Chapter 8 AIR CONDITIONING

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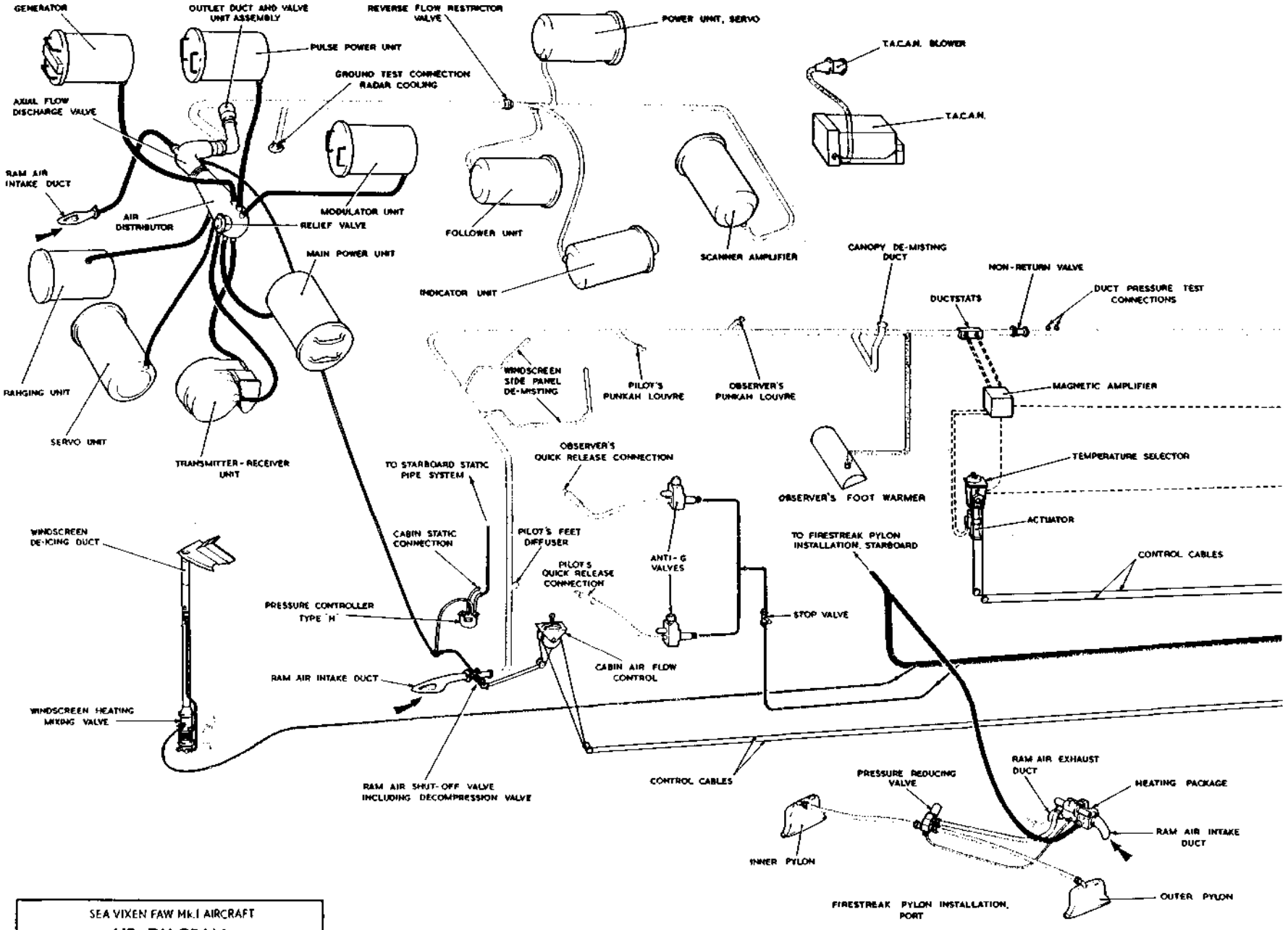

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SEA VIXEN FAW Mk.1 AIRCRAFT	
AIR DIAGRAM	
7102/MIN. SHT.1	
ISSUE 2	PREPARED BY MINISTRY OF AVIATION FOR PUBLICATION BY ADMIRALTY

Fig.1 General arrangement of air conditioning equipment (1)

◀ Observer's foot warmer added; TACAN cooling modified ▶

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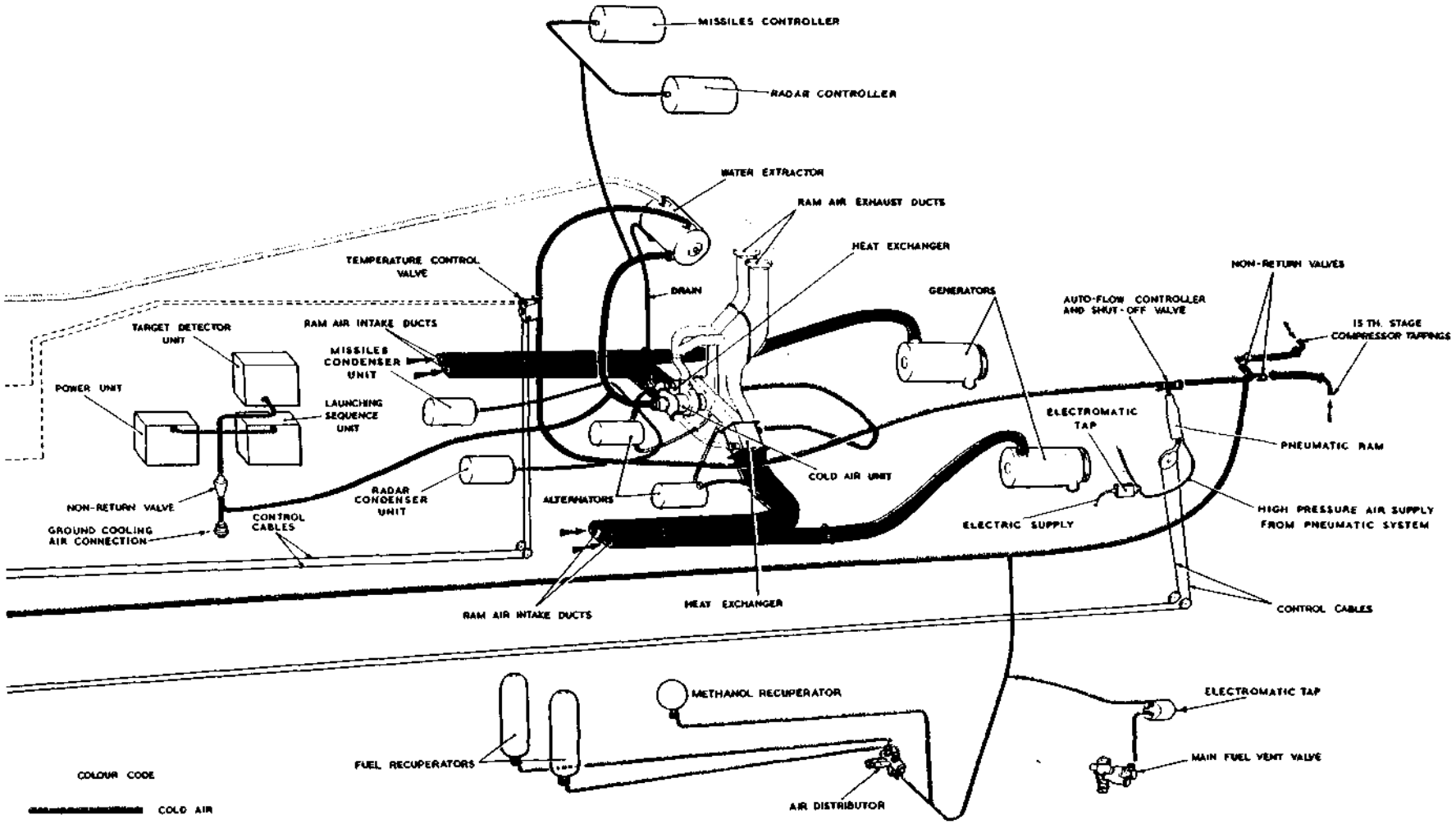

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Fig.1 General arrangement of air conditioning equipment (2)

◀ Methanol recuperator added ▶

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SEA VIXEN FAW Mk I AIRCRAFT AIR DIAGRAM 7102/MIN. SHT. 2	
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Introduction

1. Description and servicing information for the air conditioning and the cabin pressurisation system is contained in this Chapter. Where components of proprietary manufacture are installed, brief reference is made to their use and the appropriate A. P. reference is given, if available.

General

2. The air conditioning system (Fig. 1(1) and 1(2)) provides controlled ventilation, variable heating, pressurisation of the pilot's and observer's cabin and cooling air to equipment. The primary installations in the system are as follows:-

(1) Air conditioning. This installation is located in Zone A and comprises two heat exchangers, a cold air unit, a water extractor and a temperature control valve. A ducting assembly receives hot air from the engine compressors and ram air from atmosphere.

(2) Hot air supply. The hot air supply is taken from a tapping in each port and starboard engine compressor casing at the 15th stage, and passed to the heat exchangers in the air conditioning installation and for heating the equipment in the aircraft.

(3) Cabin pressure control. An installation of valves at the front pressure bulkhead automatically controls the cabin pressure.

3. Conditioned air, produced by the installation, pressurises the cabin and is supplied to the following locations by a ducting assembly:-

◀(1) Outlet duct. For observer's feet.▶

(2) Canopy. For de-misting.

(3) Punkah louvres. For the pilot and observer.

(4) Windscreen side panel. For de-misting.

(5) Outlet diffuser. For the pilot's feet.

(6) Ram air shut-off valve. The supply terminates at this valve.

4. Ram air for de-pressurised flight enters the cabin via the ram air valve and through the locations listed in para. 3. A safety valve is installed on the front pressure bulkhead and is ◀set to relieve at 3.7 p. s. i. Hot air▶ is taken from the 15th stage engine compressor tappings and delivered to the following locations:-

(1) Fuel system. Recuperators in the No. 1 tanks, to the main vent ◀valve located in the port wing, and to the methanol recuperator.▶

(2) Firestreak. Pylon installations, port and starboard.

(3) Windscreen. De-icing installation.

(4) Anti-g system. Pilot's and observer's seats.

5. Cold air produced by the cold air unit is delivered to the following locations:-

(1) Water extractor. Air conditioning system.

(2) Condensers. For cooling.

(3) Controllers. For cooling.

(4) Firestreak operating units. For cooling.

6. Ram air from atmosphere is collected by intake ducts and delivered to the following locations:-

(1) Radar equipment installed in the nose compartment of the fuselage. For cooling.

(2) Cabin. Ventilation during de-pressurised flight.

(3) Heat exchangers. Air conditioning system.

(4) Cold air unit. Fan drive air conditioning system.

(5) Generators. For cooling.

(6) Alternators. For cooling.

7. The cabin air is discharged through the radar equipment which is installed in the cabin; the radar cans are ventilated by the air which is then collected by a duct assembly and delivered to the axial flow discharge valve installed on the front pressure bulkhead. The cabin air temperature is normally controlled electrically, but should there be an electrical failure the temperature may be controlled manually.

DESCRIPTION

Hot air supply from the engine compressors

8. The diagrams (Fig. 2(1) and 2(2)) illustrate the aircraft with the cabin in a pressurised condition and with a typical distribution of air through the system. The supply of hot air for the air conditioning system is obtained from a 15th stage compressor tapping on each engine; the supply pipes, Plessiflex Type 8CX98635 and 8CX 98636, from the tappings, which are flexible braided metal hose with stainless steel ends, join at an elbow via non-return valves (Item 52). The non-return valves, Part No. 516570, are fitted near the supply tapping points on the engines to prevent a reverse flow through the supply pipes in the event of failure of the engines to which they apply. The valves are constructed of stainless steel to withstand high temperature and are operated automatically by the air flow in the supply pipes. For a full description and servicing instructions of this valve, reference should be made to A. P. 4340, Vol. 1, Book 2, Sect. 6.

9. The elbow has two outlets; one supplies the air conditioning installation, and the other pipeline has four branches; the first supplies the main vent valve via the electromatic tap, the methanol recuperator, and the fuel recuperators via the air distributor; the second branch supplies the anti-g system (Items 25 and 26); the third branch supplies the windscreen deicing system (Item 20), and the fourth branch supplies the Firestreak pylon installations.

10. The hot air supply to the air conditioning installation has a combined automatic flow controller and shut-off valve, Part No. 513910 (Item 54), installed in the pipe line and is located on rib No. 0. The automatic flow controller regulates the air supply to provide the mass flow required to ensure efficient operation of the cold air unit under all conditions of flight. The shut-off valve, which controls the cabin air supply, is operated by the pilot if it is required to fly the aircraft with the cabin sealed, or under ram-air ventilation. It is also operated automatically during armament firing. For a full description and servicing instructions on the controller and valve, reference should be made to A. P. 4340, Vol. 1, Book 2, Sect. 5.

11. From the automatic flow controller the hot air is supplied, via a branched pipe assembly, to the air conditioning installation. Joints (Item 50), which allow for expansion and contraction in the pipe assembly, are fitted and each consists of a bellows assembly with a coupling flange and pipe joint built around an inner sleeve.

Air conditioning installation

12. The air conditioning installation (Fig. 2(2) and Fig. 4) is located centrally in the aircraft in Zone A at the front firewall, and consists of a ducting assembly which incorporates heat exchangers (Item 49, fig. 2), port and starboard, a cold air unit (Item 53) and a water extractor (Item 48). A supply of ram air (Item 46) from atmosphere is taken to each heat exchanger and then exhausted into the engine bay via ducting which is fitted to the front firewall.

13. Part of the ram air supply to the heat exchanger is used for driving the cold air unit fan; the duct assembly on the exhaust side of the heat exchangers incorporates a transverse duct which collects air from both heat exchangers and delivers it to the cold air unit fan inlet. The exhaust air from the cold air unit fan is taken by a duct and fed into the heat exchanger exhaust ducting assembly.

