30.00 CONTENTS

DESCRIPTION

The ice and rain protection system allows unrestricted operation of the aircraft in icing conditions and heavy rain.

ANTI-ICING

Either hot air or electrical heating protects critical areas of the aircraft as follows.

HOT AIR

- three outboard leading-edge slats of each wing.
- engine air intakes.

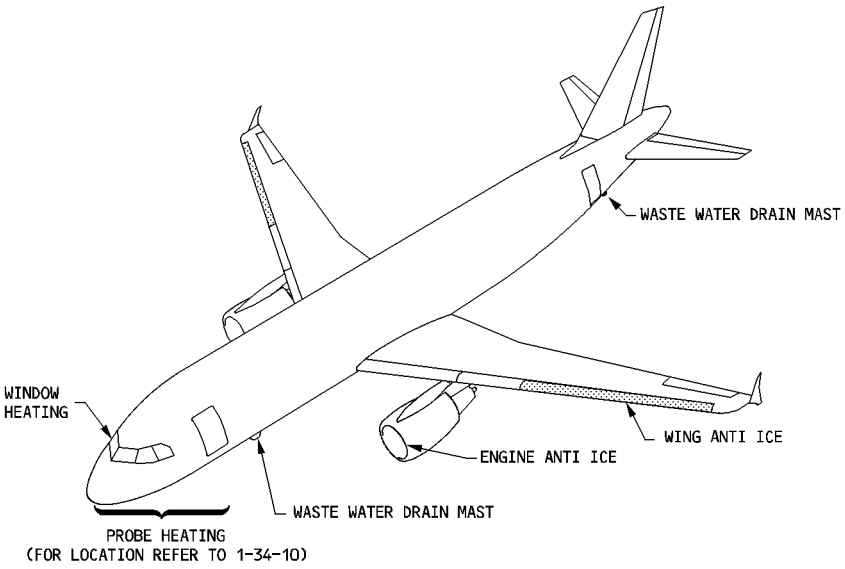
ELECTRICAL HEATING

- flight compartment windows.
- sensors, pitot probes and static ports.
- waste-water drain mast.

RAIN REMOVAL

Wipers and when necessary, fluid rain repellent, remove rain from the front windshield panels.

R



DESCRIPTION

In flight, hot air from the pneumatic system heats the three outboard slats (3-4-5) of each wing.

Air is supplied through one valve in each wing.

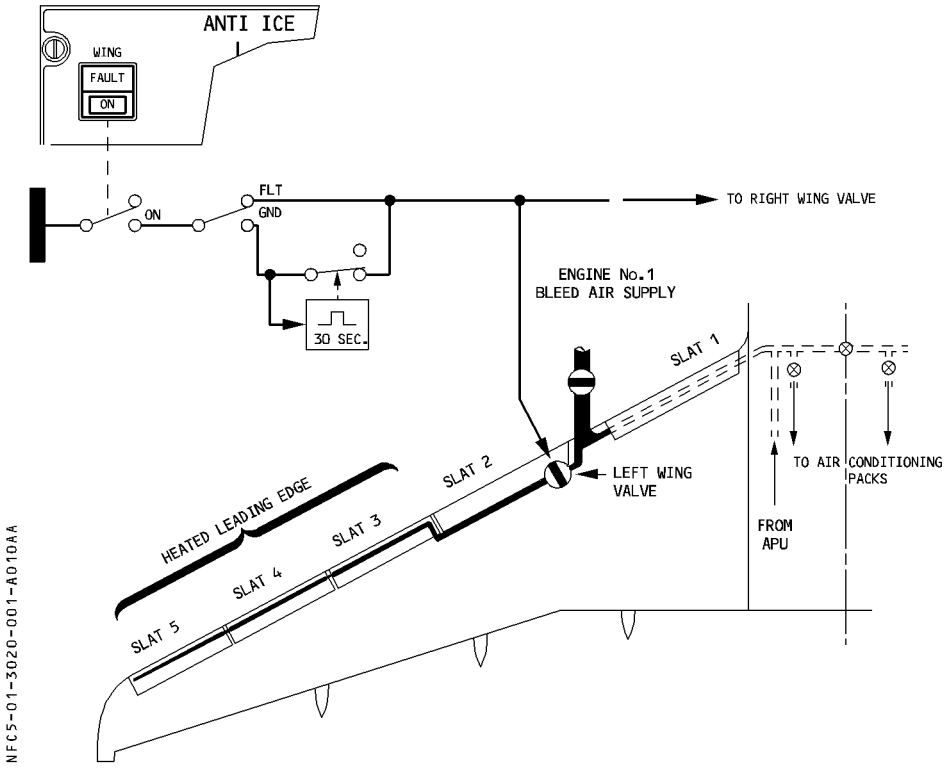
The WING pushbutton on the ANTI-ICE panel controls the valves.

