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The ice and rain protection systems permit aircraft operation in various environmental conditions and, in particular, in icing situations.

An ice detector, connected to the CCAS, monitors ice accretion. In addition, an icing evidence probe is installed to indicate visually an ice accretion.

Aircraft ice protection is provided by :

- A pneumatic system operating on areas of the airframe :
 - outer and center wing leading edges,
 - horizontal tailplane leading edges,
 - engine air intakes and gas paths.
- Electrical heating of :
 - propeller blades,
 - windshields,
 - probes,
 - flight control horns.

For the pneumatic system, the engines supply bleed air through the LH and RH de ice valves regardless of the engine bleed valves position.

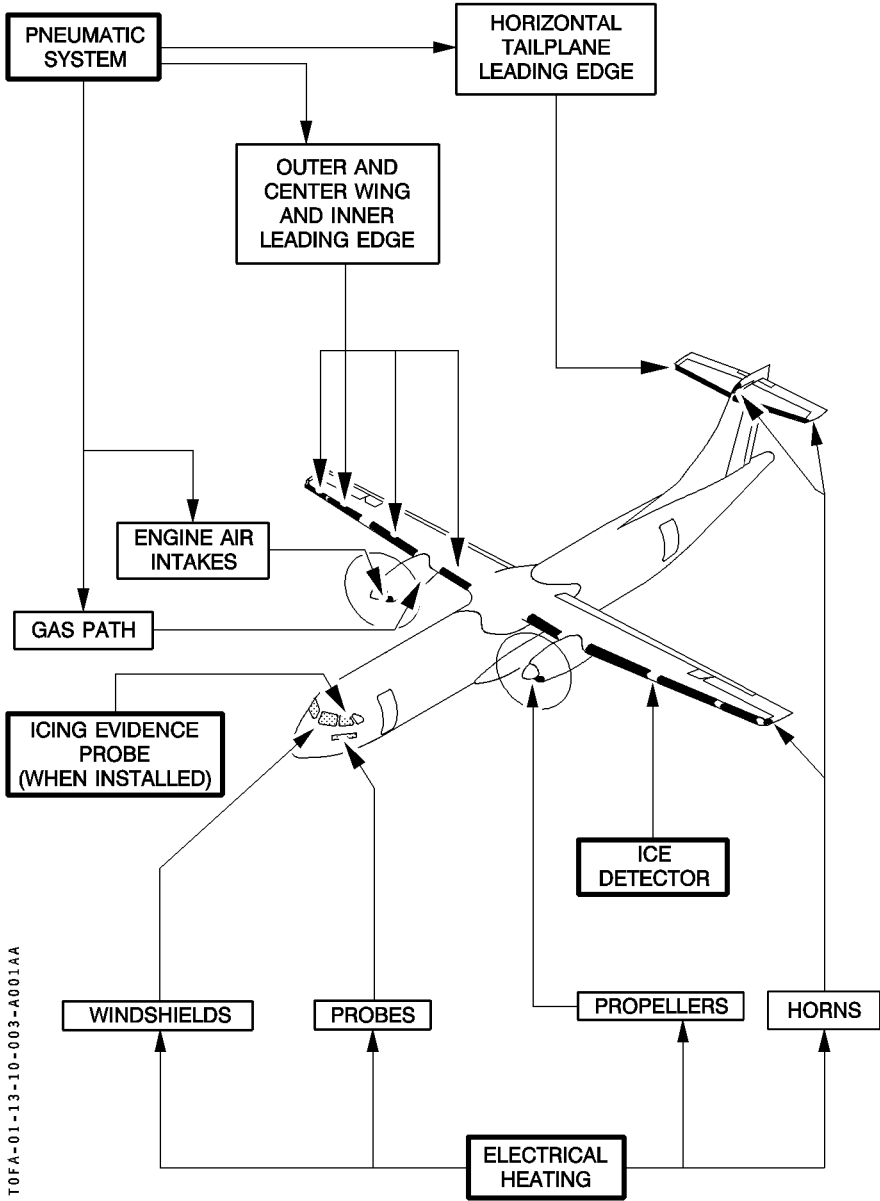
For electrical heating, the power is supplied primarily by AC wild current.

Rain removal from the front windshields is achieved by windshield wipers.

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20.1 DESCRIPTION

An anti icing advisory system (AAS) is installed.

The AAS system includes.

- An ice detector,
- An icing evidence probe,
- Three lights in the cockpit :
 - icing (amber) and ICING AOA (green) lights on central panel,
 - DE ICING blue light on memo panel.

This system has been designed to alert the crew on the correct procedures to be applied when flying in icing conditions :

- Increase of minimum maneuver/operating speeds + selection of anti-icing.
- Selection of the de icing system at first indication of ice accretion.
- Switching the de icing system OFF when ice does not build up any more on the airframe.

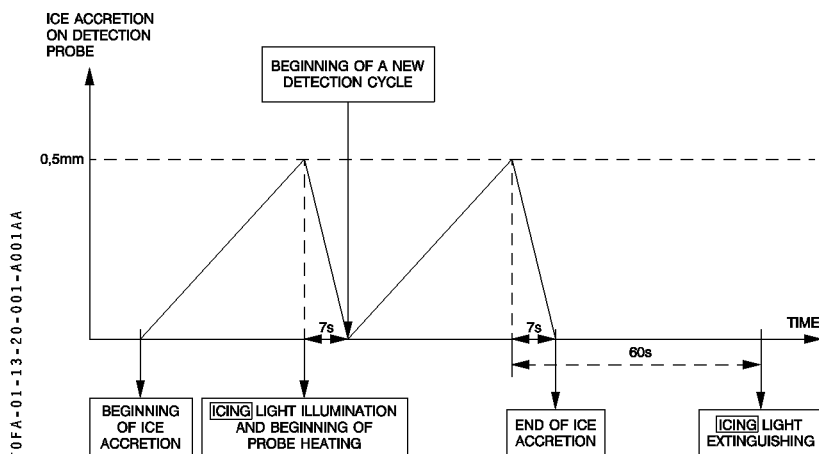
ICE DETECTOR

The ice detector, located under the left wing, alerts the crew as soon as and as long as ice accretion is sensed by the probe.

Alert is generated by the amber ICING light on the central panel.

The system is self tested constantly, and any failure generates a FAULT light illumination with single chime.

Detection of ice accretion and associated alert are performed under following cycle :



CAUTION :

The ice detector indicates ice accretion is building up on aircraft. Therefore, extinguishing of the ICING light must be regarded as an end of ice accretion and not as an absence of ice on aircraft. Consequently a visual check must be performed to assure aircraft is cleared of ice after having encountered ice accretion conditions.

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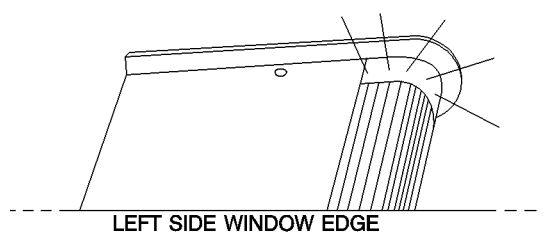
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ICING EVIDENCE PROBE

Located near left side window of the cockpit, the icing evidence probe is visible by both pilots.

An integrated lighting, to put forward ice accretion, is controlled by the NAV lights switch.

