

Chapter I POWER UNIT

(Completely revised)

LIST OF CONTENTS

DESCRIPTION	Para.		Para.		Para.
Air intakes	7	Spar shroud	31	Installation—preliminary operations	
Engine cells	9	Engine starting	32	E.C.U. assembly numbers	47
Engine doors	13			Preparing the aircraft	48
Engine mountings	15	SERVICING		Installing the E.C.U.	49
Intermediate bulkhead	17	Access	34	Engine controls adjustment	50
Controls	18	Controls	35	Checks after installation	51
Sealing lever group	22	Renewal of pressure seals	38	Running up after installation	52
Wing lever group	23				
Exhaust unit	24	REMOVAL AND INSTALLATION		DISMANTLING AND ASSEMBLY	
Jet pipe	27	Removing the generator	40	E.C.U. plus	53
Inner shroud	28	Replacing the generator	42	Exhaust unit	54
Outer shroud	30	Removing the E.C.U.	43	Trunnions	55
		Checks after removal	44	Assembling the exhaust unit	56
		Removing the exhaust unit	46		

LIST OF ILLUSTRATIONS

	Fig.		Fig.		Fig.
Engine change unit installation	1	Generator installation and removal	8	Jet-pipe partition and tie rods	14
Engine cells—starboard	2	E.C.U. removal	9	Jet-pipe tie rod end fitting	15
Engine mountings	3	Exhaust unit removal	10	Seals at forward end of exhaust unit	16
Engine controls	4	Attachment of jet pipe to engine	11	Thermo-couple mounting	17
Controls at control pedestal	5	Jet-pipe front roller mounting	12	Inner shroud drain (forward)	18
Exhaust unit	6	Exhaust unit main mounting	13	Inner shroud drain (rear)	19
Exhaust unit and spar shrouds	7				

LIST OF TABLES

Special tools and equipment	1
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DESCRIPTION

1. The four power units are buried in the mainplane—two each side of the fuselage—with the air intakes following the line of the sweptback leading edge and the jet pipe outlets coinciding with the trailing edge. Openings in the front and rear spars of the inner wing house the ends of the air intake

and jet pipe respectively. The units are numbered 1 to 4, commencing with the port outer, and each comprises the air intake, the engine-change-unit-plus, and the exhaust unit.

2. The engine is the Avon Mk. 204, turbo-jet

with a fifteen-stage axial-flow compressor driven by a two-stage-axial-flow turbine. The engine is fully described in A.P.4481A and D.

3. The engine-change-unit-plus (the engine-change-unit plus certain items which are

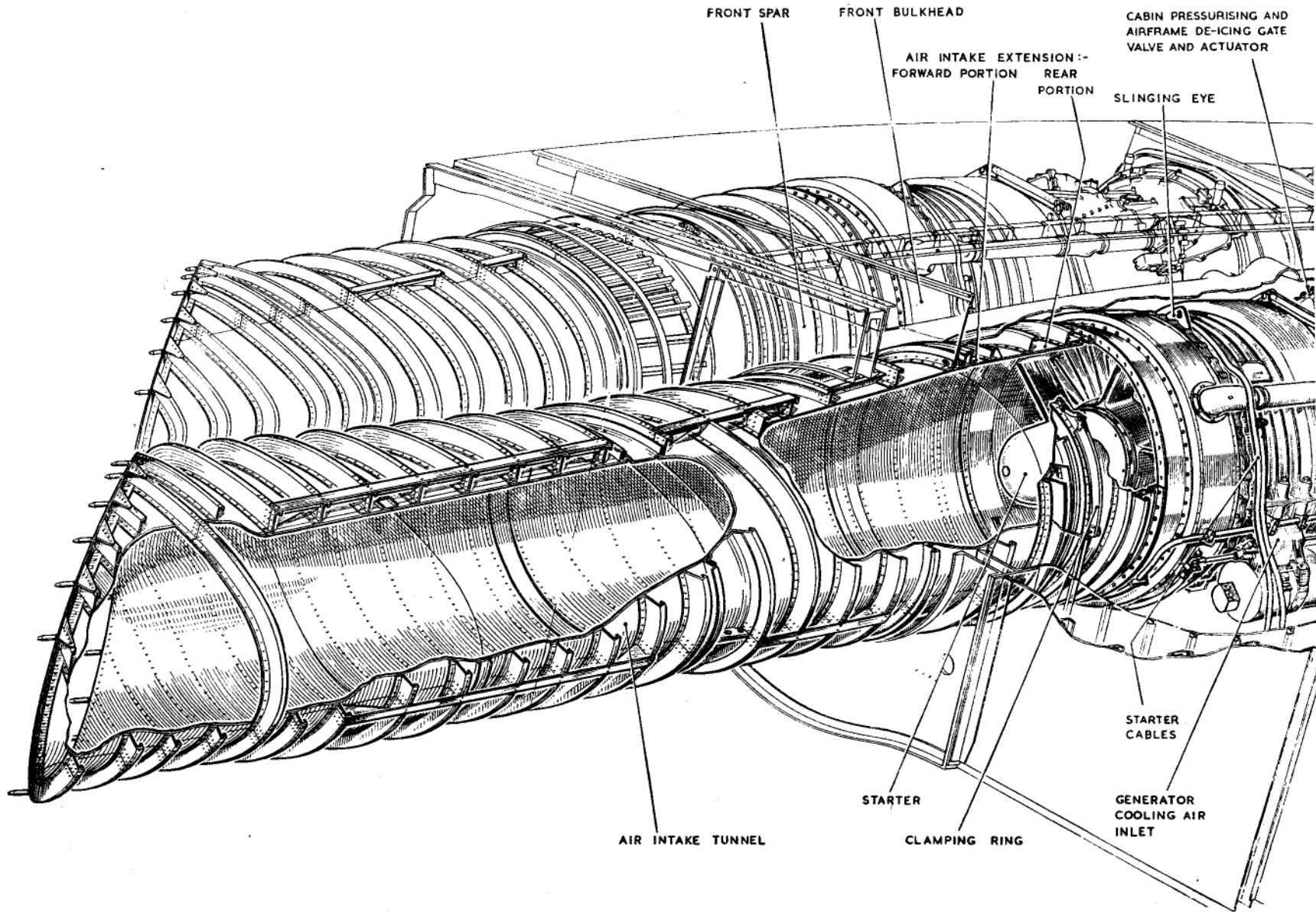


Fig. 1. Engine change unit installation (1)

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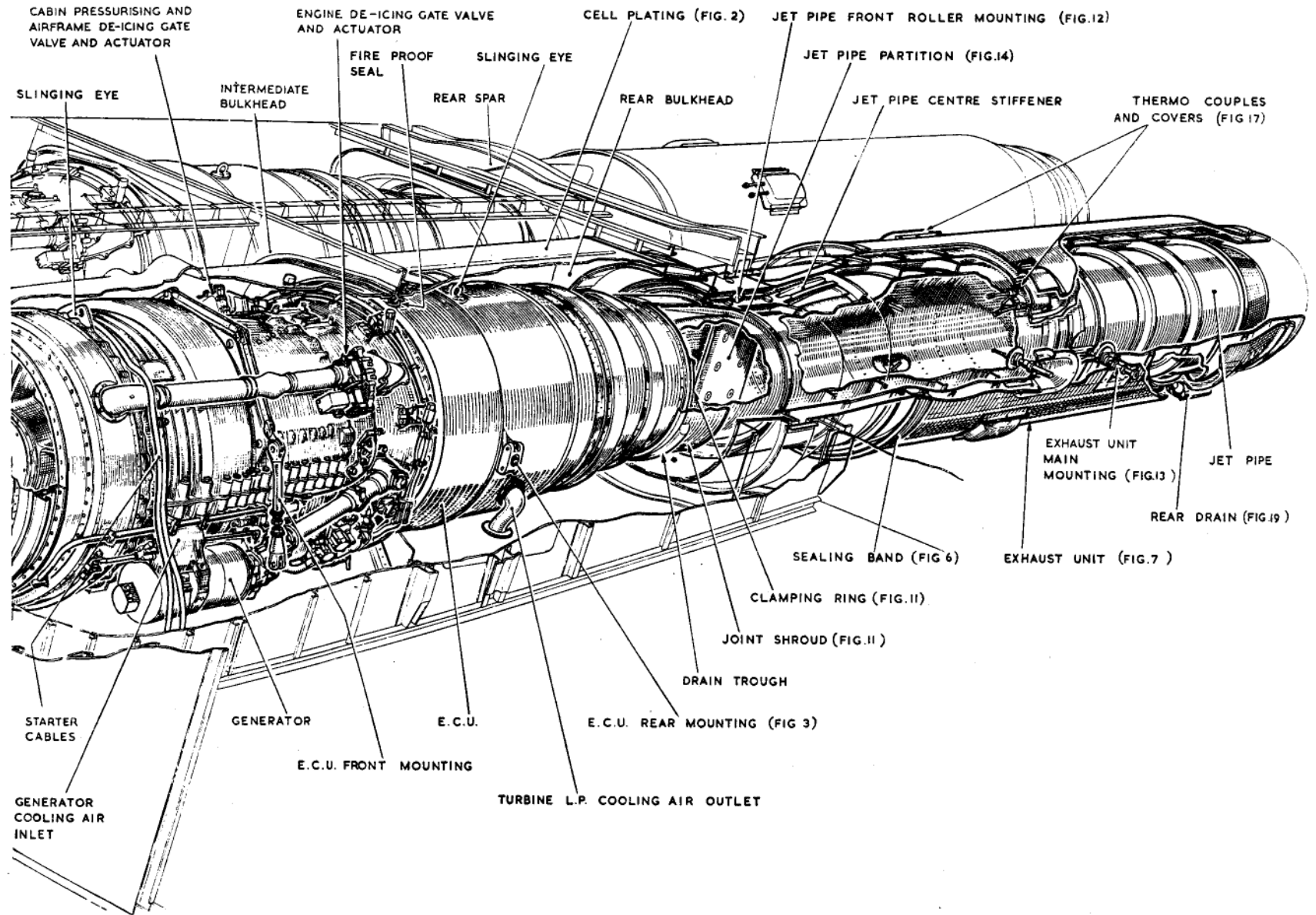


Fig. 1. Engine change unit installation (2)

classified as airframe parts) is mounted in a shroud, or cell between the front and rear spars of the inner wing. A bulkhead divides the cell into two bays—compressor (Zone 1) and combustion (Zone 2).

