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GENERAL

The air conditioning system operation is fully automatic.

It provides a continual renewal of air, and maintains a constant selected temperature in the following four zones : COCKPIT, FWD CABIN, MID CABIN, and AFT CABIN, which are independently controlled.

Air is supplied by the pneumatic system via :

- Two pack flow control valves
- Two packs
- The mixing unit, which mixes the air that comes from the cabin and the packs.

It is then distributed to the cabin and the cockpit. Temperature regulation is optimized through the two hot air pressure regulating valves and the trim air valves, which add hot air tapped upstream of the packs to the mixing unit air via the two hot air manifolds.

In an emergency, a ram air inlet can provide ambient air to the mixing unit.

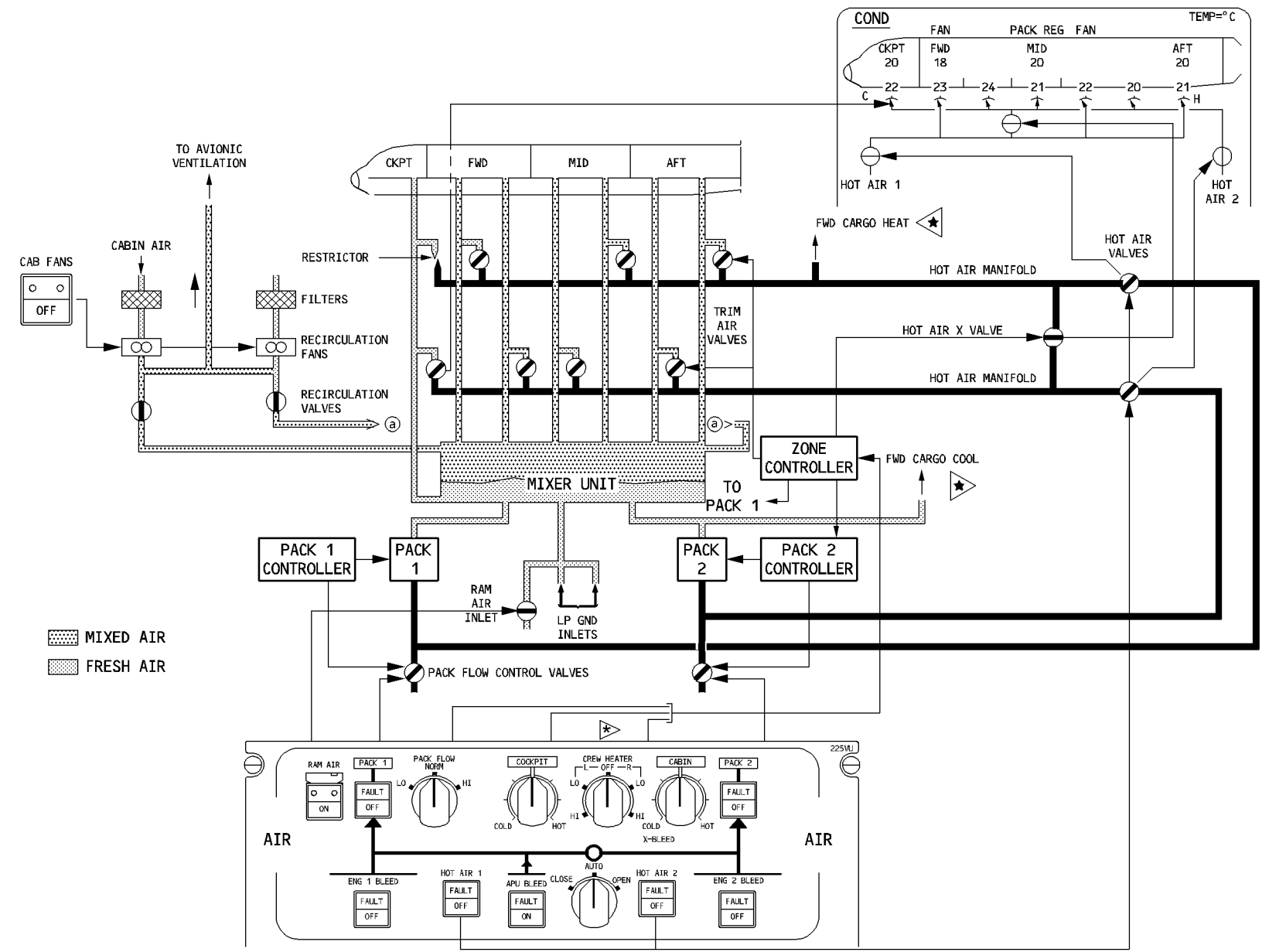
Temperature regulation is controlled by a zone controller and two pack controllers.

- R Flight deck and cabin temperature can be selected from the AIR panel in the cockpit.


A control panel is provided on the forward attendant panel. It can modify each cabin zone temperature demand from the cockpit, during cruise, with a limited authority of $\pm 2.5^{\circ}\text{C}$.

Low pressure air is supplied to the mixing unit by a ground connection.

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 AIRBUS TRAINING A330 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.10	P 3
	AIR CONDITIONING	SEQ 001	REV 05

MAIN COMPONENTS

AIR CONDITIONING PACK

The two packs operate automatically and independently of each other. Pack operation is controlled by the pack controller.

Warm pre-conditioned bleed air enters the cooling path via the pack flow control valve and is ducted to the primary heat exchanger.

Then the cooled bleed air enters the compressor section of the air-cycle machine and is compressed to a higher pressure and temperature.

It is cooled again in the main heat exchanger and, enters the turbine section where it expands and in expanding generates power to drive the compressor and cooling air fan.

R The removal of energy during this process reduces the temperature of the air resulting in
R very low air temperature at turbine discharge.

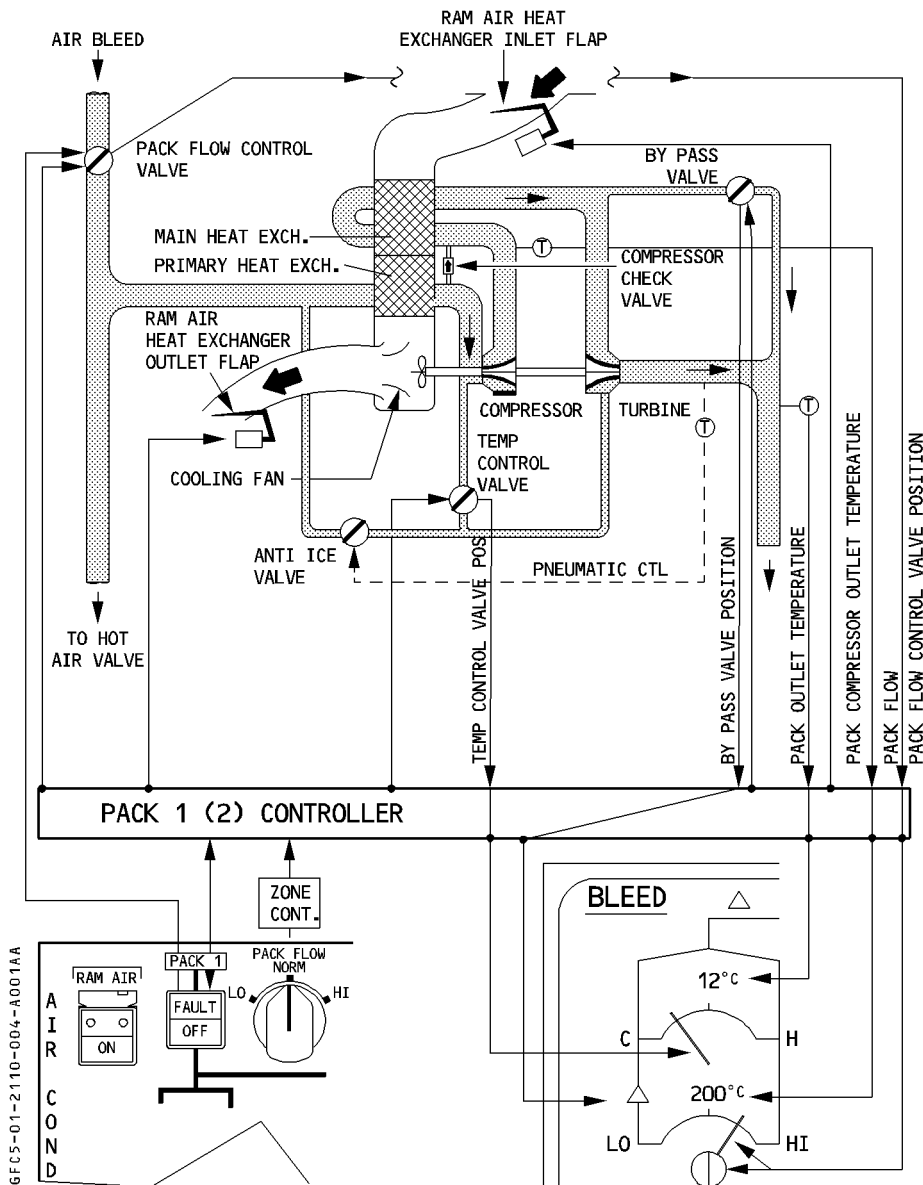
The temperature control valve can modify the pack outlet temperature by adding uncooled air to the turbine outlet flow.

In case of air cycle machine failure a by pass valve allows the bleed air to be cooled by the associated heat exchanger only.

PACK SCHEMATIC

FOR INFO

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PACK FLOW CONTROL VALVE

This valve is pneumatically-operated and electrically-controlled. It regulates the air flow in accordance with signals received from the pack controller. In the absence of air pressure, a spring keeps the valve closed. In the absence of electrical supply, the valve is open in a position equivalent to the NORM selection, provided air supply is available.

The valve closes automatically, in case of pack overheating, engine starting, operation of the fire or ditching pushbuttons, any unclosed door at engine start, or insufficient upstream pressure. The valve is controlled from the AIR panel.

RAM AIR

An emergency ram air inlet ventilates the cockpit and cabin, if both packs fail.

The emergency ram air inlet valve is controlled by the RAM AIR pushbutton on the AIR COND panel.

Operation of this pushbutton opens the ram air valve, provided that ditching is not selected.

- R The outflow valves open about 50 %, provided that they are under automatic control and
- R that the ΔP is less than one psi. They do not automatically open if they are under manual
- R control, even if ΔP is less than one psi. If ΔP is greater than one psi, the check valve, located downstream the ram air door, will not open. No airflow will then be supplied.

MIXER UNIT

This unit mixes cold fresh air from the packs with the cabin air being recirculated through the recirculation fans. The mixer unit is also connected to the emergency ram air inlet and the low pressure ground inlets.

Note : In case both packs are inoperative, the recirculation valves are partially closed.

HOT AIR VALVES

These valves regulate the pressure of hot air tapped upstream of the packs.

They are pneumatically-operated and electrically-controlled from the HOT AIR 1 and HOT AIR 2 pushbuttons on the AIR panel. In the absence of electrical supply, the hot air valves close. In the absence of air pressure, a spring keeps the valves closed.

The valve automatically closes, if the duct overheats.

TRIM AIR VALVES

These valves are electrically-controlled by the zone controller. Two trim air valves, associated with each zone, adjust the temperature by adding hot air from the two hot air manifolds. For the cockpit supply, only one trim air valve is fitted to regulate air from hot air manifold 2. Air from hot air manifold 1 passes through a restrictor.

HOT AIR X VALVE

A HOT AIR X valve is fitted between the two hot air manifolds. The valve is normally closed. It automatically opens, when one hot air supply has failed.

TEMPERATURE AND FLOW REGULATION

Temperature regulation is automatic and controlled by one zone controller and two pack controllers.

PACK CONTROLLER

Each pack controller regulates the temperature of its associated pack, in accordance with a demand signal from the zone controller, by modulating the temperature control valve and the ram air inlet flaps, and the ram air outlet flaps.

The ram air inlet and outlet flaps close during takeoff and landing to avoid ingestion of foreign objects.

Note : During takeoff, the ram air inlet and outlet flaps close when the thrust lever is at or above CL and the wheel speed (sent by the BSCU) is at or above 70 knots.

During landing, they close as soon as the main landing gear is compressed and as long as the speed is at or above 70 knots.

They open, 15 seconds after the speed drops below 70 knots.

The pack controllers also regulate flow by modulating the associated pack flow control valve according to the zone controller demand.

ZONE CONTROLLER**PACK FLOW CONTROL**

The crew can use the PACK FLOW selector to adjust the pack flow for the number of passengers and the external conditions.

Whatever the crew selects, the system delivers high flow for any of the following circumstances :

- Single pack operation, or
- When the APU is supplying bleed air.

Note : Due to ambient conditions, high flow may not be achieved.

If the crew selects LO flow and the temperature demand cannot be satisfied, the zone controller generates an ECAM advisory message to inform the crew to manually select NORM flow.

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Engine pressure demand

- R When the cooling demand in one zone cannot be satisfied and the bleed pressure is too low, the zone controller signals both Engines Interface Units (EIU) to increase the minimum idle speed in order to raise the bleed pressure.

APU flow demand

- R When the APU bleed valve is open, the zone controller signals the ECB to increase the APU output flow when any zone temperature demand cannot be satisfied.