When the aircraft is on ground, the flight crew can initiate a 30-second test sequence by turning the system ON.

If the system detects a leak during normal operation, the affected side's wing anti-ice valve automatically closes (see 1.36.10).

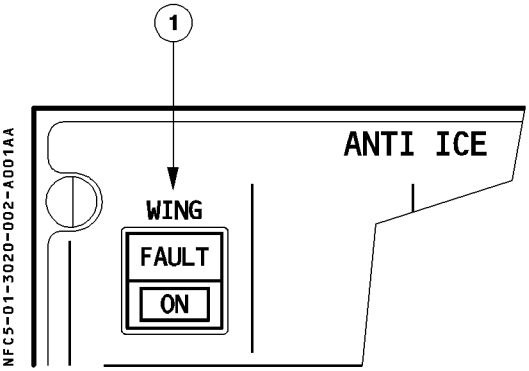
R When wing anti-ice is selected, the N1 limit is automatically reduced, and the idle N1 is
R automatically increased.

If the electrical power supply fails, the valves close.



CONTROLS AND INDICATORS

OVERHEAD PANEL



(1) WING ANTI ICE pb sw

R This switch controls the wing anti ice system on the left and right sides simultaneously.

ON : It lights up blue.
WING A. ICE appears on the ECAM MEMO page.

R Wing anti ice control valves open if a pneumatic supply is available.
On the ground the wing anti-icing control valves open for 30 seconds only (test sequence).

Off : ON light goes off.
Wing anti-icing control valves close.

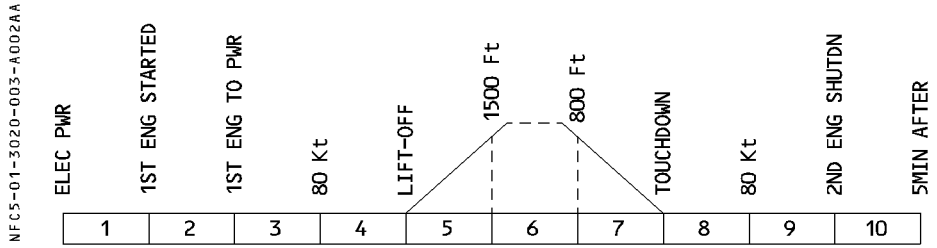
FAULT : Amber light comes on, and caution appears on ECAM, if :
- the position of the anti-icing control valve is not the required position, or
- low pressure is detected.

Note : The amber FAULT light comes on briefly as the valves transit.

ECAM BLEED PAGE

See 1.36.20.

WARNINGS AND CAUTIONS



E / WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
WING A. ICE OPEN ON GND On ground, valves remain open more than 35 seconds after wing anti-ice is selected ON.	SINGLE CHIME	MASTER CAUT	BLEED	NIL	3, 4, 5, 6, 7, 8
SYS FAULT Valve not open when wing anti-ice selected ON.				ANTI ICE WING FAULT lt	3, 4, 5, 7, 8
L (R) VALVE OPEN Valve not closed when wing anti-ice selected off					4, 5, 7, 8
HI PR High pressure detected when the wing anti-ice is selected ON.	NIL	NIL		NIL	3, 4, 5, 7, 8

MEMO DISPLAY

R The "WING A. ICE" message is displayed in green, if the WING ANTI ICE pushbutton is ON.