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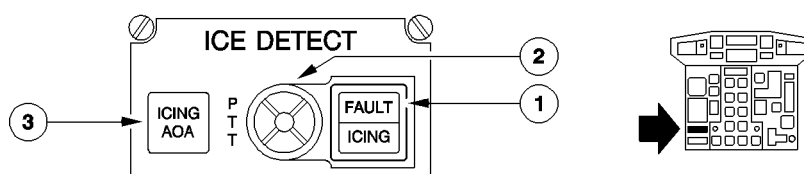
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20.2 CONTROLS

ICE DETECTOR PANEL

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① ICE DET INDICATION LIGHT

- R ICING illuminates amber when ice accretion is detected and horns anti icing is selected ON.
- R ICING flashes amber when ice accretion is detected and horns anti icing is not selected ON.
- R FAULT illuminates amber when a system failure is detected (detector fault, loss of power supply).

② ICE DET PTT

The push to test pb is used to check the ice detector correct operation.
Press and hold test button for 3 seconds.

- ICING amber light flashes on central panel (with associated warning) if system works correctly.
- ICE DET FAULT illuminates, (with associated central warnings) if an ice detector failure is detected.

③ ICING AOA pb

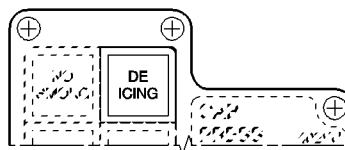
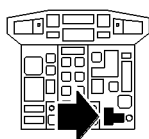
- ICING AOA It illuminates green as soon as one horns anti icing Pb is selected ON, reminding the crew of stall alarm threshold being lower in icing conditions.
- ICING AOA It can only be extinguished manually by depressing it, provided both horns anti icing are selected OFF. In this case, stall alarm threshold recovers the values defined for flight in normal conditions.

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DE ICING INDICATOR

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ILLUMINATES Blue on memo panel when the airframe de icing system is selected ON.

FLASHES Blue on memo panel when the airframe de icing system is still selected ON five minutes after last ice accretion detection.

20.3 ELECTRICAL SUPPLY/SYSTEM MONITORING

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
ICE detector	– Nil –	ACW BUS 2 (on lateral panel ICE DET PWR SPLY)
ICING/FAULT light	DC EMER BUS (on lateral panel ICING CAUTION/ Boots A and B ind)	– Nil –
ICING AOA light	DC EMER BUS (on lateral panel DE ICING-AAS/ Boots A and B ind)	– Nil –

SYSTEM MONITORING

The following conditions are monitored by visual and aural alerts :

- Ice detector failure
 - See ICE DETECTOR FAULT procedure in chapter 2.05.09.
- Ice accretion developing on aircraft
 - See adverse weather procedures in chapter 2.02.08.
- Airframe de icing system selected and no ice accretion for 5 minutes.
 - DE ICING blue light flashing on center panel. This condition is not monitored by aural alert.

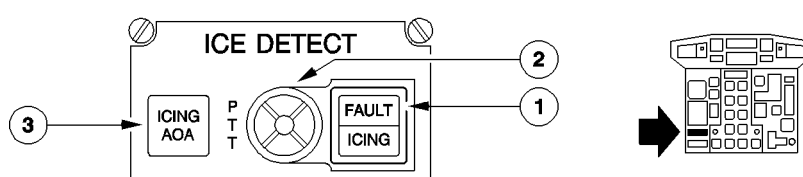
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20.2 CONTROLS

ICE DETECTOR PANEL

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① ICE DET INDICATION LIGHT

- R ICING illuminates steady amber when ice accretion is detected provided both horns anti icing and airframe de icing are selected ON.
- R ICING flashes amber when ice accretion is detected and horns anti icing and/or airframe de icing are not selected ON.
- R FAULT illuminates amber when a system failure is detected (detector fault, loss of power supply).

② ICE DET PTT

The push to test pb is used to check the ice detector correct operation.
Press and hold test button for 3 seconds.

- ICING amber light flashes on central panel (with associated warning) if system works correctly.
- ICE DET FAULT illuminates, (with associated central warnings) if an ice detector failure is detected.

③ ICING AOA pb

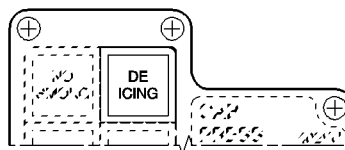
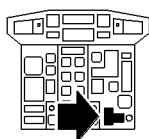
- ICING AOA It illuminates green as soon as one horns anti icing Pb is selected ON, reminding the crew of stall alarm threshold being lower in icing conditions.
- ICING AOA It can only be extinguished manually by depressing it, provided both horns anti icing are selected OFF. In this case, stall alarm threshold recovers the values defined for flight in normal conditions.

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DE ICING INDICATOR

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ILLUMINATES Blue on memo panel when the airframe de icing system is selected ON.

FLASHES Blue on memo panel when the airframe de icing system is still selected ON five minutes after last ice accretion detection.

20.3 ELECTRICAL SUPPLY/SYSTEM MONITORING

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
ICE detector	– Nil –	ACW BUS 2 (on lateral panel ICE DET PWR SPLY)
ICING/FAULT light	DC EMER BUS (on lateral panel ICING CAUTION/ Boots A and B ind)	– Nil –
ICING AOA light	DC EMER BUS (on lateral panel DE ICING-AAS/ Boots A and B ind)	– Nil –

SYSTEM MONITORING

The following conditions are monitored by visual and aural alerts :

- Ice detector failure
 - See ICE DETECTOR FAULT procedure in chapter 2.05.09.
- Ice accretion developing on aircraft
 - See adverse weather procedures in chapter 2.02.08.
- Airframe de icing system selected and no ice accretion for 5 minutes.
 - DE ICING blue light flashing on center panel. This condition is not monitored by aural alert.

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30.1 DESCRIPTION

(See schematic P 9/10)

The operating principle is to sequentially inflate the boots in order to remove ice. The de ice valves control the delivery pressure to 1.4 bar (20.3 psi).

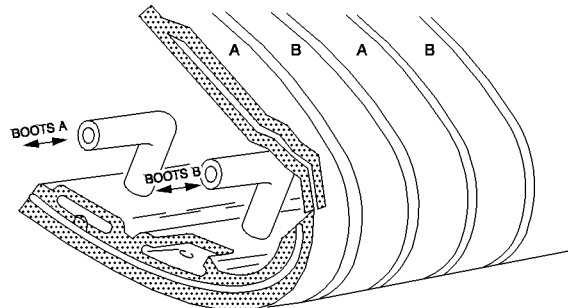
R Six distribution valves control air supply to the boots :

- valve ① to LH engine air intake and gas paths.
- valve ② to RH engine air intake and gas paths.
- valve ③ to LH outer wing leading edge.
- valve ④ to internal wing leading edges.
- valve ⑤ to RH outer wing leading edge.
- valve ⑥ to horizontal tailplane leading edge.

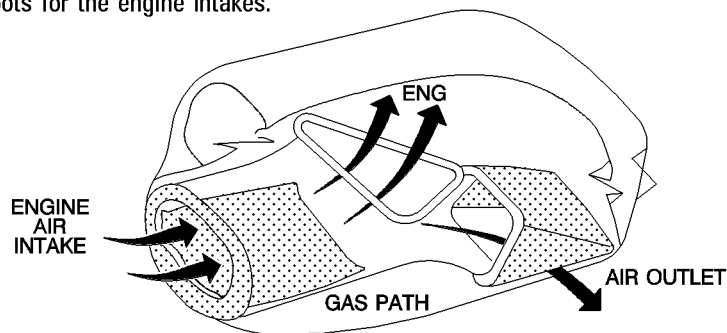
Each of these distribution valves has one input and two outputs A and B, each controlled by the MFC.

Two types of boots are used :

- Chordwise boots for the leading edges and the gas paths.



- Annular boots for the engine intakes.



When deflated, the boots are held to the structure thanks to a venturi supplied by bleed air.

Note : – The system is designed to remain operative with one engine inoperative through a common air manifold, except icing protection of the inoperative engine which is lost.