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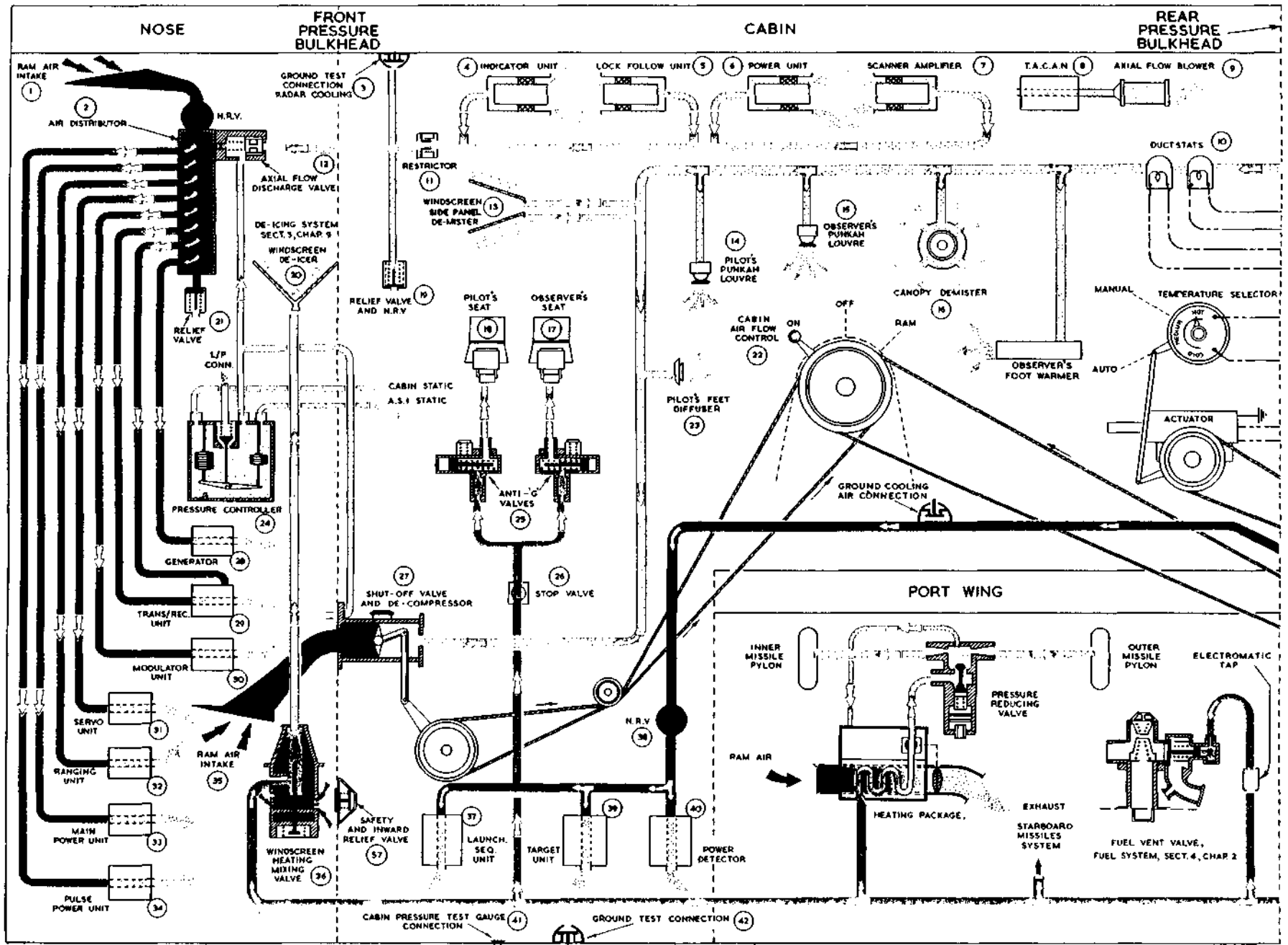

SEA VIXEN FAW Mk.1 AIRCRAFT
AIR DIAGRAM
7103/MIN. SHT. 1

Fig. 2 Air conditioning system theoretical diagram (1)

Observer's foot warmer added ▸

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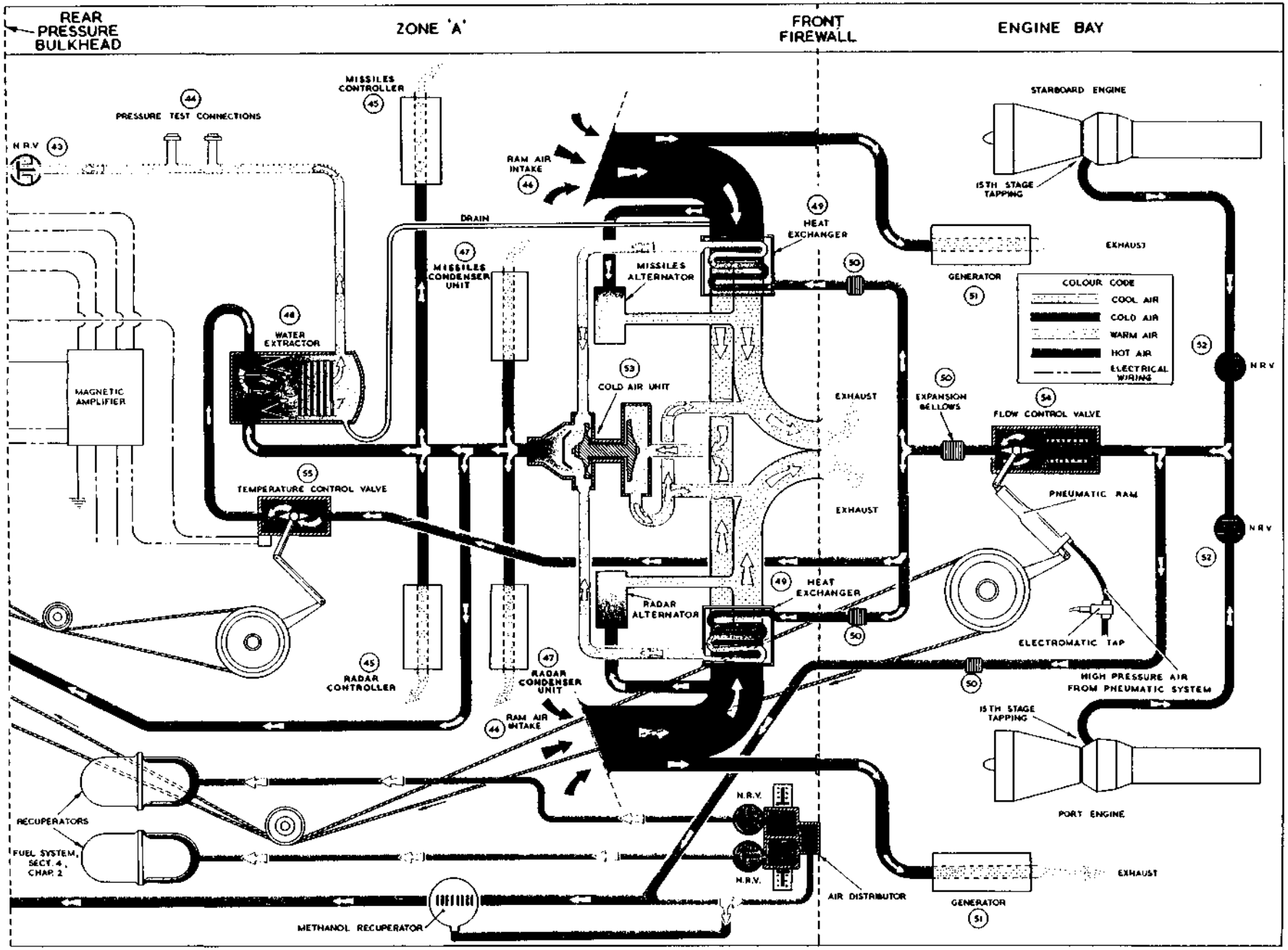

SEA VIXEN FAW Mk I AIRCRAFT
AIR DIAGRAM
7103/MIN. SHT
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Fig. 2 Air conditioning system theoretical diagram (2)

◄ Methanol recuperator added ►

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Ram air supply for the alternators

14. From a tapping on each port and starboard ram air intake ducting, air is taken to the alternators for cooling and is then fed back into the heat exchangers exhaust ducting. The port alternator is associated with the radar system and the starboard alternator with the missile system.

Ram air supply for the generators

15. A ram air supply is collected from atmosphere by duct assemblies for cooling the generators (Item 51), which are installed port and starboard and aft of the firewall; the air is then exhausted to atmosphere.

Heat exchangers

16. The heat exchangers, Type D62/6A and 7A (Item 49), are of the cross flow secondary surface type, and are constructed of aluminium alloy. The charge air enters the inlet duct and is routed to make passes across the cooler through charge airways connected in series and mounted between cooling airways, through which the cooling air flows direct. In both the charge airways and the cooling airways corrugated metal strips are positioned, parallel to the lines of air flow in each airway, to increase the cooling characteristics of the unit. The corrugated strips are the secondary surfaces. For a full description and servicing instructions on the heat exchangers, reference should be made to A. P. 4340, Vol. 1, Book 2, Sect. 8. The cooled air supply from the heat exchangers is ducted to the cold air unit turbine rotor.

Cold air unit

17. The cold air unit, Type R. U. 40-03 (Item 53) consists basically of a turbine rotor and a fan mounted on a common shaft and is housed in cast units, which comprise a fan housing, a centre casing and turbine inlet and outlet ducts. When cold air is selected the charge of air from the engine compressor tappings is directed through the heat exchangers where it passes around the matrix and becomes partially cooled. From the heat exchangers the air enters the turbine inlet ducts of the cold air unit; in passing through the fixed nozzle blades and the moving turbine blades, the charge air expands and gives up a considerable amount of its remaining heat in the form of energy to drive the turbine.

18. The heat energy extracted from the charge air is converted into mechanical energy by the turbine, and in this form is transferred to the fan which is mounted on the opposite end of the common shaft. The fan transfers the energy as heat to the cooling air which it draws from atmosphere across the heat exchangers and then discharges back to atmosphere. In passing across the heat exchangers the cooling air pre-cools the charge air; the reduction in temperature of the charge air achieved by the turbine is such that the air normally leaves the cold air unit at a temperature around freezing point. For a full description and servicing instructions on the cold air unit, reference should be made to A. P. 4340, Vol. 1, Book 1, Sect. 2. From the turbine outlet the cold air is delivered to the following locations:-

(1) Condenser units. (Item 47) port and starboard.

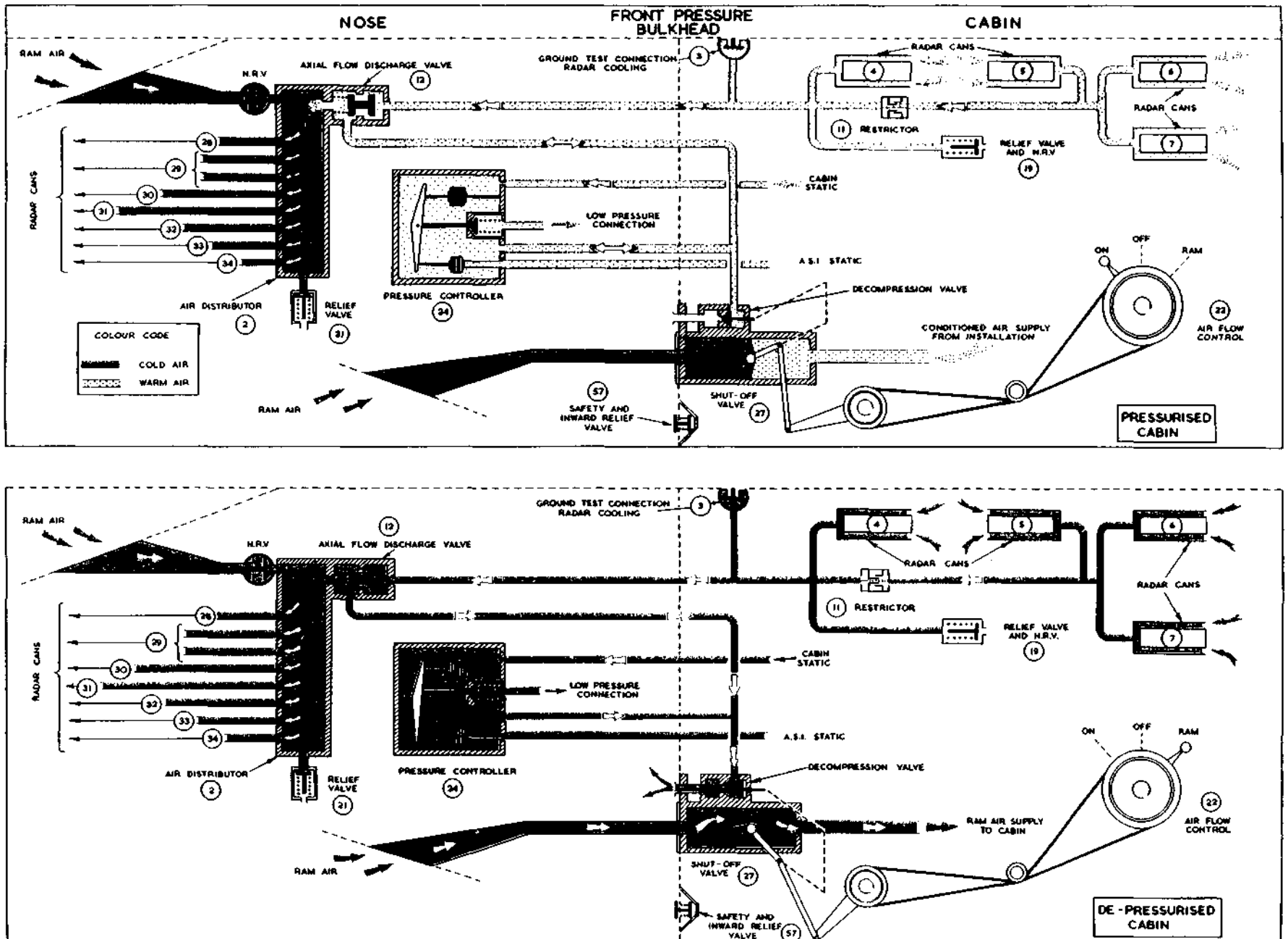
(2) Controllers. (Item 45) port and starboard.

(3) Water extractor. (Item 48).

(4) Firestreak missile operating units. Cooling air supply, via non-return valve (Item 38) to the launching sequence unit (Item 37), target unit (Item 39) and the power detector (Item 40).