Bleed temperature demand

- R When the cooling demand cannot be satisfied, the zone controller signals the BMC to decrease the bleed temperature from normal (200°C) to reduced setting (150°C). This reduction is inhibited if the wing anti ice is ON.

TEMPERATURE REGULATION

- R The zone controller regulates the temperature of the three cabin zones and the cockpit.

BASIC TEMPERATURE REGULATION

- R The flight crew uses the temperature selectors on the air panel in the cockpit to select the reference temperature which are fine tuned through the Forward Attendant Panel (FAP) for the cabin zones.

An automatic cabin temperature altitude correction may be added to the cockpit selected master temperature to compensate for reduction in cabin air humidity and reduction of cabin lining temperatures. The altitude correction is proportional to the flight altitude and is programmable. The initial manufacturer setting is that no altitude correction is added. The zone controller computes a temperature demand according to the selected temperature and the actual temperature.

- R The actual temperature is measured by sensors located in the cockpit and at points in the the extraction circuit of the lavatory and galley ventilation system for the cabin.

- R A signal corresponding to the lowest demanded zone temperature is sent to the pack controller which then makes the packs produce the required outlet temperature.

OPTIMIZED TEMPERATURE REGULATION

- R The zone controller optimizes temperatures by acting on the trim air valves.
- R The temperature selection ranges from 18°C (64°F) to 30°C (86°F).

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SYSTEM OPERATION UNDER FAILURE CONDITION

Each Controller has a Channel 1 (that is normally in control), and a Channel 2 (that acts as a backup, if Channel 1 fails).

ZONE CONTROLLER

CHANNEL 1 OR 2 FAILURE

A Channel 1 or 2 failure has no effect on zone temperature regulation.

CHANNELS 1 AND 2 FAILURE

Optimized and backup temperature regulation are lost. The packs deliver a fixed pack outlet temperature of 20 degrees C (68 degrees F). A Channel 1 and 2 failure removes all information from the ECAM COND page, which then displays "PACK REG". Flow selection from the PACK FLOW selector is lost.

PACK CONTROLLERS

CHANNEL 1 OR 2 FAILURE

A Channel 1 or 2 failure has no effect on pack regulation.

CHANNEL 1 AND 2 FAILURE

- R The corresponding anti-ice valve regulates the pack outlet temperature between
- R approximately 1 degree C and 15 degrees C (respectively 34 degrees F and 59 degrees F). The ECAM signals, associated with the corresponding pack, are lost. The flow control valve pneumatically regulates the pack flow to approximately 120% of the NORM flow.

AIR CYCLE MACHINE FAILURE

If the Air Cycle Machine (ACM) fails (compressor/turbine seizure), the affected pack may be operated in the heat-exchanger cooling mode. Warm pre-conditioned bleed air enters the cooling path, via the pack flow control valve, and goes to the primary heat exchanger. Then, the compressor check valve and the bypass valve open, and air is cooled only by the heat exchanger. The ACM seizure reduces the pack flow.

As in normal pack operation :

- The pack controller regulates temperatures, in accordance with zone controller demand, by modulating the temperature control valve and the ram air inlet and outlet flaps.
- The zone controller regulates the flow of hot air, through the trim air valves, to optimize cockpit/cabin temperature regulation. Hot air flow is less in normal pack operation, because the pack flow is reduced.

Note : A pack with a seized ACM must be switched off on ground, due to the unavailability of RAM air cooling.

HOT AIR VALVES FAILURE

One or both valves failed open : No effect.

One valve failed closed : No effect (HOT AIR X valve opens)

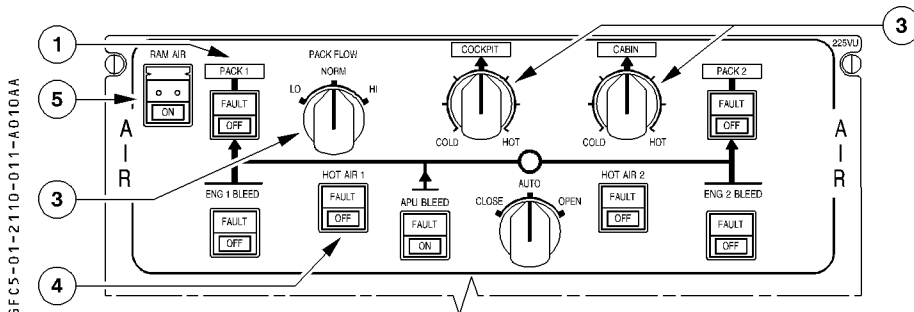
Both valves failed closed : Optimized regulation is lost. Trim air valves are driven to full closed position.
Only the packs regulate temperature.

TRIM AIR VALVE FAILURE

Failed closed : Optimized temperature regulation of half of the corresponding zone is lost.

Failed open : Corresponding hot air valve closes.

Optimized temperature regulation of half of each zone is lost.

CONTROLS AND INDICATORS**OVERHEAD PANEL****① PACK pb**

On : The pack flow control valve is automatically controlled.

It opens, except in the following cases :

- Upstream pressure is below minimum ;
- Compressor outlet overheat ;
- Engine start sequence :

1. Both valves close when :

- The MODE selector is set to IGN, when on ground (valves reopen if the MASTER switch or MAN START pushbutton are not set to ON within 30 seconds) ;
- The MODE selector is set to IGN (or CRANK) and when, on either engine:
 - The MASTER switch is set to ON (or MAN START pushbutton is set to ON), and
 - The start valve is open, and
 - $N3 < 50\%$.

2. On ground, reopening of the valves is delayed 30 seconds to avoid an extra pack closure cycle during a subsequent engine start.

- Any door is not closed and locked, aircraft on ground and any engine running
- The fire pushbutton, of the engine on the related side, is pressed.
- Ditching is selected.

Note : If there is no electrical power, the flow control valves remain open and permit NORM flow.

OFF : The pack flow control valve closes, provided it is electrically supplied.

FAULT It : The amber light and associated ECAM caution come on, when the pack flow control valve position disagrees with the selected position, or in the case of compressor outlet overheat or pack outlet overheat.

② PACK FLOW selector

Enables pack flow selection, depending on the number of passengers and ambient conditions (smoke removal, hot or wet conditions). LO (80 %) – NORM (100 %) – HI (125 %). In case one bleed fails, the flow is limited to 80 %. Any selection is irrelevant in single pack operation, or with APU bleed supply. In these cases, HI pack flow demand is automatically generated.

③ Zone temperature selector

- 12 o'clock position : 24° C (76° F)
- COLD position : 18° C (64° F)
- HOT position : 30° C (86° F)

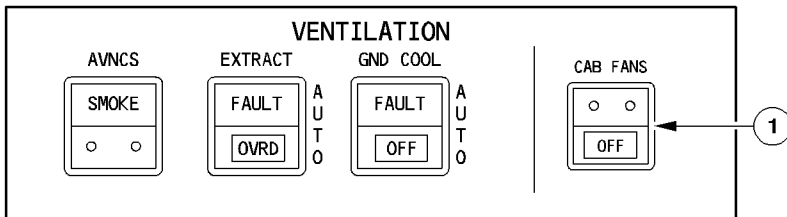
④ HOT AIR 1 (or 2) pushbutton

- On : The valve regulates hot air pressure.
 OFF : The valve closes. The FAULT circuit is reset.
 Forward cargo heating is lost, if HOT AIR 1 is affected.
 FAULT It : The amber light, and associated ECAM caution, come on when duct overheat is detected (88° C/190° F). The valve, and the associated trim air valves close automatically. The FAULT light goes off, when the temperature drops below 70° C, and the flight crew selects OFF.

⑤ RAM AIR pushbutton (guarded)

- ON : The ON light comes on white.
 If the DITCHING pushbutton, on the CABIN PRESS panel, is in normal position :
 – The RAM air inlet opens.
 – If $\Delta P < 1$ psi : Each outflow valve opens to about 50 %, when under automatic control. They do not automatically open when under manual control. The emergency ram air flow is directly supplied to the mixer unit.
 – If $\Delta P \geq 1$ psi : Each outflow valve remains normally-controlled. No emergency ram air flows in.
 Off : The RAM air inlet closes, and the outflow valves return to the normal position.

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① CAB FANS pushbutton

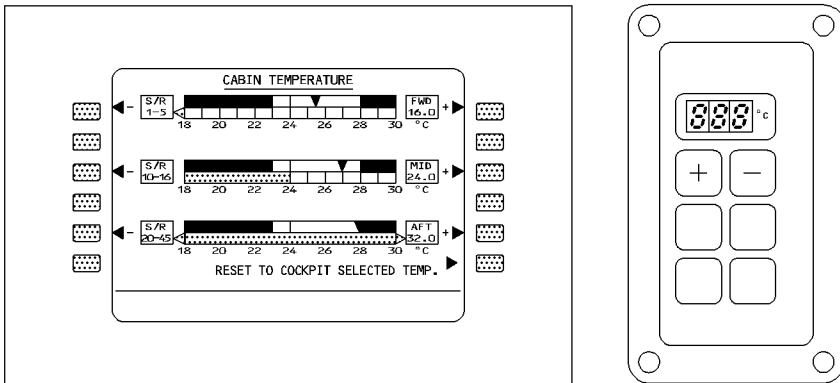
On : The two cabin fans run. Air from the cabin is blown to the avionics compartment and also to the mixer unit of the conditioning systems.
OFF : The two cabin fans stop.

Note : An ECAM caution is activated, when a fan failure occurs.

FORWARD ATTENDANT PANEL

Allows fine-tuning of individual zone temperature ($\pm 2.5^{\circ}\text{C}/\pm 4.5^{\circ}\text{F}$).

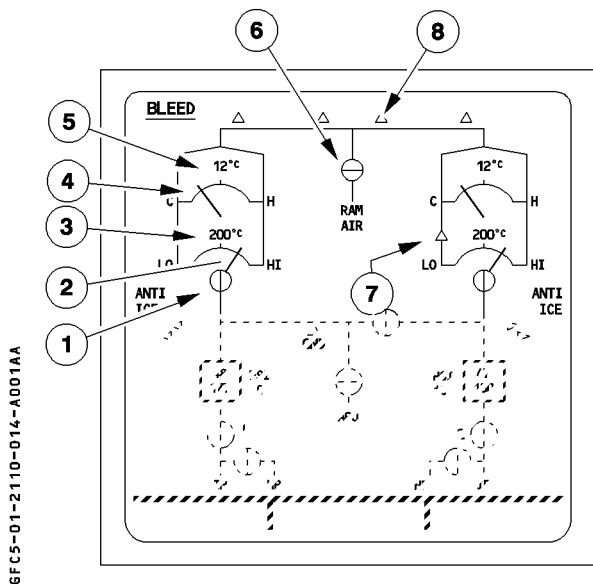
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ADDITIONAL ATTENDANT PANEL

The additional attendant panels can be installed in different locations.
 Temperature setting of the related zone can be changed ($\pm 2.5^{\circ}\text{C}/\pm 4.5^{\circ}\text{F}$).

ECAM BLEED PAGE



① Pack flow control valve

Inline - Green : The valve is open.
 Crossline - Amber : The valve is closed.

② Pack flow indication

The needle position (green) represents the actual flow rate. The 12 o'clock position corresponds to a 100 % airflow.

LO : 80 % airflow
 HI : 120 % airflow

③ Pack compressor outlet temperature indication

R It normally appears in green.
 R But, it appears in amber, if the temperature is higher than 260°C.
 R It remains amber, as long as the temperature is not lower than 180°.

④ Temperature control valve position indication

R It appears in green.
 C : The valve is closed.
 H : The valve is fully open.

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⑤ Pack outlet temperature indication

- R It appears in green.
- R But, it appears in amber, if the temperature is higher than 95°C.
- R It remains amber, as long as the temperature is not lower than 60°C.

⑥ RAM AIR inlet indication

- R Crossline - Green : The flap is normally closed.
- R In transit - Amber : The flap is partially open.
- R Inline - Amber : If open on ground, or if the flap position disagrees with the position of the RAM AIR pushbutton (OFF).
- R Inline - Green : The flap is normally open.
- R Crossline - Amber : The flap is closed, and the RAM AIR pushbutton is in the ON position.
- R

⑦ Bypass valve indication

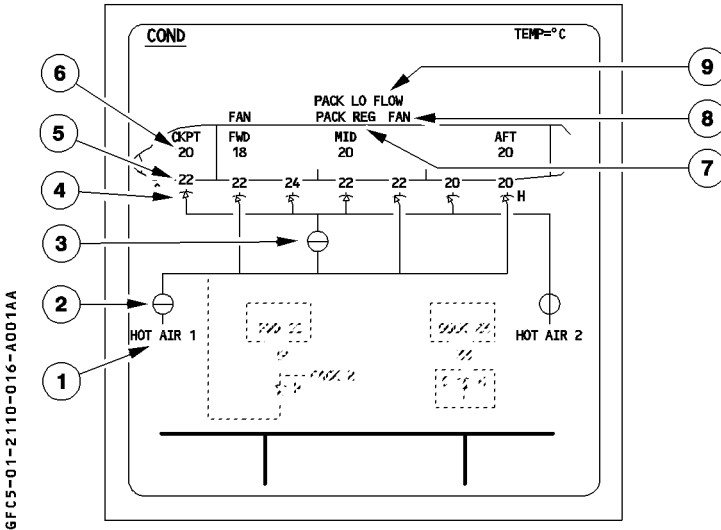
- R Triangle - Green : The bypass valve is normally open.
- R Triangle - Amber : The bypass valve is failed open.
- R No display : The bypass valve is fully closed.