CAUTION : With this type of boot, there is no need to wait for ice accretion on airframe before selecting it ON. This system MUST be selected ON as soon as and as long as ice accretion develops on airframe.

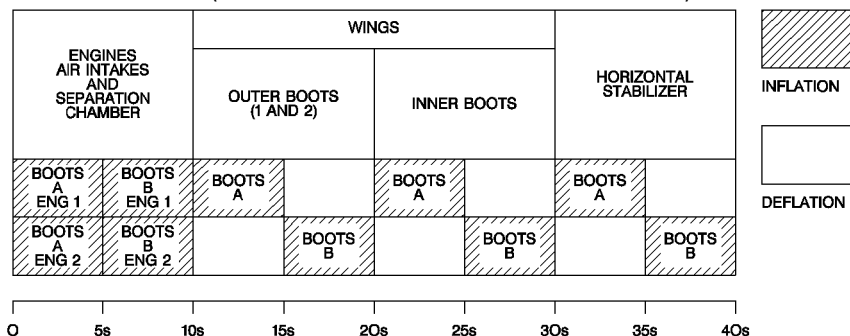
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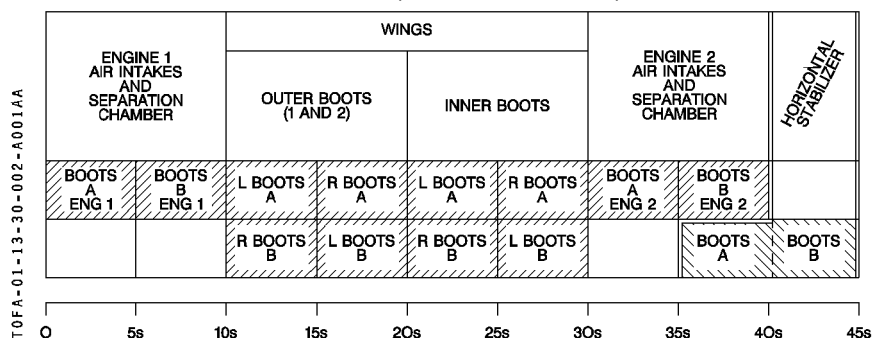
TIME SEQUENCE DIAGRAM

NORMAL MODE (AUTOMATIC SELECTION PILOTED BY MFC)



BEGINNING OF THE FOLLOWING SEQUENCE AT :
- 60 SEC (FAST MODE)
- 180 SEC (SLOW MODE)

OVRD MODE (SEPARATED TIMER)



R BEGINNING OF THE FOLLOWING SEQUENCE AT 60 SEC (FAST MODE)

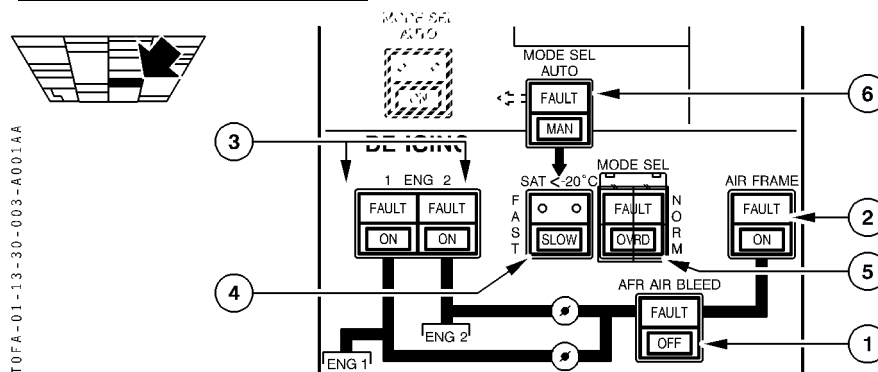
Note : When de icing OVRD mode is selected, boots inflate according to a separate timer and MFC is totally by passed.

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30.2 CONTROLS

ENGINE/WING DE ICING PANEL



① AIRFRAME AIR BLEED pb

Controls both de ice and isolation valves.

Pb pressed in Normal operation.

Both DE ICE and ISOLATION VALVES are open.

OFF (pb released) OFF light comes on white.

Both DE ICE and isolation valves are closed.

R However engine de-icing may be used (engine de-icing selected ON will open de-ice valve).

But airframe de-icing is never available.

FAULT The light illuminates amber and the CCAS is activated when :

- Air pressure downstream of the de-ice valves stays below 14 PSI for more than 10 seconds.
- Inflation sequencing of airframe boots A or B is not correct.
- Air temperature upstream of the de-ice valves exceeds 230°C.

The alert is inhibited when pb is released.

② AIRFRAME pb

Controls the outputs A and B of both wings and stabilizers distribution valves.

ON (pb pressed in) Signal is sent to the MFC in order to initiate a de-icing cycle depending on MODE SEL pb.
ON light illuminates blue.

Pb released In normal operation. Associated boots stay deflated.

FAULT The light illuminates amber and the CCAS is activated when :
- Associated distribution valve output has been controlled open but no downstream pressure has been detected, or
- Associated distribution valve output has been controlled closed but a downstream pressure is detected.

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③ ENGINE pbs

Control de-ice valves, as well as the outputs A and B of respective engine distribution valves.

ON (pb pressed in) De-ice valve is controlled open even if Airframe Airbleed is not selected ON, and a signal is sent to the MFC in order to initiate a cycle. ON light illuminates blue.

Pb released Associated boots stay deflated. Also controls associated de-ice valve in closed position, after Airframe Airbleed FAULT and ENG FAULT.

FAULT Light illuminates amber and CCAS is activated when :
 – Associated distribution valve output has been controlled opened but no downstream pressure has been detected, or
 – Associated distribution valve output has been controlled closed but a downstream pressure is detected.
 – AIRFRAME AIRBLEED pb selected OFF and air temperature upstream of the de-ice valve exceeds 230° C.
 – Inflation sequencing of engine boots A or B is not correct.

④ DE ICING MODE SEL pb

Controls the selection of wings/engines boots inflation cycles when MAN is selected on MODE SEL AUTO pb ⑥

FAST (pb released) Timing cycle = 60 s

R SLOW (pb pressed in) Timing cycle = 180 s - SLOW light illuminates blue.

⑤ DE-ICING OVERRIDE guarded pb

Controls the emergency de-icing operation.

The control panel enables control of all double valves (ENG and AIR FRAME).

NORM (pb released) Normal operation

OVRD (pb pressed in) The emergency de-icing activation is selected (timing cycle = 60 s), the light illuminates white and all de-icing lights extinguish. This position is used when the associated FAULT light illuminates.

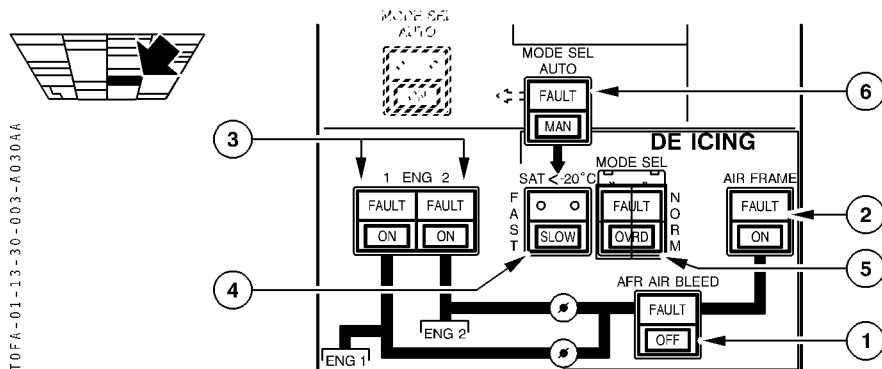
FAULT The light illuminates amber when both MFC modules associated to air intake boots control fail resulting in an incorrect inflation sequencing.

