels 72S and 76S).

(4) Disconnect the reheat fuel supply pipe and drainpipe at the reheat pipe (fig. 19, detail D; access panel 76S).

(5) Withdraw the port and starboard cooling ducts using the retractor tools (fig. 19, details G and H; access panels 74P and 74S).

(6) Disconnect the electrical cable to the jet pipe thermocouple terminal block (fig. 19, detail D; access panel 76S).

(7) Disconnect the H.T. lead to the igniter plug (fig. 19, detail B).

(8) Unlock access panels 88P and 88S using the T-spanner, hinge them back, and secure them by inserting ¼ in. dia. quick-release pins through the holes in the lower edges of the panels and the fuselage skin.

(9) Disconnect the electrical cable from the nozzle position transmitter (fig. 19, detail A).

(10) Disconnect the electrical cable from the nozzle control valve (fig. 19, detail C).

(11) Disconnect the electrical cable from the Firewire system connection on the nozzle cowling (fig. 19, detail C).

(12) Disconnect the compressor-air delivery pipe at the nozzle control valve (fig. 19, detail C).

(13) Using the roller key, lower the reheat pipe forward rollers on to the fuselage rails (access panels 76P and 76S).

Note...

Push the key inward whilst turning, to release the locking device.

(14) Support the intermediate pipe by mounting the rollers of the ground handling link, to the rail on stringer 1, and connecting the link to the pipe (fig. 20, detail B). Access is obtained by removing the access panel in frame 53.

(15) Refer to para. 37 (24), (25), (26) and (27) and release the intermediate jet pipe from the engine. Slide the intermediate pipe aft to engage the locking device (fig. 20, detail A), and disengage the handling link.

(16) Fit the cradle attachment brackets to frame 62 (para. 41 (15)).

(17) Remove the half clamps at the rear trunnion mountings on frame 62.

(18) Adapt the handling cradle to receive a No. 2 jet pipe (fig. 22). Fit the sling to the lifting eyes, lift the cradle into position and secure it to its attachment brackets. Align the cradle rails with the fuselage rails.

(19) Set the cradle to the wide position, i.e. cradle rail adjustment quick release pins through the inner holes (fig. 21, detail B).

(20) Roll the jet pipe on to the cradle

until the rear reheat pipe rollers are running on the cradle rear rails; set the cradle front rails to the narrow position, i.e. quick-release pins through the outer holes, and continue rolling the jet pipe until it is against the rear fixed stops. Fit the forward stops, using quick-release pins.

Note...

It is important that the reheat pipe be tilted immediately after removal to spill any fuel that may have collected between the pipe and its casing.

(21) Disengage the cradle from the fuselage brackets, and lower it to the ground. Lift the jet pipes from the cradle and store them in a transportation stand.

Assembly (fig. 19, 20 and 21)

45. To assemble No. 2 intermediate and reheat pipes:-

Note...

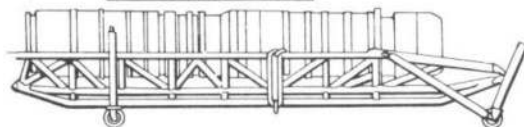
Before connecting the jet pipe assembly, secure the sealing rings of the exhaust unit/intermediate and the intermediate/reheat unit jet pipes, in the unexpanded position and with their joints uppermost, with a short length of transparent adhesive tape, to prevent displacement of the rings during installation.

(1) Ensure that the necessary precautions (para. 31) are being observed.

(2) Adapt the cradle to receive a No. 2 jet pipe, and set the aft section of the rails to the wide position, and the front section to the narrow position