⑧ Users indication

It normally appears in green.
 But it appears in amber, when the RAM AIR flap and the two packs are fully closed.

ECAM COND PAGE

R



① HOT AIR indication

Normally green.
Becomes amber if the flow control valve is fully closed.

② Hot air valve indication

- ⊕ green : normally open (not fully closed).
- ⊖ green : normally closed (fully closed).
- ⊖ amber : fully closed but controlled open.
- ⊕ amber : not fully closed and controlled closed.

③ Hot air x valve indication

Identical to the HOT AIR valve indication



④ Trim air valve position indication

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The arrow is normally in green. It becomes amber, if the valve is failed (as seen by the zone controller).

C : The valve is fully closed.

H : The valve is fully open.

Note : The number of trim air valves vary, depending on the cabin configuration.

⑤ Zone duct temperature indication

It is normally in green.

It becomes amber above 88°C.

R It remains amber, until the temperature is below 70°C.

⑥ Zone temperature indication

It is in green.

Note : This information is also displayed on the ECAM CRUISE page.

⑦ PACK REG indication

It is in green, when the zone controller is inoperative (both channels fail).
Temperature is regulated by the packs only.

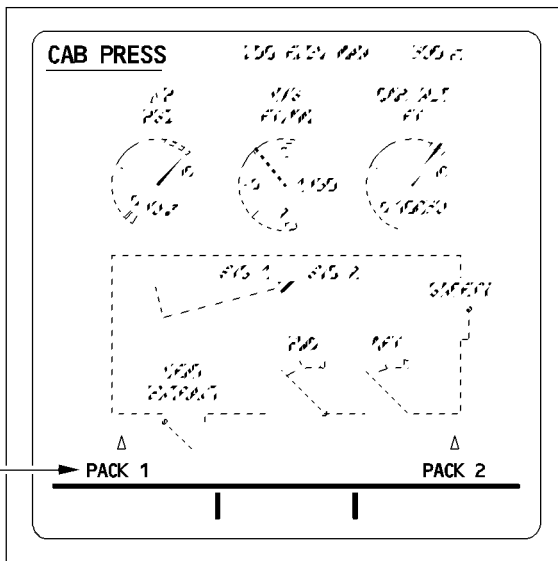
⑧ FAN indication

It is in amber, if the fan fails, or if it is selected OFF, via the CAB FANS pushbutton.

⑨ PACK LO FLOW indication

It pulses in green, when the flow is insufficient to reach the selected temperature.
This indicates that the zone controller requests an increase in flow.

ECAM CAB PRESS PAGE



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① PACK indication

pack flow control valve open :

△ → Green

PACK 1 → White

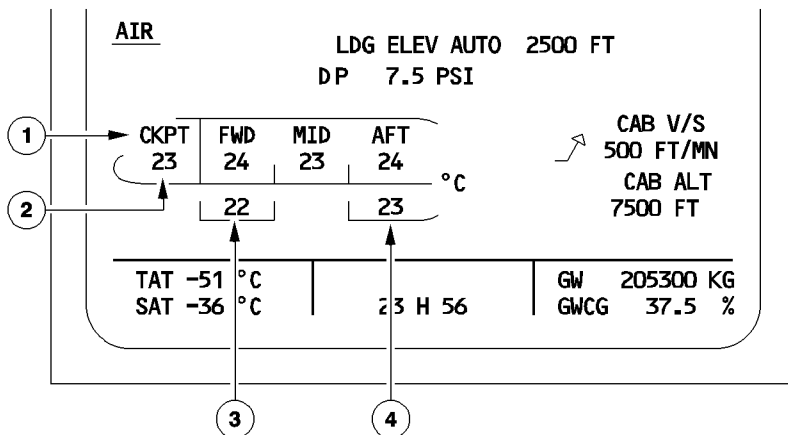
pack flow control valve closed :

△ → Amber

PACK 1 → Amber

ECAM CRUISE PAGE

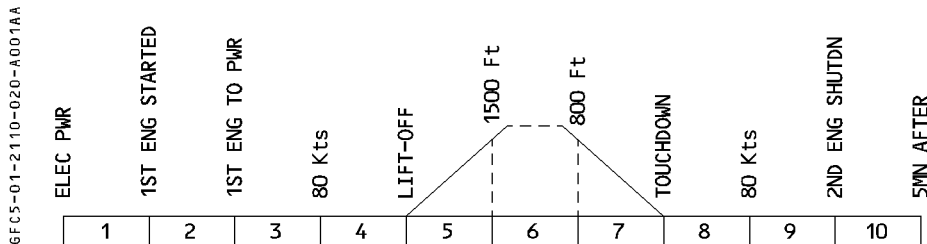
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- ① Zone indication
- ② Zone temperature
- ③ Forward cargo compartment temperature
- ④ Bulk cargo compartment temperature



WARNINGS AND CAUTIONS




R

E/W D : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
PACK 1(2) OVHT Pack compressor outlet temperature > 260°C, or pack outlet temp > 95°C.	SINGLE CHIME	MASTER CAUT	BLEED	PACK FAULT It	3, 4, 5, 7, 8
PACK VALVE 1(2) FAULT Pack valve disagree with selected position.				PACK OFF It	
PACK 1(2) OFF Pack pb off with no failure.				PACK FAULT It	
PACK 1+2 FAULT One pack off, then the other fault.	NIL	NIL	NIL	NIL	3, 4, 5, 7, 8
PACK 1(2) REGUL FAULT Pack controller failed, or air is only cooled by heat exchanger (ACM fault or RAM door failed closed, or Temperature Control Valve failed).					
ZONE CTRL 1(2) FAULT One channel of the zone controller is failed.	SINGLE CHIME	MASTER CAUT	COND	HOT AIR FAULT It	3*, 4, 5, 7, 8
ZONE REGUL FAULT Zone controller failed or hot air valve 1+2 failed				NIL	
DUCT OVHT (FWD CRG, COCKPIT, FWD/MID/AFT CABIN) Duct temp > 88°C				NIL	
HOT AIR SYS 1(2) FAULT Hot air valve 1(2) and hot air x valve failed closed	NIL	NIL	NIL	NIL	3*, 4, 5, 7, 8
L + R (L, R) CAB VENT FAULT Cab fan or recirculation valve failure.	SINGLE CHIME	MASTER CAUT	NIL	NIL	

* Only in case of single failure.

MEMO DISPLAY

- RAM AIR is displayed in green, when selected ON, on the overhead panel. It becomes amber in flight phases 1 and 2.
- The PACK FLOW LO or HI message is displayed in green, depending on the PACK FLOW selector position.

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	PRESSURIZATION	SEQ 001	REV 12

GENERAL

In normal operation, pressurization control is fully automatic.

The system consists of:

- Two Cabin Pressure Controllers (CPC)
- Two outflow valves, each having 3 motors (2 automatic, 1 manual)
- One control panel
- Two safety valves
- One negative relief valve

Any one of the three independent electric motors can power the outflow valve.

Normally, one of the two cabin pressure controllers operates the outflow valves by means of its associated automatic motor. In case of ditching, an override switch, on the control panel, allows the flight crew to close the outflow valves, and all valves below the flotation line.

AUTOMATIC OPERATION

The system can be fully or semi-automatic.

In fully-automatic operation :

Cabin pressurization is achieved from internal or external schedules, when appropriate FMGS inputs are available.

In automatic operation, a ΔP limiting function monitors differential pressure.

- R In semi-automatic operation, when FMGS data are not available, the crew needs to select
- R the landing field elevation. The pressurization system then uses the manually-selected
- R landing field elevation for internal schedules.

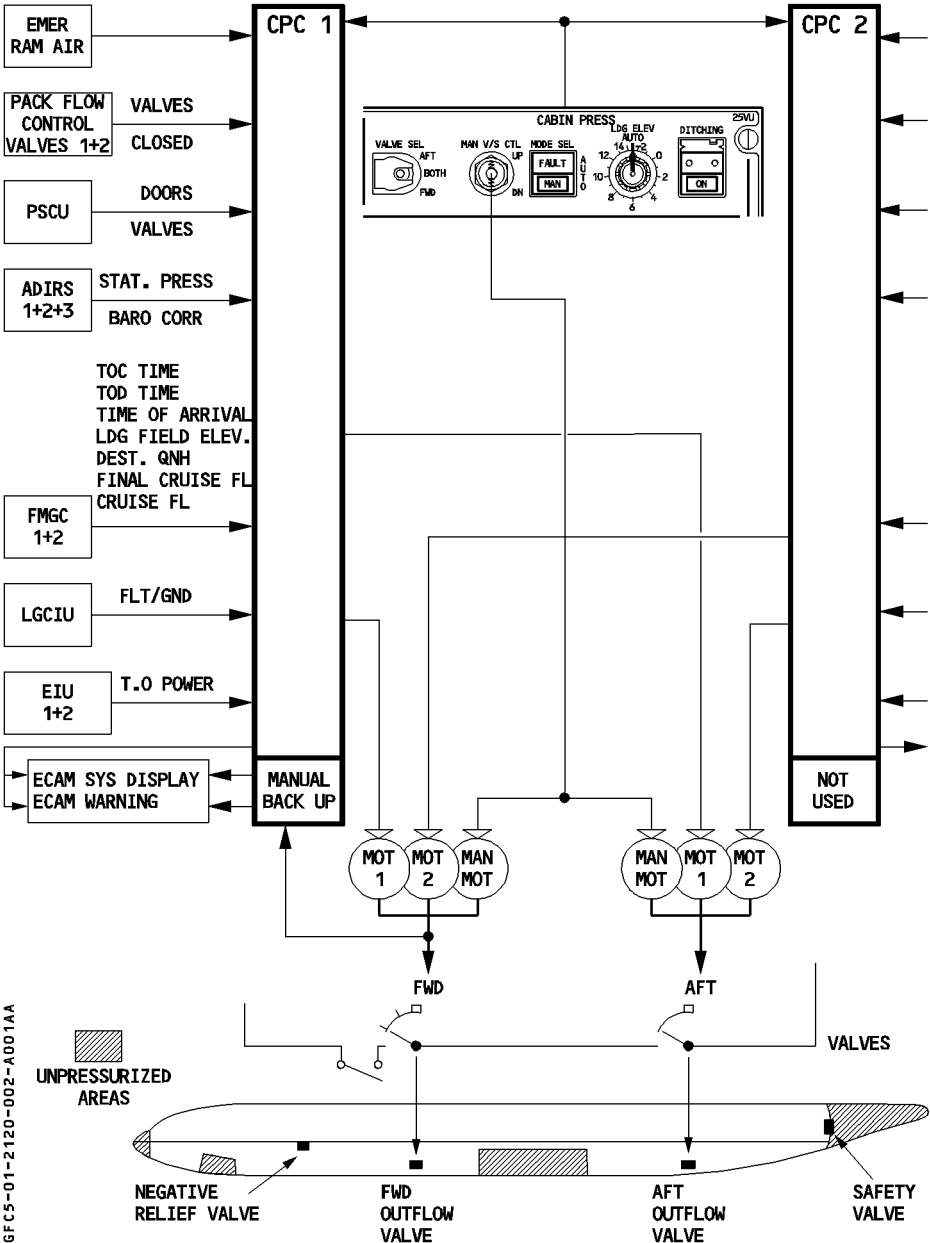
MANUAL OPERATION

In manual mode, the flight crew controls the cabin altitude via the manual motor of the outflow valves, by operating controls on the pressurization control panel.


Manual operation has priority over all other modes.

SCHEMATICS

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	PRESSURIZATION		SEQ 001	REV 13

MAIN COMPONENTS

CABIN PRESSURE CONTROLLERS

Two identical, independent, automatic controllers are used for cabin pressure control. They receive signals from the Air Data Inertial Reference System (ADIRS), the Flight Management and Guidance Computer (FMGS), the Engine Interface Unit (EIU), the Landing Gear Control Interface Unit (LGCIU), the Proximity Switch Control Unit (PSCU), and the pack flow control valves. They perform the automatic cabin pressure control. They generate signals for the ECAM. In automatic mode, one controller is active, the other is on standby. For operation in manual mode, each controller has a backup section, which is powered by an independent power supply in the controller N° 1 position. This section also has a pressure sensor that generates the cabin altitude and pressure signal for the ECAM, when MAN mode is selected.

The controllers communicate via a cross-channel link.

OUTFLOW VALVES

Two outflow valves are located below the flotation line. Each outflow valve assembly consists of a flush, skin-mounted, rectangular frame, carrying inward and outward opening flaps linked to the actuator. The actuator contains the drives of two automatic motors and the drive of the manual motor. Either of two electric motors operates the valve in automatic mode, and a third electric motor operates it in manual mode. To allow an easy and smooth control of the cabin's vertical speed in manual mode, the outflow valves move at a speed which is about 1/5 of that in automatic mode.

In automatic mode, the operating controller signals the position of the valve to the ECAM. In manual mode, the backup section of the N°1 controller signals the position of the valve to the ECAM.

The outflow valves automatically close, if the cabin altitude reaches 15 000 feet, provided the valves are in automatic mode.