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30.2 CONTROLS

ENGINE ANTI-ICING AND WING DE ICING PANEL



① AIRFRAME AIR BLEED pb

Controls both de ice and isolation valves.

Pb pressed in Normal operation.

Both DE ICE and ISOLATION VALVES are open.

OFF (pb released) OFF light comes on white.

Both DE ICE and isolation valves are closed.

However engine anti-icing may be used (engine anti-icing selected ON will open de-ice valve).

But airframe de-icing is never available.

FAULT The light illuminates amber and the CCAS is activated when :

- Air pressure downstream of the de-ice valves stays below 14 PSI for more than 10 seconds.
- Inflation sequencing of airframe boots A or B is not correct.
- Air temperature upstream of the de-ice valves exceeds 230°C.

The alert is inhibited when pb is released.

② AIRFRAME pb

Controls the outputs A and B of both wings and stabilizers distribution valves.

ON (pb pressed in) Signal is sent to the MFC in order to initiate a de-icing cycle depending on MODE SEL pb.

ON light illuminates blue.

Pb released Pb released. In normal operation. Associated boots stay deflated.

FAULT The light illuminates amber and the CCAS is activated when :

- Associated distribution valve output has been controlled open but no downstream pressure has been detected, or
- Associated distribution valve output has been controlled closed but a downstream pressure is detected.

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③ ENGINE pbs

Control de-ice valves, as well as the outputs A and B of respective engine distribution valves.

ON (pb pressed in) De-ice valve is controlled open even if Airframe Airbleed is not selected ON, and a signal is sent to the MFC in order to initiate a cycle. ON light illuminates blue.

Pb released Associated boots stay deflated. Also controls associated de-ice valve in closed position, after Airframe Airbleed FAULT and ENG FAULT.

FAULT Light illuminates amber and CCAS is activated when :
 – Associated distribution valve output has been controlled opened but no downstream pressure has been detected, or
 – Associated distribution valve output has been controlled closed but a downstream pressure is detected.
 – AIRFRAME AIRBLEED pb selected OFF and air temperature upstream of the de-ice valve exceeds 230° C.
 – Inflation sequencing of engine boots A or B is not correct.

④ DE ICING MODE SEL pb

Controls the selection of wings/engines boots inflation cycles when MAN is selected on MODE SEL AUTO pb ⑥

FAST (pb released) Timing cycle = 60 s

R SLOW (pb pressed in) Timing cycle = 180 s - SLOW light illuminates blue.

⑤ DE-ICING OVERRIDE guarded pb

Controls the emergency de-icing operation.

The control panel enables control of all double valves (ENG and AIR FRAME).

NORM (pb released) Normal operation

OVRD (pb pressed in) The emergency de-icing activation is selected (timing cycle = 60 s), the light illuminates white and all de-icing lights extinguish. This position is used when the associated FAULT light illuminates.

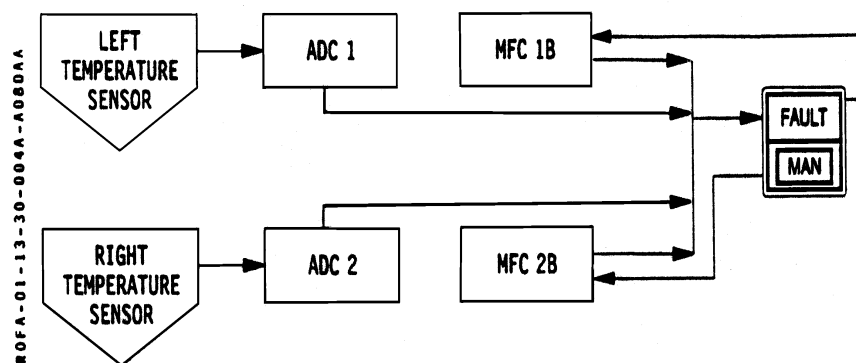
FAULT The light illuminates amber when both MFC modules associated to air intake boots control fail resulting in an incorrect inflation sequencing.

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⑥ MODE SEL AUTO pb

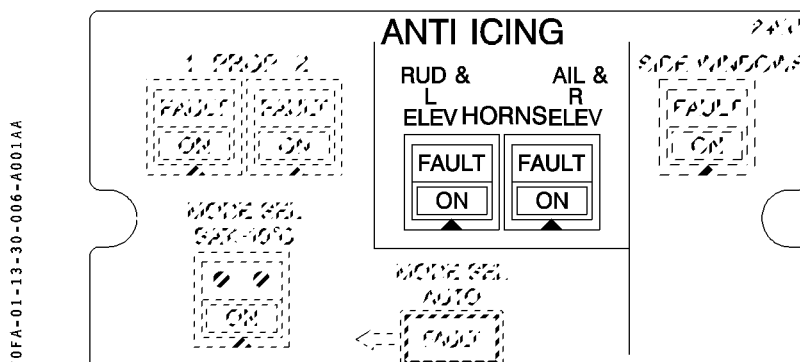
	Pb release	Normal operation (automatic operating mode). The DE-ICING MODE SEL pb (4) is inoperative.
R		The cycle selection is provided by ADC1, MFC1B, MFC1B, ADC2 and MFC2B.
R	FAULT	Illuminates amber and the CCAS is activated when MFC (1B or 2B) and/or ADC failure occurs. The DE-ICING MODE SEL pb (4) is inoperative.
R		In this case the FAST mode is automatically activated.
	MAN	(pb pressed in) The DE-ICING MODE SEL pb (4) is operative and allows the crew to select the appropriate timing cycle depending on SAT. MAN illuminates white.



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HORNS ANTI ICING PANEL



HORNS ANTI ICING pbs

Controls activation of following units :

- RUD and L ELEV : Rudder and left elevator horns anti icing.
- AIL and R ELEV : Ailerons and right elevator horns anti icing.

ON (pb pressed in) : Associated anti icing units are activated. ON light illuminates blue.

OFF (pb released) : Associated anti icing units are deactivated.

FAULT The light illuminates amber and the CCAS is activated when electrical power is lost on one of the associated units.

***Note :** As soon as at least one of the HORNS anti-icing p.b. is selected ON, stall alert threshold is reduced (refer FCOM 1.02).*

Horns heating are inhibited on ground.

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30.3 ELECTRICAL SUPPLY/MFC LOGIC/SYSTEM MONITORING

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
De ice valves	DC BUS 2 (on lateral panel SO and REG VALVE 1 and 2)	– Nil –
Isolation valves	DC ESS BUS (on lateral panel ISOL VALVE 1 and 2)	– Nil –
Distribution valves (Boots A + ENG 1)	DC EMER BUS (on lateral panel ENG 1 and AFR-BOOTS A SPLY)	– Nil –
Distribution valves (Boots B + ENG 2)	DC BUS 2 (on lateral panel ENG 2 and AFR-BOOTS B NORM SPLY) and DC EMER BUS (BACK UP) (on lateral panel ENG 2 and AFR-BOOTS B EMER SPLY)	– Nil –
Controls and alerts	DC EMER BUS (on lateral panel CTL and CAUTION)	
Left elevator and rudder horns anti icing	– Nil –	115 VAC wild BUS 1 (on lateral panel L ELEV RUD)
Left elevator and rudder horns anti icing control	DC EMER BUS (on lateral panel L ELEV and RUD)	– Nil –
Right elevator and ailerons horns anti icing	– Nil –	115 VAC wild BUS 2 (on lateral panel R ELEV R AIL L AIL)
Right elevator and ailerons horns anti icing control	DC EMER BUS (on lateral panel R ELEV and AIL)	– Nil –

MFC LOGIC

See chapter 1.01.