Cold air supply for the condenser units

19. The condensers are mounted on the fuel bay doors and each receive a cooling air supply which is tapped from the outlet of the cold air unit. The port condenser unit is associated with



SEA VIXEN FAW Mk.1 AIRCRAFT
AIR DIAGRAM
7104/MIN.
ISSUE 2
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Fig. 3 Cabin air flow diagram

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the radar system and the starboard unit with the missile system.

Cold air supply for the controllers

20. From a tapping on the cold air unit outlet ducting a supply is obtained for cooling the two controller units which are installed port and starboard of rib No. 0 and just forward of the front firewall. The port unit is associated with the radar system and the starboard with the missile system.

Water extractor

21. The water extractor, WE. 30, Mk. 9 (Item 48), removes the excess moisture from the pressurising and ventilating air before it is delivered to the aircraft cabin. Air entering the water extractor from the cold air unit passes through a coalescer where entrained moisture is formed into relatively large droplets which are carried into a tube bank assembly. The droplets run down the tubes and pass through holes in a tube bank support casing into a sump, to be discharged through a drain adapter into the starboard ram air heat exchanger exhaust duct. A restricted bore in the adapter minimises the loss of air pressure in the aircraft system when the water extractor is operating in conditions of low relative humidity. For further information and servicing instructions on the water extractor unit, reference should be made to A. P. 4340, Vol. 1, Book 2, Sect. 9.

Cold air supply for the Firestreak operating units

22. Hot air, from the engine compressors and cold air supplies are received by the water extractor, from which air of a regulated temperature is produced for the main supply to the cabin. The temperature of the hot air is regulated by a control valve and the cold air is supplied from the cold air unit turbine.

23. A cold air supply is tapped from the cold air unit outlet for cooling the Firestreak missile operating units (Para. 18(4)); the cooling air is delivered via a non-return valve (Item 38) and a four-way union, the supply pipe being routed below the cabin floor on the port side and encased by fibreglass. The connecting pipes to the union and to the power unit are of silicone hose Type D. A. S. 582/14. The supply pipes to the launching sequence unit and the target detector unit are Flexflyte Type L. 1. The non-return valve is Part No. 557112. A ground cooling air supply connection is provided, and a tee-joint with a coupling is located in the pipe line just below the non-return valve.

Cabin air supply

24. The conditioned air supply from the water extractor to the cabin is carried by a ducting assembly which terminates at the ram air shut-off valve (Item 27), which is installed in the front pressure bulkhead. Fitted to the ducting assembly are two ductstat units (Item 10) and two connections (Item 44) for test purposes. The duct passes through the rear pressure bulkhead via a non-return valve, Part No. 512510 (Item 43), Ref. A. P. 4340, Vol. 1, Book 2, Sect. 6, and supplies air to the following locations in the cabin:-

(1) Observer's foot warmer.

(2) Canopy de-misting (Item 16).

(3) Observer's punkah louvre (Item 15).

(4) Pilot's punkah louvre (Item 14).

(5) Windscreen side panels de-misting (Item 13).

(6) Diffuser at the pilot's feet (Item 23).

25. The two ductstat units, Type FHG/A/35, which are fitted in the ducting assembly are each in the form of a sensitive resistance, which, in conjunction with a magnetic amplifier, Type FLM/A/14; and the temperature control valve (Item 55) controls the

temperature of the cabin air supply to that selected by the pilot with a temperature selector rheostat, Type FHK/A/32, in the cabin. Reference to A.P. 1275A, Vol. 1, Sect. 20 will give further information on the magnetic amplifier (Chap. 12), ductstat (Chap. 9) and temperature selector (Chap. 10).

Cabin air discharge

26. Air leaves the pressurised cabin (fig. 3) by entering the radar cans (Items 4, 5, 6 and 7); a ducting installation connects the radar cans and delivers the air to an axial flow discharge valve, Part No. 512440 (Item 12), fitted on the forward face of the front pressure bulkhead. A relief valve and non-return valve, Part No. 516140, (Item 19), is incorporated in the ducting installation and forms an additional outlet for the cabin air, which can then by-pass the radar cans. A reverse flow restrictor valve, Normalair Part No. 515190 (Item 11), Ref. A.P. 4340, Vol. 1, Book 2, Sect. 6, is fitted in the duct and allows unrestricted air to flow. A ground test connection, Part No. 504300 (Item 3), Ref. A.P. 4340, Vol. 1, Book 2, Sect. 13, is located in the starboard wall of the fuselage and is connected to the ducting installation; test air can be supplied to the radar cans fitted in the pressurised cabin and restricted to an acceptable rate of flow; the remainder of the air passes through the discharge valve.

Control of air supplies to the cabin

27. The supply to the cabin of ram air from atmosphere or of conditioned air is determined by an air flow control lever (Item 22), which is located in the pilot's port console. There are three positions in a gate aperture which are marked ON - OFF - RAM, to which the control lever may be placed. The lever operates a cable mechanism which controls the ram air shut-off valve (Item 27) at the front pressure bulkhead and the hot air shut-off valve (Item 54) in the hot air supply ducting from the engine compressors. The position of the valves in relation to the control lever is illustrated in fig. 5.

Ram air valve

28. The ram air shut-off valve Part No. 513490 (Item 27), Ref. A.P. 4340, Vol. 1, Book 2, Sect. 5, is installed on the front pressure bulkhead and, with the control lever in RAM position, provides cabin ventilation by air drawn direct from atmosphere via a duct assembly which is fitted in the nose fuselage on the port side. The unit incorporates a de-compression valve which, when the ram air valve is opened, causes the cabin air axial flow discharge valve (Item 12), to open, thus ensuring free circulation of air within the cabin. The de-compression valve is mechanically connected to the ram air valve and both valves open and close in unison. The de-compression valve is arranged to open slightly ahead of the ram air valve to allow the cabin air pressure to drop before the ram air enters.

Automatic flow controller and shut-off valve

29. The automatic flow controller regulates the hot air supply from the engine compressors, and the shut-off valve, incorporated in the unit, is operated by the pilot's control lever and cable mechanism. During a period of armament firing the shut-off valve is also automatically closed by an electrical/pneumatic circuit (fig. 5) to reduce the supply of hot air.

WARNING

The aircraft armament installation (rockets and missiles) must be operated with the control lever for the cabin air supply set in the ON position. The installation must *NOT* be operated with the lever set in any other position. Failure to observe this precaution either on the ground or during flight will damage the pneumatic ram and the shut-off valve; the replacement of these damaged components will necessitate the removal of the port engine.

30. To prevent a seizure of the cold air unit during an armament firing period, the pneumatic ram operation of the cabin air shut-off valve is arr-

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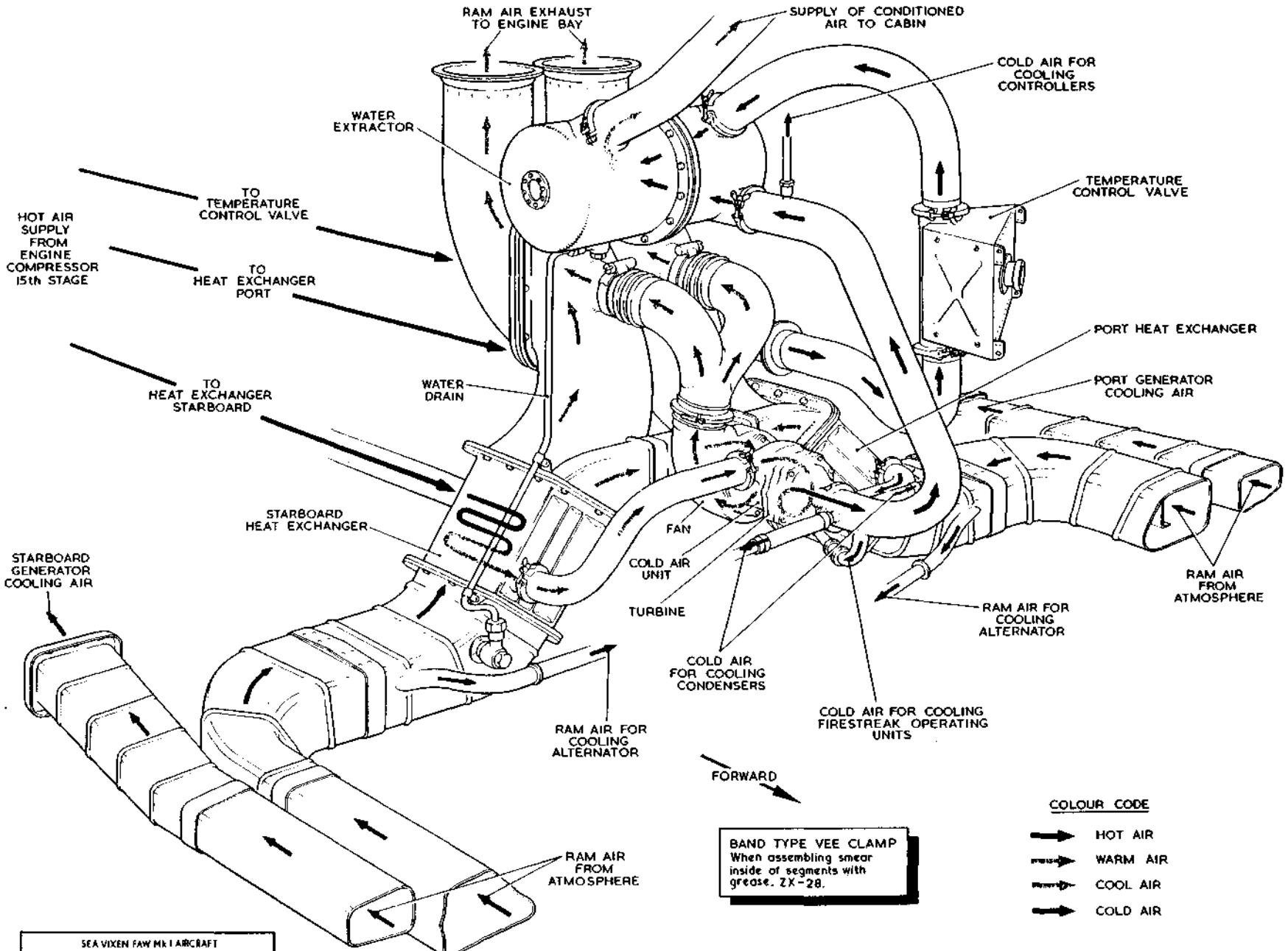

SEA VIXEN FAW Mk 1 AIRCRAFT
AIR DIAGRAM
7105/MIN.
ISSUE 1
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Fig. Air conditioning installation

anged to reduce the hot air supply to the turbine inlets of the cold air unit and to the conditioning installation. With the cabin air supply lever set in the ON position and with the shut-off valve OPEN (fig. 5) an armament firing operation will energise an electromatic tap, Dunlop Type SK. 10890, which releases high-pressure air from the three bottle pneumatic system to the pneumatic ram which extends and partially closes the shut-off valve, thus reducing the hot air supply. The high-pressure air supply is terminated automatically after the armament firing period and the pneumatic ram will retract and return the shut-off valve to the OPEN position. The pneumatic ram assembly (fig. 8) consists of a cylinder, which houses a spring-loaded piston, a combined cylinder head and lower fork end, the upper fork end being attached to the piston. The high-pressure air supply to the ram enters the cylinder head via a 1/8 in. B. S. P. union. For information on the pneumatic system and the electrical circuit involved in the installation, reference should be made to Sect. 3, Chap. 7, and Sect. 5, Chap. 1, Group F.

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Control of cabin air pressure

31. With the pilot's control lever set in the ON position, air from the conditioning installation pressurises the cabin, and is partially discharged through the radar equipment (Items 4, 5, 6 and 7 in fig. 2) which is installed in the cabin. The radar equipment is ventilated by the air which is then collected by a duct assembly fitted with a reverse flow restrictor valve, Normalair Pt. No. 515190 (Item 11), and delivered to the axial flow discharge valve installed on the front pressure bulkhead.

32. The duct assembly incorporates a combined relief and non-return valve, Part No. 516140 (Item 19) through which cabin air is also discharged to the axial flow valve and forms a by-pass to the radar equipment flow. The ducting assembly also incorporates a ground test connection (Item 3) which is located on the starboard wall of the fuselage (para. 26).

33. Air pressure in the cabin is controlled and regulated by the following components installed on the front pressure bulkhead :-

(1) Axial flow discharge valve, Part No. 512440 (Item 12). This valve, in conjunction with the pressure controller, regulates the discharge of air from the cabin.

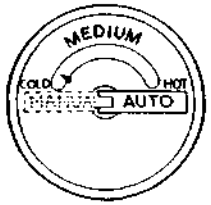
(2) Pressure controller, Type H, Part No. 514410 (Item 24). This controller limits the cabin differential pressure to 3. 5 p. s. i.

(3) Combined safety and inward relief valve, Part No. 512450 (Item 57). This valve combines the function of cabin safety valve (outward relief valve) with that of an inward relief valve. The outward relief valve will open when the cabin pressure reaches 3. 7 p. s. i. and the inward relief valve limits a negative differential pressure to a safe value. For further details of this valve reference should be made to A. P. 4340, Vol. 1, Book 2, Sect. 6.

