

The HBMs also monitor brake temperature data. The data sent by the Brake Temperature Monitoring System (BTMS), which incorporates four sensors installed in the brake housings, provides excessive brake temperature warning to the EICAS Refer to Chapter 14, LANDING GEAR for more information. The HBMU also controls heat to Yaw Damper (YD) actuators to ensure that the standby YD actuator is heated. Refer to Chapter 10, FLIGHT CONTROLS.

The HBMU receives data from various airplane systems via the Data Acquisition Units (DAU) to control the heaters. The systems that send data to the DAUs are:

- Electronic Engine Controllers (EEC) for the “all heaters off logic and for TAT probe on/off logic
- Fault Warning Computer (FWC) regarding which ADC is selected for cockpit display
- Automatic Flight Control System (AFCS) regarding which Yaw Damper is in use for YD heater control logic
- Air Data Computers (ADC) to provide TAT information to control heat to the Yaw Dampers and airspeed information for all heaters off logic
- Electrical Load Management System (EMS) provides BUS status and ADG information for heater control logic
- Weight-On-Wheels (WOW) for all heaters off logic and for TAT probe on/off logic

The heaters are driven to the indicated ON state based on the following logic:

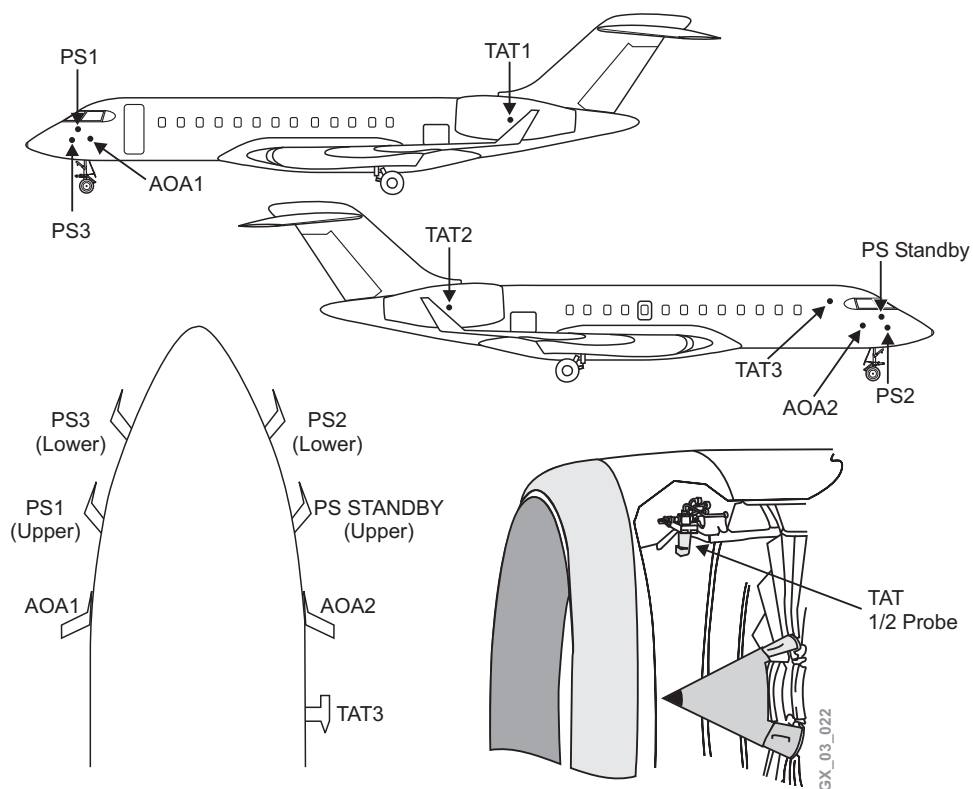
GROUND / PARK LOGIC	ENGINE START	INFLIGHT
ALL HEATERS ARE POWERED "OFF" WHEN:	AOA 1 AOA 2 PS 1 PS 2 PS 3 PS STBY	AOA 1 AOA 2 PS 1 PS 2 PS 3 PS STBY
LEFT ENGINE: OFF (AND)	} ON	} ON
RIGHT ENGINE: OFF (AND)	YD 1 ON/OFF Note (1) YD 2 ON/OFF Note (1)	YD 1 ON/OFF Note (1) YD 2 ON/OFF Note (1)
CAS: < 50 KTS (AND)	TAT 1 ON/OFF Note (2) TAT 2 ON/OFF Note (2) TAT 3 OFF	TAT 1 ON TAT 2 ON TAT 3 ON
MGWOW: GROUND		
Note: <u>HBMU IBIT</u> All heaters are tested "ON" when AC power is applied. It is recommended to remove all pitot/AOA covers prior to starting APU or connecting external power.	Note (1): YD 1 and 2 turn ON with TAT < -40°C and YD not engaged. Note (2): TAT 1 and 2 turn ON by respective engine run.	Note (1): YD 1 and 2 turn ON with TAT < -40°C and YD not engaged.