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SYSTEM MONITORING

The following conditions are monitored by visual and aural alerts :

- LOW pressure in the de icing common air manifold (p < 14 PSI and t > 6s)
- See AIRFRAME AIR BLEED FAULT procedure in chapter 2.05.09
- Distribution valve output controlled open but no downstream pressure detected or controlled closed but downstream pressure detected.
- See AIRFRAME or ENG, DE ICING FAULT procedure in chapter 2.05.09
- Power loss on a horn anti-icing unit
- See HORNS ANTI ICING FAULT procedure in chapter 2.05.09
- R - MFC 1B or 2B and/or ADC failure. Discrepancy between outputs
- See MODE SEL AUTO FAULT procedure in chapter 2.05.09
- Boots do not operate following MFC failure or both boots A and B of the same engine are supplied 200 sec after eng cycle beginning or Boots A(B) of both engines are supplied while boots B(A) are not supplied 20 sec after eng. cycle beginning.
- See DE ICING MODE SEL FAULT procedure in chapter 2.05.09

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30.3 ELECTRICAL SUPPLY/MFC LOGIC/SYSTEM MONITORING

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
De ice valves	DC BUS 2 (on lateral panel SO and REG VALVE 1 and 2)	– Nil –
Isolation valves	DC ESS BUS (on lateral panel ISOL VALVE 1 and 2)	– Nil –
Distribution valves (Boots A + ENG 1)	DC EMER BUS (on lateral panel ENG 1 and AFR-BOOTS A SPLY)	– Nil –
Distribution valves (Boots B + ENG 2)	DC BUS 2 (on lateral panel ENG 2 and AFR-BOOTS B NORM SPLY) and DC EMER BUS (BACK UP) (on lateral panel ENG 2 and AFR-BOOTS B EMER SPLY)	– Nil –
Controls and alerts	DC EMER BUS (on lateral panel CTL and CAUTION)	
Left elevator and rudder horns anti icing	– Nil –	115 VAC wild BUS 1 (on lateral panel L ELEV RUD)
Left elevator and rudder horns anti icing control	DC EMER BUS (on lateral panel L ELEV and RUD)	– Nil –
Right elevator and ailerons horns anti icing	– Nil –	115 VAC wild BUS 2 (on lateral panel R ELEV R AIL L AIL)
Right elevator and ailerons horns anti icing control	DC EMER BUS (on lateral panel R ELEV and AIL)	– Nil –

MFC LOGIC

See chapter 1.01.

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	ENGINE AND WING PROTECTION			NOV 01

AA

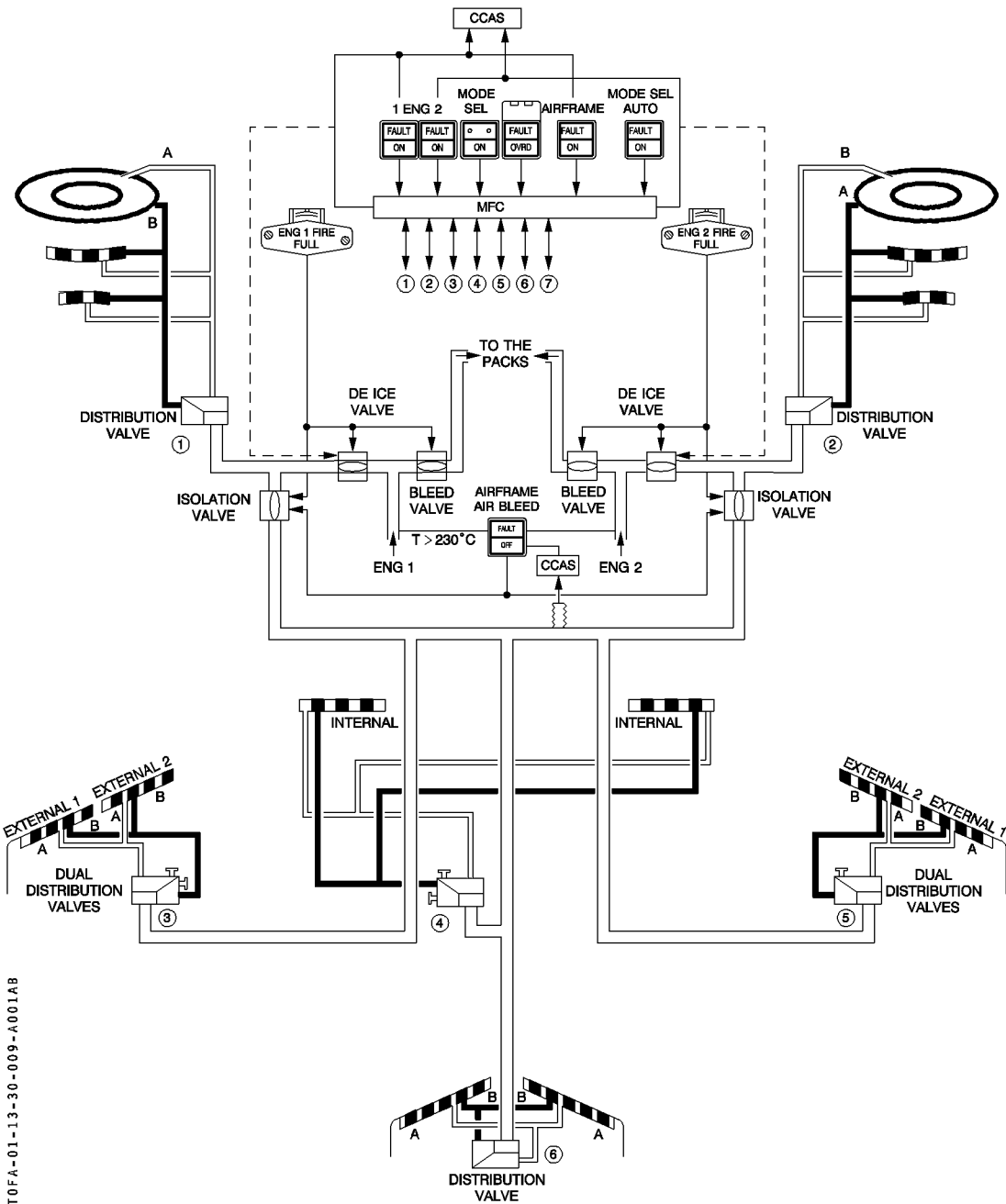
SYSTEM MONITORING

The following conditions are monitored by visual and aural alerts :

- LOW pressure in the de icing common air manifold ($P < 14$ PSI and $t > 6s$)
- See AIRFRAME AIR BLEED FAULT procedure in chapter 2.05.09
- Distribution valve output controlled open but no downstream pressure detected or controlled closed but downstream pressure detected.
- See AIRFRAME DE ICING or ENG ANTI-ICING FAULT procedure in chapter 2.05.09
- Power loss on a horn anti-icing unit
- See HORNS ANTI ICING FAULT procedure in chapter 2.05.09
- R - MFC 1B or 2B and/or ADC failure. Discrepancy between outputs
- See MODE SEL AUTO FAULT procedure in chapter 2.05.09
- Boots do not operate following MFC failure or both boots A and B of the same engine are supplied 200 sec after eng cycle beginning or Boots A(B) of both engines are supplied while boots B(A) are not supplied 20 sec after eng. cycle beginning.
- See DE ICING MODE SEL FAULT procedure in chapter 2.05.09.

	ICE AND RAIN PROTECTION		1.13.30	
			P 9/10	001
	ENGINE AND WING PROTECTION			MAR 96

30.4 SCHEMATIC



	ICE AND RAIN PROTECTION		1.13.40		
			P 1	001	
	PROPELLER ANTI ICING				DEC 95

AA

40.1 DESCRIPTION

Propeller anti icing is performed by resistors installed near the surface of the inboard sections of the blade leading edges.

