

21.00 CONTENTS

21.10 AIR CONDITIONING

- GENERAL 1
- MAIN COMPONENTS 3
- TEMPERATURE AND FLOW REGULATION 6
- SYSTEM OPERATION UNDER FAILURE CONDITION 9
- CONTROLS AND INDICATORS 11
- WARNINGS AND CAUTIONS 20

21.20 PRESSURIZATION

- GENERAL 1
- MAIN COMPONENTS 3
- SYSTEM OPERATION 4
- CONTROLS AND INDICATORS 10
- WARNINGS AND CAUTIONS 16

21.30 VENTILATION

- GENERAL 1
- AVIONICS VENTILATION 2
- AVIONICS GROUND COOLING ◁ 5
- BATTERY VENTILATION 6
- LAVATORY AND GALLEY VENTILATION 6
- BULK CARGO RACK VENTILATION ◁ 6A
- PACK BAY VENTILATION 7
- CONTROLS AND INDICATORS 8
- WARNINGS AND CAUTIONS 11

R

21.40 CARGO


- GENERAL 1
- SYSTEM OPERATION 2
- CONTROLS AND INDICATORS 8
- WARNINGS AND CAUTIONS 13

R

21.45 LOWER DECK FACILITIES ◁

21.50 ELECTRICAL SUPPLY

- BUS EQUIPMENT LIST 1

AIRBUS TRAINING  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT AIR CONDITIONING	1.21.10 SEQ 001	P 1 REV 17
--	---	------------------------	-------------------

GENERAL

The air conditioning system is fully automatic.

It provides continuous air renewal and maintains a constant selected temperature in the following four zones: COCKPIT, FWD CABIN, MID CABIN, 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 air coming from both the cabin and the packs.

It is then distributed to the cockpit and the cabin.


Temperature regulation is optimized via two hot air pressure regulating valves and the trim air valves, that 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.

R Temperature regulation is controlled by a zone controller and two pack controllers. 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. During cruise, the cabin crew can modify each cabin zone temperature from the cockpit, with a limited authority of $\pm 2.5^{\circ}\text{C}$ (4.5°F).

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

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT		1.21.10	P 3
	AIR CONDITIONING		SEQ 001	REV 20

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 aircycle machine and is compressed to a higher pressure and temperature.

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

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

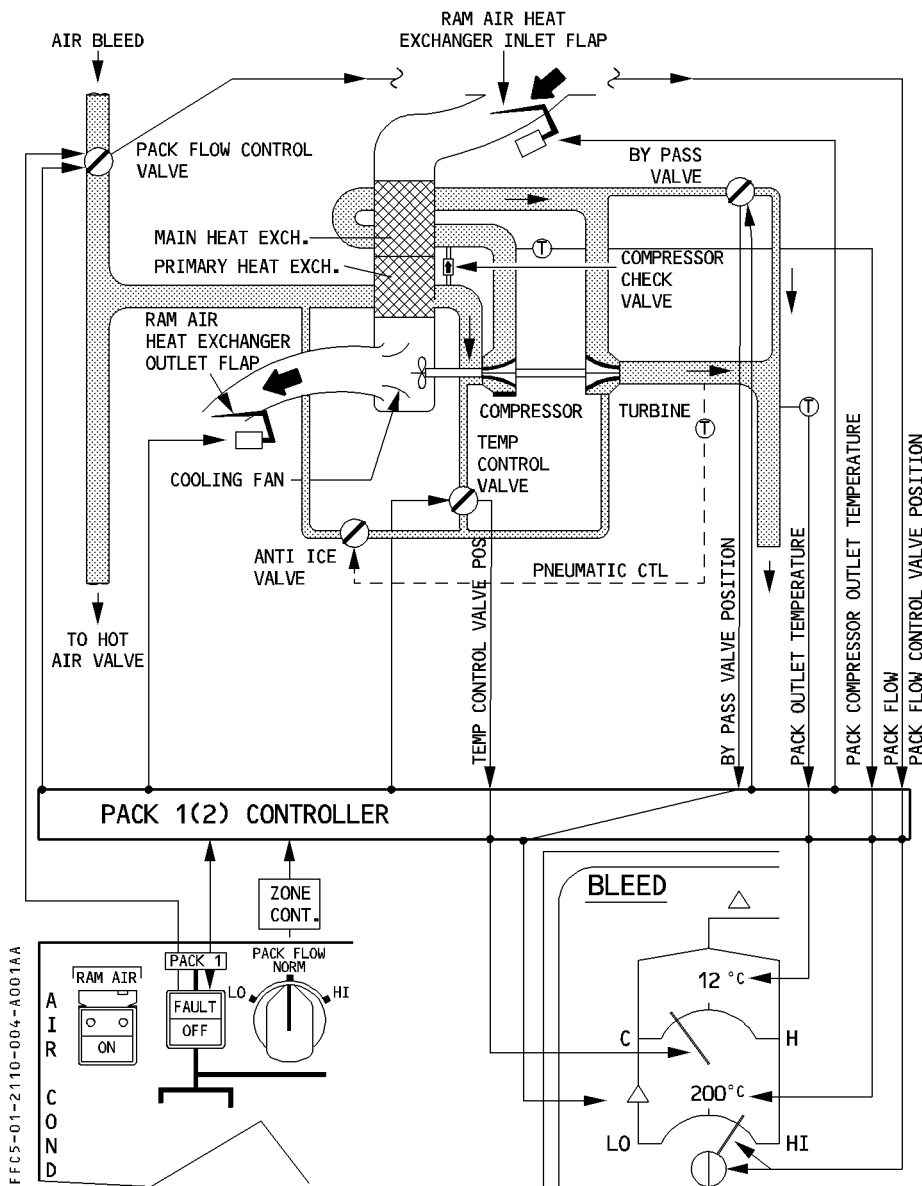
The temperature control valve can modify the pack outlet temperature by adding uncooled air to the turbine outlet flow.

