GROUP D6 CABIN PRESSURIZATION AND TEMPERATURE CONTROL (CODE CP)

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ILLUSTRATION

Introduction

1. This group contains a brief description of the cabin pressurization and temperature control circuit installed in this aircraft, together with the method of operation and the necessary servicing information required to maintain the equipment in an efficient condition. A routing and theoretical diagram of the circuit is also included. For a description of the electrical system as a whole, including system wiring details, referencing of components, and general servicing, together with the location and removal of major items of equipment, reference should be made to Groups A1, A2 and A3 of this chapter. A full description of the cabin air-conditioning system will be found in Sect. 3, Chap. 8, while detailed information of the standard electrical components used will be found in the appropriate volumes of A.P.4343 series.

DESCRIPTION

CABIN PRESSURIZATION AND TEMPERATURE CONTROL

2. The cabin pressurization and temperature control installation of this aircraft is controlled by an ON/OFF pressurization control switch, incorporating a locking guard to prevent inadvertent operation, a flood switch marked AUTO and MANUAL, an auto/manual temperature control switch, which is marked AUTO, COLDER, EMERGENCY and HOTTER, and a temperature selector. All these switches are situated on the rear portion of the cockpit port shelf. The pressurization control switch controls the air supply valve actuator located at the top of the centre fuselage aft of the rear spar frame, the Type ES/A/390 air extractor valve solenoid situated on frame 14 and the temperature control valve actuator located in the hood fairing, via the contacts of the hood interlock and flood control relays, which are both mounted on the undersurface of the cockpit port shelf. The hood interlock relay is linked with the hood control circuit (*Group* D5), and when energized, as the hood opens, it overrides the pressurization control switch to close the air supply valve and energizes the air extractor valve solenoid to open this valve. At the same time, the supply to the temperature control switch is cut off and the temperature control valve actuator is energized to close the hot by-pass. The flood control relay is automatically controlled by a Type KB.562/01 altitude switch, also located on the undersurface of the cockpit port shelf, or manually by the flood switch. When energized, the relay causes the air supply valve actuator to open to the flood position and the auxiliary air discharge valve, which is located on frame 14, to open to vent the cockpit.

3. To minimize radio interference, the supply to the temperature control valve actuator is taken through a suppressor, Type P, No. 1, mounted in the hood fairing. This actuator is controlled manually, when the temperature control switch is in the COLDER, EMERGENCY and HOTTER positions, or automatically when AUTO is selected. In this latter position the cabin temperature is selected by a Type FHK/A/7 or /26 temperature selector located on the cockpit port shelf, the selected temperature being automatically maintained by a Type FLM/A/1 (mod. 518) or FLM/A/5 magnetic amplifier. The amplifier operates the temperature control valve actuator in accordance with a Type FHJ/A/5 cabin element, a Type FHG/A/49 ductstat and a Type FLJ/A/2 follow-up resistor. The magnetic amplifier is located to the rear of the cockpit port shelf, while the cabin element is adjacent to the cabin pressure controller and the ductstat is fitted in a four-way pressurizing pipe behind the ejection seat. The follow-up resistor is situated adjacent to the temperature control valve actuator in the hood fairing. Early aircraft (pre-Mod. 210) are not fitted with the ductstat.

◀**4.** Visual warning of loss of cabin pressure is given by a lamp located on the starboard instrument panel. The warning lamp is controlled by a switch in the cabin pressure control valve, Type A, which is mounted on the

rear face of frame 6. The warning system, together with flood operation of the air supply valve actuator, may be tested on the ground by a pressure warning and flood control test switch located on the rear portion of the cockpit port shelf.

Operation

5. The cabin pressurization and temperature control circuit is interconnected with the hood control circuit (*Group* D5) either directly, as in the case of the hood seal valve solenoid, or via the hood interlock relay, which is energized when the hood is open. This interconnection prevents the supply of pressurizing air to the cabin, hood seal and air extractor valve until the hood is closed. Further, the interlock relay ensures the return of the various valves to the neutral, or closed, position on selecting "hood open", irrespective of the position of the pressurization control switch. With the hood open, the interlock relay is energized, thus a supply is made to the close field windings of the air supply valve actuator to close this valve and the air extractor valve solenoid is energized to open the extractor valve. The supply to the temperature control switch is also cut off and the close field windings of the temperature control valve actuator are energized to close the hot by-pass.