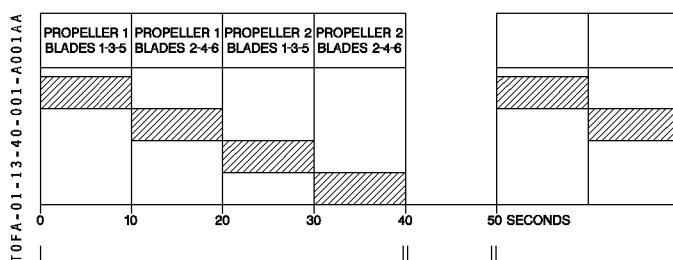
On each propeller, the heat elements are electrically connected in three blades (every other blade).

The system is supplied with 115 ACW. Two modes are available and automatically selected depending on the temperature.

TIME SEQUENCE DIAGRAM

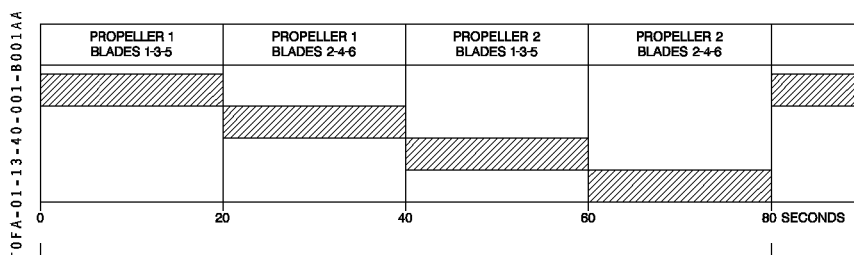
MODE SEL : NORMAL OPERATION

LOW POWER CYCLE



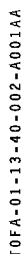
MODE SEL : ON

HIGH POWER CYCLE



AA

PROPELLER ANTI ICING PANEL



- Controls the respective propeller heating elements.

Pb released The heating elements are not supplied.

Note: When at least one propeller anti-icing system is powered on, 82 % Np is automatically selected.

- Controls the duration of propeller anti icing cycles when MAN is selected on MODE SEL AUTO pb ③ .

Pb released LOW POWER cycle is selected.

ON (pb pressed in) HIGH POWER cycle is selected. The ON It illuminates blue.

Note : • LOW POWER has to be selected when temperature is between 0°C (32°F) and - 10°C (14°F).

- ATR 42 Model : 500

	ICE AND RAIN PROTECTION		1.13.40		
			P 1	001	
	PROPELLER ANTI ICING				DEC 95

AA

40.1 DESCRIPTION

Propeller anti icing is performed by resistors installed near the surface of the inboard sections of the blade leading edges.

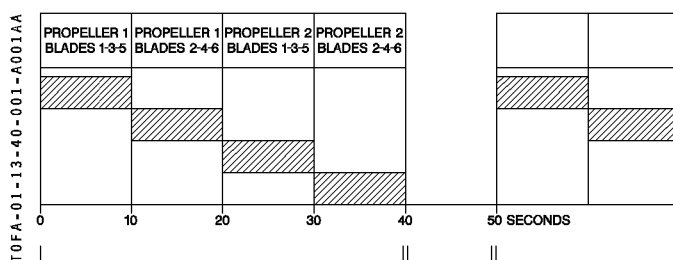
On each propeller, the heat elements are electrically connected in three blades (every other blade).

The system is supplied with 115 ACW. Two modes are available and automatically selected depending on the temperature.

TIME SEQUENCE DIAGRAM

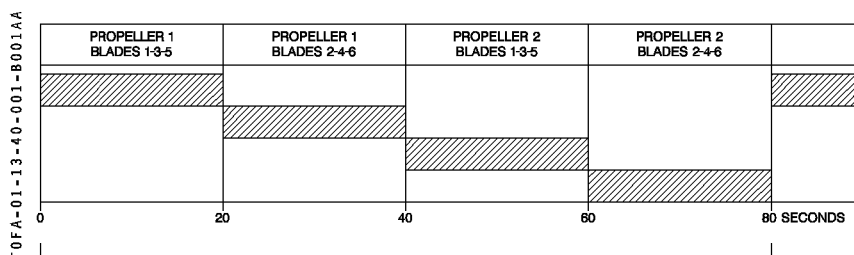
MODE SEL : NORMAL OPERATION

LOW POWER CYCLE



MODE SEL : ON

HIGH POWER CYCLE

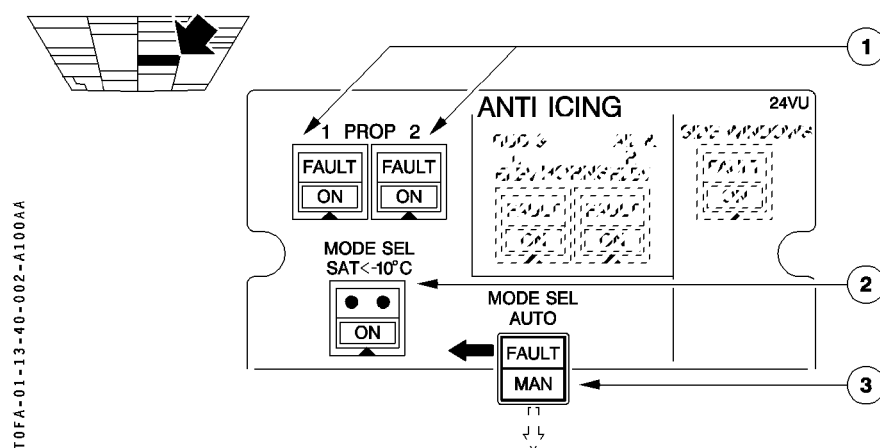


 ATR F.C.O.M.	ICE AND RAIN PROTECTION		1.13.40		
			P 2	100	
	PROPELLER ANTI ICING				NOV 96

AA

40.2 CONTROLS

PROPELLER ANTI ICING PANEL



① PROP pb

Controls the respective propeller heating elements.

ON (pb depressed), The heating units are supplied. The ON light illuminates blue.

Pb released The heating elements are not supplied.

FAULT The light illuminates amber to indicate that at least one blade is not electrically supplied.

② ANTI-ICING MODE SEL pb

Controls the duration of propeller anti icing cycles when MAN is selected on MODE SEL AUTO pb ③.

Pb released LOW POWER cycle is selected.

ON (pb pressed in) HIGH POWER cycle is selected. The ON It illuminates blue.

Note : • LOW POWER has to be selected when temperature is between 0°C (32°F) and - 10°C (14°F).

• HIGH POWER has to be selected when temperature is between - 10°C (14°F) and - 30°C (- 22°F).

• Below - 30°C (- 22°F) icing problems should be non existant (no supercooled water).

	ICE AND RAIN PROTECTION		1.13.40		
			P 1	001	
	PROPELLER ANTI ICING				DEC 95

AA

40.1 DESCRIPTION

Propeller anti icing is performed by resistors installed near the surface of the inboard sections of the blade leading edges.

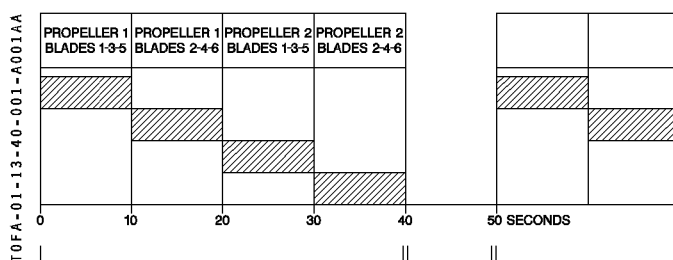
On each propeller, the heat elements are electrically connected in three blades (every other blade).

