

DC-10 FLIGHT CREW OPERATING MANUAL

CHAPTER 13 ICE AND RAIN PROTECTION

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ICE AND RAIN PROTECTION

GENERAL

The ice and rain protection systems consist of windshield anti-icing and defogging, clearview windows defogging, windshield wipers, rain repellent, wing anti-ice, engine cowl anti-ice, and pitot/static heat system. The tail surfaces have no ice protection.

DESCRIPTION

PITOT/STATIC HEAT SYSTEM

The pitot/static heat system consists of electric heating elements within the pitot tubes, static plates, angle-of-attack sensors and total air temperature (TAT) probe. The pitot tubes have dual heating elements. The elements are controlled and monitored by a single control monitor and selector. Placing the pitot/static heat control switch to any position other than OFF will activate all systems, while in flight. On the ground, all but the (TAT) probe are energized.

WINDSHIELD ANTI-ICE AND WINDSHIELD/WINDOW DEFOGGING SYSTEM

The windshield anti-ice system (may also be used as a backup for windshield defogging) consists of separate and independent electrically heated left and right windshields, their respective annunciator lights, mode selector switches, temperature controllers and temperature sensors. A controller and sensor form the automatic control system that maintains the windshield at the

designed anti-icing temperature. The controller automatically provides ramp (gradually increasing) warm-up power to the windshield for three to four minutes during initial turn on to minimize thermal shock. A controller overheat protection function automatically removes power from the windshield if an overheat condition occurs.

The defogging system consists of heating elements and sensors in each windshield/clearview window and a controller for each windshield/clearview window. A single defog switch controls defogging for the windshield/clearview windows. The controller provides ramp (gradually increasing) warm-up power to the windshield/clearview window defogging system for 2.5 to 4.5 minutes during initial turn-on to minimize thermal shock. A controller also provides overheat protection to the windshield/clearview window by removing electrical power from the heater circuit during an overheat condition.

WINDSHIELD WIPER SYSTEM

The windshield wiper system consists of two electrically powered two-speed wipers. Operation of the windshield wipers on a dry surface is not recommended.

RAIN REPELLENT SYSTEM

The rain repellent system consists of a container, a timer and separate nozzles for the Captain's and First Officer's windshields. The system is controlled by individual pushbuttons for

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the Captain and First Officer. Operation of rain repellent system on a dry windshield is not recommended.

ENGINE COWL AND ENGINE ANTI-ICE SYSTEMS (Effective for airplanes without S/B 30-47 incorporated.)

The engine anti-ice system consists of the cowl anti-ice system and the engine stator vane anti-ice system.

The cowl anti-ice system is supplied 15th stage bleed air through an electrically actuated pneumatically operated pressure regulator valve, one for each engine. These valves will regulate automatically if electrical power fails. An engine anti-ice cowl disagree light comes on if pressure downstream of the regulator is inadequate when ice protection is selected on. The light also comes on if the valve does not close after it is selected off.

The engine anti-ice system supplies 9th stage bleed air to the stator vanes through an electrically controlled solenoid valve, one for each engine. Engine anti-ice valve open advisory lights come on when the valve is open. The valves close automatically and anti-icing is not available to the stator vanes if electrical power fails. One control switch for each engine turns on both the cowl and the engine anti-ice systems.

The engine and cowl anti-ice systems are operational only when the respective engine is running and cannot be operated from the APU, around pneumatic sources or cross bleed from another engine.

WING AND UPPER VHF (VHF-1) ANTENNA ANTI-ICE SYSTEM (Effective for airplanes without S/B 30-47 incorporated.)

Wing ice protection is provided for the outboard wing slats by engine bleed air through a shutoff valve, and through a

telescoping duct to the distribution ducts. Upper VHF (VHF-1) antenna ice protection is provided from the same source through a shutoff valve. The valves close automatically and wing and upper VHF (VHF-1) antenna anti-icing is not available if electrical power fails. Ice protection is not provided for the inboard slats. One switch on the Flight Engineer's Upper Panel No. 2 controls the wing and upper VHF (VHF-1) antenna anti-ice system.