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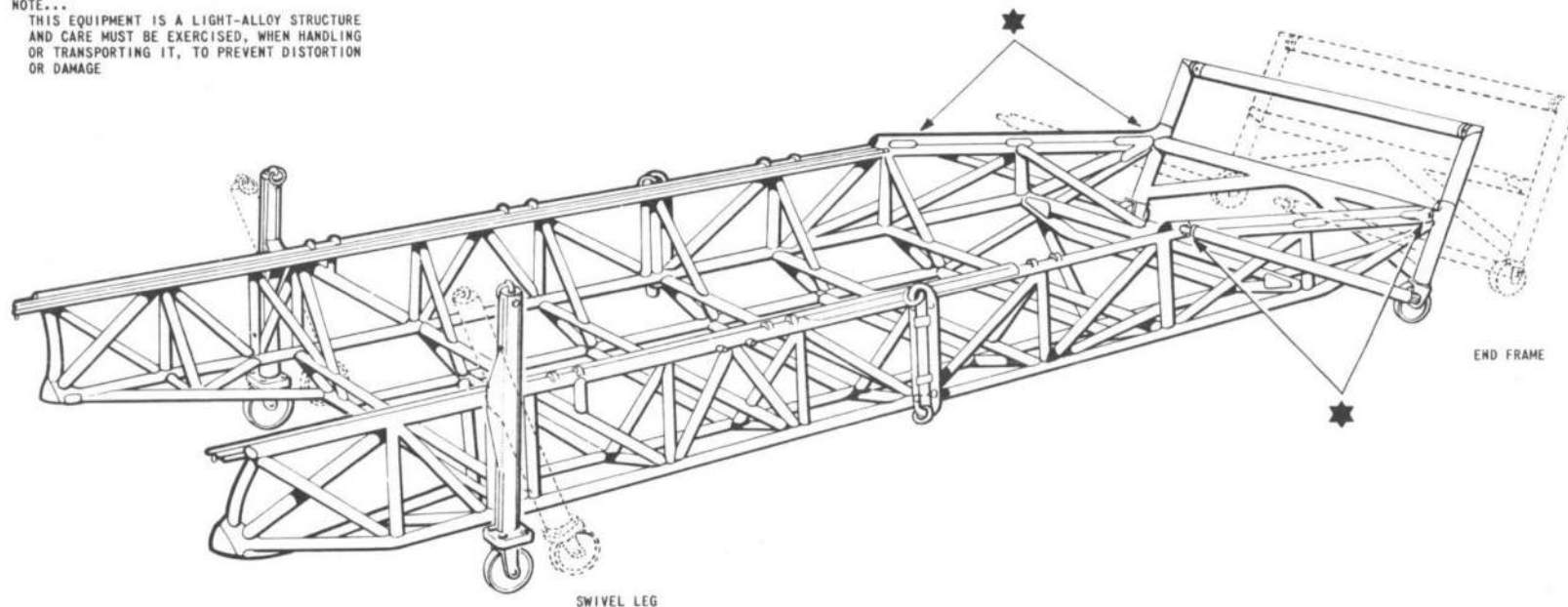
CRADLE ADAPTED FOR
NO.2 JET PIPE



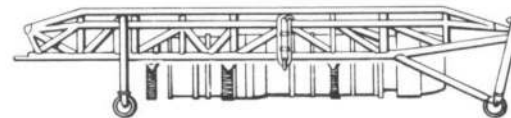
CONVERSION OF JET PIPE CRADLE

- 1 REMOVE THE QUICK-RELEASE PINS AT THE POINTS MARKED THUS * AND DETACH THE END FRAME FROM THE CRADLE
- 2 COMPLETELY REVERSE THE CRADLE AND, WHILE DOING SO, REMOVE THE QUICK-RELEASE PINS FROM THE SWIVEL LEGS, AND REVERSE THE LEGS. FIT THE QUICK-RELEASE PINS.
- 3 ATTACH THE END FRAME TO THE CRADLE IN THE POSITION WHICH CORRESPONDS TO THAT OF THE SWIVEL LEGS. (REFER TO DETAILS)

NOTE...
THIS EQUIPMENT IS A LIGHT-ALLOY STRUCTURE
AND CARE MUST BE EXERCISED, WHEN HANDLING
OR TRANSPORTING IT, TO PREVENT DISTORTION
OR DAMAGE



CRADLE ADAPTED FOR
NO.1 JET PIPE



SAFETY STRAPS

NOTE

- (1) WHEN USING THE CRADLE FOR NO.2 JET PIPES,
THE CRADLE WALKWAY SHOULD BE FITTED
- (2) WHEN USING THE CRADLE FOR NO.1 JET PIPES,
THE SAFETY STRAPS SHOULD BE FITTED

FIG.22. JET-PIPE HANDLING CRADLE

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(fig. 21, detail B). Lift the reheat pipe on to the rear section and the intermediate pipe on to the front ensuring that the coupling device is securely locked. Adjust the forward rollers to their lowest position, and fit the reheat pipe stops to the rails. Attach the sling to the cradle.

