Chapter 8 AIR CONDITIONING SYSTEM

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LIST OF ILLUSTRATIONS

DESCRIPTION AND OPERATION

Introduction

1. The aircraft is provided with an air conditioned and pressurized cabin, pressure air being obtained from the engine compressor. A switch in the cabin is provided to select pressurization, the OFF position enabling ram air, received from an air scoop in the nose of the aircraft, to be used in lieu of engine pressure air if desired. Temperature control is effected by means of a temperature control switch, which is gated for HOTTER or COLDER air selections in manual, an intermediate position maintaining the selected condition. A fourth position provides for control in AUTO, temperature selection then being made by means of a temperature selector and maintained by a temperature controller.The cabin hood is equipped with a rubber seal which is automatically inflated from the engine supply when the hood is closed, and automatically deflated when the hood OPEN selection is made, partial deflation occurring before the hood actuation gear operates.

Engine air pressure system (*fig. 7*)

2. The air supply for cabin pressurization is taken from a restricted tapping on the engine compressor and is conveyed to a pre-cooler located on the port side of the fuselage. The pre-cooler reduces the temperature of the air to a permissible value. A by-pass valve (*para. 11*), piped to the air supply and the pre-cooler, permits the air to by-pass the pre-cooler under certain conditions of flight. From the pre-cooler the air passes through the by-pass valve to a motorized air supply valve (*para. 10*) for normal supply or for flood supply (*para. 4*). For normal (*or main*) feed, the air leaves the air supply valve to continue to a flow control valve (*para. 12*), from which it is conveyed either to a motorized temperature control valve (*para. 9*) or to the cold air unit. The cold air unit consists of a free-running compressor and a turbine mounted on one shaft, with an intercooler ducted in between them, the air passing to the compressor and thence via the intercooler to the turbine. The resulting cold air output from the turbine is piped forward to rejoin the air from the temperature control valve at a water separator, located below the rear decking aft of the hood, and the combined flow is delivered through a non-return valve to the cabin ventilation ducts. These ducts feed the feet sprays and sprays at the windscreen front lights, quarter-lights and at the sides of the hood.

3. Spent ventilation air is expelled from the cabin through a combined valve unit, mounted on the front face of frame 6. The outlet from this valve is shrouded. On Mk. 8 aircraft, piping in the nose of the aircraft, downstream of the shroud, permits the waste air to circulate in jackets around the radar equipment for cooling purposes before it is finally discharged to atmosphere. On Mk. 8B and 8C aircraft, the waste air is piped to cool the TACAN equipment.

WARNING

It is imperative that nothing covers, or even partially covers, the protective grid of the combined valve unit, thereby preventing free access of spent ventilation air to the outer body of the valve. Failure to observe this precaution may lead to an excessive build-up of pressure in the cabin resulting in a structural failure.

4. Flood air from the air supply valve is fed into the outlet duct from the cold air unit. The feed is automatically obtained whenever the cabin altitude exceeds 38000 feet by the operation of an altitude switch *(Sect. 5, Chap. 1)* which opens the air supply valve to the FLOOD position to prevent low cabin pressure at this altitude. Flood air may also be obtained manually to provide hot air for demisting purposes, by placing the flood switch in the cabin to the MANUAL position.

5. A cabin pressure controller is installed in the cabin on the rear face of frame 6. The controller, which operates the combined valve units, commences pressurization at 10000 feet and the full 3½ lbf/in^2 differential is built up at 25000 feet and above.

Ram air supply

6. An alternative air supply for emergency cabin ventilation is provided from a forward facing air scoop situated in the camera gun vision cone in the front fuselage nose piece. From the scoop, the air passes through a ram air shut-off valve, mounted on the rear face of frame 6, and thence into the cabin. The shut-off valve is pneumatically-operated via a solenoid from a tapping off the main engine supply. In circumstances which entail positive isolation of the engine air pressurization supply, ram air induction is further assisted by a pneumatically-operated extractor valve, mounted on a diaphragm aft of the hood, which operates in conjunction with the ram air shut-off valve and directs outflow of spent air to a region of low pressure. This condition is obtained by placing the cabin pressure switch to OFF, thus closing the air supply valve and allowing the extractor valve to open. The hood seal is kept inflated to prevent the noise of air leakage at the hood joint. Ram air from a forward facing scoop on the radio bay access door is piped into the fuselage to cool the inverters.

Hood seal

7. A pneumatic rubber seal is mounted on the perimeter members of the cabin hood. A common air supply for the seal, the ram air valve and extractor valve is taken from a tapping downstream of the pre-cooler. The air passes to a combination of non-return valve and reducing valve, incorporating a safety blow-off, which are located on the diaphragm aft of the hood and maintain the supply to the seal at a pressure of 8 lbf/in^2 above cabin datum pressure. From the reducing valve, the supply is branched off via a solenoid valve to the ram air and extractor valves and via a de-seal valve to the hood seal. When the hood is closed, the seal adapter mates with a connector on the line ◀ from the de-seal valve. The de-seal valve is solenoid operated and is open when the solenoid is de-energized thus ensuring that the seal is inflated when the hood is closed and remains inflated if the electrical power fails. The closing of the air supply valve does not affect the seal. The de-seal valve solenoid is energized to the closed position by selecting the internal hood control switch or the external hood control switch to OPEN. This closes off the pressurizing air supply to the seal and vents the seal to atmosphere, a time delay in the electrical circuit ensuring that the seal is deflated before the hood commences to open. ▶ The valve also incorporates a mechanical override which, operating in conjunction with the hood jettison gear, provides for seal deflation prior to jettisoning the hood. *(It is recommended that the cabin pressure switch is set to* OFF *before jettisoning the hood).*

Cabin air extractor valve *(fig. 1)*

8. This valve is fitted on the diaphragm aft of the hood. It is operated pneumatically via a solenoid from a tapping off the main engine supply and is automatically opened when the air supply valve is closed. If the electrical power fails, the extractor valve remains closed. The valve operates in conjunction with the ram air shut-off valve *(para. 6)*.

Temperature control valve *(fig. 2)*

9. The temperature control valve, which is located adjacent to the water separator, consists of a valve body (A) which contains a spindle carrying the operating levers (C) which, in turn, engage with the split sleeve (D). The sleeve incorporates a specially shaped port giving a progressive opening of the valve. The actuator (B) is arranged to engage with the valve spindle for operation of the valve. A pinion on the valve spindle meshes with a separately mounted quadrant which operates, through linkage, a follow-up resistor. The resistor is part of a temperature controller *(para. 13)*.

Air supply valve (*fig.* 3)

10. The air supply valve is similar in construction to the temperature control valve (*para. 9*), except that an additional outlet port is provided for flood air. The valve is driven by an actuator which is operated by the control in the cabin for pressure 'ON' or 'OFF' and, for flood air, by an altitude switch or a manually-operated flood switch.