ENGINE COWL AND UPPER VHF ANTENNA ANTI-ICE SYSTEM (Effective for airplanes with S/B 30-47 incorporated or production equivalent.)

Engine cowl ice protection is supplied from a separate engine bleed port which is isolated from the normal pneumatic systems. This separate bleed air source provides adequate temperature for ice protection at all engine power settings. Engine 1 and 3 have shutoff valves; engine 2 has a pressure regulator valve. The valves open automatically to provide engine cowl anti-icing if electrical power fails.

The upper VHF antenna is anti-iced by supplying pneumatic system 3 air through a shutoff valve controlled by the engine 2 and antenna anti-ice switch. The VHF antenna anti-ice valve will close automatically if electrical power fails.

WING ANTI-ICE SYSTEM (Effective for airplanes with S/B 30-47 incorporated or production equivalent.)

Wing ice protection is provided for the outboard wing slats by supplying pneumatic system air through a shutoff valve, and through a telescoping duct to the distribution ducts. The valves close and wing anti-icing is not available if electrical power fails. Ice protection is not provided for the inboard slats. One switch controls the wing anti-ice system.

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APU SCREEN ANTI-ICE SYSTEM

(If installed)

The APU screen anti-ice system supplies bleed air from pneumatic duct 2 to the APU inlet screen through a shutoff valve. The valve will close automatically if electrical or pneumatic power loss occurs.