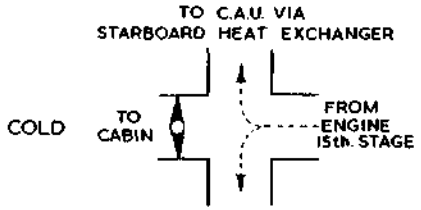
Control of cabin air temperature

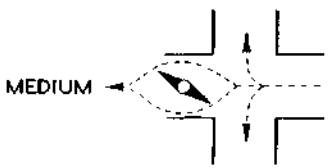
34. The temperature of the air supply produced by the conditioning installation is normally controlled electrically and by a selector unit which is located in the pilot's port console (fig. 6). The temperature may be controlled manually should there be an electrical failure. The temperature control valve, Part No. 512410 (Item 55 in fig. 2), Ref. A. P. 4340, Vol. 1, Book 2, Sect. 5, is operated by a cable and pulley installation and by a control unit which is located in the pilot's port console. Manual or automatic temperature control is selected and achieved by the pilot positioning the lever on the hand wheel at the top of the unit. The lever may be set to either MANUAL or AUTO. When set to AUTO, an actuator, which is incorporated in the unit, operates in conjunction with an electrical circuit to regulate the position of the temperature control

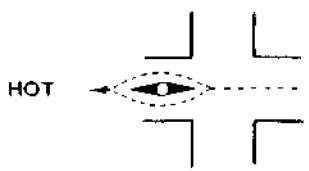
AUTOMATIC TEMPERATURE CONTROL



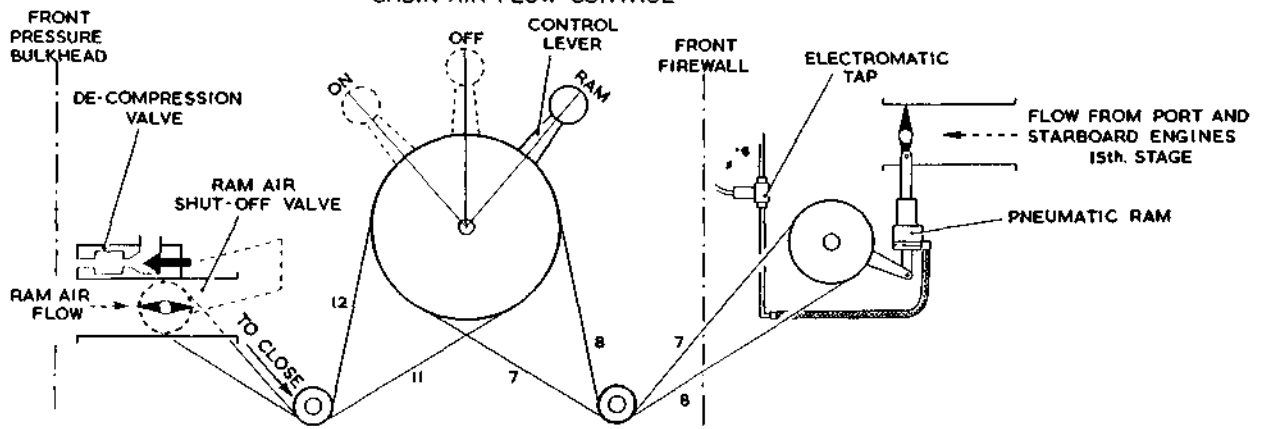
PILOT'S SELECTOR UNIT IN CABIN



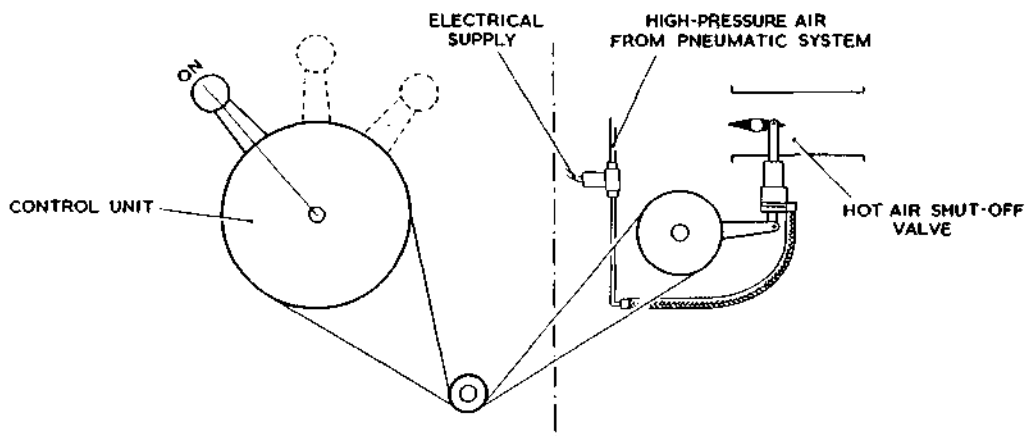




CABIN AIR FLOW CONTROL



PRE-ARMAMENT FIRING



CONDITION	CONTROL LEVER	RAM AIR SHUT-OFF VALVE	HOT AIR SHUT-OFF VALVE
CABIN PRESSURISED, AIR CONDITIONED AND PRE-ARMAMENT FIRING.	ON	CLOSED	OPEN
CABIN NOT PRESSURISED OR AIR CONDITIONED.	OFF	CLOSED	CLOSED
CABIN NOT PRESSURISED, AIR CONDITIONED.	RAM	OPEN	CLOSED

Fig.5 Control settings incorporating pre-armament firing

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valve to provide the air temperature that has been selected. The electrical installation provides automatic control of the cabin air temperature; the circuit and the components involved are described in Sect. 5, Chap. 1, Group H2 and C2. The automatic control is disconnected by placing the lever in the MANUAL position; the control valve may then be operated by rotating the hand wheel rim to the required setting.

35. The temperature control unit (fig. 7) consists of a bevel gear and chain sprocket mechanism installed in a cast housing which may be operated electrically by an actuator, Type C.10001, or manually by the pilot when the electrical circuit and actuator drive are disconnected. The hand wheel and indicator assembly is carried by bushes in the upper part of the housing, and meshes with a bevel wheel and chain sprocket assembly which is also carried by bushes in the housing. The actuator is bolted to the lower face of the housing and its bevel drive pinion meshes with the bevel wheel. A spring-loaded dog clutch connects or disconnects the actuator drive shaft to the bevel gearing and is operated by the action of a push rod and a selector lever located on the hand wheel. The positions for the selector lever are indicated on the hand wheel dial and are marked MANUAL-AUTO.

36. The hand wheel is fitted to a hollow serrated shaft which incorporates a drive gear at its upper end for the indicator assembly; the lower end of the shaft carries a bevel pinion. The push rod and a flanged guide tube are fitted in the hollow serrated shaft and are located to the housing by a forked retaining plate. The flange on the upper end of the guide tube forms a bearing surface for the selector lever boss.

37. When the selector lever is placed in the AUTO position, the cam-shaped fulcrum boss depresses the push rod which in turn engages the dog clutch in the bevel pinion with the actuator drive shaft. The movement of the push rod is also arranged to operate a micro switch, Type V4, located in the housing, which makes the electrical circuit associated with the temperature control system. When the selector lever is moved to the MANUAL position, the push rod rises, disengages the dog clutch and actuator drive, and breaks the electrical circuit at the micro switch. Rotation of the hand wheel rim regulates the hot air supply to the cabin system to the temperature indicated by the pointer on the hand wheel dial.

38. The temperature indicator mechanism is housed in the hand wheel and comprises an epicyclic gear assembly with a pointer and dial. A radial slot in the dial, through which the pointer protrudes, indicates the temperature control range and is marked COLD-MEDIUM-HOT. The dial assembly incorporates the outer gear ring and, with the selector lever assembly, is held stationary by the retaining plate which is bolted to the housing. The planet gear assembly comprises a shaft and pointer which carries an idler wheel and pinion mounted on a plate which is fitted on the hand wheel assembly shaft. The drive gear, which forms part of the hand wheel and bevel pinion assembly, engages with the planet gear which in turn meshes with the outer stationary gear ring.

39. The bevel wheel and the chain sprocket are mounted on a serrated shaft which is carried on flanged bushes fitted in the housing. Shim adjustment is provided for the bevel gear meshing.

40. When the control valve is in the closed (COLD) position, all the hot air supply from the engine compressors is directed through the heat exchangers in the air conditioning installation and is delivered, via the cold air unit, to the water extractor as cold air. When the control valve is in the open (HOT) position, the hot air supply from the engine compressors is directed, via the temperature control valve, direct to the water extractor, and to the heat exchangers in the conditioning installation.

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41. When the control valve is, for example, in the half-way (MEDIUM) position, some hot air will be routed direct to the water extractor and the remainder to the heat exchangers. The percentage of air routed through each ducting is in direct relationship to the setting of the temperature control valve. When an engine ground-run is conducted, the cabin air supply from the compressors can be directed through the air conditioning installation for cooling; but the temperature drop achieved will be less than when ram air is flowing through the heat exchangers.

Hot air supply to the Firestreak pylon installation

42. The second supply of hot air from the engine compressor tappings (para. 9) leaves the elbow via a pipe installation encased with fibreglass and fitted with a bellows assembly (Item 50), which passes through the front firewall at a flanged joint. From the flanged joint, a pipe assembly carries the air supply to a tee-joint which is located in the forward face of the front spar; from the tee-joint the supply is delivered, port and starboard, to the Firestreak pylon installations via pipe assemblies. The air is supplied to a heating package, installed inboard of nose rib No. 3A in. each wing. Each installation incorporates a ram air duct from the wing leading edge to the heating package and an outlet duct to atmosphere through the wing under-surface. From the hot air and ram air supplies, the heating package produces air of a regulated temperature which is then delivered to a Hymatic pressure reducing valve Type P. S. 99/1, Ref. A. P. 4303C, Vol. 1, Sect. 3, each of which in turn supplies two pylons. Pipes fitted internally to the pylon castings deliver the air to the missile launching shoes. For information on the pylon pneumatic installation reference should be made to Sect. 3, Chap. 7. Two tappings are taken from the Firestreak supply pipe assembly just aft of the front spar; one supply is for the windscreen de-icing system (Item 20) and the second supply is for the pilot's and observer's anti-g system. Another supply is obtained from a tapping, located forward of the front firewall, from which air is delivered via a two-way pipe assembly to the main fuel vent valve via the electromatic tap, to the methanol recuperator and to the fuel recuperators via the air distributor. For information on the fuel and methanol recuperators, and the main fuel vent valve refer to Sect. 4, Chap. 2.

Hot air supply to the windscreen de-icing system

43. The hot air supply for the windscreen de-icing system is ducted through the port side of the fuselage and under the cabin floor to a windscreen temperature control valve, which is fitted on the forward face of the front pressure bulkhead. For details of the windscreen de-icing system, reference should be made to Sect. 3, Chap. 9.

Hot air supply to the fuel recuperators from the air distributor

44. The hot air supply to the fuel recuperators is from the air distributor block. A fuel recuperator is installed in each No. 1 fuel tank; further information is given in Sect. 4, Chap. 2 of this A. P. The air distributor unit (Fig. 13) consists of a main block which houses two non-return valves, Type S. P. E. 2197, two relief valves, Type R. V. 56, and an inlet adapter reducer union. The air enters the block via the reducer union and is directed to the two outlets which are fitted with the non-return valves, the supply is then taken to the fuel recuperators.

Hot air supply to the pilot's and observer's anti-g systems

45. The hot air supply to the pilot's and observer's anti-g system is carried by a pipe installation to a stop valve, Type S.V.31/3, Ref. A. P. 4303C Vol. 1, Sect. 6, which is mounted on the port wall of the cabin. From the stop valve, the supply branches and is delivered to the anti-g valves via a pipe assembly and tee-piece. An anti-g valve, Type A.G.9/3, Ref. A.P. 4303C, Vol. 1, Sect. 4, is installed adjacent to each seat. Anti-kink hoses,

Type D. A. S. 412. E, connect the anti-g valves to the quick-release panels fitted to the seats.

Radar equipment cooling

46. Installation in the fuselage nose section. Radar equipment installed forward of the front pressure bulkhead in the fuselage nose section, receives cooling air (Item 1) from atmosphere. A ram air intake duct; fitted to the starboard side of the fuselage, supplies air to an air distributor (Item 2) and an axial flow discharge valve assembly (Item 12) L. P. hoses Mk. 7 carry the air from the distributor to the following radar units:-

1. Wave form generator (Item 28)
2. Pulse power unit (Item 34)
3. Modulator unit, (Item 30)
4. Ranging unit (Item 32)
5. Servo unit (Item 31)
6. Transmitter receiver unit (Item 29)
7. Power unit, main, (Item 33)

(1) A relief valve, Part No. 512420 (Item 21), is fitted in the distributor chamber which provides an alternative exit route for the cabin air should the air routes through the radar cans become partially or fully blocked. For a full description of this valve, reference should be made to A. P. 4340, Vol. 1, Book 2, Sect. 6.

(2) Installation in the cabin. The radar equipment installed in the cabin is ventilated by cabin discharge air and is described in para. 26. The units installed in the cabin are as follows:-

1. Amplifier (scanner) (Item 7)
2. Indicator unit (Item 4)
3. Follower unit (Item 5)
4. Power unit (servo) (Item 6)
5. T. A. C. A. N. (Item 8)

47. The T. A. C. A. N. unit is ventilated by cabin air which is circulated by an axial flow blower Part No. 3PL. 181-237 (Item 9), via a ducting assembly; the installation is located in the cabin on the starboard side.

SERVICING

Tests required

48. The following tests are required:

(1) Proof pressure test to 5. 0 p. s. i, differential pressure. This test is to be carried out on each aircraft when completed and before pressurised flight, also when called for after a major modification or repair.

(2) Fuselage leak test. This test to be carried out after each proof pressure test, after any modification or repair to the fuselage pressure wall and after each 100 hours flying.

Safety precautions

49. When conducting the tests, the following safety precautions must be observed:-

(1) Under no circumstances may a differential pressure exceeding 2. 0 p. s. i. be applied inside a hangar until a proof pressure test to 5. 0 p. s. i. has been carried out.

(2) A proof pressure test must be carried out in the open, away from buildings, and adequate precautions must be taken to safeguard personnel taking part and in the vicinity.