Pre-cooler by-pass valve (*fig.* 4)

11. This unit consists of a valve body (A) containing a spring-loaded sliding valve (D). The valve body incorporates two inlet ports (B and C), port (B) being connected to a pipe from the pre-cooler and port (C) to a pipe by-passing the pre-cooler. There is a common outlet port (E). According to the position of the sliding valve, the pressure air is either fed into the system direct or is by-passed through the pre-cooler. The position of the valve is dependent upon the pressure difference at the two ends of the valve body, one end being connected with the outlet pipe from the flow control valve (*para. 12*) and the other with the outlet duct from the cold air unit. When the pressure in the flow control valve outlet pipe is high, the by-pass valve is positioned so that the air supply is passed through the pre-cooler.

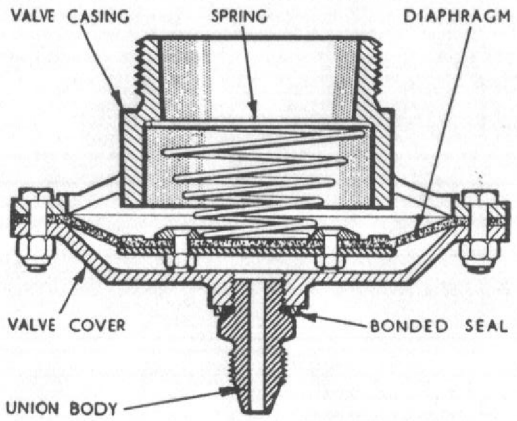

Fig. 1 Air extraction valve

Flow control valve

12. The flow control valve is installed adjacent to the inter-cooler. The purpose of the unit is to control the rate of flow of the air to the temperature control valve or the cold air unit. The inlet port of the control valve is connected with the normal outlet port of the air supply valve and the outlet port is connected to the temperature control valve and the cold air unit.

Controls

13. The cabin pressurization and air conditioning controls are grouped together in the cabin. The controls comprise a cabin pressure control switch, which is marked OFF/ON; a flood air flow switch, marked AUTO/MANUAL; a cabin temperature control switch, marked AUTO / COLDER / EMERGENCY/HOTTER and a cabin temperature selector, marked COOL/NORMAL/WARM. The cabin pressure switch controls the air supply valve actuator, the air extractor valve solenoid and the temperature control valve actuator. The air supply valve actuator is also controlled by the flood air flow switch, which gives manual control of flood operation irrespective of cabin altitude. The action of the cabin temperature control switch is such that, when it is in either the COLDER or the HOTTER position, the temperature control valve actuator closes or opens the valve, thus permitting manual control of the cabin temperature. The intermediate EMERGENCY position is used to maintain the temperature control valve in any chosen condition. With the switch placed in the AUTO position, temperature is selected by means of the cabin temperature selector. The selected temperature is then automatically controlled by a magnetic amplifier temperature controller, so that progressive alterations in temperature control valve opening are timed to damp out or suppress deviations in cabin temperature from the selected setting. When 'HOOD OPEN' is selected, provision is made for overriding the cabin pressure control switch, to close the air supply valve, and energize the solenoid to open the cabin air extractor valve. At the same time, the temperature control valve is closed. *It is recommended that the 'cabin pressure' switch is operated to OFF before jettisoning the hood.* For further information on the operation, electrical interconnection, relays, etc., reference should be made to Sect. 5, Chap. 1.

Visual warning of loss of pressure

14. Warning of loss of cabin pressure is given visually by means of a warning lamp in the cabin. The lamp is operated by electrical contacts in the pressure controller (*para. 5*), whenever the cabin pressure differential falls by approximately 1 lb/in² below nominal datum. A cabin pressure warning switch, marked TEST/NORMAL, is provided to test the warning lamp and flood circuits. For further information on the warning system, reference should be made to Sect. 5, Chap. 1.

Ground test connections

15. Provision is made for ground testing the system using an external supply. The equipment consists of the following:—

(1) A connection, for ground pressurization of the cabin, which is accessible after removal of the nose piece (*Sect. 3, Chap. 1*).

(2) A switch, for external operation of the hood, located in the nose wheel bay.

(3) A connection for hood seal inflation from an external source and a connection for a pressure gauge, both of which are accessible via the nose wheel bay.