When one pack is OFF and ΔP is above 4 psi, the aft outflow valve closes and the forward outflow valve controls the cabin pressure.

Note : When the RAM AIR pushbutton is ON , and ΔP is below 1 psi, the system drives the outflow valves about 50 % open if it is under automatic control. If the system is under manual control, the outflow valves do not automatically open, even if ΔP is below 1 psi.

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SAFETY VALVES

Two independent pneumatic safety valves prevent the cabin pressure from going too high (8.85 psi above external ambient pressure) or too low (– 1 psi below external ambient pressure). They are on the rear pressure bulkhead, above the flotation line.

NEGATIVE RELIEF VALVE

It is installed below the floor level, aft of left door n° 1, above the flotation line. It assists the safety valves in preventing the cabin pressure from negative going too low.

SYSTEM OPERATION

AUTOMATIC PRESSURE CONTROL MODE

- Two identical, independent, automatic systems (each consisting of a controller and its associated motors) control cabin pressure.
 - Either system controls the two outflow valves.
 - Only one controller operates at a time.
 - An automatic transfer occurs :
 - 80 seconds after each landing.
 - If the operating system fails.
- The controller normally uses the landing elevation and the QNH from the FMGC, and the pressure altitude from the ADIRS.
 - If FMGC data are unavailable, the controller uses the Captain Baro Reference from the ADIRS and the LDG ELEV selection.
- Pressurization is assumed through the following modes:

Ground (GND)

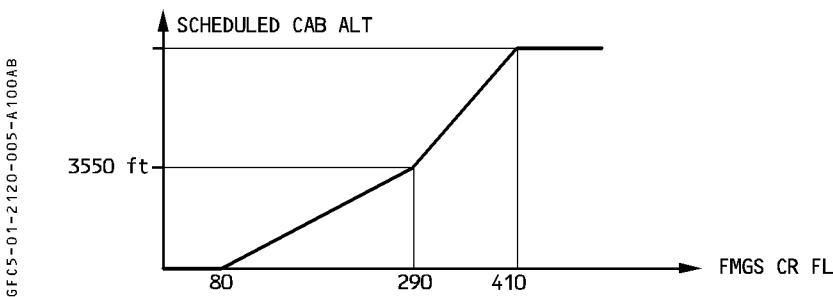
Before takeoff, and 80 seconds after landing, the system keeps the outflow valves fully open to ensure there is no residual pressure differential in the aircraft. At touchdown, to release the remaining cabin overpressure, a depressurization sequence controls the cabin V/S at + 500 feet/minute.

Takeoff (TO)

To avoid a pressure surge at rotation, the controller prepressurizes the aircraft at a rate of – 328 feet/minute until the pressure differential reaches 0.1 psi. At lift off, the controller initiates the climb phase.

Climb in internal mode (CI)

CAB V / S varies, according to a preprogrammed law, in order to reach the scheduled CAB ALT at the top of climb defined by the FMGS cruise FL. The CAB V / S is limited to 1000 feet/minute.



The LDG ELEV selector has no effect in climb.
If no FMGS cruise FL is available the defaulted FL 410 is used.

Climb external (CE)

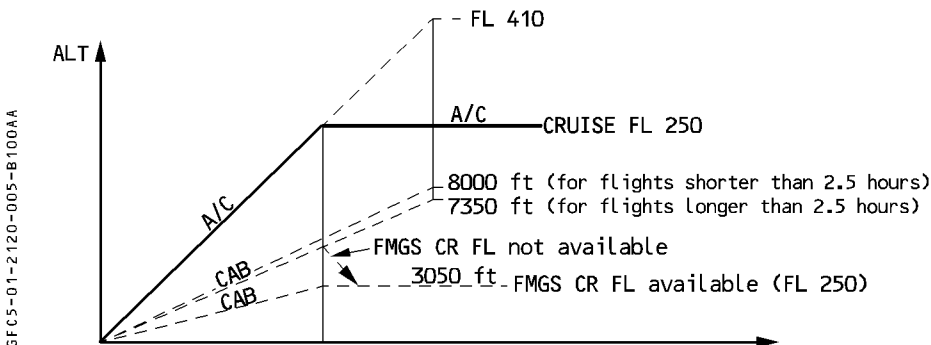
CAB ALT varies according to FMGS estimated times and planned cruise FL.
The cabin climb rate is limited to 1000 feet / min.

Cruise (CRZ)

When the CPC switches to CRZ mode, the cabin altitude is controlled to the lower of cabin altitude reached at top of climb or the scheduled CAB ALT for the actual cruise flight level.
If the cabin altitude at top of climb is higher (no FMGS CR FL available) it will descend at a rate of 300 SLFPM to the scheduled CAB ALT.

If a LDG ELEV is selected (manual or FMGS) that is above the actual CAB ALT, the cabin altitude increases up to the higher of CAB ALT at top of climb, or (LDG ELEV - 6000 ft). The cabin altitude is limited to 7350 ft for flights longer than 2.5 hours, and 8000 ft for flights shorter than 2.5 hours.

Note : If the takeoff runway is higher than 8000 ft, the cabin altitude remains at take-off altitude until cruise.





Descent in internal mode (DI)

Pressure rate is optimized so that cabin pressure reaches landing field pressure + 0.1 psi just prior to landing. The cabin descent rate is limited to 750 ft/min.

Descent in external mode (DE)

Cabin altitude varies according to FMGS-estimated times, and cabin pressure reaches landing field pressure + 0.1 psi just prior to landing.

The cabin descent rate is limited to 750 feet/minute.

Abort (AB)

R The abort mode prevents the cabin altitude from climbing, if the aircraft does not climb after takeoff. Cabin pressure is set back to the takeoff altitude + 0.1 psi.

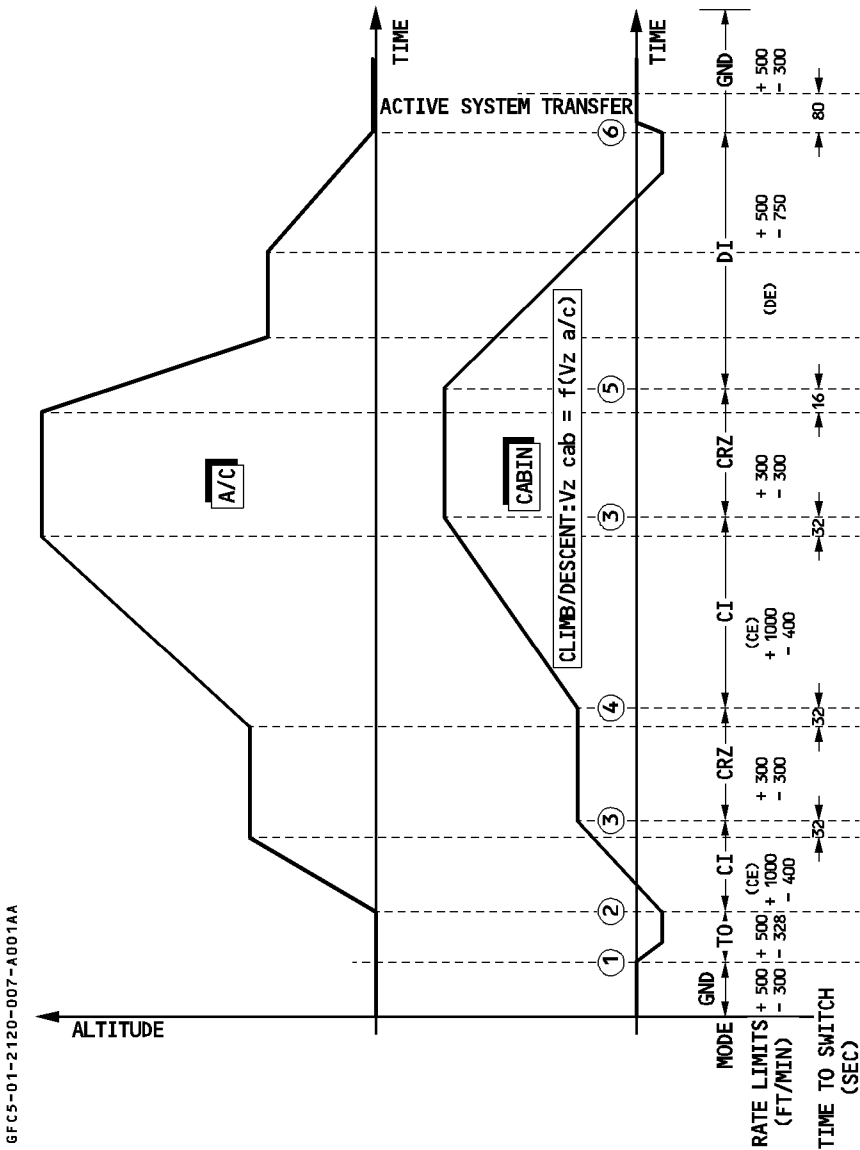
Ground (after landing) (GND)

At touchdown, to release the remaining ΔP a depressurized sequence controls the cabin vertical speed at + 500 ft/min.

80 seconds after landing the outflow valves are controlled fully open to ensure there is no residual ΔP in the aircraft.

R PRESSURIZATION FLIGHT PROFILE

FOR INFO



6FC5-01-2120-007-A001AA



FOR INFO

PRESSURIZATION MODES SWITCHING

		from	GND	TO	GND	CL	AB	TO	CL	CRZ	CRZ	DES	DES	AB
		to	TO	CL	CL	AB	GND	GND	CRZ	CL	DES	CL	GND	CL
C O N D I T I O N S	ENG 1 and ENG 2 TLA \geq CL (ENG RUNNING)		1					0						
	ENG 1 or ENG 2 TLA \geq CL (ENG RUNNING)			1										
	RH MAIN L/G sys 1 and sys 2 COMPRESSED		1	0	0			1	1					1
	ALL doors closed		1		1									
	A/C ALT $<$ 8000ft or A/C ALT change since T/O $<$ 5000ft						1							
	A/C ALT \geq 8000ft or A/C ALT change since T/O $>$ 5000ft									1				
	A/C RATE OF CLIMB \geq 50 SLFPM for 48 SEC												1	
	A/C RATE OF CLIMB \geq 250 SLFPM for 32 SEC										1			
	A/C RATE OF DESCENT \geq 250 SLFPM for 16 SEC						1					1		
	A/C RATE OF DESCENT \geq 50 SLFPM for 32 SEC									1				
	A/C RATE OF CLIMB \geq 50 SLFPM for 32 SEC													1
A/C ALT $>$ A/C ALT at switch into CRZ + 380 SLFT										1				
A/C ALT $>$ CRZ FL + 190 SLFT									1					

0 : CONDITION NOT VALID
1 : CONDITION VALID

1
2
3
4
5
6


MAXIMUM DIFFERENTIAL PRESSURE LIMITER FUNCTION

This function is only available in automatic mode.

If the differential pressure is above 8.42 psi, the CPC maintains the Δp constant, to avoid overpressurization. As a result, the outflow valves open and the CAB V/S increases. Once the differential pressure has decreased below the threshold, normal automatic control of the valves resumes, which generally causes the valves to go towards the closed position.

CAUTION

Except for the outflow valve position indication, and the Δp value on the ECAM PRESS page, there is no indication in the cockpit that the limiter function is activated. Once the Δp limiter function has opened the valves, do not counteract the automatic operation by trying to close the valves in manual mode. Due to the slow movement of the outflow valves in manual mode, the valves cannot be closed fast enough and the cabin altitude quickly increases above 20000 feet (even if an emergency descent is initiated simultaneously). The automatic mode provides the safest and the quickest way to reduce differential pressure, and recover normal pressure control.

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	PRESSURIZATION	SEQ 100	REV 15

MANUAL PRESSURE CONTROL MODE

If both automatic systems fail, the flight crew may use the CABIN PRESS control panel to take over manual control of cabin pressurization.

- Press the MODE SEL pushbutton to select MAN, and
- Push the MAN V/S CTL toggle switch UP or DN to increase or decrease cabin altitude. Depending on the VALVE SEL position, the flight crew manually controls both, or only one, outflow valve(s).

If only one outflow valve is selected, the other one remains under automatic control.

- Note :*
1. Due to the slow operation of the outflow valves in manual mode, and the limited resolution of the outflow valves' position on the ECAM, the visual ECAM indication of a change in the outflow valves' position can take up to 5 seconds.
 2. As the pressurization system is manually-controlled, the outflow valves do not automatically open at touchdown.

DITCHING

- R To prepare for ditching, the flight crew must press the DITCHING pushbutton on the CABIN PRESS control panel to close the outflow valves, the emergency ram air inlet, the avionics ventilation overboard valve, and the pack flow control valves.

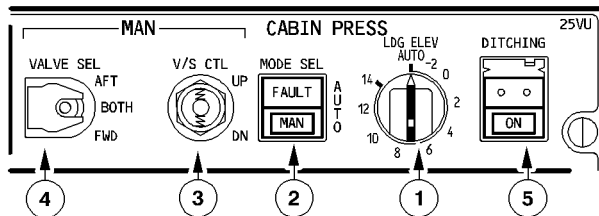
PREVENTION OF PRESSURIZATION WITH A DOOR NOT CLOSED AND LOCKED

On ground, at takeoff power application, if at least one door is not closed and locked, the CPC will remain in ground mode (outflow valves open).

