

Raytheon Aircraft Company

CREW MANUAL

ICE and RAIN PROTECTION - ICE DETECTION

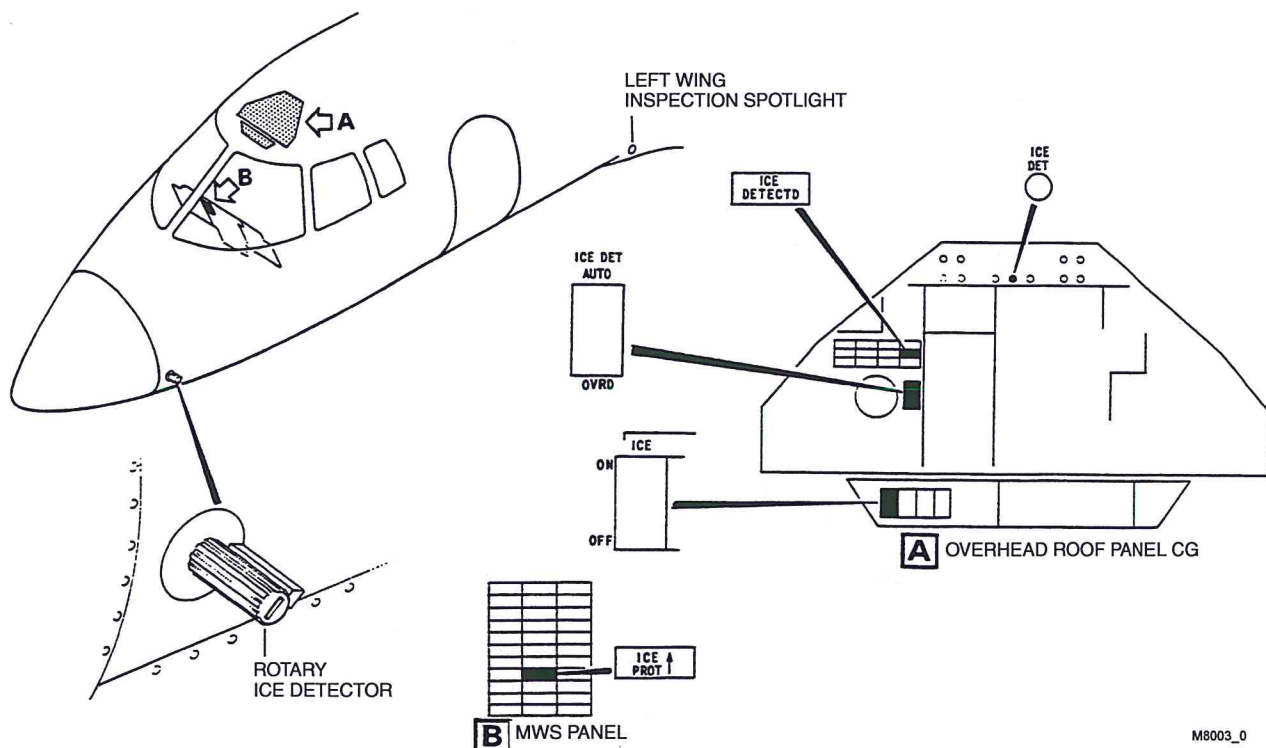
1. General

A rotary-cutter type ice detector, two warning annunciators and a left wing inspection spotlight are provided in the ice detection system (Fig. 1).

The system will automatically detect the formation of ice after takeoff, however manual selection of the detector is available for operation on the ground.

2. Location of controls and annunciators

<i>Item</i>	<i>Location</i>
ICE DET AUTO-OVRD switch ICE DETECTD annunciator (amber)	Overhead roof panel - ICE PROTECTION
ICE spotlight ON-OFF switch	Overhead roof panel - EXTERIOR LIGHTS
ICE PROT ↑ annunciator (amber)	MWS panel
ICE DET pushbutton	Overhead roof panel - TEST



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**Ice detection
Fig. 1**

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(continued)

3. Rotary-cutter ice detector

Electrical power supplies to the ice detector are fed through the weight switch relay system and controlled by an ICE DET AUTO-OVRD switch.

With the switch selected to AUTO, the detector commences operation when the airplane becomes airborne. Selecting the switch to OVRD, by-passes the weight switch relay and allows the detector to operate on the ground or in flight. The ICE DET switch should be selected to OVRD before taxiing in icing conditions.

The ice detector unit consists of an AC powered motor driving a serrated rotor which rotates in close proximity to a fixed knife-edge cutter. When ice forms on the rotor, the gap between the rotor and adjacent cutter is filled. The skimming action of the cutter against the ice causes a rise in motor torque which slightly rotates the motor within its mounting.