- R In case of an air cycle machine failure, a by pass valve allows the bleed air to be cooled
- R by the corresponding heat exchanger only.

PACK SCHEMATIC

FOR INFO

R



FFCS-01-2.110-004-A001AA

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.10	P 5
	AIR CONDITIONING	SEQ 001	REV 17

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 doors 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 panel.

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 ΔP is less than one psi. They do not automatically open if they are under manual control,
- R even if the 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 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 are closed. In the absence of air pressure, a spring keeps the valve closed.

The valve closes automatically, 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 the hot air manifold 2. Air from the 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 if one hot air supply fails.

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 bypass valve, 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 thrust lever is at or above CL and wheel speed (sent by the BSCU) is at or above 70 knots.

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

They open when the speed is below 70 knots with a 15 seconds delay.

The pack controllers also provide flow regulation by modulating the associated pack flow control valve in accordance with 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 for external conditions.

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

- in 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 that normal flow should be manually selected.

AIRBUS TRAINING  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.10	P 7
	AIR CONDITIONING	SEQ 103	REV 15

Engine pressure demand

When the cooling demand in one zone cannot be satisfied, if the bleed pressure is too low, the zone controller sends a pressure demand signal to both engines' Engine Interface Units (EIU), in order to increase the minimum idle and to raise the bleed pressure.

APU flow demand

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

Bleed temperature demand

If the cooling demand cannot be satisfied, the zone controller signals the Bleed Monitoring Computer (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 cabin and cockpit temperature.

BASIC TEMPERATURE REGULATION

The flight crew uses the temperature selectors on the air conditioning panel in the cockpit to select the reference temperature. The flight attendant adjusts the cabin temperature from the Forward Attendant Panel (FAP).

The cabin altitude can be automatically corrected to adjust the cabin temperature for passenger comfort. The correction is done to the master temperature selected in the cockpit to compensate for the dryness of the air and the coldness of the lining. (The altitude correction can be programmed, but the basic manufacturer setting is without correction). The zone controller computes a temperature demand, depending on the selected temperature and the actual temperature.

The actual temperature is measured by sensors in the :

- Cockpit
- Lavatory extraction circuit and galley ventilation system for the cabin.

A signal corresponding to the lowest demanded zone temperature goes to the pack controller, which then makes both packs produce the required outlet temperature.



OPTIMIZED TEMPERATURE REGULATION

The zone controller optimizes temperature by acting on the trim air valves.

R The temperature selection range is from 18°C (64°F) to 30°C (86°F).

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.10	P 9
	AIR CONDITIONING	SEQ 001	REV 22

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 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 temperature, 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. Packs only regulate the temperature.

