Chapter 5
BLUE STEEL INSTALLATION

LIST OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

DESCRIPTION

Introduction

1. This chapter contains descriptive and servicing information of the various services, equipment and controls installed in the aircraft for the carriage of the Blue Steel store. Reference should be made to Book 2 of this A.P. for details of electrical circuits and components.

2. The installation consists of 'fixed' and 'removable' fittings. The 'fixed' fittings remain incorporated in the structure of the aircraft irrespective of its role. The removable fittings are incorporated when the aircraft is converted to the Blue Steel role.

3. The services, equipment and controls of the installation are as follows:-

(1) Carrier beam.

(2) Rear crutching frame.

(3) Front crutching support structure.

(4) Two fixed fairing doors and support struts, (these replace the bomb-doors, inflatable seals, jacks and operating mechanism removed during conversion).

(5) Detachable fairings (fitted fore and aft of the fairing doors).

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(6) Shock absorbers to prevent damage by store foreplanes.

(7) Hydraulic unit for supplying hydraulic power to store.

(8) Hydraulic system for fin-gap door operation.

(9) Hydraulic system for store hoisting.

(10) Air heating system for the store.

(11) Cooling system for the store.

(12) Pneumatic and manual release systems.

STRUCTURAL EQUIPMENT

Carrier beam

4. The carrier beam is attached by four bolts to two forged suspension links, each of which is secured to two suspension lugs bolted to the outboard ends of bomb arches 151·919A and 182·967A. A spring-loaded plunger in each end of the carrier beam contacts the head of an adjustable stop-bolt passing through the suspension link. The purpose of this plunger is to dampen any lateral swing of the beam after release of the store. A housing, for use with a ball-ended hoisting cable, is provided at each end of the carrier beam top surface.

5. The beam is a box-like structure of light-alloy sheet with four booms of extruded light-alloy angle. End fittings, which carry the beam attachment points, are of forged aluminium alloy. Channel-section stiffeners are riveted internally to the skin panels and diaphragms on each side of the centre line, carry brackets for the mounting of the store release mechanism. A forged member, disposed about the store release unit housing in the centre of the beam, incorporates a spigot for store location. Provision is made on the forward face of the beam for mounting the hydraulic and pneumatic panels.

6. The spherical portion of the hoisting jack body is clamped between top and bottom housing rings with concave seatings, the housing rings being bolted to a forged bracket which is attached to the inboard diaphragms. The housing rings, and a spacer ring which is interposed between them, have red marker spots that must face forward and coincide on the aircraft centre line during assembly. Bolted to the diaphragms are two brackets, attached to which is a hoisting jack guide ring, which centralises the hoist jack link in the final stages of store hoisting.

7. Two pulleys are fitted inside the carrier beam for the two cables which actuate the manual safety lock removal and store release levers. Two lugs, incorporating self-aligning bearings, are mounted on the bottom edge of the beam rear face for the attachment of rear crutch stabilising struts. Two brackets, also incorporating self-aligning bearings and accessible through cut-outs in the bottom skin, are provided for the attachment of fairing door support struts. A pulley and a link are fitted to two spigots on the forward face of the beam to make provision for attaching a hoist when it is required to open or close the fairing doors.

Rear crutching frame

8. The rear crutching frame for the store is mounted in the bomb bay at former 243·172A, a trunnion at each end of the main lateral member being retained by a bearing cap in a forged bracket on either side of the bomb bay (rib 63·5 in.). Two adjustable side load members run upward and outward from a pivoted adjusting bracket in the centre of the main lateral beam to lugs in the bomb arch.

9. The main lateral beam is of extruded section light-alloy construction. The lower lateral member, which carries the two adjustable crutching points, two lugs for bracing strut attachment and a store locating spigot, is constructed of built-up

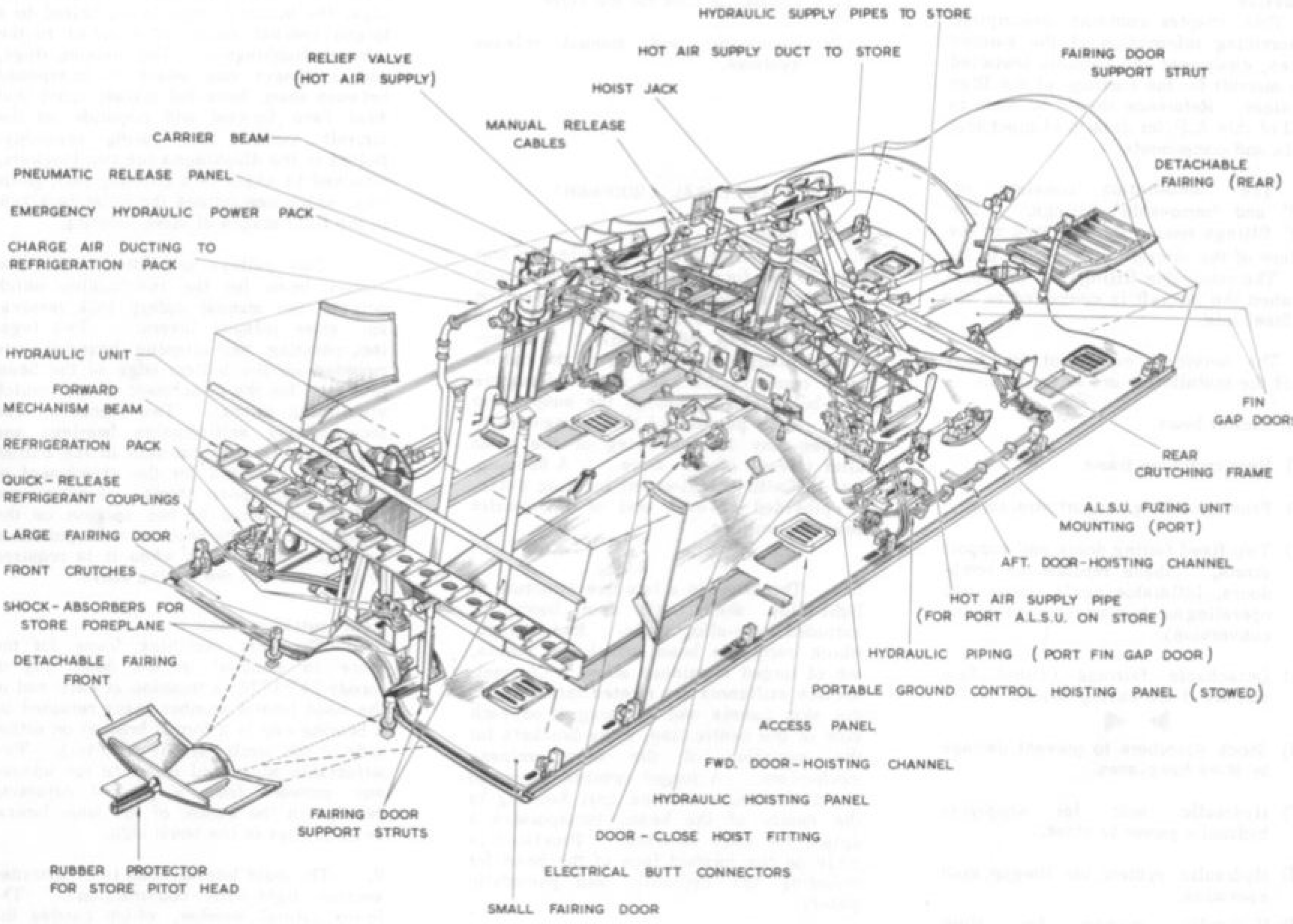

Fig. 1. Bomb bay installations for Blue Steel.
(◄ Mod No 1626, 1671 and 1699 ►)

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light-alloy extrusions and is connected to the ends of the main lateral beam by two struts, also of built-up light-alloy extrusion construction. Two further bracing struts, formed from 14 s.w.g. lipped-channel-section light-alloy, connect the ends of the lower lateral member to the centre of the main lateral beam. All strut end fittings are machined from forgings. A hoisting point for a ball ended hoist cable is provided on the pivoted adjusting bracket.

Forward crutching

10. The forward crutching frame is a 'fixed' fitting in the bomb bay immediately aft of the front spar. Two adjustable crutching points, a spigot and two cylindrical housings, for retaining the quick release refrigerant couplings of the cooling system, are fitted to the frame. The spigot, which locates the store at its forward end, has a tapped hole for attaching a sighting rod during alignment checks or, a refrigerant coupling support bracket during ground tests with the Test Set, Aircraft Missile Installation (T.S., A.M.I.).

Bomb bay fairing doors

11. Two fairing doors, contoured to suit the store upper surface, are fitted to enclose the bomb bay when the bomb bay doors, with their inflatable seals and operating mechanisms, are removed for the conversion to the Blue Steel role. The doors have inner and outer skins riveted to the internal structure, which consists of built-up and channel-section longitudinal members and ribs; intercostals are fitted between the ribs. The starboard door is wider than the port so that the joint between the doors does not coincide with the longitudinal centre line of the aircraft.

12. Each door, located on six of the existing bomb bay door hinge points, after alternative hinge brackets have been fitted, is supported by five adjustable suspension struts in the bomb bay. Sealing is effected by P-section neoprene rubber, which is secured to all edges of the doors. Anti-nuclear flash plates are provided for fitting at the hinge positions. Cut-outs are provided in the doors for the following:-

(1) Hinged fin gap doors.

(2) Six access doors.

(3) Aft crutching points.

(4) Store release unit.

(5) Hydraulic supply to store.

(6) Hydraulic return from store.

(7) Hot air supply to store.

(8) Electrical fuzing units.

(9) Electrical butt connectors.

(10) Bomb gone indicator plunger.

13. Attached to the inner skin of each door are two door - hoisting channels, walkways and a door - close hoist fitting, together with attachment points for the five suspension struts. Brackets and clips are provided for the mounting and clipping of hydraulic and electrical components, pipes and wiring.

14. A ramp-like structure, secured to the inner skin at the aft end of the starboard door, carries a fuzing unit for the store engine. A flush air intake is fitted to the starboard door to provide ram air for the refrigeration system heat exchanger. The exhaust air from the heat exchanger is ducted overboard through a vent outlet in the door. The rear access panel in the starboard door is fitted with louvres for bomb bay air pressure equalisation.

15. Fittings are provided on the outer skin of each door for the attachment of two jury struts which steady the door in the open position. Slotted strips, at the cut-outs for the hydraulic and electrical umbilical connectors, make provision for supporting the T.S., A.M.I., couplings. When Mod.1447 is embodied, the frame, for the rear access panel in the port door, incorporates a bracket to which the equipment for hoisting the upper fin of the store can be attached. This bracket is used when the hoist attachment lug, in the bomb bay roof, is rendered inaccessible by the rear bomb bay fuel tank introduced by Mod.528. An adapter, Ref.No.26DC/9557, is required for attaching the hoist to the bracket, (fig.9). The hoist is used in conjunction with two cable pulleys on the underside of the tank.

16. Boat shaped fairings are fitted to the underside of each door to accommodate two air log safety units on the store. Provision is made for ducting warm air into the fairings to maintain the units at a specified temperature. A spring loaded bellows seal, around the aperture of each fairing, bears against the store skin to prevent heat loss.

Front detachable fairing

17. The fairing is fitted forward of the bomb bay between formers 57F and 75F. The forward former of the fairing carries anchor nuts to receive screws passing through former 75F from the nose wheel bay, the other edges of the panel being drilled for attachment by 2 B.A. countersunk screws. A recessed portion, welded to the fairing, accommodates the upper surface of the nose of the store, stiffening members and, packing strips are attached by spot welding.

Rear detachable fairing

18. The fairing, fitted aft of the bomb bay, between the rear spar and former 428A, is attached by screws at its forward end and Dzus fasteners at the sides and rear. The fairing consists of longitudinal members joined by gusset plates to lateral Z-section stiffeners and covered by light-alloy skin. When Mod.1670 is incorporated, this fairing, together with all access doors and panels in the under-

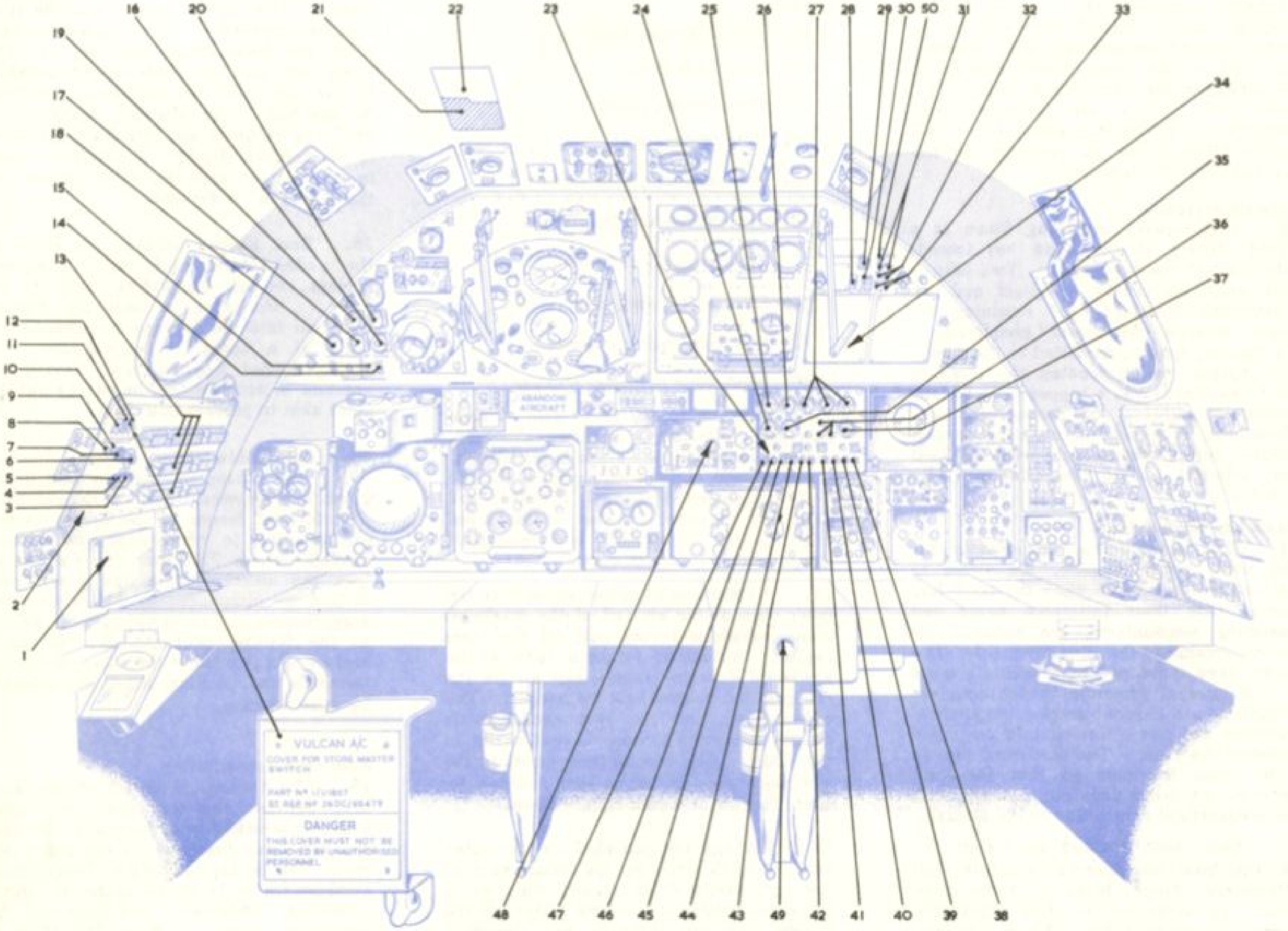

Fig. 2. Blue Steel controls and indicators at crew stations

KEY TO FIG.2

BLUE STEEL CONTROLS AND INDICATORS AT CREW STATIONS

1. MOUNTING PANEL FOR E.Q. CONTROL UNIT.
2. BOMBING PANEL FOR STORE.
3. PRESS TO TEST INDICATOR - OVER-RIDE BREAK UP.
4. PRESS TO TEST INDICATOR - COMMAND BREAK UP.
5. PRESS TO TEST INDICATOR - SHUTTERED DETONATOR.
6. DIMMER SWITCH FOR E.Q. LIGHTING.
7. GUARDED SINGLE POLE SWITCH - D.C. SUPPLIES.
8. RELEASE PRESSURE INDICATOR - PRESS TO TEST (AMBER LAMP).
9. STORE GONE INDICATOR (AMBER LAMP)
10. GUARDED DOUBLE POLE SWITCH - E.Q. POWER SUPPLY EMERGENCY OVER-RIDE.
11. SINGLE POLE ON/OFF SWITCH FOR RELEASE UNIT HEATER.
12. GUARDED DOUBLE POLE SWITCH - BOMB SELECTOR - POWER - BALLISTIC.
13. FUSE BLOCKS.
14. STORE HEATING RESET SWITCH.
15. STORE HEATING MASTER SWITCH.
16. STORE EXCHANGER OUTLET TEMPERATURE SELECTOR.
17. STORE BAY TEMPERATURE SELECTOR.
18. STORE ENGINE BAY TEMPERATURE GAUGE.
19. STORE BAY TEMPERATURE GAUGE.
20. STORE EXCHANGER OUTLET TEMPERATURE GAUGE.
21. ACCESS DOOR TO STORE RELEASE HANDLE.
22. ACCESS DOOR TO SAFETY LOCK REMOVAL HANDLE.
23. BLUE STEEL CONTROL PANEL.
24. HYDRAULIC PRESSURE/TEMPERATURE GAUGE.
25. DUAL PRESSURE GAUGE - NITROGEN.
26. A.P.U. - H.T.P. TEMPERATURE GAUGE.
27. H.T.P. TANKS TEMPERATURE GAUGES (3 OFF).
28. SWITCH FOR NORMAL OPERATION OF FIN GAP DOORS.
29. THREE POSITION INDICATOR FOR FIN GAP DOORS.
30. GUARDED SWITCH FOR EMERGENCY OPERATION OF FIN GAP DOORS.
31. E.P.C.U. START PUSH SWITCH AND PRESS TO TEST INDICATOR.
32. START AND STOP PUSH SWITCHES - A/C HYDRAULIC UNIT.
33. START AND STOP PUSH SWITCHES - A/C REFRIGERATION UNIT. A UNIT-FAILED INDICATOR IS INCORPORATED IN THE START SWITCH.
34. POSITION FOR TELEMETRY PANEL (FITTED TO S.O.O.), OR WINDOW LAUNCH CONTROL UNIT.
35. DUAL PRESSURE GAUGE - A.P.U. PRESSURF
36. AUTO-PILOT TWO POSITION MAGNETIC INDICATORS (4 OFF).
37. ALTERNATOR VOLTAGE INDICATOR.
38. H.T.P. TANK VENT VALVE SWITCH (VENT VALVE THREE POSITION INDICATOR ABOVE SWITCH).
39. AUTO-PILOT H.T. SWITCH (TWO POSITION INDICATOR ABOVE SWITCH).
40. A.P.U. NITROGEN SWITCH.
41. A.P.U. START AND H.T.P. SWITCH (THREE POSITION INDICATOR FOR H.T.P. MASTER COCK, ABOVE SWITCH.)
42. FOREPLANE LOCK AND UNLOCK SWITCH.
43. FUEL SYSTEM NITROGEN SWITCH (NITROGEN VALVE THREE POSITION INDICATOR, ABOVE SWITCH).
44. STORE/A/C REFRIGERATION SWITCH.
45. SET TO LAUNCH SWITCH.
46. INERTIA NAV. MIX AND FREE SWITCH.
47. POWER RELEASE PUSH BUTTON.
48. I.N. CONTROL PANEL.
49. I.N. MONITORING UNIT.
50. REFRIGERATION HEATER SWITCH

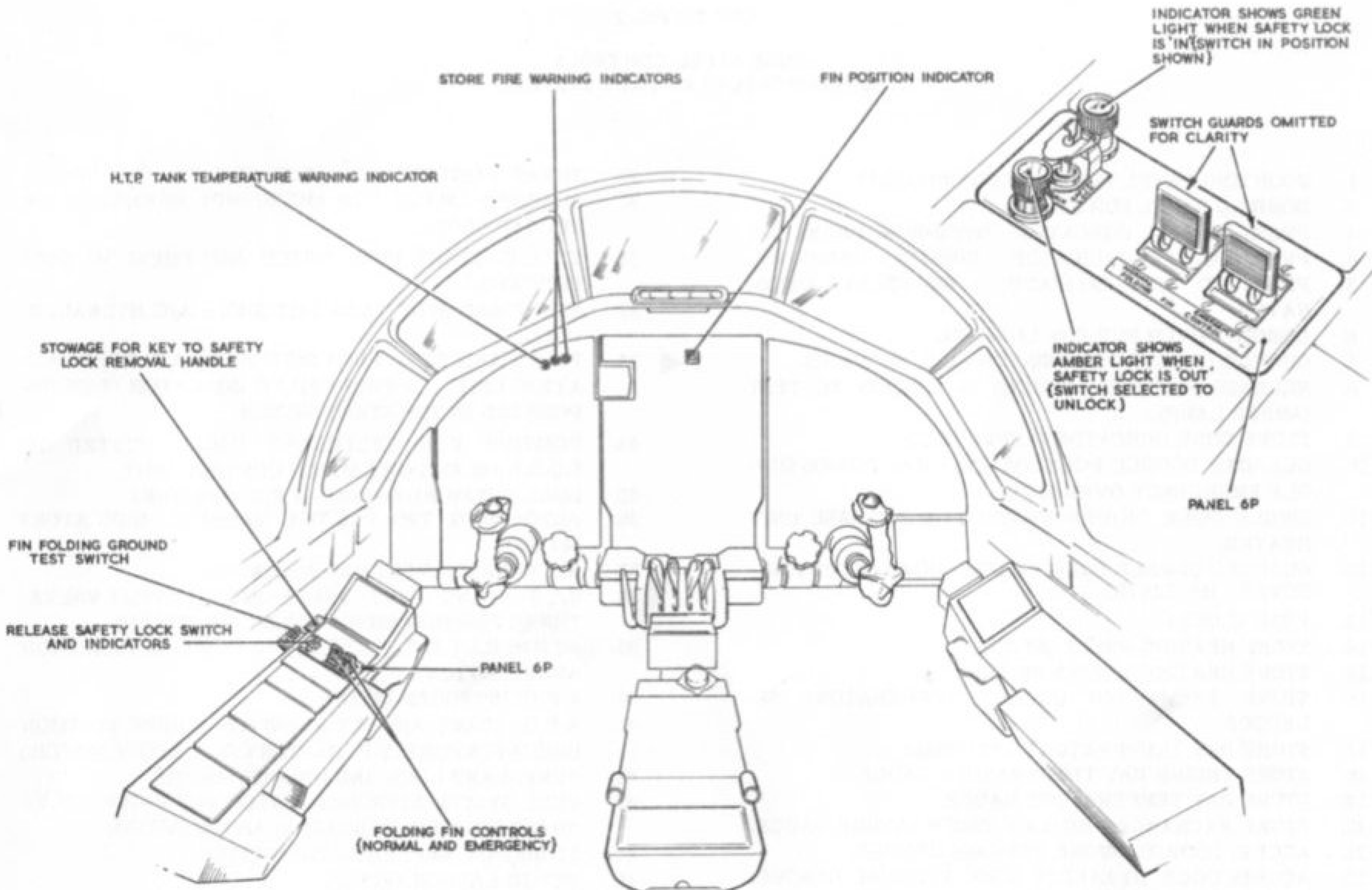

Fig. 3. Blue Steel controls and indicators at pilot's position.

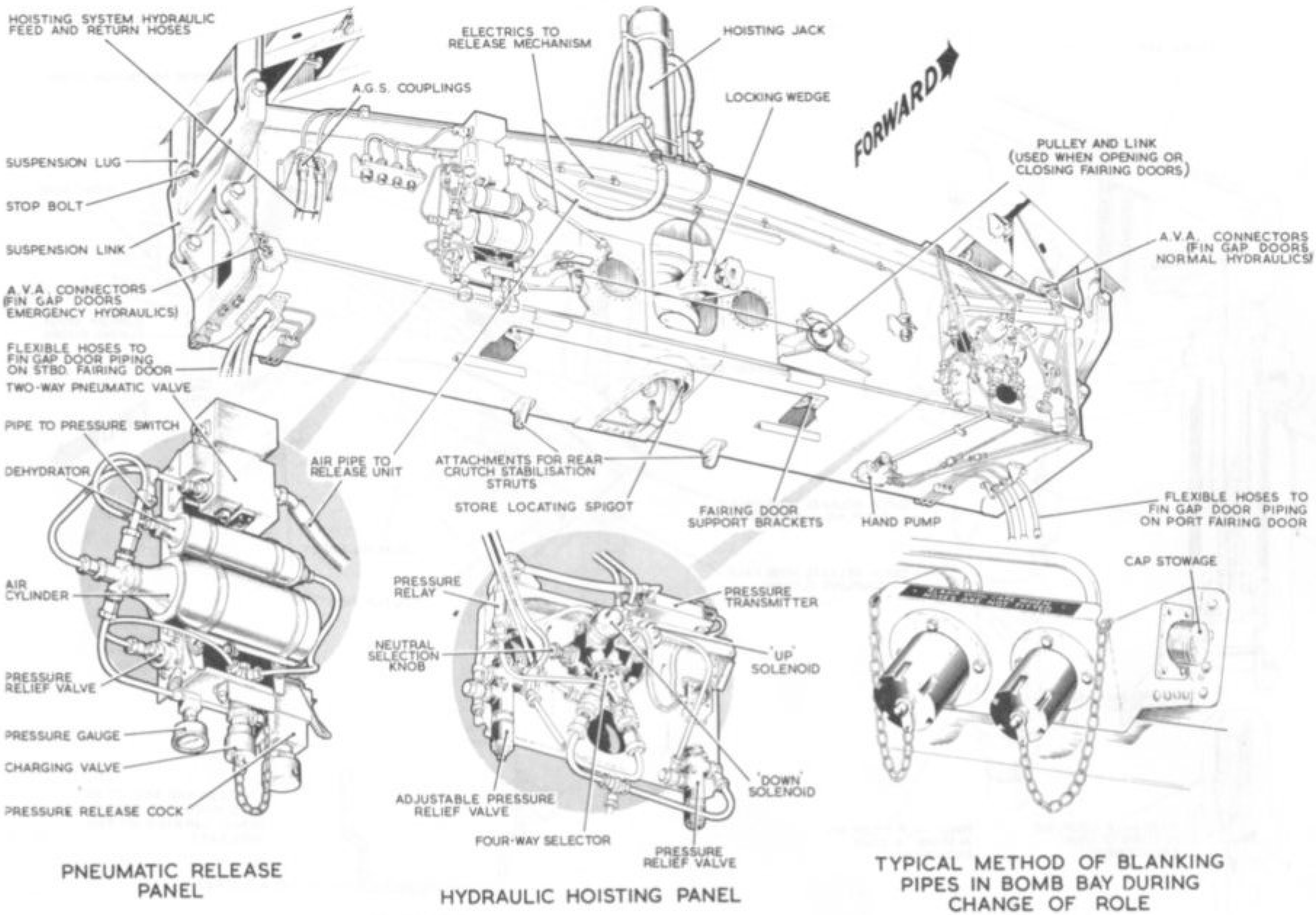

Fig. 4. Carrier beam.
(◄ Mod. 1353 and 1626 ►)

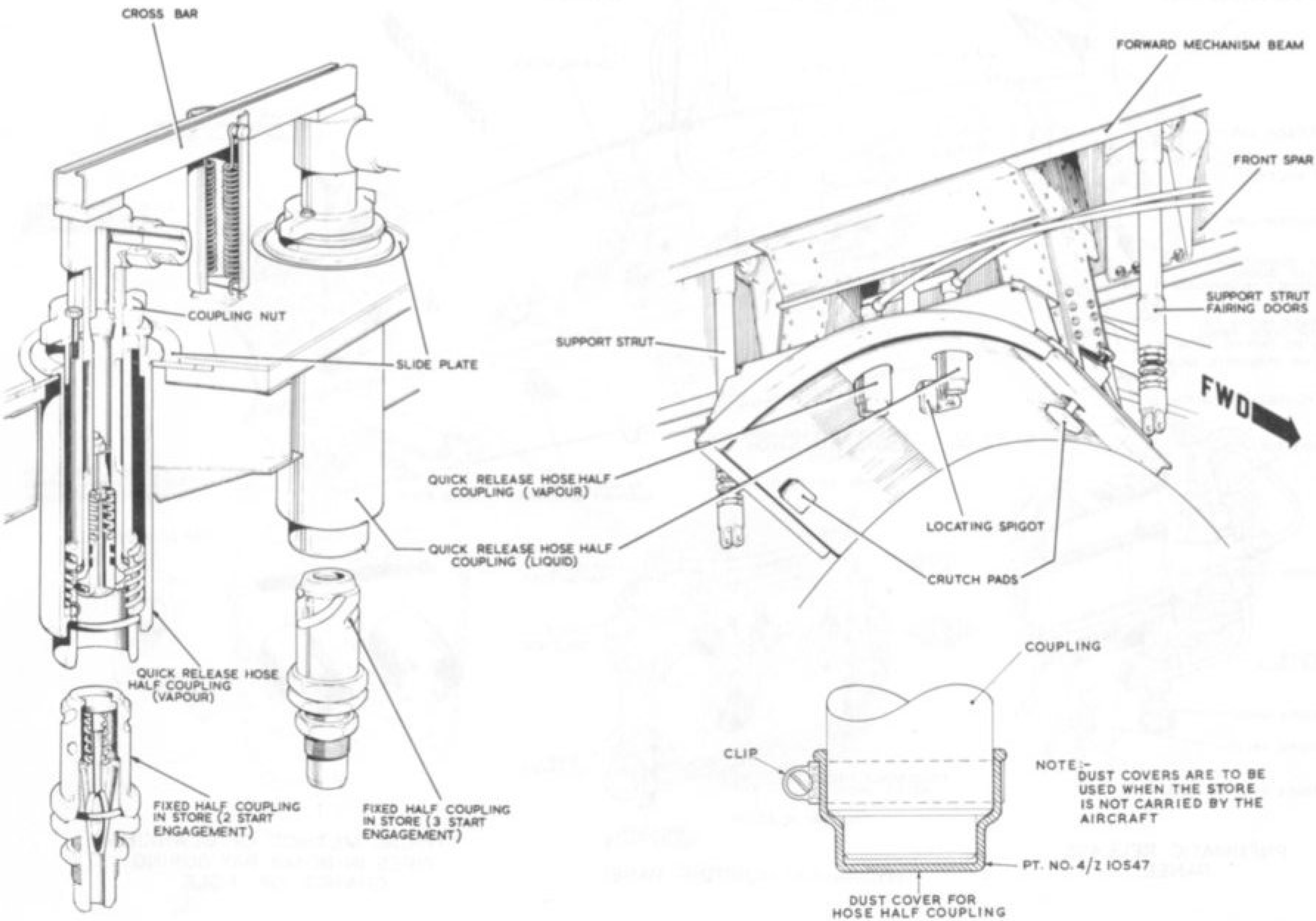

Fig.5. Front crutch.
(◄ Mod.1699 and 1712 ►)

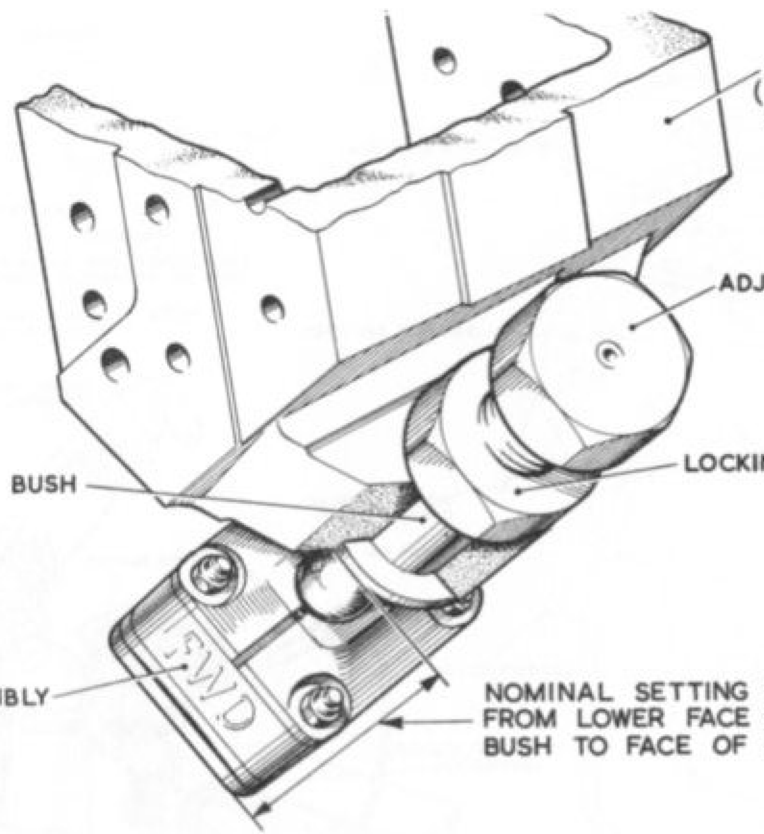

Fig. 6. Front crutch pad

side of the rear fuselage, is sealed against the ingress of H.T.P. which vents from the store. Sealing of the fairing is effected, at its edges, by a layer of Thiokol P.R.1301 (Ref.No.33H/130). Along the fairing centre line, the drain holes are plugged by rivets. Sealing of the access doors and panels is effected by rubber strips, P-section rubber seals and rubber caps; the latter fitted over the locking springs of the Dzus fasteners.

Shock-absorbers

19. Two shock-absorbers, loaded with 'Belleville' washers, are fitted to the fairing under No.2 tank bay to prevent damage to both store and aircraft in the event of nose up runaway of the store foreplanes. Tail up runaway is catered for by a depression in each fairing door.

STORE HYDRAULIC SUPPLY SYSTEM

General

20. This system is self-contained and arranged as a packaged hydraulic unit powered by an electrically-driven motor pump. The package is installed in the bomb bay and supplies hydraulic power to the store for driving a variable swash-plate hydraulic motor, operating the lower folding fin and testing the flying control surfaces. For these operations the store has two alternative power requirements, high pressure at 2,250 ± 50 p.s.i. and low pressure at 1,700 ± 50 p.s.i. High pressure is required for folding fin operation, control surfaces testing and for a specified period immediately prior to store release; low pressure is required during all other periods of parent flight. To achieve

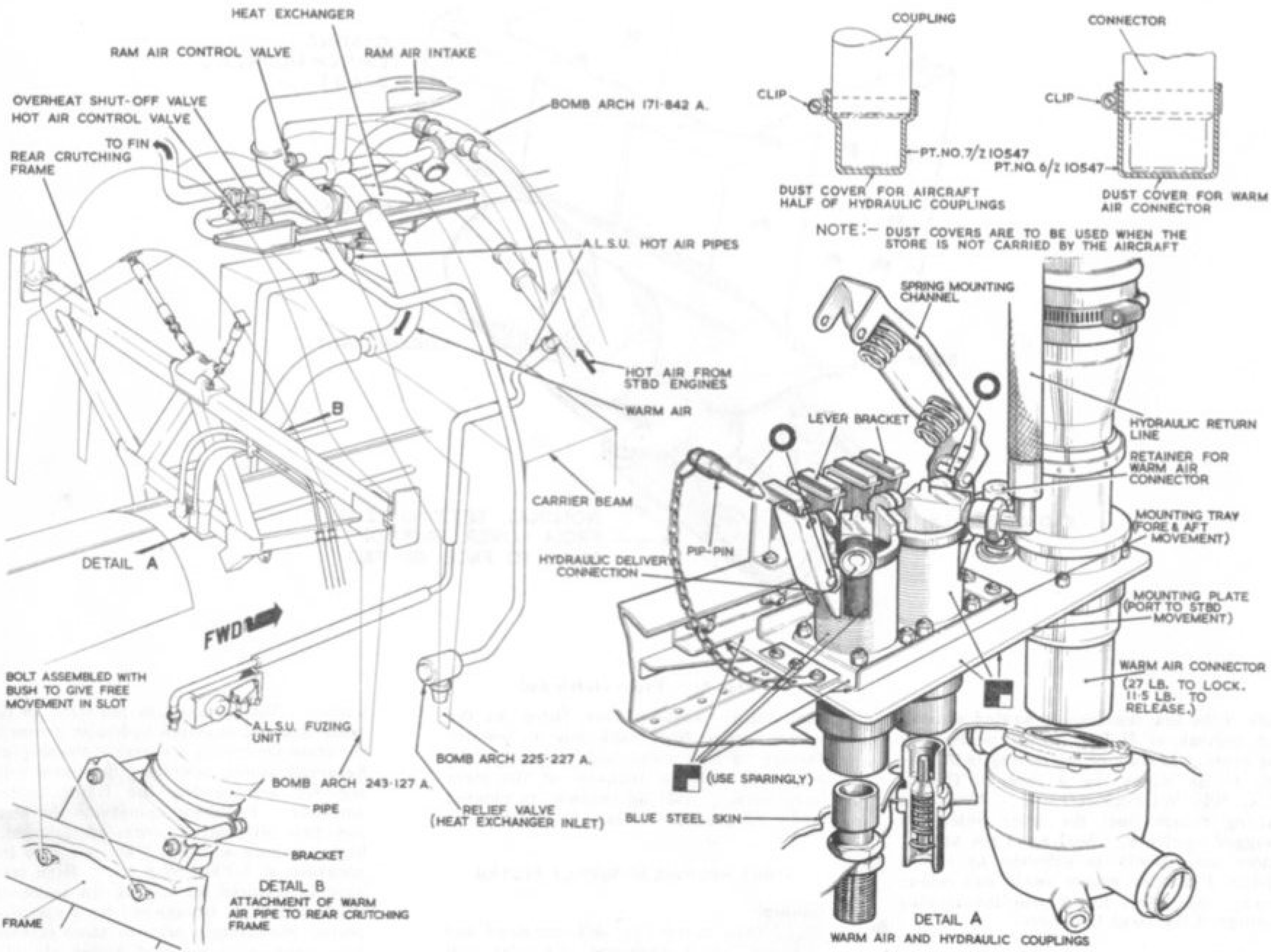

Fig. 7. Installations at rear crutch.
(◄ Mod. No. 1926 ►)

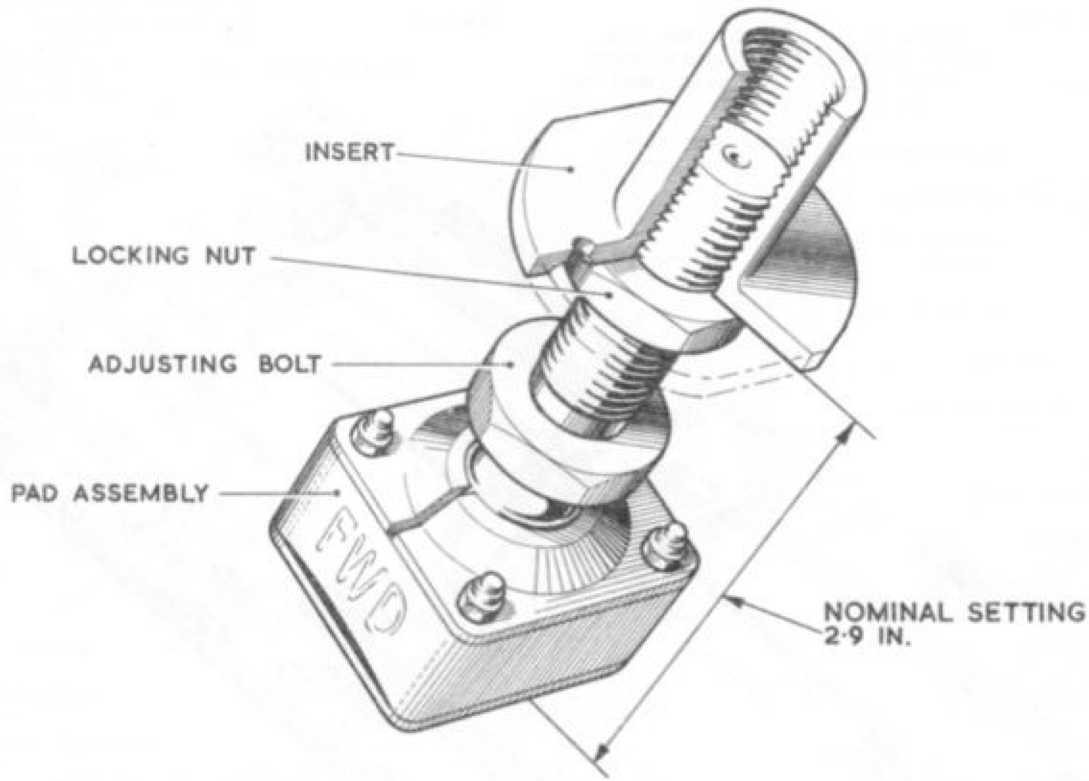

Fig. 8. Rear crutch pad

these pressures at the store connections, the relief valves of the hydraulic unit are set to give an output pressure of 2,300±50 p.s.i. and 1,750±50 p.s.i. Two pull-off type quick-release self-sealing couplings make the aircraft-to-store hydraulic connections. The female portion of each coupling is mounted in the starboard fairing door, aft of the rear crutch, and the male portion is a store fixture, remaining with it on release

21. The hydraulic unit, mounted on the starboard side of the bomb bay forward mechanism beam, is connected by rigid pipes and flexible hoses to the female coupling halves which are retained in engagement with the fixed halves by conical springs mounted on a hinged spring mounting channel. The channel is held in the shut position by a Pip-pin. Manual engagement and dis-engagement of the coupling half is effected by a lever (Part No. Z9997), following release of the Pip-pin. All components of the hydraulic supply system are listed in Table 1 and, with the exception of the quick-release couplings and two thermal relief valves, are all contained within the packaged unit.