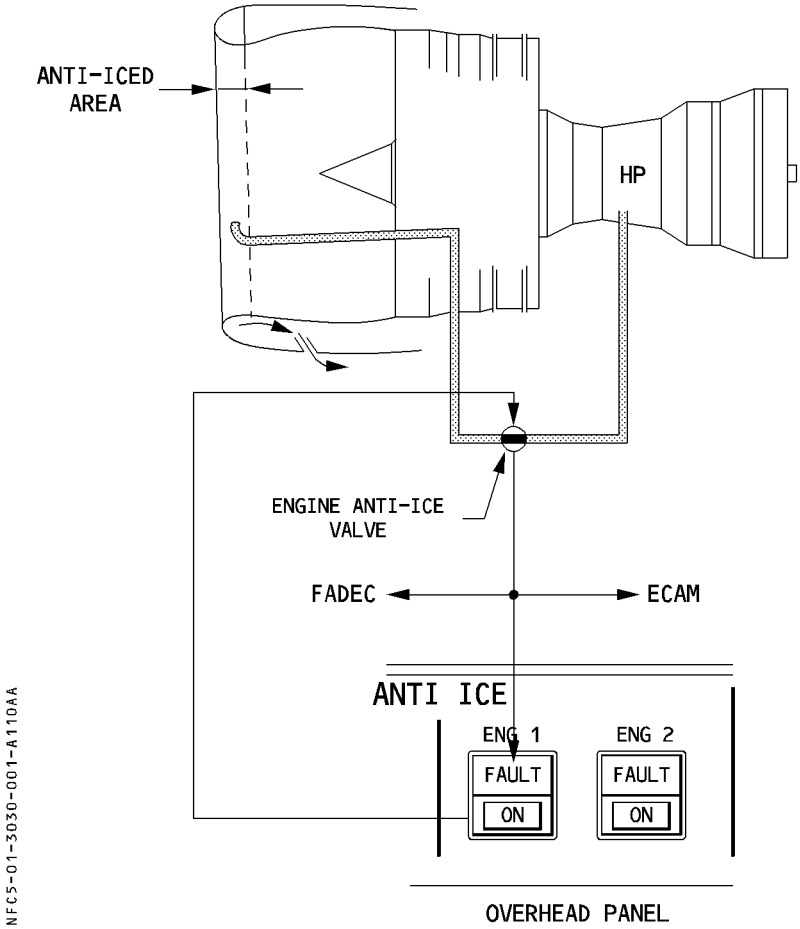
DESCRIPTION

An independent air bleed from the high pressure compressor protects each engine nacelle from ice. Air is supplied through a two-position (open and closed) valve that the flight crew controls with two pushbuttons, one for each engine.

The valve automatically closes, if air is unavailable (engine not running).

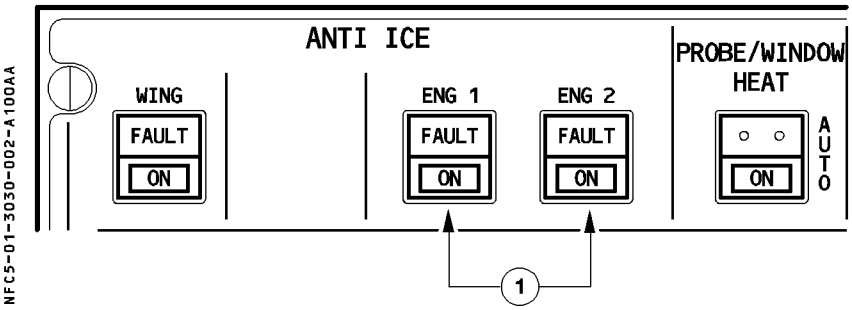
R When an engine anti-ice valve is open, the N1 limit is automatically reduced and, if necessary, the idle N1 is automatically increased for both engines in order to provide the required pressure.

If electrical power fails, the valves open.