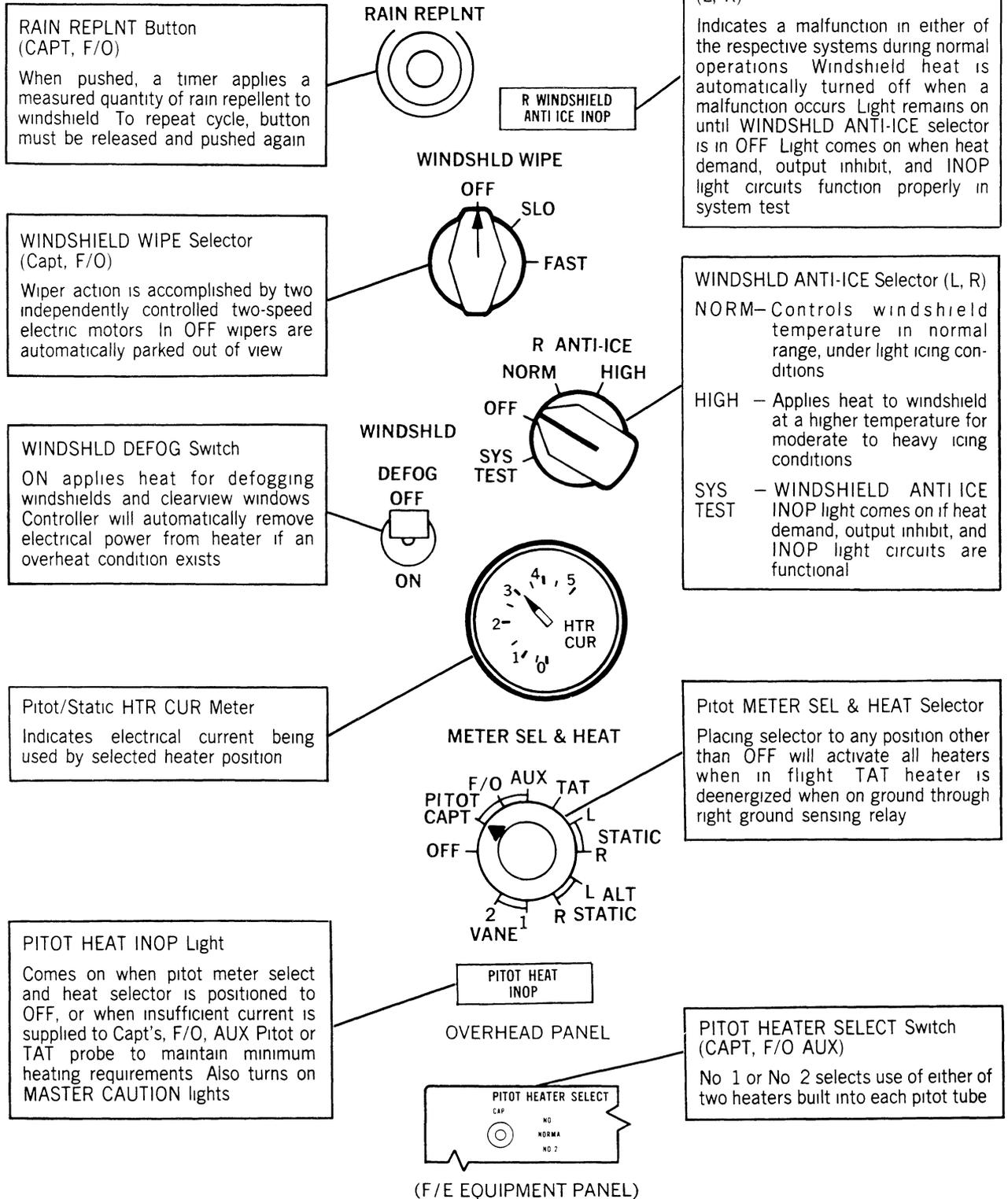
CONTROLS AND INDICATORS

Controls, indicators, and annunciator lights are on the Pilot's Overhead Panel, and Flight Engineer's Upper Panel No. 2. Illustrations of the panels are in Chapter 1. Individual controls and indicators are illustrated and described in another section of this chapter.

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ICE AND RAIN PROTECTION - Controls and Indicators

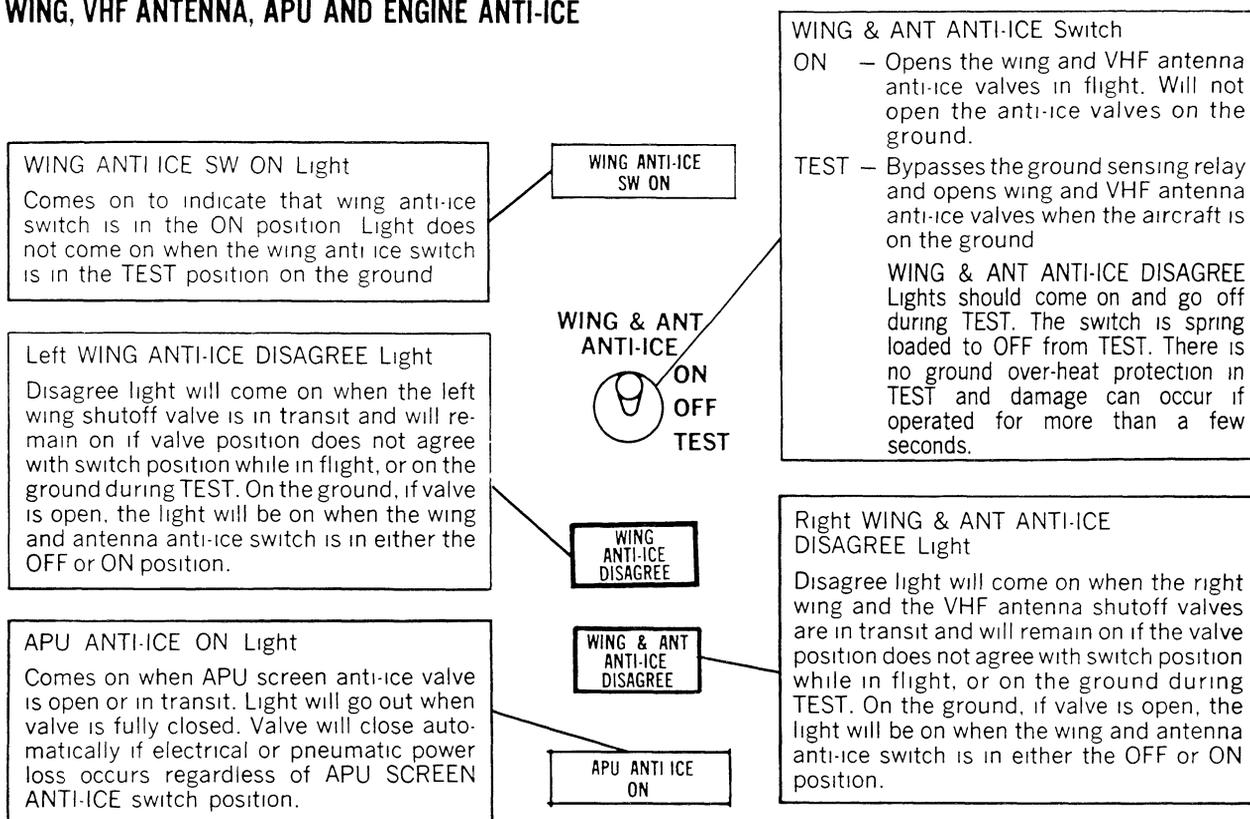
Windshield Anti-ice, Windshield/Window Defogging and Pitot/Static Heat