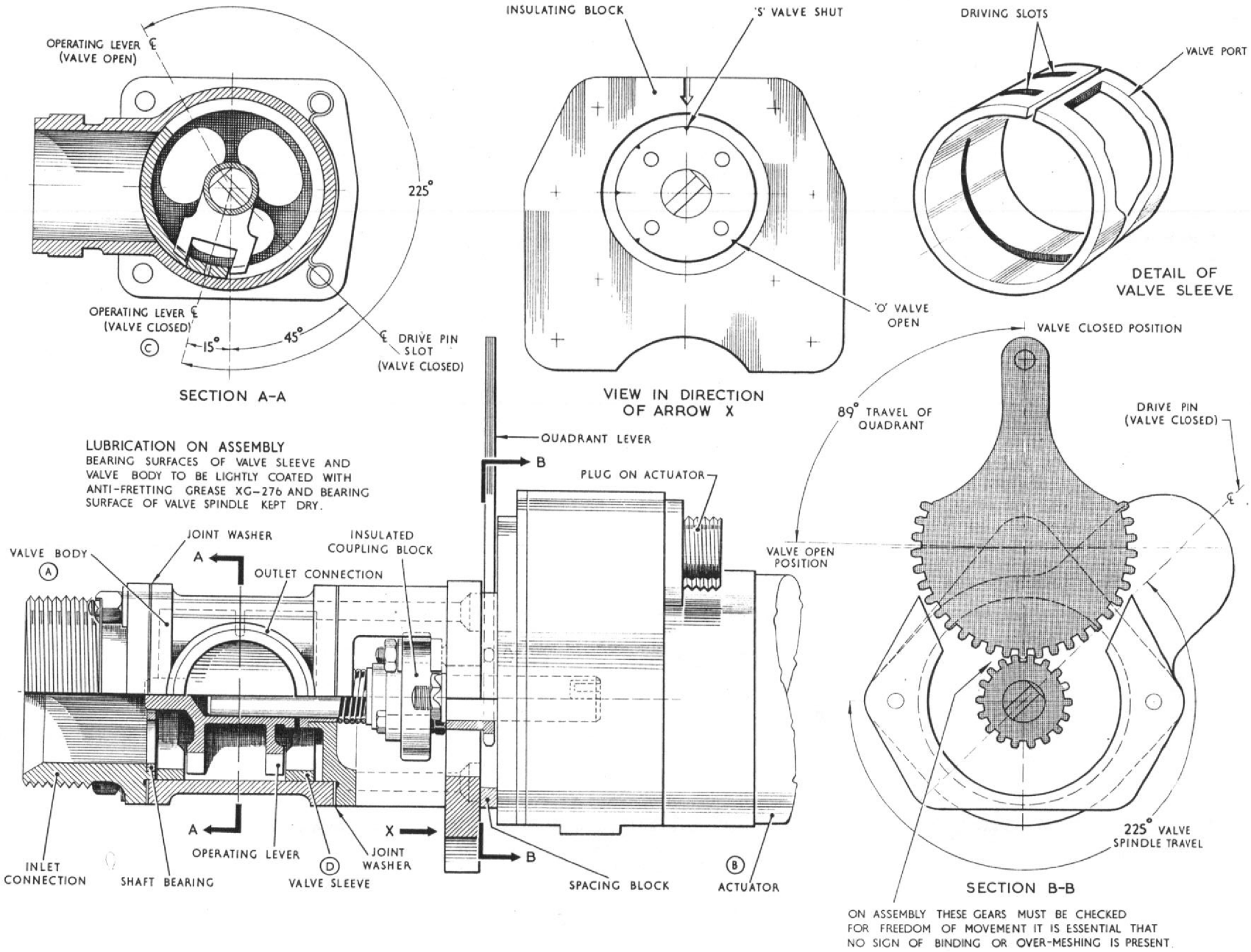

Fig. 2 Temperature control valve

◀Lubrication change, assembly note added▶

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SERVICING

WARNING

Only personnel certified as medically fit for servicing duties inside pressure cabins are permitted inside the aircraft when tests are carried out at ground level. Personnel with colds must have further medical approval.

Cold air unit—servicing before installation

16. At all times, care must be taken to exclude dirt, oil or foreign matter from entry into this assembly. Before installation, all connecting pipe flanges should be examined for damage and distortion and it should be ensured that they are clean and free from obstruction or oil. If the unit has been inoperative for an appreciable time (*e.g., as in storage*), it should be primed as detailed in A.P.4340, Vol. 1.

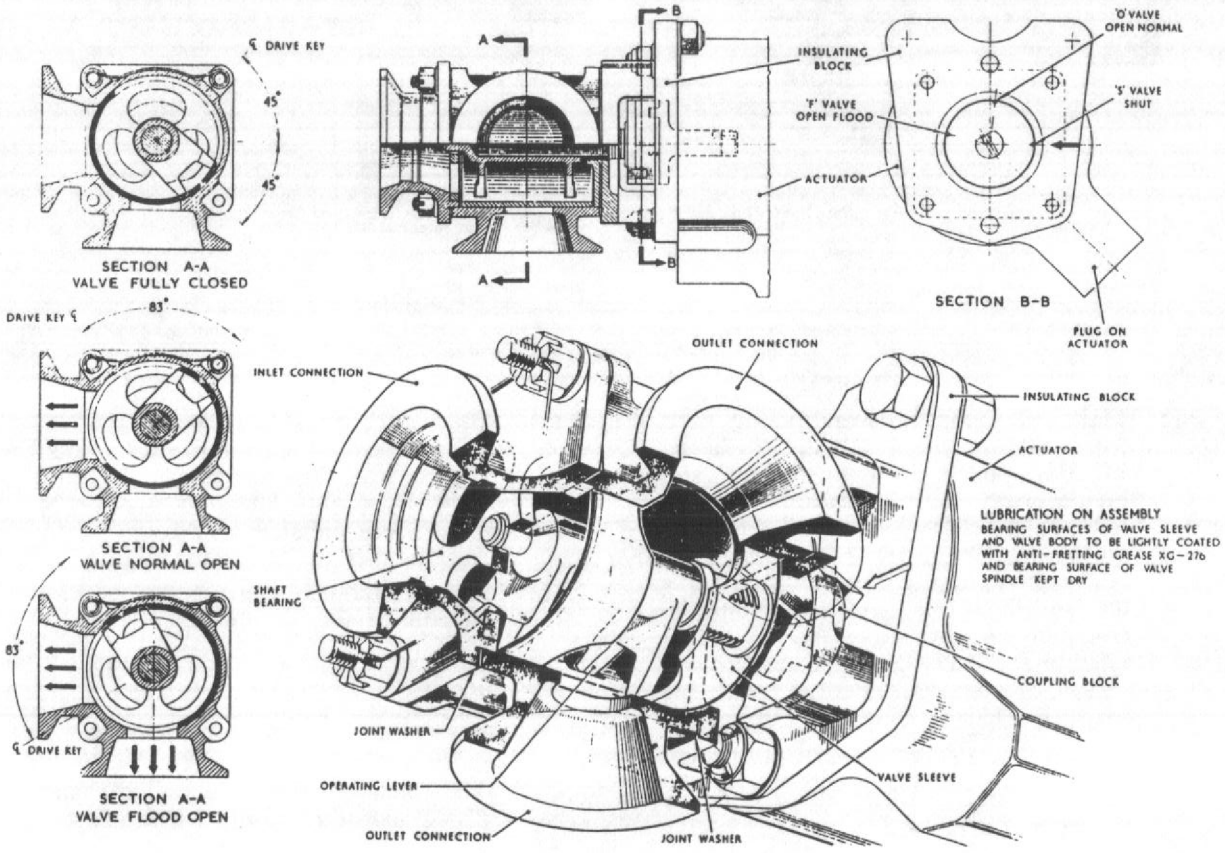

Fig. 3 Air supply valve

Cold air unit—topping up

17. When the unit is subsequently serviced on the aircraft, it should be topped up daily (*Sect. 2, Chap. 2*). The oil and the containers must be absolutely clean. Avoid overfilling the unit as excess oil may seep past the labyrinth seals when the unit is stationary.

Drains

18. The water separator is provided with a restricted drain which terminates outside the fuselage skin. The drain should be periodically examined to ensure that it is not blocked. The pre-cooler and the inter-cooler are each provided with a drain pipe. The plugs sealing the drain pipes should be removed periodically and any water that may have collected should be drained off.

MAINTENANCE OF CABIN PRESSURE AND STRUCTURAL SEALING

Sealing cabin structure

19. The maintenance of cabin pressure at high altitude is essential and all sources of air leakage must be sealed as follows:—

(1) *3M Sealer EC.802.*
This is a brushable water and oil resistant compound for use as a sealant between mating surfaces.

3M Sealer EC.750.
This is a stopper extruded from a tube or pressure applicator to form a bead round the edges of mating parts and for filling small spaces.

(3) *3M Sealer EC.801/B2 class B with accelerator EC.1352 or sealer PR.1422.* This is a stopper extruded from a pressure applicator to form a bead round the edges of mating parts and to act as a sealer in corners, etc., in the vicinity of Perspex.

(4) *3M Sealer EC.847*
This is a quick drying coating to seal small leaks.

(5) *'PRESTIK' PRESSURE PLASTIC*
This is a stopper to fill gaps in corners etc. of cabin structure and used when Sealer EC.750 is found unsuitable.

Materials (1), (2), (3) and (4) above are for rubber to metal or metal to metal sealing (3) is for Perspex.

Note . . .

The 3M Sealers are not to be used with or near the laminated glass of the windscreen front lights. 3M Sealers EC.802, EC.750 or EC.847 must not be used with or near Perspex. After handling, the hands should be washed before touching food.

Application of sealants

20. The method of application of the above sealants is as follows:—

(1) Parts to be assembled or rectified for leakage should have a coat of primer applied before assembly.