CONTROLS AND INDICATORS

OVERHEAD PANEL



(1) ENG 1 (2) pb sw

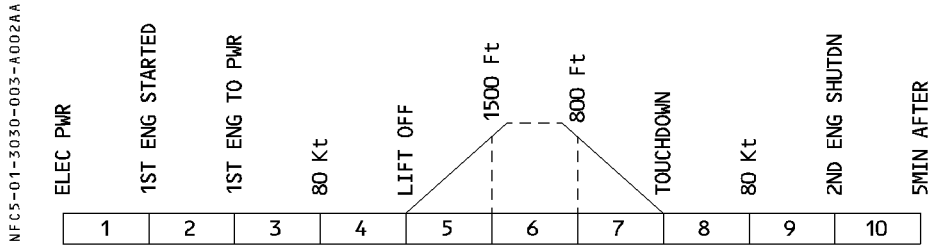
R ON : light comes on blue.
ECAM MEMO displays "ENG A. ICE".
Engine anti-ice valve opens if bleed air is available from the engine.
Continuous ignition is selected when the valve is opened and the ANTI
R ICE ENG pushbutton switch is selected ON. This makes the IGNITION
R memo appear on the ECAM.

Off : ON light goes out.
Engine anti-ice valve closes.

FAULT : Amber light comes on, and caution message appears on ECAM, if the position of the anti-icing valve disagrees with the ENG 1 (2) pushbutton selection.

Note : The amber FAULT light comes on briefly as valve transits.

WARNINGS AND CAUTIONS



E / WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1(2) VALVE OPEN Valve disagree in the open position.	SINGLE CHIME	MASTER CAUT	NIL	ENG 1 (2) ANTI ICE FAULT lt	3, 4, 5, 7, 8
ENG 1(2) VALVE CLSD Valve disagree in the closed position.					

MEMO DISPLAY

R This display shows "ENG A. ICE" in green, if one or both ENG A. ICE pushbuttons are ON.

DESCRIPTION

The aircraft uses electrical heating for anti-icing each windshield and demisting the cockpit side windows.

Two independent Window Heat Computers (WHCs), one on each side, automatically regulate the system, protect it against overheating, and indicate faults.

Window heating comes on :

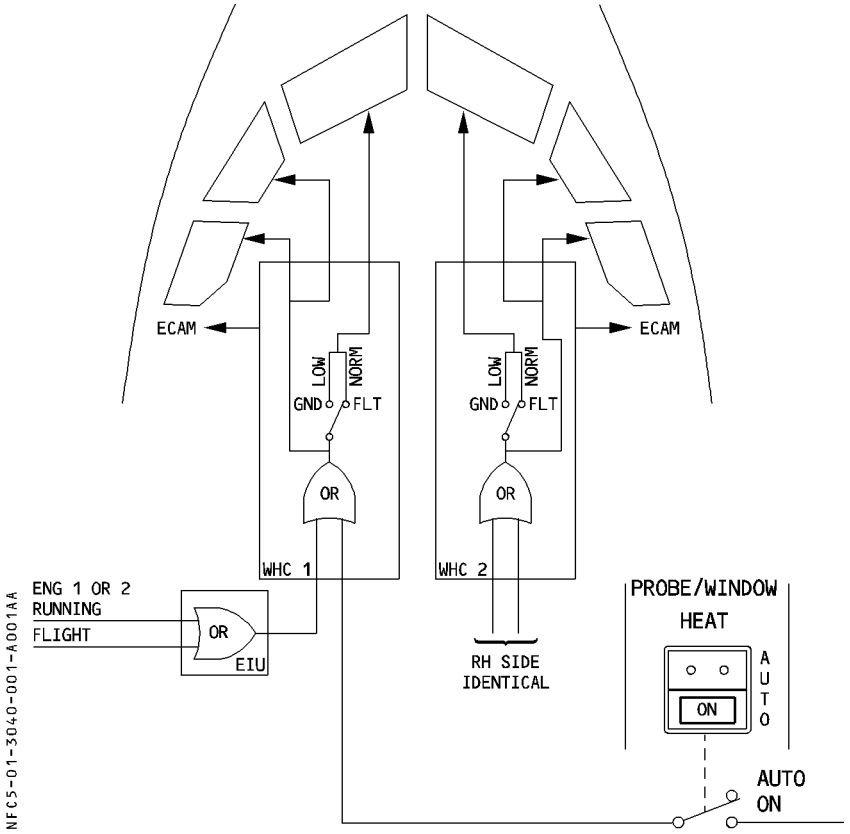
- automatically when at least one engine is running, or when the aircraft is in flight.
- manually, before engine start, when the flight crew switches ON the PROBE/WINDOW HEAT pushbutton switch.