(3) Lift the cradle and jet pipes to the fuselage, and secure the cradle to the brackets on frame 62. Align the cradle rails with the fuselage rails.

(4) Remove the cradle rail stops, and roll the jet pipe into the fuselage until the front rollers are on the fuselage rails. Reset the forward section of cradle rails to the wide position, and continue rolling until the rear trunnions are positioned in their mountings.

(5) Connect the ground handling link to the bracket on the intermediate pipe

(fig. 20, detail B), and adjust on the link to align the pipe with the engine exhaust unit.

(6) Release the locking device by lifting the forward end of the reheat jet pipe and pull the intermediate pipe forward until supported by the self-aligning trunnions in the channel sections. Align the intermediate pipe flange with the engine exhaust unit flange. Referring to para. 39, (10), (11) and (12), connect the jet pipe to the engine and fit the overboard vented heat shield.

(7) Lift the reheat pipe rollers clear of the fuselage rails, using the roller raising key (access panels 76P and 76S).

(8) Remove the cradle, the cradle attachment brackets and the ground handling link. Fit the half clamps at the rear trunnion mountings.

(9) Connect the reheat fuel supply

pipe and drainpipe (fig. 19, detail D, access panel 76S).

(10) Connect both forward and aft reheat fuel drain connections (fig. 19, details E and F; access panels 72S and 76S).

(11) Connect all electrical and Firewire cables (fig. 19, details A, B, C, and D).

(12) Release the port and starboard cooling air ducts and remove the retractors (fig. 19, details G and H).

(13) Connect the compressor air pipe to the nozzle control valve (fig. 19, detail C).

(14) Carry out the fuel pipe pressure test (para. 28 or 29, as applicable).

(15) Check that all connections are correctly made, and, where applicable locked. Fit the panel in frame 53, the skin access panels and No. 2 engine hatch.

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TABLE 1
Tools and equipment

| Ref. No. | Part No. | Item | Qty. | Purpose |
|------------|--------------------|------------------------------|-------|--|
| | | Engine controls rigging | | |
| 26DK/95457 | CH. 91783 | Rigging pin | 1 | Locking of control unit |
| 26DK/95127 | EB1. 88. 1093 | Rigging pin | 1 | Locking of control runs as necessary |
| 64VV/2135 | BR. 13033 | Quadrant | 1 | Throttle setting |
| | | No. 1 E. C. U. | | |
| 4GC/5752 | - | Hoist | 4 | Installation and removal of E.C.U. |
| 4GC/6093 | - | Extension tube, 12-inch | 4 | |
| 4GC/6099 | - | Top sheath ball, 1 1/16-inch | 4 | For use with hoist |
| 4GC/6100 | - | Ball end cable, 1 1/16-inch | 4 | |
| 4GC/5743 | | Handle, 9-inch | 4 | |
| 26DK/95011 | EB2. 88. 79 | Hoist support beam (fwd) | 2 | |
| 26DK/95010 | EB2. 88. 77 | Hoist support beam (rear) | 2 | For securing hoist to airframe |
| 26DK/95792 | EF3. 88. 1777 | Hoisting cradle | 1 | Supporting E.C.U. during assembly and removal operations |
| 26DK/95397 | EB2. 88. 5801 | Spanner | 2 | Engine trunnion |
| 26DK/95094 | EB2. 88. 741 | Spanner, box | 2 | Trunnion bolt |
| 26DK/95095 | EB2. 88. 3737 | Key, hexagon | 1 | Trunnion cone (starboard mounting only) |
| 26DK/95297 | EB2. 88. 4915 | Extractor tool | 1 | Engine trunnion |
| 26DK/95403 | EB2. 88. 6017 | Spanner | 1 | Auxiliary air connection |
| 26DK/95248 | EB2. 88. 4345 | Spanner | 1 | N.R.V. air connection |
| 26DK/95158 | EB2. 88. 2265 | Spanner | 1 | N.R.V. unit |
| 26DK/95240 | EB2. 88. 5795 | Spanner | 1 | |
| 26DK/95240 | EB2. 88. 5797 | Spanner | 1 | Hydraulic couplings |
| 26DK/95242 | EB2. 88. 5799 | Spanner | 1 | |
| 64VV/3055 | HW. 68287 (R. R.) | Divorcing tool | 2 | Engine jet pipe joint |
| 26DK/95241 | EB2. 88. 4169 | Key | 1 | Air intake sealing ring |
| 26DK/95351 | EB2. 88. 5975 | Blanking panels (set of six) | 1 set | Air intake |
| 26DK/95008 | EB2. 88. 63 | Trolley | 1 | Installation of E.C.U. |