(2) All joints in the pressure cabin must be sealed and, for an effective seal, the surfaces to which the sealant will be applied must be scrupulously clean, dry and free from grease. *This is essential.*

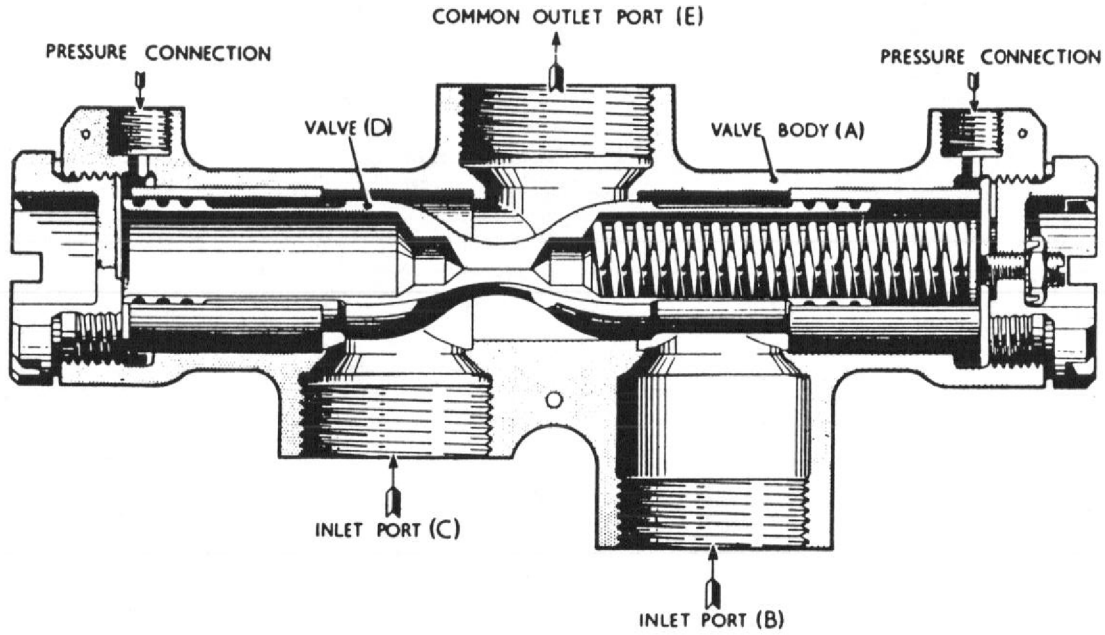

Fig. 4 Pre-cooler by-pass valve

(3) Make all joints between mating parts (*e.g., skin to frames*) with 3M Sealer EC.802 applied with a medium soft bristle brush, the application to extend for $\frac{1}{8}$ in. from the joint in all directions on the pressure side. Allow a *minimum of 10 minutes* drying time before bringing the joint faces together and riveting up. Dip bolts in 3M Sealer EC.802 before assembly. Fill any large apertures (*above 0·10 in. approx. dia.*) in corners with 3M Sealer EC.750 or EC.801. Fill tooling holes with "Chekaleke" plugs. Fill pop rivets with 3M Sealer EC.750 on the pressure side. Allow to dry for a *minimum of 2 hours.*

(4) Apply a fillet of 3M Sealer EC.750 as necessary along the edges of mating parts and in jointed corners. Allow to dry for *24 hours.*

(5) Apply a coat of 3M Sealer EC.802, extending over the whole area treated in sub-para. (3), including all bolts, rivets, plugs, etc. Allow to dry for *24 hours* before pressure testing.

(6) Pressurize the cabin in accordance with the requirements in para. 21.

(7) Stop any leaks shown by the above test with a further application of 3M Sealer EC.750 and EC.802 over the pressure side of the leak and allow to dry for *24 hours.* Alternatively use EC.847 and EC.802 and allow to dry for *2 hours.*

(8) Allow *6 hours* from the last application of sealant before painting.

(9) Re-test in accordance with the requirements detailed in para. 21.

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Cabin pressure tests

21. The following equipment will be required:—

(1) Test trolley—*Ref. 4F/1714.*

(2) Hood seal inflator—*Ref. 4F/1812.*

(3) Connection adapter for cabin pressure gauge—2 off—*Ref. 4F/1810.*

(4) Hood seal pressure gauge—*Ref. 6A/1582.*

(5) Cabin pressure gauge—*Ref. 6A/1582.*

(6) A length of rubber hose to suit adapters (3) above.

(7) Foot pump for hood seal inflation (*car type*).

(8) An external electrical supply.

(9) A hydraulic test rig.

22. To pressure test the cabin, proceed as follows:—

(1) Connect the equipment listed in para. 21 to the aircraft and check the hood operating and locking mechanism for correct adjustment. With the battery and engine master switches OFF and the cabin pressure control switch ON close and lock the hood by means of the external switch and gradually apply pressure with the foot pump to the hood seal and the ram air and extractor valves. Note the pressure at which the valves close and continue pumping until the hood seal pressure builds up to 8 lb/in². Check for leaks in the seal and valves systems.

(2) Blank the static vent of the pressure controller and run the test trolley with the blow-off valve set to produce a pressure of 3½ lb/in² in the cabin. The trolley blow-off valve setting should not exceed about 5 lb/in². Carry out checks for leakages from various points, particularly the following:—

(*a*) Ram air and extractor valves.

(*b*) The combined valve unit.

(*c*) Non-return valve in the main supply line.

(*d*) Access panels for flying controls, etc.

(3) Operate the flying and engine controls to ensure that their movement does not increase leakage. Check the rate of cabin pressure drop. The required rate is for the pressure to drop from 3½ to ◀ 1¾ lb/in² in not less than 30 seconds after disconnecting the external supply, with the hood seal pressure maintained at 8 lb/in². At the end of these tests, deflate the hood seal, allow the cabin pressure to fall to zero and remove the blank from the static vent of the pressure controller. ▶

(4) With the hood closed and cabin pressure ON, build up the hood seal pressure to 8 lb/in². Disconnect the foot pump and check that the seal pressure does not fall below 6½ lb/in² over a period of 5 minutes. At the end of all tests, disconnect the ground equipment.

WARNING

The external hood switch must not be operated until the cabin pressure, as shown by the gauge, is zero.

Pressure test of pipe lines

23. The piping system should be pressure tested as follows:—

(1) Connect a high pressure air supply, a control valve and a pressure gauge at the main engine air supply connection.

(2) Disconnect the four way air supply pipe at the rear of the cabin, blank off the outlet of the non-return valve and fit a pressure gauge (*0–50 lb/in²*) at this point.

(3) Disconnect the ¼ in. diameter control pipes from the by-pass valve and blank off connections on the valve.

(4) Disconnect and blank the drain connection on the water separator.

(5) With the air supply valve closed, i.e., cabin pressure control switch at OFF, and with the hood open, gradually apply pressure at the main air supply connection up to the maximum (*120 lb/in² if possible*).

(6) Check that no leakage occurs from ducts, joints and all components, up to the air supply valve. (*A small leakage flow through the air supply valve may occur*).

(7) Remove blanks from the by-pass valve and re-connect control pipes.

