

Chapter 1 ICE WARNING AND ANTI-ICING

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Introduction

1. This chapter contains a description of the ice warning and anti-icing systems employed in the aircraft. Routeing and theoretical diagrams are included. For more detailed information on the components employed, reference should be made to the publications listed in Table 1.

ICE WARNING SYSTEM

Description

2. The Sangamo Weston ice warning system employed is operated by the two conditions responsible for the formation of ice. These are, the presence of free atmospheric water and an ambient temperature at, or below, freezing point, when they occur together. On receipt of the warning the anti-icing device can be operated from the front cockpit.

3. The warning system consists of three standard units:-

- (1) A water detecting head, located in the air stream, on the underside of the starboard fairing, between frames 10 and 11.
- (2) A temperature sensitive bulb, to monitor air temperature, located on the underside of the starboard fairing, behind the water detecting head.
- (3) A control unit, which integrates the signals from the two detector units and illuminates the cockpit warning captions.

To prevent the heaters contained in the water detecting head from raising the temperature of the head to a level which would damage the detecting elements, the system only becomes operative in flight.

TABLE 1

Equipment, type and A.P. reference

Equipment	Type	A.P. reference
◀ Icing detector head ...	Sangamo-Weston S171/1/12 or S171/1/15 (mod.166)	} A.P.1275A, Vol.1, Sect. 27 ▶
Temperature bulb ...	Type B. ...	
Control unit ...	Sangamo-Weston S172/2/11	A.P.1275A, Vol.1, Sect. 27
Pressure regulator ...	Teddington FRH/A/4	A.P.4713A & B, Vol.1

Operation

4. When the aircraft becomes airborne a pitot-static pressure switch, calibrated to operate at 140±3 knots, energizes relay No.11 and from then on, ice detection is fully automatic. The temperature sensitive



Fig. 1. Ice warning and anti-icing (routing and theoretical)

resistance bulb, monitors air temperature; the resistance forms one arm of a wheatstone bridge. At temperatures below 8deg.C the bridge becomes unbalanced and causes a signal to be fed to the control unit. The water detecting head consists of two temperature sensitive resistors contained in two heated bulbs. The detecting head is so placed in the air stream, that the front bulb shields the rear bulb. When the aircraft enters an atmosphere containing free water, the rear bulb does not cool at the same rate as the front bulb; this difference in temperature causes a difference in the resistance of the two bulbs. The bulb resistors form arms of a wheatstone bridge which becomes unbalanced, sending a signal to the control unit.

5. When icing conditions prevail, the contacts of relays A and F in the control box will be closed, completing the secondary warning circuit illuminating the caption ICE. The control unit is self resetting and the captions will be extinguished when the aircraft leaves the icing area.

Testing

6. A test switch is provided in the starboard fairing so that the circuit can be ground tested; it is a three-position switch sprung to the central AUTO position. When made to the ON position, simulated signals cause the warning captions to be illuminated. If the prevailing conditions are those that will normally produce an ice warning, the control box will remain activated after the test had been completed. The system must be reset after testing by first making the test switch to OFF and then returning it to AUTO.

ANTI-ICING SYSTEM

Description

7. Hot air can be ducted to the engine intake web to prevent the formation of ice by the operation of a solenoid valve situated on the engine. The solenoid valve operating switch is located on the front cockpit instrument panel. When selected to ANTI-ICE the switch supplies current from fuse F 40 through the closed contacts on the fire extinguisher switches in both cockpits to energize the solenoid valve. Operation of the fire extinguisher in an emergency will de-energize the valve.

Testing

8. A test indicator lamp is fitted in the starboard fairing, the circuit being completed by a microswitch integral with the solenoid valve, which is operated when the valve is energized from the anti-icing switch.

Note...

Ground testing of the anti-icing system must only be carried out with the engine running.

Servicing

9. Servicing of both systems is restricted to testing for correct operation, damage will occur if either system is left energized for long periods on the ground. Should it become necessary to replace the water detecting head, care must be taken to ensure that the head is fitted according to the instructions engraved on the head.

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