R Windshield heating operates at low power on the ground and at normal power in flight. The changeover is automatic.

R Only one heating level exists for the windows.

FOR INFO

R

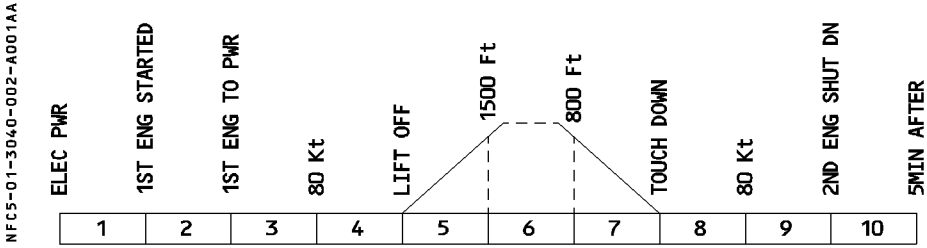


CONTROLS AND INDICATORS

OVERHEAD PANEL

Refer to 1.30.50.

WARNINGS AND CAUTIONS



E / WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
L(R) WINDSHIELD Failure of L or R windshield heating	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
L+R WINDSHIELD Failure of both windshield heating					
L(R) WINDOW Failure of L or R window heating	NIL	NIL			

DESCRIPTION

Electrical heating protects :
- pitot heads
- static ports
- Angle-Of-Attack probes (AOAs)
- Total Air Temperature (TAT) probes

Three independent Probe Heat Computers (PHCs) automatically control and monitor :
- Captain probes
- F/O probes
- STBY probes

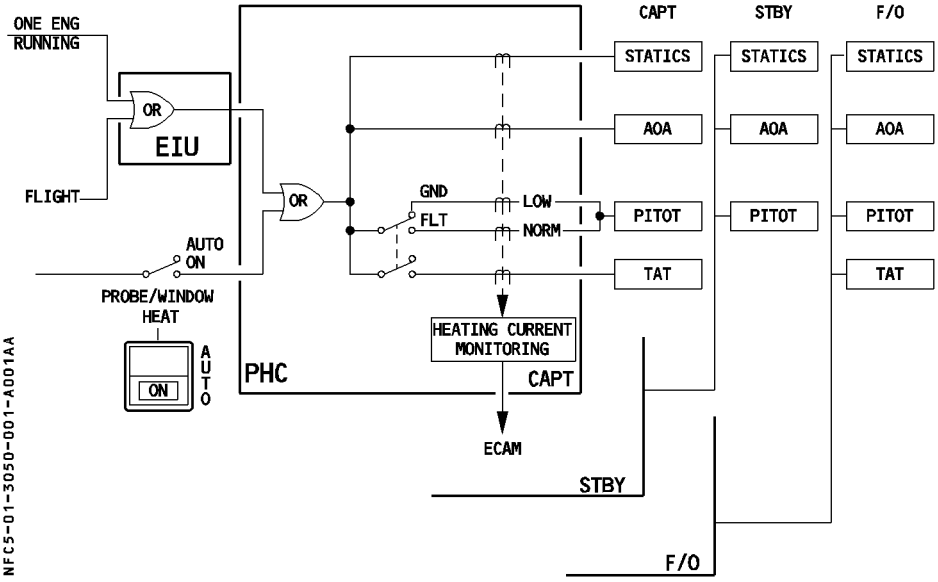
They protect against overheating and indicate faults.

The probes are heated :

R
- automatically when at least one engine is running, or when the aircraft is in flight.
- manually, when the flight crew switches ON the PROBE/WINDOW HEAT pushbutton switch

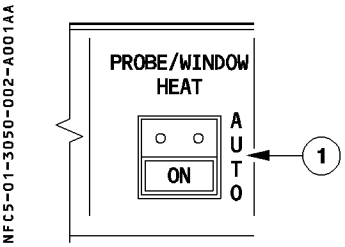
On the ground, the TAT probes are not heated and pitot heating operates at a low level (the changeover to normal power in flight is automatic).