4. A rib between the spars separates the two engine cells and forms a mounting for the engine control lever assembly. The control rods, passing from the fuselage, run under the air intake, forward of the front bulkhead, and connect with lever groups which direct the controls down the left-hand side of each engine to their connections on the fuel control unit.

5. Air for airframe de-icing and cabin pressurizing is ducted from a connection in the upper half of the compressor casing

of each engine. Fuel tank pressurizing is served by a connection in the lower half.

6. Fuel is supplied from cells in each outer plane and in the fuselage. A pair of underwing tanks can be fitted to supplement the supply for long-range work. The oil system is integral with the engine. For details and illustrations of the fuel system, refer to Chap. 2, of this Section. For details and illustrations of the fire protection system, refer to Chap. 5, of this Section. Provision is made for de-icing the engine air-intake tunnels with hot air supplied from the engines. A separate hot air supply from the engines provides for the thermal de-icing of the air-intake leading edges. This latter system is described and illustrated in Sect. 3, Chap. 9.

The electrical system is described and illustrated in Sect. 5, Chap. 1.

AIR INTAKES

7. The four separate air-intake tunnels are incorporated in the inner wing structure. They are fabricated from light-alloy sections, butt and strap jointed together, with circumferential and longitudinal stiffeners to give the necessary rigidity. Each tunnel passes through the front spar and is bolted to the front bulkhead in the engine bay.

8. From the bulkhead the air is directed between the intake tunnel and the engine, through an air-intake extension which is made in two portions and designed to give the necessary amount of flexibility at this

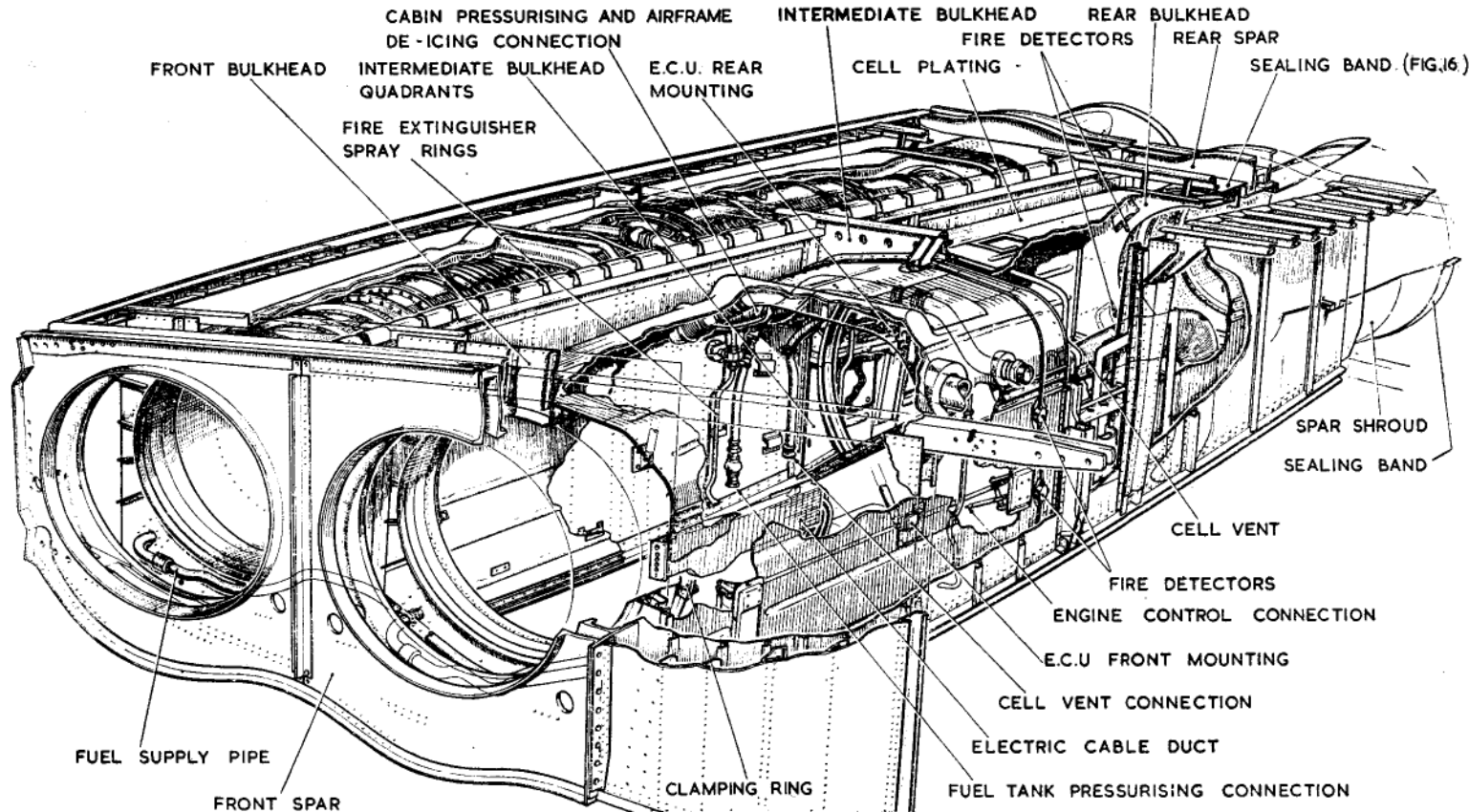


Fig. 2. Engine cells—starboard

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point. The forward portion is bolted to the bulkhead by the same bolts that secure the rear end of the air-intake tunnel, and the rear portion is clamped to a flange on the engine, the free ends sliding one within the other. The joint between the forward and rear portions is made by means of hinged clamp rings and quick-release fasteners. When these are released, the two portions can be telescoped sufficiently to ensure the necessary clearance when installing or removing the E.C.U.

ENGINE CELLS (fig. 2)

9. Each cell houses the engine and its fire-protection system and is constructed in two sections. The forward section, which embraces the engine compressor, is fabricated from light alloy sheet with longitudinal stiffeners. It extends from the front bulkhead to the intermediate bulkhead. The rear section covers the combustion bay and is built up, in a similar manner, from heat-resisting steel sheet. It extends from the intermediate bulkhead to a rear bulkhead frame supported by the wing structure. The cells remain in situ when the engines are changed.

10. Panels in the top surface of the mainplane, and in the engine doors which close the undersurface of the cells, provide access to the engines. Openings in the doors and panels also provide cooling air inlets and exhausts for air vents. The panels in the mainplane incorporate louvres which are cable operated to close when the undercarriage is retracted and open when it is lowered for landing.

11. The intakes in the forward door direct air through the bay, where it is induced, by the fifteenth stage vent exhaust, into ducts which pass through the intermediate bulkhead and exhaust to atmosphere through the rear door. The same intakes also supply air for cooling the external surface of the cell plating. The ducts are mounted on each side of the rear bay.

12. Air entering through intakes in the combustion bay continues, after cooling the engine, down the jet pipe annulus to atmosphere.

ENGINE DOORS

13. A removable door in two sections is fitted in the undersurface of each inner plane between the front and rear spars, to enclose the engine cells. A channel member crosses the cells to support the joining ends of the door sections; this must be removed to facilitate engine removal. The doors, having double skins supported by lateral and longitudinal stiffeners, are lowered to give access to the engine unit, or raised for assembly, by means of two Minihoists (Sect. 3, Chap. 2). The hoists are operated from the upper surface of the plane, the cables being passed through rib 45-28, the central main longitudinal member dividing the engine cells. The panelling is formed mainly from light-alloy sheets, the exception being that part of the rear door inner plating aft of the engine bulkhead, which is of heat resisting steel.

14. The forward door incorporates the lower segment of the engine bulkhead and four flush cooling-air intakes. Ducts in the rear door vent the fifteenth stage vent and zone cooling air. Access panels are provided for the fuel and oil filters, generator bushes, engine controls, pump governors, igniters, oil level checking, and oil filling. Two small spring-loaded panels are incorporated in the rear door to receive the nozzle of an external fire appliance—these are painted red and marked FIRE PANEL. A more detailed description of the doors and instructions for their handling will be found in Sect. 3, Chap. 2.

ENGINE MOUNTINGS (fig. 3)

15. Each engine is mounted in its cell at four points—two at each side of the engine. The forward attachments consist of two adjustable struts which are attached to the airframe structure and join tubular members which pass over and are attached to, the upper half of the compressor casing.

16. The rear attachments are trunnion mountings, one at each side of the turbine nozzle box, which are supported in phosphor bronze bearings fitted in H-housings. The housings are secured to the wing structure by taper bolt assemblies, each assembly consisting of a tapered cone on a special bolt which screws into a nut anchored to the structure. To allow for radial expansion of the engine, the bearing in the right-hand housing is free to float, the left-hand bearing being pinned to the engine trunnion.

INTERMEDIATE BULKHEAD

17. The intermediate bulkhead is positioned at the forward end of the combustion chambers to separate the compressor and combustion bays and is made in four independent sections, each panelled with heat-resisting steel plate. The upper section is integral with the wing structure, the lower with the engine doors, and the two side quadrants fill the space on either side of the engine. The sections are designed to engage with each other and with the engine. Rubber seals close the mating faces, and locking pins hold the side quadrants in place when the door has been removed.

CONTROLS (fig. 4)

18. The lay-out of the control system and arrangement of the levers in the control pedestal are shown in fig. 4 and 5. The pedestal, mounted centrally on the pilots' floor, carries four hand levers mounted upon a common shaft, the shaft being housed and located in the side walls. The hand levers, numbered 1 to 4 from left to right to correspond to the engines operated by them, are connected to a system of push-pull rods and levers which operate the throttle valves and high pressure fuel cocks. The fuel cocks are closed when the hand levers are pulled to the rear and the latches raised. The throttle lever friction can be controlled by a lever mounted on each side of the pedestal.