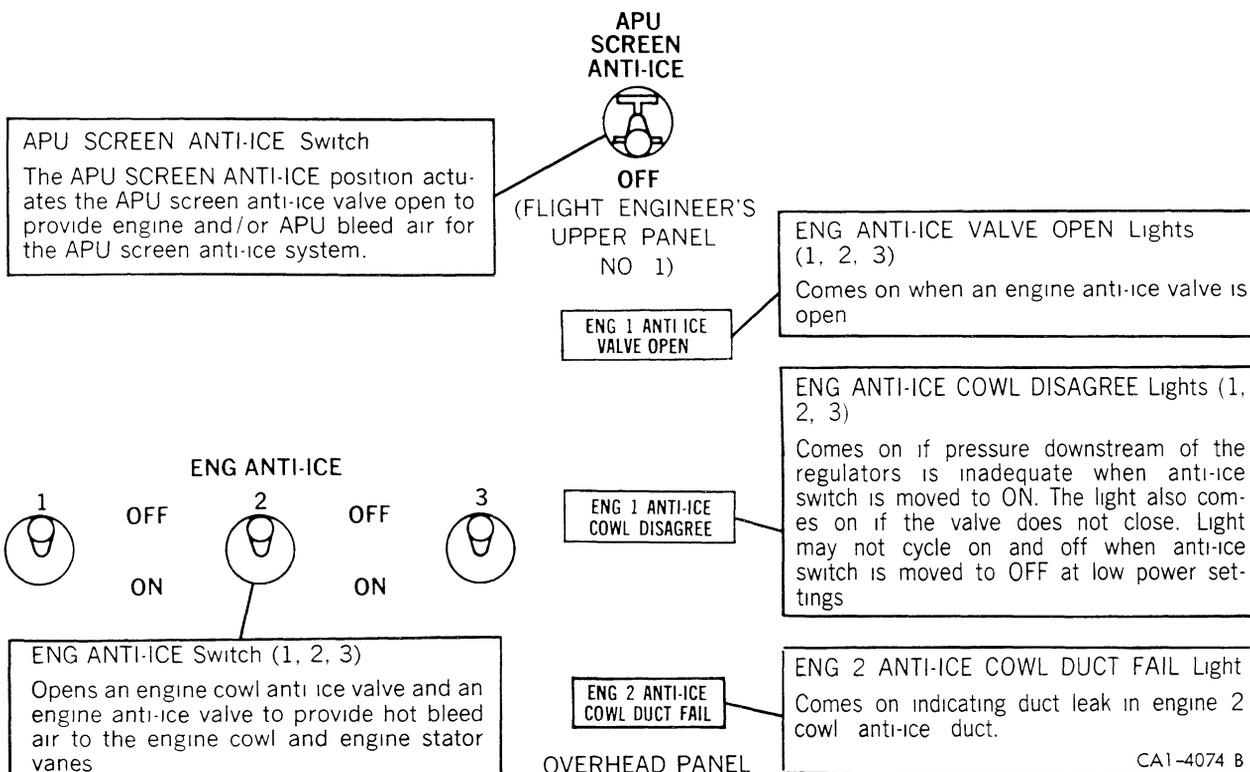
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ICE AND RAIN PROTECTION - Controls and Indicators WING, VHF ANTENNA, APU AND ENGINE ANTI-ICE



(FLIGHT ENGINEER'S UPPER PANEL NO. 2)