TRIM AIR VALVE FAILURE

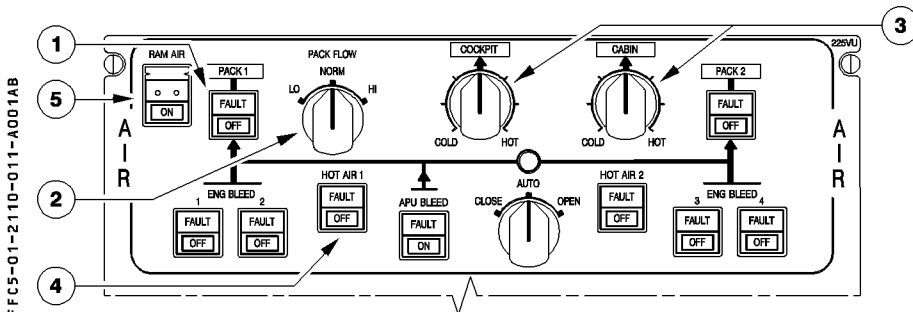
Failed closed : Optimized temperature regulation of half of the corresponding zone is lost.

Failed open : Corresponding hot air valve closes.

Optimized temperature regulation of half of each zone is lost.

CONTROLS AND INDICATORS**OVERHEAD PANEL**

R

**① PACK pb sw**

On : The pack flow control valve is automatically controlled.

It opens except in the following cases :

- upstream pressure 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 MASTER switch or MAN START pushbutton switch 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 switch is set to ON) and,
 - the start valve is open, and
 - $N_2 < 50 \%$.

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

- any door is not closed and locked, aircraft on ground and any engine running.
- Onside engine fire pushbutton pressed.
- ditching selected.

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

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

FAULT It : AMBER light , associated with ECAM caution, comes on when pack flow control valve position disagrees with selected position or in case of compressor outlet overheat or pack outlet overheat.

R

**②** PACK FLOW sel

Enables the selection of pack flow, 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 failed, the HI flow is limited to 112 %. Manual selection is irrelevant in single pack operation, or with APU bleed supply. In these cases, HI is automatically selected

③ Zone temperature sel

- 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 (158° F), and the flight crew selects OFF.

⑤ RAM AIR pushbutton (guarded)

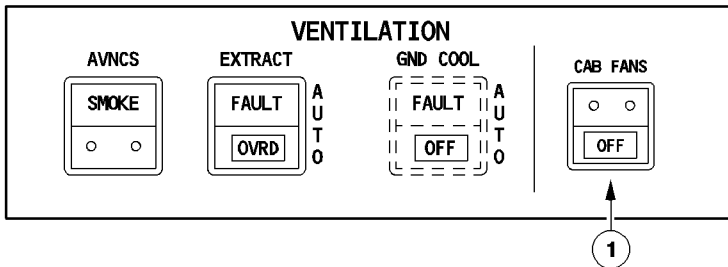
ON : The ON light comes on white.

If the DITCHING pushbutton, on the CABIN PRESS panel, is in the 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.

FFC5-01-2110-013-A001AA



① CAB FANS pb sw

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

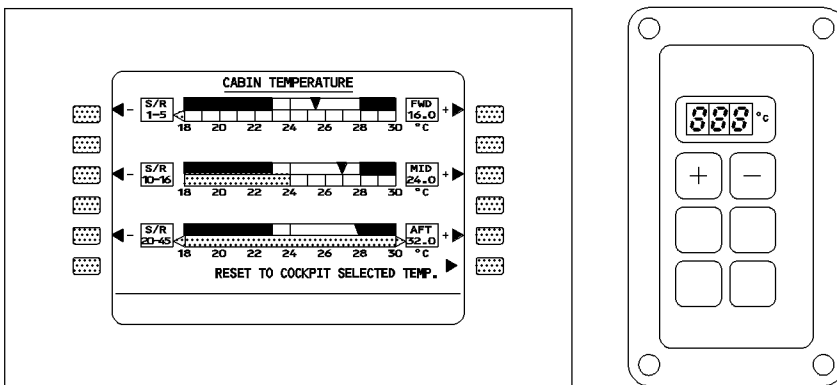
OFF : the two cabin fans stop.

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

FWD ATTENDANT PANEL

Allows fine trimming of individual zone temperature ($\pm 2,5^{\circ}\text{C}/\pm 4.5^{\circ}\text{F}$).