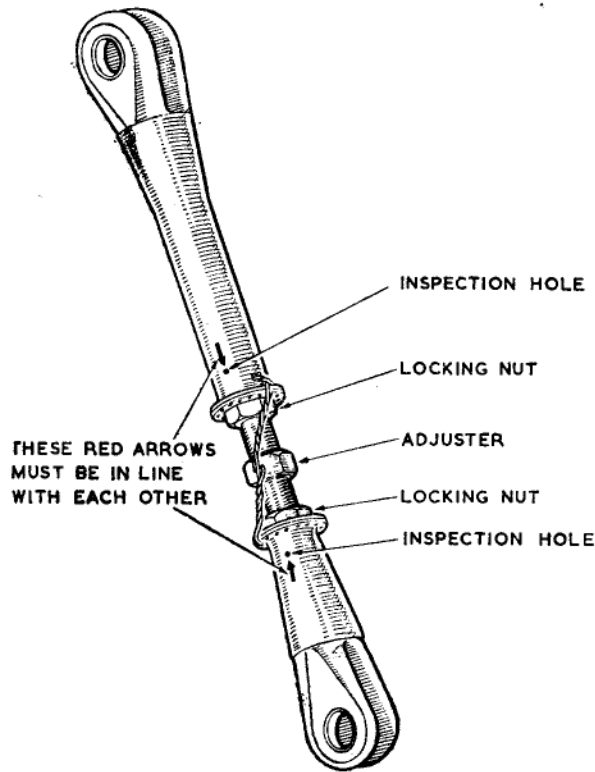
19. In addition to the push-pull rods that pass down the pedestal connecting the pilots throttle control levers to the levers in the base

of the pedestal operating the control system, connection is also made from each throttle lever to a lever which embodies a cam and operates one of a set of four micro-switches. These switches are operated through the control linkage when the throttles are closed to a pre-determined setting. At this setting, if the undercarriage is NOT locked down, a warning horn will sound in the cabin.

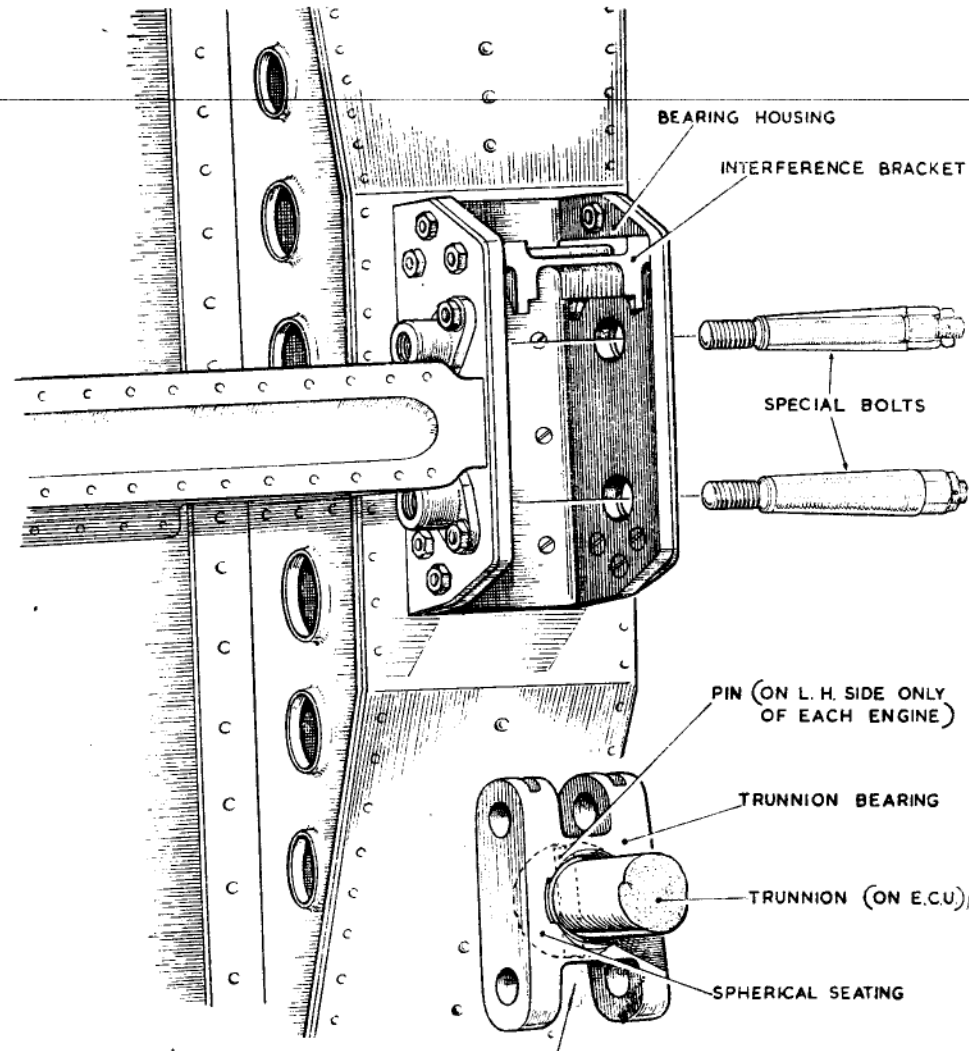
20. A restrictor bar operated by the control locking lever on the right-hand side of the pedestal prevents the throttles from being opened for take-off while the flying controls are locked. Sufficient movement, however, is allowed to enable the engines to be run for taxiing.

21. The control rods extend left and right

from the base of the pedestal to where they connect with independent (port and starboard) control runs through the fuselage. The runs are supported by idler lever assemblies at stations 216.1 and 241.4 and continue to where they are passed, by means of sealed levers, through the pressure bulkhead. From here the rods are directed, via lever groups at station 330, to the rear of frame



FRONT SUSPENSION STRUT



REAR MOUNTING

Fig. 3. Engine mountings

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462-68 where they pass through the fuselage and into the main plane, via torsion box assemblies at the wing root. From the torsion boxes they connect with lever groups which direct the controls down the left-hand side of the engines to torsion lever assemblies mounted on the wing ribs. These assemblies pass the control to the fuel-control units on the engines.

Sealing lever group

22. This unit is contained in a box mounted on the rear pressure bulkhead. A housing at each side of the box supports the ball-bearing mountings for the lever shafts and the synthetic rubber seals. There are two lever shafts and their central mounting consists of a common housing in which two ball-bearings support the ends of the shafts.

The control rods from the pilot's pedestal connect with the levers inside the box and the control run is continued through the fuselage from the levers outside the sealed box.