Note : As a backup, the zone controller closes the pack valves (Refer to 1.21.10).

CONTROLS AND INDICATORS**OVERHEAD PANEL**

6FES-01-2.120-010-A 1000A

**① LDG ELEV sel**

AUTO : The pressurization system uses the FMGEC data to construct an optimized descent pressure schedule.
To leave the AUTO position, pull out and turn the selector.

Other positions : The pressurization schedule does not use the landing elevation from the FMGEC, but instead uses the landing elevation selected with this knob (from – 2000 to 14000 feet) as its reference.

Note : The LDG ELEV selector scale is only given as an indication.
(Refer to the ECAM information for accurate adjustment).

② MODE SEL pb

AUTO : Automatic mode is operating. One of the two systems controls the outflow valve.

Note : If the pilot suspects that the operating pressurization system is not performing properly, he can attempt to select the other system by switching the MODE SEL pushbutton to MAN for at least 3 seconds, then returning it to AUTO.

MAN : This legend appears in white, and the FAULT does not come on. The flight crew then uses the MAN V/S CTL switch to control the system.

FAULT : This legend appears in amber and the ECAM caution light only comes on when both automatic systems are faulty.

Note : The pilot may notice a variation (up to ± 1000 feet) in CAB ALT indication on the ECAM PRESS page, when the system switches from the cabin pressure control AUTO mode to MAN mode, due to the reduced resolution of the backup pressure sensor.

③ V/S CTL toggle sw

- R The switch, spring loaded to neutral, controls the position of the outflow valve selected through the VALVE SEL. It controls the MAN motor, when the MODE SEL pushbutton switch is in the MAN position.
 UP : The valve(s) move towards open position.
 DN : The valve(s) move towards closed position.

④ VALVE SEL guarded sel

- AFT : The aft outflow valve can be manually controlled. The forward outflow valve remains under automatic control.
 BOTH : Both outflow valves can be manually controlled.
 (guarded position)
 FWD : The forward outflow valve can be manually controlled. The aft outflow valve remains under automatic control.

⑤ DITCHING guarded pb sw

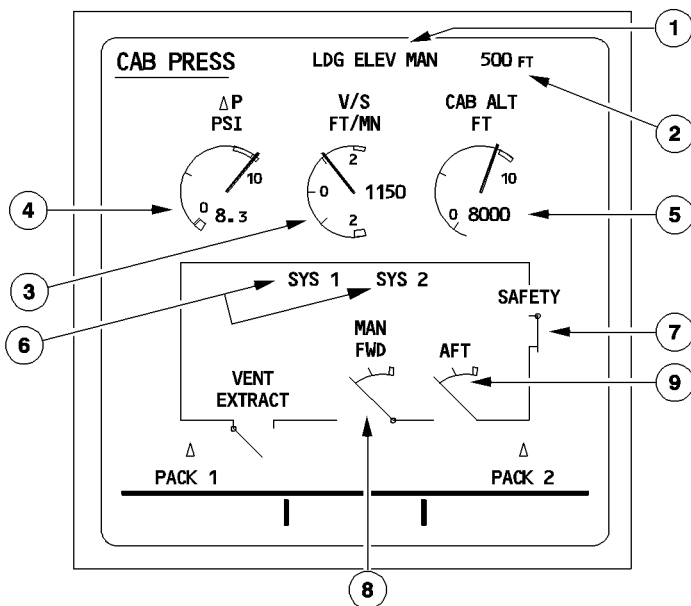
- Normal : The system functions normally.
 R ON : The outflow valves, emergency ram air inlet, avionics ventilation overboard
 R valve, cargo compartment isolation valves and pack flow control valves
 R close. The ON light appears in white.

Note : *The outflow valve(s) will not close automatically if it (they) is (are) under manual control.*

CAUTION

- R If the ditching pushbutton is put to ON, on ground, with low pressure ground cart
 R connected and all doors closed, a differential pressure will build up.

ECAM CAB PRESS PAGE



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① LDG ELEV AUTO / MAN


- R - LDG ELEV AUTO appears in green when the LDG ELEV selector is in AUTO. Becomes amber if the landing elevation is not transmitted by the FMGS.
- R - LDG ELEV MAN appears in green when the LDG ELEV selector is not in AUTO.
- R Neither appears when the MODE SEL pushbutton is in MAN and VALVE SEL selector is in BOTH, or when the LDG ELEV selector is faulty.

② Landing Elevation

- R Landing elevation selected either automatically by the FMGS or manually by the pilot appears in green but not when the MODE SEL pushbutton is in MAN and the VALVE SEL is in BOTH).

③ V/S FT/MIN (cabin vertical speed)

- R The analog and digital presentation appear in green when V/S is in the normal range.
- R The digital presentation pulses when V/S is greater than + or – 1800 feet/minute.

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	PRESSURIZATION		SEQ 001	REV 08

④ ΔP PSI (Cabin differential pressure)

- R The analog and digital presentations appear in green when ΔP is the normal range.
 They appear in amber when $\Delta P \leq -0.2$ psi or ≥ 8.85 psi.
 The digital presentation pulses if $\Delta p > 1.5$ psi (resets at 1 psi) during flight phase 7.

⑤ CAB ALT FT (cabin altitude)

The analog and digital presentations appear in green, in normal range.
 They appear in red if the cabin altitude goes above 9550 feet.
 The digital presentation pulses if the cabin altitude is between 8800 feet and 9550 feet.

⑥ Active system indication (SYS 1 or SYS 2 or MAN)

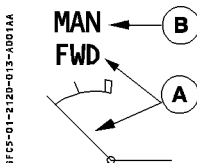
SYS 1 or SYS 2 appears in green when active and in amber when faulty. When either system is inactive, its title does not appear.

⑦ Safety valve position

SAFETY appears in white and the diagram in green when both safety valves are fully closed.
 SAFETY and the diagram appear in amber when at least one valve is not closed.

Note : The safety valves open when the cabin differential pressure is between 8.75 and 8.95 psi.

⑧ Forward outflow valve position

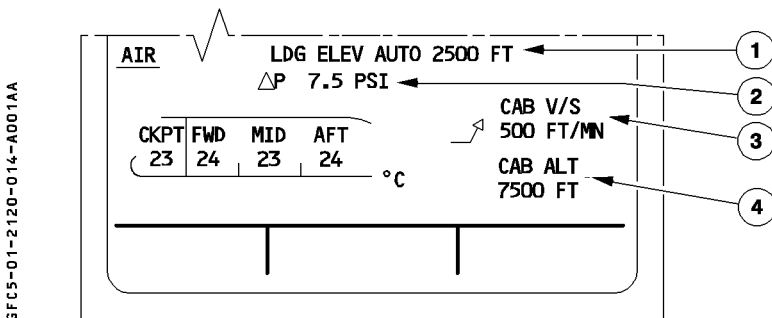


- ① When the valve is operating, normally, the needle appears in green and FWD appears in white.
 Both become amber when the valve :
 · opens more than 95 % during flight.
 · failes under automatic control.
- ② When the valve is under manual control MAN appears in green.

⑨ Aft outflow valve position

Identical to forward outflow valve.

ECAM CRUISE PAGE



① LDG ELEV AUTO / MAN

Identical to CAB PRESS page.

② ΔP indication

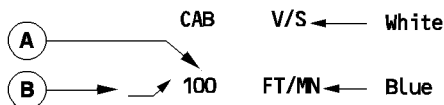
- Normally green.
- Pulses green between 1.5 and 8.85 psi when the aircraft is in final approach.
- Becomes amber below -0.2 psi or above + 8.85 psi.



③ CAB V/S FT/MN (cabin vertical speed indication)

In AUTO PRESS mode

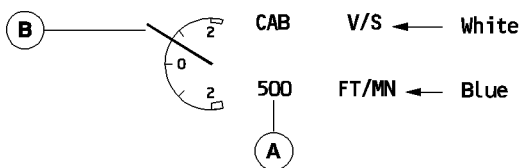
6FC5-01-2120-015-AG01AA



- ① Absolute value of cabin vertical speed is normally green.
It pulses green above 1800 feet/minute or below - 1800 feet/minute.
- ② ↗ : displayed green when the cabin vertical speed is between 25 and 1800 feet/minute.
pulsing green when the cabin vertical speed is above 1800 feet/minute.
- ↘ : displayed green when the cabin vertical speed is between -1800 and -25 feet/minute.
pulsing green when the cabin vertical speed is below -1800 feet/minute.
nothing is displayed when the cabin vertical speed is between -25 and +25 feet/minute.

In MAN PRESS mode (MODE SEL pushbutton switch at MAN and VALVE SEL at BOTH position):

6FC5-01-2120-015-B001AA

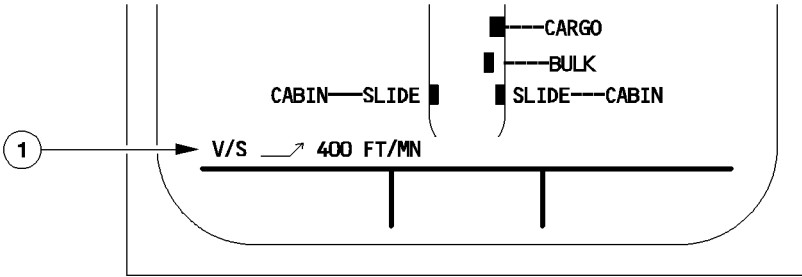


- ① Identical to AUTO PRESS mode, but minus sign is added for negative values
 - ② The needle for the cabin vertical speed indication is normally green.
It pulses green below -1800 feet/minute or above +1800 feet/minute
- ### ④ CAB ALT FT cabin altitude indication

Refer to CAB ALT value on CAB PRESS page.

ECAM DOOR/OXY PAGE

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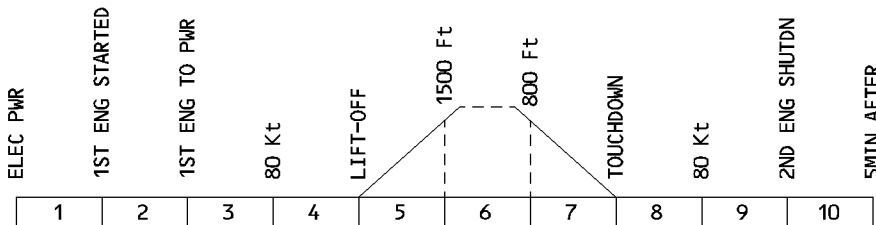
① V/S (cabin vertical speed)

identical with cabin vertical speed indication on cruise page when in AUTO PRESS mode.



WARNINGS AND CAUTIONS

6FC5-01-2120-017-A110AA



R

E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
EXCESS CAB ALT Cabin altitude exceeds – In CLB (DES) the higher of both : 9550 feet or takeoff (landing) field pressure altitude + 1000 feet – In CRZ 9550 feet	CRC	MASTER WARN	CAB PRESS	NIL	1 to 5 7 to 10
SYS 1 + 2 FAULT Both pressure controllers fail.				MODE SEL FAULT It	4, 5, 7, 8
LO DIFF PR Time to reach $\Delta P = 0 < 1.5$ mn Not active below (landing field pressure altitude + 1500 SLFT)	SINGLE CHIME	MASTER CAUT		NIL	1 to 5 7 to 10
FWD (AFT) OFV NOT OPEN Outflow valve not fully open on ground (time delay 80 seconds)					3 to 8
SAFETY VALVE OPEN Safety valves not fully closed.					2 to 5 7, 8
LDG ELEV FAULT No data available, with LDG ELEV sel at AUTO					1, 3, 4, 5 7 to 10
SYS 1 (2) FAULT Pressure controller fault.	NIL	NIL			3, 4, 5 7, 8

MEMO DISPLAY

- The “MAN LDG ELEV” message is displayed in green, if the LDG ELEV selector is not in the AUTO position.
This message becomes amber in Phases 1 and 2.

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		SEQ 100	REV 05

GENERAL

- R The ventilation system includes the avionics ground cooling and ventilation for :
- R – the avionics,
- R – the battery,
- R – the lavatories and galleys,
- R – the pack bay.

R Note : For a description of cargo ventilation, see 1.21.40

Two computers are provided :

- the Avionic Equipments Ventilation Controller (AEVC),
- and the Ventilation Controller.

AVIONICS VENTILATION

GENERAL

The avionics ventilation system is fully automatic.

It cools the electrical and electronic components, in the electronic bay and flight deck (including the instruments).

It uses air recirculated from the cabin, and extracts air from the different panels and equipments racks.

MAIN COMPONENTS

TWO CABIN FANS

Two electric fans continuously operate, as long as the aircraft's electrical system is supplied. They can be simultaneously cut-off through the CABIN FAN pushbutton.

They make the air circulate around the avionics equipment, and blow to the mixer unit of the air conditioning system through the recirculation valves.

RECIRCULATION VALVES

They are normally open, and are partially closed automatically by the ventilation controller, when both packs are OFF (provided both CABIN FANS are ON to ensure sufficient air flow to avionics).

EXTRACT FAN

It operates continuously, as long as the aircraft's electrical system is supplied, and blows air through the underfloor extract or overboard extract valve.

UNDERFLOOR AND OVERBOARD EXTRACT VALVES

These valves are fitted with actuators, controlled by the Avionics Equipment Ventilation Computer (AEVC), or by the EXTRACT pushbutton from the flight deck.