6. With the hood closed the interlock relay is de-energized, thus when the pressurization control switch is placed in the ON position, a supply will be made to the open field windings of the air supply valve actuator, via contacts of the interlock relay and flood control relay, and this valve will move to the normal open position to supply pressurizing air to the cockpit. The air extractor valve is closed under this condition. The pressurization control switch will also supply the temperature control switch, via contacts of the interlock relay.

7. When the cabin altitude exceeds 38,000 ft. the contacts of the altitude switch are made and energize the flood control relay, which in turn will energize the auxiliary discharge valve and change the supply to the air supply valve actuator, causing the valve to open to the flood position, thus preventing low cabin pressure occurring at this altitude.

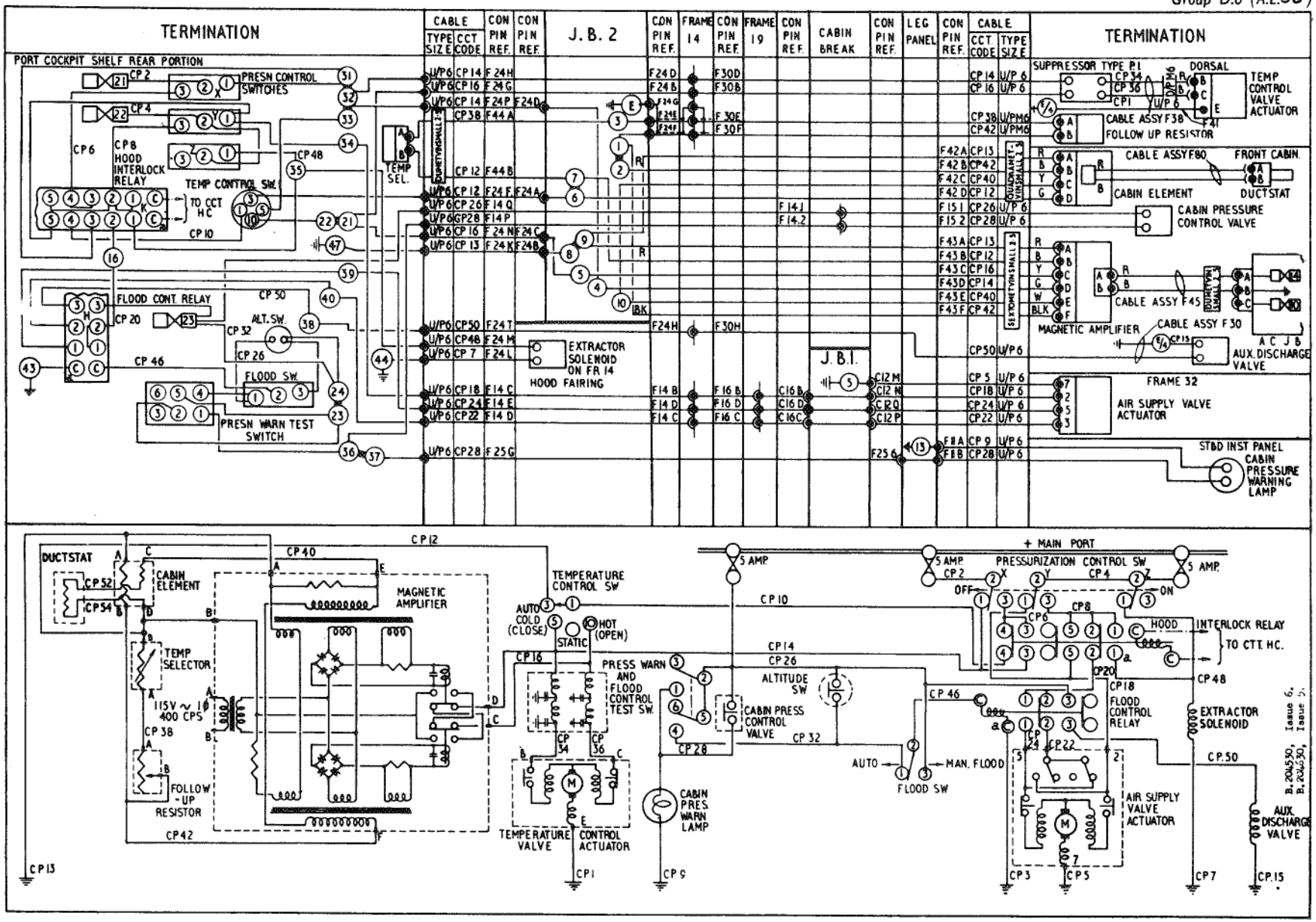
8. For the purpose of de-misting the windscreen and hood, in flight, flood operation may be obtained irrespective of the altitude switch by placing the flood switch in the MANUAL position. Under these conditions the flood control relay is energized, the auxiliary discharge valve is opened, and the air supply valve actuator operated to open the valve to the flood position, as during flood operation, described in para. 7.