PROBES

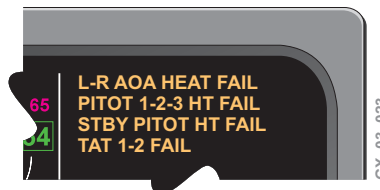
There are four Pitot-Static (PS) probes on the side of the fuselage. They supply pitot and static pressure to the Air Data Computers and standby instruments. Heater elements are installed in the PS heads and mounting bases.

There are three Total Air Temperature (TAT) Probes, one on the fuselage and one in each engine inlet.

There are two AOA probes mounted on the fuselage, one on either side.



The current being drawn by the heater is measured and a heater fault is generated if the current drawn is less than the minimum required by the particular probe. The fault is then transmitted to the EICAS.



WINDSHIELD HEAT

The Windshield Temperature Control System provides defog and anti-icing for the Pilot's and Copilot's windshield and side window. The system continuously monitors the temperature of each windshield and side window and maintains the temperature within specified limits.

WINDSHIELD TEMPERATURE CONTROLLER

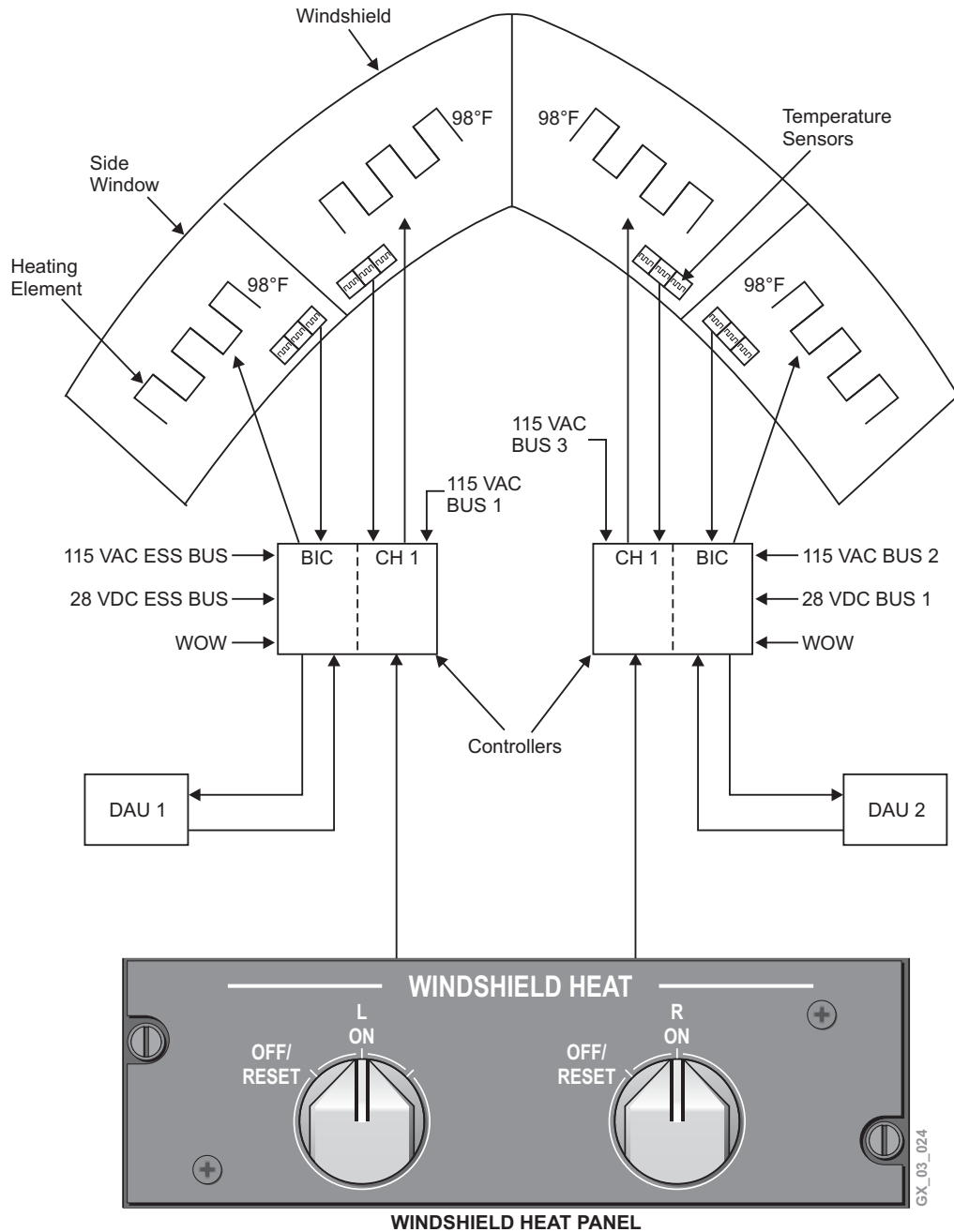
There are two dual channel Windshield Temperature Controllers (WTC). The left hand WTC controls the left windshield heater and the left side window heater. The right hand WTC controls the right windshield