Reservoir

22. The accumulator-type reservoir is pressurised from a nitrogen cylinder charged to 1,600 p.s.i. Fluid content of the reservoir is measured by a dipstick and a fluid charging point is incorporated in the system. A pressure gauge is fitted to the nitrogen cylinder for checking the

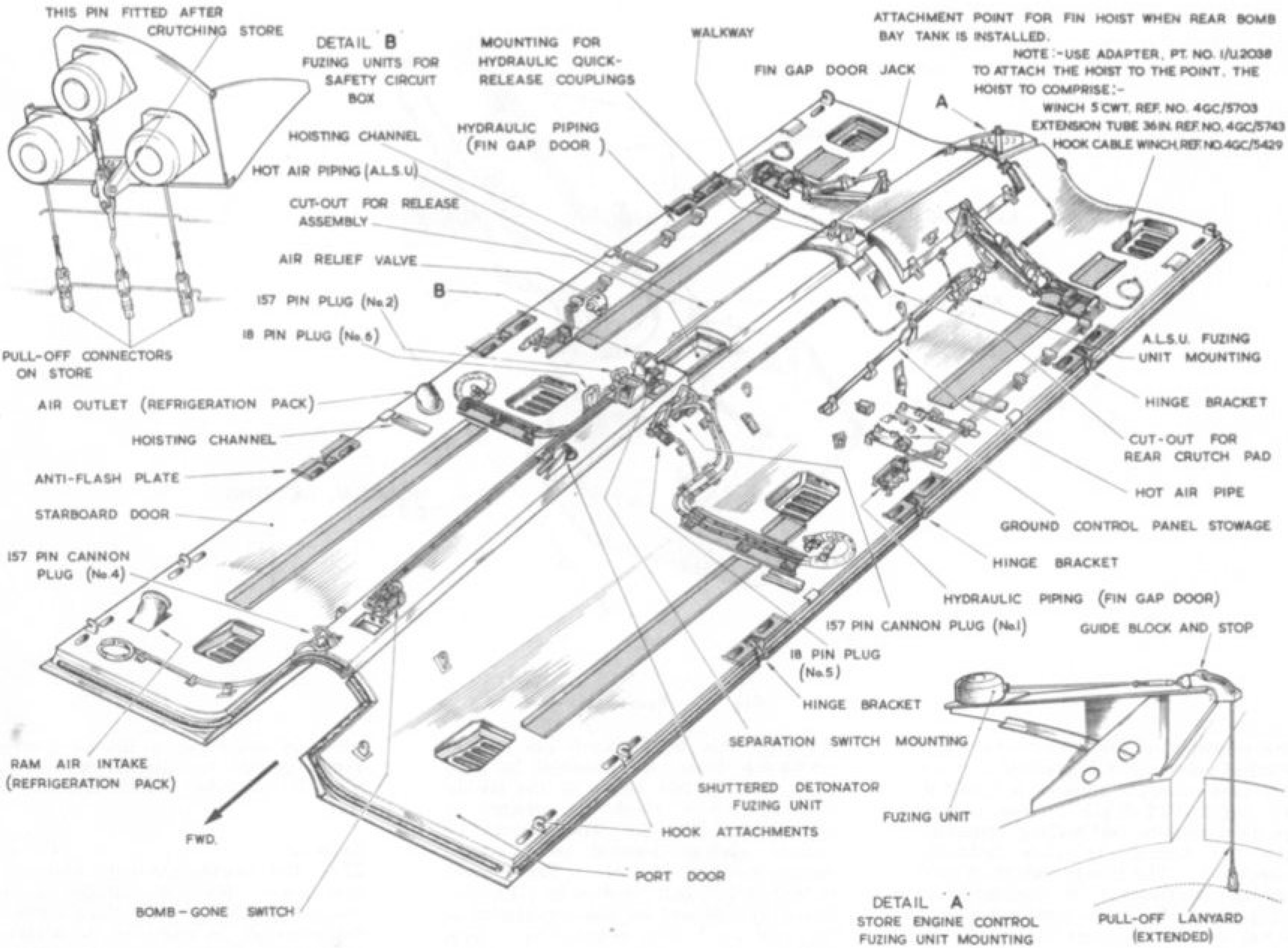

Fig. 9. Fairing doors (1)
(◄ Mod. No. 1447 ►)

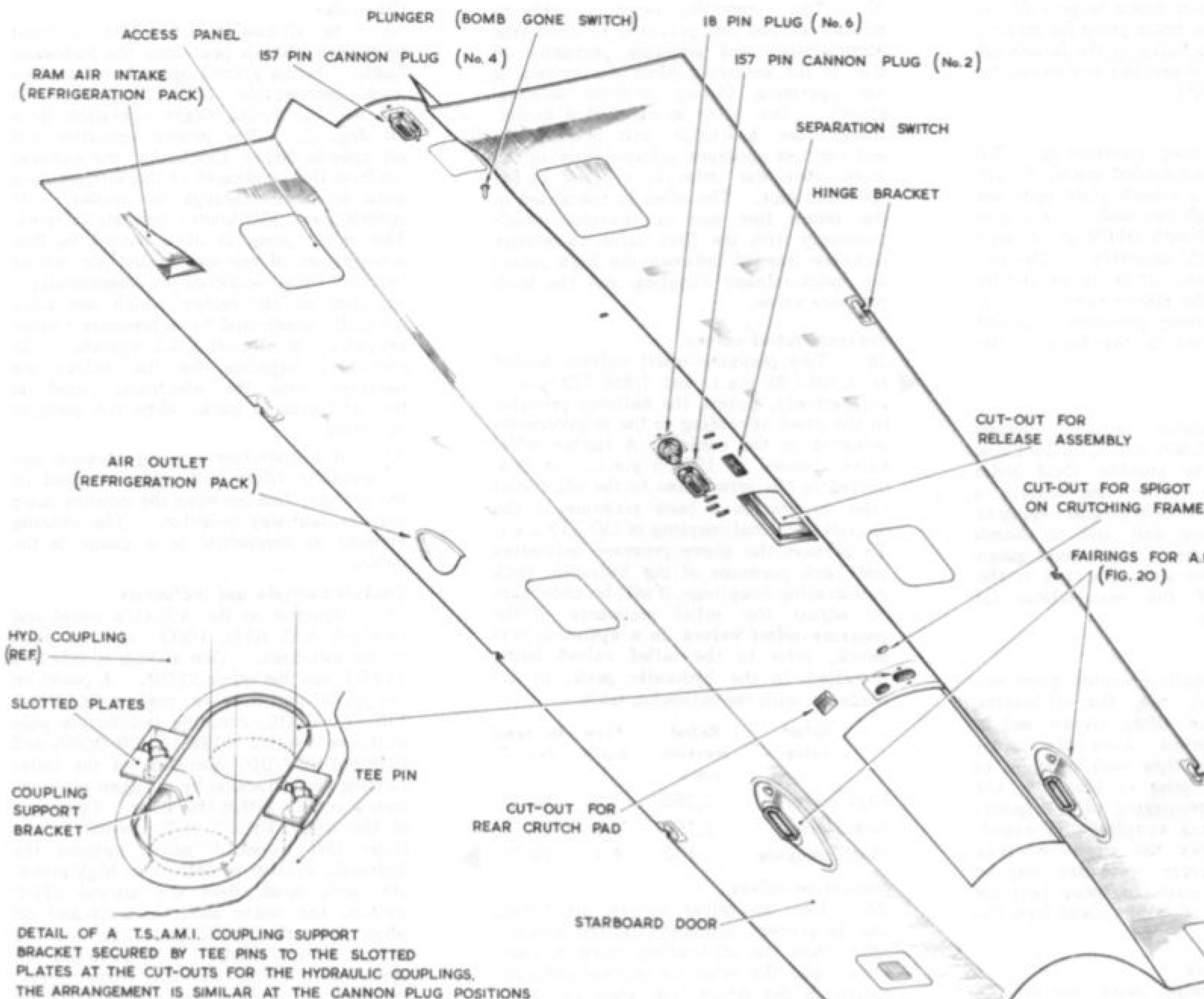

Fig. 10. Fairing doors (2)

pressure and a bleed screw is provided in the feed line to the motor pump for priming the system. Two holes in the framework below the reservoir provide a stowage for the reservoir dipstick.

Motor pump

23. The motor pump consists of a 200 volt 3-phase a.c., air-cooled motor, driving a gear pump and a swash plate operated piston pump through the medium of a gear box which is filled with oil OM-15, through a vent and dipstick assembly. The two pumps are in series, oil being passed by the gear pump to the piston pump where it is boosted to delivery pressure. Bleed screws are provided in the body of the piston pump.

Accumulator

24. An accumulator, initially charged with nitrogen to 1,600 p.s.i., is included in the system to provide fluid under pressure to the store immediately a change over is made from ground supply to the aircraft supply unit and to absorb pressure fluctuations. A pressure gauge and charging valve are connected to the nitrogen side of the accumulator for servicing purposes.

Selector valves

25. Two electrically-operated three-way valves are fitted; one, the off-loading valve, provides an idling circuit and is automatically opened when the motor pump is started to allow working r.p.m. to be attained, and prior to launching the store so that disengaging of the quick-release self-sealing couplings is eased. The other provides the means whereby high or low delivery pressures may be selected. A main four-way selector controls the flow of fluid to and from the store.

Thermal relief valve

26. A thermal relief valve, set at 200-250 p.s.i., safeguards the return piping of the hydraulic unit when the four-way selector is de-energised.

27. Two manually-operated pressure release valves are provided to discharge accumulators and equalise pressures to that of the reservoir when the system is not operating (4-way selector de-energised). One valve is connected to discharge the hydraulic unit accumulator and the low pressure accumulators in the store when the latter is coupled to the hydraulic unit. The other is connected in the return line and is operated simultaneously with the first valve to release pressure trapped between the high pressure quick-release coupling and the back pressure valve.

Pressure relief valves

28. Two pressure-relief valves, loaded at 2,300 $\pm$ 25 p.s.i. and 1,850 $\pm$ 25 p.s.i., respectively, govern the delivery pressure to the store according to the requirements selected in the cabin. A further relief valve, loaded at 100 $\pm$ 5 p.s.i., is connected in the return line to the oil cooler inlet to provide a back pressure at the aircraft umbilical coupling of 130 $\pm$ 10 p.s.i. To achieve the above pressure deliveries and back pressure at the hydraulic pack self-sealing couplings, it will be necessary to adjust the relief pressures of the pressure-relief valves on a hydraulic test bench, prior to the relief valves being installed in the hydraulic pack, in accordance with the following table:-

Relief valve	Relief pressure p.s.i.	Flow g.p.m.	Oil temp. deg. C.
High power	2,250	1.0	50 $\pm$ 5
Low power	1,750	1.0	50 $\pm$ 5
Back pressure	100	4.3	50 $\pm$ 5

Non-return valves

29. Two non-return valves are fitted, one to prevent discharge of the accumulator when the off-loading valve is energised, and the other to prevent pressurisation of the return line when the motor pump is being operated with the four-way selector de-energised i.e., during fluid warming.

Oil cooler

30. An air-cooled oil cooler is fitted to remove excess heat from the hydraulic fluid. During ground operation the maximum permissible fluid temperature is 80 deg. C; during flight operation it is 70 deg. C. For ground operation and air speeds below 150 knots, the exhaust air from the condenser of the refrigeration pack is ducted through the cooler. At speeds over 150 knots, ram air is used. The motor pump is also cooled by this arrangement of ram or exhaust air, either service being selected by electrically - actuated on/off valves which are automatically controlled by a pressure switch sensed to the aircraft A.S.I. system. The electrical supplies for the valves are obtained from the electrical panel on the refrigeration pack, when the pack is operating.

31. A temperature-sensing element and a hydraulic filter unit are positioned in the delivery line between the monitor pump and the four-way selector. The sensing element is connected to a gauge in the cabin.

Cockpit controls and indicators

32. Mounted on the A.E.O.'s panel and labelled A/C HYD. UNIT, are two push button switches. One switch is labelled START and the other STOP. A panel on the pilots' port console, marked FOLDING FIN CONTROL, contains two double pole switches labelled NORMAL, UP-DOWN and EMERGENCY-UP, operation of the latter causing fin retraction by nitrogen pressure from a supply within the store. Operation of the AUTO-PILOT H.T. switch on the Blue Steel control panel selects the hydraulic system to deliver at high pressure and, apart from the normal STOP switch, the motor pump is switched off when both the INERTIA NAV. and the A.P.U. START AND H.T.P. switches are operated to FREE and ON, respectively, the switches being wired in series. When these switches are used to stop the motor pump, the off-loading selector is energised causing a rapid drop in pressure.

TABLE 1

Components of the hydraulic supply system to the store

Component	Part No.	No.off.	A.P.Ref.
Motor pump unit	Dowty 1.01262.004	1	1803U, Vol.1, Book 1
Accumulator	Dowty 101.062.001	1	1803U, Vol.1, Book 1
Selector (off loading)	Dowty 07437.Y.A.16	1	
Selector	Dowty 97437.Y.AO.9	1	
High pressure relief valve	Dowty 1.00051.022	1	1803U, Vol.1, Book 4
Low pressure relief valve	Dowty 1.00051.021	1	1803U, Vol.1, Book 4
Back pressure relief valve	Dowty 1.00051.016	1	1803U, Vol.1, Book 4
Thermal relief valve	Dowty 1.00063.001	1	1803U, Vol.1, Book 4
Pressure release valve (button operated)	D.7375.Y.Mk.B	2	
Selector, 4-way	Dowty 100144014	1	
Pressure gauge 0-3,000 p.s.i.	Ref.No.6A/2691	2	
Charging valve, nitrogen	DC.24.DAMIC	2	
Oil cooler	Delaney Gallay C.4280	1	
Non-return valve	Dowty D.5233.Y.Mk.B	1	1803U, Vol.1, Book 4
Reservoir	Dowty 1.00656.001	1	1803U. Vol.1, Book 1
Filter	Electro-Hydraulics EH.7957	1	1803F, Vol.1
Bleed screw	A.G.S.1174	1	
Charging valve (oil)	Exactor GM/B/19210	1	
Bottle 1,600 p.s.i.	Electro-Hydraulics EH.4094	1	
Temp. sensing bulb	Sangamo Weston S.110G.3.200	1	
Connector; quick-release (delivery ½ in. B.S.P.)	Lucas B.S.C.V.100	1	
Connector; quick-release (return 5/8 in. B.S.P.)	Lucas B.S.C.V.102	1	

33. A combined fluid temperature and pressure gauge is mounted on the Blue Steel control panel, the temperature sensing element being fitted in the system delivery line and the pressure sensing element in the store. The fluid may be warmed up to its minimum operating temperature by holding in the ON switch on the A.E.O.'s instrument panel until the temperature indicator registers that temperature. This procedure allows the motor pump to be run while the main selector is closed so that the fluid is heated in its passage through the high pressure relief valve. Should an attempt be made to land with the folding fin extended, selection of U/C down will cause the fin to commence moving to the folded position. A three-position indicator at the top of the pilot's centre panel, labelled, BOMB DOORS AND FIN POSITION shows UP when the fin is folded, DOWN when the fin is extended and striped in intermediate positions. A test switch on the pilot's port console, labelled FIN FOLDING, enables the aircraft fin control circuit to be ground tested by the T.S.,A.M.I. whilst the aircraft is standing on its wheels.

Operation

34. When the motor pump is initially switched on, the off-loading selector is automatically held open for a few seconds, by an electrical delay, to allow the motor pump to achieve working r.p.m. When the off-loading selector closes, the accumulator pressure will build up to the high pressure value. Seven to nine seconds after release of the start button the main four-way selector and the pressure selector will be energised to allow delivery to the store system at the low power value, sufficient to carry navigator loads.

35. Selection of the higher delivery pressure, by the fin folding control or the AUTO-PILOT H.T. switch, de-energises the pressure selector which isolates the low pressure relief valve so that delivery pressure is controlled by the high pressure relief valve. On completion of folding fin extension the pressure selector is automatically energised, causing delivery pressure to fall to the low value.

36. The sequence of operations necessary for starting the store internal power

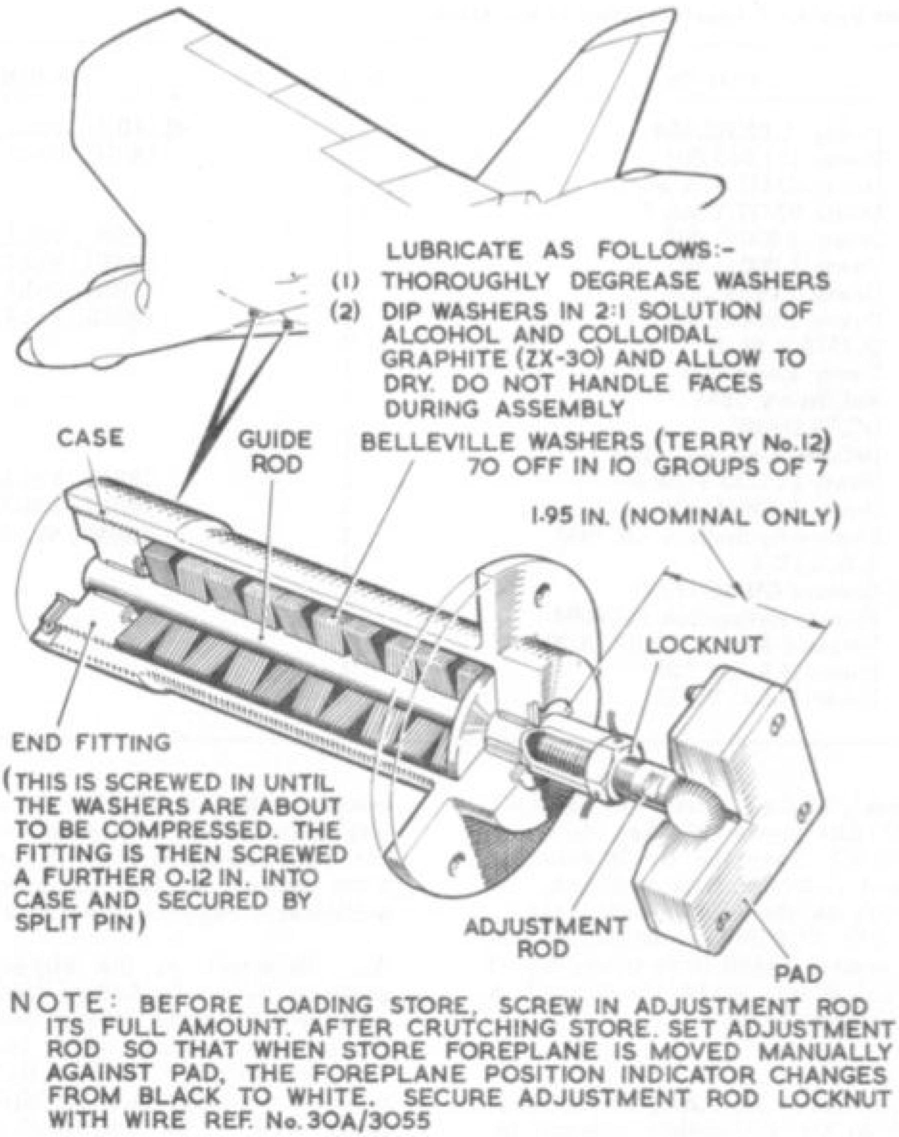

Fig.11. Shock absorbers under No.2 tank bay

(◂ Mod.1960 ▸)

supply, prior to release, switches off the aircraft system motor pump and de-energises the main and pressure selectors. Simultaneously, the off-loading selector is energised to connect the pump outlet directly to return. Fluid under accumulator pressure is trapped between the two non-return valves, whilst the pressures at the release couplings are limited by the back pressure and thermal relief valves.

FIN GAP DOOR HYDRAULIC SYSTEM

General

37. A hydraulically-operated door is hinged to the aft end of each half of the fixed bomb bay fairing, the doors being open when the store is fitted to accommodate the upper fin. A hydraulic jack, incorporating bleed plugs, is attached to a lever mounted at the centre hinge point of each door. The starboard door is wider than the port and as they over-lap when closed, they must be opened and closed in correct sequence. The starboard door closes before and opens after the port, the sequence being controlled by two mechanically-operated valves in the circuit. The system utilises one of the normal selectors, the emergency selector and the supplies which previously operated the bomb bay doors, using different control switches. Pressure and return lines from these selectors are led to a single shuttle valve, from which a door opening line is taken to the port door jack and a door closing line to the starboard door jack. The flow through two pipes inter-connecting port and starboard jacks is governed by the mechanically-operated sequence valves. At points in the normal door opening and closing circuit, between the normal selector and the shuttle valve, two lines embodying thermal relief valves are tee-d in to connect with the return line of the store hoisting system. Servicing details of hydraulic components are given in A.P.1803 and details of electrical circuits are given in Book 2, Sect.6 of this A.P.

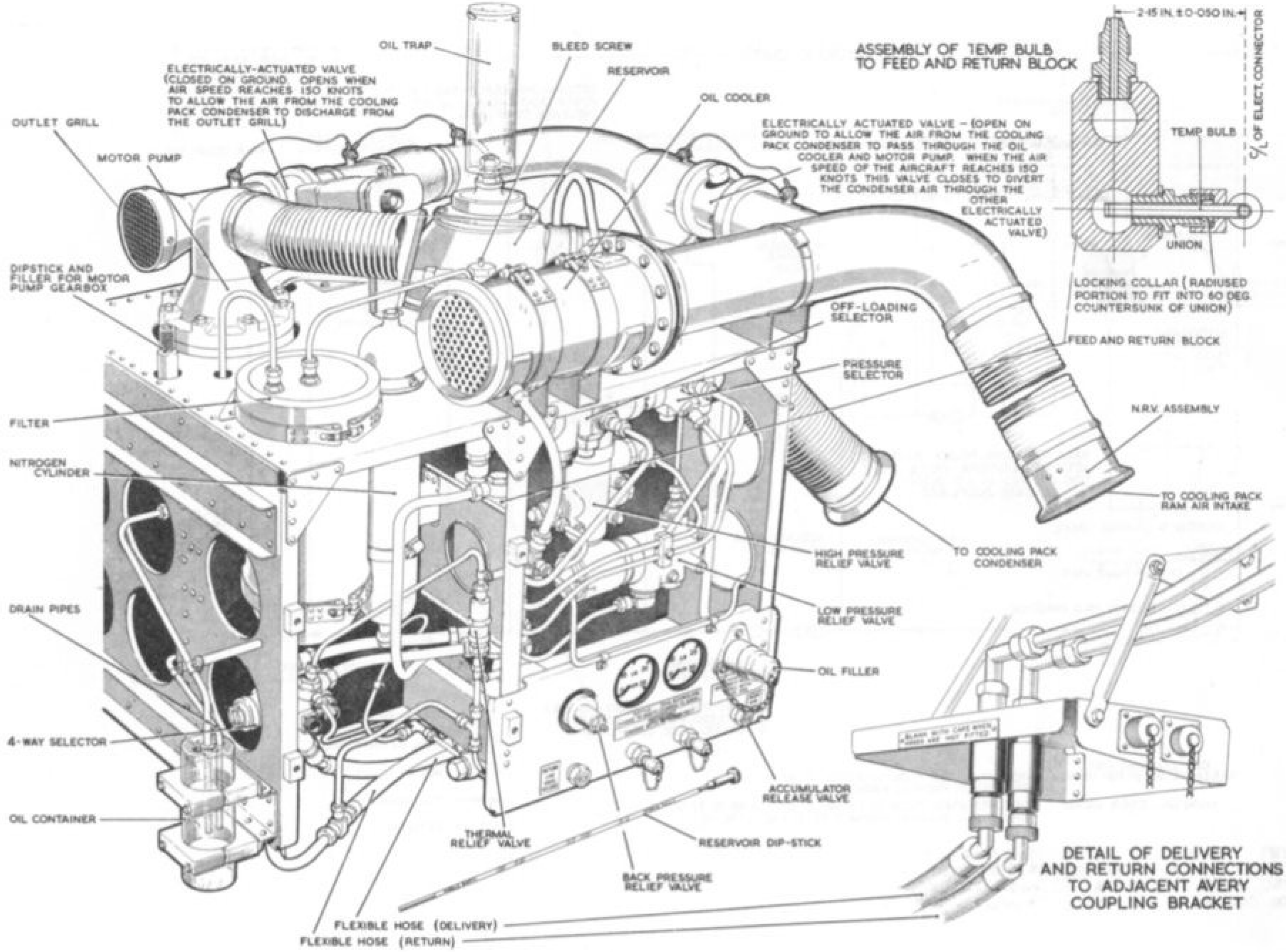

Fig. 12. Hydraulic unit.

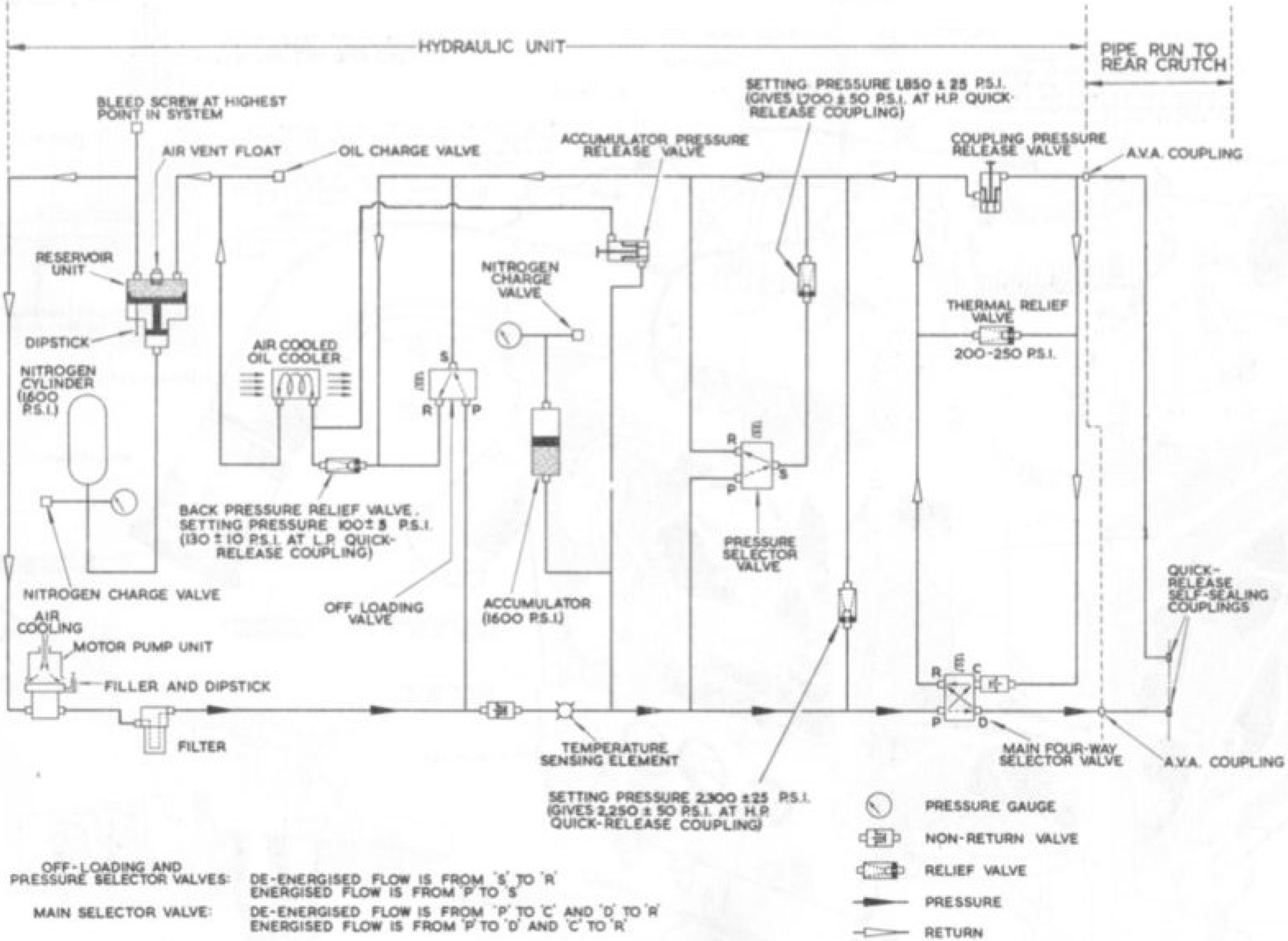

Fig. 13. Hydraulic supply system circuit diagram.
(◀ *Relief valve setting altered* ▶)

TABLE 2

Change of role components - fin gap door hydraulic system

Component	Part No.	No.off	A.P.Ref.
Jack	Dowty 1.00419.001	2	1803U, Vol.1, Book 5
Sequence valve	Dowty 1.1950.Y.A09	2	1803U, Vol.1, Book 4
Shuttle valve	Dowty 1.00465.001	1	1803U, Vol.1, Book 4
Thermal relief valve	Dowty C4603.Y.Mk.3	2	

Controls and indicators

38. The fin gap doors are normally opened and closed by operation of a single-pole switch, labelled FIN DOORS, NORMAL, OPEN-CLOSE, on the A.E.O's upper outboard panel. An adjacent double-pole switch, labelled EMERGENCY, OPEN-CLOSE, is provided for operation of the doors when the hydraulic power pack is in use. A three-position magnetic indicator, located above the switches, shows white when the doors are open, black when the doors are closed and black and white stripes when the doors are in an intermediate position or when the electrical system is de-energised.

Operation

39. With the doors shut, operation of the NORMAL selector switch to OPEN, allows fluid to flow through the normal selector and the shuttle valve to the port fin gap door jack, retracting the jack and opening the door. Return fluid from the port jack is directed through the starboard door sequence valve, shuttle valve and selector to the reservoir. When the port door is fully open, the plunger of its sequence valve is depressed and fluid is directed to the starboard door jack, causing it to retract and open the door.

40. When the DOORS CLOSED selection is made, fluid is directed to the starboard door jack, causing it to extend and close the door. Return fluid passes through the port door sequence valve, shuttle valve and selector, to the reservoir. When the starboard door is closed, the plunger of its sequence valve is depressed and fluid is directed to the port door jack, causing it to extend and close the door. As the port door closes its sequence valve plunger is released and the valve is set for the next door opening operation.

Emergency operation

41. When the doors are operated by the emergency system the shuttle valve utilises the hydraulic power pack delivery and return services, via the emergency selector valve.

STORE HOISTING HYDRAULIC SYSTEM

General

42. The store hoisting and lowering hydraulic system is self-contained within the aircraft and is controlled from a portable ground test and control panel. When not in use the control panel is secured in a stowage on the port fairing door.

43. The system is supplied from the aircraft emergency power pack, fluid being delivered via an electrically-operated four-way selector to a hoisting jack mounted vertically in the centre of the carrier beam. The store is attached to a release unit coupled to the end of the jack ram by a link which centralises the release assembly when it is in the retracted position. The selector is normally returned to the neutral position by hydraulic pressure but, if the store is being lowered under gravity with no hydraulic pressure available, the neutral position may be selected to halt the lowering operation by a push button on the valve.

44. The pressure in the DOWN line is restricted to 1,000± 50 p.s.i. by a pressure relief valve, ensuring that the jack is not subjected to excessive compression loads when the store is lowered to its handling trolley. The pressure in the UP line is controlled by an adjustable relief valve, which is set to 2,380±20 p.s.i. to give a pre-determined crutching load. All components are mounted on a hydraulic panel located on the port side of the carrier beam forward face. The electrical plug for connecting the lead from the ground control panel, is installed at the port side of the bomb bay, on the forward face of bomb arch 151·919A.

45. A distribution block on the ram end of the jack body embodies a restrictor in the UP line. Two bleed screws in the block allow bleeding of both lines.

Hoisting jack

46. The jack embodies a forked locking wedge which is moved to engage round a collar on the jack ram when the jack is in the retracted position. The wedge is internally threaded to receive a captive screw, which is rotated by a plastic handwheel. A visual wedge-out indicator is provided on the wedge mechanism, the

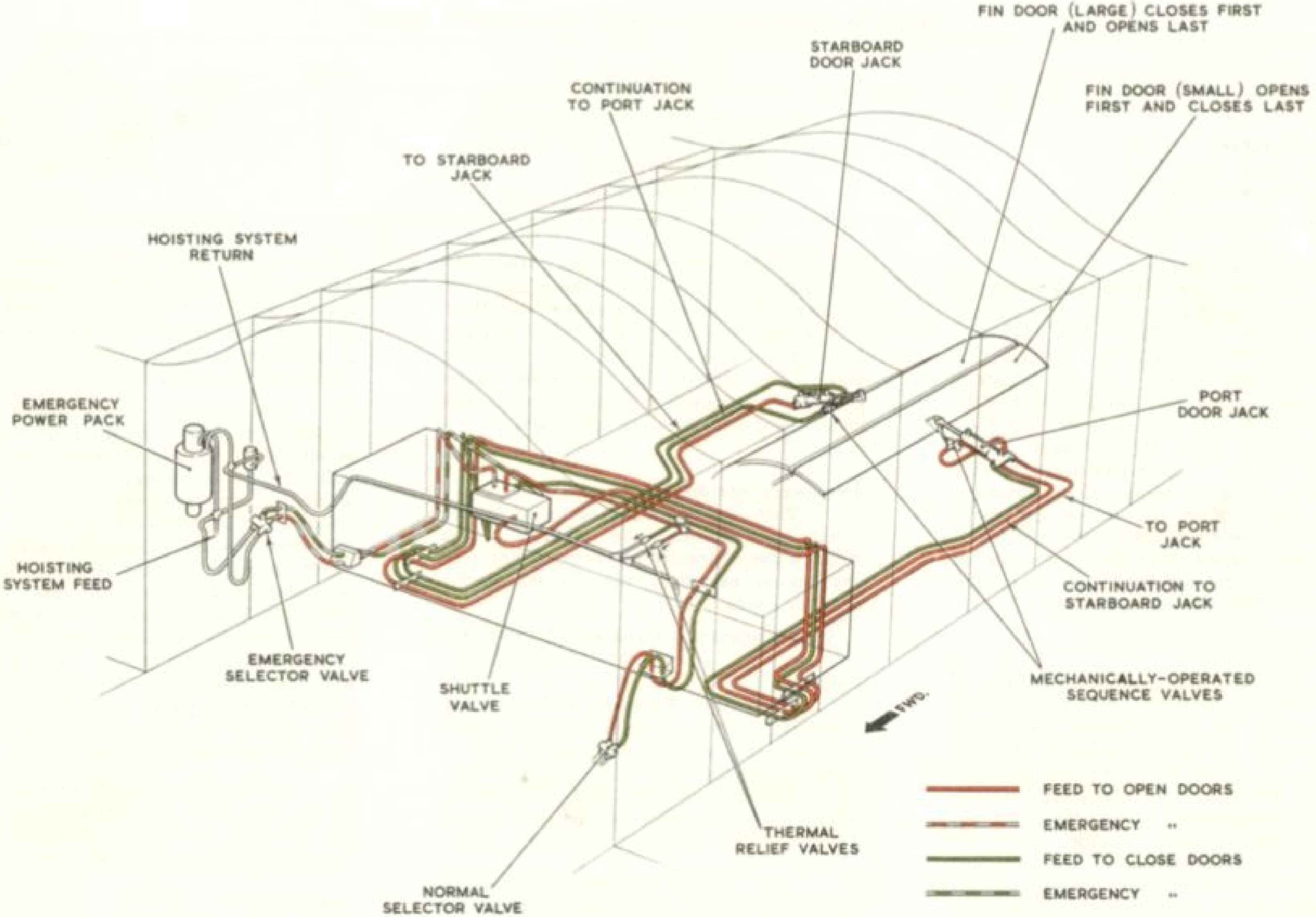

Fig. 14. Hydraulic system–fin gap doors.