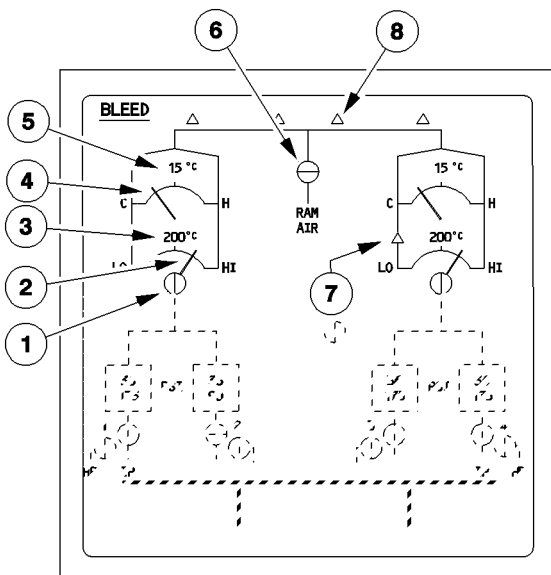
FFC5-01-2110-013-B001AB



ADDITIONAL ATTENDANT PANEL

The additional attendants panel can be installed in different locations. Temperature setting of related zone can be changed ($\pm 2,5^{\circ}\text{C}/\pm 4.5^{\circ}\text{F}$).

ECAM BLEED PAGE



FFCS-01-2110-014-A001AA

① Pack flow control valve

In line - 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 : 125 % airflow

③ Pack compressor outlet temperature indication

It is normally green.


R It becomes amber, if the temperature is above 260°C.

④ Temperature control valve position indication

It is green.

C : The valve is closed.

H : The valve is open.

AIRBUS TRAINING  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.10	P 15
	AIR CONDITIONING	SEQ 001	REV 22

⑤ Pack outlet temperature indication

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

⑥ Emergency 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
 R position of the RAM AIR pushbutton (OFF).
 R Inline - Green : The flap is fully open.
 R Crossline - Amber : The flap is closed, and the RAM AIR pushbutton is in the ON
 R position.

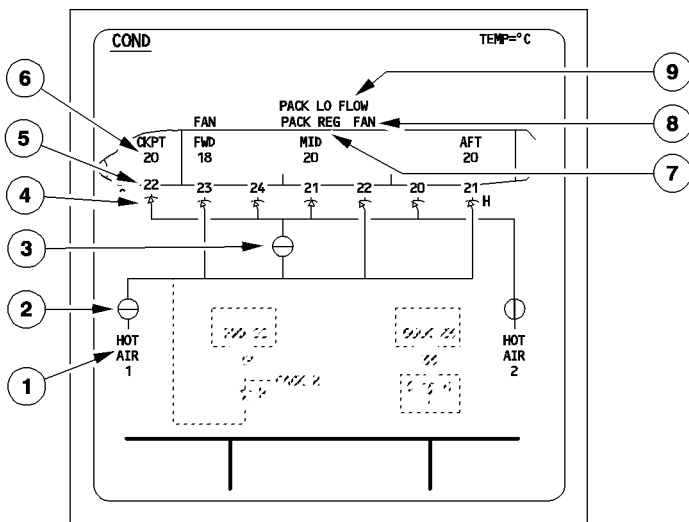
⑦ Bypass valve indication

- 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 Bleed users' indication

- R It normally appears in green.
 R But, it appears in amber, when the RAM AIR flap is fully closed, and if no air comes
 R from the two packs, or if the two flow control valves are fully closed.

ECAM COND PAGE



FFCS-01-2110-016-A001AA

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

FFC5-01-21-10-017-A001AA



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

C : valve fully closed

H : valve fully open

R Note : Depending on the cabin configuration, the number of trim air valves changes.

⑤ Zone duct temperature indication

R Indication is green.

R Becomes amber if the temperature is above 88°C.

⑥ Zone temperature indication

Indication is green.