heater and the right side window heater. Both WTCs are interfaced with the EICAS via different DAUs. The controllers automatically control the power supplied to the heaters when electrical power is applied to the system.

The WTC has two totally independent channels. Channel 1 (CH1) monitors and regulates windshield heating and manages the Channel 1 Built-In-Test (BIT).

The BITE Interface Channel (BIC) monitors and regulates the side window temperature and manages the BIC Built-In-Test. Also, it communicates to EICAS and stores faults in a Non-Volatile Memory (NVM) for later retrieval by CAIMS.

The left and right switches on the Windshield Heat panel, independently control power to the left and right windshield and side window temperature controllers.

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The heat for the windshields and side windows is supplied by electrical heaters.

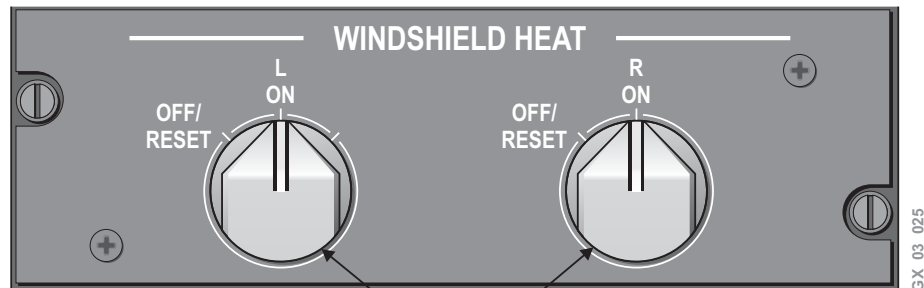
The windshield is a laminated transparency comprising two acrylic mainplies and an outer glass faceply. A conductive film is deposited on the interior surface of the faceply except for a half-inch wide zone along its periphery. The conductive film acts as the windshield heating element.