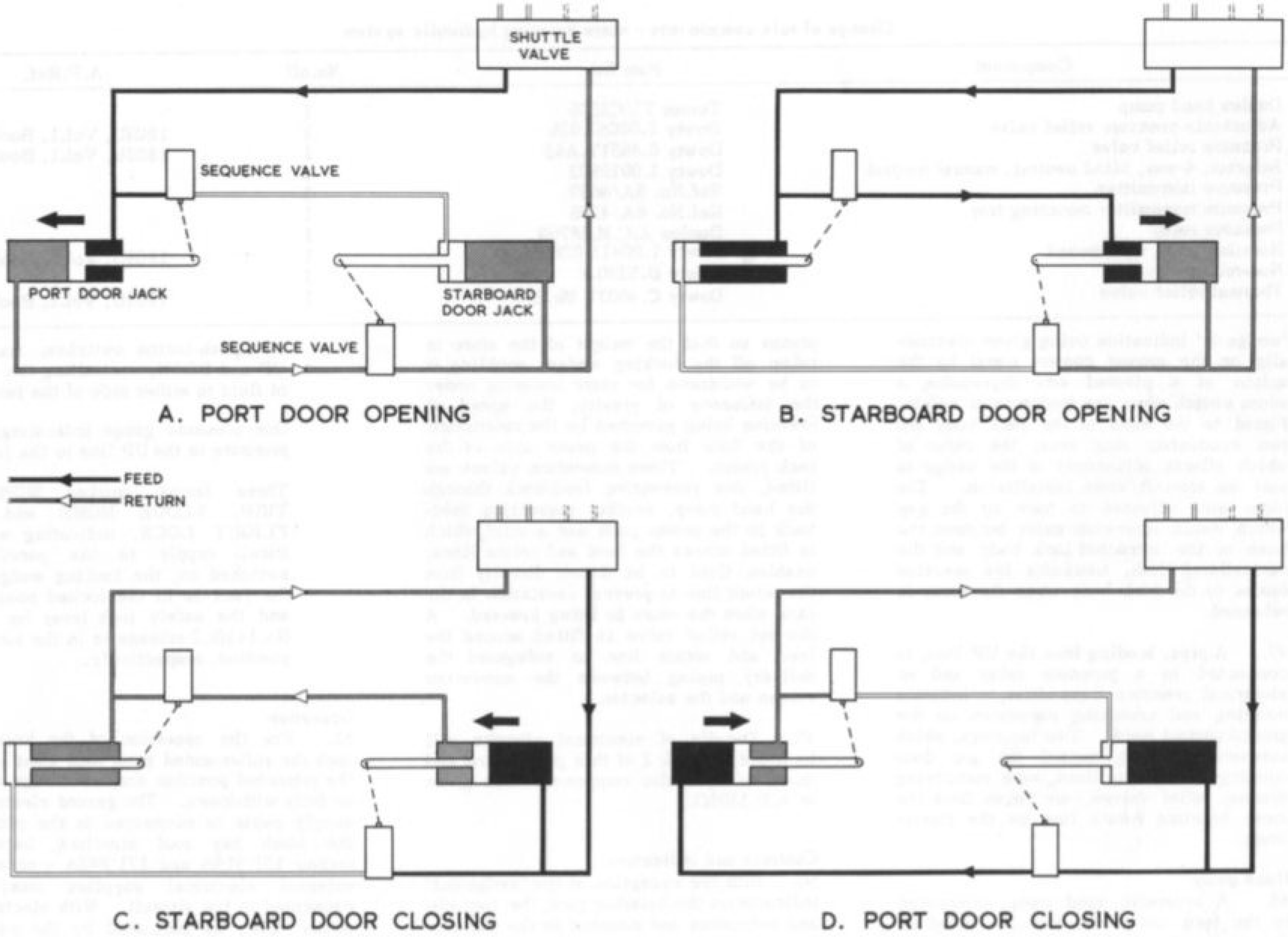

Fig.15. Fin gap door circuit diagram

V. 1.2A 1575

TABLE 3

Change of role components - store hoisting hydraulic system

Component	Part No.	No.off	A.P.Ref.
Duplex hand pump	Turner 77/C1276	1	
Adjustable pressure relief valve	Dowty 1.00051.026	1	1803U, Vol.1, Book 4
Pressure relief valve	Dowty 0.4651Y.A43	1	1803U, Vol.1, Book 4
Selector, 4-way, blind neutral, manual neutral	Dowty 1.0019902	1	
Pressure transmitter	Ref.No. 6A/4659	1	
Pressure transmitter mounting tray	Ref.No. 6A/4295	1	
Pressure relay	Dunlop A.C.M.18798	1	
Hoisting jack, wire wound	◀ Dowty 1.00411.028 ▶	1	1803U, Vol.1, Book 5
Non-return valve	Dowty D.5230.Y	3	
Thermal relief valve	Dowty C.4603Y Mk.B	1	1803U, Vol.1, Book 4

'wedge-in' indication being given electrically on the ground control panel by the action of a pivoted arm depressing a micro switch when the wedge is in safety. Fitted to the base of the jack body are two concentric ring nuts, the outer of which effects adjustment of the wedge to suit the aircraft/store installation. The inner nut, adjusted to take up the gap which would otherwise exist between the base of the retracted jack body and the centralising link, transmits the reaction forces to the jack body when the store is released.

47. A pipe, leading from the UP line, is connected to a pressure relay and an electrical pressure transmitter, to indicate hoisting and crutching pressures on the ground control panel. Two tappings, which communicate with normal fin gap door opening and closing lines, each embodying thermal relief valves, are taken from the store hoisting return line on the carrier beam.

Hand pump

48. A hydraulic hand pump, connected to the feed and return lines, is fitted on the carrier beam to operate the hoisting jack if the normal source of power is not available. The function of the pump is to pressurise the retracting side of the jack piston so that the weight of the store is taken off the locking wedge, enabling it to be withdrawn for store lowering under the influence of gravity, the speed of lowering being governed bv the restriction of the flow from the lower side of the jack piston. Three non-return valves are fitted, one preventing feed-back through the hand pump, another preventing feed-back to the power pack and a third, which is fitted across the feed and return lines, enables fluid to be drawn directly from the return line to prevent cavitation in the jack when the store is being lowered. A thermal relief valve is fitted across the feed and return line to safeguard the delivery piping between the non-return valves and the selector.

49. Details of electrical circuits will be found in Book 2 of this publication and those of hydraulic components are given in A.P.1803D.

Controls and indicators

50. With the exception of the 'wedge-out' indicator on the hoisting jack, the controls and indicators are mounted in the portable control panel, which is connected to the electrical plug on bomb arch 151·919A for operation of the system. Controls and indicators on the panel are as follows:-

Two push-button switches, marked UP and DOWN, controlling the flow of fluid to either side of the jack.

One pressure gauge indicating the pressure in the UP line to the jack.

Three lamps, marked SUPPLY TRIP, WEDGE HOME and IN FLIGHT LOCK, indicating electrical supply to the panel is switched on, the locking wedge in the jack is in the locked position and the safety lock lever for the No.14 Mk.2 release is in the locked position, respectively.

Operation

51. For the operation of the hoisting jack the roller-ended push rods must be in the retracted position and the wedge must oe fully withdrawn. The ground electrical supply cable is connected to the plug in the bomb bay roof structure, between arches 151·919A and 171·842A - no other external electrical supplies must be connected to the aircraft. With electrical power 'ON', as indicated by the supply indicator on the remote control panel, the emergency hydraulic pack is started by the switch in the nose wheel bay. Until the UP or DOWN button on the remote

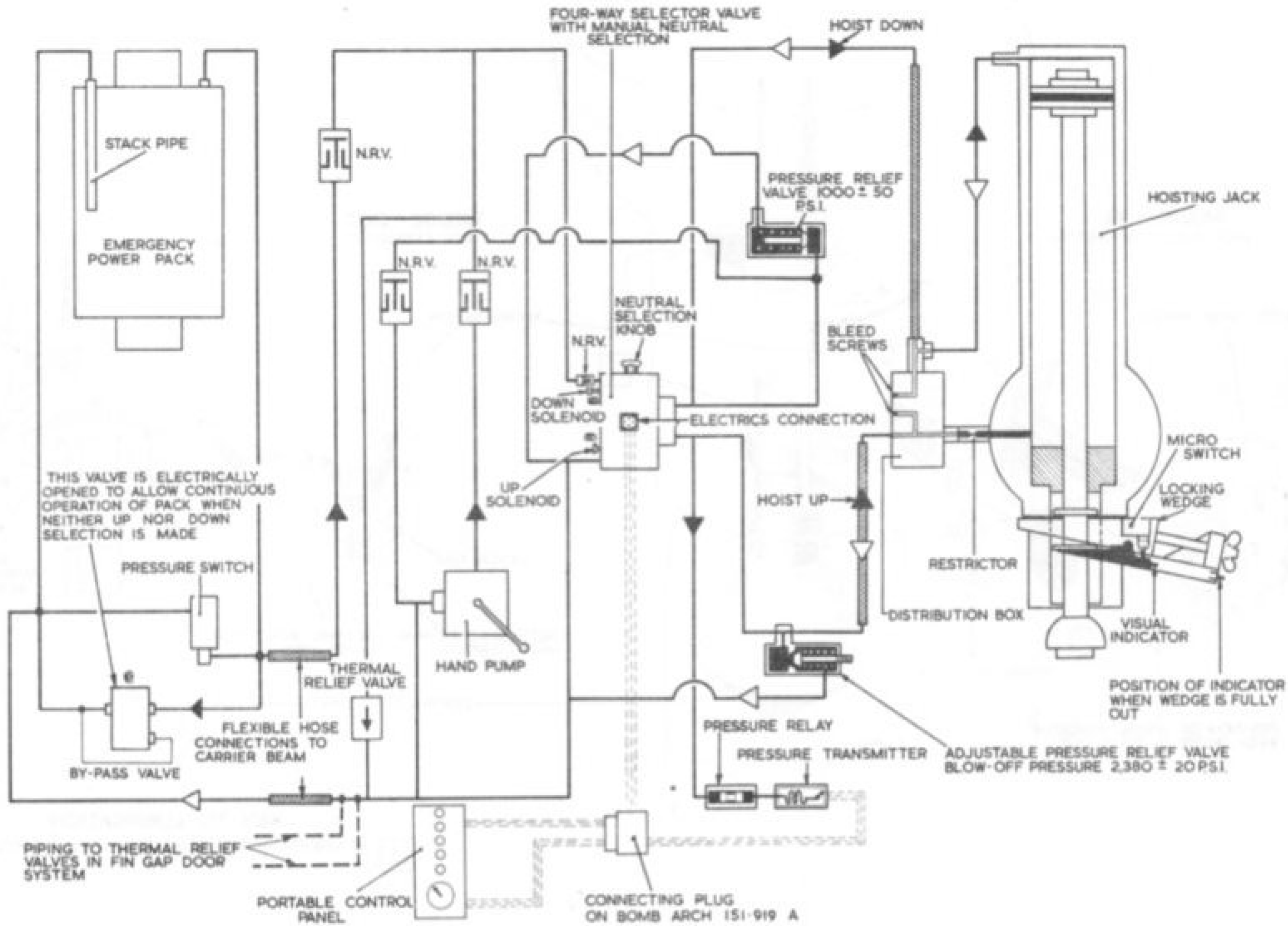

Fig. 16. Hoisting diagram

RESTRICTED

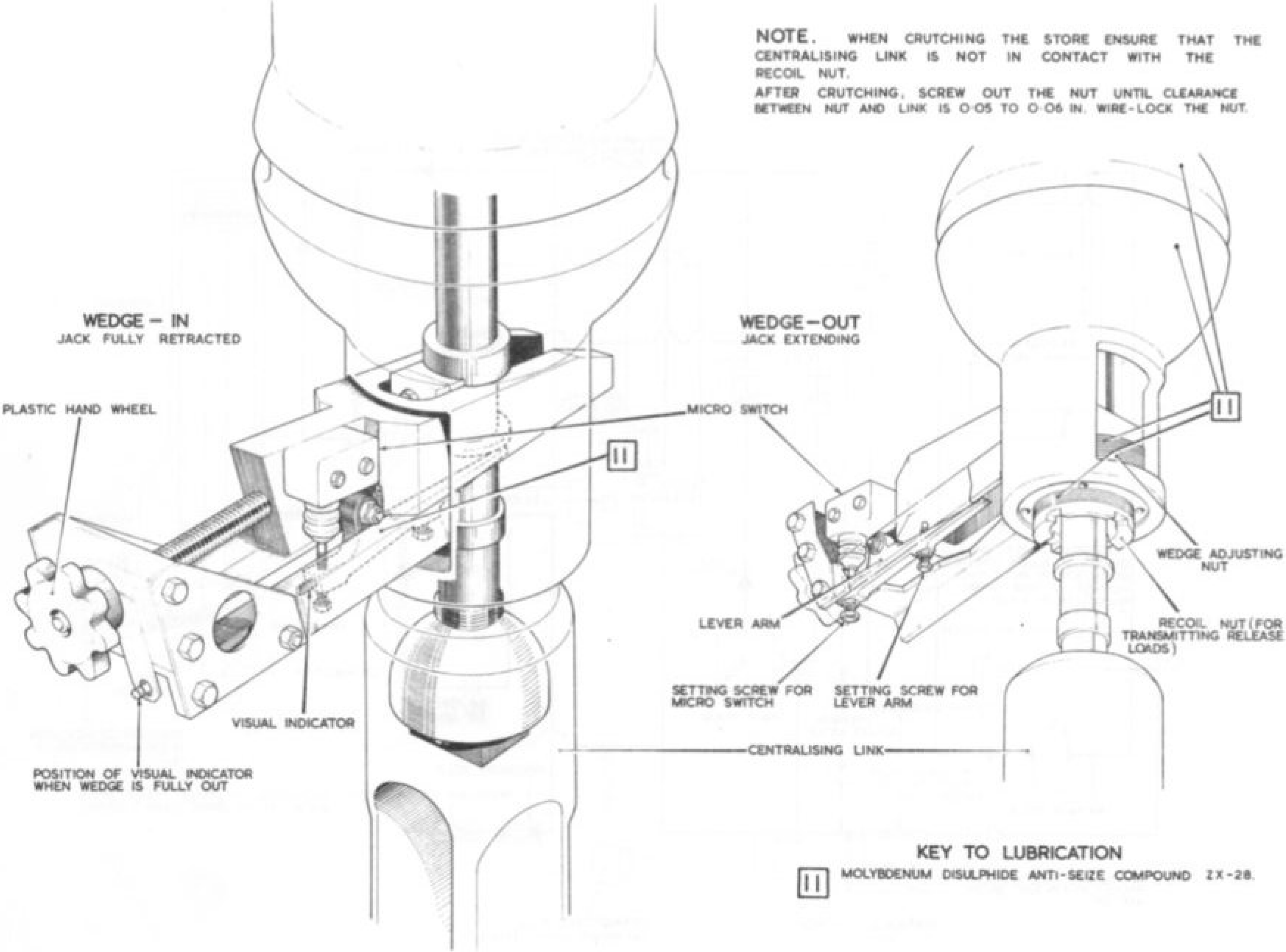

Fig. 17. Hoist jack locking wedge.
(◄ Additional lubrication ►)

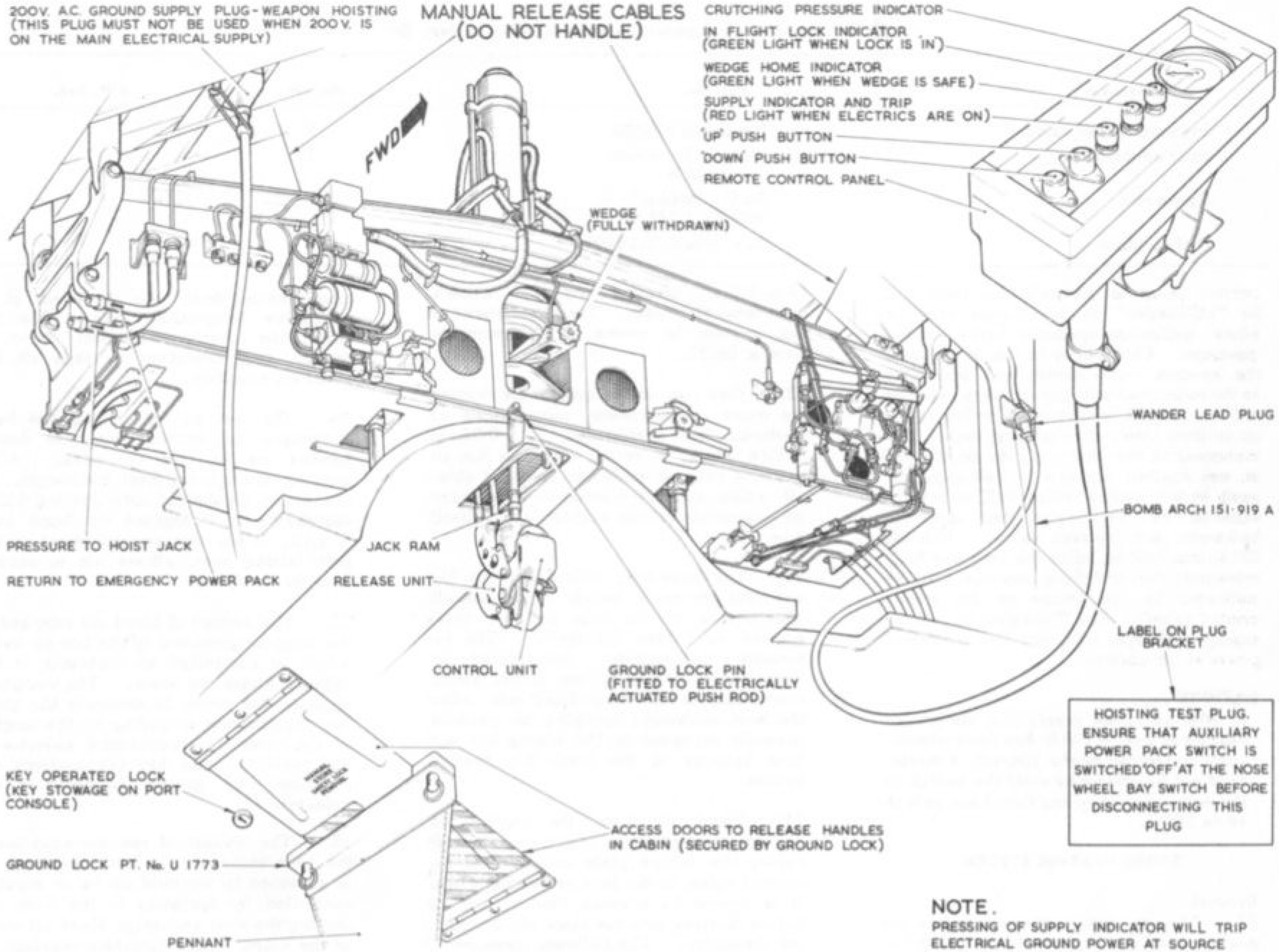

Fig.18. Operation of hoist jack

TABLE 4

◀ Change of role components - store heating system ▶

Component	Part No.	No. off	A.P. Ref.
Pressure-relief valve	Normalair 522580	1	
Heat exchanger	Marston Excelsior D-1418-20A	1	
Connector	Sir G. Godfrey AC4 Mk.2 151223	1	
Orifice plate	A.V. Roe 7/Z.10559	1	

control panel is pressed, the pack will be "off-loaded" by its by-pass valve to allow continuous operation below cut-out pressure. When either button is pressed, the by-pass valve closes and, according to the selection made, the delivery pressure will be limited by the relief valve in the up or down line to the hoisting jack. The movement of the jack ram may be stopped in any desired position by releasing the push button switch which will return the selector to the neutral and open the hydraulic pack by-pass valve. With the UP button held in, after the jack has fully retracted, the crutching pressure will be indicated by the gauge on the remote control panel. The "pressing in" of the supply indicator will trip the electrical power at its source.

WARNING ...
If, after using the supply trip, the ground electrical supply cable has been continually connected to the aircraft, a restart must not be attempted until the switch in the nose-wheel bay has first been selected to STOP.

◀ ### STORE HEATING SYSTEM

General

52. This system is incorporated in the engine bleed air ducting in the bomb bay to provide heating for compartments in the store and for the air log safety units, (A.L.S.U.), mounted on the store's horizontal stabilizer. The arrangement of the system is shown in diagrammatic form in fig.21.

53. That part of the system for heating the store compartments, incorporates an air-to-air heat exchanger, a 0·75 in. orifice plate, a relief valve, a hot air valve, a cold air valve, an overheat shut-off valve and an aircraft-to-store warm air connector of the self-sealing pull-off type.

54. The over-heat valve and the hot and cold air valve remain in the aircraft irrespective of its role and are categorised as "fixed fittings". The remaining components, categorised as "removable fittings", are fitted during conversion to the Blue Steel role, when the heat exchanger occupies the position normally occupied by the mixing box and heat injector of the bomb bay heating system.

55. Bleed air from the engines is ducted through the over-heat shut-off valve, the orifice plate and the hot air control valve, to the heat exchanger where it is cooled by a cross flow of ram air before delivery into the store via the pull-off connector. The delivery pressure of the bleed air is limited to 10 p.s.i. by the relief valve, - this is fitted on the starboard fairing door. In the event of an excessive temperature rise within the store, the overheat shut-off valve is brought into operation to shut off the bleed air supplies.

56. The ram air for cooling the heat exchanger is ducted from the dorsal intakes via the cold air valve. After passing through the heat exchanger, the ram air is discharged into ducting which distributes it throughout the bomb bay. A grill, in the rear access panel of the port fairing door, allows air to escape from the bomb bay.

57. The amount of bleed air supplied to the store is governed by the hot air valve which is controlled by ductstats in the ducting within the store. The ductstats regulate the valve to maintain the store bay temperature according to the setting of the store bay temperature selector in the cabin. Store bay temperatures are monitored by gauges adjacent to the selector.

58. The amount of ram air supplied to the heat exchanger, to cool the bleed air, is governed by the cold air valve which is controlled by ductstats in the duct connecting the heat exchanger bleed air outlet to the store. The ductstats regulate the valve to maintain the exchanger bleed air outlet temperature according to the setting ▶

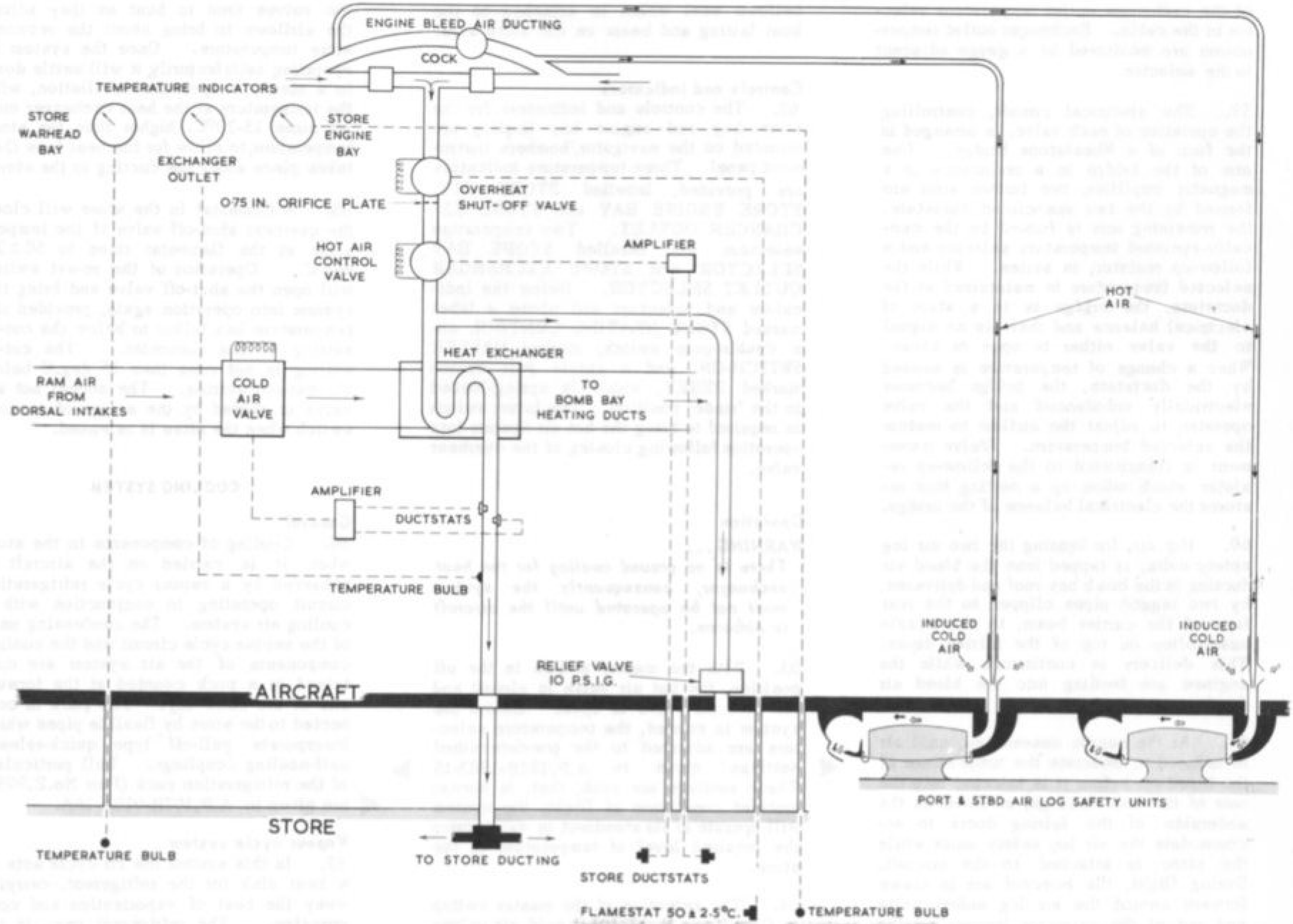

Fig. 21. Hot air system diagram

of the exchanger outlet temperature selector in the cabin. Exchanger outlet temperatures are monitored by a gauge adjacent to the selector.

59. The electrical circuit, controlling the operation of each valve, is arranged in the form of a Wheatstone bridge. One arm of the bridge is a resistance in a magnetic amplifier, two further arms are formed by the two associated ductstats, the remaining arm is formed by the manually-operated temperature selector and a follow-up resistor, in series. While the selected temperature is maintained at the ductstats, the bridge is in a state of electrical balance and there is no signal to the valve either to open or close. When a change of temperature is sensed by the ductstats, the bridge becomes electrically unbalanced and the valve operates to adjust the airflow to restore the selected temperature. Valve movement is transmitted to the follow-up resistor which takes up a setting that restores the electrical balance of the bridge.

60. Hot air, for heating the two air log safety units, is tapped from the bleed air ducting in the bomb bay roof and delivered, by two lagged pipes clipped to the rear face of the carrier beam, to two nozzle assemblies on top of the fairing doors. This delivery is continuous while the engines are feeding into the bleed air ducting.

61. At the nozzle assemblies, cold air is induced to moderate the temperature of the bleed air before it is injected into the rear of the boat fairings, mounted on the underside of the fairing doors to accommodate the air log safety units while the store is attached to the aircraft. During flight, the injected air is drawn forward around the air log safety units and out of the extractor louvres on the forward side of each boat fairing. Sealing, between the boat fairing and the store, is effected by a spring loaded bellows seal which is attached to the boat fairing and bears on the store skin.

Controls and indicators

62. The controls and indicators for the store bay and engine bay heating are mounted on the navigator/bombers instrument panel. Three temperature indicators are provided, labelled STORE BAY, STORE ENGINE BAY and STORE EXCHANGER OUTLET. Two temperature selectors are labelled STORE BAY SELECTOR and STORE EXCHANGER OUTLET SELECTOR. Below the indicators and selectors and above a label marked STORE HEATING CONTROL are a double-pole switch, marked MASTER SWITCH-ON, and a single pole switch marked RESET, which is spring-loaded in the 'made' position. The latter switch is required to bring the hot air system into operation following closing of the overheat valve.

Operation

WARNING...

There is no ground cooling for the heat exchanger, consequently the system must not be operated until the aircraft is airborne.

63. With the master switch in the off position, the hot air valve is closed and the cold air valve is open. Before the system is started, the temperature selectors are adjusted to the pre-determined settings given in A.P.101B-1902-15 These settings are such, that, in normal ambient conditions of flight, the system will operate at its steadiest in maintaining the required level of temperature in the store.

64. The selection of the master switch to ON allows the hot and cold air valves to come under the control of their respective electrical bridge. In response to changes of temperature at the ductstats the valves tend to hunt as they adjust the airflows to bring about the required store temperature. Once the system is operating satisfactorily, it will settle down to a steady temperature oscillation, with the temperature at the heat exchanger outlet some 15-20°C. higher than the store temperature, to allow for the heat loss that takes place along the ducting to the store.

65. A flamestat in the store will close the overheat shut-off valve if the temperature at the flamestat rises to $50 \pm 2\frac{1}{2}$ deg.C. Operation of the re-set switch will open the shut-off valve and bring the system into operation again, provided the temperature has fallen to below the cut-in setting of the flamestat. The cut-in setting is not more than 15 deg.C below the cut-out setting. The normal hot air valve is closed by the action of a micro switch when the store is released.

COOLING SYSTEM

General

66. Cooling of components in the store when it is carried on the aircraft is achieved by a vapour cycle refrigeration circuit operating in conjunction with a cooling air system. The condensing units of the vapour cycle circuit and the cooling components of the air system are contained in a pack mounted at the forward end of the bomb bay. The pack is connected to the store by flexible pipes which incorporate pull-off type quick-release self-sealing couplings. Full particulars of the refrigeration pack (Part No.Z.9954) are given in A.P.107B-010A-16A.

Vapour cycle system

67. In this system the air cycle acts as a heat sink for the refrigerant, carrying away the heat of vaporization and compression. The refrigerant used in the system is Freon 12 or Arcton 12, and this is vaporized in the store evaporators at a rate which is varied by the store expansion

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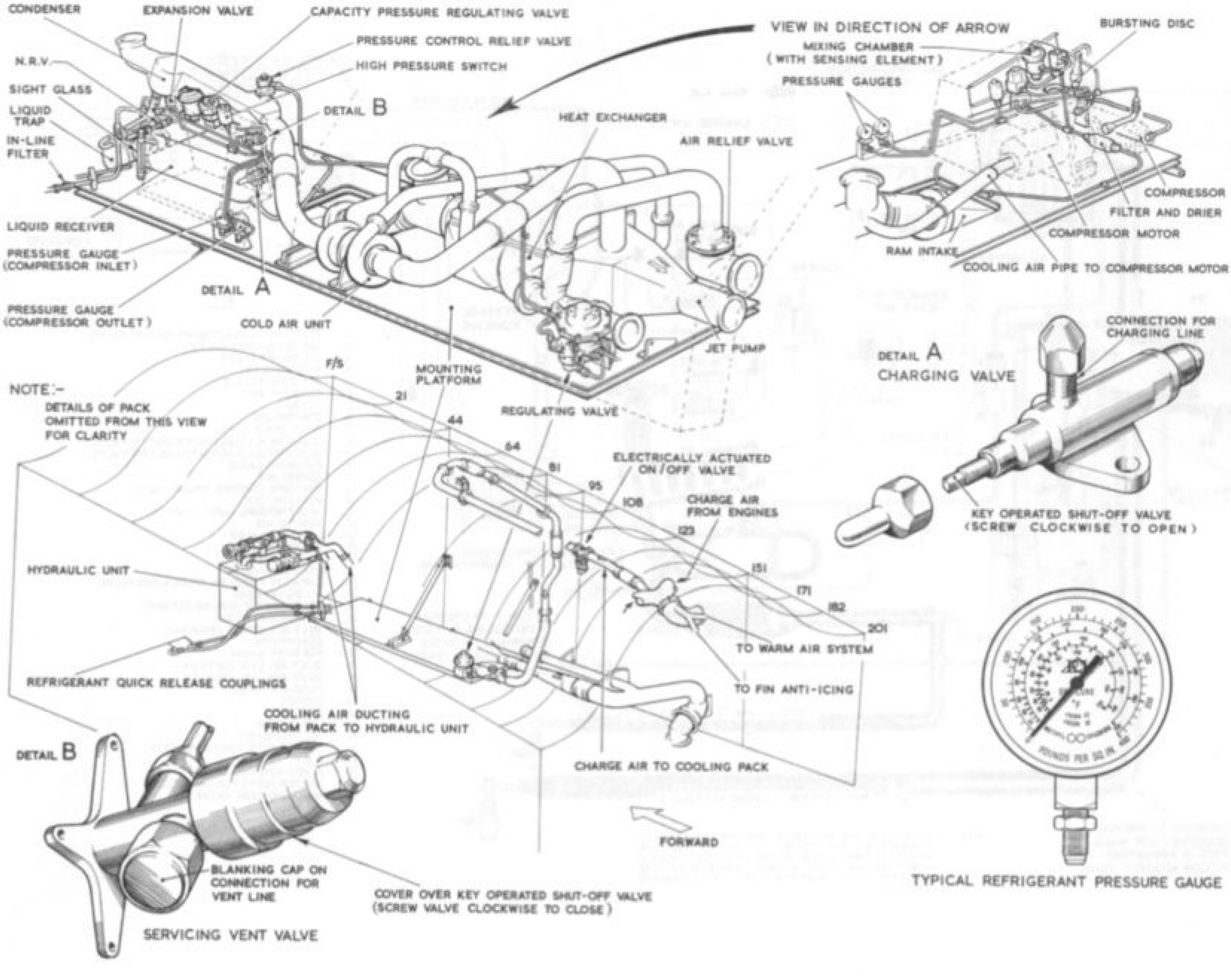
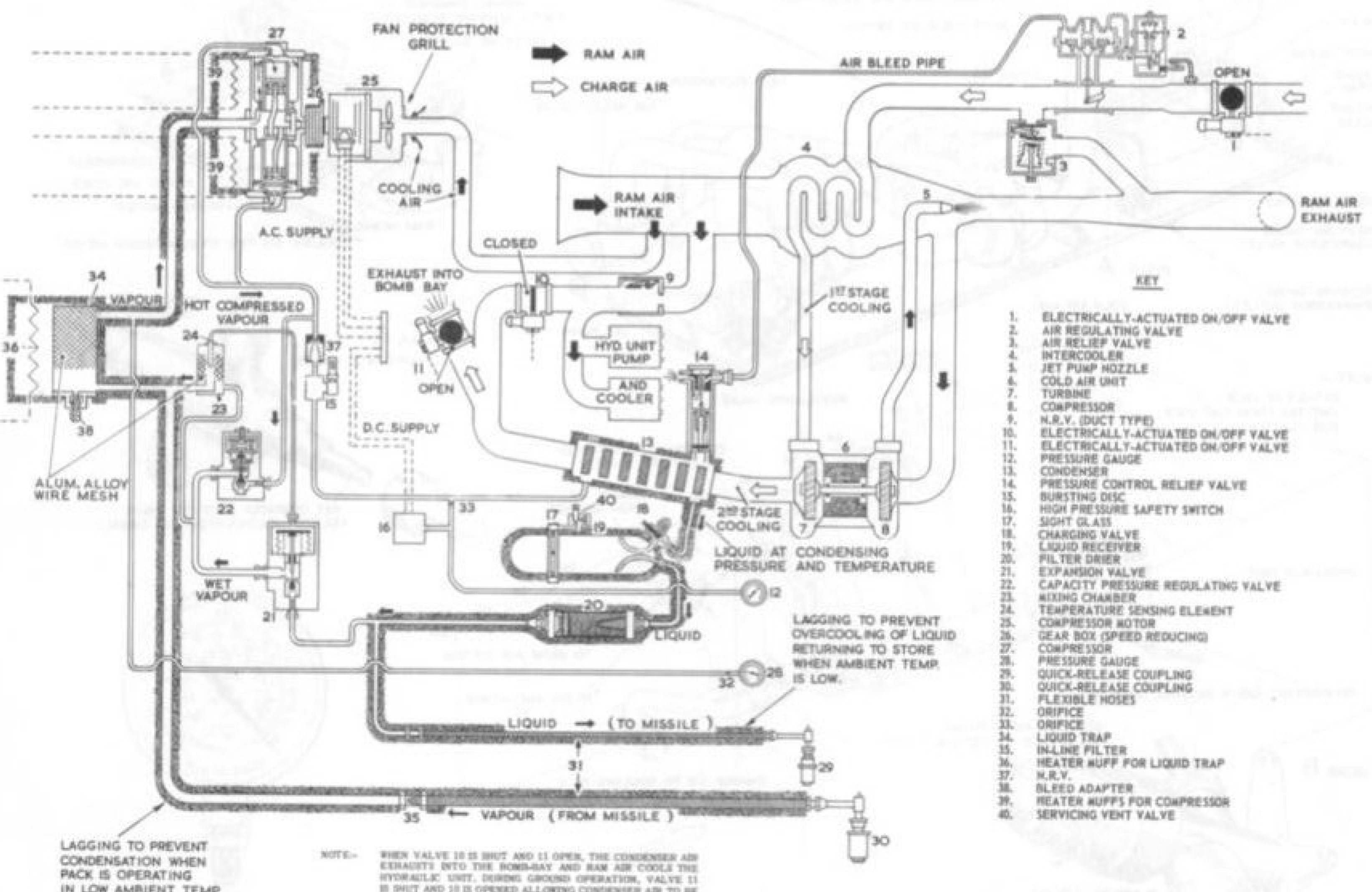


Fig. 22. Cooling pack installation.



KEY

1. ELECTRICALLY-ACTUATED ON/OFF VALVE
2. AIR REGULATING VALVE
3. AIR RELIEF VALVE
4. INTERCOOLER
5. JET PUMP NOZZLE
6. COLD AIR UNIT
7. TURBINE
8. COMPRESSOR
9. N.R.V. (DUCT TYPE)
10. ELECTRICALLY-ACTUATED ON/OFF VALVE
11. ELECTRICALLY-ACTUATED ON/OFF VALVE
12. PRESSURE GAUGE
13. CONDENSER
14. PRESSURE CONTROL RELIEF VALVE
15. BURSTING DISC
16. HIGH PRESSURE SAFETY SWITCH
17. SIGHT GLASS
18. CHARGING VALVE
19. LIQUID RECEIVER
20. FILTER DRIER
21. EXPANSION VALVE
22. CAPACITY PRESSURE REGULATING VALVE
23. MIXING CHAMBER
24. TEMPERATURE SENSING ELEMENT
25. COMPRESSOR MOTOR
26. GEAR BOX (SPEED REDUCING)
27. COMPRESSOR
28. PRESSURE GAUGE
29. QUICK-RELEASE COUPLING
30. QUICK-RELEASE COUPLING
31. FLEXIBLE HOSES
32. ORIFICE
33. ORIFICE
34. LIQUID TRAP
35. IN-LINE FILTER
36. HEATER MUFF FOR LIQUID TRAP
37. N.R.V.
38. BLEED ADAPTER
39. HEATER MUFFS FOR COMPRESSOR
40. SERVICING VENT VALVE

NOTE:- WHEN VALVE 10 IS SHUT AND 11 OPEN, THE CONDENSER AIR EXHAUSTS INTO THE BOMB-BAY AND RAM AIR COOLS THE HYDRAULIC UNIT. DURING GROUND OPERATION, VALVE 11 IS SHUT AND 10 IS OPENED ALLOWING CONDENSER AIR TO BE DIVERTED TO COOL HYDRAULIC UNIT BY THE NON-RETURN VALVE 9.

Fig.23. Cooling system diagram
(Mod.2179 Incorporated)

valves according to the heat load to be absorbed. The setting of the store expansion valves is such that the vapour leaving the evaporators is slightly superheated. This ensures complete vaporization of the refrigerant, preventing any liquid entering the compressor.

68. In the compressor the vapour is compressed to a high temperature and then passed to the condenser where, at constant pressure, it is cooled and condensed, the heat of vaporization and compression having been extracted by the flow of cooling air provided by the air system.

69. From the condenser the liquid refrigerant flows to the receiver and thence through a filter drier to the expansion valves and evaporators in the store.

V.1.2A 1579

Air cooling system

70. Charge air, at high temperature from the engine compressors, is fed to the regulator valve on the refrigeration pack via an electrically-actuated on/off valve in the supply ducting. The air is cooled in two stages before passing into the condenser to extract the excess heat from the refrigerant.

71. First stage cooling takes place when the air passes through the intercooler, the majority of the heat being lost to ram air from a flush air intake in the fairing doors. Second stage cooling occurs across the turbine of the cold air unit, after which the air passes to the condenser to absorb heat from the refrigerant.

72. The cold air unit braking compressor draws air from the ram air ducting immediately downstream of the intercooler. The compressor exhausts into the jet pump nozzle, inducing a flow into the ram air intake and through the intercooler when the aircraft is taxying or stationary with engines running. The exhaust ram air is ducted overboard.