Rotation of the motor actuates a microswitch which connects a DC power supply, via a time delay relay, to illuminate an ICE DETECTD annunciator on the overhead roof panel. The ice warning is repeated, by the illumination of an amber ICE PROT ↑ annunciator on the MWS panel (Fig. 1).

Pushing an ICE DET TEST push button illuminates both annunciators.

The time delay relay maintains the ice warning signal during intermittent rises in motor torque. When ice ceases to form, a spring returns the motor to the normal position, the microswitch opens and after a delay of 30 seconds (Pre-Mod. 253214) or 60 seconds (Mod. 253214), the warning is cancelled.

4. Left wing inspection spotlight

The standard spotlight, controlled by an ICE ON-OFF switch, illuminates the left wing leading edge for night visual inspection.

5. Electrical power supplies

Power distribution to the equipment is as follows:

<i>Item</i>	<i>Busbar</i>
Rotary ice detector	XS2
Ice warning annunciators	PS2
Left wing inspection spotlight	PS1

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ICE and RAIN PROTECTION - AIRFRAME ANTI-ICING SYSTEM

1. General

A TKS fluid airframe anti-icing system is provided for the leading edges of the wings and the horizontal stabilizers. The system is controlled by a timer switch and a warning chime which sounds when the system setting times out and switches off.

2. Location of timer switch and annunciators

<i>Item</i>	<i>Location</i>
WING/TAIL ANTICE timer switch ANTICE LO PRESS annunciator (amber) ANTICE LO QTY annunciator (amber)	Overhead roof panel ICE PROTECTION
ICE PROT ↑ annunciator (amber)	MWS panel
Tank contents indicator	Right side console

3. Fluid storage

Anti-icing fluid for the system is stored in a tank with a total capacity of 5.55 US gallons (21.03 liters) which provides priming and protection for approximately 61 minutes.

The FULL/EMPTY indicator reads FULL above 4.5 US gallons (17.05 liters) and reads EMPTY when 13 minutes of protection remains.

A tank filler cap is accessible from inside the airplane forward of the main entry door.

Two containers of fluid may be carried to replenish the system in flight. After filling a completely empty system, the vent valve, located below the tank filler, should be pushed for 10 seconds to bleed the pump.

NOTE: The vent valve must not be operated while the pump is running.

4. Warning annunciators

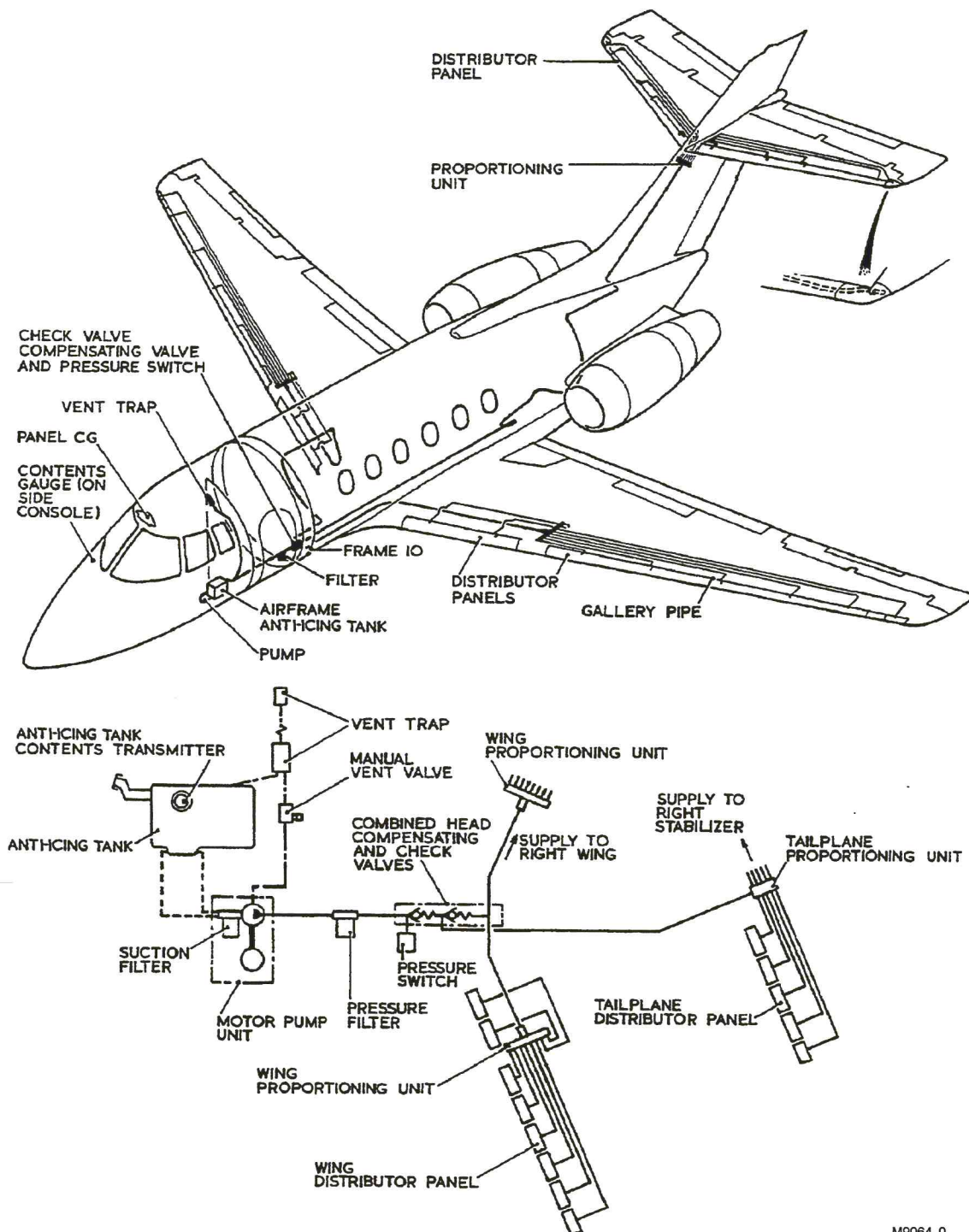
With the TKS pump running, system low pressure is indicated by the illumination of an amber ANTICE LO PRESS annunciator and the amber ICE PROT ↑ flashing repeater annunciator.