(3) When it is necessary, before the proof pressure test, to inspect the fuselage while under a pressure greater than 2. 0 p. s. i. the pressure must be raised to one and one-third times that at which the inspection is required, held at that pressure for one minute,

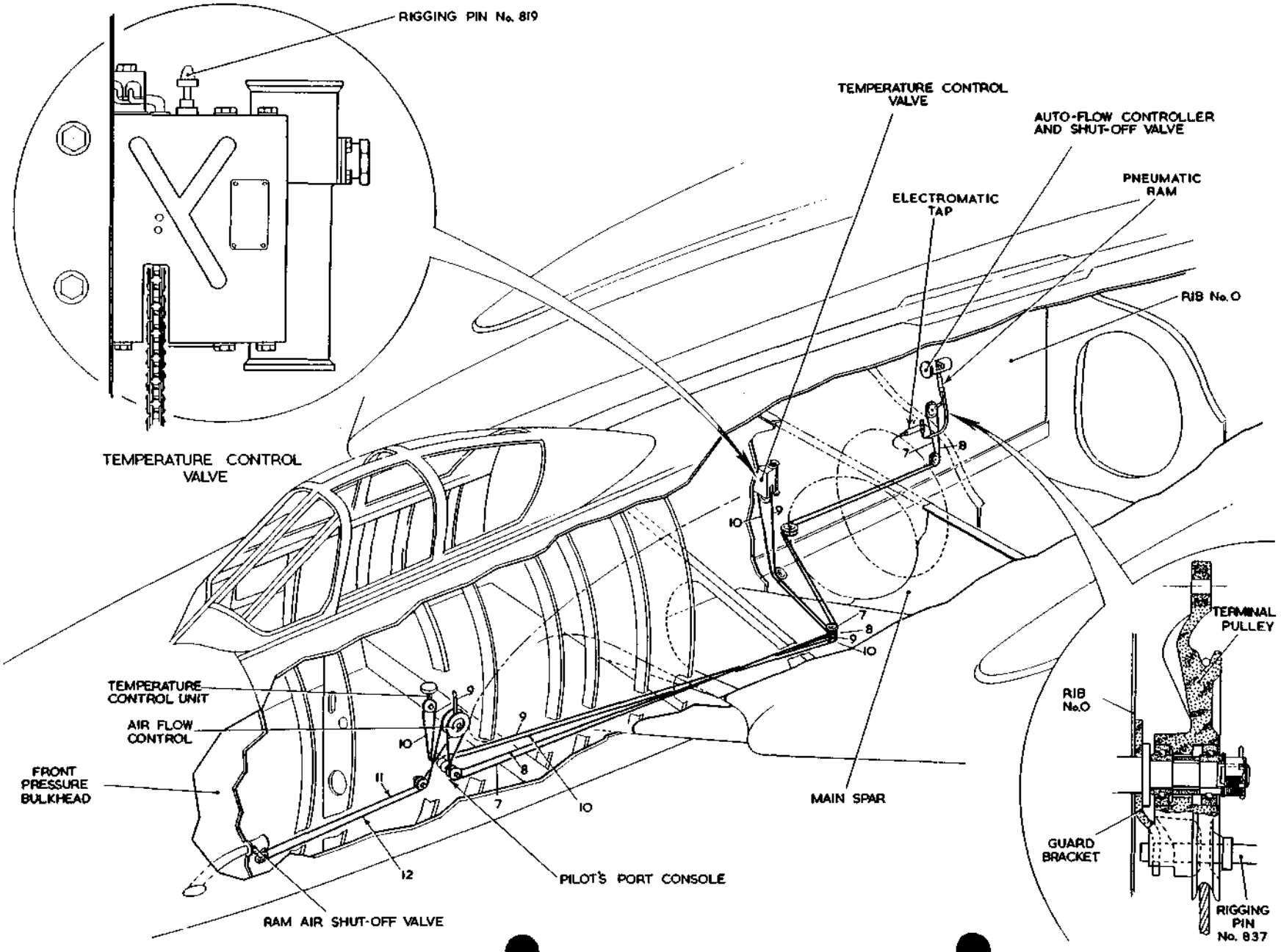
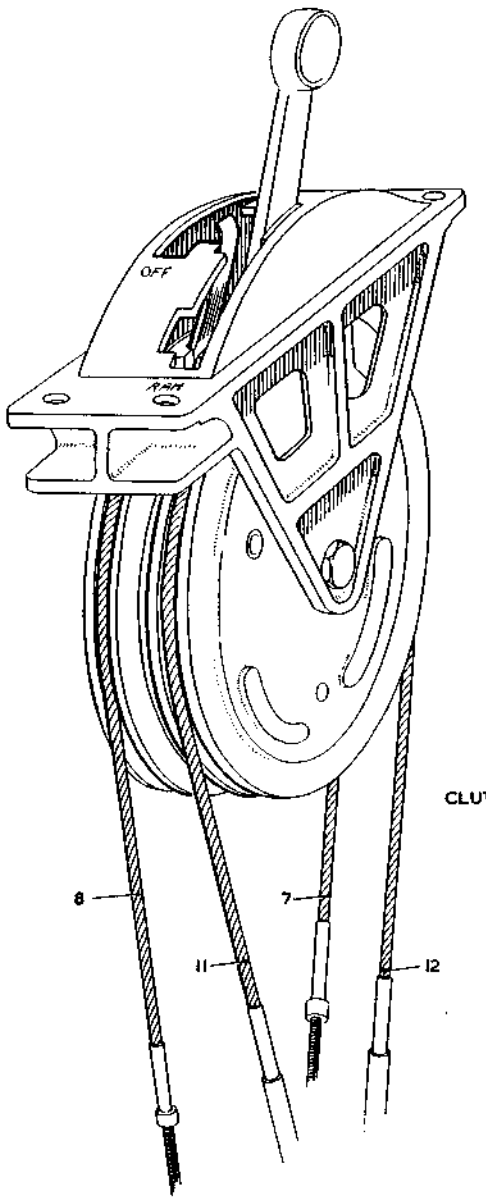
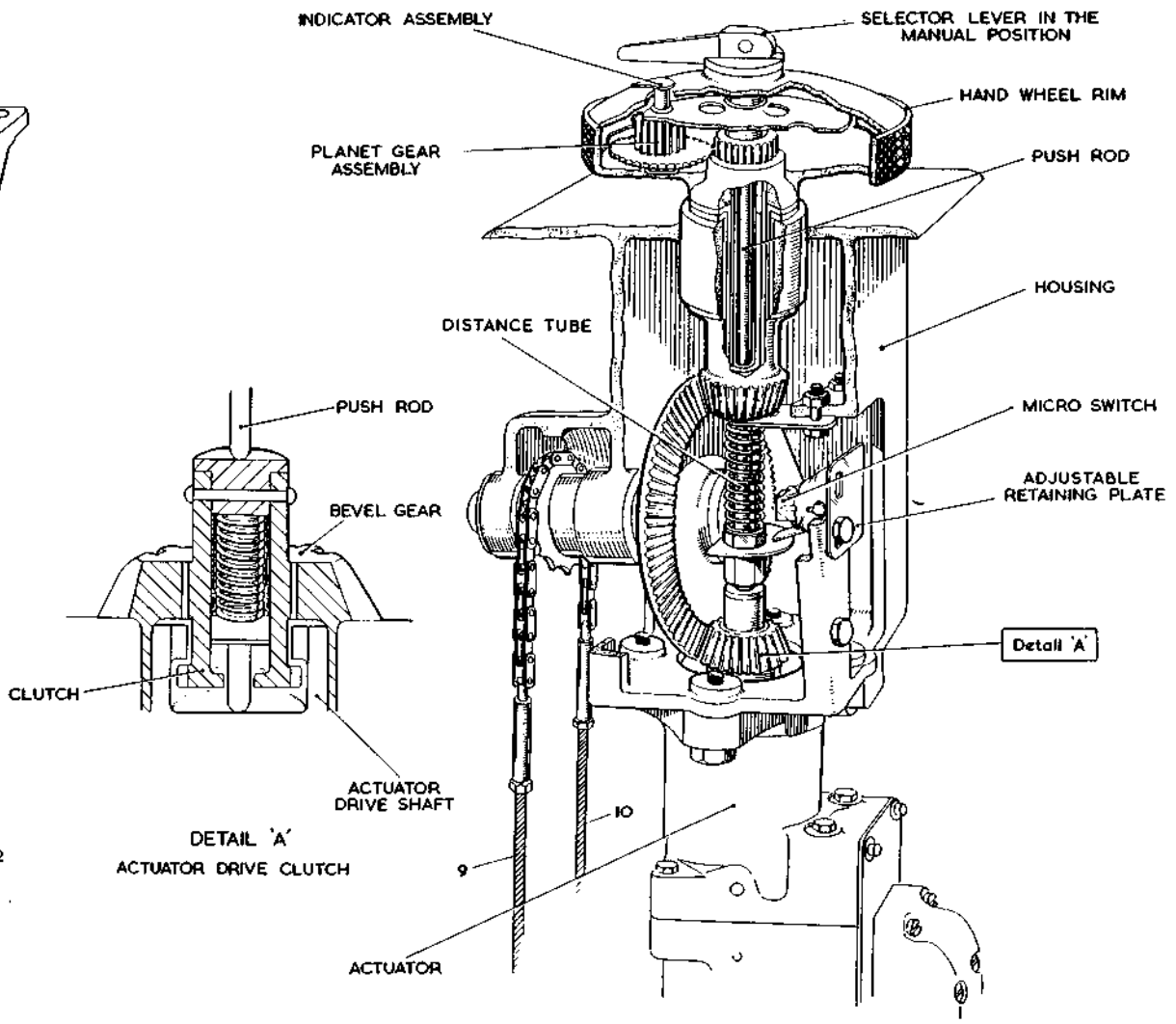


Fig. 6 Arrangement of air flow and temperature control installation



CABIN AIR FLOW CONTROL



TEMPERATURE CONTROL UNIT

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Fig. 7 Air flow control and temperature control unit

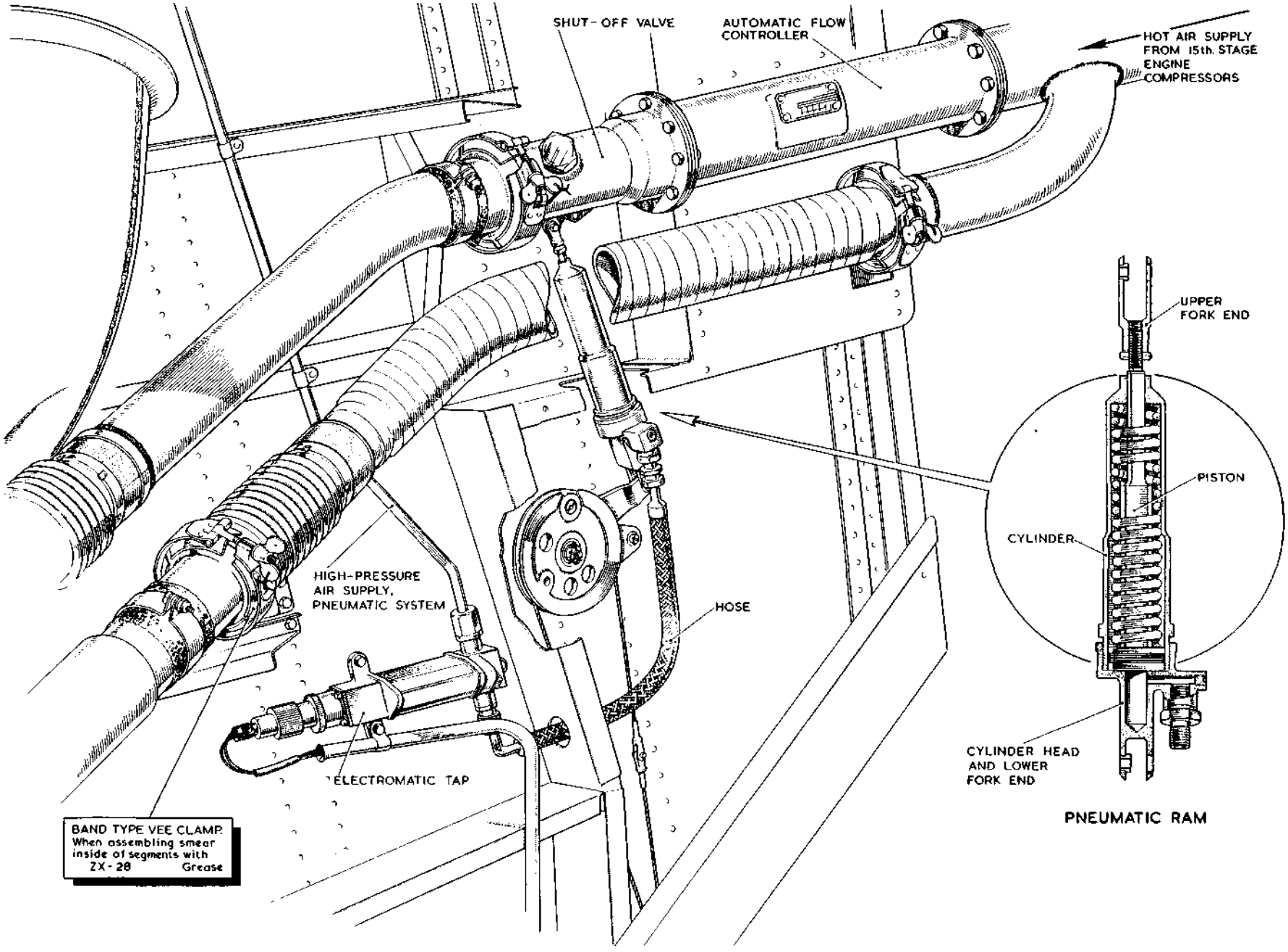

Fig.8 Electrical and pneumatic control of shut-off valve

and then reduced to the inspection pressure before the fuselage is approached. Under NO circumstances may the fuselage be inspected at a pressure greater than 3.7 p.s.i.

(4) Should the leak rate increase unduly, during any pressure test, as shown by a sudden change in the reading of the Rate of Climb Indicator, the pressure must be released and the fuselage inspected for damage before the test is continued.

(5) Make certain that the observer's hatch is properly locked shut by observation of the centralized warning panel through the canopy; therefore a 24 volt d.c. power supply must be provided for the warning system.

(6) Before carrying out a proof pressure test, safeguards should be provided to prevent serious damage should the observer's hatch blow open.

Note...
Should doubt exist as to the strength of the structure reference should be made to Vol. 6.

Pre-test procedure

50. The pre-test procedure is as follows:-

(1) Check that the shut-off valve and the ram air valve control lever is in the ON position.

(2) Ensure that all the openings in the fuselage are properly closed, i.e., pilot's canopy, observer's hatch, etc.

(3) If all or part of the radar equipment is not fitted, ensure that the false orifice blanking covers are fitted and that the hoses in the nose compartment are unobstructed.

(4) Connect an external air supply at 9.0 p.s.i. to the hood seal connection in the port boundary layer bleed. On completed aircraft with pneumatic bottles installed, the ON-OFF cock on the selector reducing valve (dive brake bay) is to be selected to the OFF position.

(5) Connect the external air supply to the pressure test connection in the port boundary layer bleed.