73. The exhaust air from the condenser is utilised to cool the hydraulic unit at aircraft speeds of less than 150 knots. Above that speed, the condenser air is exhausted into the bomb bay and ram air is used for hydraulic cooling. For the interaction of the electrically-actuated valves controlling this operation, refer to para.30 and fig.23.

Controls and indicators

74. Mounted on the A.E.O.'s upper outboard instrument panel are two push switches labelled START - STOP - A/C REFRIGERATION UNIT. These switches control the refrigeration pack compressor motor and the on/off valve in the charge air ducting to the pack. The start switch incorporates an indicator lamp which is illuminated while the pack is operating. Above the pack switches is an on/off switch labelled REFRIGERATION HEATERS. It is essential to leave this switch selected ON during pack operation so that, if the pack stops, the heaters will immediately come into operation to maintain conditions in the pack that will allow the compressor to be safely started. The Blue Steel control panel contains a three position toggle switch labelled REFRIGERATION - A/C - STORE. This switch selects either the aircraft refrigeration system or the store internal refrigeration system to be employed in the cooling of the store.

75. Two pressure gauges are connected to the refrigeration piping, one to indicate compressor inlet and the other outlet pressure. Each gauge has four concentric scales, the inner three of which are graduated in deg.F. for Freon 22, Freon 12 and methyl chloride. The outer scale is calibrated in p.s.i.g. to indicate the saturated vapour pressures corresponding to the temperatures on the inner scales. For example, with the system at rest at an ambient temperature of 60 deg.F. the vapour pressure for Freon 12 should be 58 p.s.i.g. approx.

Compressor

76. The opposed twin cylinder reciprocating compressor is driven through a gear-box at a constant speed of 2,000 r.p.m. by a 2 H.P. electric motor, which is cooled by ram air and a fan. Refrigerant vapour enters the compressor through a connection in the crankcase and is discharged to the condenser from each cylinder head. The gearbox is charged with oil OX-38 to 1/8 in. below the edge of the filler hole. Two heater muffs, around the compressor casing, are switched on to prevent liquid refrigerant collecting in the crankcase and cylinder heads while the compressor is stopped.

Condenser

77. This single-pass, contra-flow air/refrigerant heat exchanger of matrix form is inclined at 10 deg. to the horizontal to ensure the collection of liquid refrigerant at the outlet end. A pressure control relief valve, mounted on the condenser, operates to effect an adjustment of the air regulator valve and increase the supply of cooling air to the condenser when the condensing pressure increases beyond the maximum working pressure.

Pressure switch

78. A pressure switch, piped into the high pressure side of the compressor, is set to switch off the compressor motor if the pressure rises to 234^{+13}_{-7} p.s.i.g. The switch contacts remake when the pressure has appreciably reduced but, the ON button in the cabin must be pressed in order to effect a re-start. The 'cut-in' pressure differential of the switch is to be not less than 10 p.s.i.g., nor more than 70 p.s.i.g. below the cut-out pressure.

Liquid receiver

79. The liquid receiver accommodates

TABLE 5
Vapour cycle

Component	Part No.	No. Off	A.P. Ref.
Pressure gauge	Refrigeration components P.G.1	2	◀ A.P.107B–0104–16A
Condenser	Normalair 523000	1	A.P.107B–0104–16A
Liquid receiver	Normalair 522630	1	A.P.107B–0104–16A
Filter drier	Normalair 517630	1	A.P.107B–0104–16A
Pressure control relief valve	Normalair 519280	1	A.P.107B–0104–16A
Bursting disc	Normalair 522610	1	A.P.107B–0104–16A
Compressor	D.H. propellers Type CR.02-02	1	A.P.107B–0104–16A
Expansion valve	D.H. propellers 19/06	1	A.P.107B–0104–16A
Capacity pressure regulating valve	D.H. propellers CV34/01	1	A.P.107B–0104–16A
H.P. cut-out	Teddington FRJ/A/18	1	A.P.107B–0104–16A
Coupling quick release Exactor (vapour line) (Two start ball engagement)	(C18915 (aircraft half coupling) (C17460 (store half coupling)	1	A.P.107B–0104–16A
Coupling quick release Exactor (liquid line) (Three-start ball engagement)	(C19007 (aircraft half coupling) (C17463 (store half coupling)	1	A.P.107B–0104–16A
Mixing chamber	Z10462	1	A.P.107B–0104–16A
Filter	66/Z9954	2	A.P.107B–0104–16A
Liquid trap	Z11162	1	A.P.107B–0104–16A
Flamestat	Teddington FOH/A/524	1	A.P.107B–0104–16A
Non-return valve	British Oxygen 801370	1	A.P.107B–0104–16A
Servicing vent valve	Normalair 52557[illegible]	1	A.P.107B–0104–16A
Heater muff (compressor)	Dunlop SKM.14802	1	A.P.107B–0104–16A
Heater muff (compressor)	Dunlop SKM.14803	1	A.P.107B–0104–16A
Heater muff (liquid trap)	Dunlop SKM.14797	1	A.P.107B–0104–16A

TABLE 6
Air cycle

Component	Part No.	No. Off	A.P. Ref.
Ram intercooler	Normalair 519240	1	A.P.107B–0104–16A
Regulator valve	Normalair 523850	1	A.P.107B–0104–16A
Air relief valve	Normalair 519230	1	A.P.107B–0104–16A
Jet pump	Normalair 519250	1	A.P.107B–0104–16A
Cold air unit	Normalair 31.201160	1	A.P.107B–0104–16A
Outlet jet pump	Normalair 519260	1	A.P.107B–0104–16A ▶
Non-return valve	Normalair 522620) Hydraulic	1	
On/off valve	Teddington FMP/A5065) unit cooling) system	2	
On/off valve (aircraft fixed fitting)	Teddington FMP/A5094	1	

excess liquid refrigerant condensed when the system flow requirements are lessened due to a reduction of the heat load. A contents sighting glass and a charging valve are incorporated in the receiver. The sight glass contains a float and has an adapter at its top for the servicing vent valve connecting pipe.

Filter drier

80. This is a cartridge-type unit, containing silica-gel and a felt pad, designed to filter the circulating refrigerant and absorb water/vapour.

Air regulating valve and pressure control relief valve

81. The regulator valve controls the flow of charge air to the condenser and is operated by differential air pressure across its diaphragm. Initially both sides of the diaphragm are subjected to the same pressure, being connected to a tapping in the supply duct from the engine compressors, upstream of the valve. One side of the diaphragm is connected to the pressure control relief valve. When the condensing pressure rises above 195-200 p.s.i.g. the relief valve operates and bleeds off the pressure from that side of the diaphragm, causing the regulator valve to open and admit cooling air to the condenser. On falling condensing pressure the relief valve closes at 180±5 p.s.i.g. to effect the closing of the regulating valve.

Air relief valve

82. The pressure of the engine bleed air delivered via the regulating valve to the intercooler is limited by the relief valve to 55 p.s.i. The valve is sited in a branch duct from the delivery ducting, the outlet being connected to the ram air exhaust where it is vented to atmosphere.

Cold air unit

83. Second stage cooling in the cold air unit is obtained by virtue of the energy transfer between the turbine and its associated compressor, which gives an increase in temperature of the air leaving the compressor and a decrease in temperature of the air leaving the turbine.

Bursting disc

84. This is a safety precaution in case the high pressure switch fails to operate. It is installed in the line between the refrigerant compressor and condenser and will rupture when the system pressure rises to between 250 and 290 p.s.i. In the case of aircraft fire the disc is a safeguard against explosion.

Capacity pressure regulating valve

85. This valve is fitted to ensure a minimum evaporating pressure at the compressor inlet of 20 p.s.i. absolute, thus safeguarding the compressor when, due to a reduction in the heat load, the expansion units in the missile shut down the refrigerant flow. The valve, reacting to a lowering of the evaporating pressure, passes hot gas from the compressor delivery, directly to the inlet.

Expansion valve

86. The expansion valve opening, which is controlled by a temperature sensing element fitted to a mixing chamber, injects liquid refrigerant to cool the hot compressed gas from the capacity pressure-regulating valve.

Mixing chamber

87. This provides for complete evaporation of the liquid refrigerant from the expansion valve, so preventing liquid droplets from entering the compressor.

Intercooler

88. This unit, which pre-cools the charge air before it enters the turbine of the cold air unit, is a cross flow air-to-air heat exchanger with a double pass of the charge air and a single pass of the cooling ram air flow.

Quick-release couplings

89. The two pull-off type quick-release couplings connect the aircraft pack and the store at the front crutch. Each coupling consists of a hose-half which is an aircraft fitting, and a fixed-half which is a store fitting. The hose-halves are carried on slide plates and retained in two cylindrical housings in the front crutch structure by a cross-bar which is manually sprung into the retaining position against the tension of two coiled springs. Each hose-half is manually screwed into and out of engagement with the fixed half in the upper skin of the store. The fixed-half will pull straight out of the hose half, this occurring when the store is released for free flight.

Refrigerant piping

90. Flexible pipes from the quick-release couplings join rigid copper pipes connecting the various vapour cycle components on the pack panel. An in-line filter is fitted in the main suction pipe to protect the compressor. An orifice is fitted in both pipe lines to the pressure gauges to damp out pressure fluctuations. The screwed connections of the refrigerant piping are normally assembled dry. However, sealing compound P.R.1422B.T. (Ref.No.33H/222), may be used, sparingly, on the mating faces when a leakproof joint can not otherwise be obtained. If the sealing compound is applied too liberally, the force required, eventually, to loosen the joint is likely to be so excessive that the pipes will be distorted.

Liquid trap

91. This unit, together with the refrigeration heater muffs and the non-return valve fitted in the compressor delivery line, form the compressor protection system against damage due to hydraulicing on starting. The trap is fitted in the suction line to collect liquid when the pack is connected to a store. While the pack is running oil is likely to be collected. While the pack is stopped in

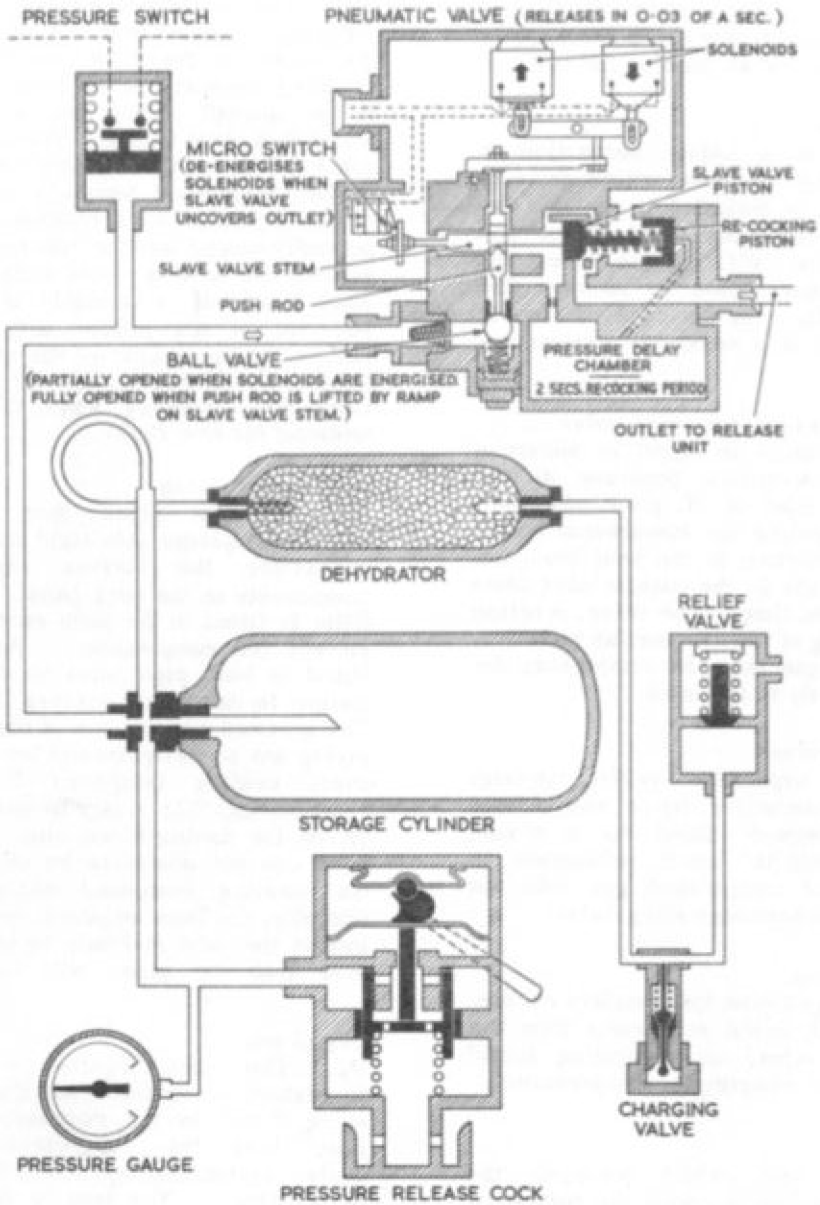


Fig.24. Pneumatic release diagram

low ambient temperatures, without the refrigeration heaters operating, liquid refrigerant, formed from vapour migrating from the store, will be collected. Should the trap overfill, it must be cleared of liquid before the compressor can be safely started. A bleed adapter is fitted to the trap so that liquid can be blown off during ground servicing. One of the refrigeration heater muffs is fitted to the trap, (the other two muffs enclose the compressor crank-case). The heaters are switched on to prevent the trap overfilling and to maintain local vapour conditions that will allow the compressor to be safely started at all times. When the compressor starts, the heaters automatically cut out and, provided the heaters switch at the A.E.O.'s station remains selected ON and that an electrical supply is available, will automatically cut in again should the pack stop.

Non-return valve

92. This unit is fitted in the compressor delivery line, upstream of the bursting disc, to prevent a back flow of liquid refrigerant entering the compressor from its delivery side, whilst it is static. The valve is loaded onto its seat by a coil spring.

Servicing vent valve

93. This valve, positioned adjacent to the charging valve on the liquid receiver, is connected to the top of the receiver, sight glass by a short pipe. The valve makes provision for balancing the vapour pressures of the charging cylinder and the pack, during the charging or topping-up operations.

STORE RELEASE SYSTEMS

General

94. Two operations must be carried out to release the store; the release unit safety lock must be withdrawn electrically or manually, before the release unit is

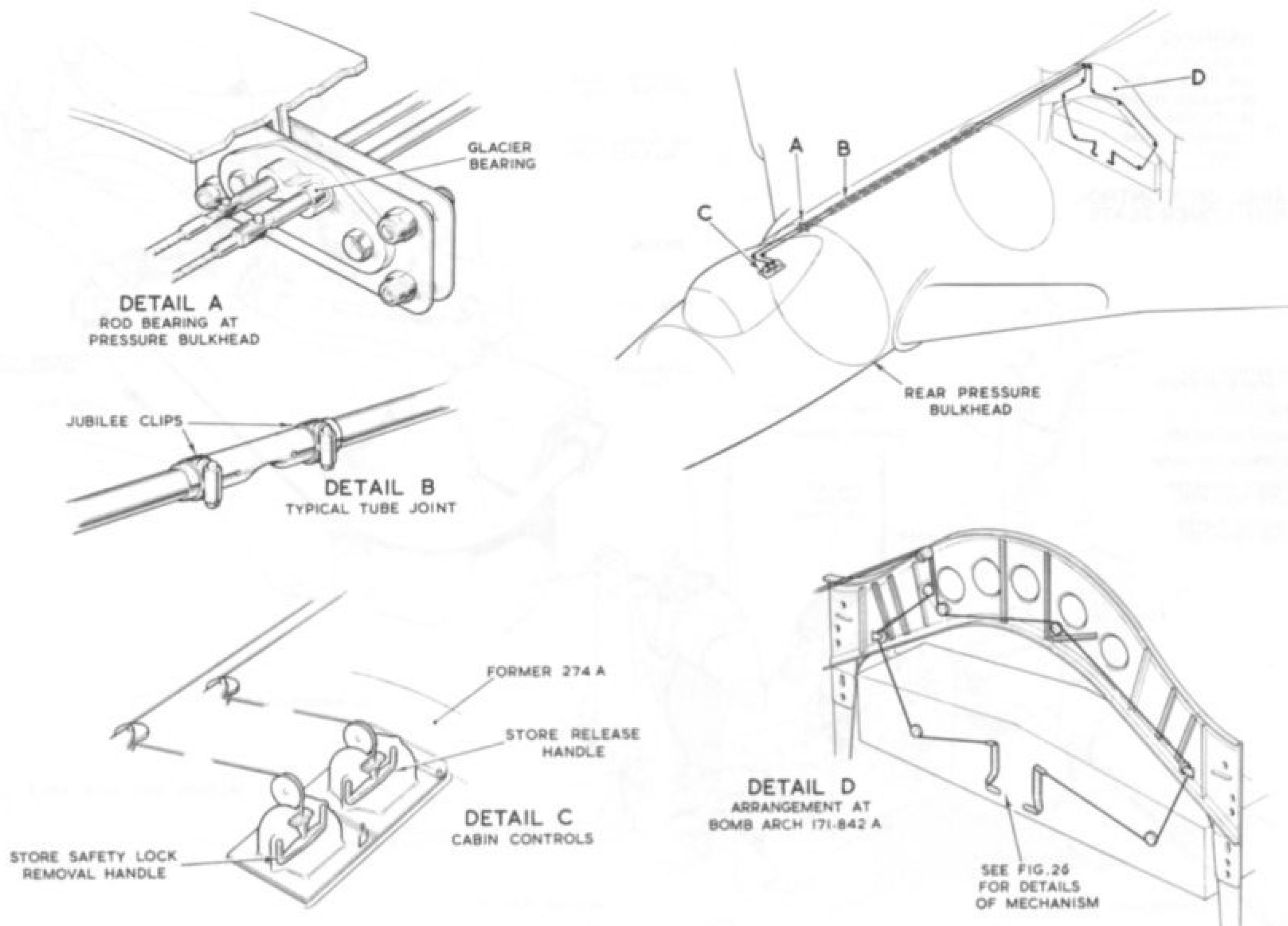


Fig. 25. Mechanical release system.

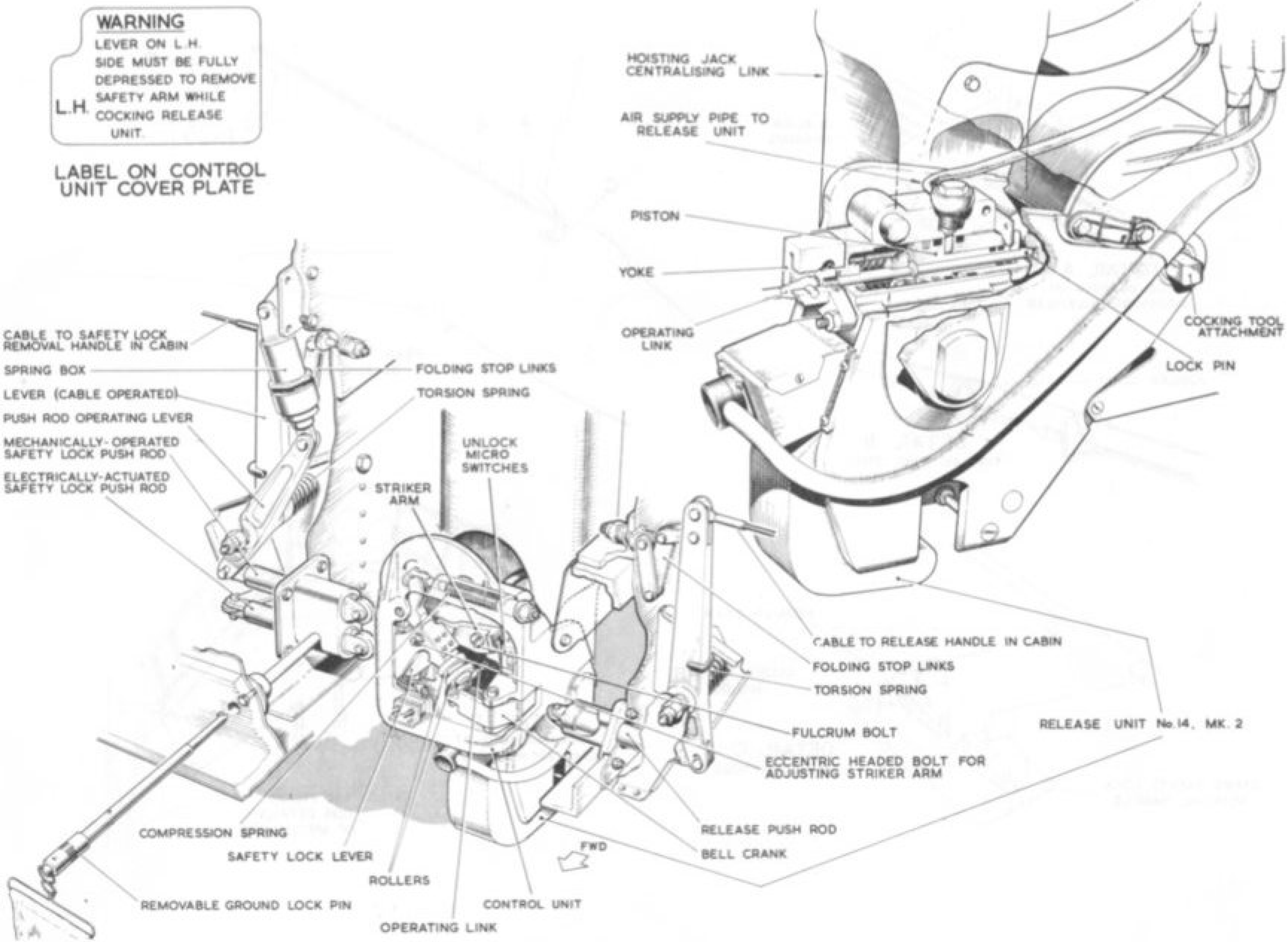


Fig. 26. Release mechanism.
(◄ Mod No. 1626 ►)

TABLE 7

Components of the electro-pneumatic release system

Components	Part No.	No.off	A.P.Ref.
Air storage cylinder	Dunlop AC11798	1	
Air dehydrator	Dunlop ACM19534	1	
Release cock	Dunlop ACM19540	1	
Relief valve	Dunlop ACM17730	1	
Pressure switch	Dunlop ACM19070	1	
Air charging valve	H.P. components A506	1	
Air pressure gauge	Ref.No. 11A/5039	1	
Pneumatic stop valve	Ref.No. 11A/5589	1	
Twin motor actuator	Plessey 500/1/01660	1	

operated, electro-pneumatically or manually. The manual controls are provided for use in emergency. Arming of the store is a function of release for a 'live drop', the arming process being started by A.L.S.U. fuzing units on the fairing doors.

Electro-pneumatic release

95. A pneumatic panel is mounted on the starboard side of the carrier beam. During charging, the storage cylinder is filled to a pressure of 1,500 p.s.i. with dry air which passes through a dehydrator filled with activated alumina. Operation of the store release switch will energise the two solenoids of the pneumatic stop valve and air will pass to operate the piston of the No.14 Mk.2 release unit.

96. The charging circuit is fitted with a charging valve and a pressure relief valve. One tapping from the supply line to the pneumatic valve ends in a pressure switch which, after withdrawal of the safety lock, gives an indication in the cabin that adequate air pressure is available for store release. Another tapping from the supply line to the pneumatic valve contains an air pressure gauge and terminates in a pressure release cock which contains a vent restrictor.

Manual release

97. The store is released by the operation of two handles which are fitted in housings on the starboard side of the cabin roof between formers 260F and 274F. Access to the release handles is gained by opening two doors, the forward of which is painted red and marked MANUAL STORE SAFETY LOCK REMOVAL. The aft door is painted black and yellow and marked MANUAL STORE RELEASE. The handles are coloured the same as their respective doors. The doors are opened by pulling on webbing straps, thereby disengaging the door fasteners from their spring clips. The manual release is not effective until the safety lock is disengaged, therefore the forward handle must be pulled first. When the handles are released they will be withdrawn into their housings due to the action of spring loaded levers. The safety lock, however, will remain disengaged until the operating mechanism in the carrier beam has been re-set.

98. A ground device is fitted to prevent the handles being inadvertently pulled. It consists of an angle bracket which prevents the opening of the two doors when retained by two ¼ in. Pip-pins. A lock is provided for the forward door. A stowage, for the key of this lock, is fitted to the port console.

99. Cables, attached to the handles, pass over pulleys above the handles and are led aft to two further pulleys, after which the cables run in guards down the starboard side of the cabin, to connect, by swaged screwed cable ends, turnbuckles and locknuts, to two rods which pass through Glacier bearings in the rear bulkhead. Aft of the bulkhead the rods are connected to further cables which run in light alloy conduits through the nose wheel bay. In the bomb-bay the cables run aft in guards, joints being made forward of bomb-arch 21·717A by turnbuckles. After passing round twin pulleys on the forward face of bomb-arch 171·842A the cables diverge laterally, each having a turnbuckle connection with a further cable before passing round a pulley into the carrier beam, the safety lock removal cable passing into the starboard side and the release cable into the port, to connect to the release mechanism levers.

Controls and indicators

100. Apart from the manual release handles all controls and indicators are mounted on the navigator/bomber's and navigator/plotter's instrument panels. For details see fig.2.

Release mechanism (fig.26)

101. The No.14 Mk.2 release unit with its associated control unit is connected to the end of the jack ram by a hoist centralising link. Pneumatic and electrical leads, connected to the release unit, are looped through a guide bracket, on top of the carrier beam, to provide an arrangement which allows the leads to be paid out as the jack extends and to be taken in as it retracts. When the hoist jack is retracted to the "missile loaded" position, the control unit, which carries the safety lock and a bell crank, is aligned with three roller-ended push rods, two on the starboard side and one on the port. The starboard push rods operate the safety lock lever, the upper being operated manually (emergency) and the lower by an electrical actuator. The port push rod, also operated manually (emergency), actuates the control unit bell crank to open the release unit. Normal opening of the release unit is effected by a pneumatic ram within the unit.

102. The upper starboard push rod is moved by the action of two levers which are independently mounted on a common pivot, but which are made to move together over a small range of movement by interconnecting dogs when the initial manual 'lock-out' selection is made. The cable operated lever is loaded in the 'lock-in' position by a torsion spring, and the push rod operating lever is loaded into the 'lock out' or 'lock in' position by a spring box, according to the selection made. The port push rod is moved by a cable-operated lever which is loaded in the 'release unit closed' position by a torsion spring. The length of travel of the two cable operated levers is restricted by folding stop links.

103. The electrically- actuated safety lock push rod is locked in position when the aircraft is on the ground by the insertion of a special Pip-pin in a hole in the forward face of the carrier beam. The pin passes through a guide tube and

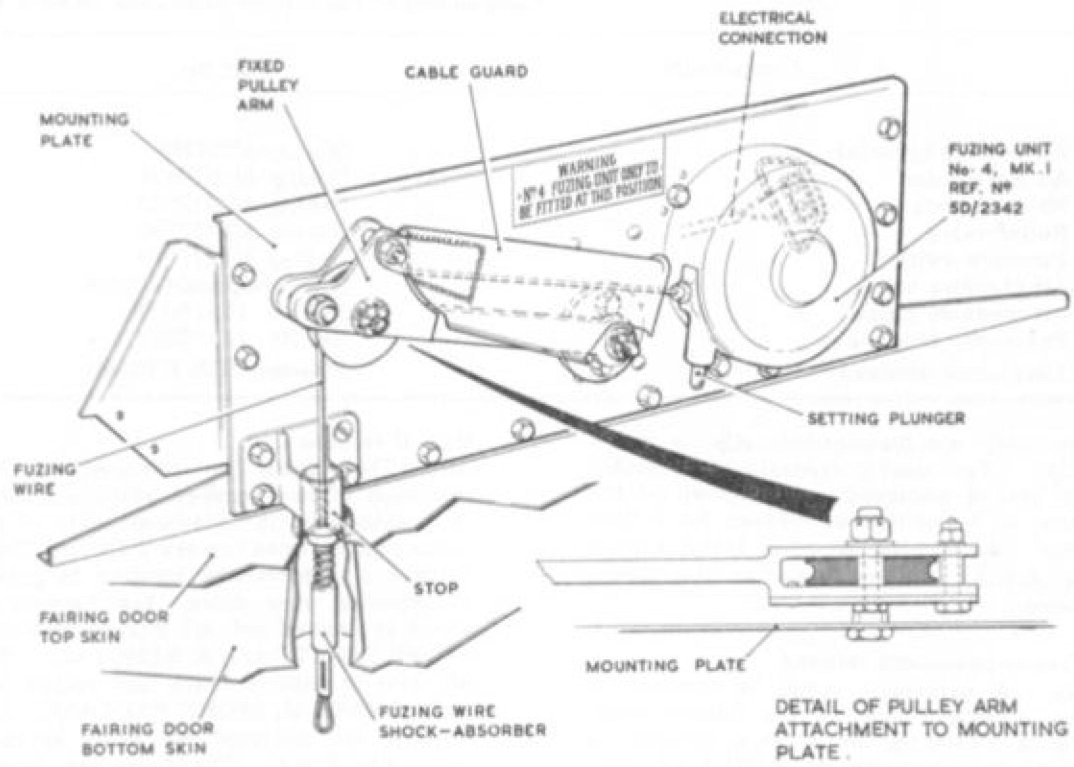


Fig.27. A.L.S.U. fuzing unit mounting

a drilling in the push rod housing to enter a slotted hole in the push rod. A red pennant is attached to the pin.

104. The safety lock lever, mounted in the control unit, pivots between two micro switches and is fitted with rollers which run on a machined guide plate. The micro switches are operated by the lock lever to give indication of its position. One micro switch also cuts the actuator feed when the lock is fully withdrawn. In the 'lock in' position, a yoke which is attached to the piston assembly of the release unit, is retained against the face of that unit, thus preventing the operation of the piston and the opening of the release. A compression spring loads the lever to the 'lock in' position.

Normal operation

105. Selection of the safety lock control switch to UNLOCK causes the electrically actuated push rod to contact the safety lock lever, swinging it upwards against the action of the compression spring, so

that the yoke attached to the piston assembly of the release unit is free to move. When the pneumatic valve is energised, air is admitted to the piston of the release unit, thus opening the jaws and releasing the store.

Emergency operation

106. The pulling downwards of the cabin foremost handle, marked MANUAL STORE SAFETY LOCK REMOVAL, pulls the top end of the starboard cable-operated lever outboard against the torsion spring loading. As the lever moves around its pivot, the engagement of dogs causes the push rod operating lever to move the uppermost push rod inboard and swing the safety lock lever upwards clear of the piston operated yoke on the release unit. The push rod operating lever is at first resisted and then assisted as a geometrical lock is overcome.

107. Pulling the cabin handle, marked MANUAL STORE RELEASE, downwards causes the top of the port cable-operated lever to move outboard against the loading of the torsion spring and the lower end, with the push rod to swing inboard. The roller, at the end of the push rod, butts against one arm of a bell crank lever, causing it to swing about its pivot and, by means of a link attached to its other arm, move the yoke which causes the release unit to open.

A.L.S.U. FUZING UNIT MOUNTING

General

108. An electro magnetic No.4, Mk.1 fuzing unit for each air log safety unit (A.L.S.U.) on the store, is fitted to a mounting plate on the upper surface of each fairing door. These units, described in A.P.1664A, are energized for a 'live' drop of the store. An energized unit will retain its fuze wire so that the triggering pin will be pulled from the air log safety unit to start the arming process as the store clears the aircraft.

109. On each mounting plate, the fuzing wire passes over a pulley on the end of a fixed arm, through a stop and through the fairing door. During the energized state of the fuzing unit, the wire is allowed a limited amount of free run so that motion between aircraft and store, during parent flight, will not result in a premature triggering of the air log safety unit.

110. After pull-off from the air log safety units, the wires are rapidly wound in by the fuzing units until the shock absorbers, at the end of each wire, strikes the stop. The stop is positioned to prevent complete withdrawal through the fairing door.

111. When the store is to be dropped 'safe', the fuzing units are not energized. A de-energized unit will allow the fuzing wire to run out and drop with the store.

SERVICING

HYDRAULIC SUPPLY SYSTEM

Priming the hydraulic supply system

112. The hydraulic unit is normally primed before fitment to the aircraft, however, should the necessity arise the unit can be primed in situ. After the hydraulic unit is installed and connected to the feed and return lines, fluid is circulated by operating the unit with the quick-release couplings joined by a connector pipe (Pt.No.U1905), which incorporates a shut-off cock. This cock, when shut, enables the pressure to build up and close the servo-operated four-way selector when the motor pump is switched off. Whilst the pump is running, the air in the system will be carried to the hydraulic unit reservoir and there displaced through the float-operated vent valve.

113. Replenishment of the system is carried out by a pressurised fluid can (Ref.No.4G/5378) which is connected to the oil charging valve on the hydraulic unit by an adapter (Pt.No.GM/B/19209). To avoid damage to the float of the reservoir vent valve, the replenishing can charging pressure must not exceed 40 p.s.i. In the priming procedure which follows, items (1) to (5) do not apply if the hydraulic unit is already full and prepared for operation.

(1) Charge the nitrogen cylinder and the accumulator to 1,600 p.s.i.

(2) Top up the gearbox of the motor pump with oil OM-15 to the level mark on the dipstick.

(3) Fit the connector pipe to the quick-release couplings and fully open the cock.

(4) Charge the reservoir with oil OM-15. A fully charged reservoir is indicated when the reservoir dipstick cannot be inserted further than the MISSILE EMPTY mark.

(5) Open the bleed screw on the reservoir outlet pipe adapter and release any air at this point. Close and lock the bleed screw.

(6) Start the motor pump. If the hydraulic unit is not pre-primed, hold in the start button for approximately 15 seconds to ensure adequate circulation through the high pressure relief valve and its associated pipes. During this 15

seconds, operate the pressure release valves to prime their associated pipes. The main four-way selector will be energised to open 7-9 seconds after the release of the start button and fluid will flow from the delivery to the return via the connector pipe.

(7) After approximately one minute running close the shut-off cock and allow the delivery pressure to rise and operate the low pressure relief valve. Stop the motor pump.

(8) Discharge the accumulator.

(9) Top up the hydraulic reservoir.

(10) Start the motor pump and repeat the operations specified in operation (7) and (8). Check that the reservoir remains fully charged.

(11) Check that the two pressure gauges on the hydraulic unit are indicating 1,600 p.s.i.

(12) Remove the connector pipe.

Testing the hydraulic unit

114. For this operation, which is carried out using the hydraulic test equipment in the T.S., A.M.I., refer to S.D.4766D. The test equipment is connected by flexible hoses to the quick-release couplings at the rear crutch to check supply pressures and flows by measuring the pressure drop across solenoid selected orifices. One orifice, designed to dissipate power at a rate which represents the maximum heat load on the system when operating with the store, is selected to check that the cooling effect of the exhaust air from the refrigeration pack is sufficient to prevent the oil temperature, as indicated by the gauge on the Blue Steel control panel, from exceeding the maximum permissible limit. The point of discharge of the refrigeration pack exhaust air depends

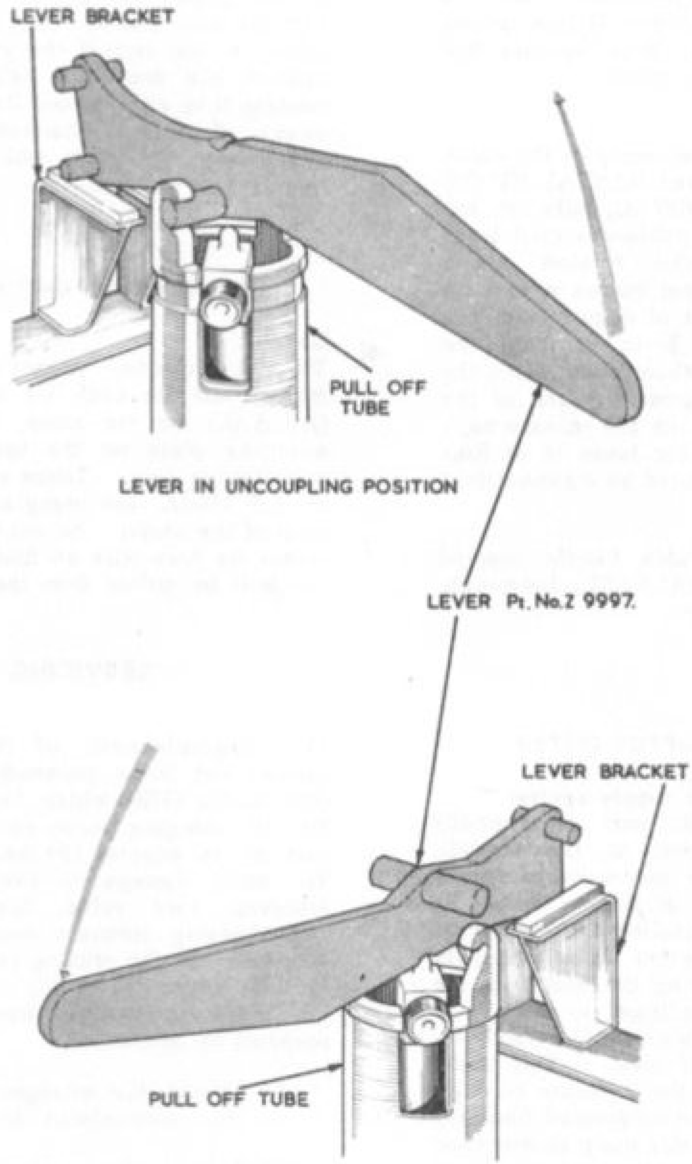


Fig.28. Hydraulic coupling lever

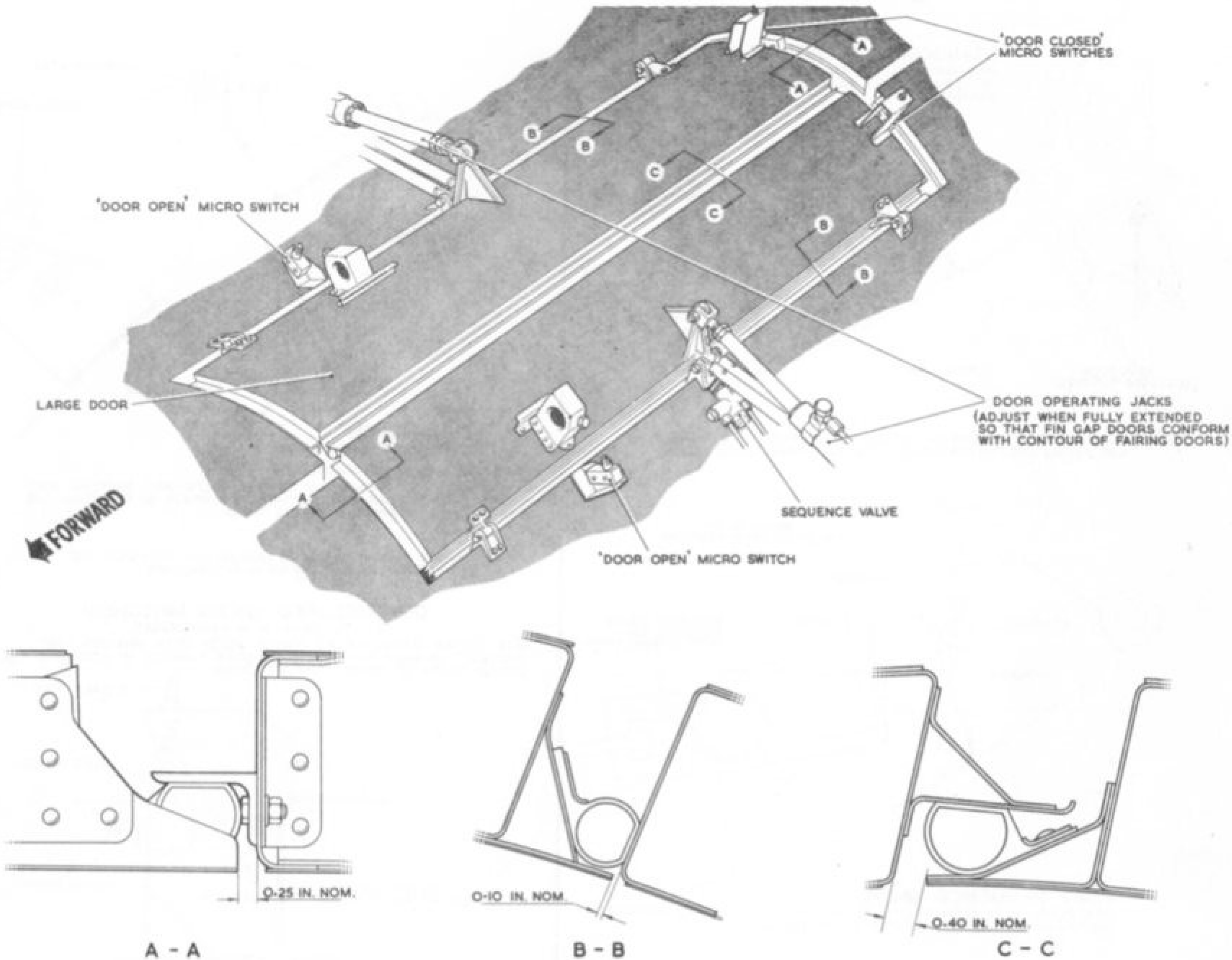


Fig. 29. Setting of fin gap door jacks.