(8) Turn off the air supply, close the hood and open the air supply valve by selecting cabin pressure ON. Apply pressure gradually up to 20 lb/in² and check that the remainder of the system is free from leaks (*a small leakage from the vents of the cold air unit cannot be avoided*).

(9) On completion of these tests, turn off the air supply, remove all test equipment and restore the system to normal by removing blanks and remaking connections.

ASSEMBLY OF COMPONENTS

Air supply valve and temperature control valve assemblies

24. The following should be observed when it becomes necessary to change either the actuator or the valve in any of the above assemblies.

(1) When fitting the actuator to the valve, care should be taken to see that the actuator driving pin engages correctly with the valve spindle. The two components should slide together freely without force being applied to the driving spindle, due to malalignment. Malalignment may cause damage to the actuator and increase the valve gland leakage. After fitting the quadrant lever of the temperature control valve the gears must be checked for freedom of movement, there must be no sign of binding or over-meshing of the gears.

(2) With the valves closed, apply an air pressure of about 75 lb/in² to the end inlet connection of the temperature control valve and about 135 lb/in² to the inlet connection of the air supply valve. This should be carried out before and after assembly to the actuators to check that gland leakage has not increased.

(3) With a suitable Breeze plug and switch, connect the actuator to a 24 volt supply. With pressure applied, open and close the valve over its full range by means of the actuator.

Pipes

25. Care should be taken to ensure that the access doors in the centre fuselage will not foul the pipe between the inter-cooler and the cold air unit turbine or the engine supply pipe by-passing the pre-cooler.

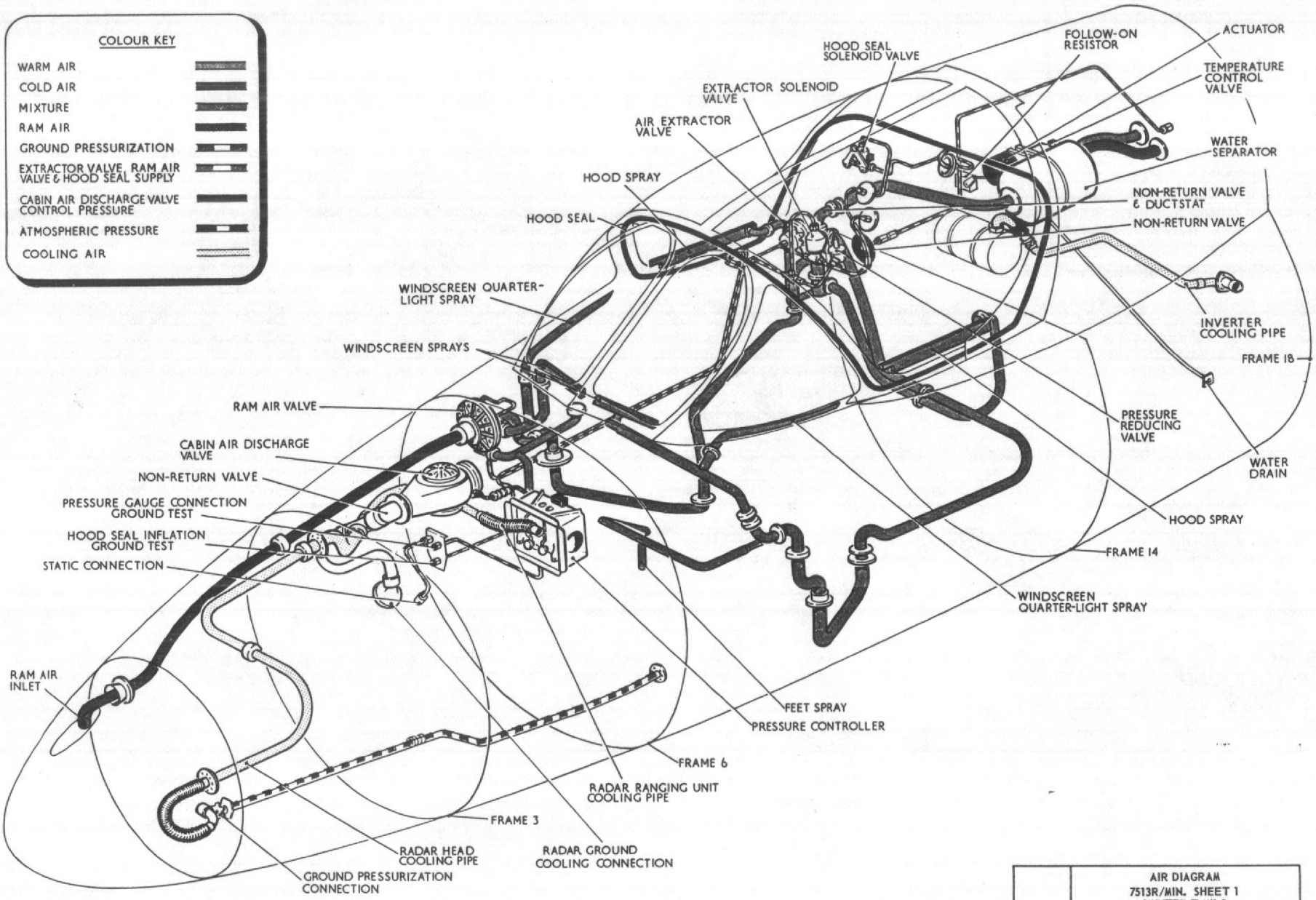
Pipe clamps

26. When fitting the cabin conditioning pipes between frames 8 and 9, adjacent to the instrument panel, ensure that the pipe clamps are fitted with the clamp bolt positioned to avoid fouling the instruments or piping.

TABLE 1

Component and Air Publication List

Component	Air Publication
Cold air unit, Type A.C.R.E.9, Mk. 8W	4340, Vol. 1, Sect. 2
Combined valve unit, Type 7/20, 510710	1275A, Vol. 1, Sect. 20
Flow control valve, Type CV9, Mk. 1	4340, Vol. 1, Sect. 6
Follow-up resistor, Type FLJ/A/2	4343E, Vol. 1, Sect. 22
Ground pressurizing connection, 504600	4340, Vol. 1, Sect. 13
Inter-cooler, D.1137/3A	4340, Vol. 1, Sect. 8
Pre-cooler, D.1137/3A	4340, Vol. 1, Sect. 8
Pressure controller, Type A	1275A, Vol. 1, Sect. 20
Sensing element, Type FHG/A/49	1275A, Vol. 1, Sect. 20
Valve, electro-pneumatic, Type ES/A/390	4343E, Vol. 1, Sect. 1
Valve, electro-pneumatic, Type ES/A/430	4343E, Vol. 1, Sect. 1
Valve, non-return, Type NR9, Mk. 6	4303C, Vol. 1, Sect. 4
Valve, pressure reducing, Type PS/29/4	4303C, Vol. 1, Sect. 4
Water extractor, Type WE30, Mk. 7	4340, Vol. 1, Sect. 9



	AIR DIAGRAM 7513R/MIN. SHEET 1 HUNTER T MK 8
ISSUE 3	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY MINISTRY OF DEFENCE