(6) Connect the following instruments to the instrument union in the port layer bleed:

Pressure gauge 0 to 10 p.s.i. or manometer.
Rate of Climb Indicator 0 to 4000 ft. per min.
The instrument panel must be fitted with a vibrator to prevent the instruments sticking.
The instruments must be accurately calibrated before use.

Note...
Duplicate instruments MUST be provided for proof pressure tests.

51. The following operation must be made before carrying out any tests above the controller GROUND TEST setting (2.90 p.s.i.):-

(1) Cabin leak rate tests: Remove the filter cap from the false static connection on the Type H controller and fit a test blanking assembly (Item G.6, Sect. 2, Chap. 4). Remove the blanking assembly and replace the filter cap after the test.

(2) Cabin proof pressure tests: Blank off the false static connection as in sub-para. (1) above, and replace the aircraft combined safety and inward relief valve, Part No. 512450, with a special proof test safety valve, Part No. 515960.

(3) After the above tests remove the test valve and replace the aircraft valve, also remove the blanking assembly and replace the filter cap.

Fuselage pressure test

52. To carry out a pressure test, proceed as follows:-

(1) Inflate the hood and hatch seals with air at 9.0 p.s.i.

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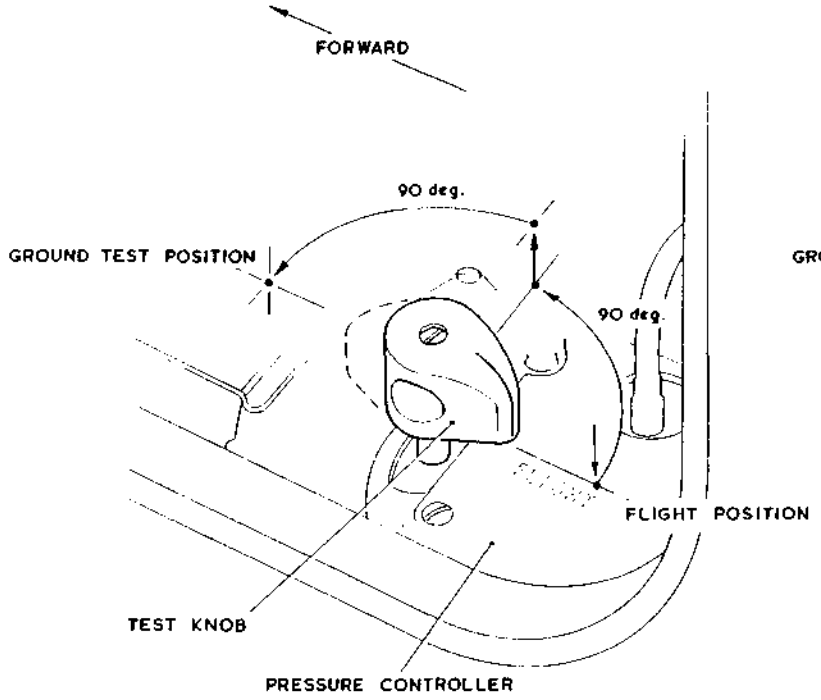
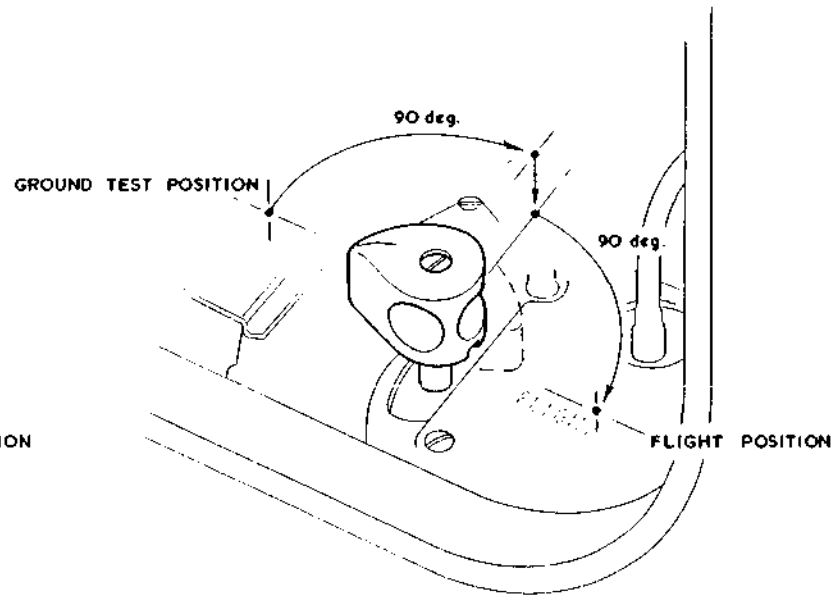


FLIGHT POSITION TO GROUND TEST POSITION

To set the knob from the FLIGHT position to the GROUND TEST position, proceed as follows:

(1) Press the knob downwards from its bayonet location and rotate in an *anti-clockwise* direction for 90 deg., when the knob will automatically spring up.

(2) Pull the knob upwards (no undue force is necessary) and continue to rotate in the *anti-clockwise* direction for 90 deg. where the GROUND TEST position is located in a bayonet fixing (180 deg. from the FLIGHT position).



GROUND TEST POSITION TO FLIGHT POSITION

To set the knob from the GROUND TEST position to the FLIGHT position, proceed as follows:

(1) Rotate the knob in a *clockwise* direction for 90 deg.

(2) Press the knob downwards and continue to rotate in the *clockwise* direction for 90 deg. where the FLIGHT position is located in a bayonet fixing.

Note...
The ground test knob should NEVER be rotated in an *anti-clockwise* direction when re-setting from the GROUND TEST position to the FLIGHT position.

Fig. 9 Test knob setting procedure. Pressure controller, Type H

(2) Inflate the fuselage to the test pressure required at a maximum rate of change in the cabin of 2000 ft. per min. Hold the cabin at the pressure required and then deflate the cabin at the same maximum rate.

(3) When carrying out a proof pressure test, the cabin pressure must be maintained at 5.0 p. s. i. for one minute and then deflated.

(4) Under no circumstances may the pressure be taken above 5.0 p. s. i. at any time.

(5) Deflate the hood and hatch seals

Fuselage leak test

53. To carry out a leak test, proceed as follows:-

(1) Inflate the hood and hatch seals as in para. 52(1).

(2) Inflate the fuselage as in para. 52(2) to 3.7 p. s. i.

(3) Shut off the air supply and allow the cabin pressure to fall under its own leak rate, measuring the time taken for the pressure to fall from 3.5 p. s. i. to 1.75 p. s. i. This must not be less than 30 seconds.

(4) Totally deflate the cabin.

(5) Deflate the hood and hatch seals.

Pressure controller and discharge valve functioning test

54. To carry out a pressure controller and discharge valve functioning test (in situ), proceed as follows:-

(1) Set the knob of the pressure controller (fig. 9) from the FLIGHT to the GROUND TEST position.

(2) Inflate the hood and hatch seals as in para. 52(1).

(3) Inflate the fuselage as in para. 52(2) and check that the fuselage pressure stabilises at 2.9 to 3.23 p. s. i.

(4) Shut off the air supply and deflate the fuselage and the seals.

(5) Return the pressure controller knob (fig. 9) from the GROUND TEST position to the FLIGHT position.

Hood and hatch seals, proof pressure and leak tests

55. To carry out proof pressure and leak testing of the hood and hatch proceed as follows:-

(1) Connect an external air supply to the seal test connection in the port boundary layer bleed using the test rig.

◀(2) Disconnect the outlet pipe from the seal supply pressure reducing valve and blank off the pipeline with a cone plug, Part No. AGS 1143/B

(3) Close the sliding hood and observer's hatch, l and inflate the seals to 17.5 p. s. i. and hold for one minute. Check the system for obvious leakage.

(4) Turn off the air supply, and check the time for the pressure to drop from 9 p. s. i. to 8 p. s. i. The minimum permissible time is 90 secs.

(5) Remove the test rig, and refit the blanking cap to the test connection.

(6) Remove the blanking cone from the pipeline, and reconnect the pipeline to the reducing valve. ▶

Ram air shut-off valve rigging

56. The rigging procedure for the ram air shut-off valve is as follows:-

(1) Select the cabin air supply control lever to the OFF position on the pilot's port console.

(2) Close the valve by pulling the inboard chain, which rotates the valve clockwise when viewed from above, until the stop is reached.

(3) Connect the cable runs No. 11 and 12 and tension to 20 lb.

Hot air supply shut-off valve rigging

57. The rigging procedure for the cabin hot air supply shut-off valve is as follows:-

(1) Select the cabin air supply control lever to the OFF position on the pilot's port console.

(2) Insert the rigging pin No. 5265 into the terminal pulley and bracket (fig. 6).

(3) Connect the cable runs No. 7 and 8 and tension to 20 lb.

(4) With the pneumatic ram disconnected, turn the shut-off valve lever in the clockwise direction until the valve is closed. Adjust the length of the pneumatic ram to suit and connect up.

(5) Remove the rigging pin.

◀ (6) Select cockpit lever to ON, and rotate the pulley eccentric stop until the stop just touches the pulley lever. ▶

Cabin temperature control valve test and rigging

58. The cabin temperature valve may be controlled by the two methods given below.

(1) Manual operation.

(a) Check that the control is correctly rigged (para. 74).

(b) Set the lever on the hand wheel to the MANUAL position and check that the actuator motor is fully declutched.

(c) Wind the manual control wheel rim over the full range each way and check that the valve operates in the correct sense and without any undue effort.

(2) Automatic operation

(a) With the actuator motor clutch engaged and the automatic controller switched ON, select FULL HOT position on the temperature selector switch in the cabin and check that the valve moves to the fully open position.

(b) Select FULL COLD and check that the valve moves to the fully closed position.

Combined inward relief and safety valve

59. These must be checked in the following manner:-

◀ (1) Safety valve. Prepare the aircraft as for the cabin proof test, but with the standard aircraft safety valve fitted (para. 51). Pressurise the cabin and check that the safety valve relieves fully at 3.7 p.s.i. (A small leak is permissible at 3.5 p.s.i.). ▶

(2) Inward relief valve. Check that the inward relief valve is free to open by pressing on the outside of the valve head.

Pressure controller, discharge valve and radar cooling by-pass valve operation

60. These must be checked as follows:-

(1) Prepare the aircraft as described in para. 50(1) to para. 50(6) inclusive. Pressurise the cabin with an airflow of 40 lb. per min. and check that the cabin differential pressure does not exceed 0.9 p.s.i.

Note...

This check may be carried out at maximum engine r.p.m. during the ground engine run (para. 63).

Ground cooling of the radar equipment

61. Connect the ground cooling trolley (item H4, Sect. 2, Chap. 4) to the 2 in. connector on the starboard side of the cabin fuselage wall and check that cooling air flows from all radar units installed in the cabin and nose compartment. Check that air does not flow into the cabin via the radar cooling by-pass valve, or flow into

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the nose compartment via the air distributor relief valve.

Clearing of the air conditioning system upstream of the cold air unit

◀62. Whenever work has been carried out or when component failure has occurred upstream of the cold air unit, and when the cold air unit has been changed because of damage by foreign matter, the supply ducts must be blown through, to remove loose particles, as follows :-▶

(1) Disconnect the starboard pipe assembly at the heat exchanger connection, slacken the connection at the cold air unit, and swing the pipe upwards to clear the heat exchanger connection. Disconnect the port pipe assembly at the cold air unit and heat exchanger connections by slackening the pipe clamps and swinging the pipe clear of the cold air unit and heat exchanger connections.

(2) Blow through the system from each of the engine compressor tapping hoses with a minimum air mass flow of 40 lb. per min. for one minute. This flow may be obtained by running each engine in turn at maximum r.p.m.

(3) Reassemble the starboard pipe assembly at the heat exchanger and cold air unit connections and tighten the clamps.

(4) Reassemble the port pipe assembly at the cold air unit and heat exchanger connections and tighten the clamps.

(5) Pipe joints which have been broken for servicing reasons must be taped immediately and the pipes, when refitted, must be free of foreign matter.

◀Temperature control tests▶

Note...
The usual engine ground running precautions are to be taken during the period of the tests; reference should be made to Sect. 2, Chap. 2.

◀63. The tests are made to check the functioning of the equipment under operating pressures and temperatures during engine runs. The systems are▶ to have instruments fitted to measure the air temperature in the cabin inlet duct, cabin differential pressure and the outside air temperature. The air temperature in the cabin inlet duct must not be less than 0°C, nor more than 100°C, the cabin differential pressure must not exceed 0·9 p.s.i. and with the temperature control lever set in the AUTO position, temperature should be within the following ranges :-

+ 5° setting	-	0°C to 25°C
+50° setting	-	45°C to 50°C
+95° setting	-	90°C to 100°C

◀64. To make the functional tests, set▶ the cabin air valve control lever to the OFF position, and the temperature control lever to the MANUAL position. Operate the hand wheel rim to the mid-position (given by the indicator on the hand wheel dial). Start one engine, run at ground idling speed, and then proceed as follows :-

(1) Close the observer's hatch and the pilot's hood. Set the cabin air valve control lever to the ON position and wait for the temperature to stabilise. Rotate the temperature control hand wheel rim to the full HOT position and note the readings. Repeat the operation with the hand wheel control set in the full COLD position.

(2) Set the temperature control lever to the AUTO position, switch on the automatic controller and check the operation by selecting full HOT and full COLD and noting the temperature readings.

(3) Set the temperature controller to +5°C and take readings at 75% and maximum engine r.p.m. of the cabin inlet temperature and differential pressure.

(4) Set the temperature controller to +50°C and take readings at 50% engine r.p.m. of the cabin inlet temperature and differential pressure.