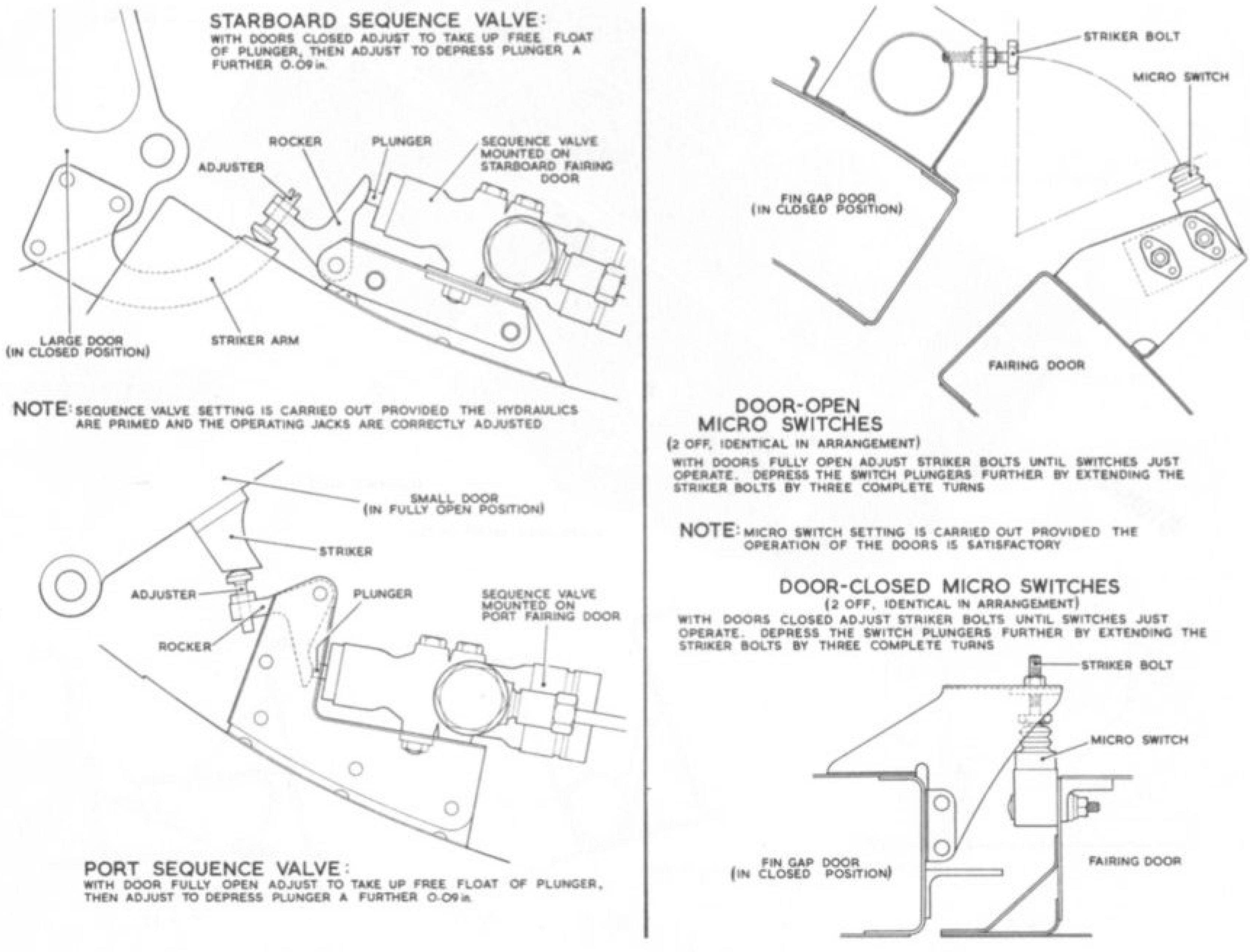


Fig. 30. Setting of sequence valves and micro switches – fin gap doors.

on which one of the two electrically actuated butterfly valves, on top of the hydraulic unit, is open and which one is closed. During ground operation, the air should issue from the oil cooler and not from the outlet grill at the end of the air ducting. The action of the valves and the setting of the A.S.I. system's pressure switch controlling the valves, may be checked when a pitot/static test rig, (Ref.No.6C/849), is used to simulate aircraft speed. On increasing the simulated speed to just over 150 knots, the contacts of the pressure switch should open to operate the valves so that the air will issue from the grill and not from the oil cooler. On reducing the simulated speed to just below 150 knots the air should start to issue from the cooler and cease to issue from the grill.

Before commencing the test ensure that :-

The hydraulic unit reservoir is fully charged.

The nitrogen gauges on the hydraulic unit indicate 1,600p.s.i.

The T.S., A.M.I. hoses are supported from the slot attachments on the fairing doors.

The flap type non-return valve, in the ram air supply duct to the hydraulic unit, is serviceable. (Access to the valve is obtained by disconnecting the supply duct from the refrigeration pack. Under hand pressure, the flaps should open and close easily).

After the test :-

Disconnect the T.S., A.M.I. and immediately fit a dust cover, Pt.No. 7/Z10547 to the aircraft half of each quick-release coupling (Protectors must also be fitted to the T.S., A.M.I. couplings).

Operate the pressure release valves, on the hydraulic unit, and check that the reservoir is fully charged. Allow the unit to cool to ambient, then check that the gauges indicate a nitrogen pressure of 1,600 p.s.i.

FIN GAP DOOR HYDRAULIC SYSTEM

Priming the fin gap door system

115. This is done with the operating jacks disconnected from the fin gap doors and supported so as not to cause damage when their rams extend. The fairing doors may be open or shut.

Proceed as follows :-

(1) Connect a hydraulic servicing trolley to the ground test couplings in the port wheel bay.

(2) Check the main and emergency power pack reservoirs. Top up if necessary.

(3) Start the pump of the servicing trolley and run at idling r.p.m.

(4) Operate the jacks by the fin gap door normal selector switch whilst bleeding off air from the bleed-screws on the jacks.

NOTE . . .
When the switch is selected to OPEN it will be necessary to press in the plunger of the port sequence valve in order to retract the starboard jack. When CLOSED is selected it will be necessary to press in the plunger of the starboard sequence valve in order to extend the port jack.

(5) Shut off the servicing trolley.

(5) Operate the jacks by the emergency selector switch and again bleed off at the jacks.

NOTE . . .
The emergency power pack will be automatically switched off when the jacks have fully extended or retracted.

(7) Fully extend the jacks.

(8) Connect the jacks to the fin doors (para.117).

(9) Set the sequence valves (para.116).

(10) Carry out a functional test (para. 118) and if satisfactory leave the doors in the open position. Top up the reservoirs.

Setting fin gap door sequence valves (fig.30)

116. This is carried out as follows:-

(1) Check that the fin gap doors conform to the contour of the fairing doors when the operating jacks are fully extended.

(2) Screw in the adjuster for the starboard sequence valve to take up the 0·01 to 0·12 in. free float of the valve plunger. The valve is now at the "cracking point".

(3) Screw in the adjuster to depress the plunger a further 0·09 in. The valve should now be fully open. If, subsequently, further adjustment is found to be necessary it must not cause the plunger to be depressed more than 0·19 in. from the "cracking point".

(4) Screw out the adjuster for the port door sequence valve in order that this valve will not be actioned when the port door is fully opened.

(5) With an electrical supply connected to the aircraft, select OPEN on the fin gap door emergency selector switch. (The emergency power pack is automatically started). The port door should open fully and the starboard remain shut.

NOTE . . .
After the door operation the power pack

will be cut out by the action of its pressure switch. When the pack cuts out return the selector switch to the neutral position.

(6) Screw in the adjuster for the port sequence valve to take up the free float of its plunger.

(7) Screw in the adjuster a further 3½ complete turns in order to depress the plunger, which is not easily accessible for measuring, by 0·09 in. approx.

(8) Again select OPEN on the emergency selector switch. The starboard door should now open fully.

(9) Select doors CLOSED and check for satisfactory operation.

(10) Carry out a functional test of the doors (para.118).

Setting fin gap door jacks (fig.29)

117. This is done with the jacks fully extended. Proceed as follows:-

(1) Screw in the adjuster bolts which operate the fin gap doors micro switches. This will avoid over-compression of these switches when the doors are operated.

(2) Connect the jacks to the fin gap doors, adjusting the forkends so that the fin gap doors conform with the contour of the fairing doors.

(3) Set the sequence valve (para.116).

(4) Carry out a functional test (para. 118) and when satisfactory adjust the micro switches (fig.30).

Functional test of fin gap doors

118. Using a hydraulic servicing trolley operate the fin gap doors by the normal selector switch and check that they :-

(a) Open in 2 ±1 sec.
(b) Close in 2 ±1 sec.

Using the emergency selector switch, operate the doors by power supplies by the hydraulic pack. Check that the doors:-

(a) Open in 3 ±1 sec.
(b) Close in 3 ±1 sec.

STORE HOISTING HYDRAULIC SYSTEM

Priming the hoisting system

119. Priming entails the operation of the hoisting jack and, before proceeding, the following must be strictly observed:-

The wedge must be fully withdrawn.

The electrically - actuated push rod must be locked in the fully retracted position by the ground lock pin.

The manually - operated push rods must be fully retracted with the access doors to the release handles in the cabin roof secured by the locking device (Pt.No.U1773).

120. The system is primed and bled mainly by use of the hand pump, the up or down selection of the jack being made by pressing the appropriate solenoid button on the servo-operated selector valve. Note, that when the system is being operated by the hand pump, a satisfactory change over of the selector will only be achieved provided pressure is built up before making the other selection. When the jack is being retracted ensure that the release assembly is aligned fore and aft to allow its entry into the carrier beam. When topping up the system the jack should be fully retracted. Priming and bleeding is carried out as follows:-

(1) Fit a clamp to the pressure relay on the hydraulic hoisting panel.

(2) Using the hand pump, extend and retract the hoisting jack whilst bleeding off at the appropriate bleed screws on the jack distribution box. Note that the down side bleed screw is the one at the starboard side. Tighten and lock the bleed screws. Top up the hydraulic reservoir when the jack is fully retracted.

(3) Operate the hand pump, select UP and bleed off at the pipe connection to the pressure transmitter. After bleeding, tighten the pipe connection and remove the clamp from the pressure relay.

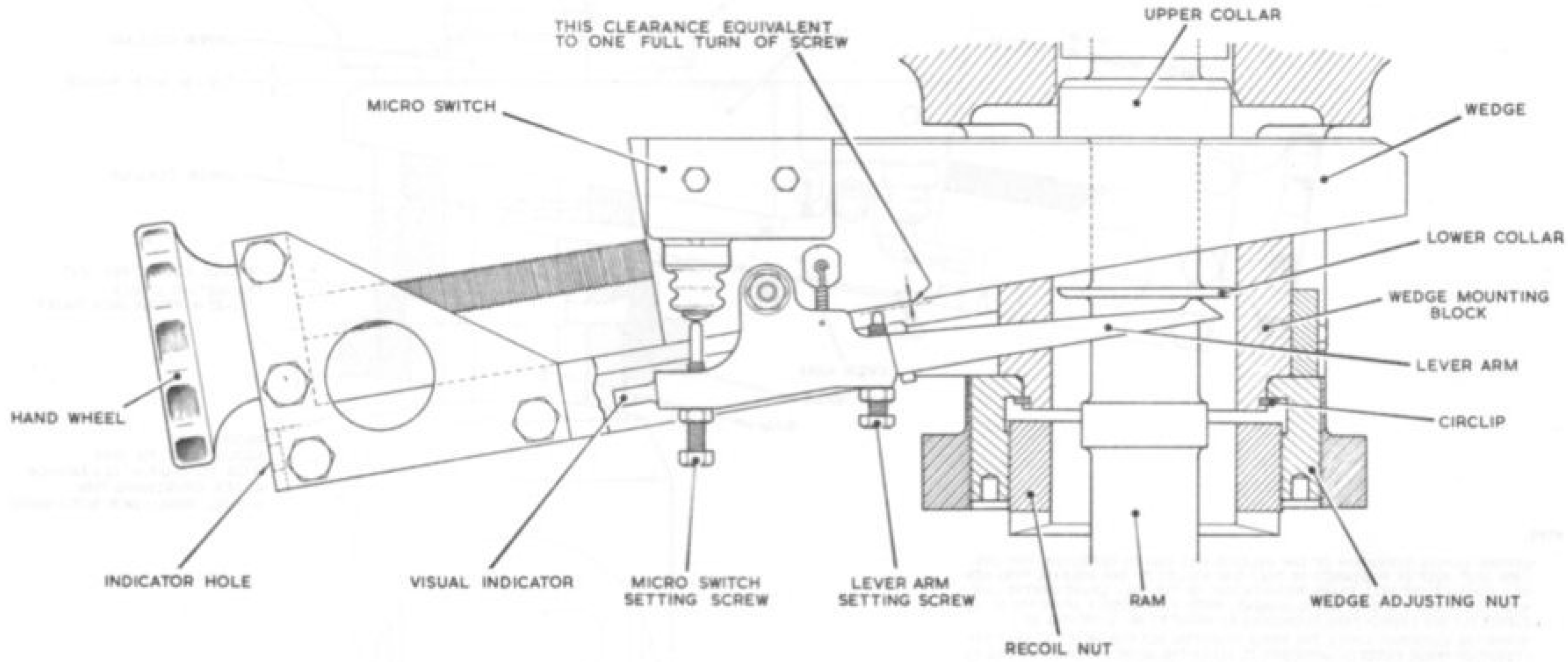
(4) Hang weights (approximately 2,500 lb.), from the hook of the release unit.

(5) Build up pressure on the hand pump and select DOWN. Stop pumping when the jack starts to extend. Under the influence of the weights the jack should continue to extend without the necessity of holding in the down button. As extension takes place fluid will be drawn through the non-return valve connected across the delivery and return lines, thus priming this valve and its associated piping.

(6) Check the power pack reservoir fluid level and replenish as necessary.

(7) Connect the remote control panel to the plug on bomb-arch 151·919A.

(8) Connect the electrical ground supplies to the aircraft via the ground supply plug in the bomb bay roof structure between arches 151·919A and 171·842A. Ensure no other electrical supplies are connected to the aircraft.



SEQUENCE OF OPERATIONS

(1) CONNECT THE REMOTE CONTROL PANEL TO THE PLUG ON BOMB ARCH 151-919A. THIS WILL ENABLE THE WEDGE HOME INDICATOR LAMP ON THE PANEL TO BE USED FOR CHECKING THE OPERATION OF THE WEDGE MICRO SWITCH.

(2) ENSURE THAT THE PUSH RODS ARE IN THE RETRACTED POSITION AND THAT THE ELECTRICAL AND PNEUMATIC LEADS ARE NOT CONNECTED TO THE CONTROL UNIT.

(3) WITHDRAW THE WEDGE AND CHECK THAT THE VISUAL INDICATOR WILL ENTER THE INDICATOR HOLE. IF NECESSARY ADJUST THE LEVER ARM SETTING SCREW TO ALLOW THIS.

(4) SCREW THE RECOIL NUT FULLY IN. THIS WILL ENSURE THAT THE NUT WILL NOT PREVENT THE JACK FROM BEING CORRECTLY POSITIONED.

(5) BY MEANS OF THE HAND PUMP, POSITION THE RAM SO THAT THE WEDGE CAN BE FULLY ENTERED UNDER THE UPPER COLLAR.

(6) SCREW THE WEDGE FULLY HOME, ENSURING THAT THE WEDGE IS IN CLOSE CONTACT WITH ITS SLIDE.

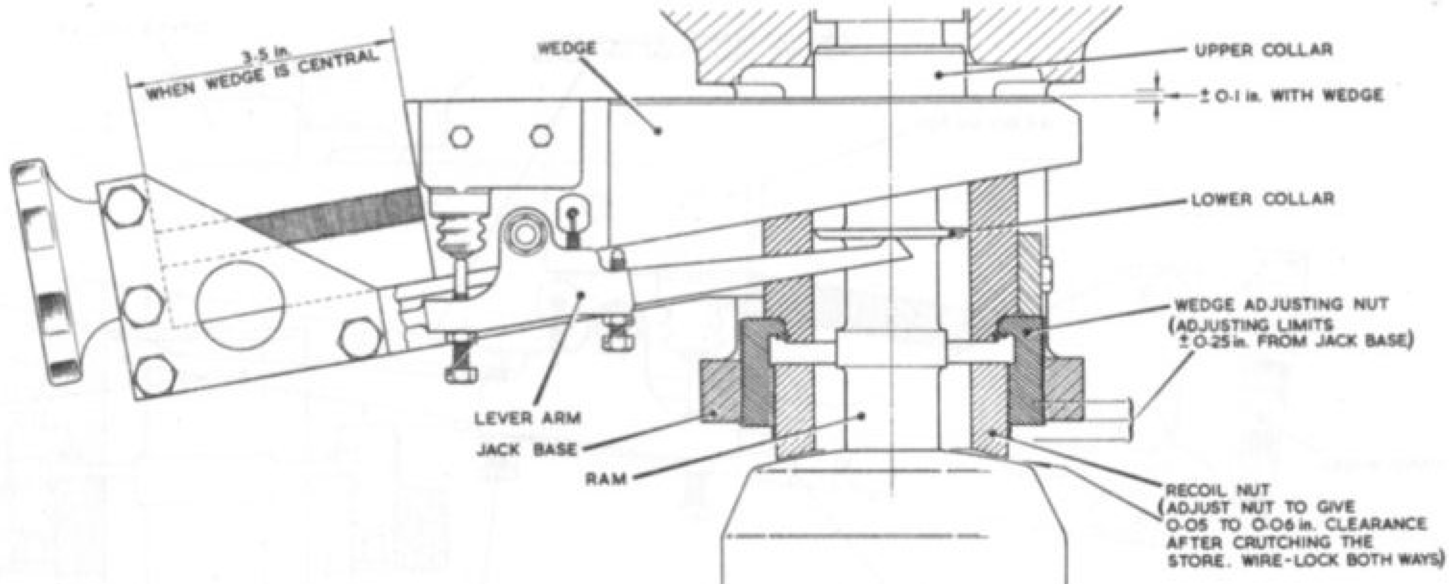
(7) LOWER THE RAM SO THAT THE UPPER COLLAR IS RESTING ON TOP OF THE WEDGE.

(8) ADJUST THE LEVER ARM SETTING SCREW UNTIL IT IS JUST IN CONTACT WITH THE BASE OF THE WEDGE, THEN UNSCREW ONE TURN FURTHER. TIGHTEN THE LOCKNUT.

(9) ADJUST THE MICRO SWITCH SETTING SCREW SO THAT THE SWITCH JUST OPERATES AND THE INDICATOR LAMP LIGHTS. TIGHTEN THE LOCK NUT. LOCK BOTH ADJUSTING SCREWS.

(10) WITHDRAW AND INSERT THE WEDGE THREE OR FOUR TIMES, CHECKING THAT THE INDICATOR LAMP IS EXTINGUISHED ON WITHDRAWAL AND LIGHTS WHEN THE WEDGE IS HOME. THE OPERATION OF THE LAMP SHOULD BE WITHIN REASONABLY CONSTANT LIMITS.

Fig. 31. Setting the wedge micro switch



NOTE...

BEFORE MANUAL OPERATION OF THE RELEASE UNIT CAN BE EFFECTED, THE CONTROL UNIT MUST BE POSITIONED SO THAT THE ROLLER OF THE RELEASE PUSH ROD WILL CONTACT THE BELL CRANK WITHIN ±0.25IN. OF THE BELL CRANK CENTRE LINE. WHEN CRUTCHING A STORE, THIS ALIGNMENT, WHICH IS ADVERSELY AFFECTED BY INCORRECTLY SET CRUTCH PADS, IS CHECKED BY GAUGE PT.NO. U.1950 (FIG. 39).

WITHIN THE ALIGNMENT LIMITS, THE WEDGE ADJUSTING NUT CAN BE SET SO THAT THE EXTENT OF WEDGE ENTRY IS SUFFICIENT TO ALLOW THE MICRO SWITCH LEVER ARM TO CONTACT THE LOWER COLLAR. THUS, THE WEDGE HOME LAMP WILL INDICATE THAT THE WEDGE IS WITHIN THE SAFE RANGE.

WHEN THE LEVER IS IN CONTACT WITH THE R.H. EDGE OF THE LOWER COLLAR, THE WEDGE WILL BE 0.2IN. HIGHER THAN WHEN THE ARM IS IN CONTACT WITH THE L.H. EDGE. FOR ALL RAM POSITIONS WITHIN THIS DIMENSION, THE WEDGE WILL ENTER THE SAFE RANGE WITHOUT THE NECESSITY OF HAVING TO ADJUST THE WEDGE NUT.

WITH THE PUSH ROD ALIGNED WITH THE BELL CRANK CENTRE LINE (FIG. 38 REFERS), AND WITH THE WEDGE NUT SET SO THAT THE LEVER ARM WILL MAKE CENTRE CONTACT WITH THE LOWER COLLAR, THE SAFE RANGE IS EQUALLY DISPOSED. THIS CATERS, WITHIN ±0.1IN., FOR ANY SLIGHT DIFFERENCE BETWEEN INDIVIDUAL STORES.

SEQUENCE OF OPERATIONS

(1) CONNECT THE REMOTE CONTROL PANEL TO THE PLUG ON BOMB ARCH 151A IN ORDER THAT THE WEDGE HOME INDICATOR LAMP CAN BE UTILISED. ENSURE THAT THE WEDGE HOME MICRO SWITCH HAS BEEN CORRECTLY ADJUSTED.

(2) SCREW IN THE RECOIL NUT SO THAT IT WILL NOT PREVENT THE CONTROL UNIT FROM BEING CORRECTLY POSITIONED.

(3) FIT THE GAUGE PT.NO. U.1887 (FIG. 38). THIS WILL ALIGN THE BELL CRANK CENTRE LINE WITH THE RELEASE PUSH ROD

(4) ADJUST THE WEDGE NUT UNTIL ITS BASE IS APPROXIMATELY FLUSH WITH THE BASE OF THE JACK. THIS SHOULD ALLOW THE WEDGE TO BE ENTERED INTO THE SAFE RANGE.

◄ (5) SCREW THE WEDGE FULLY HOME, ENSURING THAT THE WEDGE IS IN CLOSE CONTACT WITH ITS SLIDE AND CHECK THAT THE WEDGE HOME LAMP IS ILLUMINATED. ►

(6) MEASURE THE DISTANCE FROM THE OUTER FACE OF THE WEDGE TO THE OPPOSITE FACE ON THE HAND WHEEL MOUNTING. IF THIS MEASUREMENT IS 3.5 IN. THE WEDGE IS SET IN ITS CENTRAL POSITION. IF ANY OTHER MEASUREMENT IS OBTAINED: WITHDRAW THE WEDGE, ADJUST THE WEDGE NUT AND REPEAT OPERATION (5) UNTIL THE CENTRAL SETTING IS ACHIEVED.

(7) WIRE LOCK THE WEDGE ADJUSTING NUT BOTH WAYS.

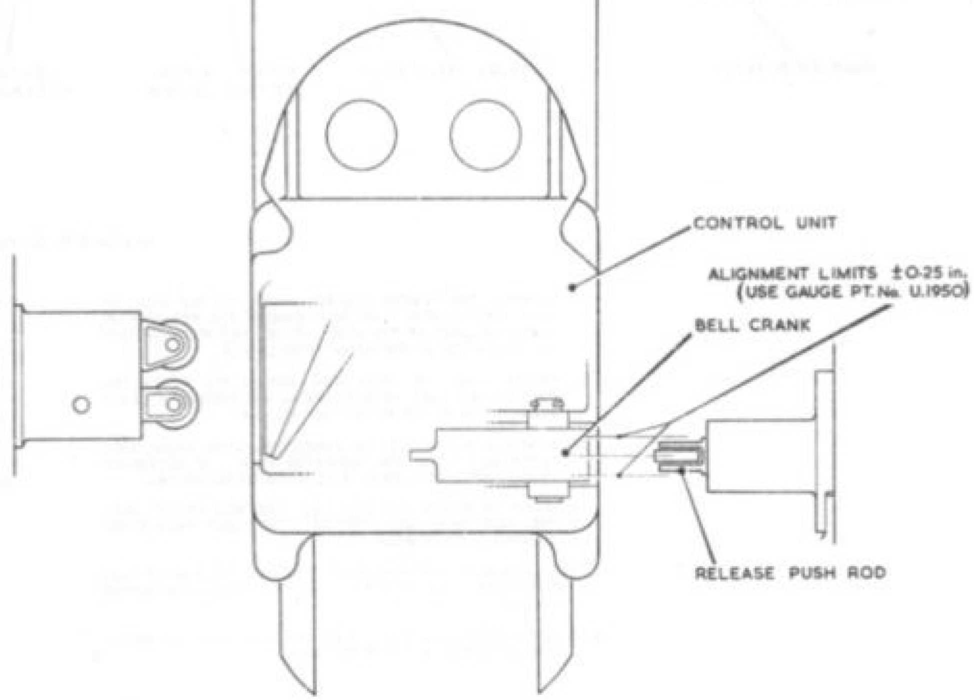
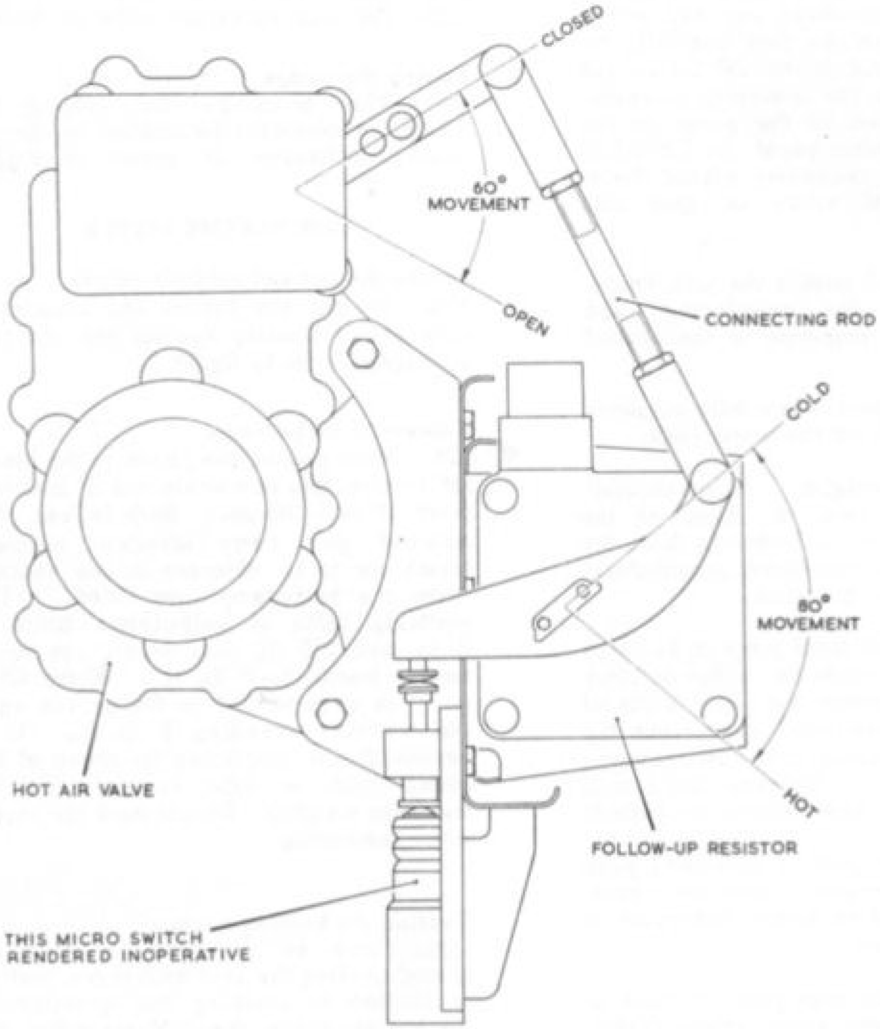


Fig. 32. Setting the wedge.

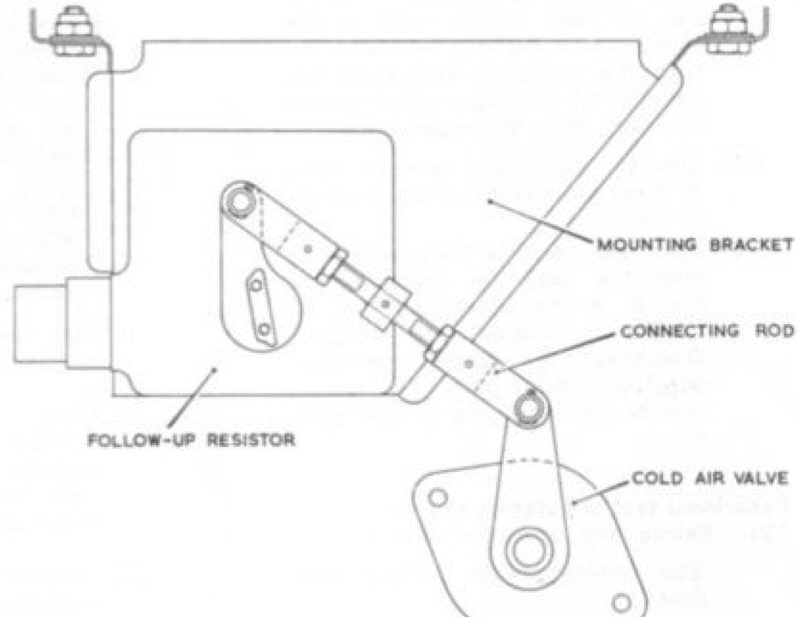
RESTRICTED



NOTE:

(1) THE SETTING OF THE HOT AIR VALVE REMAINS UNCHANGED IRRESPECTIVE OF THE AIRCRAFT ROLE

(2) THE SETTING OF THE COLD AIR VALVE IS PECULIAR TO THE BLUE STEEL ROLE



GEOMETRY OF COLD AIR VALVE LINKAGE

Fig. 33. Store heating equipment — setting of hot and cold air valves

(9) Start the emergency power pack by the switch in the nose-wheel bay. Extend and retract the jack using the remote control panel. At the end of each stroke hold in the button for a further 5-10 sec. so that the pressure will build up, operate the pressure relief valves and fully prime the return lines.

(10) Operate the jack several times to clear the system of any pockets of air.

(11) When the jack is fully retracted, stop the pack by selecting the switch in the nose-wheel bay to STOP. Remove the weights, disconnect the ground electrical supplies cable, stow the remote control panel and top up the reservoir.

Functional test of hoisting system

121. Before this operation ensure that:-

The locking wedge is fully withdrawn.

The electrically-actuated push rod is locked in the fully retracted position by the ground lock pin.

The manually-operated push rods are fully retracted and the access doors to the release handles in the cabin roof are secured by the locking device (Pt.No.U1773).

The test procedure is as follows:-

(1) Connect the remote control panel to the plug on bomb arch 151·919A.

(2) Connect the electrical ground supplies to the aircraft via the ground supply plug installed in the bomb bay roof structure between arches 151·919A and 171·842A. Ensure no other electrical supplies are connected to the aircraft.

(3) Start the power pack by the switch in the nose-wheel bay and select UP. When the jack has fully retracted, hold in the UP button and check that the crutching pressure, as indicated by the gauge on the remote control panel, is $2{,}380 \pm 20$ p.s.i. If necessary adjust the up line relief valve to give this pressure.

(4) Extend and retract the jack twice, checking for satisfactory and immediate response to the control buttons.

(5) Stop the jack when fully retracted and switch off the power pack.

(6) Hang weights (approximately 2,500 lb.), from the hook of the release unit in order to load the jack for a simulated gravitational lowering of the store.

(7) Operate the hand pump to build up sufficient pressure in the delivery line to operate the servo slide of the selector valve, then press the DOWN button of the selector solenoid. Release the button when the jack starts to extend.

(8) Whilst the jack is extending push in the neutral selection knob. Check that no further extension is taking place.

(9) Operate the hand pump to build up pressure and again select DOWN. Check that the jack is now extending.

(10) Remove the weights from the hook of the release.

(11) Using the power pack, fully retract the jack. Stop the pack by the switch in the nose-wheel bay. Disconnect the ground electrical supply cable and stow the remote control panel.

Setting the wedge micro switch

122. For this operation refer to fig.31.

Setting the wedge

123. The procedure for setting the wedge in correct relationship to the release mechanism is given on fig.32.

AIR HEATING SYSTEM

Setting the hot and cold air valves

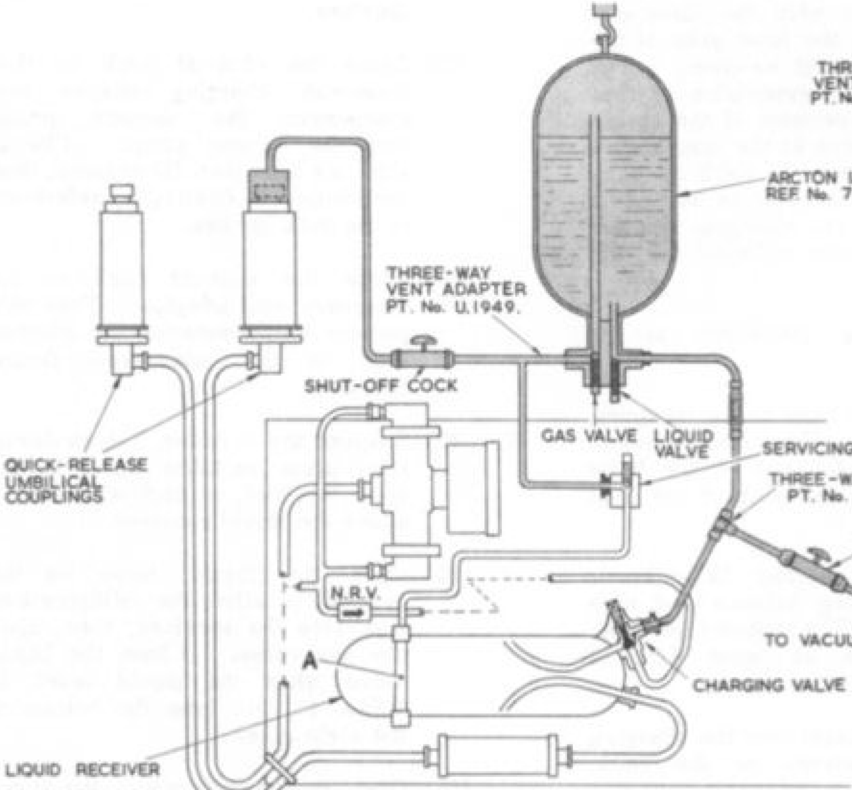
124. To set the levers and connecting rods of the heating system hot and cold air valves, refer to fig.33.

Fitment of half-clamps

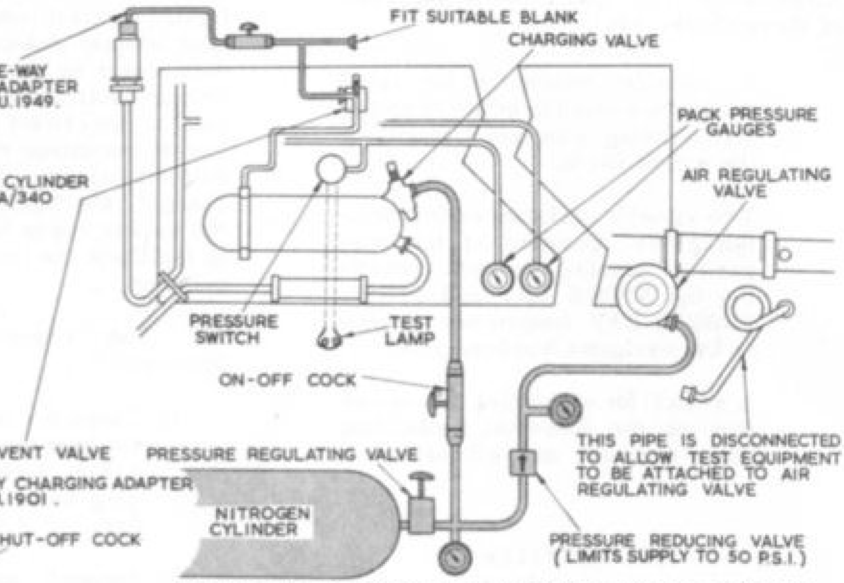
125. When making the joints in the bleed air ducting, use new seals and fit matched pairs of half-clamps. Both halves of a matched pair carry identical numbers which are to be adjacent to one another when the half-clamps are fitted. The securing bolts of half-clamps fitted to 2 in. and 2·5 in. dia. ducts, are to be torque loaded to 5 lb. ft. Where difficulty is experienced in fitting the split pin without exceeding 5 lb. ft., it is permissible to gently tap the crown of the clamp with a light hammer, (0·5 lb. maximum weight). Do not mark the crown when hammering.

Testing the heating system

126. Since no provision is made for ground cooling the heat exchanger, testing is limited to checking the operation of the hot air valve, the cold air valve, the overheat shut-off valve and the temperature indicators associated with store heating. During the checks hot air must not be supplied to the charge air ducting. To check those valves and indicators normally controlled from the store the T.S., A.M.I. is used in accordance with S.D.4766D. Checks applicable to the cold air valve and the exchanger outlet temperature gauge will be detailed in A.P.4505B, Vol.1, Book 2. The controls



CHARGING WITH REFRIGERANT



PRESSURE TESTING THE VAPOUR CYCLE CIRCUIT

TOPPING-UP

THE TOPPING-UP OPERATION IS AFFECTED BY THE TEMPERATURE RELATIONSHIP OF THE PACK AND THE ARCTON CYLINDER.