TP 17210

Fig 5 Air conditioning system installation (1) (T MK.8 aircraft)

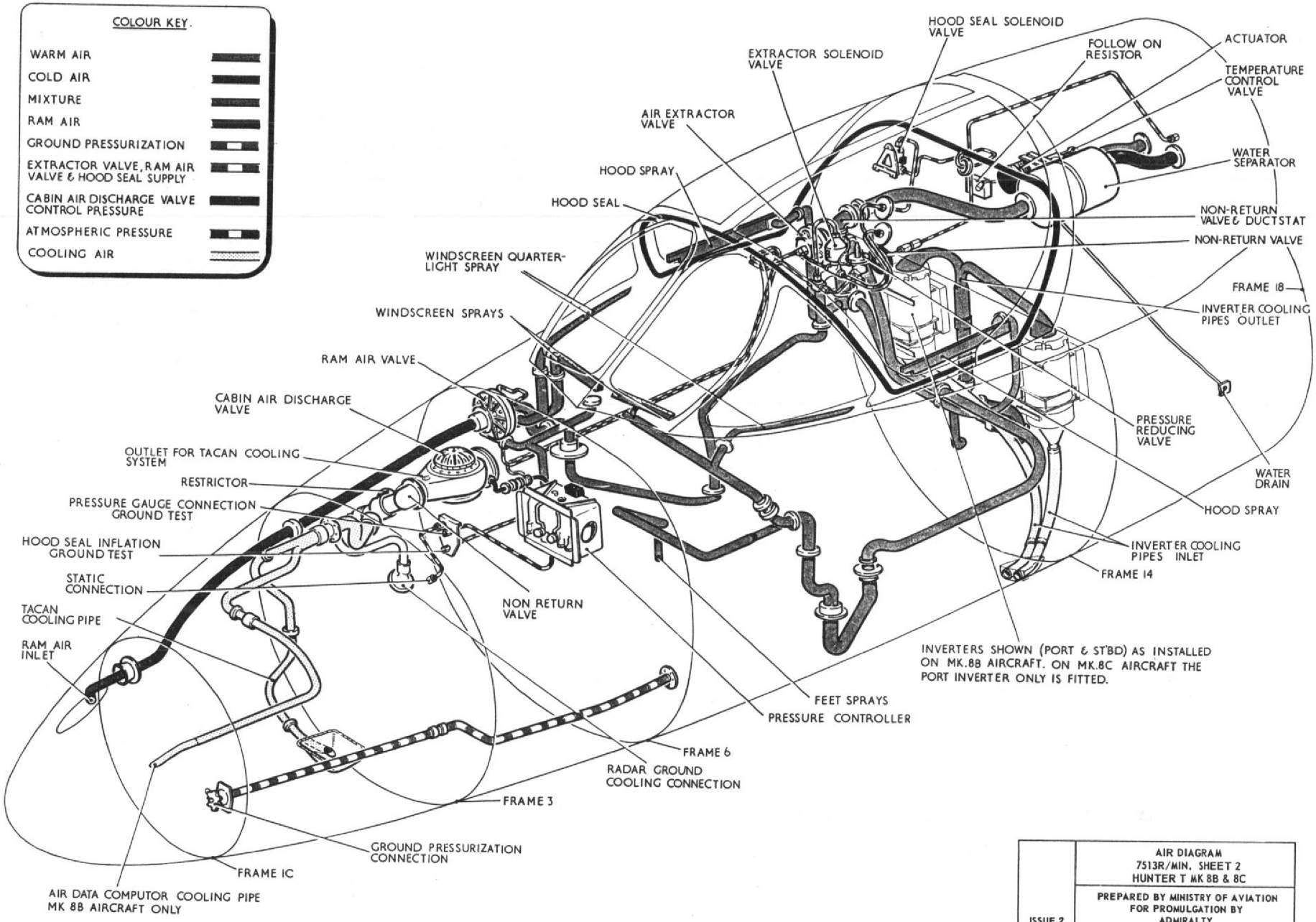


Fig 5A Air conditioning system installation (1) (T Mk.8B & 8C aircraft)