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

⑦ PACK REG indication

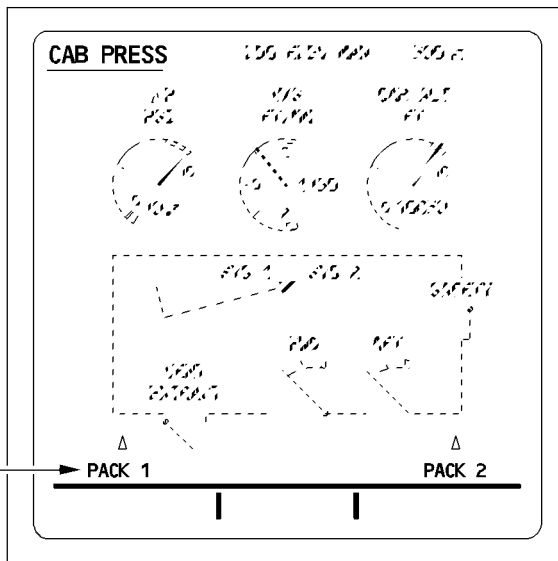
Appears in green when the zone controller is inoperative (both channels fault).
Temperature is regulated by packs only.

⑧ FAN indication

R Appears in amber if the FAN fails or is selected OFF through the FAN pushbutton.

⑨ PACK LO FLOW indication

R Displayed in green, pulsing, when the flow is insufficient to reach the selected temperature, indicating that the zone controller requests a flow increase.

ECAM CAB PRESS PAGE

FFCS-01-2110-018-A001AA

① PACK indication

pack flow control valve open :

△ Green

PACK 1 White

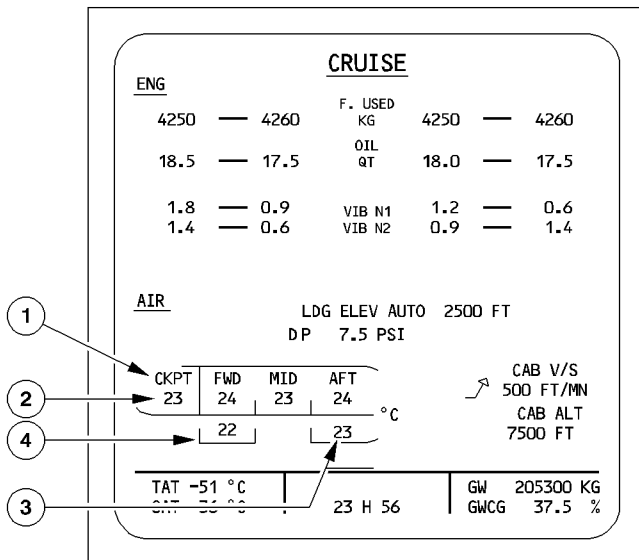
pack flow control valve closed :

△ Amber

PACK 1 Amber

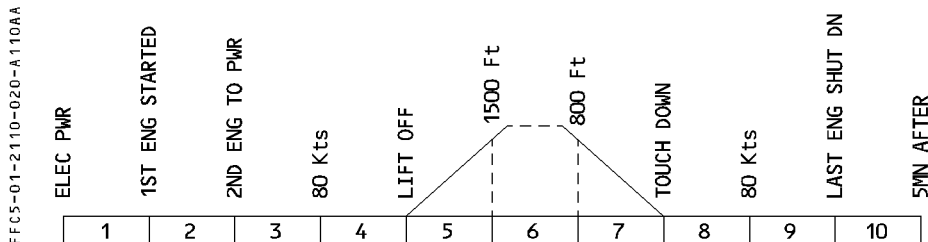
ECAM CRUISE PAGE

FFCS-01-2110-019-A202AA

① Zone indication② Zone temperature

This field displays the temperature and the scale in use (°C or °F).

③ Bulk cargo compartment temperature④ Forward cargo compartment temperature


WARNINGS AND CAUTIONS

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 above 260°C or pack outlet temp above 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 sw at 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					
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 1+2 failed					
DUCT OVHT (FWD CRG, COCKPIT, FWD/MID/AFT CABIN) Duct temp > 88°C or above 80°C 4 times in one flight					
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			
LAV + GALLEY FAN FAULT	NIL	NIL	NIL	NIL	3, 4, 5, 7, 8,

* Only in case of single failure.

MEMO DISPLAY

- RAM AIR message appears in green if the ram air pushbutton switch is ON. Becomes amber in flight phases 1 and 2.
- PACK FLOW LO or HI message appears in green according to the PACK FLOW selector position.

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.20	P 1
	PRESSURIZATION	SEQ 001	REV 16

GENERAL

In normal operation, pressurization control is fully automatic.

The system consists of :

- Two Cabin Pressure Controllers (CPC)
- Two outflow valves, with actuators that incorporate three motors (two for automatic operation, one for manual operation)
- One control panel
- Two safety valves
- One negative relief valve

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

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. The flight crew can set the system to operate automatically, semi-automatically, or manually.