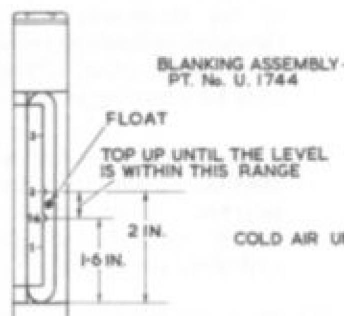
WHEN THE CYLINDER TEMPERATURE IS THE SAME OR HIGHER THAN THAT OF THE PACK, TOPPING-UP CAN BE EFFECTED USING A SINGLE CONNECTING HOSE.

WHEN THE PACK IS THE HOTTER, IT WILL BE NECESSARY TO VENT IT TO THE CYLINDER, VIA AN ADDITIONAL HOSE, BEFORE THE NECESSARY TRANSFER OF LIQUID WILL TAKE PLACE.

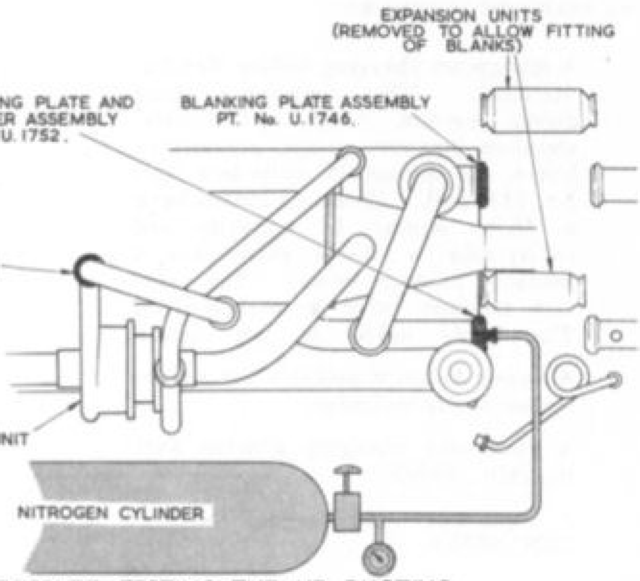
THE HOSES ARE FIRST CONNECTED TO THE CYLINDER SO THAT ITS VAPOUR CAN BE RELEASED TO PURGE THE HOSES AS THEY ARE BEING CONNECTED TO THE PACK. WHEN PURGING THE VENT HOSE, THE CYLINDER MUST BE IN THE "VALVES DOWN" POSITION. WHEN PURGING THE OTHER HOSE, THE CYLINDER MUST BE IN THE "VALVES UP" POSITION.

TOPPING-UP MAY BE CARRIED OUT USING THE THREE-WAY VENT AND CHARGING ADAPTERS IN PLACE OF THE HOSES. THE USE OF THE ADAPTERS ENTAIL THE ADDITIONAL OPERATION OF PURGING THEIR BRANCH PIPES CONTAINING THE SHUT-OFF COCKS.

WHEN THE ADAPTERS ARE USED FOR TOPPING-UP IT IS NOT NECESSARY TO HAVE THE COUPLING OF THE VENT ADAPTER MATED WITH THE UMBILICAL COUPLING.



SIGHT GLASS
DETAIL A



PRESSURE TESTING THE AIR DUCTING

Fig. 34 Cooling pack servicing diagram
(◄ Mod. No. 1919 ►)

fitted in the T.S., A.M.I. for the purposes of these checks are:-

A variable resistance for simulating the operation of the temperature sensing elements controlling the hot air valve.

Two variable resistances for simulating the operation of the temperature sensing elements controling the STORE BAY and STORE ENGINE BAY temperature gauges on the navigator/bombers panel.

A switch for simulating the operation of the flamestat controlling the overheat shut-off valve.

COOLING SYSTEM

Charging the refrigeration pack

127. To charge a pack in situ the following equipment is required:-

A refrigerant charging trolley Ref.No. 4G/6582. This contains a motor driven vacuum pump, a 0-760 mm. absolute pressure gauge, connecting hoses and Arcton 12 cylinders Ref. No. 71A/340. These cylinders have a 15 lb. Arcton 12 capacity and incorporate a liquid valve and a pressure balance valve. The pressure balance valve is marked GAS. The liquid valve is not marked.

A spring balance suitable for weighing an Arcton cylinder.

A three-way charging adapter Ref. No.26DC/95493.

A three-way vent adapter Ref.No. 26DC/95514.

128. Before the refrigerant charge is introduced, the pack must be evacuated to 8 mm. Hg. absolute. This is carried out with the vacuum pump connected to the liquid receiver and, with the three-way vent adapter linking the inlet side of the compressor to the liquid receiver. The link-up facilitates the evacuation of that part of the circuit upstream of the spring loaded non-return valve in the compressor delivery piping. When the pack is being charged, the liquid receiver is vented to the vapour space in the charging cylinder to facilitate the transfer of liquid from the cylinder.

129. The charging procedure is as follows:-

(1) Check the oil level in the compressor gear box. The correct level is 1/8 in. from the top of the filler plug hole, in the side of the gear box.

(2) Suspend an Arcton 12 cylinder from the spring balance and note the weight. (The cylinder selected must contain at least 5 lb. of Arcton 12).

(3) Remove the caps from the charging and vent valves, on the pack.

(4) Connect the cylinder to the pack as shown in fig.34. The connecting of the three-way vent adapter to the quick release umbilical coupling is effected after lifting the latter from its housing at the front crutch.

(5) Connect the vacuum pump to the shut-off cock of the three-way adapter. Ensure that the gas and liquid valves, on the charging cylinder, are closed.

(6) Start the vacuum pump, open the shut-off cock on the three-way charging adapter, open the charging and vent valves on the pack, open the shut-off cock on the three-way vent adapter and evacuate the system to at least 8 mm. Hg. absolute.

(7) Close the shut-off cock on the three-way charging adapter and disconnect the vacuum pump. Stop the vacuum pump. Check, after not less than 10 minutes, that the vacuum is holding by reference to the pack gauges.

(8) Close the shut-off cock on the three-way vent adapter. This will prevent liquid entering the suction side of the compressor during charging.

(9) Suspend the cylinder, valves down, from some suitable point in the bomb bay roof, as high as possible above the liquid receiver.

(10) Open the liquid valve on the cylinder to allow the refrigerant to flow into the receiver, then, open the gas valve. Close the liquid valve when the liquid level, is 1·6 in. to 2 in. from the bottom of the sight glass.

(11) Open the shut-off cock on the three-way vent adapter to equalise vapour pressures throughout the system.

(12) Close the charging and vent valves on the pack.

(13) Close the gas valve on the cylinder.

(14) Disconnect the vent adapter from the quick release umbilical coupling. Fit the coupling into its housing at the front crutch.

(15) Disconnect the charging and vent equipment. Weigh the cylinder. Refer to (2) and deduce the weight of the refrigerant transferred to the pack. If this is approximately

5lb. the pack is proved to be correctly charged.

(16) Fit the caps on the charging and vent valves. Check these valves for leaks using soapy water or a refrigerant leak detector trolley (para.133 refers).

Topping-up the refrigerant

130. The liquid level in the receiver of a correctly charged pack is between the 1.6 in. and 2 in. marks on the sight glass. A lower level indicates loss through leakage which must be traced and rectified before topping up. A high level is probably due to over filling or the migration of liquid from a store or TSAMI while the umbilicals are mated; migrated liquid in the receiver should return to the store or TSAMI when the pack is started. Excess liquid is to be blown off at the charging valve on the receiver. Topping-up or blowing off may be carried out with the pack running but when topping-up an operating pack, it is necessary to charge until the level is approximately ½ in. above the desired level before shutting off the charging line, after which the level should drop to that required. Topping-up is achieved in the following manner. A Trolley Refrigerant Servicing (78AA/70), having been serviced and filled in accordance with AP 4766G, Vol.1, Book 2, Sect.9, Chap.1, paras 27 and 28, is connected to the servicing valve on the pack via a flexible refrigerant hose. Pressurized freon is fed to the pack and the level controlled by the servicing valve. To top-up proceed as follows:

(1) Remove the end cap and cap nut from the charging valve on the pack

(2) Ensure refrigerant servicing trolley valve R12 is closed and connect flexible refrigerant hose to trolley quick release coupling. Loosely connect (finger tight) the other end of this hose to the charging valve on the liquid receiver.

(3) Wearing protective clothing (goggles and gloves), slowly open trolley valve R12. After ensuring that there is no refrigerant leak from the hoses fully open valve R12.

(4) Loosen the flexible hose connection at the servicing valve and allow refrigerant vapour to purge the hose. Tighten the hose connection (finger tight) at the charging valve.

(5) On the refrigerant servicing trolley close the N2 vent cock and open the N^2 pressure cock to allow the trolley freon system to be pressurised to 190 psi.

NOTE . . .
The pressure should stabilise and remain constant at this value.

(6) Using the 'T' bar open the servicing valve and control the flow of freon into the liquid receiver until the correct level is attained. Close the servicing valve.

(7) On the refrigerant servicing trolley close the N^2 pressure cock and open the N^2 vent cock. When nitrogen ceases to flow from the nitrogen vent line close valve R12.

(8) Disconnect the trolley hose from the flexible refrigerant hose at the quick release coupling. Carefully loosen the other end of this hose at the service valve and allow the freon liquid and vapour to vent before completely removing the hose. Refit the end cap and cap nut to the charging valve and check for leaks, (para.129 (16)).

Testing the refrigeration pack

131. This test is carried out using the T.S., A.M.I. in accordance with S.D.4766D. The test equipment in the T.S., A.M.I. is connected by flexible hoses to the quick release umbilical couplings at the front crutch. The test equipment, incorporating a lagged water bath containing a 2kW immersion heater and an Arcton 12 evaporator coil, simulates the store evaporator system at full heat load conditions. Situated downstream of the evaporator coil is a back pressure valve set to maintain a specified minimum evaporating pressure. At the upstream end of the coil is an expansion valve and a solenoid operated shut-off valve which is energised to open when the immersion heater is switched on. When de-energised, the the solenoid valve shuts off the refrigerant flow, thus enabling the capacity system of an operating pack to be checked. The switching arrangement ensures that the heater is not on during a capacity check. When the heater is switched on, satisfactory operation of the pack is indicated if it extracts heat at a rate which maintains the water bath at a constant specified temperature. To operate the pack, charge air must be supplied to the air starter connection, either from a Blackburn Mk.4 air starter unit incorporating a bleed adapter, or, by running No.3 or No.4 engine (the T.S., A.M.I. is normally positioned in front of the other two engines). To use the air starter unit refer to A.P.4677C, Vol.1 and 6.

WARNING . . .
If while the umbilicals of a static pack are mated with a T.S., A.M.I. (or store), the electrical supply to the pack heater circuit is cut, then the compressor must not be started until the umbilical couplings have been disconnected and the liquid trap cleared of liquid; otherwise, damage due to hydraulicing is likely to result.

To clear the liquid trap, blow off at its bleed adapter until a clear stream of gas emerges. To maintain conditions that will prevent liquid entering the compressor after the trap has been cleared, the operation of connecting the umbilicals to the T.S., A.M.I., the starting and stopping of the pack and then the disconnecting of the umbilicals, must be carried out in accordance with the following procedure. Where this procedure differs from that for the store, the differences are indicated:-

(1) Remove the protection blanks from the pack ram intake and exhaust. Ensure charge air supplies are available for the pack.

(2) Connect the T.S., A.M.I. liquid line hose to the pack delivery umbilical. Use the Tee-pin support bracket, supplied with the hose, to support the hose from the front crutch spigot.

NOTE ...
In respect of a store, neither umbilical would be connected to the store at this stage.

(3) Select REFRIGERATION HEATERS switch to ON. Allow the heaters to operate for at least 5 minutes before carrying out the next operation.

(4) Start the pack. When the pack has operated for approximately 1 minute, connect the T.S., A.M.I. vapour line hose to the pack suction umbilical coupling. Support the hose with the Tee-pin support bracket.

NOTE ...
Operation (4), in the store case, would read: start the pack and, approximately 1 minute later, connect both umbilicals to the store.

(5) Check the liquid level in the pack receiver after approximately 2 minutes running of the pack. The level should be between the 1·6 and 2 in. marks on the sight glass. Bleed off or top-up according to the level indication (para.121).

(6) Carry out the tests outlined in the T.S., A.M.I. schedule.

NOTE ...
During the test, the REFRIGERATION HEATERS switch must remain selected ON so that if the pack has to be stopped before the test is concluded, the heaters will automatically come into operation to maintain the pack in a ready-to-start condition. In the store case, operation (6) will obviously not apply but, the use of the heaters will allow the pack to be safely stopped or started either on the ground or in the air.

(7) Switch off the pack.

(8) Disconnect the umbilical couplings.

NOTE ...
In the store case, any oil collected by the trap during operation is to be bled off as soon as the umbilicals have been disconnected.

(9) Select REFRIGERATION HEATERS switch to off.

(10) Fit dust covers to the aircraft and T.S., A.M.I. halves of the umbilical couplings

Emptying the refrigerant

132. This is carried out by opening the servicing valve and allowing the liquid content to boil off.

WARNING ...
Personnel must not allow liquid refrigerant to contact their skin or severe burns may result. Pipe joints must not be released until the pack is at ambient pressure.

Pressure testing the vapour cycle circuit (fig.34)

133. This test is in two parts: the leak test, (Part A), and the component function-test, (Part B). For the leak test the pack must contain some refrigerant. If the pack is empty, charge with a small amount of Arcton 12 (para.129). During the test, the upstream and downstream sides of the non-return valve in the compressor delivery line, must be linked to ensure pressure equalisation. The link-up can be effected, from the suction umbilical to the servicing vent valve, by using the three-way vent adapter with its cylinder connection blanked, or, if the cylinder happens to be connected, with the gas valve closed. Unless, as a result of charging with a small amount of refrigerant, the three-way vent adapter already contains vapour, it must be purged by allowing vapour, from the umbilical and the servicing vent valve, to escape while tightening the blank. Proceed as follows:-

Part A.

(1) Connect a nitrogen supply to the charging valve on the liquid receiver and raise the system pressure to 225 p.s.i.g.

(2) Check the system for leaks using a refrigerant leak trolley (Ref. No.78AA/119), positioned at a safe distance from the aircraft. Apart from a small leak which may be present at the vent on the underside of the compressor, no leaks are permissible.

(3) Disconnect the nitrogen supply and release the system pressure.

Part B.

(4) Connect a test lamp across the terminals A and B in the high pressure cut-out switch.

(5) Connect a nitrogen supply to both

the charging valve and the pressure reducing section of the air regulating valve, as shown in fig.34. The supply to the regulating valve must be limited to 50 p.s.i. by a pressure reducing valve.

(6) Open the charging valve and raise the system pressure, gradually. Refer to the pack gauges and observe the pressure at which the air regulating valve commences to open. This should be 195-200 p.s.i. Continue to raise the pressure until the pressure switch cuts out. This should occur at $234 {}^{+13}_{-7}$ p.s.i.

(7) Close the charging valve and the cock in the supply line to the charging valve. Disconnect the supply line from the charging valve.

(8) Open the charging valve just sufficient to allow the pressure to escape. As the pressure falls, check the cut-in pressure of the pressure switch and the pressure at which the air regulating valve commences to close. The cut-in pressure should be not less than 10 p.s.i.g., nor more than 70 p.s.i.g., below the cut-out pressure. The air regulating valve should commence closing at 180 ± 5 p.s.i.g.

(9) Disconnect the nitrogen supply from the air regulating valve and connect the coiled pressure pipe.

Pressure testing the air ducting

134. Only the high pressure section of the air circuit of the refrigeration pack is subjected to a static pressure test. This test is as follows:-

(1) Remove the clamps from the pipe joints at the inlet to the turbine of the cold air unit and blank off the duct using blanking assembly Pt.No.U1744.

(2) Blank off the outlet from the air relief valve using blanking assembly Pt.No.U1746.

(3) Remove the expansion unit from the inlet flange of the air regulating valve.

(4) Blank the air regulating valve inlet using blanking plate and adapter assembly Pt.No.U1752.

(5) Connect an air supply to the adapter and apply a pressure of 58 p.s.i. Maintain this pressure for 60 sec.

(6) Shut off the air supply and allow the pressure in the ducting to fall by leakage through joints and connections. Check the time for the pressure to fall from 40 p.s.i.g. to 20 p.s.i.g. This must not be less than 10 seconds. If leakage rate is greater than this, check all joints and rectify as necessary.

(7) Remove blank from the relief valve, raise pressure slowly and check the pressure at which the valve relieves. This should occur at 55 ± 5 p.s.i.g.

(8) Reduce the pressure in the ducting to atmospheric, remove the blanking plates, fit the expansion unit and remake the joints.

RELEASE SYSTEMS

Setting the control unit micro switches

135. For this operation, which is carried out after removal of the unit to a servicing bay, refer to fig.35.

Checking the operation of the control unit micro switches

136. When the safety lock lever, in the control unit, is depressed by hand, check that:-

(1) Initial depression will cause the green light, adjacent to the safety lock switch on panel 6P, to be extinguished.

(2) Full depression will cause the amber lamp, on panel 6P, to illuminate ('Unlock') micro switches operated).

(3) When the lever is released, the red light becomes extinguished and the green lamp illuminates ('Lock' micro switches operated).

Setting the release mechanism in the retracted position

137. For this operation refer to fig.36.

Checking the operation of the mechanical release system (fig.37)

138. For this check ensure that:-

The release cables and the electrical actuator have been correctly adjusted (fig.36).

The micro switches in the release control unit have been correctly set (fig.35).

Proceed as follows:-

(1) Refer to fig.38 and fit the gauge (Part No.U1887).

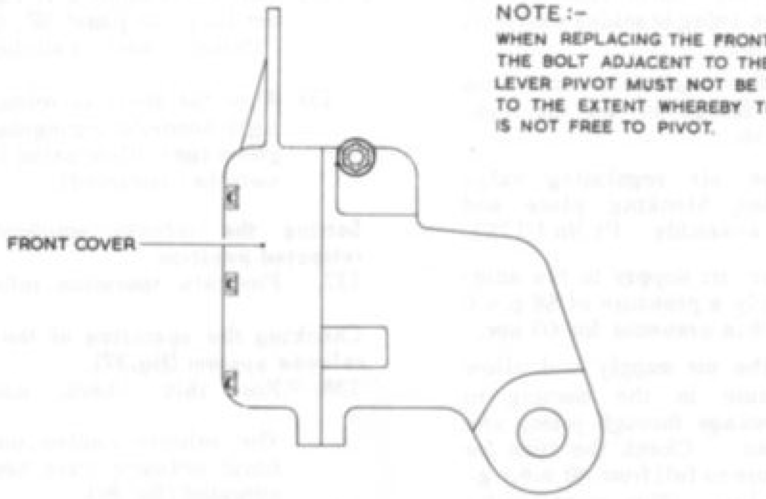
(2) Connect the electrical supplies to the aircraft and check that the green lamp, on panel 6P, is illuminated (Safety lock "in").

(3) Remove the ground lock pin from the electrically-actuated push rod.

(4) Select the safety lock switch on panel 6P to UNLOCK. The green must extinguish immediately and when the actuator begins to extend the green light flashes on and then goes out. When the actuator cuts out, check that the amber lamp, on panel 6P, is illuminated and that a gap of 0.05 to 0.06in. exists between the control unit body and the guide of the safety lever stop nut. This will indicate the satisfactory operation of the 'unlock' micro switches in the control unit.

V.2.1A. 1162

NOTE:-
WHEN REPLACING THE FRONT COVER THE BOLT ADJACENT TO THE SAFETY LEVER PIVOT MUST NOT BE TIGHTENED TO THE EXTENT WHEREBY THE LEVER IS NOT FREE TO PIVOT.



SEQUENCE OF OPERATIONS

(1) REMOVE THE FRONT COVER OF THE UNIT TO GAIN ACCESS TO THE MICRO SWITCHES.

(2) CONNECT TEST LAMPS AND A SUITABLE ELECTRICAL SUPPLY IN ORDER TO CHECK THE OPERATION OF THE MICRO SWITCHES.

(3) SLACKEN THE STRIKER PLATE RETAINING SCREWS TO ALLOW THE ELONGATED SCREW HOLES TO GIVE PLATE MOVEMENT.

(4) ADJUST THE STRIKER PLATE SO THAT THE 'LOCK' MICRO SWITCHES JUST OPERATE. TIGHTEN AND WIRE LOCK THE PLATE RETAINING SCREWS.

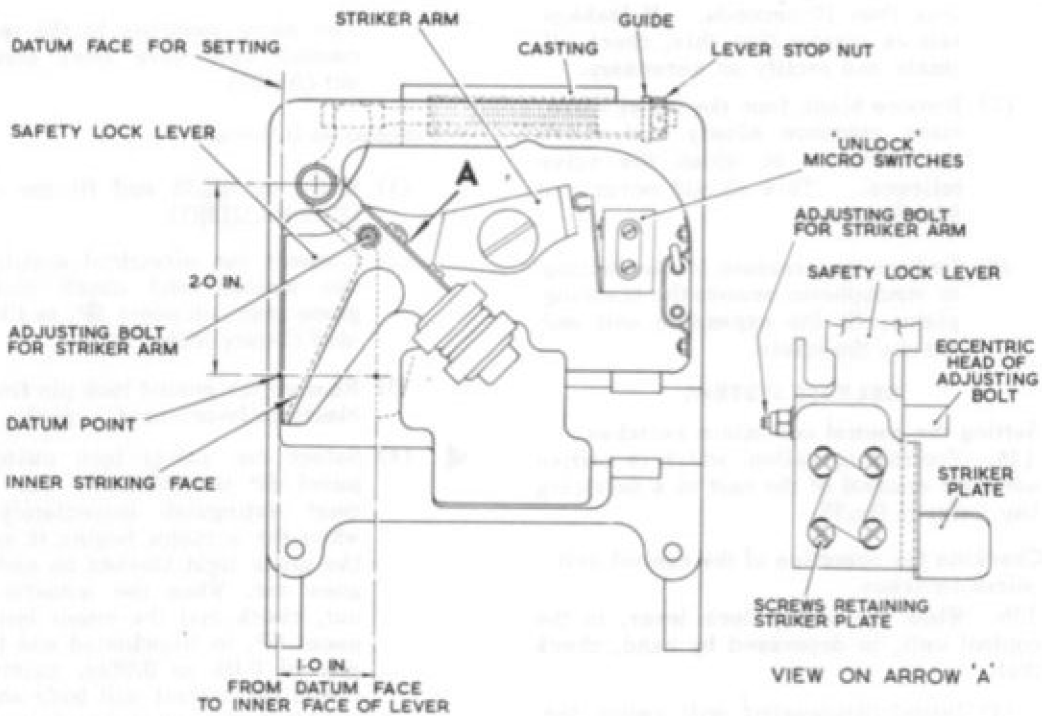
(5) AT A POINT TWO INCHES FROM ITS PIVOT, DEPRESS THE SAFETY LEVER UNTIL ITS INNER STRIKING FACE IS ONE INCH FROM THE DATUM FACE. IN THIS POSITION ADJUST THE STRIKER ARM SO THAT THE 'UNLOCK' MICRO SWITCHES JUST OPERATE. SECURE THE STRIKER ARM ADJUSTING BOLT WITH ITS LOCK NUT.

(6) WITH THE LEVER RETAINED IN THE POSITION AS IN (5) CHECK THAT THE GAP BETWEEN THE STOP NUT GUIDE AND THE CASTING IS 0.05 IN. TO 0.06 IN. IF NECESSARY ADJUST THE STOP NUT.

(7) RELEASE THE LEVER.

(8) CHECK THE ACTION OF THE SWITCHES THROUGH AT LEAST FOUR COMPLETE OPERATIONS OF THE LEVER.

(9) DISCONNECT THE TEST EQUIPMENT AND REPLACE THE FRONT COVER.



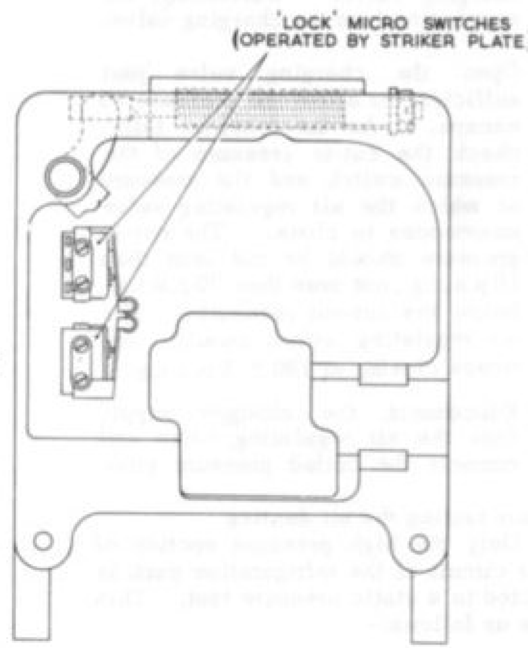
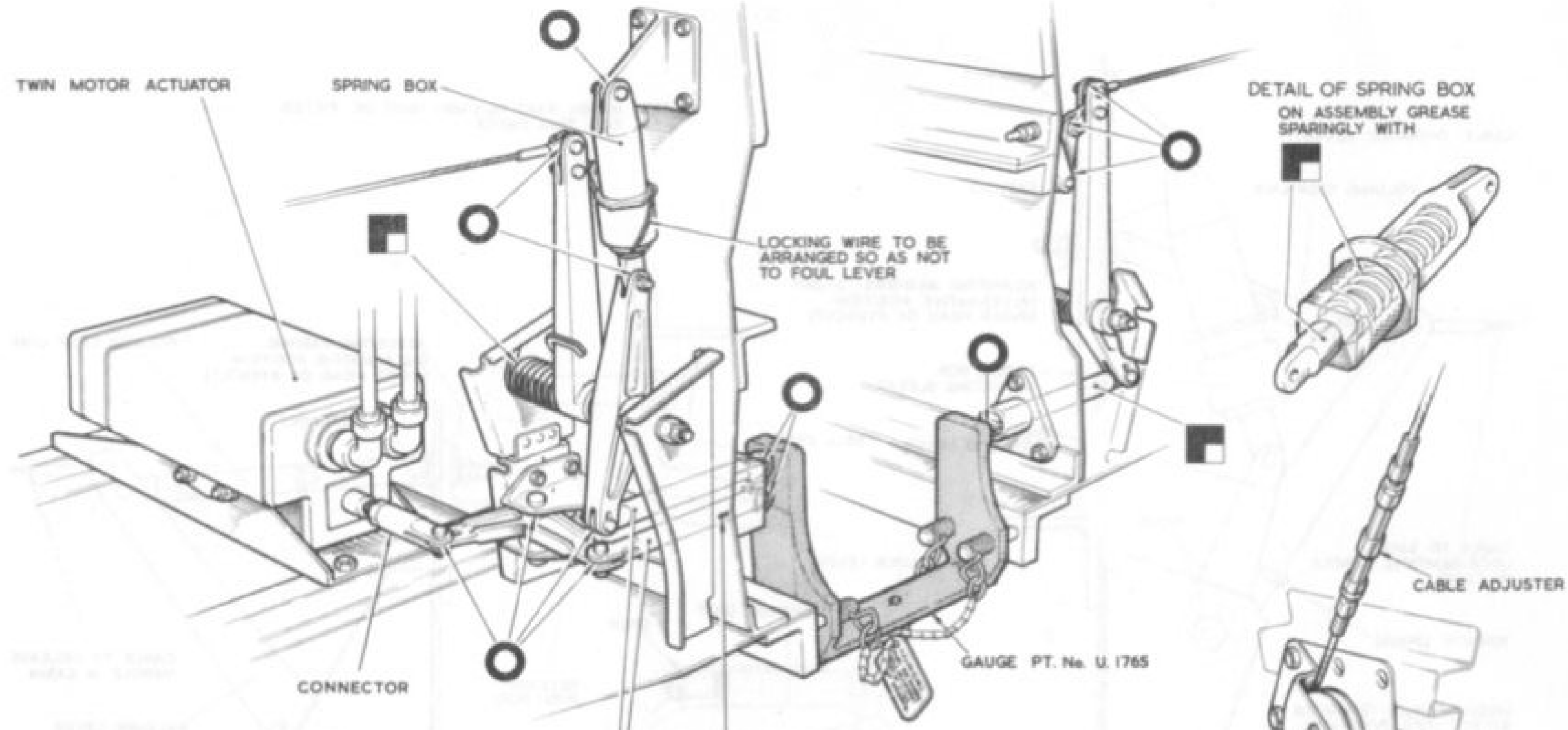


Fig. 35. Setting the release control unit micro switches



SEQUENCE OF OPERATIONS

1 INSERT GAUGE AND SECURE INTO POSITION USING THE PIP PINS PROVIDED. THE ROLLERS ON THE ENDS OF THE THREE PUSH RODS MUST NOT FOUL THE GAUGE DURING THIS OPERATION. WHEN SECURE, ENSURE THE SHOULDERS OF THE PIP PINS ARE HARD AGAINST THE GAUGE.
2 ADJUST CABLE TURNBUCKLES UNTIL THE ROLLERS ON THE MANUAL RELEASE ROD AND MANUAL B.R.S.L. PUSH ROD JUST CONTACT THE GAUGE.
3 WITH GROUND LOCK PIN REMOVED ADJUST THE ELECTRICALLY-OPERATED ACTUATOR EYE-END UNTIL THE GAP BETWEEN THE PUSH-ROD ROLLER AND THE GAUGE DOES NOT EXCEED 0·015 IN.
4 REMOVE THE GAUGE AND REPLACE THE GROUND LOCK PIN.

NOTE

LIGHT CONTACT OF THE ROLLER WITH THE GAUGE IS PERMISSIBLE, BUT OVER-ADJUSTMENT WILL CAUSE MISALIGNMENT AND JAMMING OF THE GAUGE.

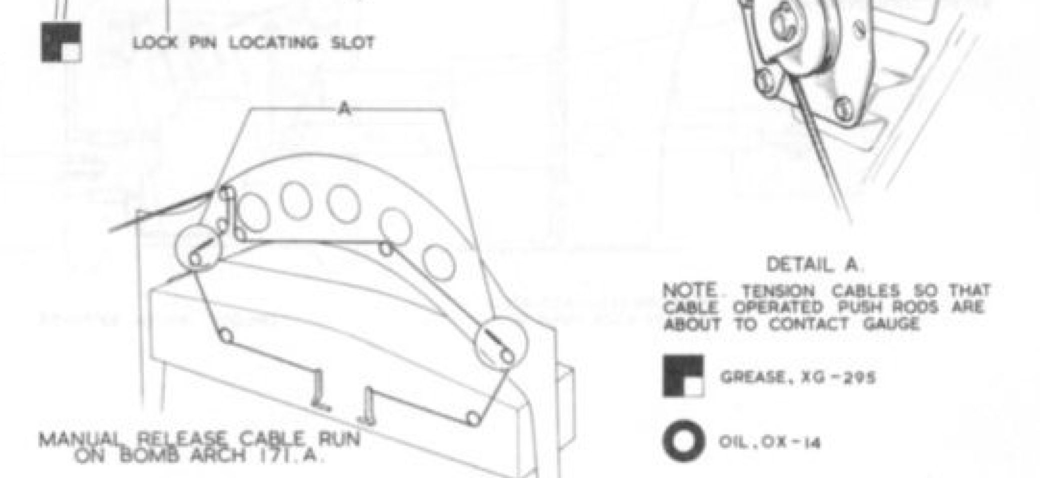


Fig. 36. Setting of release mechanism in the retracted position.

V.2.1A. 1163

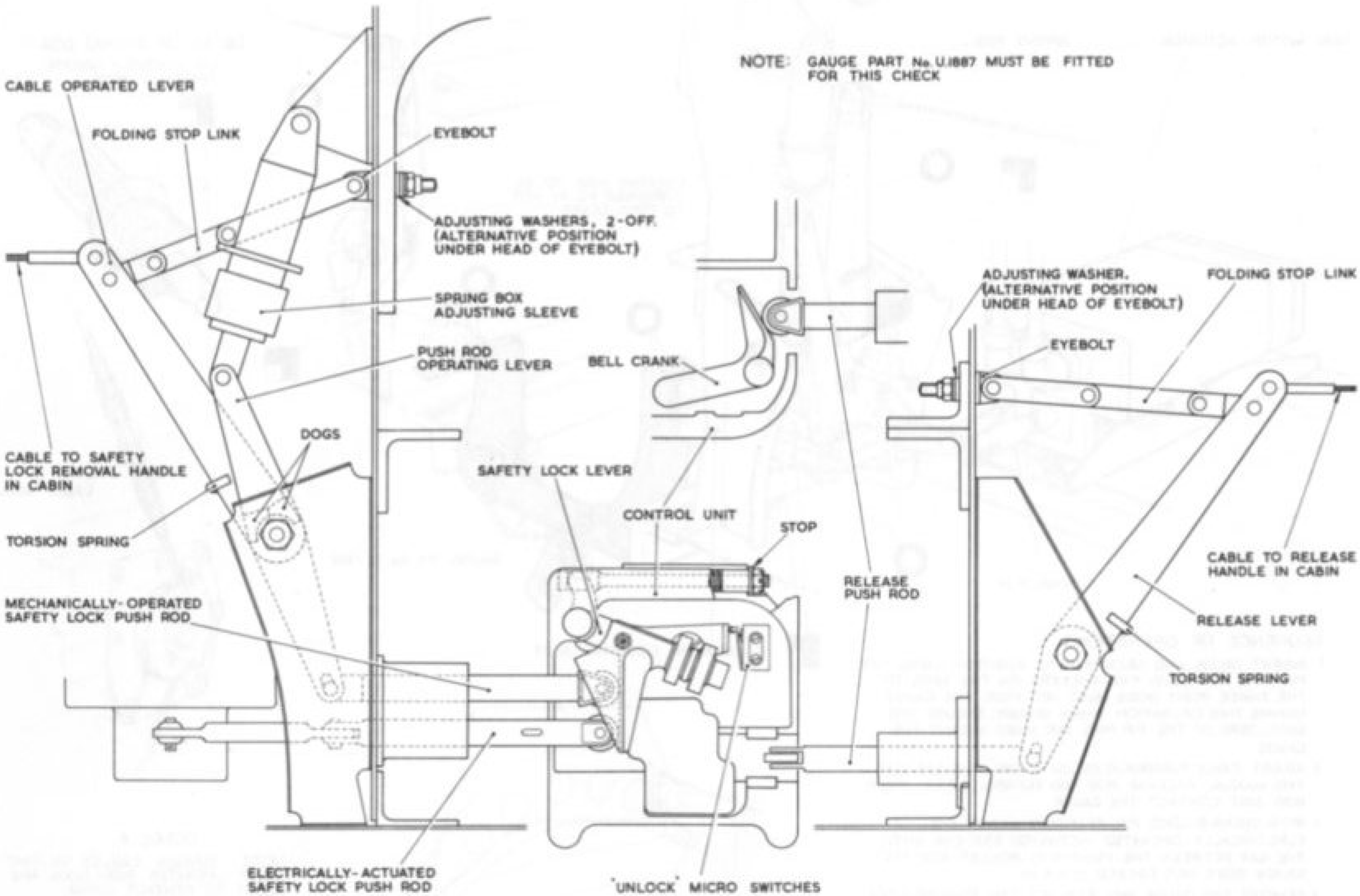


Fig. 37 Checking the operation of the mechanical release system.

V.2.1A. 1164

V.2.1A. 1165

(5) Select the safety lock control switch to the 'lock in' position and check that the amber light becomes extinguished as the actuator starts to retract. As the actuator continues to retract check that the green lamp becomes illuminated. When the actuator cuts out, check that the shoulder, at the roller end of its push rod, is not retracted hard against the guide block.

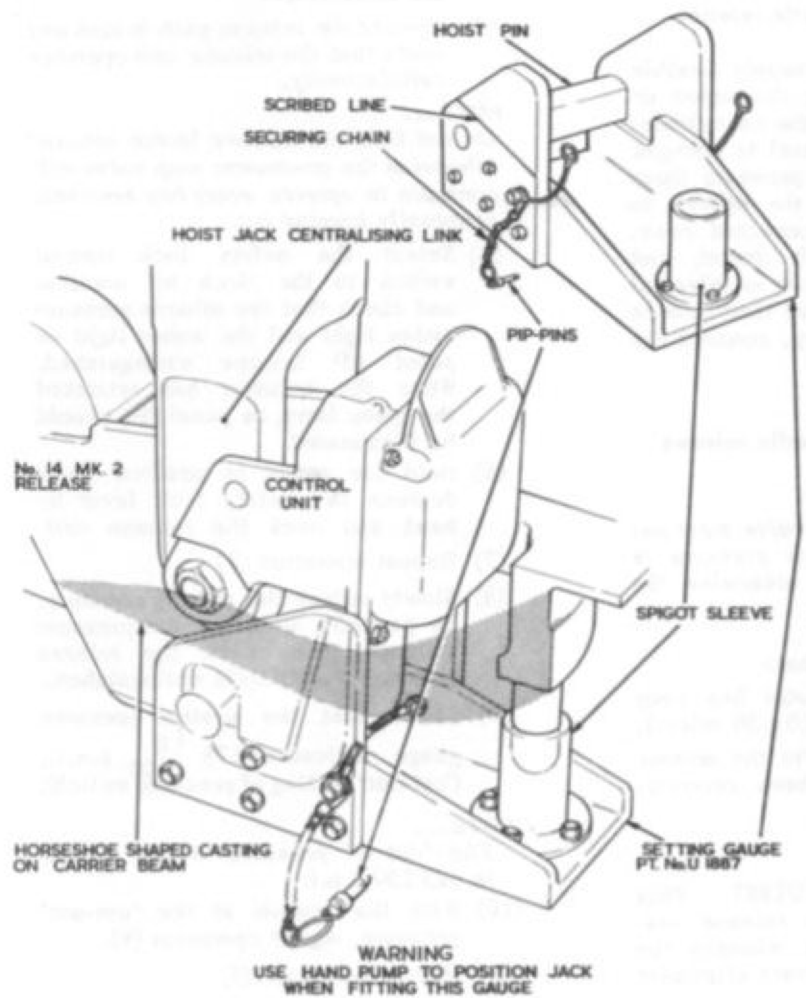
(6) Extend the safety lock push rod by operating the safety lock removal handle in the cabin roof, then allow the handle to be withdrawn into the roof by the spring-loaded lever in the carrier beam. The push rod will remain extended due to the spring box. The amber lamp, on panel 6P, should be illuminated.

(7) Check that the safety lever stop is in contact with the body of the control unit. This setting is normally obtained with the spring box adjusting sleeve tightened hard on to the box body.

(8) Again operate the safety lock removal handle, this time retaining it at the limit of travel. Check that the stop link allows the dogs on the levers to just contact one another. Stop link adjustment is effected by the interchange of the adjusting washers between the normal and alternative position.

(9) Allow the safety lock handle to be withdrawn into the roof, then operate the release handle to action the release unit. If necessary the reach of the release push rod can be extended by transferring its stop link adjusting washer to the alternative position.

(10) Remove the gauge and set the safety lock push rod in the retracted position. Wire lock the



SEQUENCE OF OPERATIONS

(1) DISCONNECT THE PNEUMATIC AND ELECTRICAL LEADS FROM THE CONTROL UNIT.

(2) ENSURE THE PUSH RODS ARE IN THE RETRACTED POSITION.

(3) WITHDRAW THE WEDGE AND PARTIALLY EXTEND THE JACK.