Wing lever group

23. The torsion lever assembly is housed in a box mounted at the wing root and is built

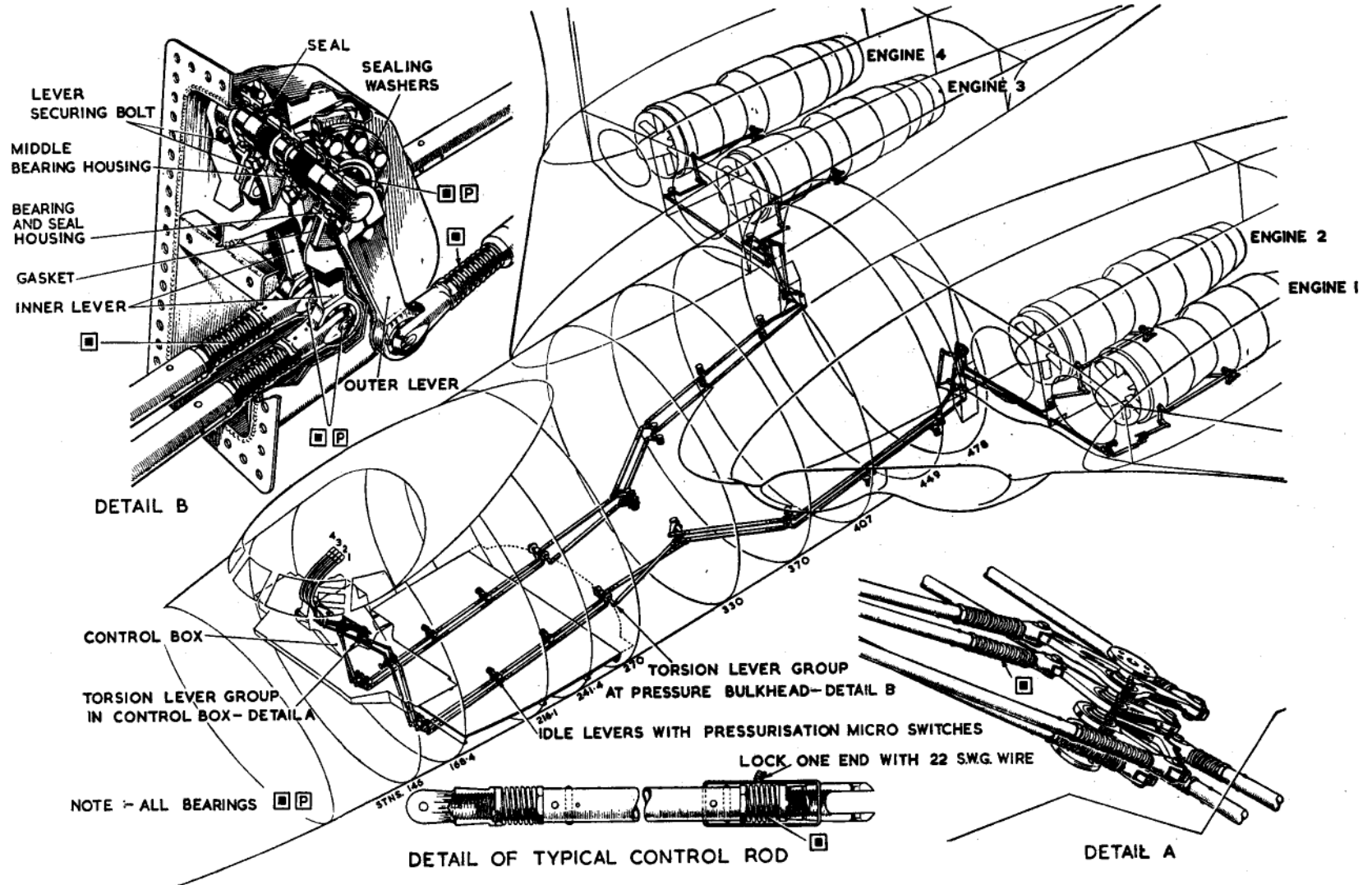


Fig. 4. Engine controls
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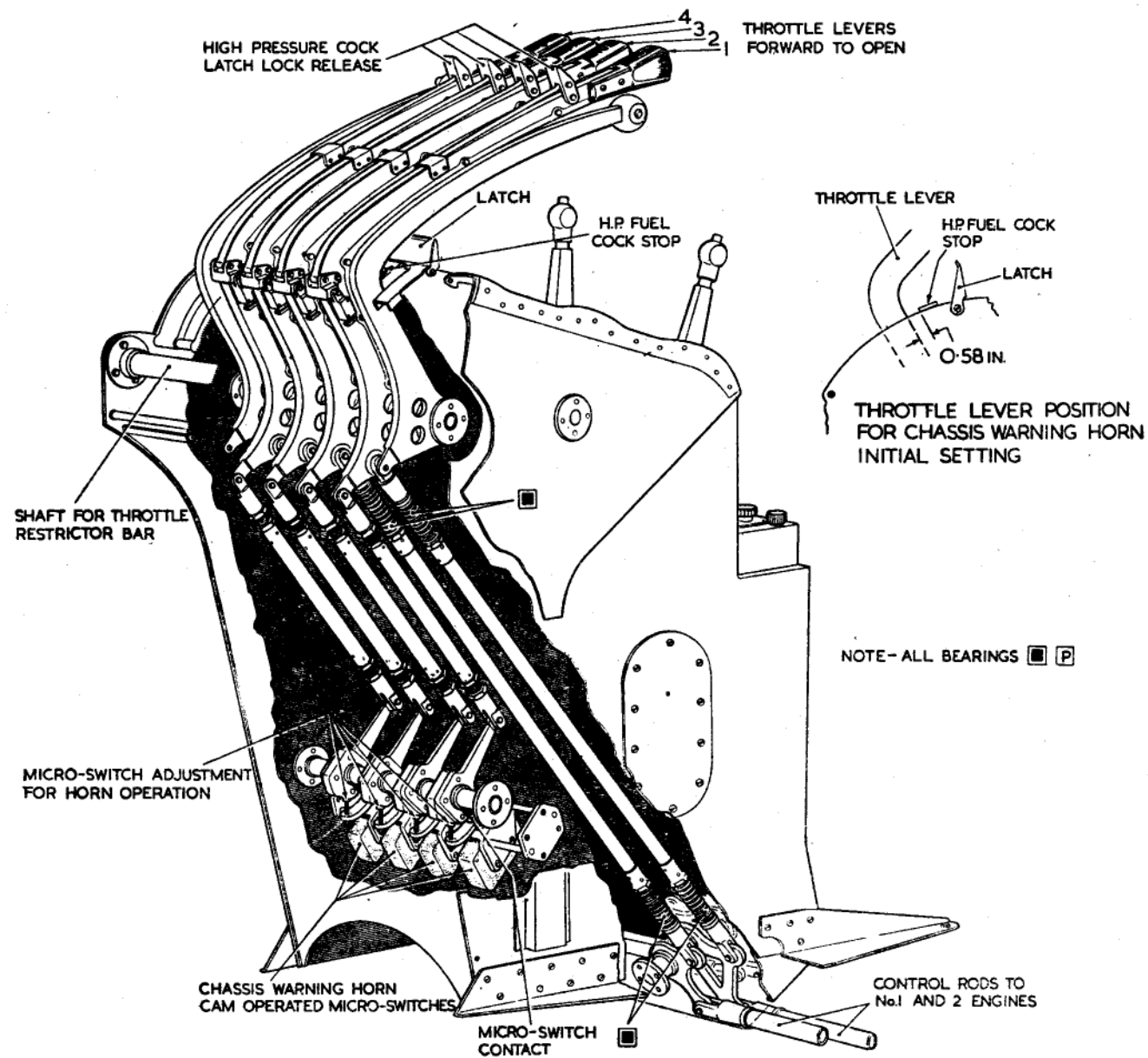


Fig. 5. Controls at control pedestal

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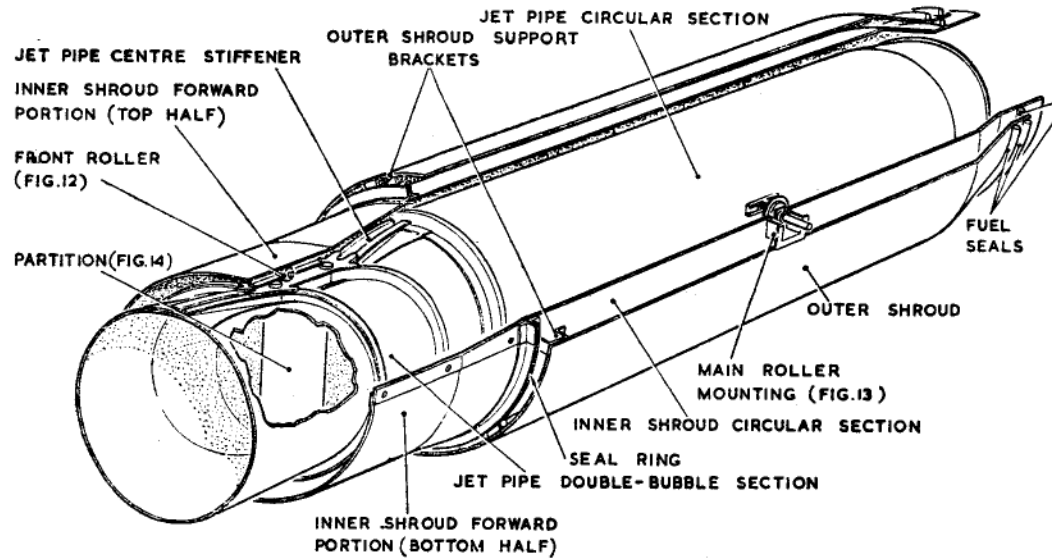


Fig. 6. Exhaust unit

up in a similar manner (less seals) to the sealed lever group i.e. two shafts rotating in ball-bearing mountings each carrying two levers, one for the rod from the fuselage and the other for the control in the mainplane.

EXHAUST UNIT (fig. 6)

24. The jet efflux from each engine exhausts to atmosphere through a stainless steel jet pipe insulated by two shrouds (inner and outer) of the same material. The inner shroud extends from forward of the rear spar to beyond the end of the pipe. The outer shroud commences at the forward end of the circular section of the jet pipe and terminates approximately half way between the end of the jet pipe and the inner shroud.

25. The complete assembly is supported in the inner wing structure by two main mountings (fig. 13), one at either side, approximately half way along the unit, consisting of a special bolt which, while retaining the inner and outer shrouds, also supports the jet pipe through a roller mounting. The rollers in the main mountings and

the rollers (fig. 12) at the forward end of the inner shroud facilitate expansion due to changes in temperature and also allow the movement necessary for withdrawing the jet pipe aft when removing the E.C.U.

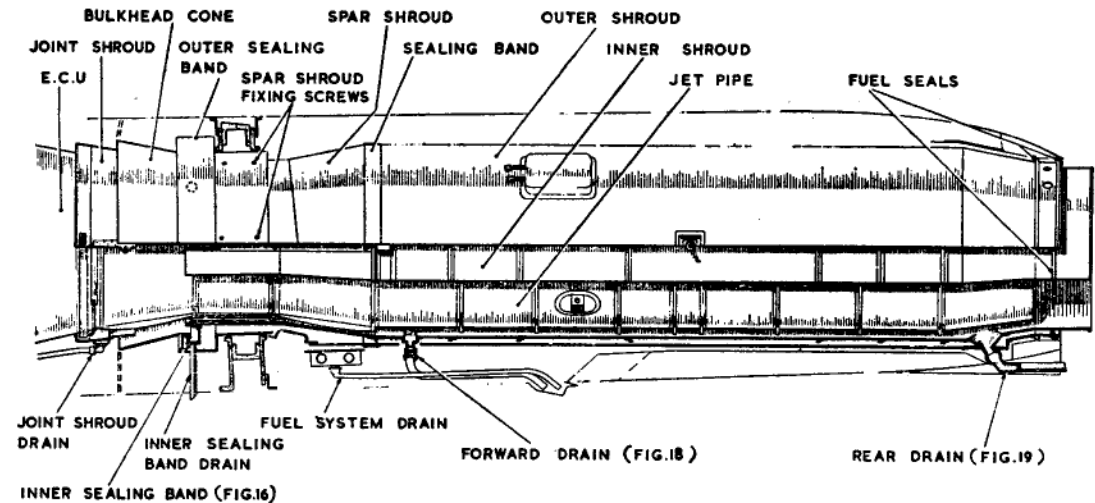


Fig. 7. Exhaust unit and spar shrouds

Sealing rings at the rear end of the shrouds prevent unburnt fuel from the jet pipe entering the shrouds and wing structure; fluid drains are provided in the shrouds.

26. Eight thermo-couples are inserted in the jet pipe, four to measure temperature and four for the J.P.T. fuel control.

Jet pipe

27. The jet pipe is fabricated from stainless steel sheet joined by seam welds and supported by stiffener rings spaced at intervals along the pipe. At the forward end the pipe is shaped to a double-bubble section to conform to its housing in the wing spar. This section is supported longitudinally by two external stiffeners, upper and lower; the rollers mounted in the forward end of the inner shroud bear on the gusset plates securing the stiffeners. The section is further stiffened by an internal partition and two vertical tie-rods (fig. 14). From the rear of the spar it continues circular in section to the rear end and houses eight thermo-couples.