FOR INFO



CONTROLS AND INDICATORS

OVERHEAD PANEL

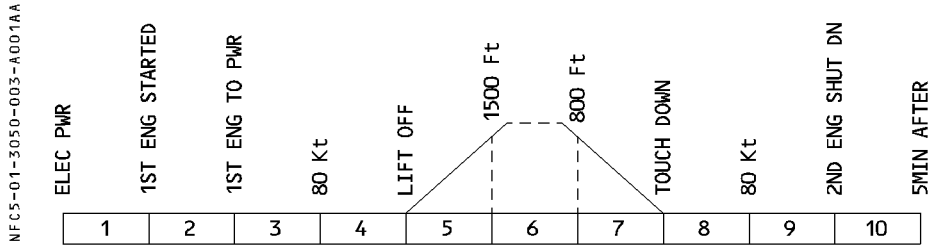


(1) PROBE/WINDOW HEAT pb

AUTO : Probes/Windows are heated automatically :
- in flight or
- on the ground (except TAT probes) provided one engine is running.

R ON : Probes and windows are heated permanently. Blue light comes on.

WARNINGS AND CAUTIONS



E / WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CAPT (F/O) PITOT CAPT (F/O) L(R) STAT CAPT (F/O) AOA CAPT (F/O) TAT Failure of corresponding probe heating	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7,8
STBY PITOT STBY L(R) STAT STBY AOA Failure of corresponding probe heating					
CAPT (F/O) (STBY) PROBES Failure of one probe heat channel/computer					

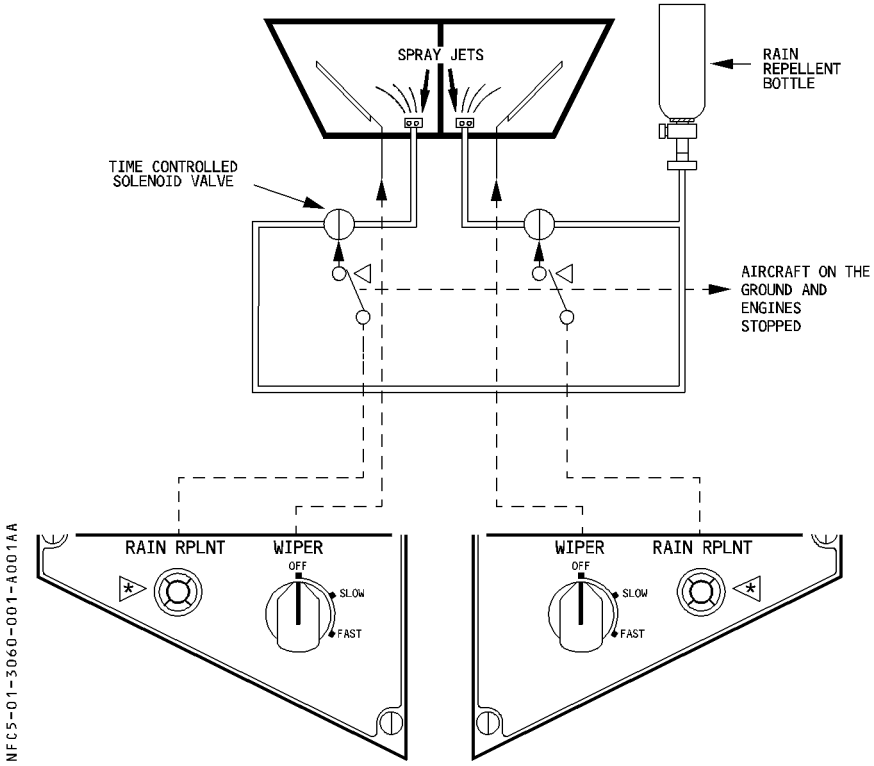
DESCRIPTION

WIPERS

Each front windshield has a two-speed electric wiper.
A rotary selector controls each.