Bombardier Global Express - Anti-Ice

The side window construction is similar to that of the windshield, except that the laminated transparency comprises only two acrylic mainply layers. On the side window, the conductive film is deposited on the interior surface of the outer mainply.

WINDSHIELD HEAT PANEL

Selections for the pilot's and copilot's windshield and side window heating are made on the WINDSHIELD HEAT panel located on the overhead panel.



- LEFT and RIGHT WINDSHIELD HEAT Selectors**
- **OFF/RESET** – Turns windshield/window heat OFF
 - Resets the system in the event of a failure
 - Inhibits all windshield and window fail messages
 - **ON** – Activates the windshield/window temperature control system.

Modes of Operation

The windshield modes of operation are as follows:

Warm-Up Mode

The warm-up mode is provided to avoid the effect of thermal shock on the windshield. While in the warm-up mode, the windshield heater generates only 33% of nominal heat for approximately 4 minutes. The warm-up mode is activated on WTC power-up under the following conditions:

- Heat was not applied to the windshield for more than 5 seconds
- The airplane is weight-on-wheels

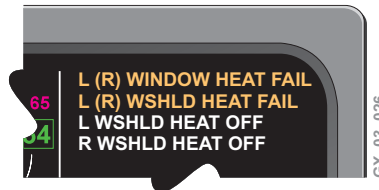
If the airplane is weight-off-wheels, the warm-up mode is terminated. Once the warm-up mode is terminated, it automatically switches to normal regulating mode.

Normal Regulating Mode

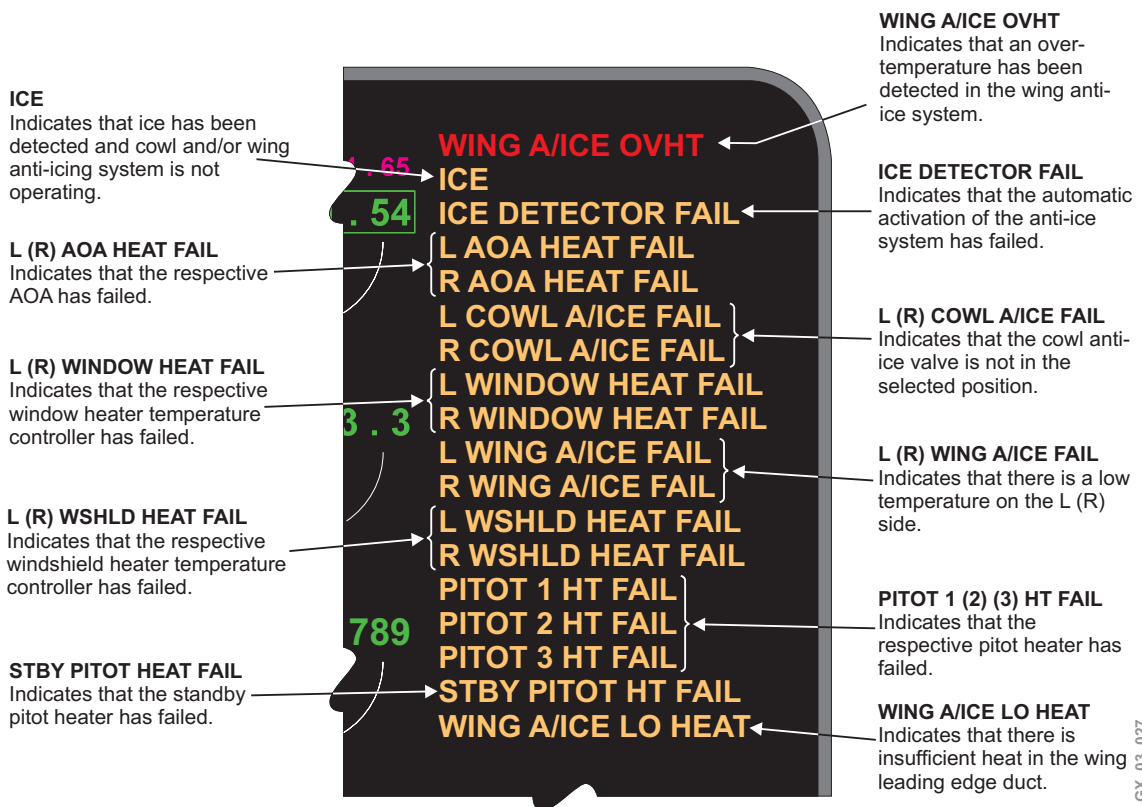
On WTC power-up, both channels controlling the windshield and respective side window are energized. Each channel continuously monitors the temperature through its sensor element. If the temperature decreases below a specified limit, the heater is turned on. If the temperature exceeds a specified limit, the heater is turned off.