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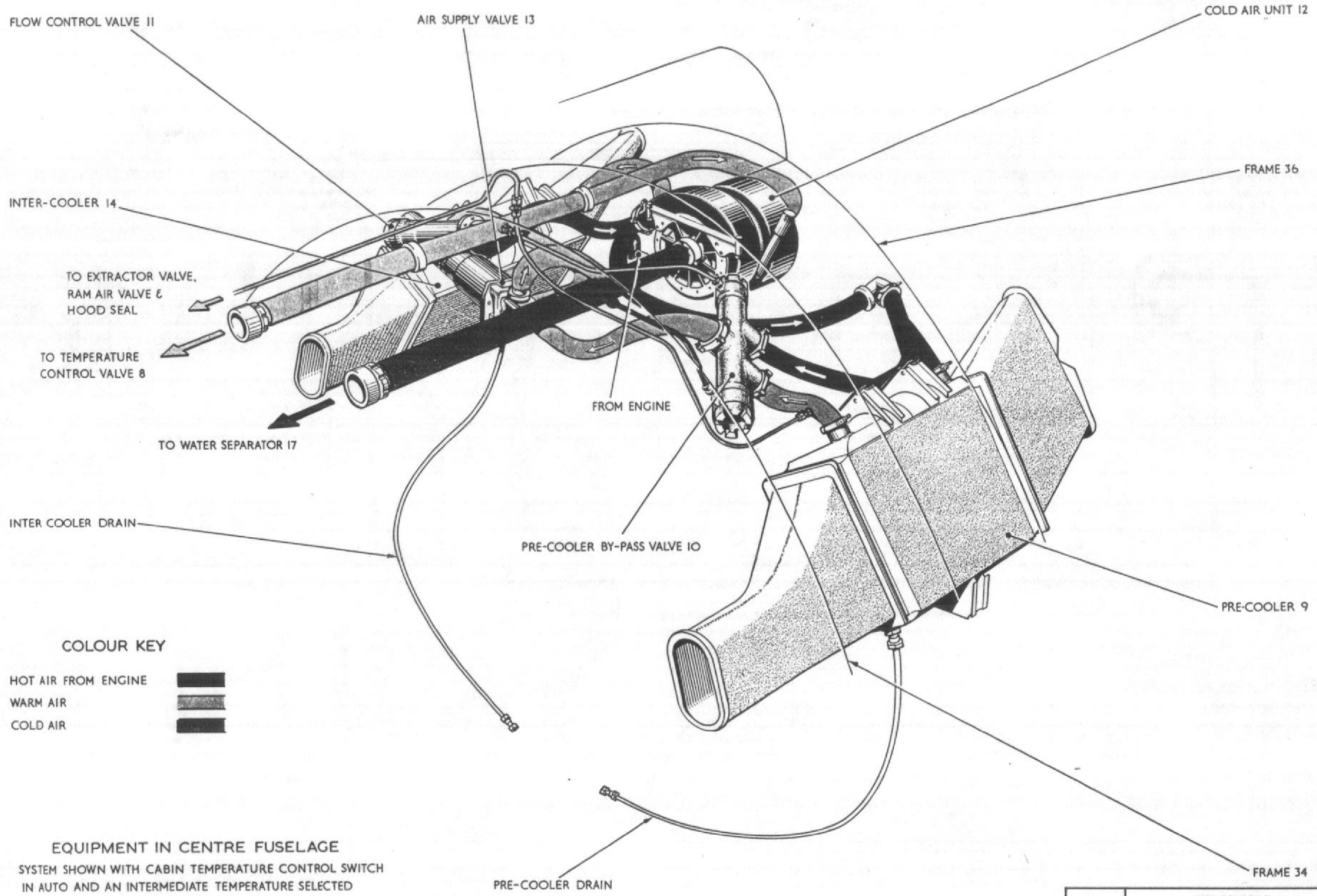
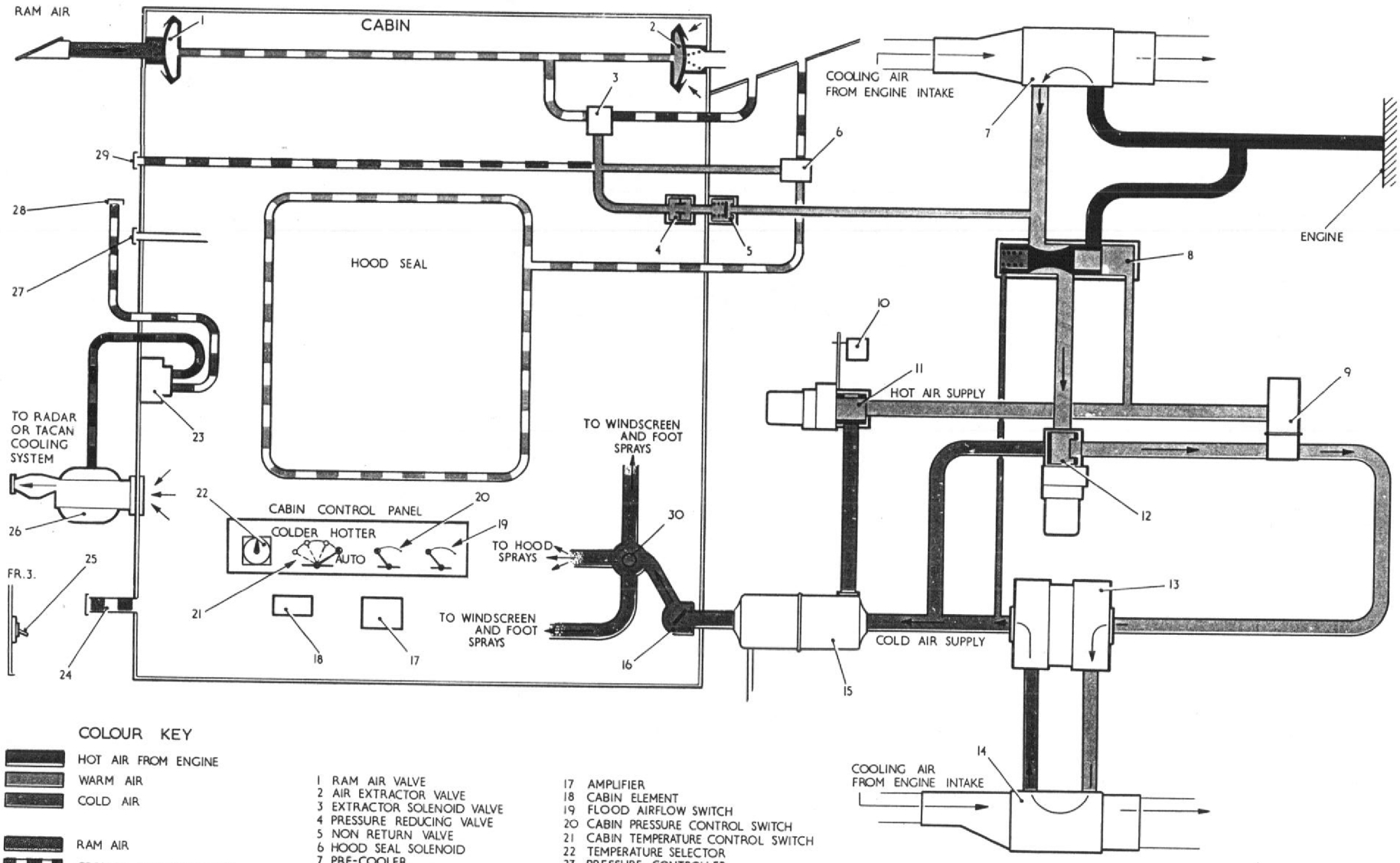


EQUIPMENT IN CENTRE FUSELAGE

SYSTEM SHOWN WITH CABIN TEMPERATURE CONTROL SWITCH IN AUTO AND AN INTERMEDIATE TEMPERATURE SELECTED

Fig. 6 Air conditioning system installation (2)

ISSUE 1	AIR DIAGRAM 7513S/MIN HUNTER T MK 8, 8B & 8C PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY ADMIRALTY



COLOUR KEY

- HOT AIR FROM ENGINE
- WARM AIR
- COLD AIR
- RAM AIR
- GROUND PRESSURIZATION.
- EXTRACTOR VALVE RAM AIR VALVE & HOOD SEAL SUPPLY.
- CABIN AIR DISCHARGE VALVE CONTROL PRESSURE.
- ATMOSPHERIC PRESSURE.

1 RAM AIR VALVE
2 AIR EXTRACTOR VALVE
3 EXTRACTOR SOLENOID VALVE
4 PRESSURE REDUCING VALVE
5 NON RETURN VALVE
6 HOOD SEAL SOLENOID
7 PRE-COOLER
8 PRE-COOLER BY-PASS VALVE
9 FLOW CONTROL VALVE
10 FOLLOW-ON RESISTOR
11 TEMPERATURE CONTROL VALVE
12 AIR SUPPLY VALVE
13 COLD AIR UNIT
14 INTER-COOLER
15 WATER SEPARATOR
16 NON RETURN VALVE
17 AMPLIFIER
18 CABIN ELEMENT
19 FLOOD AIRFLOW SWITCH
20 CABIN PRESSURE CONTROL SWITCH
21 CABIN TEMPERATURE CONTROL SWITCH
22 TEMPERATURE SELECTOR
23 PRESSURE CONTROLLER
24 GROUND PRESSURIZATION CONNECTION
25 SWITCH (HOOD CONTROL)
26 CABIN AIR DISCHARGE VALVE
27 PRESSURE GAUGE CONNECTION (EXTERNAL)
28 STATIC CONNECTION
29 HOOD SEAL INFLATION (EXTERNAL SUPPLY)
30 DUCTSTAT

DIAGRAM FOR 'FULLY COLD' DELIVERY

ALL AIR THROUGH COLD AIR UNIT.
CABIN TEMPERATURE CONTROL SWITCH 21 IN AUTO. & TEMPERATURE SELECTOR 22 SET TO PROVIDE LOW TEMPERATURE AIR.
ALTERNATIVELY FOR MANUAL SETTING 'COLDER' ON SWITCH 21.