(5) Set the temperature controller to +95°C and take readings at 50%

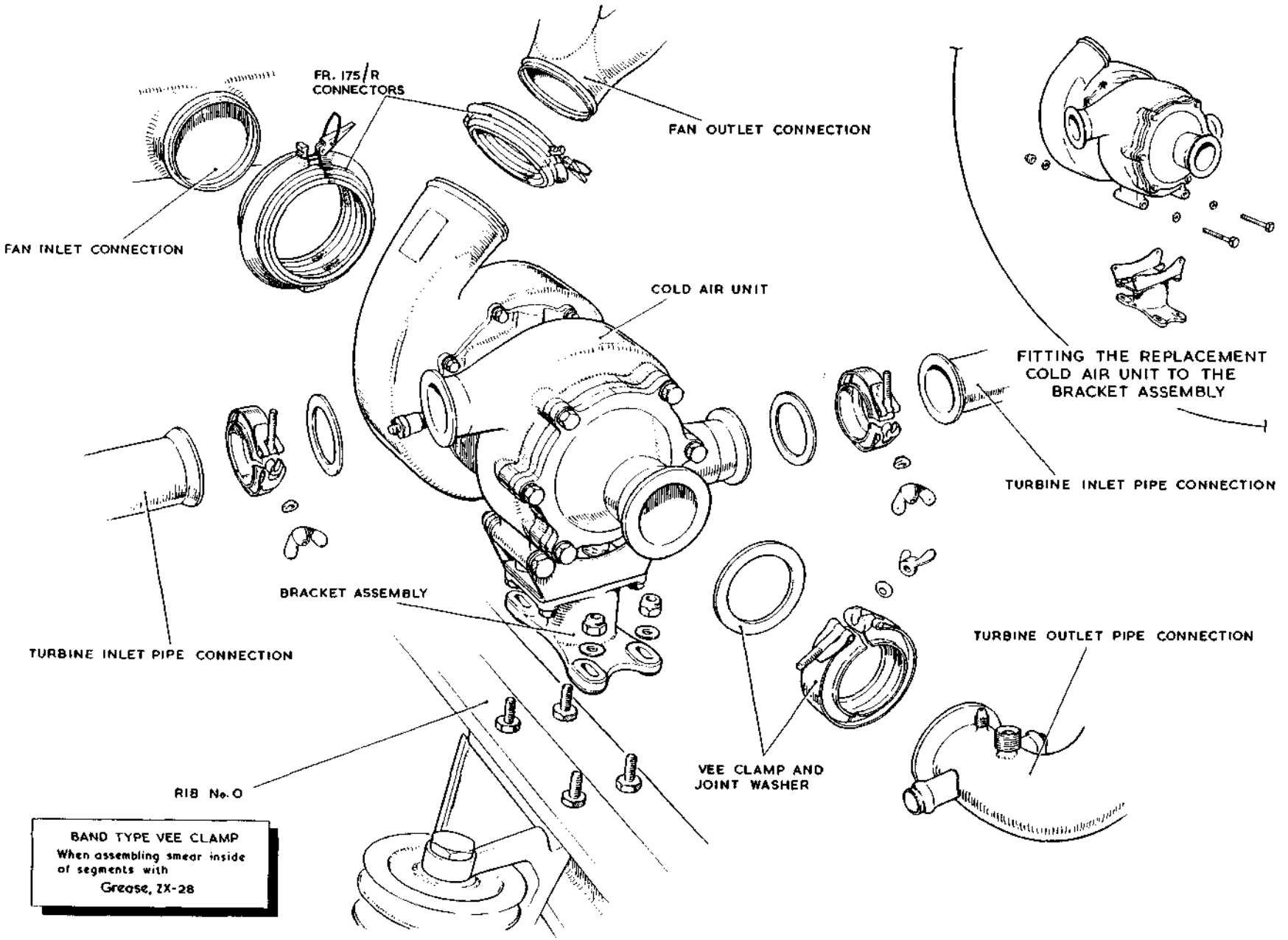

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Fig. 10 Cold air unit removal

◄ Turbine outlet pipe connections modified ►

RESTRICTED

and maximum r.p.m. of the cabin inlet temperature and differential pressure. (Canopy may be opened to ease discomfort of test personnel).

Note...
Ensure that para 50(3) is complied with before starting the engine run.

Firestreak heating package
65. The design and construction of the heating package is such that the need for servicing is precluded; however, after completion of the specified flying hours, the heating package must be removed from the aircraft and returned to the manufacturer for overhaul.

Hot air supply to the
missile pylons
66. The following operations must be carried out to check the supply of hot air to the missiles :-

(1) Fit test boxes (A.I.T.S.) to the base of the four missile pylons.

(2) Start both engines from cold, and then raise the engine speed of both engines to 70%.

(3) Read the pressure gauges (0 to 30 p.s.i. range)on all test boxes as soon as the engine speed has been achieved. The pressure should not be less than 5·0 p.s.i. The temperature reading on the pylon test boxes is to be ignored since the conditions during ground check are transient.

(4) Continue running the engines at 70% speed and note that the ball cock of the heating pack shuts off the missile supply, this being indicated by the gauge readings falling to zero.

(5) Remove the test boxes from the pylons.

Pilot's and observer's
anti-g valve check
◀67. The pilot's and observer's anti-g valves may be checked, whilst the engines are running, as follows :-

(1) Depress the test button on the anti-g valves (use the test lever on the pilot's anti-g valve when mod. 534 is embodied).

(2) Check for a flow of air from the seat connectors in the high and low gradient positions.▶

REMOVAL AND INSTALLATION

General
68. The procedure for removal and installation of most of the air conditioning equipment will be readily apparent when the components are seen on the aircraft. Extreme cleanliness is essential during these operations especially with regard to the cold air unit, where the ingress of foreign matter may damage the turbine blades under conditions of high speed rotation.

Band type Vee-clamp assemblies
69. Sound joints are essential and, on assembly of a clamp band, the inside of the segments should be smeared with Grease, ZX-28 to ensure even tightening up. The wing nut must be tightened by hand only, pliers or any other kind of tool must not be used to obtain more purchase. Over-tightening will result in a deformation of the clamp band. Finally lock the wing nut with non-corrodible steel wire, 22 S.W.G.

Cold air unit removal (Fig.10)
70. The removal procedure is as follows :-

(1) Remove the four engine access panels located over Zone A, port and starboard panels No.5,(Sect.4, Chap.1, Fig.1).

(2) Remove the top detachable air intake sections for access, port ◀and starboard using special spanner (Item K62, Sect.2, Chap.4).▶

(3) Fit the segment blanks to the engine air entry casings (6 per engine).

(4) Disconnect the fan inlet and outlet connections. Ease the rubber connections on to the inlet and outlet pipes of the airframe.

◀(5) Disconnect the three Vee-▶ clamps on the turbine inlet and outlet connections.

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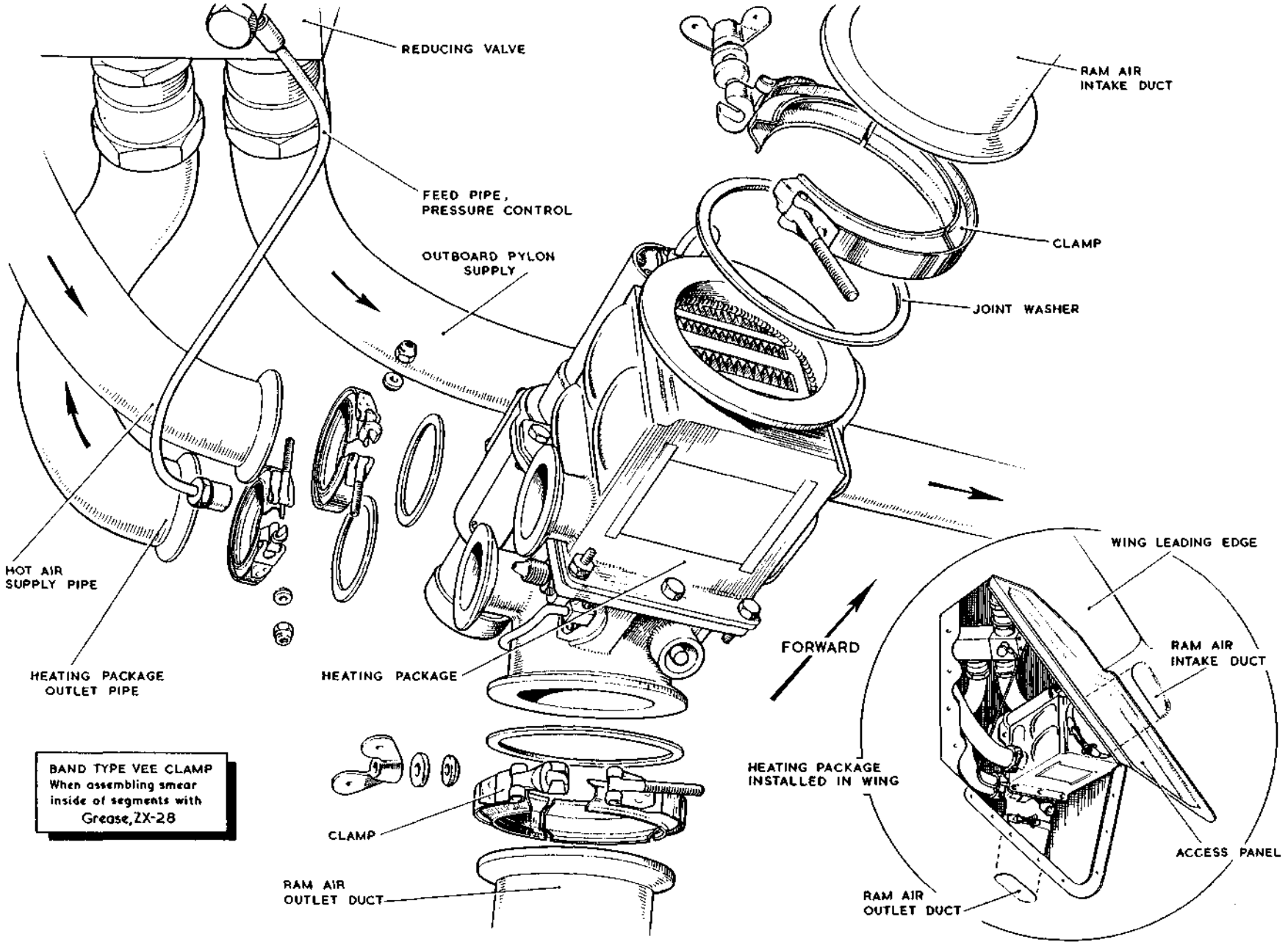

Fig. 11 Firestreak heating package removal, port

(6) The cold air unit is mounted on a bracket assembly which in turn is attached to rib No.0 by four studs and self-locking nuts. Remove the self-locking nuts and washers, and lift clear the cold air unit with the bracket assembly attached.

(7) Blank off the inlet and outlet pipes with suitable blanks.

(8) Remove the bracket assembly from the cold air unit, and mark the forward face to ensure the correct position when installing.

Cold air unit installation (Fig.10)

◀ Note...

(1) When a cold air unit has failed, the water extractor must be stripped and examined in accordance with A.P.4340, Vol.1, Book 2.

(2) If the duct upstream of the cold air unit has been contaminated, the duct must be blown through as described in para.62 before the cold air unit is installed.

71. Install the cold air unit as follows :-

(1) Stand the cold air unit on the turbine outlet and fan inlet flanges, for 15 min. in each position, to lubricate the bearings.

(2) Fit the bracket assembly to the cold air unit.

(3) Remove blanks from the cold air unit and pipelines.

(4) Fit the cold air unit to the mounting studs. Leave the nuts loose to allow for movement in the slotted holes.

(5) Adjust the cold air unit to give 0·1 in. clearance between the pipes at the fan inlet and outlet connections, then fit the rubber seals.

(6) Line up the turbine inlet and outlet connections and fit the sealing rings and Vee-clamps as described in para.69.

(7) Fit the seal housings and clamp rings to the fan connections.

(8) Tighten the mounting nuts.

(9) Remove the engine air entry casing blanks.

(10) Check the air intake ducts for serviceability and for freedom from loose articles.

(11) Refit the detachable air intake duct panels (smear the mating faces with grease, XG-285, and tighten down to leave a clearance of 0·01 - 0·02 in. between the mating surfaces).

(12) Refit the engine access panels. ▶

Cabin air temperature actuator removal

72. The procedure for removing the cabin temperature actuator from the aircraft is as follows :-

(1) Remove the four engine access panels located over Zone A, port and starboard panels No.5, (Sect. 4, Chap.1, Fig.1).

(2) Remove the top detachable air intake sections for access, port ◀ and starboard, using special spanner (Item K62, Sect.2, Chap. 4). ▶

(3) Fit the segment blanks to the engine air entry casing (6 per engine).

(4) Remove the air conditioning pipe which connects the temperature control valve to the water extractor.

(5) Disconnect the operating cables from the chains at the temperature control valve and secure by attaching two lengths of cord.

(6) Remove the observer's hatch and ejection seat.

(7) Remove such items of equipment beneath the master reference gyro platform to enable the operator to gain access to the rear of the pilot's port console.

(8) Remove the pilot's ejection seat and canopy, (Sect.3, Chap. 11), this, whilst not essential, will simplify the work.

(9) Remove the pilot's anti-g valve (pre mod. 439).

(10) Remove panel No.82, (Sect.2, Chap.4, Fig.7).