Inner shroud

28. The inner shroud is in three parts; the top and bottom halves of the forward

portion, which covers the double-bubble section of the jet pipe, and the circular section, which shrouds the remainder of the pipe. Where the forward portion passes through the spar the skin has a double thickness joined by spot and seam welds. A channel section mounting is set fore and aft (in both halves) for the roller on which the jet pipe rides. The two halves of this portion are identical and are joined on assembly by bolts and anchor nuts. The rear flange is drilled to take the bolts which secure it to the forward flange of the circular section of the shroud.

29. The circular section is built up from welded stainless steel sheet supported by stiffener rings in a similar manner to the jet pipe. Immediately behind the joint, six brackets are positioned around the forward end of the circular section to support the shroud in the outer shroud. Two drain sumps, with exit pipes, are fitted, one at the forward end of the shroud and the other at

33. Before attempting any servicing, first ensure that the ENGINE STARTER MASTER SWITCH is at SAFE, ACCUMULATOR SWITCHES are at OFF, EXTERNAL START SWITCH is at EXTERNAL and FUEL COCKS are at OFF.

ACCESS

34. Care must be taken when handling engine doors, access panels and other parts of the aircraft structure that are removed to gain access for engine and exhaust unit servicing. If removed, they must not be thrown on the ground, placed one on top of the other, damaged or distorted. Misuse of the parts will affect their alignment, with consequent difficulty in refitting, and any attempt to force the panels into position will result in further damage.

CONTROLS

35. The layout of the engine controls is shown in fig. 4 and 5. The controls should operate freely and positively throughout the full extent of travel. Faulty functioning may

the rear. The rear sump can be unbolted from its securing anchor nuts on the shroud. Protecting covers are bolted to the shroud at points where the thermo-couples pass through into the jet pipe.

Outer shroud

30. Except that the stiffener rings are welded to the internal surface of the outer shroud, the general construction is similar to that of the jet pipe and inner shroud. Openings are provided for the inner shroud drains; the forward drain passing through a slide which permits expansion between the shrouds while sealing against possible fuel leakage. The rear drain is sealed in a similar manner, a pipe from the fuel funnel attached to the inner shroud passing through a sealing box in the outer shroud. Thermo-couple cover boxes fit over similar boxes protruding from the inner shroud; these are made detachable for easy access to the thermo-couples and to enable the shrouds to be dismantled.

SERVICING

be due to bowed control rods, chafing or cumulative wear at pin joints. Before routine lubrication all wearing parts and joints should be cleaned and inspected for defects and their locking checked.

36. It is important that checks be made to ensure that the correct performance figures are obtained on each engine after disturbance or adjustment of any control has taken place. Reference should be made to Pilot's Notes for the necessary data. It is important that all adjustable points and locknuts are securely locked after adjustment has been made.

37. The friction adjuster on the control pedestal must be examined for wear and the correct friction obtained to prevent the engine control levers creeping out of position due to engine vibration.

Renewal of pressure seals (fig. 4, detail B)

38. To renew the seals in the engine control

Spar shroud (fig. 7)

31. A spar shroud incorporated in the structure of each engine mounting bay connects the front face of the spar with the forward end of the outer shroud. The shroud is bolted to the spar and is air-cooled from a duct fed by flush intakes in the undercarriage doors. An inner sealing band (fig. 16) links the bulkhead cone and inner shroud, contacting the latter through a Graphitol sealing strip. An outer sealing band links the forward end of the spar shroud and the bulkhead cone; the shroud passes through, and is bolted to, the spar.

ENGINE STARTING

32. Engine starting is effected by means of an electric starter on each engine controlled from a switch on the pilot's port console. Current is supplied from a standard servicing trolley to a socket on the port side of the fuselage, behind the nose wheel bay. For starting instructions see A.P.4481A and D, Vol. 1.

lever group at the rear pressure bulkhead proceed as follows:—

- (1) Unlock and unscrew the control rods from the end attachments on the inner and outer levers.
- (2) Remove the securing bolts from the two outside levers and remove the levers from the shaft.
- (3) Remove the bolts securing the bearing and seal housings to the box. Remove the housings—complete with bearing, seal and gasket.
- (4) Remove the securing bolts from the two inner levers and withdraw the shafts—leaving the centre bearings in place.
- (5) Fit the new seals and reassemble the unit, reversing the previous operations. Bolt the housings in position, fitting a soft aluminium sealing washer under the head of each bolt, and wire-lock the bolts.

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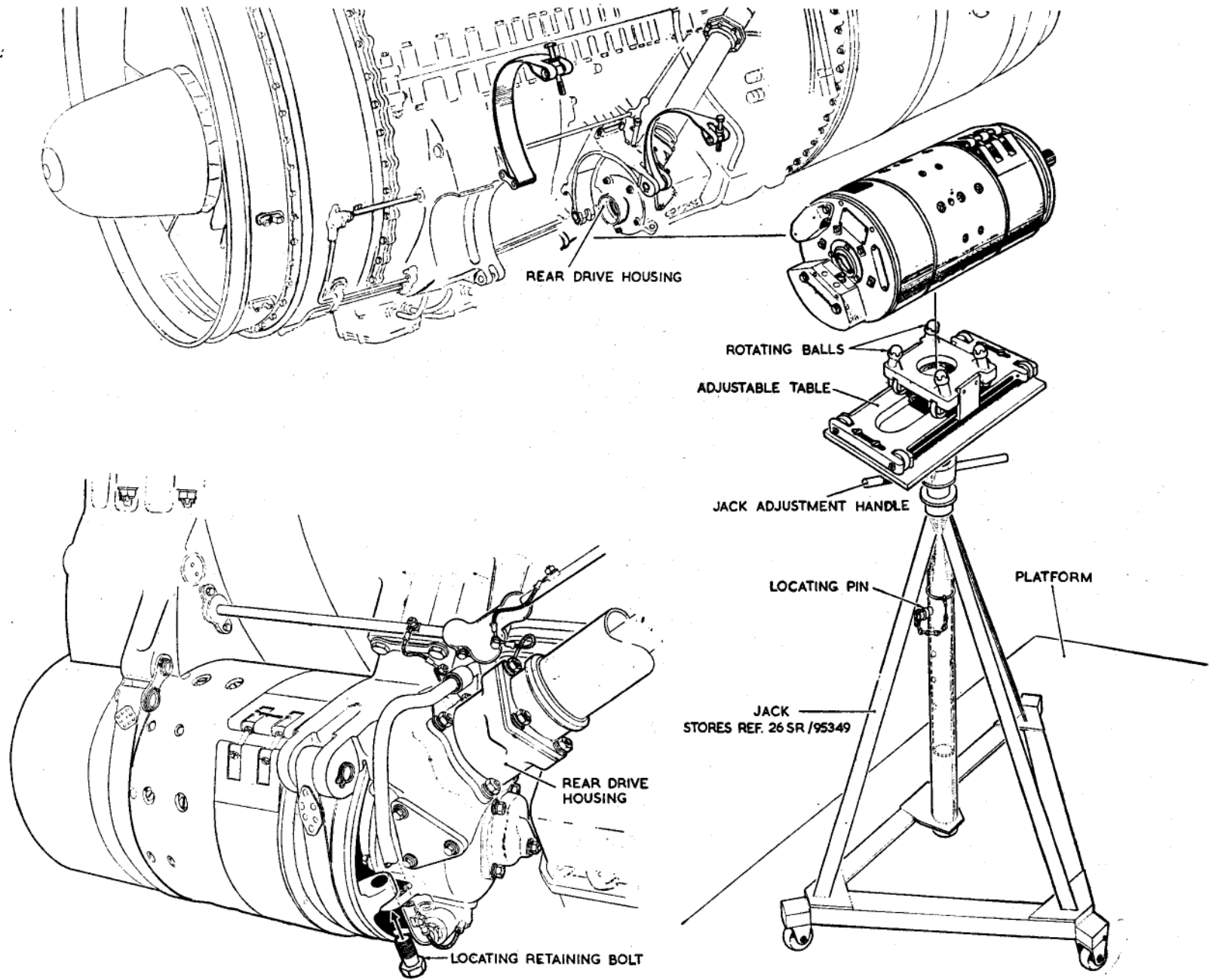


Fig. 8. Generator installation and removal

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Note . . .

The group must be assembled with the bolt heads on the outside levers facing aft, and on the inside levers facing forward.

(6) Reconnect the controls, locking them on completion of any adjustments necessary and check for full and free movement.

(7) Pressure test the cockpit (Sect. 3, Chap. 8).