Through the overboard extract valve, air is blown overboard.

Through the underfloor extract valve, air is blown under the forward cargo compartment, then overboard through the outflow valve.

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		SEQ 001	REV 10

COOLING EFFECT DETECTOR (CED)

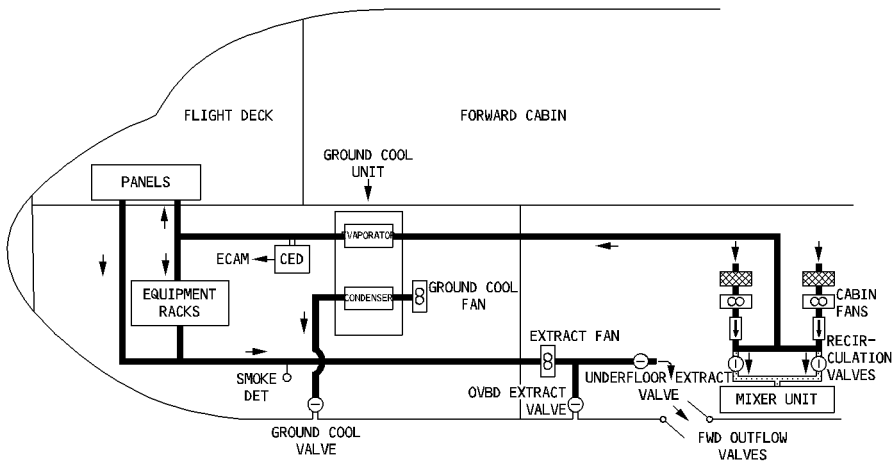
This detector triggers an ECAM caution when the cooling capacity (flow and temperature) of the blown air is abnormal. On ground, it also activates the external horn and the external warning light.

AVIONICS EQUIPMENT VENTILATION COMPUTER (AEVC)

R This Computer controls the position of the underfloor and OVBD extract valves.

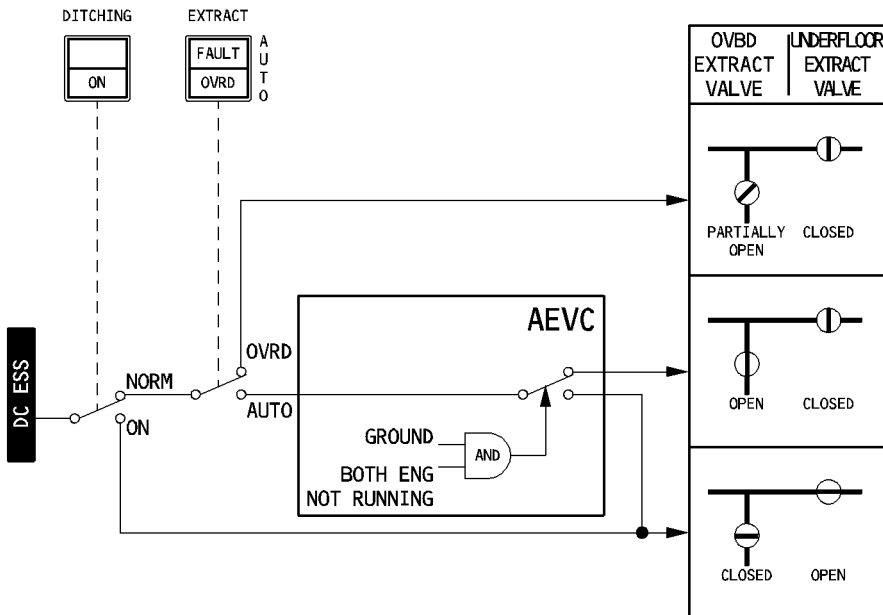
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6FC5-01-2.130-004-A100AB



FOR INFO

6FC5-01-2.130-004-B100AA



 A330 <small>SIMULATOR</small> FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT VENTILATION	1.21.30	P 5
		SEQ 201	REV 12

SYSTEM OPERATION

The cabin and extract fans operate continuously. Air, recirculated from the cabin, is provided to the avionics compartment and the flight deck instrument panels.

Note : In case of failure of the two cabin fans, fresh air is blown from the packs.

In normal operation, fresh air is blown by the extract fan :

- On ground, engines not running: Through the OVBD extract valve (the underfloor extract valve is closed).
- In flight, or on ground, with engines running : Through the underfloor extract valve (the OVBD extract valve is closed).

If OVRD is selected on the EXTRACT pushbutton, air is blown through the OVBD extract valve which is partially open (underfloor extract valve is closed).

When the DITCHING pushbutton is ON, the OVBD extract valve is closed and the underfloor extract valve is open, whatever the position of the EXTRACT pushbutton.

AVIONICS GROUND COOLING

GENERAL

Avionics ground cooling is fully automatic.

On ground, it ensures the cooling of the avionics ventilation air, in case of extremely hot outside air. The cooling system is integrated in the avionics ventilation system, but operates independently.

MAIN COMPONENTS

The cooling system consists of :

- 1 ground cool fan
- 1 ground cool unit, consisting of a freon gas closed cycle evaporator/condensor system, including a control box
- 1 ground cool valve.

SYSTEM OPERATION

Ambient air, used by the cooling unit, is drawn from the avionics compartment by the fan and is rejected overboard via the ground cool valve.

Operation of the ground cooling unit and the fan is controlled by the control box. The AEVC controls the ground valve's position.

As soon as one pack is operating, the ground cooling system stops.

Ground cool valve opens when :

- the aircraft is on ground and,
- the engines are stopped and,
- the ground cool pushbutton is in the auto position.

The ground cool unit operates when :

- the above conditions are met and,
- the ventilation air temperature is higher than 27°C (80°F).

The ground cool unit will automatically stop when :

- the engines start or,
- the ventilation air temperature is lower than 18°C (65°F) or,
- the ventilation air temperature is higher than 50°C (122° F) or,
- at least one pack is operating.

In case of system failure, the GND COOL FAULT light comes on associated with an ECAM caution and a ground crew call.

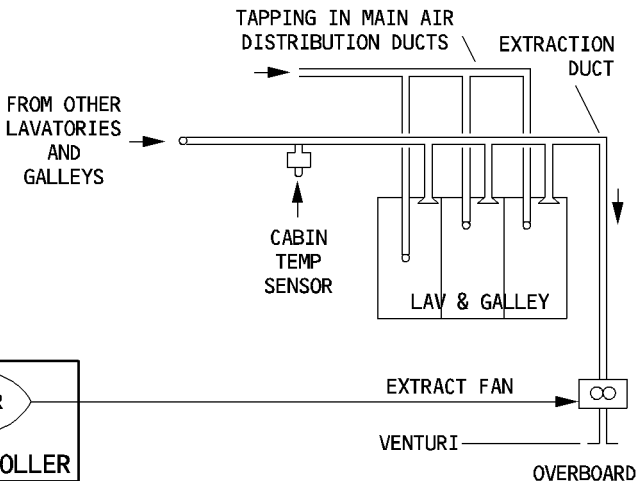
BATTERY VENTILATION

- R A venturi in the skin of the aircraft draws air from the space around the batteries and vents
- R it overboard. The resulting air flow ventilates the batteries.

LAVATORY AND GALLEY VENTILATION

- R An extraction fan draws ambient cabin air through the lavatories and galleys and exhausts
- R it through a venturi.
- R On ground, or if $\Delta P < 1$ psi, the ventilation controller controls the extraction fan.
- R The ventilation of the cabin temperature sensors is connected to the extraction duct.

FOR INFO



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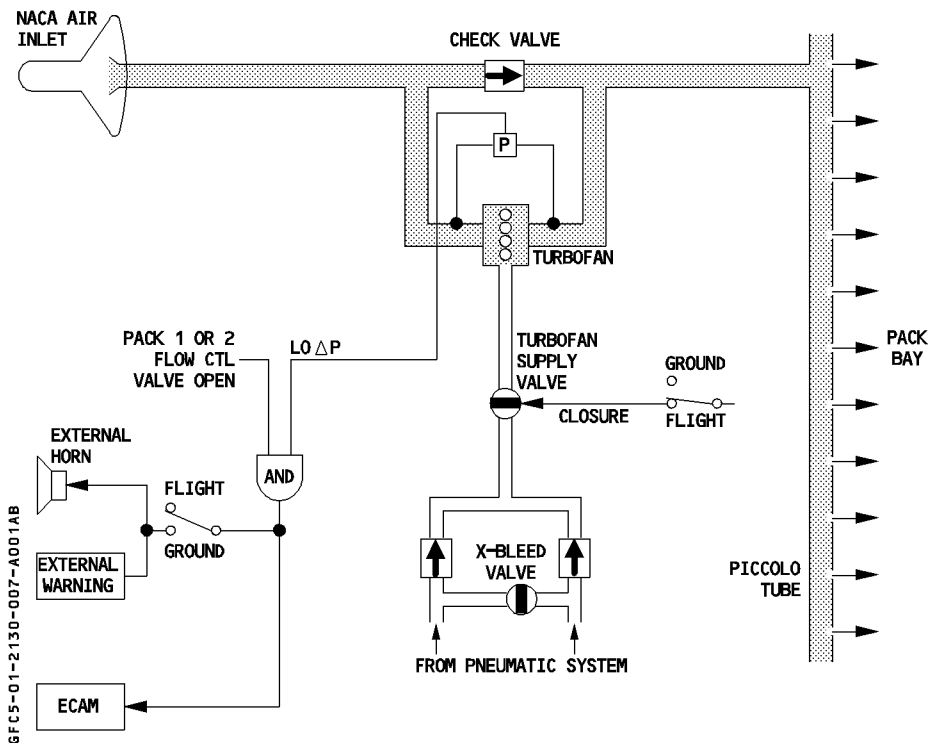
PACK BAY VENTILATION

The ventilation of the pack bay ensures air circulation in order to maintain, on ground and in flight, a mean temperature compatible with the structure constraints in the relevant area.

- R In flight, air from outside flows into the pack bay through a NACA air inlet.
- R On ground, a turbofan provides a sufficient airflow.
- R The turbofan is driven by air from the bleed system which is supplied through the turbofan supply valve. Controlled by the AEVC, the fan operates when the aircraft is on ground.
- R An ECAM warning associated with an external horn on ground is triggered in case of failure of the turbofan (supply valve failed closed or turbofan jammed).

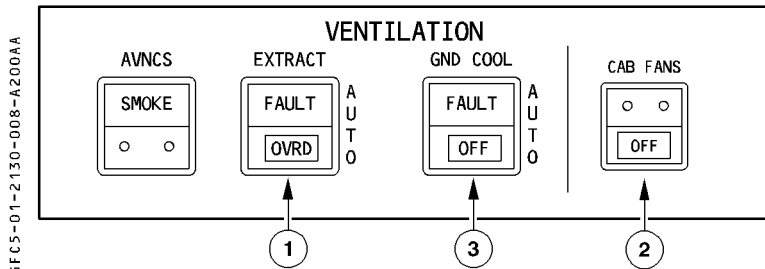
FOR INFO

R



CONTROLS AND INDICATORS

OVERHEAD PANEL



① EXTRACT pb

AUTO : On ground, with both engines not running, the underfloor extract valve is closed and the OVBD extract valve is open, provided DITCHING is not selected.

In flight, or on ground with at least one engine running, the underfloor extract valve is open and the OVBD extract valve is closed.

OVRD : The underfloor extract valve closes and the OVBD extract valve partially opens, provided DITCHING is not selected.

FAULT It : The amber light and associated ECAM caution come on when an extract low flow is detected in the avionics compartment. The **FAULT It** goes out when **OVRD** is selected.

② CAB FAN pb

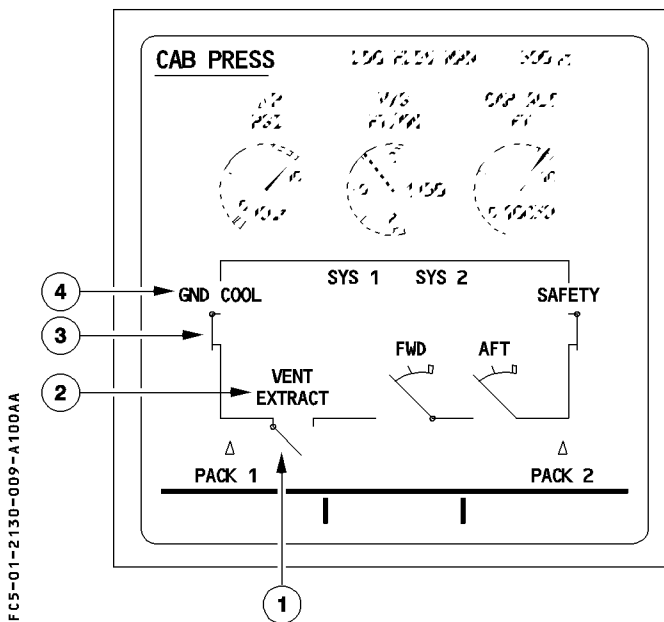
(Refer to 1.21.10)

③ GND COOL pb

AUTO : The ground cool valve opens. The ground cool fan and the ground cool unit automatically start, provided the aircraft is on ground, the engines are stopped, and the temperature of cabin recirculated air is $\geq 27^{\circ}\text{C}$. The ground cool unit stops when at least one pack is operating.