OVERHEAD PANEL

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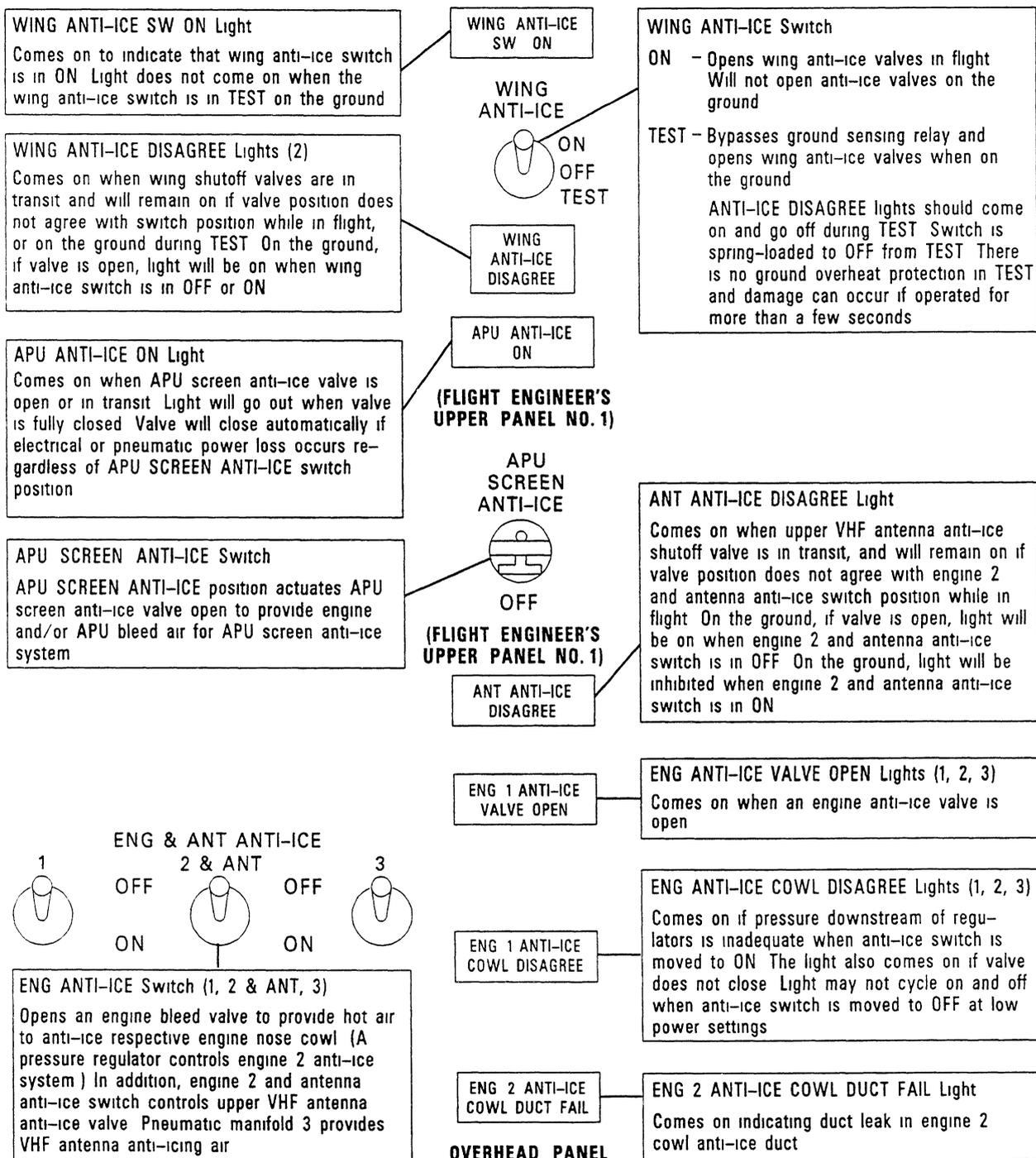
Effective for airplanes with VHF antenna on wing anti-icing system. ENG 2 ANTI-ICE COWL DUCT FAIL light, APU ANTI-ICE ON light and APU SCREEN ANTI-ICE switch installed on some airplanes.