(4) OFFER UP THE GAUGE SO THAT ITS HOIST PIN IS ENGAGED IN THE JAW SLOT OF THE RELEASE UNIT AND THE SPIGOT SLEEVE IS ALIGNED WITH THE SPIGOT.

(5) FULLY DEPRESS THE SAFETY LOCK LEVER IN THE CONTROL UNIT, THEN COCK THE RELEASE TO HOLD THE GAUGE.

(6) RETRACT THE JACK UNTIL THE GAUGE SECURING CABLES CAN BE ATTACHED BY THE PIP-PINS TO THE HORSE SHOE SHAPED CASTING ON THE CARRIER BEAM.

(7) FURTHER RETRACT THE JACK UNTIL THE SCRIBED LINE ON THE GAUGE IS ALIGNED WITH THE LOWER EDGE OF THE HORSESHOE CASTING.

(8) SCREW HOME THE LOCKING WEDGE, ENSURING THAT THE WEDGE IS IN CLOSE CONTACT WITH ITS SLIDE, VISUALLY CHECK THAT THE TOP FACE OF THE WEDGE IS IN CONTACT WITH THE UNDER SIDE OF THE JACK RAM TOP COLLAR.

NOTE ...
AFTER THE GAUGE IS FITTED THE CONTROL UNIT SHOULD BE IN DATUM ALIGNMENT WITH THE ROLLER-ENDED PUSH RODS IN THE CARRIER BEAM. CHECK THIS BY PARTIALLY EXTENDING THE RELEASE PUSH ROD IN ORDER TO GAUGE THE POINT WHERE ITS ROLLER WILL MAKE CONTACT. THE CONTACTING POINT SHOULD BE ON THE HORIZONTAL CENTRE LINE OF THE RELEASE BELL CRANK IN THE CONTROL UNIT. THE GAUGE PREVENTS MOVEMENT OF THE RELEASE ASSEMBLY ABOUT THE UPPER ATTACHMENT OF THE CENTRALISING LINK.

Fig.38. Fitting of gauge for checking the operation of the mechanical release system.

spring box so as not to foul the lever. If the spring box adjusting sleeve is set in a position other than tight on to the box body, it must be positively locked both ways.

Pressure testing the pneumatic release panel

139. For this test the air supply flexible hose is disconnected from the union on top of the carrier beam and the air cylinder of the pneumatic release panel is charged to 1,500 p.s.i. At this pressure there must be no leakage from the system or from the end of the disconnected hose. Operate the release push switch and check that a short burst of air is released from the end of the hose and then ceases completely. If satisfactory, connect the hose to the union.

Functional test of the pneumatic release system

WARNING...

The Mk.4 pneumatic stop valve must not be operated if the system pressure is less than 300 p.s.i., otherwise the valve will be damaged.

140. For this test ensure that:-

The electrical actuator has been correctly adjusted (fig.36 refers).

The micro switches in the release control unit have been correctly set (fig.35 refers).

Proceed as follows:-

(1) Fit the gauge Pt.No.U1887. This will firmly hold the release assembly in a position whereby the control unit is in correct alignment with the push rods.

(2) Charge the pneumatic system with dry air to a pressure of 1,500 p.s.i.

(3) Select the safety lock control switch to UNLOCK and check that the electrically-actuated push rod extends, causing the green light on panel 6P to be extinguished. When the actuator cuts out, check that the amber lamp, of the release pressure indicator on panel 9P and the amber lamp on panel 6P, are illuminated.

(4) Operate the release push button and check that the release unit operates satisfactorily.

NOTE...

Do not hold the release button pressed otherwise the pneumatic stop valve will continue to operate every two seconds; eventually burning out.

(5) Select the safety lock control switch to the 'lock in' position and check that the release pressure amber light and the amber light on panel 6P become extinguished. When the actuator has retracted the green lamp, on panel 6P, should be illuminated.

(6) Hold the gauge in position, fully depress the safety lock lever by hand and cock the release unit.

(7) Repeat operation (3).

(8) Slowly reduce the system pressure, by partially operating the pressure release cock, until the release pressure amber light extinguishes.

(9) Check that the system pressure gauge indicates $575\ {}^{+0}_{-100}$ p.s.i., ('cut-out' setting of pressure switch).

NOTE...

The 'cut-in' pressure of the switch is 625 ± 50 p.s.i.

(10) With the system at the 'cut-out' pressure, repeat operation (4).

(11) Repeat operation (5).

(12) Remove the gauge and charge the system to 1500 p.s.i.

Renewing the alumina

141. The operation of renewing the alumina in the pneumatic release system is carried out at the specified servicing period as follows:-

(1) Operate the pressure release cock and completely discharge the system.

(2) Remove the dehydrator cylinder from the panel.

(3) Hold the body of the cylinder in suitable clamps.

(4) Unscrew and remove the inlet and outlet end connections from the cylinder and discard the bonded seals. If necessary, clean the filters in the end connections.

(5) Empty the cylinder and examine the interior for moisture and corrosion. Remove moisture by blowing through with warm air. A corroded cylinder must be renewed.

(6) Lightly smear two new bonded seals (A.G.S.1186/D) with silicone grease XG-315 and fit one to each end connection.

(7) Fit one end connection to the cylinder applying a torque of 40 lb. ft.

(8) Place the new alumina content of a container Ref.No.27VA/5911) in a 10-16 mesh sieve. Waft the alumina pellets with dry air or nitrogen whilst gently shaking the sieve. This will remove loose particles and dust.

NOTE...

To ensure that sufficient alumina is available, the content of a new container is slightly in excess of the capacity of the dehydrator. The content must not be regarded as a measured charge.

(9) Fill the cylinder with the alumina pellets, ensuring sufficient space is left to accommodate the end connection without crushing the pellets. Gently shake the cylinder to bed-in the pellets.

(10) Fit the other end connection as in

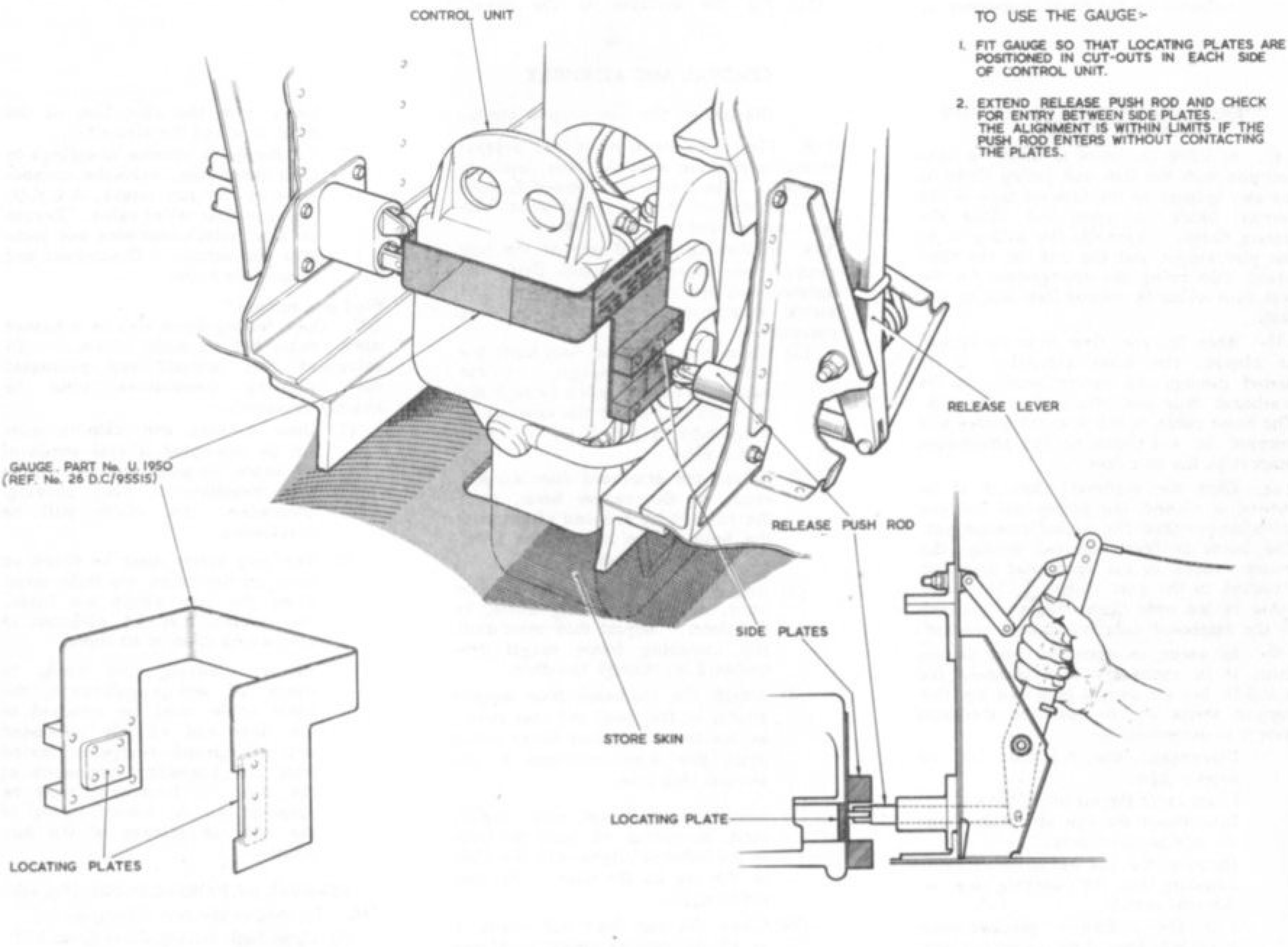


Fig. 39 Checking the release mechanism alignment after crutching a store.

(7). During this operation it will be necessary to gently shake the cylinder to facilitate movement of the pellets to house the extension of the end connection.

(11) Fit the cylinder to the panel.

(12) Charge the system to 1,500 p.s.i. and pressure test as in para.139.

OPENING AND CLOSING THE FAIRING DOORS (fig.40)

142. A 3,250 lb. hoist is used, in conjunction with the link and pulley fitted to the two spigots on the forward face of the carrier beam, to open and close the fairing doors. Normally the pulley is on the port spigot and the link on the starboard, this being the arrangement for the port door which is opened first and closed last.

143. When the port door is to be opened or closed, the hoist extension is inserted through the centre access in the starboard door and attached to the link. The hoist cable is led over the pulley and secured by a Pip-pin to the attachment bracket on the port door.

144. When the starboard door is to be opened or closed, the pulley and link are interchanged from the normal arrangement. The hoist is then inserted through the centre access in the open port door and attached to the port spigot. The hoist cable is led over the pulley and secured to the starboard door attachment bracket.

145. In order to open the port fairing door, it is necessary to disconnect the A.L.S.U. hot air supply pipe and the five support struts and to open the starboard door it is necessary to:-

Disconnect the A.L.S.U. hot air supply pipe.

Disconnect the air relief valve.

Disconnect the ram air intake from the refrigeration pack.

Release the hot air quick-release coupling from its mounting ring, at the rear crutch.

Lift the hydraulic quick-release couplings from their mountings and secure to the crutching frame.

REMOVAL AND ASSEMBLY

Disconnect the five support struts.

146. The disconnection of the support struts is effected with the hoist cable in tension. The doors are allowed to open under control of the hoist and when fully open are secured by the jury struts.

138. Following the release of the jury struts, the doors, starboard first, are hoisted shut and connected to the support struts in accordance with the following procedure:-

(1) Close the starboard door until the store locating spigot, on the carrier beam, protrudes through the door 2·3 in., or, in the case of an early type spigot, 2 in. (Detail A, fig.40).

(2) Adjust the starboard door support strut, on the carrier beam, until the hole in its fork-end aligns with the hole in the lug on the door. Fit the securing pin.

(3) Attach the starboard door support strut, on the crutching frame, to the door. Adjust this strut until the crutching frame spigot protrudes 2 in. through the door.

(4) Attach the starboard door support struts, at the front and rear spars, to the door. Adjust these struts until the door conforms to the aircraft skin line.

(5) Adjust the starboard door support strut, at station 44, until the hole in its fork-end aligns with the hole in the lug on the door. Fit the securing pin.

(6) Close the port door and attach it to all its support struts. Adjust these struts until the door conforms with the skin line of the other door and the aircraft.

(7) Fit the quick release couplings to their mountings, make the connections to the ram intake, A.L.S.U. piping and air relief valve. Ensure all strut attachment pins and locknuts are secure. Disconnect and remove the hoist.

Wind precautions

147. Open fairing doors can be a hazard when subjected to side winds. To safeguard both aircraft and personnel the following precautions must be strictly observed:-

(1) Door opening and closing must not be attempted if side winds of 30 knots or more are blowing in the direction of door opening. Otherwise, the winch will be overloaded.

(2) The jury struts must be fitted as soon as the doors are fully open. When the jury struts are fitted, the aircraft may be picketed in side winds of up to 40 knots.

(3) Before removing jury struts in winds of any significance, the hoist cable must be attached to the door and slightly tensioned and all ground equipment moved from the immediate surrounds of the door. Personnel must be prepared for an inward sweep of the door on release of the jury struts.

REMOVAL OF FAIRING DOORS (fig.42)

148. To remove the port fairing door:-

(1) Open both fairing doors (para.142).

(2) Ensure all electrics are OFF.

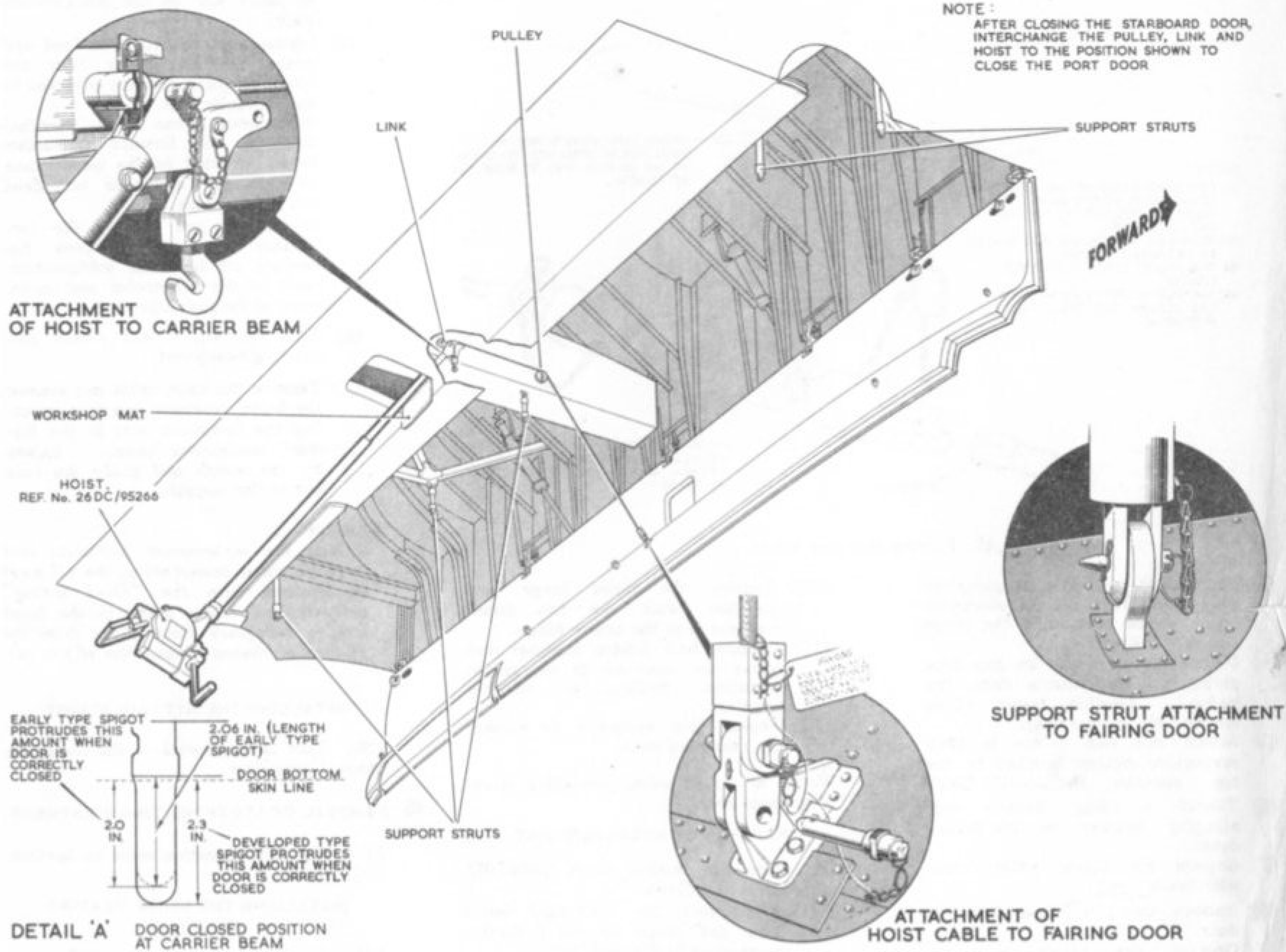


Fig. 40. Fairing door closing.

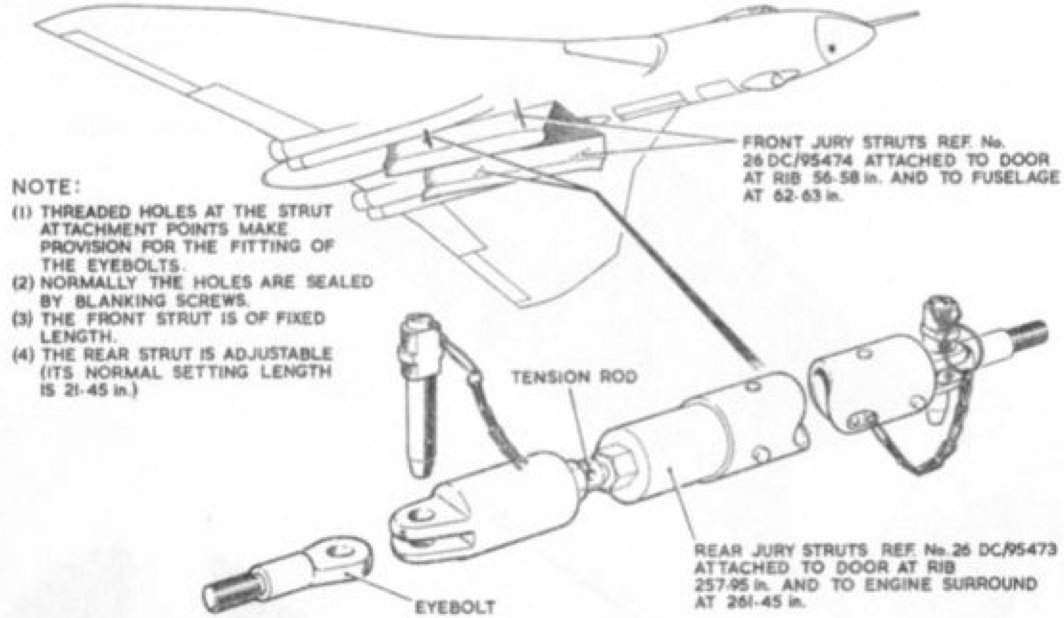


Fig.41 Fairing door jury struts

(3) Disconnect, at the appropriate plug connectors, all the electrical leads which pass over the hinge line of the door.
(4) Disconnect, from the fin gap door piping on the fairing door, the hydraulic flexible hoses which run from the carrier beam.
(5) Attach the two hoists to their respective anchor bracket by the top sheaths Ref.No.4GC/6306.
(6) Thread a sling through each slinging bracket on the fairing door.
(7) Engage the hoists cable hooks with the slings.
(8) Remove the jury struts from the door.
(9) Operate the hoists until the cables are just taut.
(10) Remove the three hinge pins together with the two thrust washers from the centre hinge.
(11) Operate both hoists together and lower the door on to the transportation trolley, or suitable trestles.
(12) Repeat this operation to remove the starboard door.

NOTE...
Refer to fig.43 when installing a replacement door.

REMOVAL OF HYDRAULIC UNIT

149. Open the fairing doors (para.142) and proceed as follows:-
(1) Disconnect the electrical leads from the plugs on the hydraulic pack electrical panel 29P.
(2) Disconnect from the hydraulic unit the two electrical leads which run to panel 93P on the refrigeration pack.
(3) Disconnect the hydraulic feed and return flexible pipes from the Avery coupling bracket adjacent to the hydraulic unit.
(4) Disconnect, from the terminal block on the forward mechanism beam, the lead to the temperature bulb in the hydraulic unit feed and return block.
(5) Disconnect and remove the two flexible pipes which pass the cooling air from the refrigeration pack to the oil cooler and motor pump of the hydraulic unit.
(6) Refer to fig.44 and attach the hoisting equipment.
(7) Tension the hoist cable and remove the bolts, washers and nuts securing the hydraulic unit to the forward mechanism beam. Lower by the winch and guide the unit out of the aircraft.

WARNING...
Unless the replacement hydraulic unit is to be fitted immediately, the oil must be drained from the "fixed fitting" delivery and return pipes in the bomb bay, to safeguard these pipes from the effects of thermal expansion of the oil.

INSTALLING THE HYDRAULIC UNIT

150. This is a reversal of the foregoing removal procedure.

REMOVAL OF STORE HEATING EQUIPMENT

151. For this operation refer to Section 2, Chap.5A.

INSTALLING THE STORE HEATING EQUIPMENT

152. For this operation refer to Section 2, Chap.5.

REMOVAL OF COOLING PACK

153. The procedure for removing the cooling pack is detailed on fig.45.

INSTALLING THE COOLING PACK

154. For this operation reverse the removal procedure. When making the connection to the bleed air ducting, refer to para.125.

REMOVAL OF RELEASE AND CONTROL UNIT ASSEMBLY

155. The No.14 Mk.2 release unit and its associated control unit are joined by the release link and secured to the hoist jack centralising link by the same bolt and pin. Both units are, therefore, removed together. As soon as possible after removal, the bolt and pin should be fitted to hold both units in correct relationship for storage. The removal procedure is as follows:-

(1) Check that the roller-ended push rods are fully retracted.

(2) Withdraw the wedge and extend the the jack using the hand pump.

(3) Remove the banjo bolt and sealing washers from the pneumatic pipe connection on top of the release unit.

(4) Disconnect the two electrical plugs from the sockets in the guide arm.

(5) Support the control unit and the release unit, then remove the bolt and pin attaching both units to the hoist jack centralising link.

(6) Lower the assembly on to a platform and fit the bolt and pin.

FITTING THE RELEASE AND CONTROL UNIT ASSEMBLY

156. This is the reversal of the foregoing para. with the following additional checks.

(1) Check the action of the micro switches in the control unit (para.136).

(2) Check the action of the release, both pneumatically and manually (para.138 and 140).

REMOVAL OF CARRIER BEAM

157. Open the fairing doors (para.142) and referring to fig.47 attach the two hoists. Proceed as follows:-

(1) Disconnect, from the top rear face of the beam, the two flexible hoses of the A.L.S.U. heating supply piping.

(2) Disconnect the manual release cables at the turnbuckles located in bomb arch 171.842A. Stow the cable ends.

(3) Disconnect the electrical supply leads from the plug and socket brackets on the forward face of the beam.

(4) Disconnect, at the appropriate Avery couplings, the twelve flexible hoses of the fin gap door and hoisting system piping to the beam.

(5) Disconnect the two horizontal stabilizing struts from both the beam and the crutching frame.

(6) Tension the hoist cable to take the weight of the beam, then remove the shouldered bolts connecting the suspension links to the beam.

(7) Operate both hoists together and lower the beam out of the aircraft.

INSTALLING THE CARRIER BEAM

158. The procedure for installing the beam is the reversal of that in para.157. Before connecting the suspension links to the beam, smear the shanks of the shouldered bolts with anti-seize compound ZX-28 Use locating bullets (Ref. No.26DC/95502) to facilitate entry of the bolts. When the fitment of the beam has been completed, place the aircraft in rigging position and carry out the adjustment of the suspension link stop bolts (fig.47 refers)

REMOVAL OF HOIST JACK

159. For this operation the release assembly must be removed from the jack ram, and the carrier beam must be removed from the aircraft. It is usually convenient to remove the release assembly before the carrier beam is removed from the aircraft. Proceed as follows:-

(1) Check that the three roller-ended push rods are fully retracted.

(2) Withdraw the locking wedge.

(3) Partially extend the hoist jack to allow easy removal of the release assembly.

(4) Remove the release assembly (para.155).

(5) Remove the carrier beam from the aircraft, (para.157).

(6) Remove the guide bracket and arm,

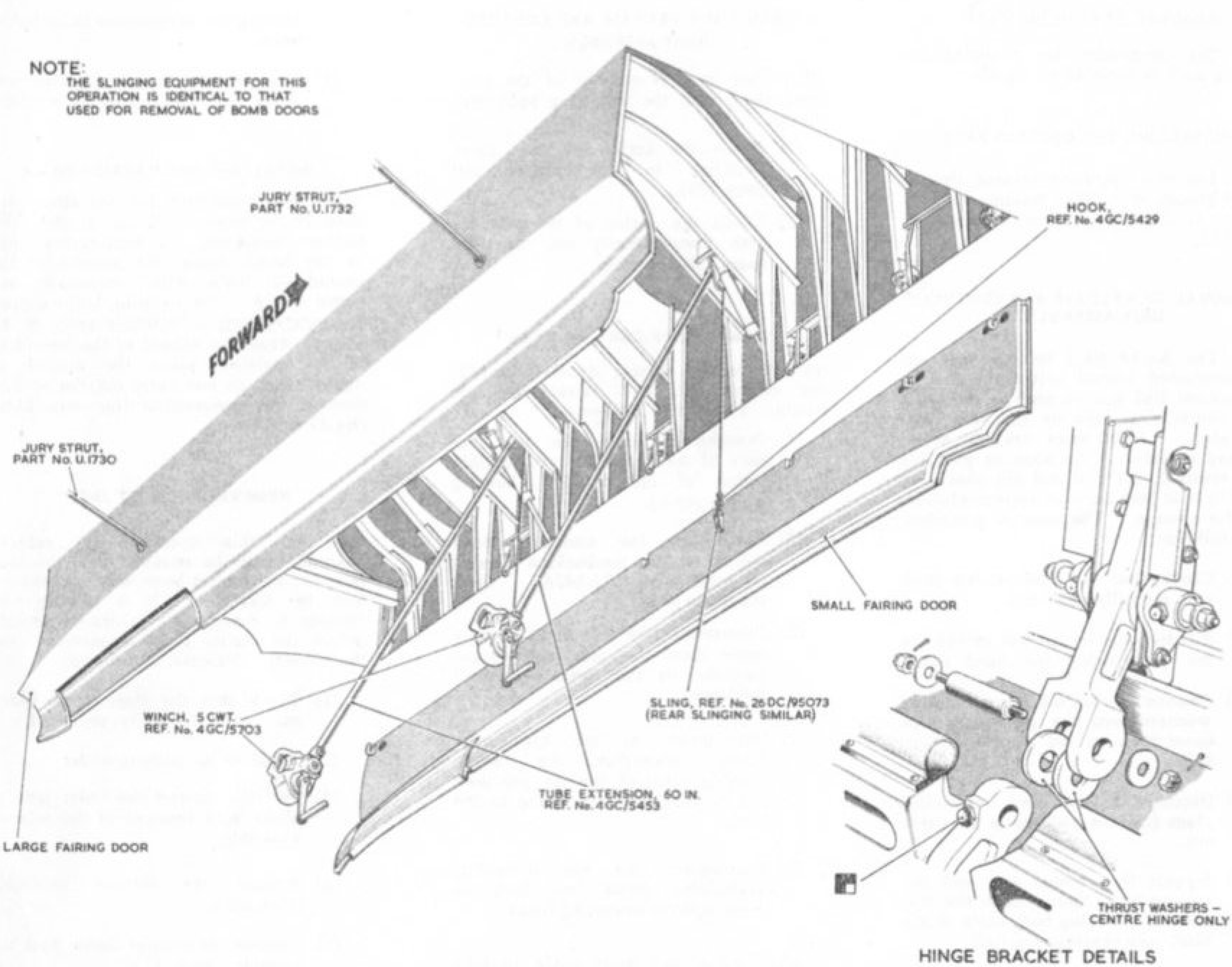


Fig. 42. Fairing door removal

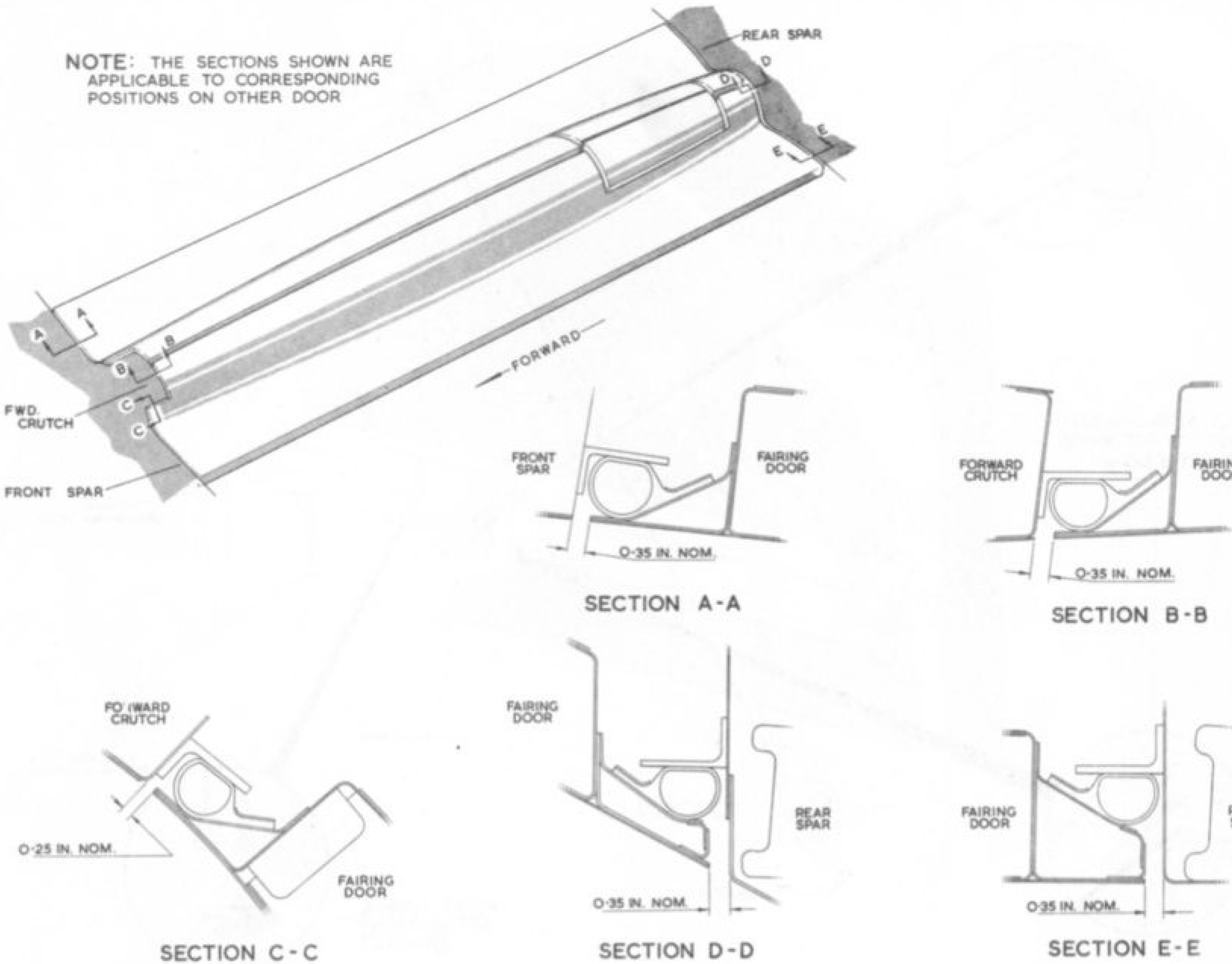


Fig. 43. Fitting of fairing doors.

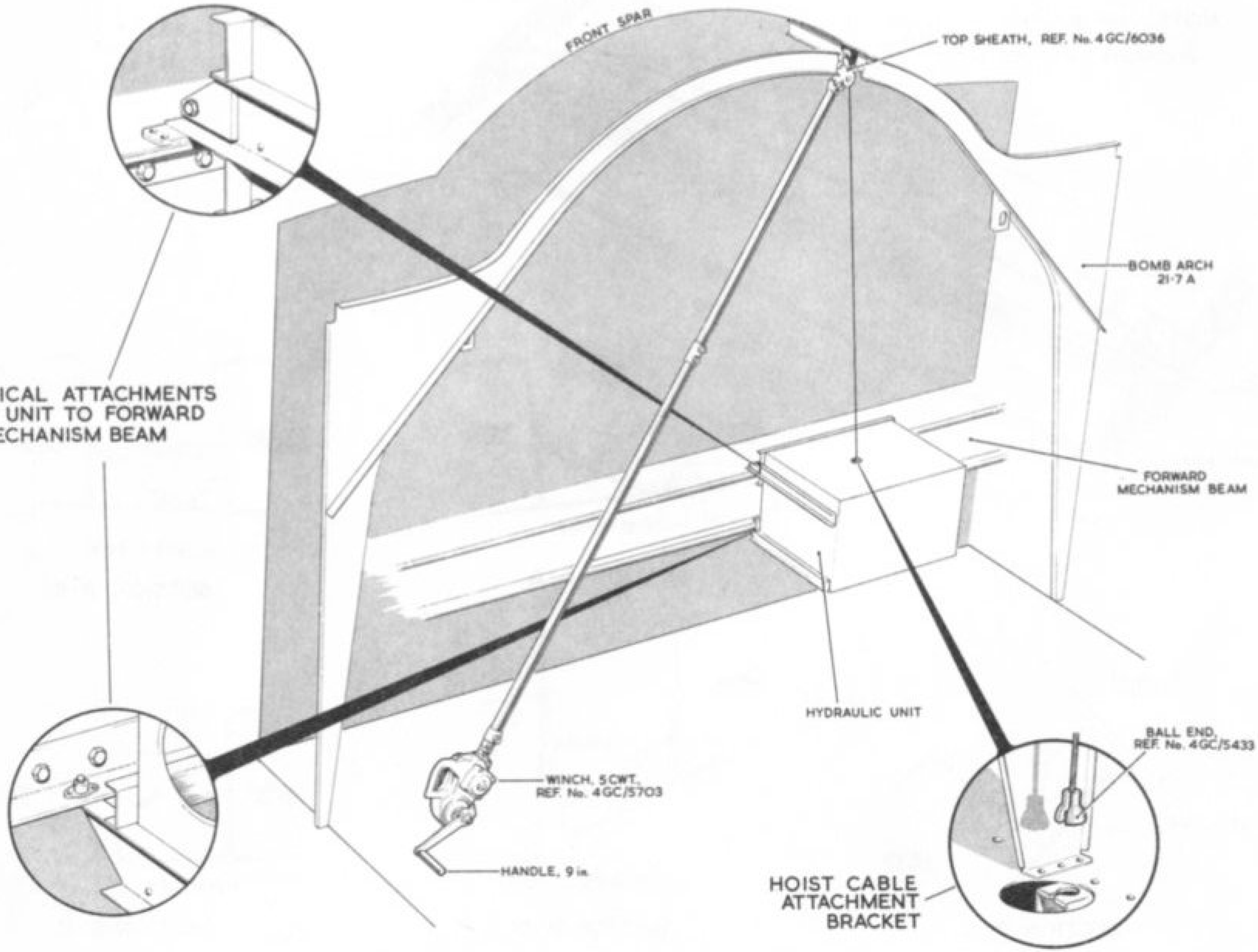
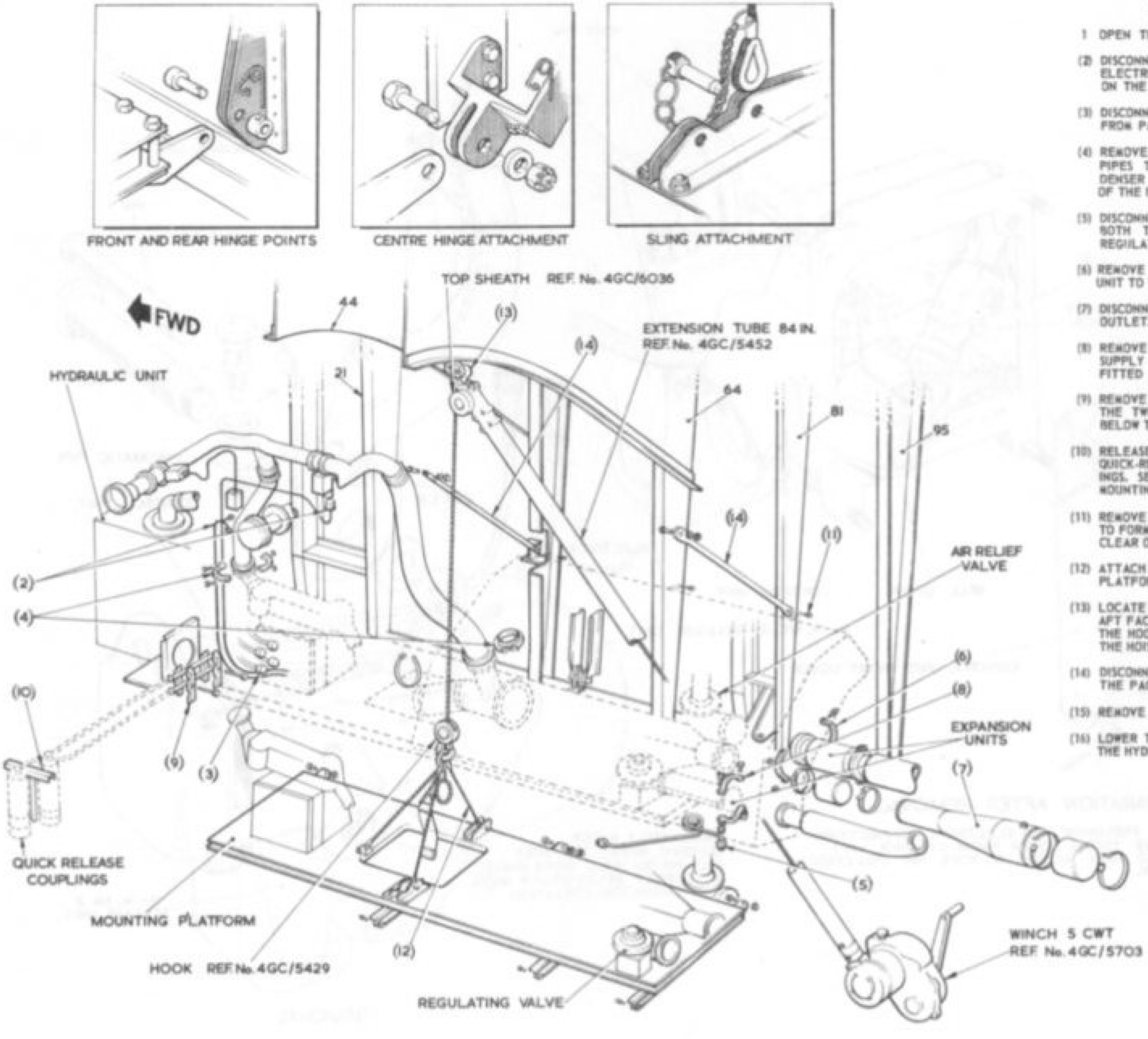


Fig. 44. Removal of hydraulic unit.