cont inued...

RESTRICTED

TABLE 1 Tools and equipment - continued

| Ref.No. | Part No. | Item | Qty. | Purpose |
|------------|-----------------|------------------------------|-------|---|
| | | No. 2 E.C.U. | | |
| 4GC/5348 | - | Sling, universal, Mk.2 | 1 | Installation and removal of engine |
| 4GC/5714 | - | Plate, adapter | 1 | |
| 4L/2014 | - | Block, pulley | 1 | |
| 26DK/95014 | EB2.88.237 | Link, handling | 1 | |
| 26DK/95397 | EB2.88.5801 | Spanner | 2 | Engine trunnion |
| 26DK/95094 | EB2.88.741 | Spanner, box | 2 | Trunnion bolt |
| 26DK/95095 | EB2.88.3737 | Key, hexagon | 2 | Trunnion cone (starboard mounting only) |
| 26DK/95297 | EB2.88.4915 | Extractor tool | 1 | Engine trunnion |
| 26DK/95420 | EB2.88.6163 | Spanner | 1 | Igniter plug lead |
| 26DK/95279 | EB2.88.4375 | Spanner | 1 | N.R.V. air connection |
| 26DK/95241 | EB2.88.4169 | Key | 1 | Air intake sealing ring |
| 26DK/95278 | EB2.88.4373 | Key | 1 | Engine N.R.V. |
| 26DK/95299 | EB2.88.3261 | Drain | 1 | Starter exhaust |
| 26DK/95351 | EB2.88.5975 | Blanking panels (set of six) | 1 set | Air intake |
| 64VV/3055 | HW.68287 (R.R.) | Divorcing tool | 2 | Engine jet pipe joint |
| | | No. 1 jet pipe | | |
| 26DK/95013 | EB2.88.15 | Cradle | 1 | Removal and installation of jet pipe |
| 26DK/95103 | EB3.88.425 | Sling | 1 | Use with cradle |
| 26DK/95148 | EB2.88.3633 | Pin | 1 | Used for locking rear fuselage doors in the open position |
| 26DK/95242 | EB2.88.4171 | Key | 1 | Jet pipe rollers |
| 26DK/95089 | EB2.88.21 | Retractor tool | 2 | Cooling ducts |
| 26DK/95163 | EB2.88.2555 | T-spanner | 1 | Access panels 88P and S |
| | | No. 2 jet pipe | | |
| 26DK/95013 | EB2.88.15 | Cradle | 1 | Removal and installation of jet pipe |
| 26DK/95103 | EB3.88.425 | Sling | 1 | Used with cradle |

continued...