WINDSHIELD/WINDOW FAILURE INDICATION

In the event of a system failure or being turned off, a message is displayed on the EICAS.

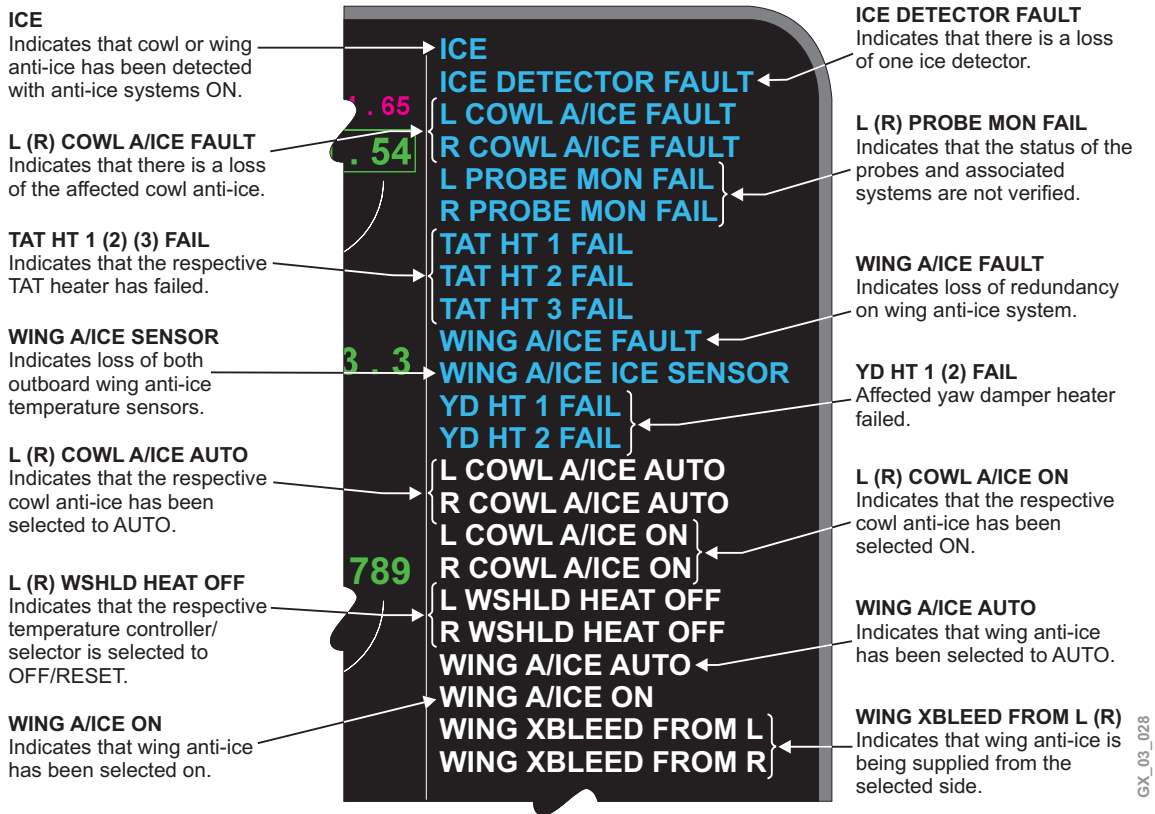


ICE AND RAIN EICAS MESSAGES



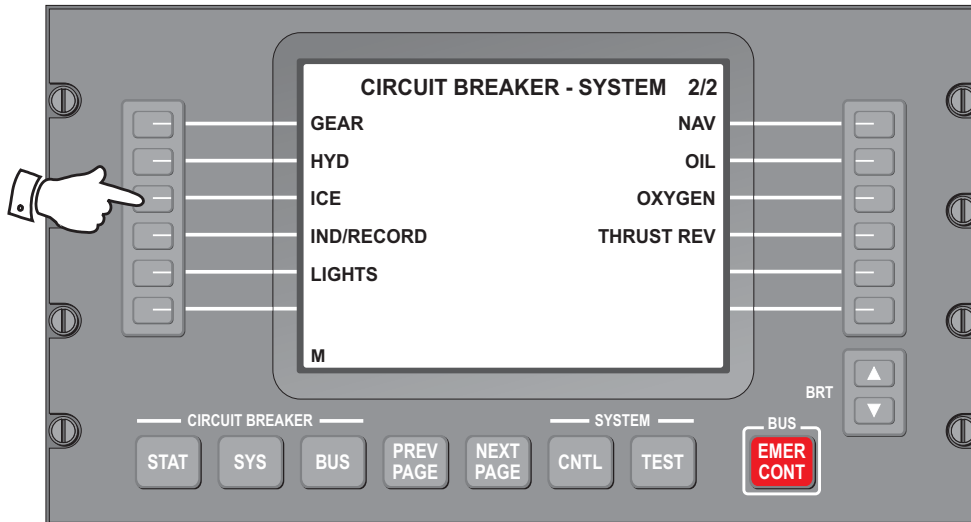
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ICE AND RAIN EICAS MESSAGES (Cont)



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EMS CIRCUIT PROTECTION



CB - ICE SYSTEM				1/5	CB - ICE SYSTEM				4/5
HBMU 1	BATT		IN	R WINDOW HEAT	AC 2	CCBP	IN		
HBMU 2	DC ESS		IN	R WINDOW HEAT CTL	DC 1		IN		
L AOA HEAT	AC ESS	CCBP	IN	R WING A/ICE CTL	DC ESS		IN		
L COWL A/ICE VLV	BATT		IN	R WSHLD HEAT 1	AC 3	CCBP	IN		
L ICE DETECTOR	AC ESS	CCBP	IN	R WSHLD HEAT 2	AC 3	CCBP	IN		