OFF : The ground cool unit stops, the valve closes, and the fan stops.

FAULT It : Comes on amber accompanied by ECAM and ground crew call system activation when a fault is detected in the ground cool unit, valve or fan.

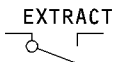
ECAM CAB PRESS PAGE**① OVBD valve position indication**

R

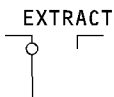
6FC5-01-2130-009-B100AA


 EXTRACT

: This indicates that the OVBD extract valve is fully closed.


 EXTRACT

: This indicates that the OVBD extract valve is partially open.


 EXTRACT

: This indicates that the OVBD extract valve is fully open.



Normally, the EXTRACT indication appears in white and the valve symbol is in green. Both become amber in case of an abnormal position.

② VENT indication

This normally appears in white.

It becomes amber in case of extract low flow.

③ GROUND COOL VALVE position

DISPLAY	COLOR	GROUND COOL VALVE POSITION	IN FLT PHASE
	GREEN	FULLY CLOSED	3, 4, 5, 6, 7, 8
	AMBER	FULLY CLOSED	1, 2, 9, 10
	GREEN	FULLY OPEN	1, 10
	AMBER	FULLY OPEN	2, 3, 4, 5, 6, 7, 8, 9

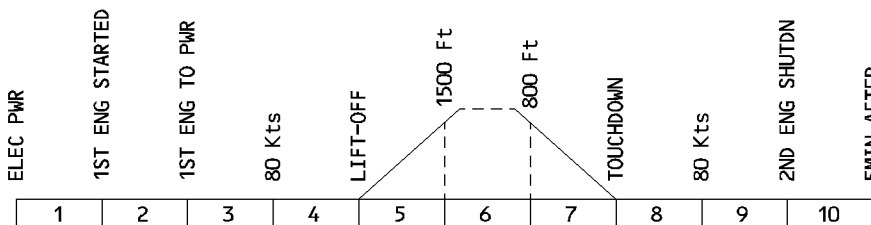
6FC5-01-2130-010-A100AA

④ GROUND COOL indication

Normally white, becomes amber when the ground cool valve is displayed in amber or when the ground cooling system is faulty.

WARNINGS AND CAUTIONS

6FC5-01-2130-011-A200AA



R

E / WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
BLOWING FAULT * Low cooling capacity detected by the CED.	SINGLE CHIME	MASTER CAUT	NIL	NIL	4, 5, 7, 8
EXTRACT FAULT * Low extract flow detected by the pressure switch.			CAB PRESS	EXTRACT FAULT light	3, 4, 5, 7, 8
OVBD VALVE FAULT Valve open at engine start, or not partially open after override.				NIL	3 to 8
PACK BAY VENT FAULT * Lo Δ P detected accross the turbofan, with at least one pack in operation.				GND COOL FAULT light	3, 4, 5, 7, 8, 9
GND COOL FAULT GRU, fan or ground cool valve failure detected.			NIL	NIL	NIL
LAV + GALLEY FAN FAULT	NIL	NIL	NIL	NIL	3, 4, 5, 7, 8, 9

* Associated with the external ground horn, triggered after a time delay of 5 minutes.

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		SEQ 001	REV 03

GENERAL

The system provides ventilation and heating to the cargo compartments. It is controlled by the ventilation controller which has two channels. Channel 2 is a backup in case of channel 1 failure.

SYSTEM OPERATION

BULK CARGO COMPARTMENT

VENTILATION

Air from the cabin goes via the inlet isolation valve to the bulk cargo compartment, and is driven by an extraction fan. Air is controlled by the outlet isolation valve, goes to the bilge, then goes through the aft outflow valve.

– Normal operation

The cargo ventilation controller controls the operation of the inlet and outlet isolation valves and the extraction fan.

The ventilation system operates when the isolation valves are fully open. To open the isolation valves, switch the BULK ISOL VALVE pushbutton to the on position.

The controller closes the isolation valves and stops the extraction fan when :

- The flight crew sets the BULK ISOL VALVE pushbutton OFF, or
- The aft cargo smoke detection unit detects smoke.

The outlet valve closes and the extraction fan stops, when the flight crew sets the DITCHING pushbutton ON.

In case of overheat, the extraction fan is stopped and the OVHT COND FANS RESET FAULT light comes on on the maintenance panel.

HEATING

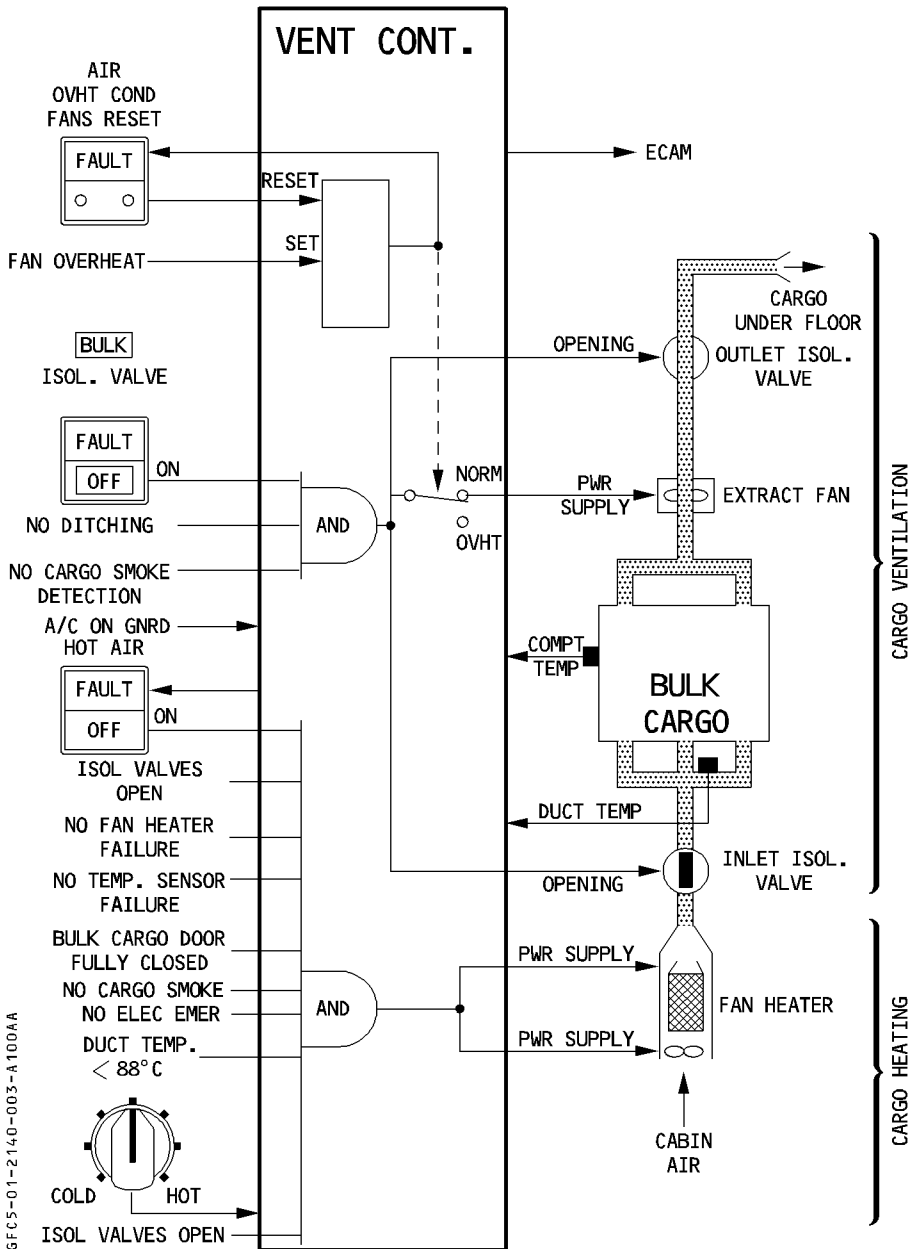
Bulk cargo compartment heating is performed by an electrical fan heater. Air from the cabin, driven by the electrical fan, goes into the compartment through a heating element. The temperature demand is selected from the cockpit.

– Normal operation

Provided the cargo door is closed, the heater operates when the temperature sensors indicate that the compartment air temperature is less than the selected one.

– On ground operation

When the bulk cargo door is open, the electrical power no longer supplies the heating element of the fan heater. Compartment heating is not available, as long as the cargo door remains open.



AFT CARGO COMPARTMENT

VENTILATION

R Due to extract fan suction, cabin air flows through the two inlet valves and via sidewall inlets into the aft cargo compartment. Air is extracted through outlets on the opposite sidewall and goes, via the extract fan and outlet isolation valve, to the aft outflow valve area.

– **Normal operation**

The cargo ventilation controller controls the inlet and outlet isolation valves, and the extraction fan. The ventilation system operates when the isolation valves are open. To open the isolation valves, switch the AFT ISOL VALVE pushbutton to the ON position. The controller closes the isolation valves and stops the extraction fan, when :

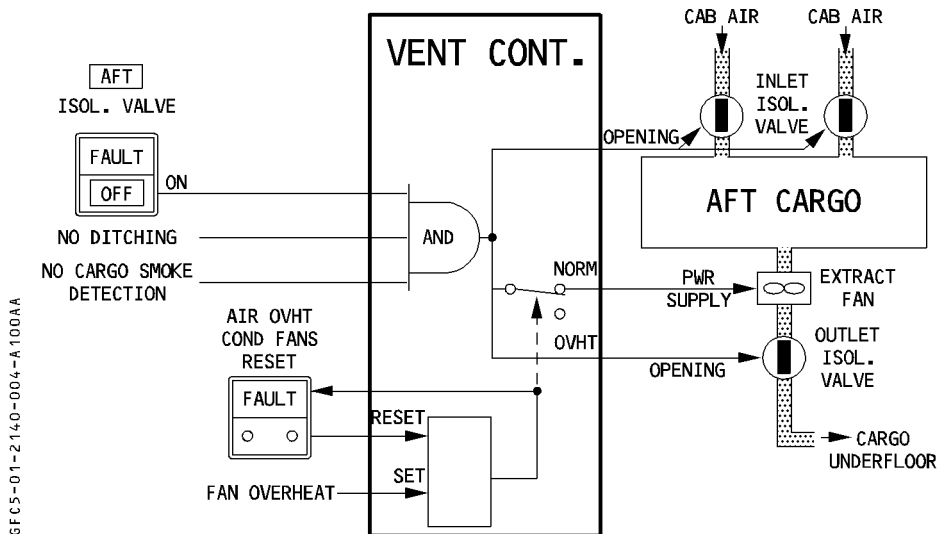
- The flight crew sets the AFT ISOL VALVE pushbutton OFF, or
- The aft cargo smoke detection unit detects smoke.

The outlet valve closes and the extraction fan stops, when the flight crew sets the DITCHING pushbutton ON.

In case of an overheat, the extraction fan stops and the maintenance panel's OVHT COND FANS RESET FAULT light comes on.

Note : No heating is available for the aft cargo compartment.

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		SEQ 200	REV 15

FORWARD CARGO COMPARTMENT

VENTILATION AND COOLING

Due to extract fan suction, cabin air flows through the two inlet isolation valves into the forward cargo compartment via the sidewall and ceiling inlets. Air is extracted through outlets on the opposite sidewall, and goes via the extract fan and outlet isolation valve to the underfloor bilge area near the forward outflow valve.

To decrease compartment temperature, the inlet ventilation air is mixed with cold air from pack 2. The cold air valve has three positions which enable the quantity of cooled conditioned air, mixed with the ventilation air, to be adjusted. The valve position is selected from the cockpit.

Note : 1. In general, if COOLING is selected at NORM or MAX, the parameters could be different between both packs.

2. Below 20,000 feet, the pack 2 outlet temperature is limited to 5°C, in order to avoid ice accumulation on the cold air valve.

– Normal operation

The cargo ventilation controller controls the inlet and outlet isolation valves and the extraction fan.

The ventilation system operates when the isolation valves are open. To open the isolation valves, switch the FORWARD ISOL VALVE pushbutton to the on position.

The controller closes the isolation valves and stops the extraction fan, when :

- The flight crew turns the FORWARD ISOL VALVE pushbutton, or
- The forward cargo smoke detection unit detects smoke.

The outlet valve closes and the extraction fan stops, when the flight crew sets the DITCHING pushbutton ON.

In case of an overheat, the extraction fan stops and the OVHT COND FANS RESET FAULT light, on the maintenance panel, comes on.

The cold air valve is fully closed when :

- a) The COOLING selector is selected OFF, or
- b) The forward cargo door is not fully closed, or
- c) The forward cargo smoke detection system is triggered, or
- d) In case of forward cooling system failure, or
- e) At least one pack is off.

HEATING

To provide variable temperature, inlet air is mixed with the hot air ducted upstream of PACK 1. The forward cargo trim air valve controls the quantity of hot air added.

R The temperature is selected from the cockpit.

Normal operation

When the HOT AIR 1 pushbutton (Refer to Air Conditioning Overhead Control Panel, described in 1.21.10) is switched ON, hot air is added to the cargo ventilation system. A trim air valve controls the quantity of hot air. The Ventilation Controller controls the position of this trim air valve, according to the sensed duct temperature and to the selected temperature. Manually switching the HOT AIR 1 pushbutton to OFF stops the heating.