In normal operation, cabin pressurization is fully automatic.

AUTOMATIC OPERATION

The flight crew monitors system operation, but does nothing to control it. Air pressure in the cabin follows external schedules that the system receives as signals from the Flight Management and Guidance System (FMGS).

When FMGS data is not available for automatic pressurization, the crew only needs to select the landing field elevation.

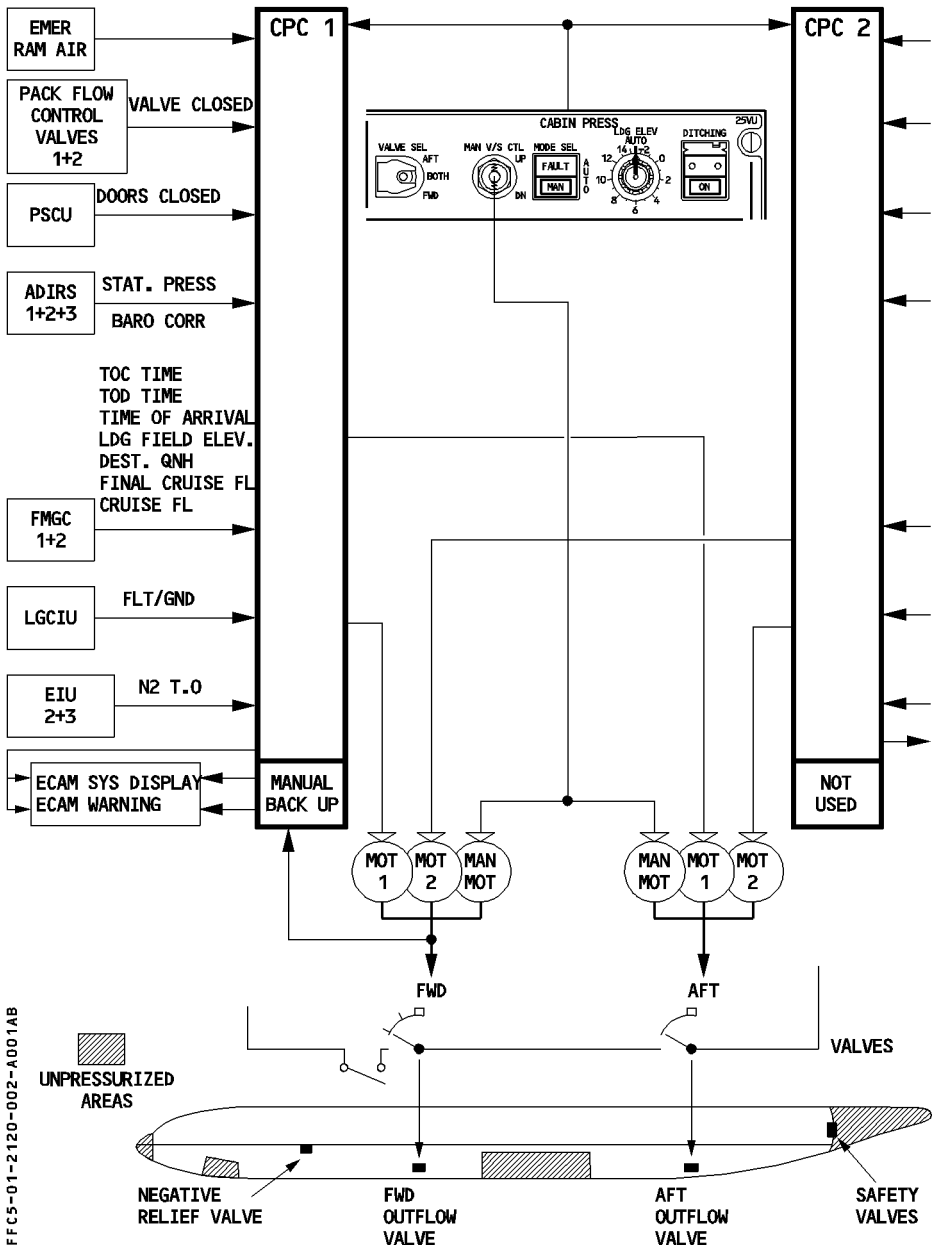
- R The pressurization system then uses the manually-selected landing field elevation for
- R internal schedules.