L WINDOW HEAT	AC ESS	CCBP	IN	STBY PITOT HT	AC ESS	CCBP	IN		
CB - ICE SYSTEM				2/5	CB - ICE SYSTEM				5/5
L WINDOW HEAT CTL	DC ESS		IN	TAT HT 1	AC ESS	CCBP	IN		
L WING A/ICE CTL	DC ESS		IN	TAT HT 2	AC ESS	CCBP	IN		
L WSHLD HEAT 1	AC 1	CCBP	IN	TAT HT 3	AC 3	CCBP	IN		
L WSHLD HEAT 2	AC 1	CCBP	IN	WAI XBLEED CTL	DC ESS		IN		
PITOT 1 HT A	AC 1		IN	WAI XBLEED VLV	DC ESS		IN		
PITOT 1 HT B	AC ESS	CCBP	IN						
CB - ICE SYSTEM				3/5	CB - ICE SYSTEM				M
PITOT 2 HT	AC 1	CCBP	IN						
PITOT 3 HT	AC ESS	CCBP	IN						
R AOA HEAT A	AC 1	CCBP	IN						
R AOA HEAT B	AC ESS	CCBP	IN						
R COWL A/ICE VLV	BATT		IN						
R ICE DETECTOR	AC 1	CCBP	IN						
M									

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