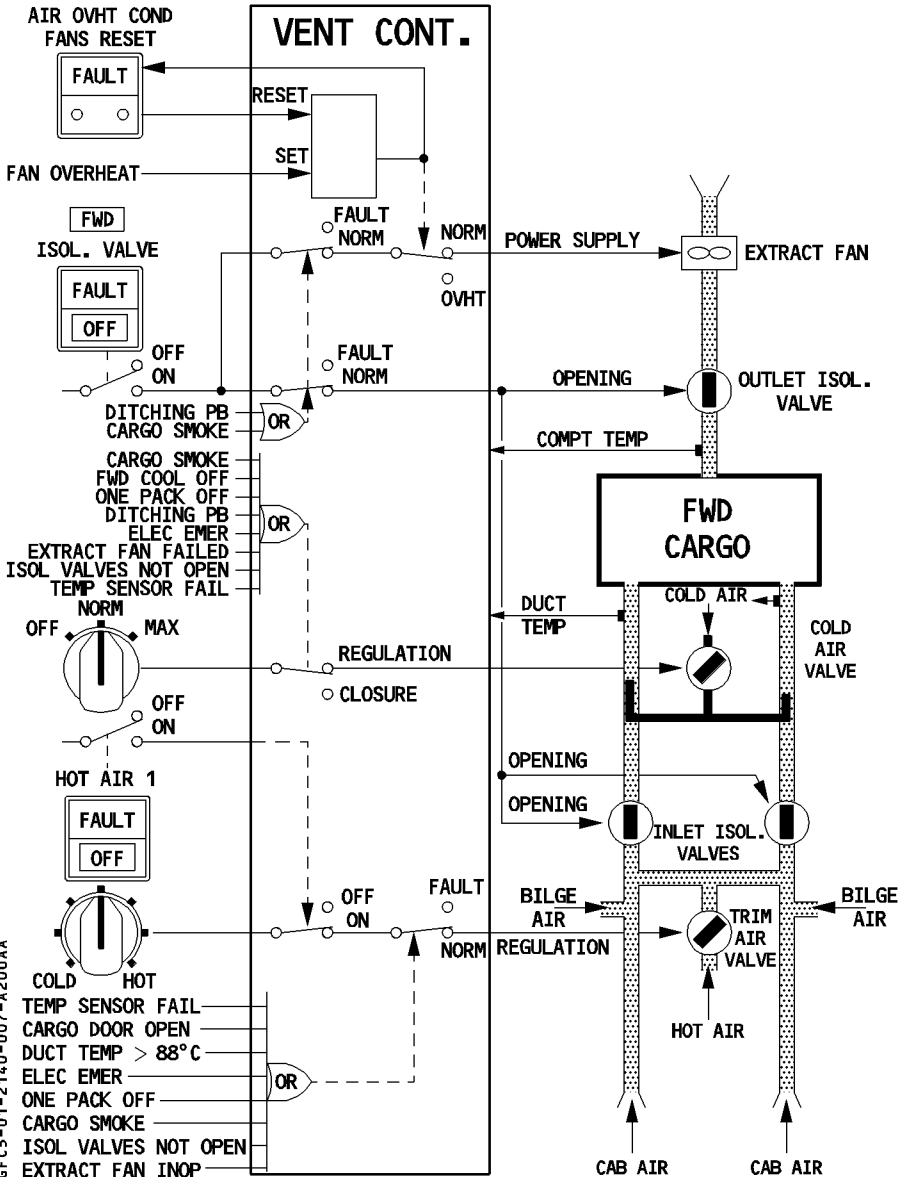
Note : If there is a failure in one of the hot air supplies, the hot air X valve opens. The forward cargo compartment supply remains either through Channel 1 (Channel 2 failure), or through Channel 2 (Channel 1 failure).

If you stop the forward cargo compartment heating system with the HOT AIR 1 pushbutton, temperature control for the respective cabin zones (Refer to 1.21.10) is also lost.

On ground operation

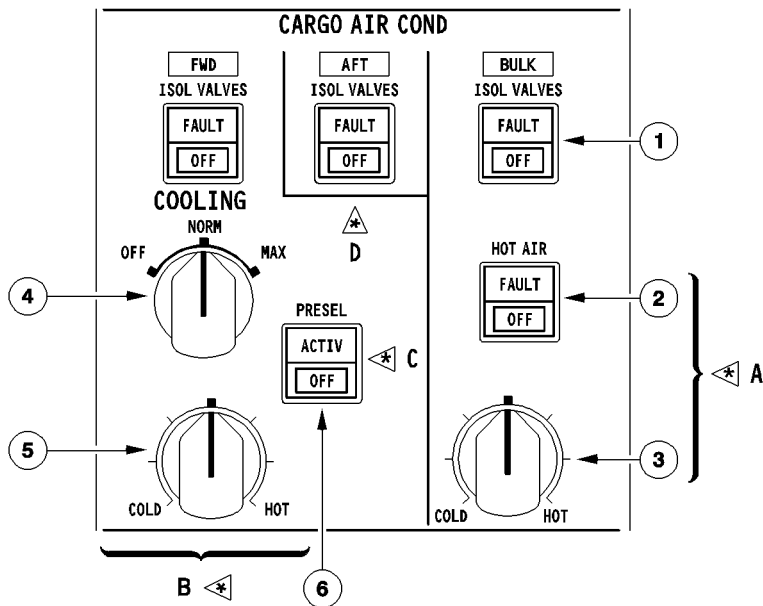
The trim air valve closes when the forward cargo door opens. Compartment heating is unavailable, as long as the cargo door remains open.





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CONTROLS AND INDICATORS

OVERHEAD CARGO AIR COND PANEL



- A  BULK CARGO HEATING
- B  FWD CARGO VENTILATION AND HEATING
- C  FWD CARGO TEMP PRESELECTION
- D  AFT CARGO VENTILATION

① ISOL VALVE pushbutton

On : The inlet and outlet isolation valves open, and the extraction fan runs.
 If smoke is detected in the cargo compartment, the inlet and outlet isolation valves close, and the fan stops.

OFF : The inlet and outlet isolation valves close, and the fan stops.

FAULT It : The amber light and associated ECAM caution come on, when either the inlet or outlet valve is not in the selected position.

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② HOT AIR ◀

ON : The fan heater operates, provided the BULK cargo compartment temperature is below the selected one, and the BULK cargo door is closed.

OFF : The fan heater stops. Inlet air is not heated.

FAULT It : The amber light, and associated ECAM message, come on when the duct overheats (88°C - 190°F). The light goes off when the temperature drops below 70°C (158°F), and OFF is selected. The fan heater stops.

③ Temperature selector ◀

R **COLD position** : 5°C (41°F)

R **HOT position** : 25°C (77°F)

R **Middle position** : 15°C (59°F)

R Note : *Cargo compartment temperature may vary due to such factors as flight duration, outside temperature, and cabin temperature. As a result, the actual temperature may be higher than the one indicated by the selector position.*

④ COOLING selector ◀

OFF : The cold air valve is closed. No cold air is added to the ventilation air.

NORM : The cold air valve is partially open for normal operation.

MAX : The cold air valve is fully open. Maximum quantity of cold air is supplied to cool the forward cargo compartment.

⑤ Temperature selector ◀

COLD position : 5°C (41°F)

HOT position : 25°C (77°F)

Middle position : 15°C (59°F)

⑥ FWD PRESEL ◀

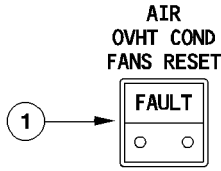
R **ACTIV It** : The light comes on green, when FWD PRESEL is selected, or the cargo compartment service panel's ON/OFF toggle is momentarily switched to ON. Once this toggle switch is ON, the temperature can be preselected on the forward cargo compartment service panel.

OFF : ACTIV light goes out. Temperature selection from the cockpit overrides the temperature preselected from the service panel.

Note : *The preselection system is automatically set to OFF, when the forward cargo door is opened after flight.*

OVERHEAD MAINTENANCE PANEL

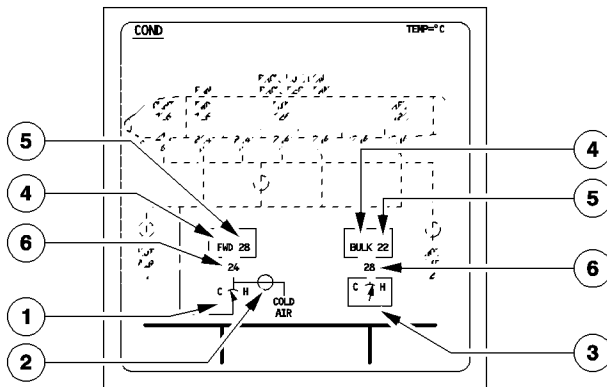
GFC5-01-2140-010-A001AA

**① OVHT COND FANS RESET pushbutton**

FAULT It : Comes on amber when extract fan overheat occurs. Fan is stopped. To resume fan operation press the OVHT COND FANS RESET pushbutton (FAULT light goes out).

ECAM COND PAGE

6FC5-01-2140-011-A200AC

**① Trim air valve (Heating)**

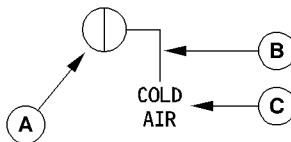
H - Hot (Green) : Valve is open.

C - Cold (Green) : Valve is closed.

Amber, if the valve fails.

② Cold air valve

6FC5-01-2140-011-B200AA



- R **①** In line – Green : Valve is fully open.
 R In line – Amber : Valve is failed open.
 R In transit – Green : Valve is partially open.
 R In transit – Amber : Valve is failed partially open, or in transit.
 R Cross line – Green : Valve is fully closed.
 R Cross line – Amber : Valve is failed closed.

Note : The color of the symbol changes from green to amber, if one of the two pack flow control valves is fully closed, independent of the cold air valve position.

- ②** This indication is in green either when the pack flow control valves are not fully closed, or when positions are not available. It becomes amber when one of the two valves is fully closed.
- ③** This indication is in white.



③ Bulk fan heater

R The arrow is normally green. It becomes amber, if the heater fails.

R H - Hot (green) : The heater operates at its highest level.

R C - Cold (green) : The heater operates at its lowest level.

④ Compartment indication

It is in white.

⑤ Compartment temperature

It is in green.

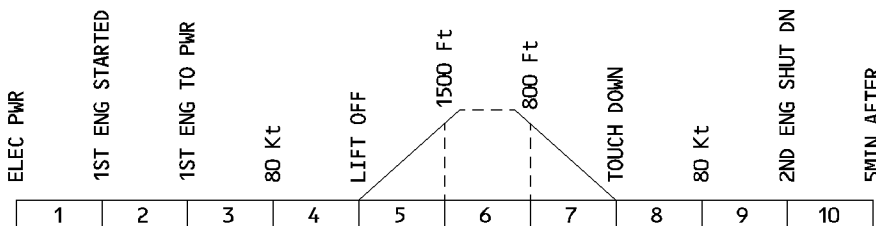
⑥ Duct temperature

It is normally in green. It becomes amber, when the temperature is above 88°C.



WARNINGS AND CAUTIONS

6FCS-01-2140-013-A001AB



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E/W/D : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
VENT SYS FAULT Ventilation controller failure	SINGLE CHIME	MASTER CAUT	COND	NIL	3, 4, 5, 7, 8
BULK (FWD) CRG HEAT FAULT ◀ Heating system failure	NIL	NIL			
BULK (FWD) (AFT) CRG VENT FAULT ◀ Ventilation system failure					
BULK (FWD) (AFT) CRG ISOL FAULT ◀ Cargo isolation valve disagreement	NIL	NIL	NIL	ISOL VALVE FAULT It	
FWD CRG COOL FAULT ◀ Cooling system failure			NIL		
BULK CRG DUCT OVHT ◀ Duct temp > 88°C or above 80°C 4 times in one flight	SINGLE CHIME	MASTER CAUT	COND	HOT AIR FAULT It	



BUS EQUIPMENT LIST

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			NORM			EMER ELEC		
			AC	DC	DC BAT	AC ESS	DC ESS	HOT
AIR COND	PACK CONTROLLER	1 channel 1	AC1	DC1				
		channel 2	AC1	DC1				
	ZONE CONTROLLER	2 channel 1	AC2	DC2				
		channel 2	AC2	DC2				
	PACK VALVES CLOSURE	channel 1		DC1			X	
channel 2			DC2					
PRESS	CAB PRESS CONT	1					X	
		2		DC2				
		MANUAL CONTROL			X			
VENT	CABIN FANS	1	AC1					
		2	AC2					
	AVIONIC	AEVC	AC1					
		EXTRACT FAN	AC1					
CARGO	VENT CONT			DC2			SHED	
	BULK	EXTRACT FAN	AC2					
		ISOL VALVES (3)	AC2					
		FAN HEATER◀	AC2					
	AFT	EXTRACT FAN◀	AC1					
		ISOL. VALVES◀	AC1					
	FWD	EXTRACT FAN◀	AC2					
		ISOL. VALVES◀	AC2					
		COLD AIR VALVE◀	AC2					
		HOT AIR VALVE◀		DC2				SHED