	AIR DIAGRAM 7513T/MIN HUNTER T.MK.8, 8B & 8C
ISSUE 2	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY MINISTRY OF DEFENCE

Fig.7 Air conditioning system diagram (1)

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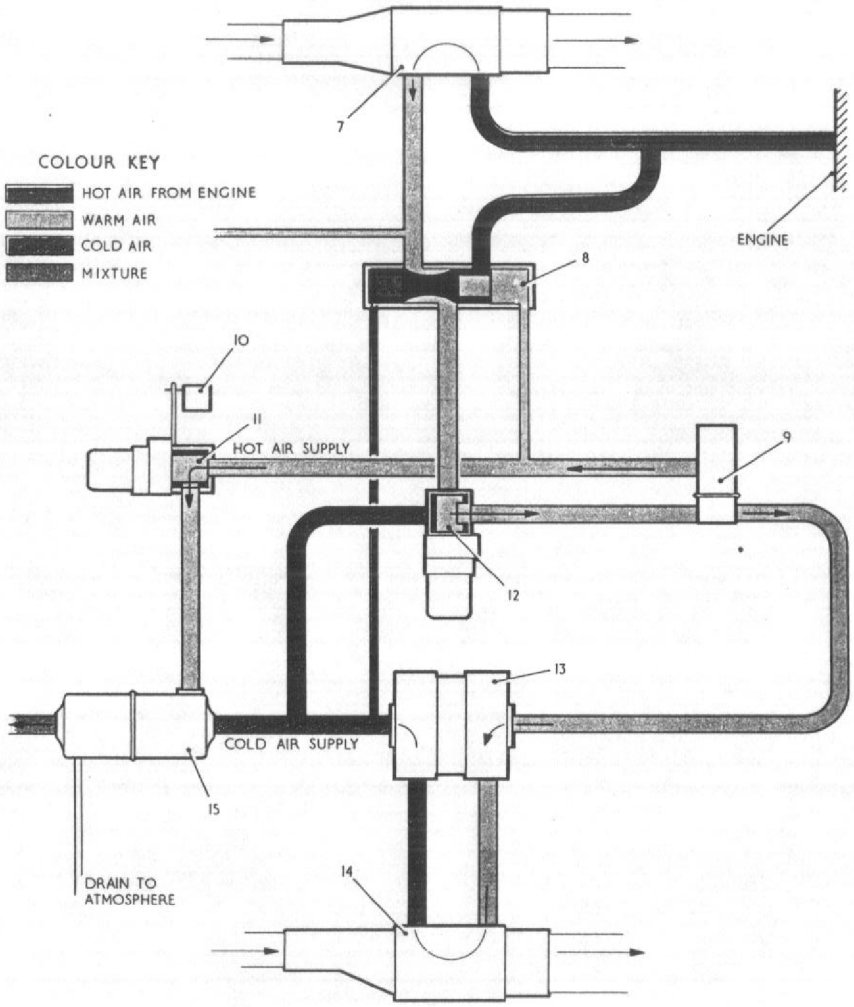

DIAGRAM FOR INTERMEDIATE TEMPERATURES

MIXTURE OF HOT AND COLD AIR

CABIN TEMPERATURE CONTROL SWITCH 21 IN AUTO. AND TEMPERATURE SELECTOR 22 SET TO PROVIDE REQUIRED TEMPERATURE OF AIR.

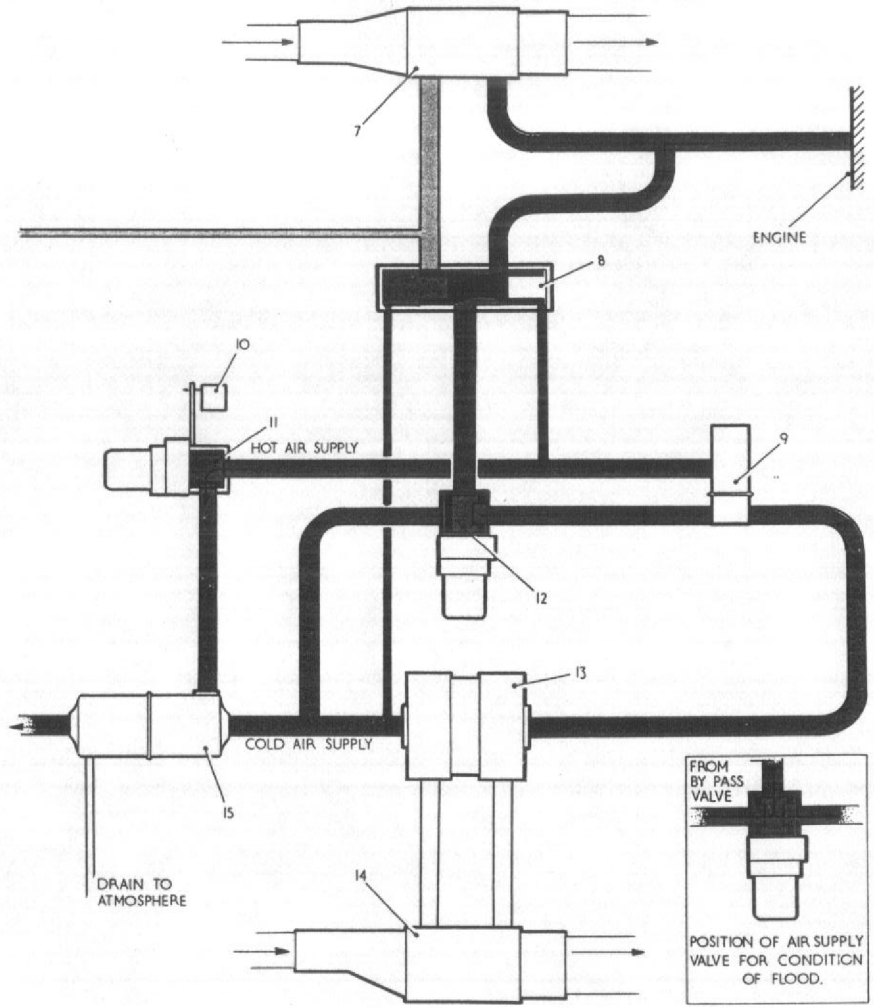

DIAGRAM FOR 'FULLY HOT' DELIVERY

COLD AIR UNIT BY-PASSED

CABIN TEMPERATURE CONTROL SWITCH 21 IN AUTO. AND TEMPERATURE SELECTOR 22 SET TO PROVIDE HIGH TEMPERATURE AIR.

ALTERNATIVELY FOR MANUAL SETTING HOTTER ON SWITCH 21

	AIR DIAGRAM 7513U/MIN HUNTER T MK 8, 8B & 8C
ISSUE 1	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY ADMIRALTY

Fig. 8 Air conditioning system diagram (2)