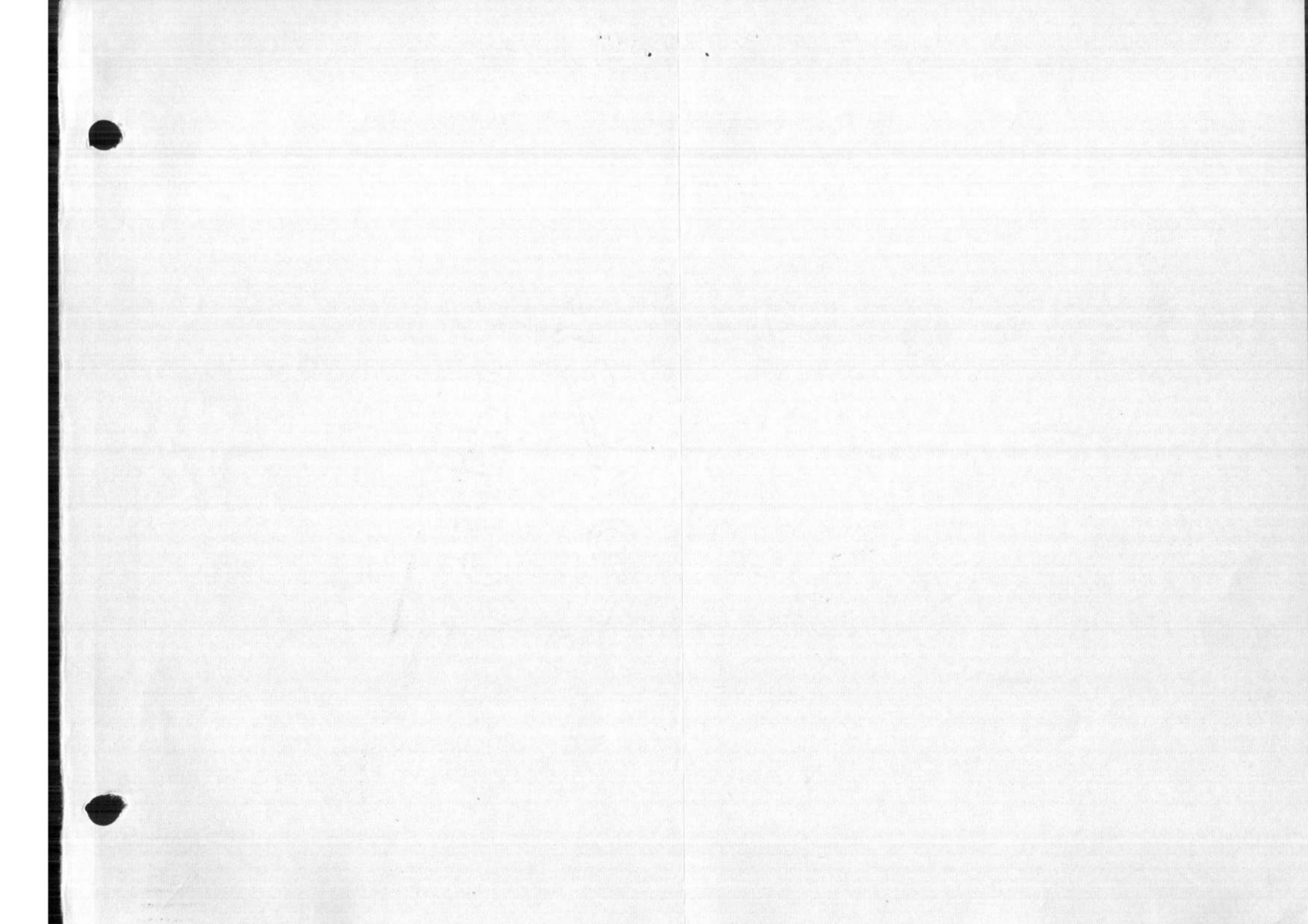
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TABLE 1 Tools and equipment - continued

| Ref. No. | Part No. | Item | Qty. | Purpose |
|------------|---------------|----------------------------|------|---|
| | | No. 2 jet pipe - continued | | |
| 26DK/95148 | EB2. 88. 3633 | Pin | 1 | Used for locking rear fuselage doors in the open position |
| 26DK/95014 | EB2. 88. 237 | Handling link | 1 | Removal and installation of jet pipe |
| 26DK/95089 | EB2. 88. 21 | Retractor tool | 1 | Cooling ducts |
| 26DK/95242 | EB2. 88. 4171 | Key | 1 | Jet pipe rollers |

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101B-1001-1A/ 123/939952/ 499/4-72/BAC/1405



October, 1973

LIGHTNING FMK.1/1A AIRCRAFT

GENERAL AND TECHNICAL INFORMATION

ADVANCE INFORMATION LEAFLET NO.2/73

INSERT this leaflet in A.P.101B-1001-1A, Sect.4, Chap.1A, facing para.9

Para.9. Delete sub para.(7) and the following Note.
Re-number the existing sub para.(8) and (9)
to read (7) and (8) respectively.

Note...

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

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