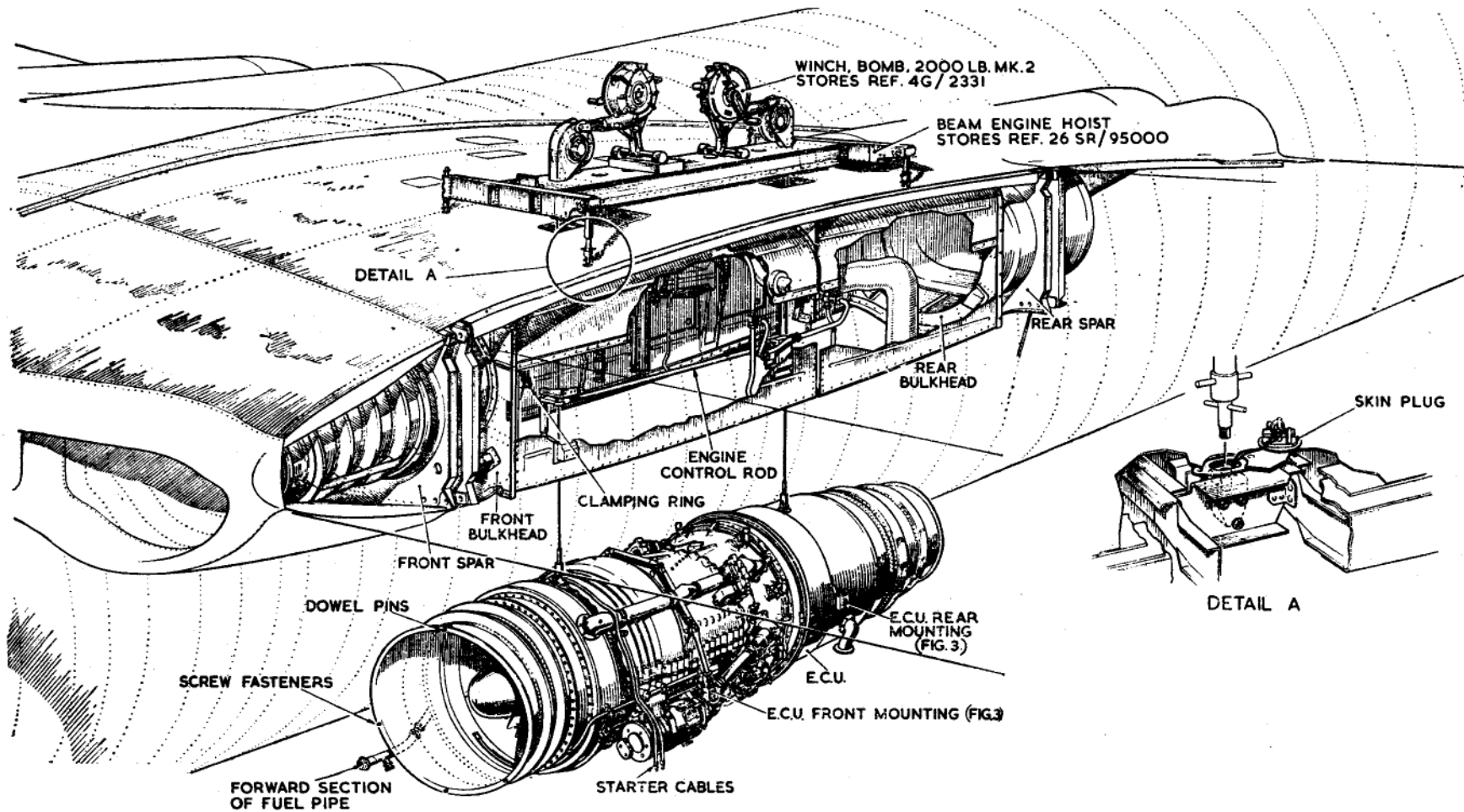


Fig. 9. E.C.U. removal

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39. It is important that all disconnections and connections are made at the points indicated and that suitable blanking caps are fitted as required. It is also essential that all accessories and components belonging to the unit are transferred with it. Unless otherwise stated, installation is the reverse of the removal sequence.

REMOVING THE GENERATOR *fig. 8*

40. The generator can be removed from or fitted to an engine without removing the engine from the aircraft. It is not, however, necessary to remove a generator before removal of an engine. Owing to the weight of the generator (approx. 160 lb.) and the confined working space, the generator cannot be manually removed or fitted without risk of damage to the splined drive; it is therefore necessary to use the special jack, Ref. No. 26SR/95349, for final raising and fitting, or removal and lowering. When used, the jack is mounted on a servicing platform, the surface of which must permit easy movement of the wheeled jack when holding the generator. As a precautionary measure it may be found advisable to apply ballast to the offset leg of the jack stand.

41. To remove the generator from an installed engine, proceed as follows:—

- (1) Remove the forward engine door (*Sect. 3, Chap. 2*).
- (2) Place the lifting jack on the servicing platform, operate the jack handle and raise the adjustable table, leaving sufficient thread in the jack for the final lift and adjustment.
- (3) Remove the pip-pin from the jack extension tubes and extend the jack to the approximate working height. Repin the tubes at the holes giving the nearest adjustment to the required height and move the adjustable table towards the rear of the aircraft. This will ensure that sufficient movement of the table is available when drawing the generator from its housing.

REMOVAL AND INSTALLATION

- (4) Ensure that the aircraft battery isolation switch is off and that the ground battery is not plugged in. Disconnect the electrical cables from the generator.
- (5) Remove the rib cooling duct from the cell plating near the forward end of the generator.
- (6) Position the jack with the ball-end prongs centrally under the generator and raise the table to cradle it.
- (7) Release the two generator retaining straps.
- (8) Remove the generator locating bolt.
- (9) Release the generator cooling duct.
- (10) Rotate the generator $\frac{1}{3}$ rd of a turn anti-clockwise (viewed from the front) to disengage the generator flange from the rear drive housing on the engine, and slide the generator forward on the table to disconnect the splined drive.
- (11) Lower the jack table and remove the jack. The generator may now be removed manually from the jack.

REPLACING THE GENERATOR

42. Fitting the generator with the engine installed in a reversal of these operations except that the adjustable table of the jack should be positioned towards the front of the engine when offered up in order to permit engagement of the generator splined drive and generator flange with the engine rear drive housing. When pushing the generator home, care must be taken to avoid damage to the engine generator cooling duct rubber seal. When refitting the generator retaining straps, a torque load of 200 lb/in is applied to the forward strap bolt and 130 lb/in to the rear.

REMOVING THE E.C.U. (*fig. 9*)

43. Removal of the engine change unit from the aircraft is carried out by using a special engine hoist beam, Ref. No. 26SR/95000 in conjunction with two standard

2000 lb. bomb winches, Ref. No. 4G/2331. The hoist beam, which consists of two short beams attached to one central beam, carries four adjustable feet which pick up special screwed sockets disposed along the strengthened ribs forming the walls of the engine cells. These sockets are normally covered by plugs which must be removed for assembly of the hoist beam. Disposed centrally along the skin plating over each engine cell are three access panels, the front and rear panels giving access to the lifting eye at the compressor casing and the lifting bracket at the nozzle box casing respectively. These lifting points are attached to the cable ends of the bomb winches, which, when mounted on the hoist beam are used for lowering or raising the engine. The hoist beam can be used at any of the four engine positions, a label attached to it giving directions for use. To remove the engine proceed as follows:—

- (1) Disconnect the cables to the air inlet louvres in the centre and rear access panels on the upper wing surface over the engine cell and remove all three panels.
- (2) Remove external drain pipe and shroud from rear engine door and remove the engine doors and under-carriage door, fixed portion, as described in *Sect. 3, Chap. 2*.
- (3) Mount the hoist beam in position on the inner wing, attach the cables to the engine slinging eyes and wind the cables taut.
- (4) Check that the engine master cock is closed and drain the fuel system by removing the blanking plugs from the engine filter drain.
- (5) Disconnect the cabin pressurization pipe.

◀ Note . . .

To prevent loosening of the pipe retaining clamp during service, the spring washer and plain nut are replaced, post-Mod. 3063, by a plain washer and an Aerotight stiffnut. ▶

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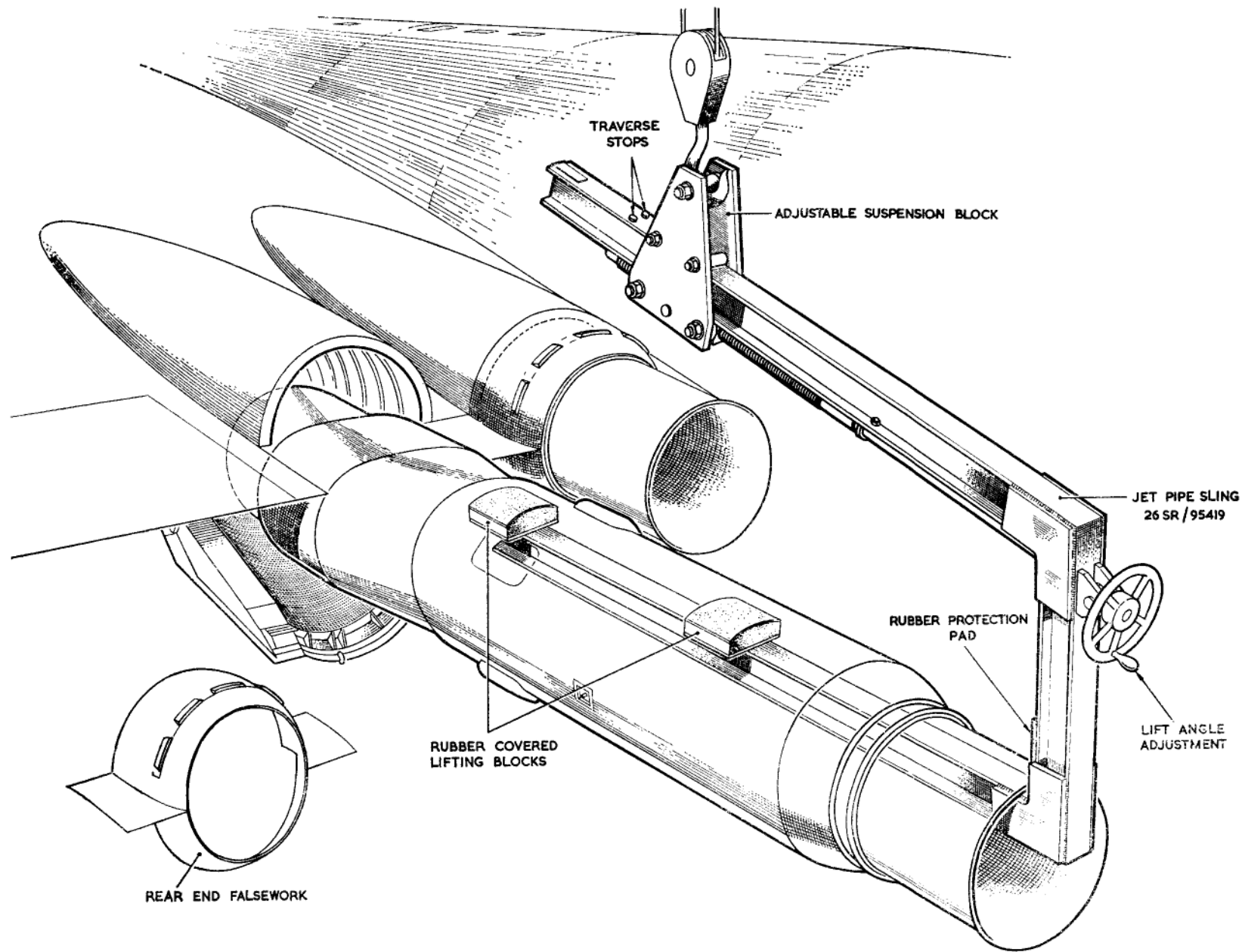


Fig. 10. Exhaust unit removal

(6) Remove the starter lead shroud.
 (7) Remove the lower portion of the bleed valve duct.