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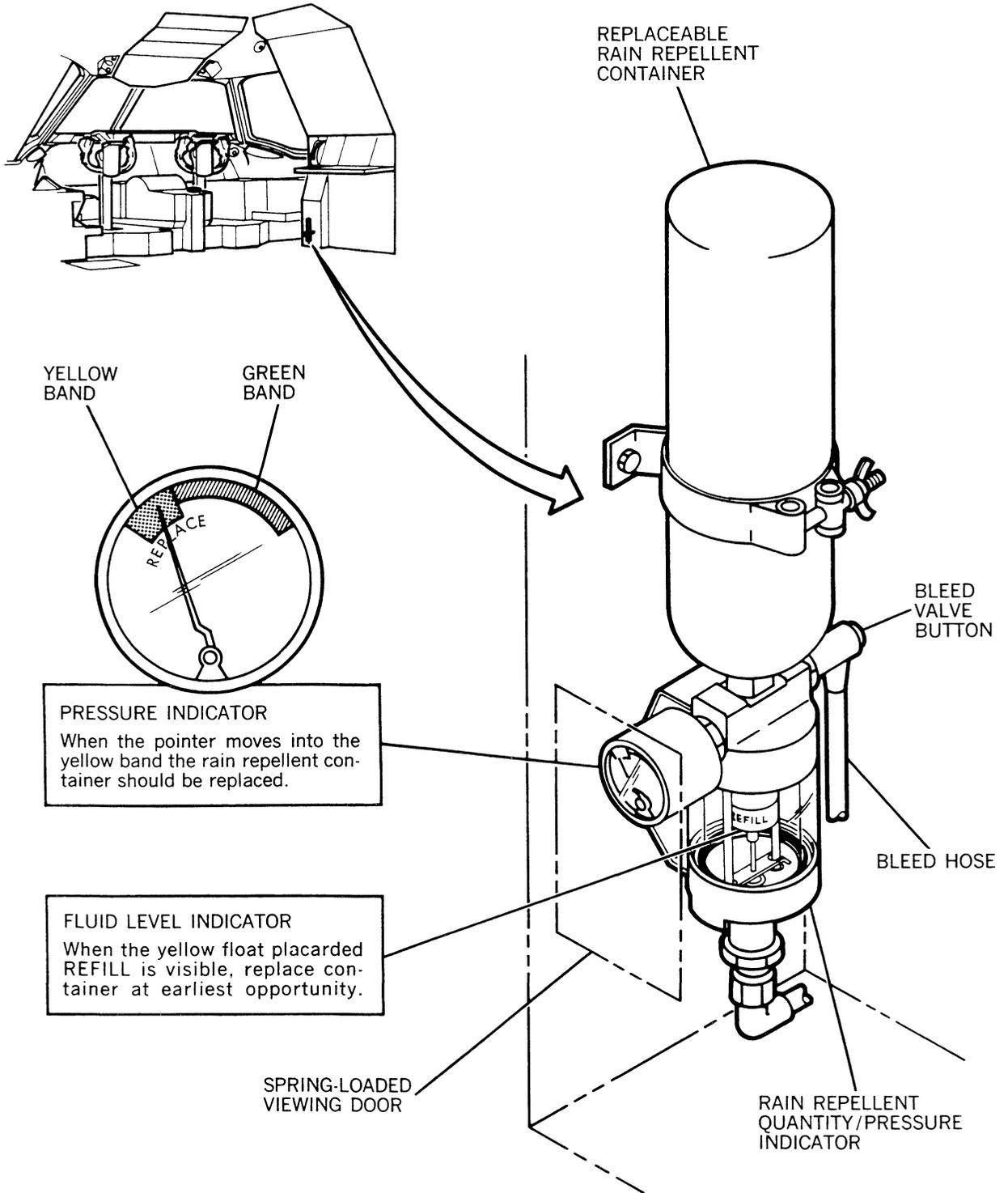
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ICE AND RAIN PROTECTION – Controls and Indicators

Wing, VHF Antenna, APU, and Engine Anti-ice



ICE & RAIN PROTECTION - Controls & indicators
Rain Repellent Quantity/Pressure Indicator



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