The system is supplied with 115 ACW. Two modes are available and automatically selected depending on the temperature.

TIME SEQUENCE DIAGRAM

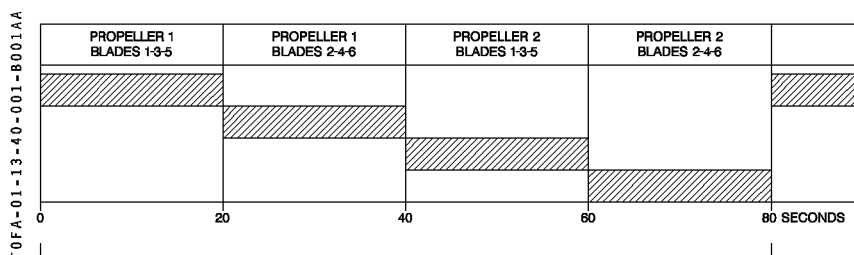
MODE SEL : NORMAL OPERATION

LOW POWER CYCLE



MODE SEL : ON

HIGH POWER CYCLE



AA

PROPELLER ANTI ICING PANEL



- Note :
- *LOW POWER has to be selected when temperature is between 0°C (32°F) and - 10°C (14°F).*
 - *HIGH POWER has to be selected when temperature is between - 10°C (14°F) and - 30°C (- 22°F).*
 - *Below - 30°C (- 22°F) icing problems should be non existant (no supercooled water).*

	ICE AND RAIN PROTECTION	1.13.40		
		P 3	001	
	PROPELLER ANTI ICING			NOV 01

AA

③ MODE SEL AUTO pb (Same pb as ENGINE AND WING PROTECTION)

	Pb released	Normal operation (automatic operating mode). The ANTI-ICING MODE SEL pb (2) is inoperative.
R		The cycle selection is provided by ADC1, MFC1B, MFC1B, ADC2 and MFC2B.
R	FAULT	Illuminates amber and the CCAS is activated when MFC (1B or 2B) and/or ADC failure occurs. The ANTI-ICING MODE SEL pb (2) is inoperative.
R		In this case the HIGH POWER mode is automatically activated.
	MAN	(pb pressed in) The ANTI-ICING MODE SEL pb (2) is operative and allows the crew to select the appropriate timing cycle depending on SAT. MAN illuminates white.

	ICE AND RAIN PROTECTION	1.13.40		
		P 4	001	
	PROPELLER ANTI ICING			NOV 01

AA

40.3 ELECTRICAL SUPPLY/MFC LOGIC/SYSTEM MONITORING

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
Propeller 1 anti-icing PWR	- Nil -	AC wild BUS 1 (on lateral panel PROP1 ANTI ICING PWR SPLY)
Propeller 2 anti-icing PWR	- Nil -	AC wild BUS 2 (on lateral panel PROP2 ANTI ICING PWR SPLY)
Prop anti-icing CTL and Ind	DC EMER BUS (on lateral panel PROP CTL and IND)	

Note : Propeller anti icing is inhibited when Np is below 63 %.

MFC LOGIC

See chapter 1.01

SYSTEM MONITORING

The following conditions are monitored by visual and aural alerts :

- One or more blade heating unit (s) inoperative.
 - See PROP ANTI-ICING FAULT procedure in chapter 2.05.09.
- R - MFC 1B or 2B and/or ADC failure, discrepancy between outputs.
 - See MODE SEL AUTO FAULT procedure in chapter 2.05.09.

 ATR F.C.O.M.	ICE AND RAIN PROTECTION	1.13.40		
		P 5	001	
	PROPELLER ANTI-ICING			DEC 95

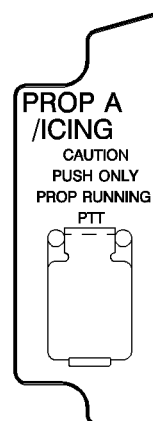
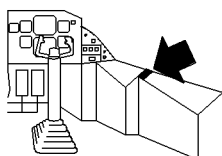
AA

40.4 LATERAL MAINTENANCE PANEL

On the RH Maintenance panel, controls are provided for maintenance purposes only, to check propeller anti-icing system.

PROPELLER ANTI-ICING TEST PUSH-BUTTON

TOFA-01-13-40-005-A001AA



This guarded push-button is used to check the propeller anti-icing system functioning. It must only be operated on ground, with propellers above 63 % NP.

Test procedure :

- Aircraft on ground, propellers > 63 % NP.
- Mode select (overhead panel) : NORM.
- Push test Button.
- The system performs a short anti-icing cycle.

	ICE AND RAIN PROTECTION WINDOW HEAT	1.13.50		
		P 1	001	
				DEC 95

AA

50.1 DESCRIPTION

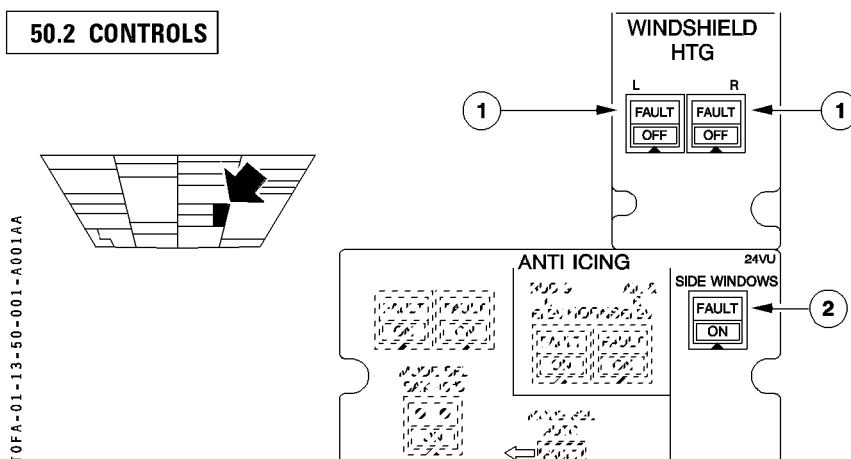
The cockpit windows are electrically heated :

- The front windshields for ice protection and defogging.
- The side windows for defogging only.

The front windshields are protected against ice formation by an electrically heated transparent film incorporated between two plies of glass. It is supplied with 200 VACW, and temperature is controlled by an electronic controller which keeps the outer windshield temperature over 2°C (35°F). The inner surface remains above 21° C (70° F) to prevent mist formation.

The side windows are protected by an electrically heated system consisting of small wires embedded between two plies of glass. It is supplied with 28 volts DC and keeps the inner temperature over 21°C (70°F).

50.2 CONTROLS



① WINDSHIELD HTG L or R pb

Controls activation of window heat systems :

- Pb pressed in Power is supplied to the associated window heat system.
 OFF (pb released) Window heat system is deactivated. The OFF light illuminates white.
 FAULT The light illuminates amber and the CCAS is activated when there is a power loss. The light also illuminates during MFC test.

② SIDE WINDOWS pb

Controls activation of side windows heat systems.

- ON (pb pressed in) Power is supplied to both side windows heat systems. ON light illuminates blue.
 Pb released Side windows heat systems are deactivated.
 FAULT The light illuminates amber and the CCAS is activated when there is a power loss.