(8) Remove the rib cooling ducts.
 (9) Disconnect the fuel feed from the front bulkhead.

(10) Disconnect the fuel tank pressurizing pipe at the starboard side of the cell.

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- (11) Disconnect the L.T. leads from the J.B. at bottom centre line of engine.
- (12) Disconnect the starter leads at the terminal blocks—starboard side of the cell.
- (13) Disconnect the generator cables at the generator.
- (14) Remove the control rods—F.C.U. to port side of the cell.
- (15) Remove the lower quadrant of the intermediate bulkhead.
- (16) Remove Zone 1 drain pipes—2 A.G.S. couplings in Zone 1 and 2 in Zone 2.
- (17) Disconnect the main drain at the rear bulkhead.
- (18) Disconnect the joint shroud drain.
- (19) Remove the 2 lower fire detectors from the rear bulkhead.

- (20) Remove the joint shroud.
- (21) Remove the jet pipe clamps and push the jet pipe aft about 1 in.
- (22) Disconnect the air-intake extension at the front end and pull it rearwards to clear the joint dowels.
- (23) Remove 4 taper bolts at the rear mountings and 2 bolts at the front mountings and lower the E.C.U. onto the stand.

Checks after removal

44. Secure the unit in the stand and remove the items additional to the E.C.U. (A.P. 4481A and D, Vol. 6, Part 1). Secure all loose items of equipment to the E.C.U., and ensure that all apertures are correctly blanked off. Check that the unit is complete to the checking list detailed in the supplements to A.P.4481 A and D, Vol. 1, Part 2, Sect. 1. Thoroughly clean the mounting bay after the E.C.U. has been removed. Inspect the mountings and the various break points for damage and/or corrosion.

45. Special care must be taken if the removal was occasioned by engine failure accompanied by severe vibration, to ensure

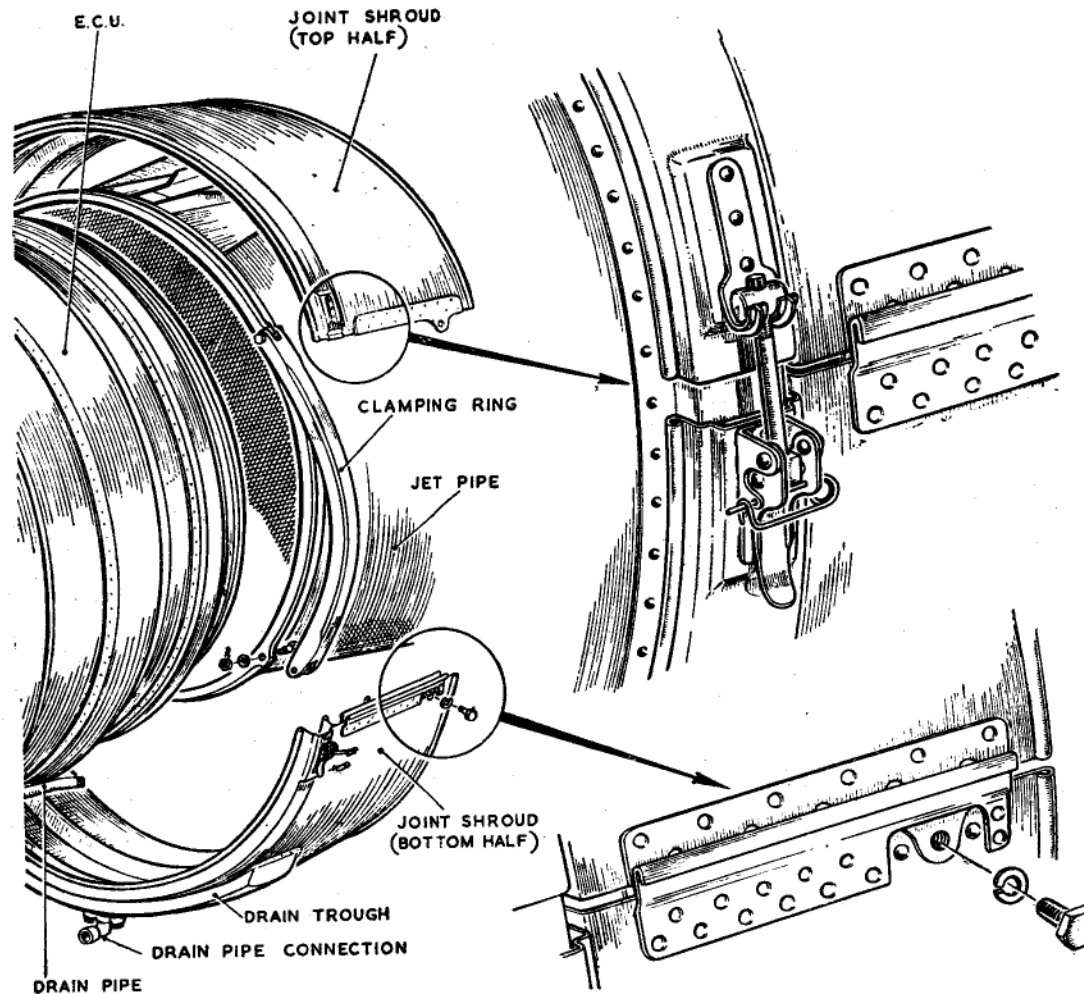


Fig. 11. Attachment of jet pipe to engine

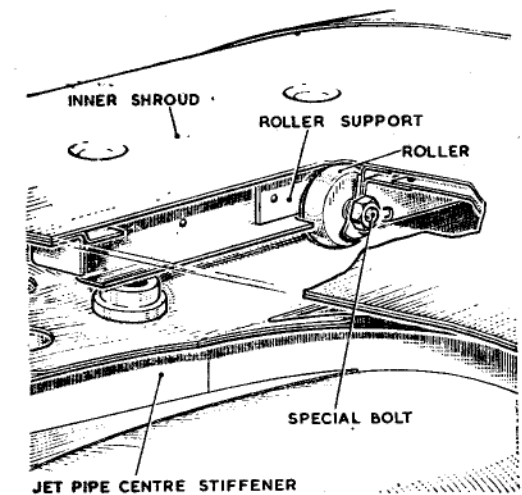


Fig. 12. Jet-pipe front roller mounting

TABLE I
Special tools and equipment

Ref. No.	Part No.	Description	Remarks
26SR/95134	A/21/61/2	Hoist, Minilift 450 lb.	For installing and removing engine doors
26SR/95477	67479-6667	Spanner, engine door bolts	
26SR/95135	67479 Sht.93	Tripod, hoist mounting	For installing and removing Avon E.C.U. Engine generators
26SR/95206	67479-2097	Plate, hoisting engine doors	
26SR/95000	66079 Sht.123	Beam, engine hoist	
26SR/95151	67479 Sht.249	Connector, winch 2000 lb.	
4G/2331	—	Winch, bomb, 2000 lb.	
26SR/95349	67479 Sht.743	Jack, lifting	For removal from transportation case
26SR/95350	67479-5131	Sling, jet pipe	Installation and removal
26SR/95419	67479 Sht.741	Sling, jet pipe	Jet expansion nut
26SR/95215	67479-2275	Spanner, special	
40B/1030	—	Stand, Universal, Avon E.C.U.	
40B/1032	—	Adapter, type AV/2	
40B/1147	—	Bolt, trunnion, $\frac{3}{8}$ in. dia.	
or			
40B/1166	—	Stand, Universal, Avon E.C.U.	
or			
40B/1214	—	Stand, Universal, Avon E.C.U.	
or			
40B/1220	—	Stand, Universal, Avon E.C.U.	
40B/1168	—	Adapter, type AV.3.	