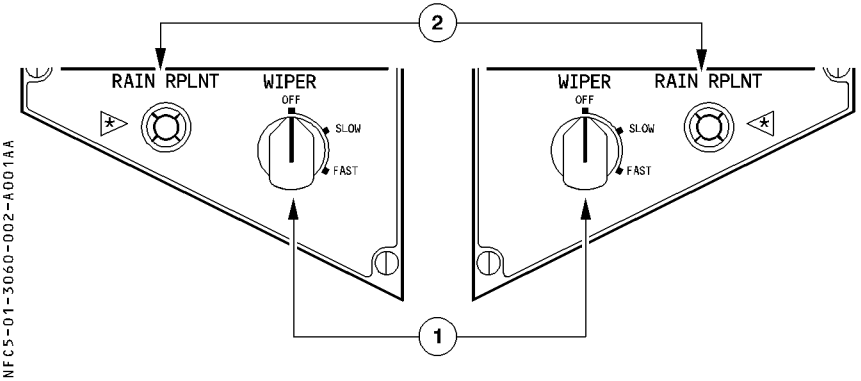
R RAIN REPELLENT ◁

In moderate to heavy rain, the flight crew can spray a rain repellent liquid on the windshield to improve visibility.
After about 30 seconds, the windows is covered by spray.
Separate pushbuttons control the rain repellent application on each side of the windshield.



CONTROLS AND INDICATORS

OVERHEAD PANEL



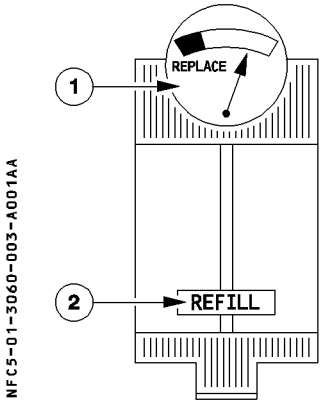
(1) WIPER rotary selector

R Each rotary selector controls its wiper at low or high speed. When turned off, the wiper stops out of view.

(2) RAIN RPLNT pushbuttons ◁

Each of these buttons controls the application of rain repellent fluid to the corresponding side of the front windshield.
When the flight crew pushes the button, the timer applies a measured quantity of rain repellent to the windshield. To repeat the cycle, the flight crew must push the button again.
This function is inhibited when the aircraft is on the ground and the engines are stopped.

REAR COCKPIT



(1) RAIN RPLNT pressure indicator

This gauge shows the nitrogen pressure in the rain repellent bottle. When the needle is in the yellow sector the bottle should be replaced.

(2) RAIN RPLNT quantity indicator

When the REFILL float is in view the bottle should be replaced.

DESCRIPTION

VISUAL ICE INDICATOR

An external visual ice indicator is installed between the two windshields.

R The indicator has also a light (◁).

BUS EQUIPMENT LIST

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
WING ANTI ICE	L and R SHUT OFF VALVES					SHED	
ENG ANTI ICE CLOSURE	VALVE	1		DC1			
		2		DC2			
WINDOW HEAT	WHC	1		DC1			
		2		DC2			
	HEATING POWER	L	AC1				
		R	AC2				
PROBE HEAT	PHC	CAPT				X	
		F/O		DC2			
		STBY		DC1			
	STATICS	CAPT and STBY		DC1			
		F/O		DC2			
	PITOT	CAPT			X (1)		
		F/O	AC2				
		STBY	AC1				
	AOA	CAPT			SHED		
		F/O	AC2				
		STBY	AC1				
	TAT	CAPT	AC1				
		F/O	AC2				
RAIN REMOVAL	WIPER	CAPT		DC1			
		F/O		DC2			
	RAIN REPELLENT ◁	CAPT				X	
		F/O		DC2			
ICE DETECT SYSTEM ◁	DETECTOR 1		AC1				
	DETECTOR 2		AC2				

(1) When AC1 and AC2 are lost and AIR DATA is switched to "CAPT 3", the STBY pitot is switched to AC ESS bus and CAPT pitot heating is lost.