	ICE AND RAIN PROTECTION	1.13.50		
		P 2	001	
	WINDOW HEAT			DEC 95

AA

50.3 ELECTRICAL SUPPLY/MFC LOGIC/SYSTEM MONITORING

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
LH Front windshield supply	– Nil –	AC Wild BUS 1 (on lateral panel L FRONT WINDOW HTG)
Front windshield control	– Nil –	ACW BUS 1 (on lateral panel FRONT CTL and CAUTION)
Front windshield alert	DC BUS 2 (on lateral panel WDSHLD IND L)	– Nil –
Side window supply and control	DC BUS 1 (on lateral panel SIDE WDO L CTL)	– Nil –
RH Front windshield supply	– Nil –	AC wild BUS 2 (on lateral panel R FRONT WINDOW HTG)
Front windshield control	– Nil –	ACW BUS 2 (on lateral panel FRONT CTL and CAUTION)
Front windshield alert	DC BUS 1 (on lateral panel WDSHLD IND R)	– Nil –
Side window supply and control	DC BUS 2 (on lateral panel SIDE WDO R CTL)	– Nil –
Side windows alert	DC ESS BUS (on lateral panel side window CAUTION)	– Nil –

MFC LOGIC

See chapter 1.01.

SYSTEM MONITORING

The following condition is monitored by visual and aural alerts :

- Loss of window heating.
 - See WINDOW HTG FAULT procedure in chapter 2.05.09.

	ICE AND RAIN PROTECTION WINDOW HEAT	1.13.50		
		P 3	001	
				DEC 95

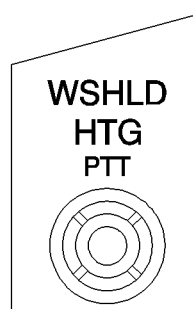
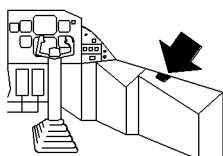
AA

50.4 LATERAL MAINTENANCE PANEL

On the RH Maintenance panel, controls are provided for maintenance purposes only, to check windshield heat system.

WINDSHIELD HEAT TEST PUSH-BUTTON

T0FA-01-13-50-003-A001AA



Test push-button

Is used to check the windshield heat controller functioning.

- Test procedure :
- Press and hold test button for 3 seconds.
- The B.I.T.E. executes a programmed check of the controllers, ending with de-energization of both overheat power relays.
- MFC magnetic indicator illuminates on the RH maintenance panel when a failure has been detected during the windshield heating cycle.

	ICE AND RAIN PROTECTION PROBE HEAT	1.13.60		
		P 1	001	
				DEC 95

AA

60.1 DESCRIPTION

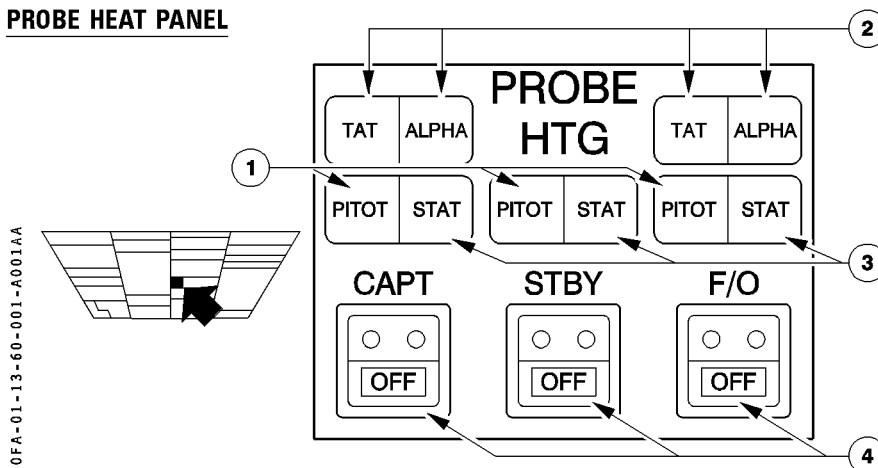
To prevent icing on air data sensors, electrical heating is provided for :

- CAPT, F/O, STBY pitot tubes
- CAPT, F/O, STBY static ports
- CAPT, F/O alpha (angle of attack) probes
- CAPT, F/O TAT probes

The probes are heated both on the ground and in flight, except TAT sensors heating which are inhibited on the ground.

60.2 CONTROLS

PROBE HEAT PANEL



① PITOT lights

Illuminate amber and the CCAS is activated if :

- In flight or on the ground, the associated pitot is not heated.

② ALPHA, TAT lights

Illuminate amber and the CCAS is activated when the respective probe is not heated.

③ STAT lights

Illuminate amber and the CCAS is activated when the respective port is not heated. In flight, static ports are not monitored by CCAS.

④ CAPT STBY F/O pbs

Control the activation of probe heating of their respective circuits.

Pb pressed in Probe heating is activated.

OFF (pb released) Probe heating is deactivated. OFF light illuminates white. Respective PROBE HEAT light illuminates amber.

 ATR F.C.O.M.	ICE AND RAIN PROTECTION	1.13.60		
		P 2	001	
	PROBE HEAT			DEC 95

AA

60.3 ELECTRICAL SUPPLY/SYSTEM MONITORING

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
CAPT		ACW BUS 1
Pitot tubes	– Nil –	(on lateral panel PITOT)
Alpha probe	– Nil –	ACW BUS 1
		(on lateral panel ALPHA)
Static ports	DC BUS 1 (on lateral panel)	– Nil –
Alerts	DC ESS BUS (on lateral alert CAUTION)	– Nil –
TAT probe	– Nil –	ACW BUS 1
		(on lateral panel CPT TAT)
F/O		ACW BUS 2
Pitot tubes	– Nil –	(on lateral panel PITOT)
Alpha probe	– Nil –	ACW BUS 2
		(on lateral panel ALPHA)
Static ports	DC BUS 2 (on lateral panel)	– Nil –
Alerts	DC BUS 2 (on lateral panel CAUTION)	– Nil –
TAT probe	– Nil –	ACW BUS 2
		(on lateral panel F/O TAT)
STBY		ACW BUS 1 and 115 VAC
Pitot tube	– Nil –	STBY BUS
		(on lateral panel STBY PITOT NORM SPLY and EMER SPLY)
Static ports	DC BUS 1 (on lateral panel LEFT, RIGHT)	– Nil –
Alerts	DC ESS BUS (on lateral panel CAUTION)	– Nil –

SYSTEM MONITORING

The following condition is monitored by visual and aural alerts :

– Probe (s) not heated

- See ALPHA PROBE HTG FAULT procedure or PROBE HTG FAULT (except ALPHA PROBES) procedure in chapter 2.05.09.

 ATR F.C.O.M.	ICE AND RAIN PROTECTION		1.13.70	
	RAIN PROTECTION		P 1	001
				NOV 97

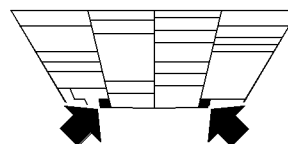
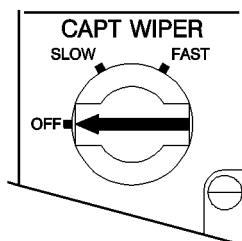
AA

70.1 DESCRIPTION

Rain removal from front windshields is provided by two wipers : each wiper is driven by a two speed electric motor. They are controlled by two WIPER selectors on the overhead panel : one for the Captain, and one for the F/O. Maximum speed to operate the wipers is 160 kt.

70.2 CONTROLS

T0FA-01-13-70-001-A001AA



WIPER rotary selector

Controls the windshield wiper on the associated side.

FAST wiper operates at 130 cycles/mn.

SLOW wiper operates at 80 cycles/mn.

OFF wiper operation stops at the end-of-travel (Park) position.

70.3 ELECTRICAL SUPPLY

R	EQUIPMENT	DC BUS SUPPLY (C/B)
	Captain wiper	DC ESS BUS (on lateral panel CAPT)
	F/O wiper	DC BUS 2 (on lateral panel F/O)