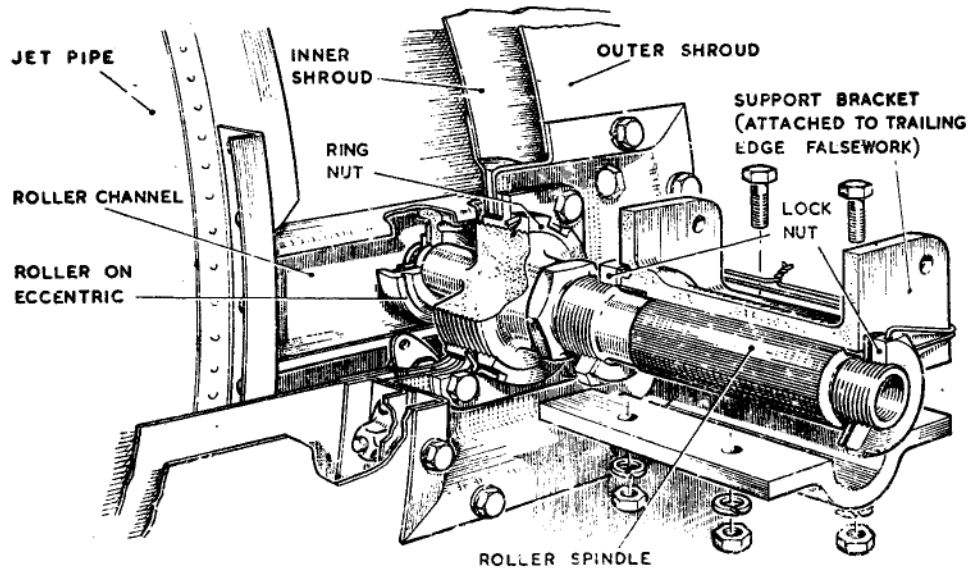


Fig. 13. Exhaust unit main mounting

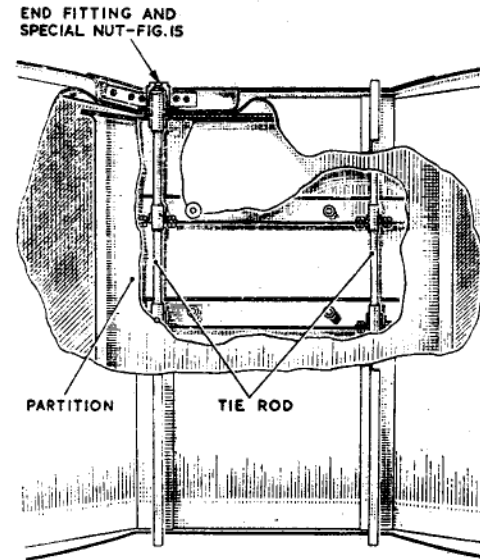


Fig. 14. Jet-pipe partition and tie rods

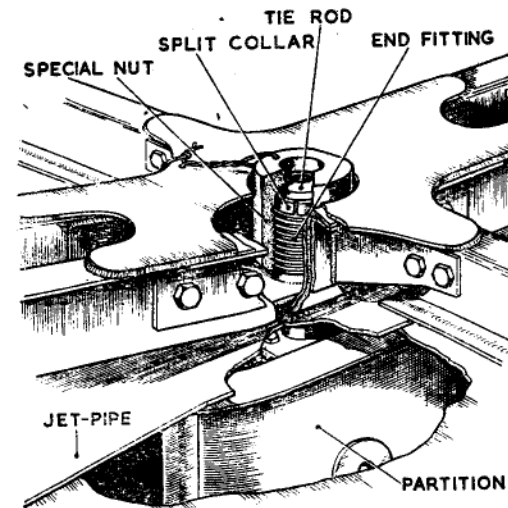


Fig. 15. Jet-pipe tie rod end fitting

RESTRICTED

(11) *Sling* (fig. 10)—Position the sling with the lifting arm inserted into the jet pipe from the rear and the pads contacting the inner wall of the pipe.

(12) *Roller mounting* (fig. 13)—Slacken the locking nuts and unbolt and remove the lower half of the left- and right-hand brackets supporting the roller mountings.

(13) With the exhaust unit supported by the sling, ease the unit rearward until it is clear of the inner spar and lower onto a stand.

INSTALLATION—PRELIMINARY OPERATIONS

E.C.U. assembly numbers

47. The introduction of certain modifications affect both the E.C.U. and the airframe. Replacement units must therefore be at the same modification stage as the airframe into which they are installed and to ensure this an assembly number is allocated which classifies engine change units and airframes according to their modification stages. The E.C.U. assembly number will be found on the identification plate on the engine and the airframe assembly number on the identification plate attached to the mounting bay. Before installing an E.C.U. it is essential to ensure that the assembly numbers of the power unit and the airframe are identical, indicating that both units are at the same modification stage.

Preparing the aircraft

48. The replacement unit should be checked against the checking list, and before attempting to install the E.C.U., the engine bay should be cleaned and inspected, with special attention paid to:—

- (1) The mountings and the surrounding structure for damage.
- (2) Piping for security of attachment, freedom from damage and security of joints.
- (3) Ducting for structural damage.
- (4) Electrical wiring for cleanliness, condition and security.

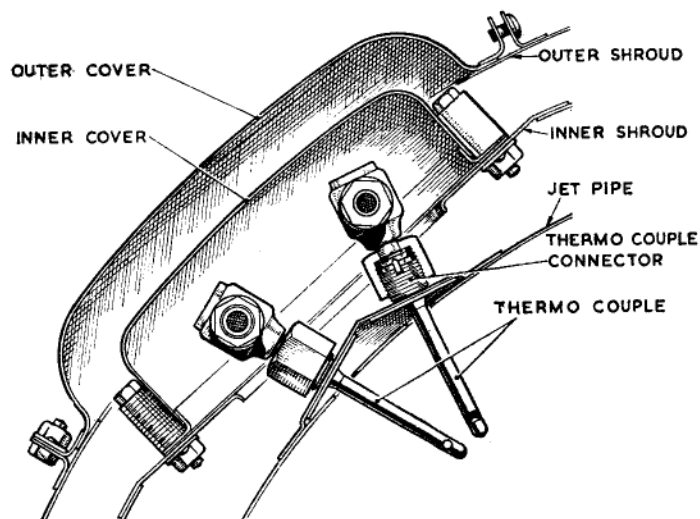


Fig. 17. Thermo-couple mounting

(5) Engine controls for cleanliness and freedom of movement.

(6) Cell plating attachment bolts for security and their seals for condition.

◀(7) The positioning of the aircraft de-icing duct (A.P.4377, Vol. 6, Part 2, Repair Leaflet C.8, fig. 4) relative to the engine bay structure. This must be achieved, using the special jig, Ref. No. 26SR/95246.▶

alignment of the engine may require the use of special off-set bearers. These are supplied in pairs, and, when fitted at the rear mounting position will move the nose of the engine to left or right according to the selection of bearer and movement required, (Vol. 6, Part 2, Leaflet C.8). Care must be taken to avoid over-tightening the special bolt assembly securing the rear attachment trunnion mounting. On reassembly the taper sleeve should be smeared with anti-scuffing paste ZX-28 (Ref. No. 34B/9437518).

INSTALLING THE E.C.U.

49. The installation is a reversal of the sequence given in para. 43. Before hoisting the E.C.U. check that:—

- (1) The joint shroud has been removed from the aircraft.
- (2) The jet pipe has been moved aft to clear the rear of the engine unit.
- (3) The air intake extension has been moved aft to allow the dowels to clear the aircraft connection.

Where the installation has followed repair affecting the engine bearers, obtaining correct

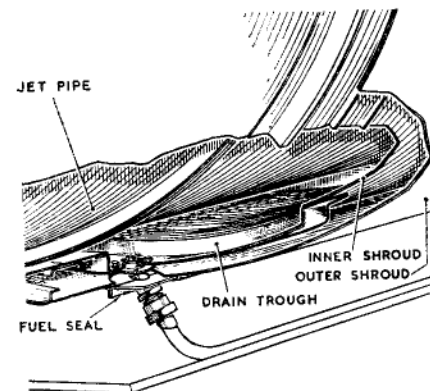


Fig. 18. Inner shroud drain (forward)

◀Note . . .

During installation great care must be taken to avoid overtightening the engine control rod special bolts (Ref. No. 26SR/9890), thereby distorting the bolt heads. Each bolt should be just nipped and then locked with a split pin. ▶

Engine controls adjustment

50. The control assembly has provision for adjustment throughout its run, adjustable rods being available at the control pedestal and cabin, and also at the engine cells. The pilots' throttle levers, whilst controlling engine speed also operate the H.P. fuel cut-off cocks when the latches are raised and the levers pulled fully back. Normally, the latch when down will hold a throttle lever 0.58 in. from the stop position, this setting being initially used when setting up the under-carriage horn warning. Final adjustment for horn warning is made on the microswitches to energize the horn circuit when the engine speed is reduced to 4,500 r.p.m. At the engine bays adjustable rods are provided as linkage between the front bulkhead torsion groups, from the bulkhead to engine cell

E.C.U. plus

53. The procedure for removing and installing the items additional to the engine-change unit is given in A.P.4481A and D, Vol. 6, Part 1.

Exhaust unit

54. To dismantle the exhaust unit, proceed as follows: —

- (1) Remove the outer and inner shroud thermo-couple covers (fig. 17). Remove the thermo-couples.
- (2) Remove the nuts and bolts securing the two halves of the frame trap at the shroud drain connection at the forward end of the unit. Remove the flame trap.
- (3) Remove the sealing plate, sealing box and sealing washer at the drain at the rear end of the outer shroud. Unbolt and

walls, and to the E.C.U., thus providing facilities for obtaining full range of movement and synchronization. After setting or adjustment, all adjustable rods must be wire locked.

Checks after installation

51. On completion of the installation of the E.C.U., checks should be made as follows: —

- (1) To ensure that all pipelines are securely locked and fitted, and unlikely to suffer damage due to chafing.
- (2) That the engine controls move freely with full movement, and do not foul the structure or accessories.
- (3) That all accessories are secure and locked.
- (4) That all electrical connections and bonding are secure.
- (5) That loose tools, equipment or cleaning materials have not been inadvertently left in the air intake or engine cell.

Running up after installation

52. On completion of checks and before

DISMANTLING AND ASSEMBLY

remove the funnel from the inner shroud.

- (4) Unbolt the double-bubble section of the inner shroud from the circular section and remove the half sections. Retain the sealing ring.
- (5) Pull the jet pipe forward to its full extent.
- (6) Remove the bolts securing the roller spindles (one spindle each side) and withdraw the spindles complete. Retain the washers.
- (7) Pull the jet pipe straight out and put it on a suitable stand.
- (8) Remove the bolts from the face and side of the roller spindle support plate and withdraw the inner shroud from the outer.

running the engine, fit the engine doors and ensure that the breathers are correctly aligned. Fit the three access doors to the top surface of the inner plane and connect the louvre cables at the centre and rear panels. The engine can then be run (A.P.4481A and D, Vol. 1, Sect. 2, Chap. 2).

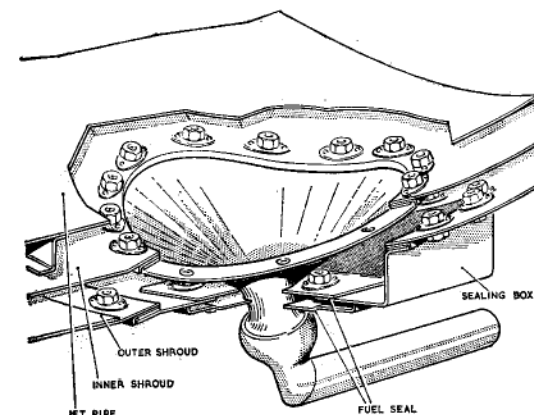


Fig 19. Inner shroud drain (rear)

Trunnions

55. Fig. 3, in showing how the trunnions are fitted, indicates the differences between the left- and right-hand assemblies. If reference is not made to the illustration however, and the trunnions are assembled incorrectly, interference brackets incorporated in the mounting structure prevent the E.C.U. from being bolted in position.

Assembling the exhaust unit (fig. 6)

56. Reassembly of the exhaust unit is essentially a reversal of the dismantling operations. To enable the jet pipe to be centralized in the shrouds, the roller mountings are provided with an eccentric for vertical adjustment and the spindles are threaded sufficiently to permit lateral adjustment.



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