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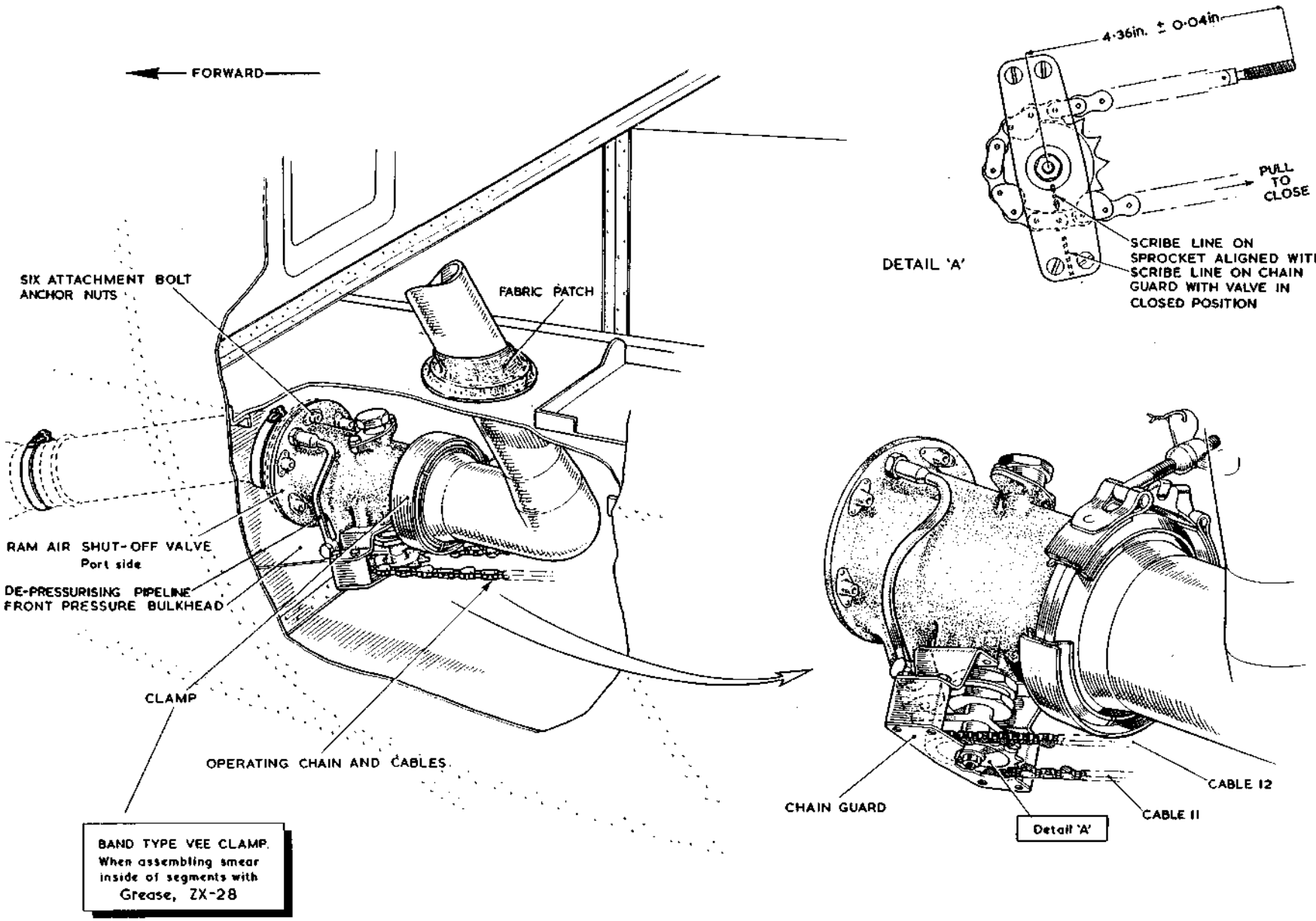

Fig. 12 Removal of ram air shut-off valve

◀ Additional annotation ▶

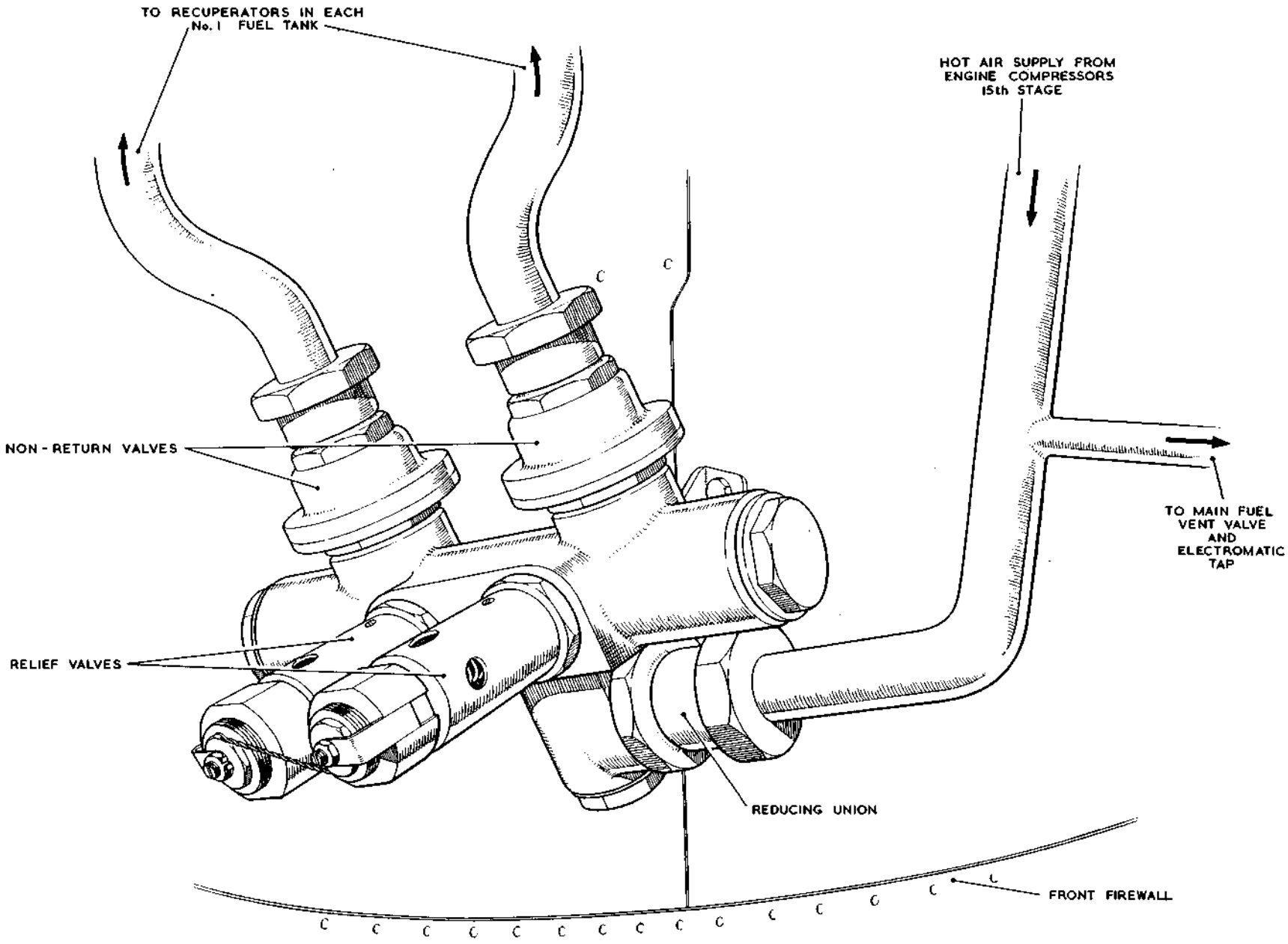

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Fig. 13 Air distributor

(11) Remove the guard, fitted over the electrical cables at the rear of the pilot's console. (The guard partly covers the actuator mounting).

(12) Disconnect the electrical cables at terminal block DN, (through panel 82) and uncleat them from the two P clips in the rear of the pilot's console.

(13) Disconnect the electrical plug at the actuator.

(14) Remove the four securing screws and tilt the temperature control unit clear of the console sufficiently to detach the actuator. Feed the operating cables through whilst doing this.

Cabin air temperature actuator replacement

73. The procedure for replacing the cabin temperature actuator in the aircraft is as follows:-

(1) Replace the actuator in the reverse order to that for its removal.

(2) Connect the cables but do not tension.

(3) Carefully check the run of the cables.

Cabin air temperature control run rigging (fig. 6)

74. The procedure for rigging the cabin air temperature control run is as follows:-

(1) Place the temperature control valve in neutral and insert the rigging pin No. 819, Item F5, (Sect. 2, Chap. 4).

(2) Set the indicator on the temperature selector unit to MANUAL and the cabin control to the mid-position.

(3) Hold the temperature control valve and the cabin control in the NEUTRAL position and tension the cables to 20 lb.

(4) Select MANUAL and rotate the hand wheel to full HOT and then to full COLD. Ensure by listening at the temperature control valve that, just before the indicator reaches the full HOT and COLD positions (up to 0.1 in. before), the limit micro switches make.

(5) Select AUTO and with a 28 volt supply connected, operate the cabin temperature rheostat and check the electrical operation of the control.

Firestreak heating package removal (fig. 11)

75. Heating packages are handed port and starboard and are not therefore, interchangeable. The procedure for removing a heating package (port or starboard) is as follows:-

(1) Access is gained through the panel No. 150, (Sect. 2, Chap. 4, fig. 7).

(2) Remove the clamp on the hot air supply pipe to the heating package.

(3) Disconnect and remove the feed pipe from the reducing valve to the heating package.

(4) Remove the clamps on the outlet pipe from the heating package to the reducing valve.

(5) Remove the clamps at the ram air inlet and outlet joints to the heat exchanger.

(6) Withdraw the heating package downwards through the access panel.

Firestreak heating package replacement (fig. 11)

76. When removed from storage, the replacement heating package must be inspected for damage prior to installation on the aircraft. The procedure for replacing a heating package (port or starboard) is as follows:-

(1) Inspect the seals on the joints between the inlet and outlet pipes to the heat exchanger of the package.

(2) Clean the flanges of the aircraft ducts.

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(3) Remove the blanking covers from the ram air and charge air inlet and outlet ducts of the heating package, and clean the flanges.

(4) Clean and inspect the inlet union for the charge air to the shut-off assembly.

(5) Install the heating package in the aircraft in the reverse order to that of removal.

77. After the installation of a heating package, the rate of flow and temperature of the hot air supply to the pylons must be checked by the use of test sets which incorporate adapters for coupling to the pylons. The test procedure is given in para.66.

Ram air shut-off valve removal (Fig.12)

◀78. Remove the ram air shut-off valve as follows :-

(1) Remove the access panel, in the pilot's cockpit floor, adjacent to the valve.

(2) Place the ram air valve control lever in the OFF position.

(3) In the nose bay, remove the six bolts securing the valve to the bulkhead (retain the gasket between the pipe assembly and bulkhead).

(4) Disconnect the pipeline to the pressure controller, and remove the Vee-clamp (retain the gasket and sealing ring).

(5) Disconnect the cables, and remove the valve complete with chain.

Ram air shut-off valve installation

Note...
If a new valve is to be fitted, it should be to mod.1093 standard with the sprocket and chain assembled with the valve. If the original valve is being refitted, check that the chain and sprocket are fitted in the position shown in detail 'A', Fig.12, with the valve closed.

79. Install the valve as follows :-

(1) Check that the cables are not twisted, then connect the cables to the chain.

(2) Refit the valve in the reverse order to that of removal, ensuring that :-

(a) The depressurising pipe is aligned with the hole in the bulkhead.

(b) The gaskets and sealing ring are refitted.

(c) The Vee-clamp is lightly lubricated with grease, ZX-28.

(3) Rig the control as described in para.56, and check for full and free movement.▶

(Fig.14 overleaf)

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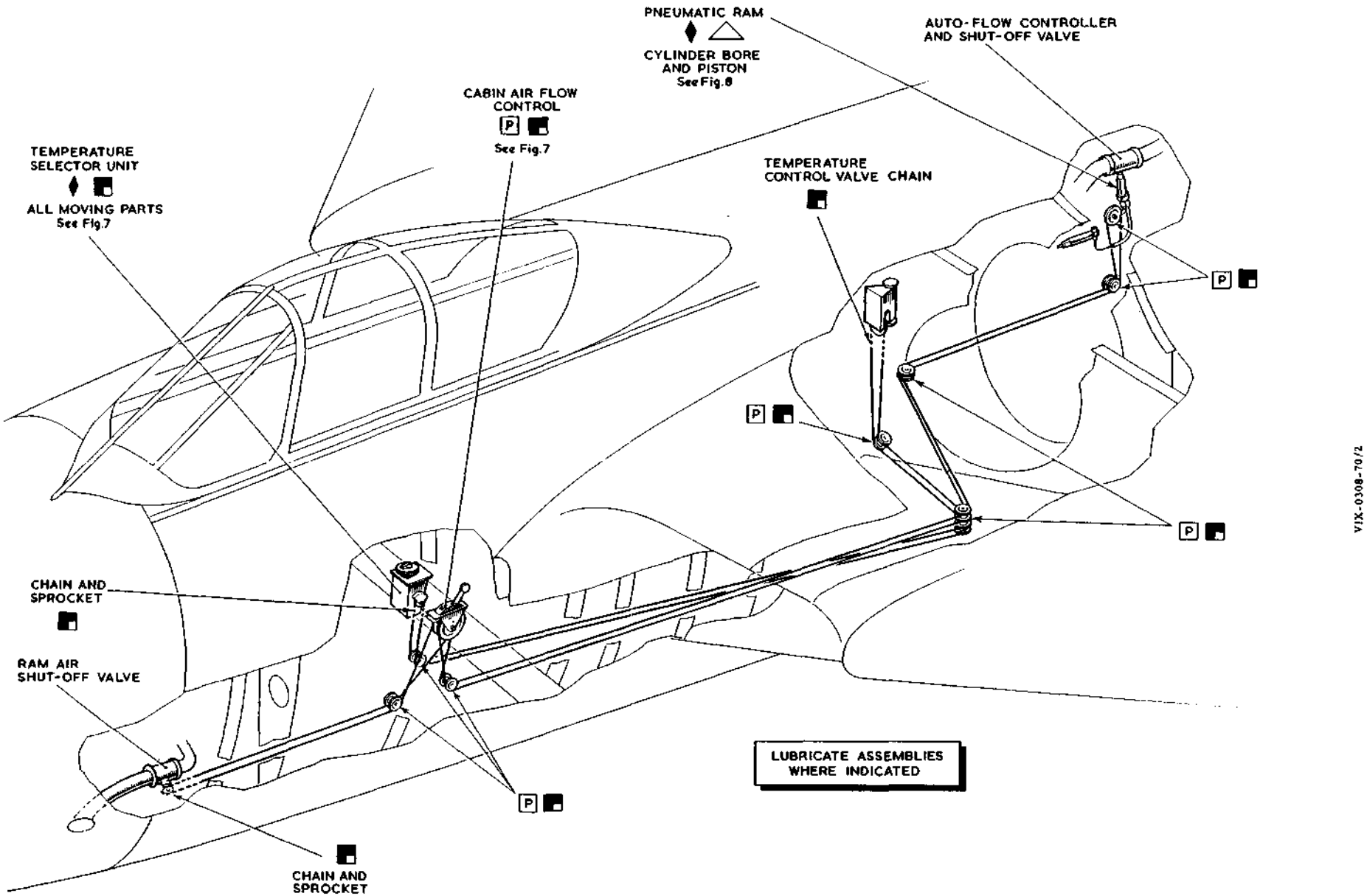

Fig. 14 Lubrication—Air flow and temperature control installation

◀Symbols amended▶

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