RESTRICTED



SEQUENCE OF OPERATIONS

1 OPEN THE FAIRING DOORS

(2) DISCONNECT FROM THE HYDRAULIC UNIT THE ELECTRICAL CABLES WHICH RUN TO PANEL 93P ON THE COOLING PACK.

(3) DISCONNECT THE FOUR ELECTRICAL PLUGS FROM PANEL 93P.

(4) REMOVE THE CLIPS SECURING THE AIR COOLING PIPES TO THE FORWARD END OF THE CONDENSER AND TO THE BRANCH DUCT FORWARD OF THE INTERCOOLER.

(5) DISCONNECT THE COILED PRESSURE PIPE FROM BOTH THE CHARGE AIR DUCTING AND THE REGULATOR VALVE.

(6) REMOVE THE CLIPS SECURING THE EXPANSION UNIT TO THE AIR RELIEF VALVE OUTLET.

(7) DISCONNECT AND REMOVE THE JET PUMP OUTLET.

(8) REMOVE THE CLIPS SECURING THE CHARGE AIR SUPPLY DUCTING TO THE EXPANSION UNIT FITTED TO THE REGULATOR VALVE INLET.

(9) REMOVE THE CLAMPS AND CONDUITS SECURING THE TWO FLEXIBLE PIPES TO THE BRACKET BELOW THE HYDRAULIC UNIT.

(10) RELEASE THE CROSS-BAR AND REMOVE THE QUICK-RELEASE COUPLINGS FROM THEIR HOUSINGS. SECURE THE COUPLINGS ON THE PACK MOUNTING PLATFORM.

(11) REMOVE THE PINS SECURING THE FUEL GUARD TO FORMERS 44, 64 AND 81 AND LIFT THE GUARD CLEAR OF THE COOLING PACK.

(12) ATTACH THE SLING TO THE MOUNTING PLATFORM.

(13) LOCATE THE HOIST TO THE BRACKET ON THE AFT FACE OF BOMB ARCH 44.592 A. AND ENGAGE THE HOOK WITH THE SLING. SLIGHTLY TENSION THE HOIST CABLE.

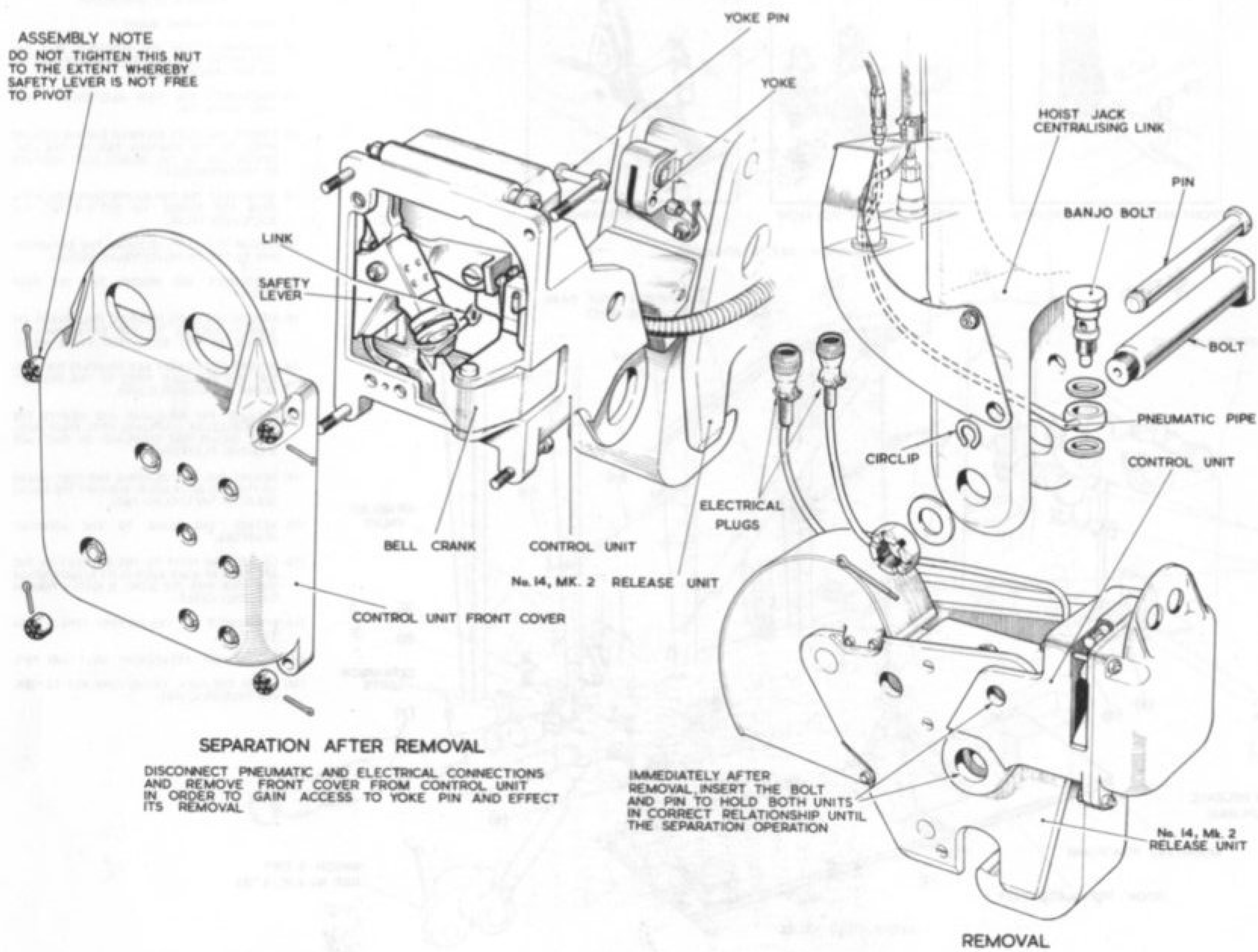
(14) DISCONNECT THE TWO SUPPORT STRUTS FROM THE PACK.

(15) REMOVE THE ATTACHMENT BOLT AND PINS.

(16) LOWER THE PACK, TAKING CARE NOT TO FOUL THE HYDRAULIC UNIT.

V.2.1A. 1166

Fig.45. Cooling pack removal



SEPARATION AFTER REMOVAL

DISCONNECT PNEUMATIC AND ELECTRICAL CONNECTIONS AND REMOVE FRONT COVER FROM CONTROL UNIT IN ORDER TO GAIN ACCESS TO YOKE PIN AND EFFECT ITS REMOVAL

IMMEDIATELY AFTER REMOVAL, INSERT THE BOLT AND PIN TO HOLD BOTH UNITS IN CORRECT RELATIONSHIP UNTIL THE SEPARATION OPERATION

REMOVAL

Fig. 46. Removal of release and control unit assembly.
(Mod. No. 1626)

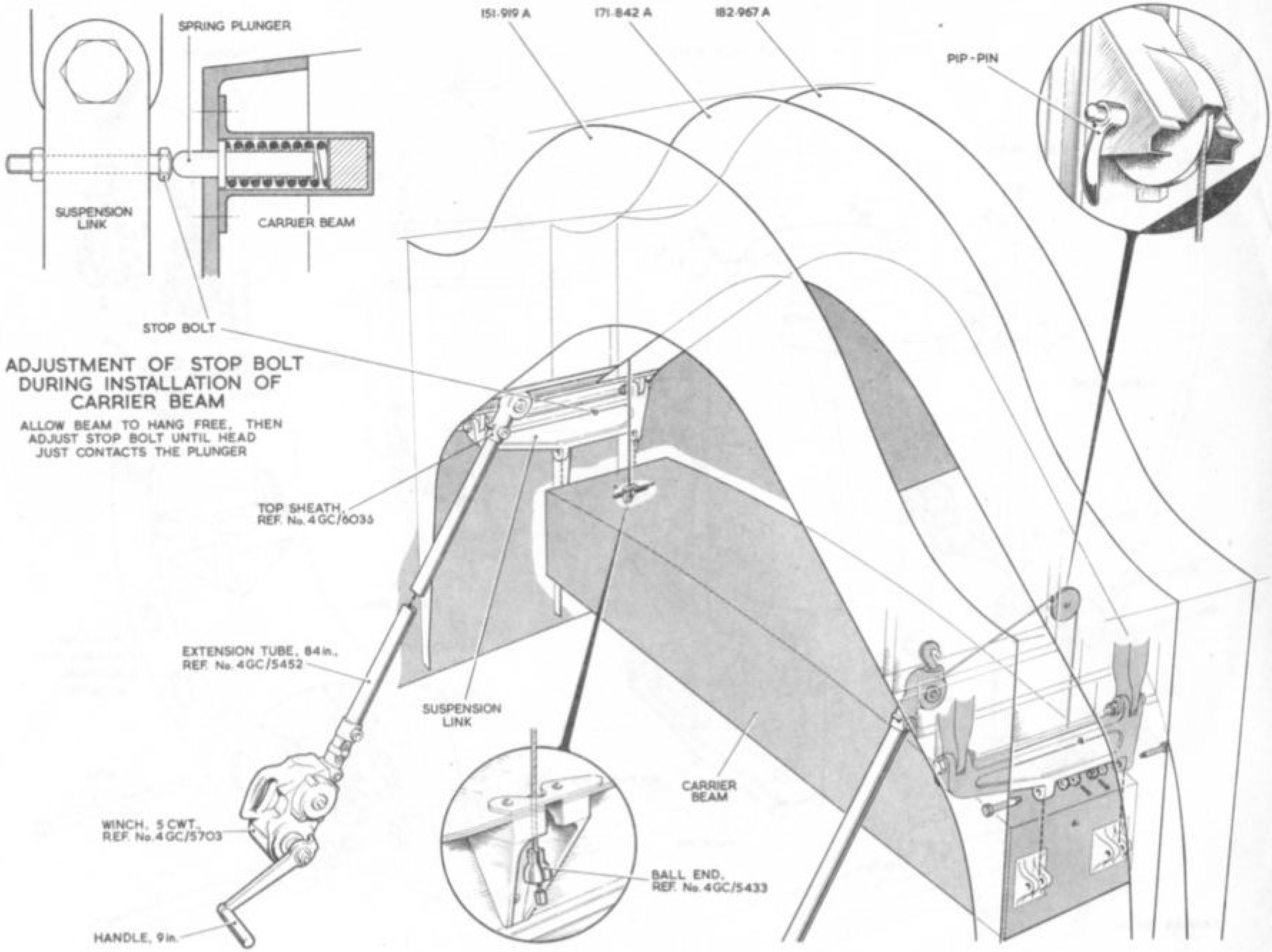


Fig. 47 . Removal of carrier beam

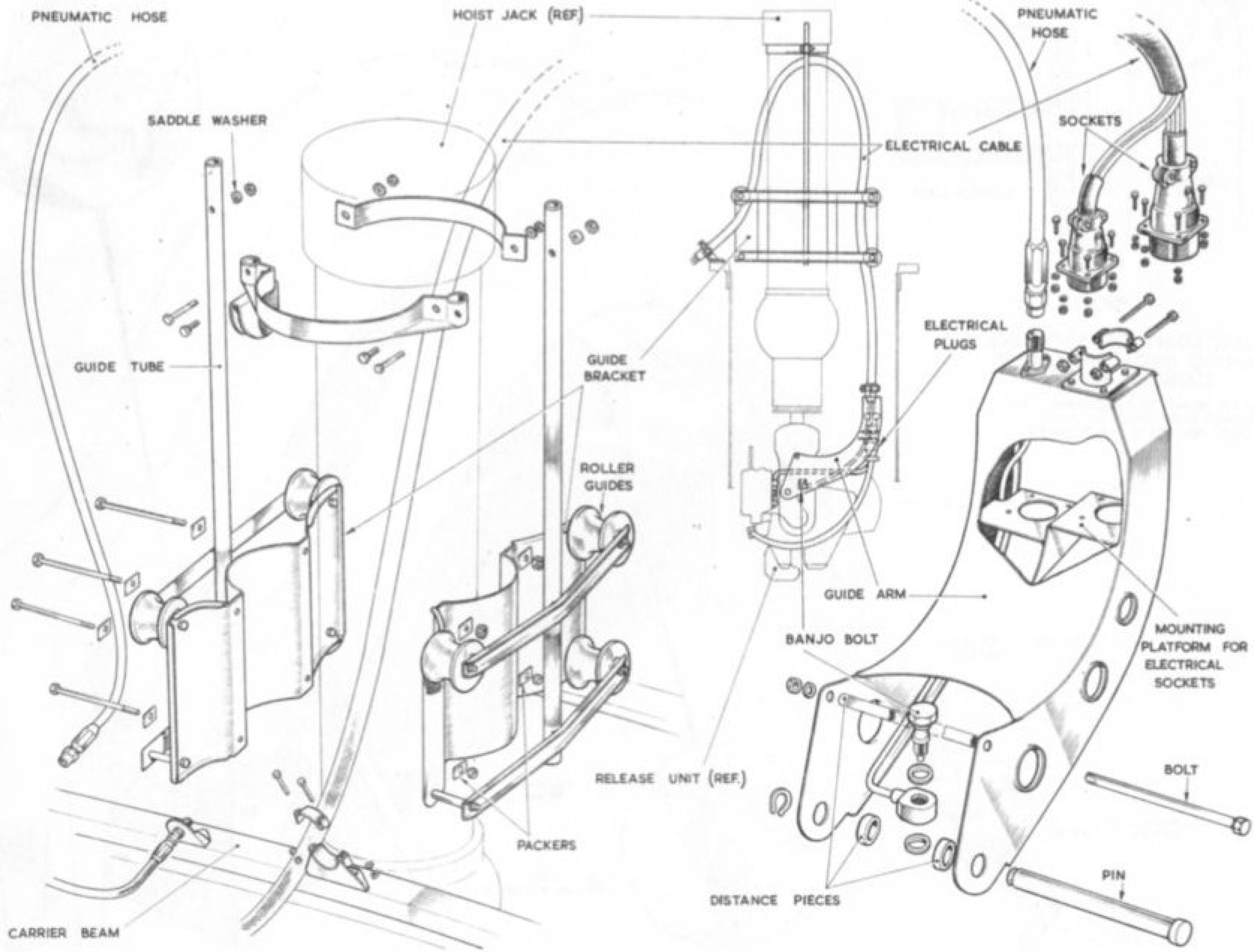
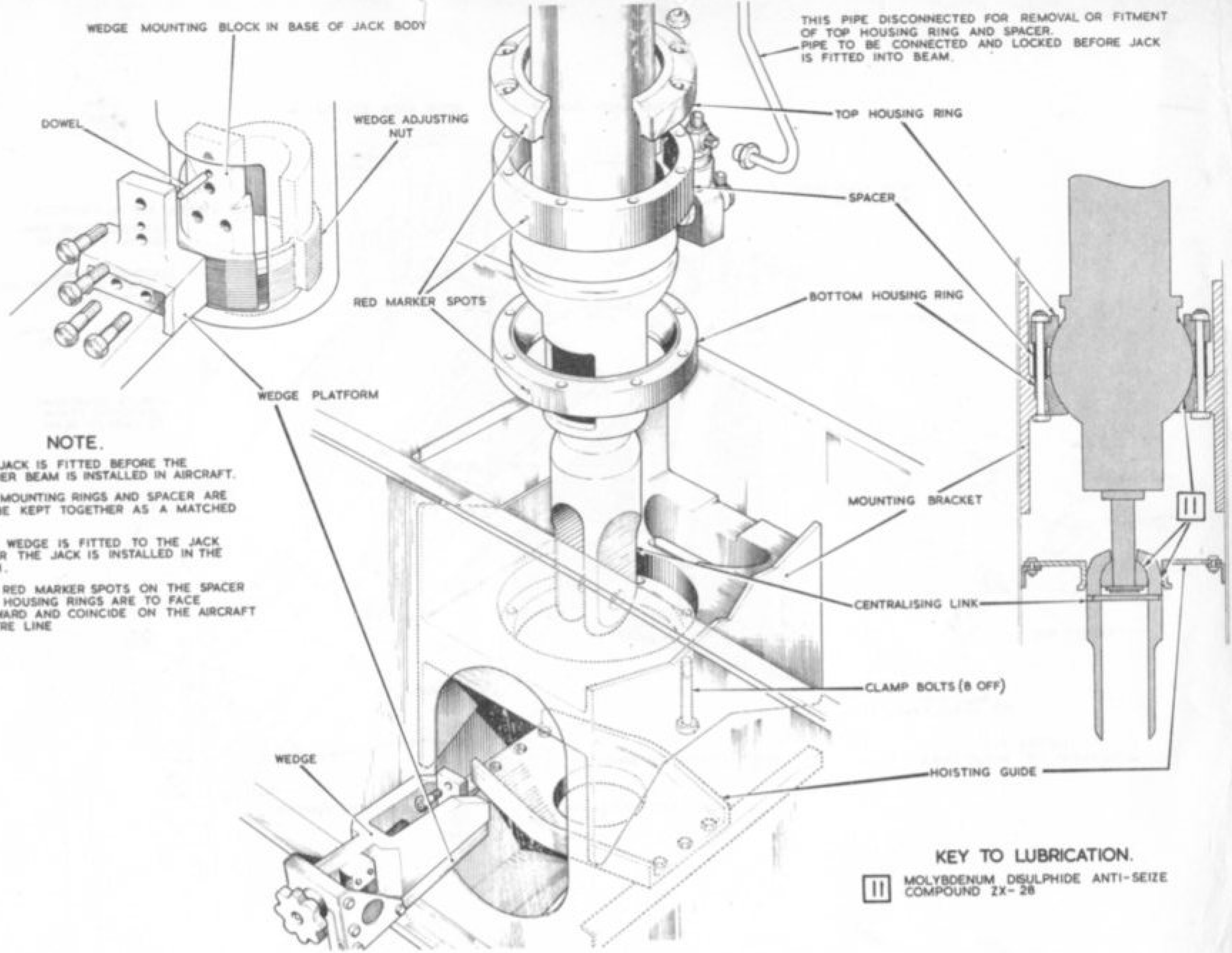


Fig. 48. Assembly of guide bracket and arm for pneumatic and electrical leads to release unit.



NOTE.

THE JACK IS FITTED BEFORE THE CARRIER BEAM IS INSTALLED IN AIRCRAFT.

THE MOUNTING RINGS AND SPACER ARE TO BE KEPT TOGETHER AS A MATCHED SET.

THE WEDGE IS FITTED TO THE JACK AFTER THE JACK IS INSTALLED IN THE BEAM.

THE RED MARKER SPOTS ON THE SPACER AND HOUSING RINGS ARE TO FACE FORWARD AND COINCIDE ON THE AIRCRAFT CENTRE LINE

KEY TO LUBRICATION.

II	MOLYBDENUM DISULPHIDE ANTI-SEIZE COMPOUND ZX-28

Fig. 49. Hoist jack mounting in carrier beam.

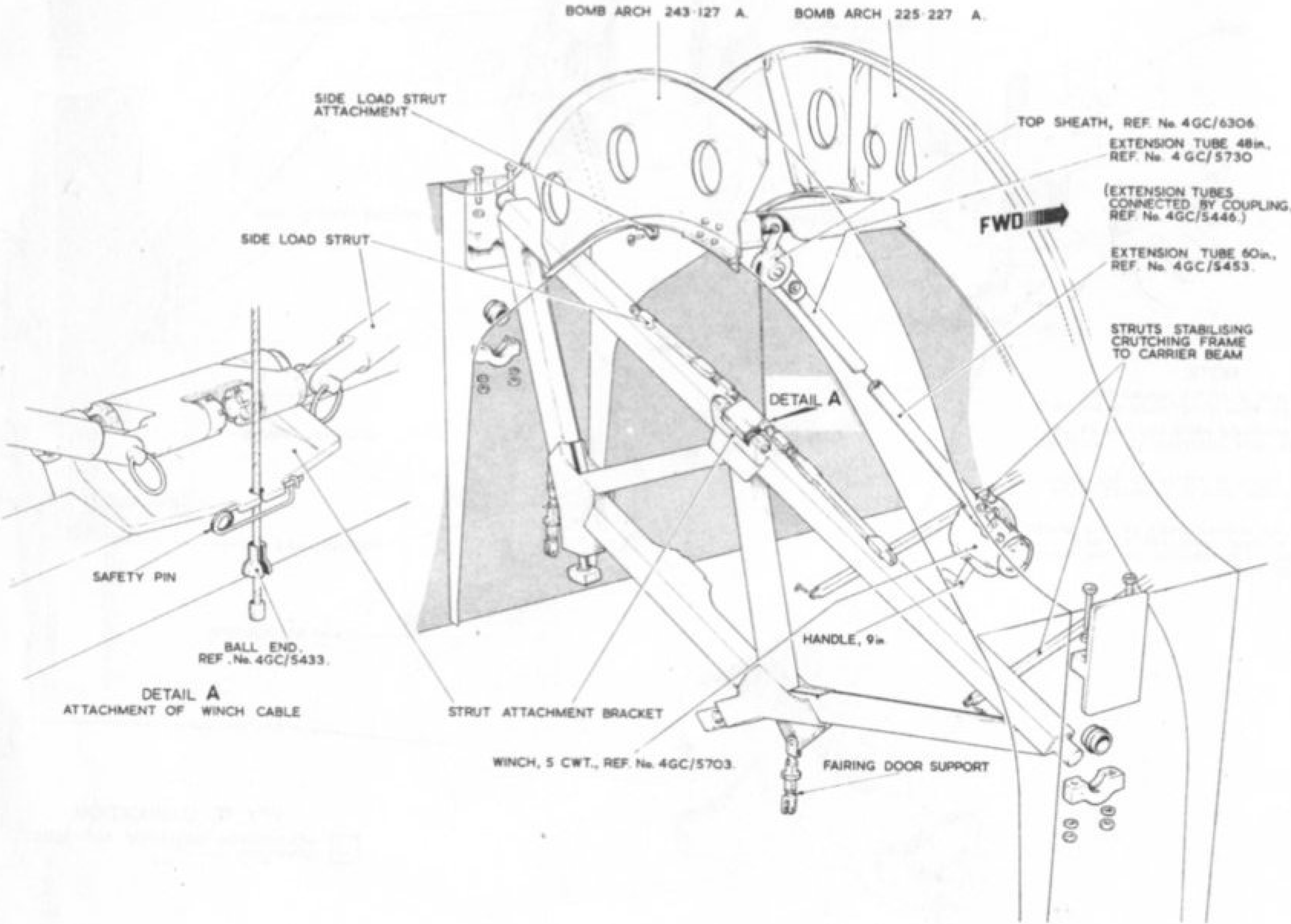


Fig. 50. Removal of rear crutching frame

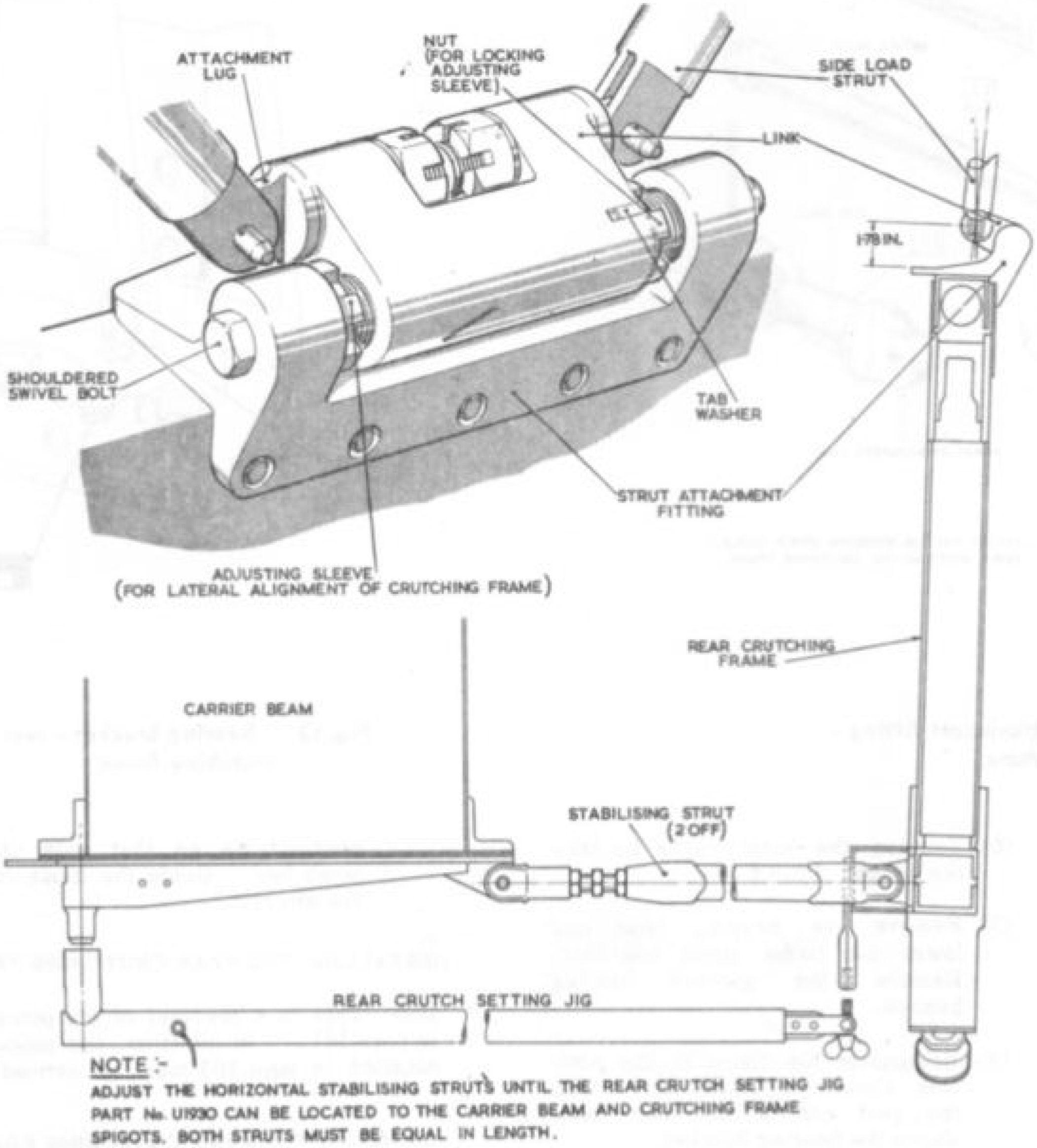


Fig.51. Crutching frame alignment

together with the pneumatic hose and electrical cable. (For the breakdown of this assembly refer to fig.48).

(7) Refer to fig.49 and remove the complete wedge assembly.

(8) Disconnect the 'up' and 'down' lines from the feed and return block on the jack.

(9) Remove the nuts from the eight clamp bolts retaining the jack in its mounting.

(10) Free the bolts from the top housing ring and spacer.

(11) Using suitable lifting tackle, hoist the jack from the beam.

INSTALLING THE HOIST JACK

160. During installation of the jack into the beam, ensure that the bearing surfaces are lubricated with anti-sieze compound ZX-28, as shown in fig.49. Ensure that the red marker spots on the spacer and housing rings are correctly aligned (fig.49). The procedure is then the reversal of that in para.159.

REMOVAL OF REAR CRUTCHING FRAME

161. Open the fairing doors, (para.142) and, referring to fig.50 attach the hoist. Proceed as follows:-

(1) Remove, from both sides of the bomb bay, the lengths of fuel pipe passing across bomb arches 243A and 225A.

(2) Disconnect the crutching frame side load struts from bomb arch 243A. Secure the struts to the frame.

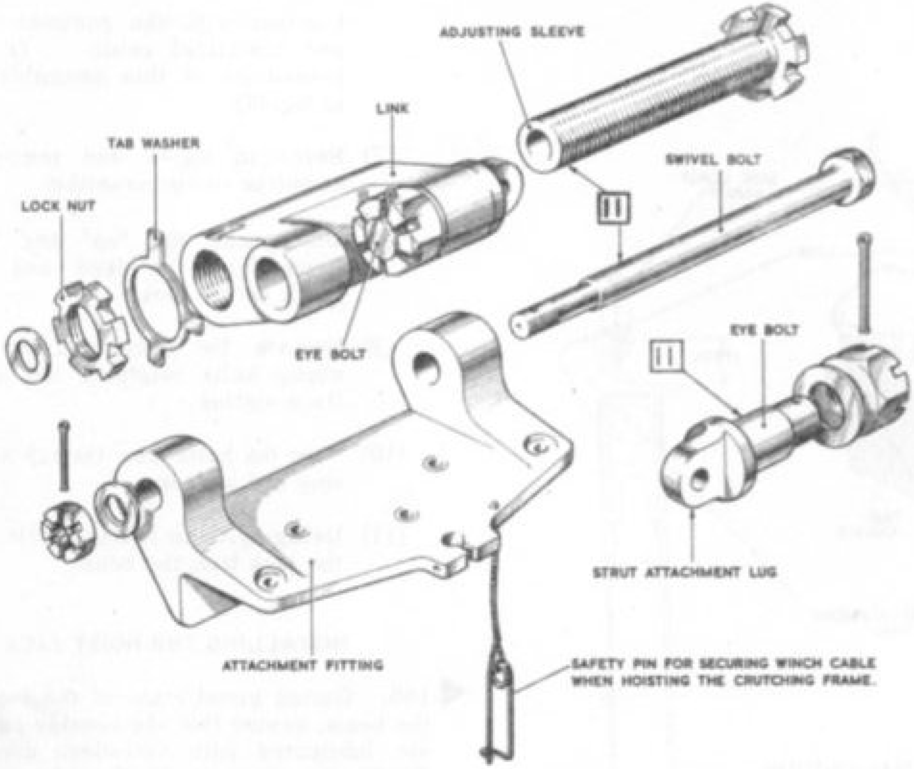


Fig.52 Assembly of strut attachment fitting - rear crutching frame

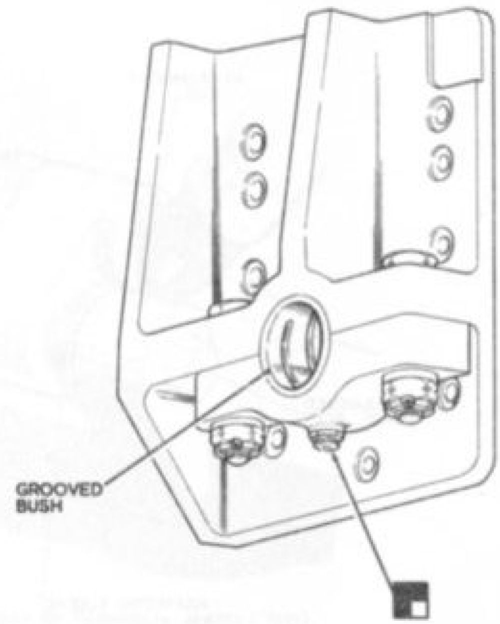


Fig.53 Bearing bracket - rear crutching frame

(3) Disconnect the horizontal stabilising struts from both the crutching frame and the carrier beam.

(4) Disconnect from the Avery coupling bracket on the port side of bomb arch 225A the two hydraulic flexible hoses which run to the crutching frame.

(5) Release, from the frame, the bracket securing the duct which carries the hot air to the store. Secure the duct clear of the frame.

(6) Tension the hoist cable to take the weight of the frame.

(7) Remove the bearing caps and lower the frame about one foot. Remove the grooved bearing bushes.

(8) Manipulate the frame to the position shown in fig.50 i.e., with the port end of the main beam above the bearing bracket.

(9) Lower the frame, allowing the starboard side to drop and clear obstructions on that side of the bomb bay. Guide the frame out of the aircraft.

INSTALLING THE REAR CRUTCHING FRAME

162. This is a reversal of the procedure in para.161. In addition, the procedure detailed in para.163 must be carried out.

ALIGNING THE REAR CRUTCHING FRAME

163 This operation is commenced with the side load struts disconnected from the

PROCEDURE

(1) FIT COMPASS SIGHTING RODS.

(2) ESTABLISH THE AIRCRAFT HEADING USING A DATUM COMPASS, (A.P.1275B, VOL.1, SECT.10). ONCE THE HEADING HAS BEEN ESTABLISHED, THE DATUM COMPASS SUPPORTS MUST NOT BE MOVED.

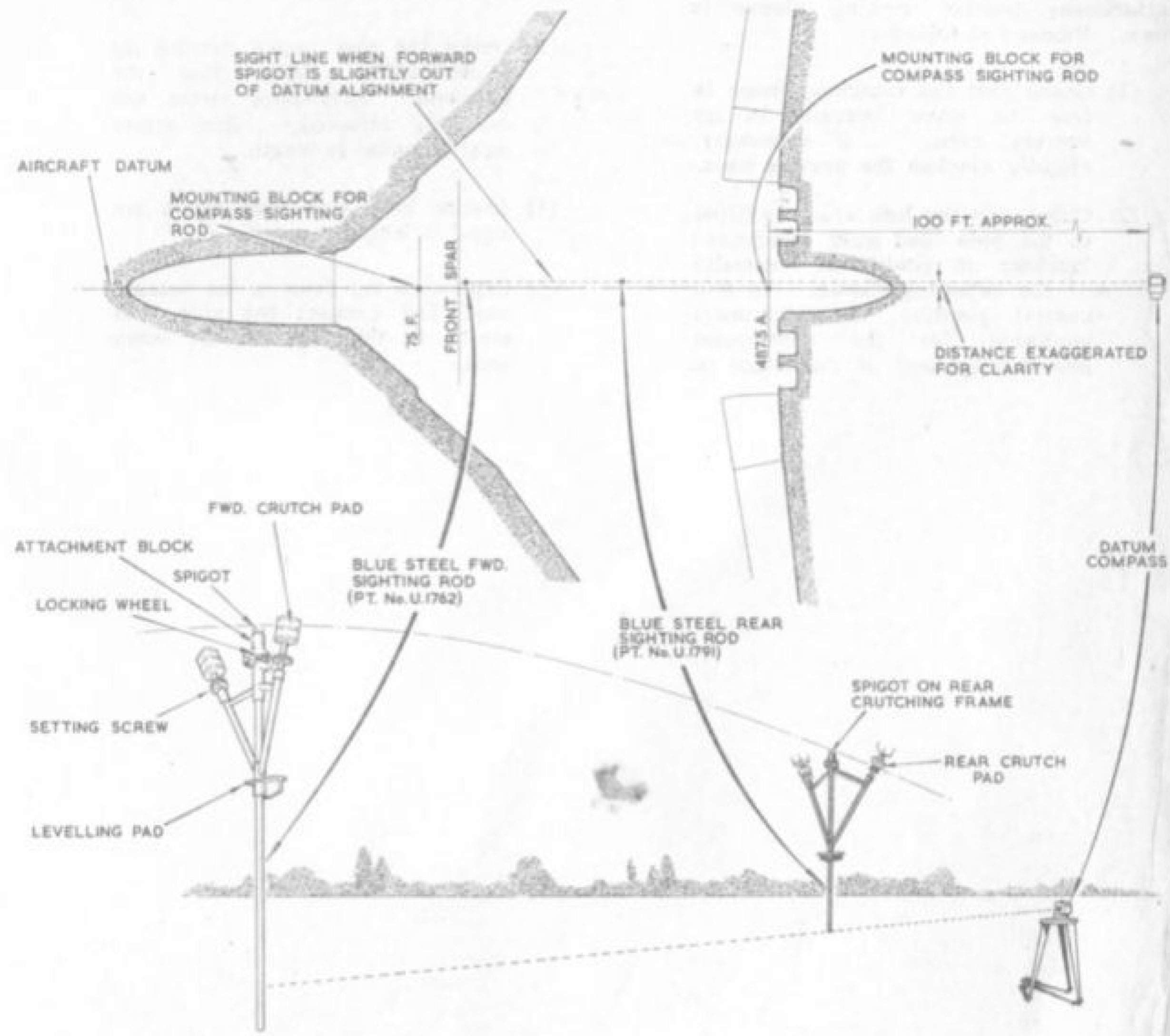
(3) REMOVE COMPASS SIGHTING RODS.

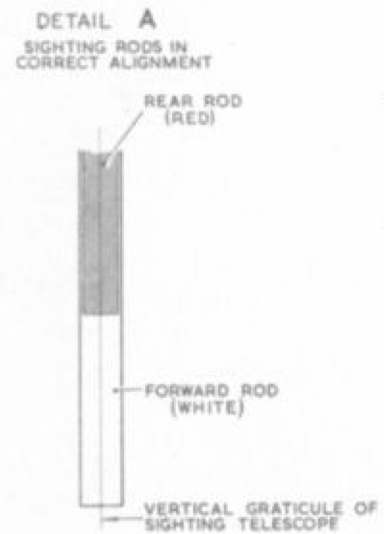
(4) FIT THE FWD. BLUE STEEL SIGHTING ROD.

(5) AT THE COMPASS DATUM SETTING ESTABLISHED IN (2), SIGHT THE FWD. BLUE STEEL SIGHTING ROD. IF THE FWD. SPIGOT, FOR BLUE STEEL, IS ACCURATELY POSITIONED ON THE AIRCRAFT DATUM, THE VERTICAL GRATICULE OF THE SIGHTING TELESCOPE WILL 'SPLIT' THE ROD, CENTRALLY. IF THE SPIGOT IS SLIGHTLY OUT OF DATUM ALIGNMENT IT WILL BE NECESSARY TO TRAVERSE THE COMPASS, ON ITS TRAVERSING PLATFORM, UNTIL THE GRATICULE IS 'SPLITTING' THE SIGHTING ROD. IN THE LATTER CASE, THE LINE OF SIGHT WILL BE PARALLEL TO THE AIRCRAFT DATUM.

(6) FIT THE REAR BLUE STEEL SIGHTING ROD.

(7) ALIGN THE CRUTCHING FRAME, LATERALLY, (PARA.163), UNTIL THE RED ¼ IN. DIA. REAR ROD IS SIGHTED AGAINST THE WHITE OF THE ⅝ IN. DIA. FWD. ROD (DETAIL A).





NOTE:
TO FIT SIGHTING RODS:- LOCATE ATTACHMENT BLOCK TO SPIGOT AND TIGHTEN LOCKING WHEEL. ADJUST SETTING SCREWS UNTIL THE LEVELLING PAD IS LATERALLY BRACED IN THE TRUE HORIZONTAL. USE AN ACCURATE LEVELLING INSTRUMENT

Fig. 54. Spigot alignment.

bomb arch. It is assumed that the tab washer under the lock nut of the strut attachment bracket locking sleeve is new. Proceed as follows:-

(1) Check that the crutching frame is free to move laterally in its bearing caps. If necessary, slightly slacken the bearing caps.

(2) Check that the link which is fitted to the side load strut attachment bracket, is positioned centrally on the adjusting sleeve. In this central position, the adjustment available for the subsequent lateral alignment of the frame is approximately 3/8 in. either side of the aircraft centre line.

(3) Using the rear crutch setting jig Pt.No.U1930, check that the horizontal stabilizing struts are correctly adjusted. Both struts must be equal in length.

(4) Ensure both side load struts are equal in length.

(5) Centralise the beam in its bearing caps and connect the side load struts to the lugs on the bomb arch.

(6) Adjust both side load struts by equal amounts until the correct setting of the link is obtained. This setting is 1·78 in. measured vertically from the upper surface of the attachment bracket to the centre line of the lugs on the link eyebolts.

(7) Carry out the spigot alignment check (fig.54) and, by means of the adjusting sleeve, laterally align the frame as necessary. Secure the adjusting sleeve by the locknut and engage the tab-washer. Tighten and lock the crutching frame bearing caps.