Fluid low quantity is indicated by the illumination of an amber ANTICE LO QTY annunciator and the amber ICE PROT ↑ flashing repeater annunciator (30 minutes of protection remains).

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ICE and RAIN PROTECTION - AIRFRAME ANTI-ICING SYSTEM (continued)



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Airframe anti-icing system
Fig. 1

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ICE and RAIN PROTECTION - AIRFRAME ANTI-ICING SYSTEM

(continued)

5. System operation

A WING/TAIL ANTICE timer switch controls an electrically operated pump for up to 10 minutes. When initially selected, the first minute of operation is at a high rate of flow, then reverts to a normal rate of flow.

During operation of the timer switch, if icing conditions prevail or further icing conditions are expected, then a continued period of operation should be selected before the timer switch reaches zero. Selecting further use of the system, before the timer switch reaches zero, avoids the system initiating a high rate of flow and conserves anti-icing fluid.

When the timer switch reaches zero, the pump is de-energized and a warning chime sounds through the airplane audio system.

NOTE: At very low temperatures of -28° C or less, ice crystals can exist in the atmosphere, but do not present a hazard. If the TKS system is used at these low temperatures, the water/alcohol content of the TKS fluid will evaporate, leaving solidified glycol which together with the impinging ice crystals can give the appearance of ice.

Use of the TKS fluid, under these conditions, is not advisable.

Therefore, operation of the TKS timer switch should be limited to the priming procedures, and additional use in flight only when weather conditions warrant.

Anti-icing fluid is drawn from the tank through a suction filter to the pump and then via a pressure filter and check valve to the head compensating valve. The head compensating valve ensures equal fluid pressure at the wings and horizontal stabilizers proportioning units. Fluid is fed from the head compensating valve to three proportioning units. One unit is located in each wing and the other between the horizontal stabilizers.

A check valve is incorporated in each proportioning unit outlet to prevent back-flow when the system is inoperative. Each proportioning unit splits the main flow down to the requirements of the individual distributor panels. If a pipe were to become disconnected, this arrangement ensures the fluid supply is maintained at the remaining outlets.

At each distributor panel, fluid is fed through a metering tube into a cavity. The fluid then passes through a micro-porous plastic sheet and through a stainless steel outer skin of greater porosity to escape into the atmosphere. The airflow then causes the fluid to spread rearward over the airfoil section.

6. Electrical power supplies

DC power supplies to the airframe anti-icing pump and chime unit are taken from busbar PS2.

Supplies to the ANTICE LO PRESS, ANTICE LO QTY and ICE PROT ↑ annunciators are taken from busbar PE.

The fluid contents indicator is supplied from busbar PE when the airplane is on the ground and busbar PS2 while in flight. Changeover is via a weight-on-wheels microswitch.

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