9. Should the cabin differential pressure drop by ½ to 1 lb. per sq. in. below normal, the switch in the cabin pressure control valve will close and illuminate the warning lamp to indicate failure. The pressure warning and flood control test switch operates the warning lamp and flood control relay, in a similar manner to that of the cabin pressure control valve and altitude switches.

10. The action of the temperature control switch is such that, when in either the COLDER or HOTTER position, the temperature control valve actuator is energized to close or open the valve, respectively, permitting manual control of the cabin temperature; the intermediate EMERGENCY position is used to stop the actuator to maintain the valve in any chosen condition. In the AUTO position of the temperature control switch, the temperature control valve actuator is automatically operated by the magnetic amplifier, cabin element and follow-up resistor in accordance with the temperature selector.

11. The magnetic amplifier contains a Wheatstone bridge network wherein the selected temperature (i.e., equivalent resistance) and the actual cabin temperature are compared. The error signal current arising from their difference is amplified by means of a pair of transductors (saturated transformers), and this amplified and rectified a.c. output is then made to actuate one of a pair of electrically interlocked relays, according to the direction of bridge unbalance. The operated relay supplies d.c. to the appropriate side of the split field series actuator operating the temperature control valve. The actuator moves, carrying with it the sliding contact of the follow-up resistor, until the bridge network is re-set at the new equilibrium, when the error current is cancelled and the relay contacts drop out. In this way progressive alterations in the control valve opening are timed to damp out or suppress deviations from the selected setting of cabin temperature.

12. Placing the pressurization control switch to the OFF position energizes the close field coil of the temperature control valve actuator, the close field coil of the air supply valve actuator and the extractor valve solenoid. The hot by-pass is thus closed by the temperature control valve actuator, the pressurization air supply is cut off by the air supply valve actuator and the extractor valve opened to vent the cabin to atmosphere.



(A.L.38, Nov.56)

FIG. 1. CABIN PRESSURIZATION AND TEMPERATURE CONTROL

RESTRICTED

SERVICING

13. For servicing of the electrical system as a whole, reference should be made to Group A1 of this chapter. All the components should be kept clean and inspected periodically for signs of damage and to ensure that they are securely mounted. Apart from the routine functional testing of the circuit and components, no further servicing should be necessary, but should a fault be reported the cause must be investigated and rectified before the next flight. Should the fault be found to be in any component of the temperature control equipment or in the valve actuators, the faulty component must be removed from the aircraft and replaced with a fully-serviceable component, as no attempt must be made to service these units in situ.

REMOVAL AND ASSEMBLY

14. Once access has been obtained, the removal and assembly of the electrical components forming the cabin pressurization and temperature control circuit should present no unusual difficulties. The removal of the rear portion of the cockpit port shelf, which carries the control switches, relays and other components of the circuit, is fully described in Group A2 of this chapter, while the location and access to all the components is indicated in Group A3.