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



FFC5-01-2120-002-A001AB

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.20	P 3
	PRESSURIZATION	SEQ 001	REV 17

MAIN COMPONENTS

CABIN PRESSURE CONTROLLERS

Two identical, independent, automatic digital controllers control the system, and automatically maintain the proper cabin pressure. They receive signals from the Air Data Inertial Reference System (ADIRS), the Flight Management and Guidance Computer (FMGC), the Engine Interface Unit (EIU), the Landing Gear Control Interface Unit (LGCIU), the Proximity Switch Control Unit (PSCU) and the pack flow control valves.

When the system is in automatic or semi-automatic mode, one controller is active, the other is on standby.

The controllers also generate signals for the Electronic Centralized Aircraft Monitoring (ECAM).

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 with each other via a cross-channel link.

OUTFLOW VALVES

The 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 automatic motors operates the valve in automatic mode, and the manual motor operates it in manual 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 that 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.

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



SAFETY VALVES

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

NEGATIVE RELIEF VALVE

- R It is below the floor level, aft of left door n° 1, above the floatation line.
 R It assists the safety valves to prevent the cabin pressure from 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.
- R 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.
- R – The controller normally uses the landing elevation and QNH from FMGC, and the pressure altitude from ADIRS.
 If FMGC data are not available, the controller uses captain Baro Reference from the ADIRS and the LDG ELEV selection.
- Pressurization is assumed through the following modes :

R Ground (GND)

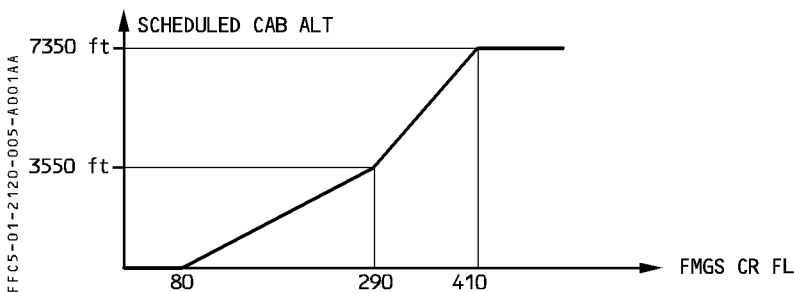
- R Before takeoff and 80 seconds after landing, the system keeps the outflow valves fully open
 R to ensure there is no residual pressure differential inside the aircraft.
 R At touchdown, to release any remaining pressure differential, a depressurization sequence
 R maintains the cabin rate of descent at 500 feet/minute.

R Takeoff (TO)

- R 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.

R 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.
- R The CAB V/S is limited to 1000 feet/minute.



The LDG ELEV selector has no effect in climb.
If FMGS cruise FL is not valid, the default FL 410 is used.

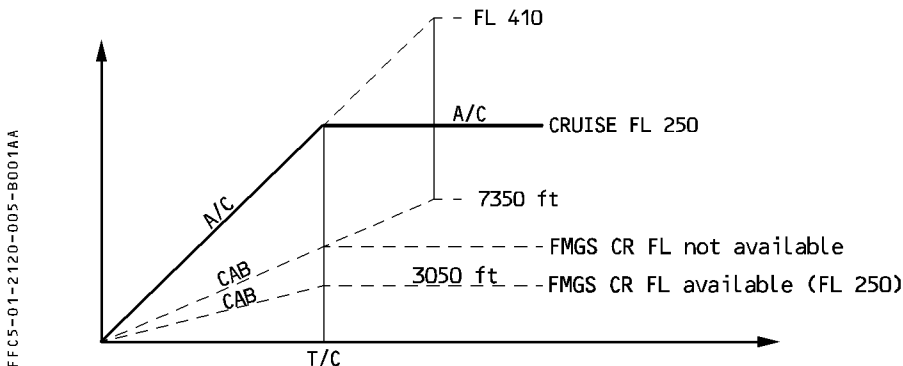
Climb in external mode (CE)

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

Cruise (CRZ)

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

If a LDG ELEV above the actual CAB ALT is selected (manual or FMGS), the cabin altitude increases up to the higher of CAB ALT, at the top of climb, or to the LDG ELEV minus 6000 feet). The cabin altitude is limited to a maximum of 7350 feet.



**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 feet/minute.

Descent in external mode (DE)

CAB 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)

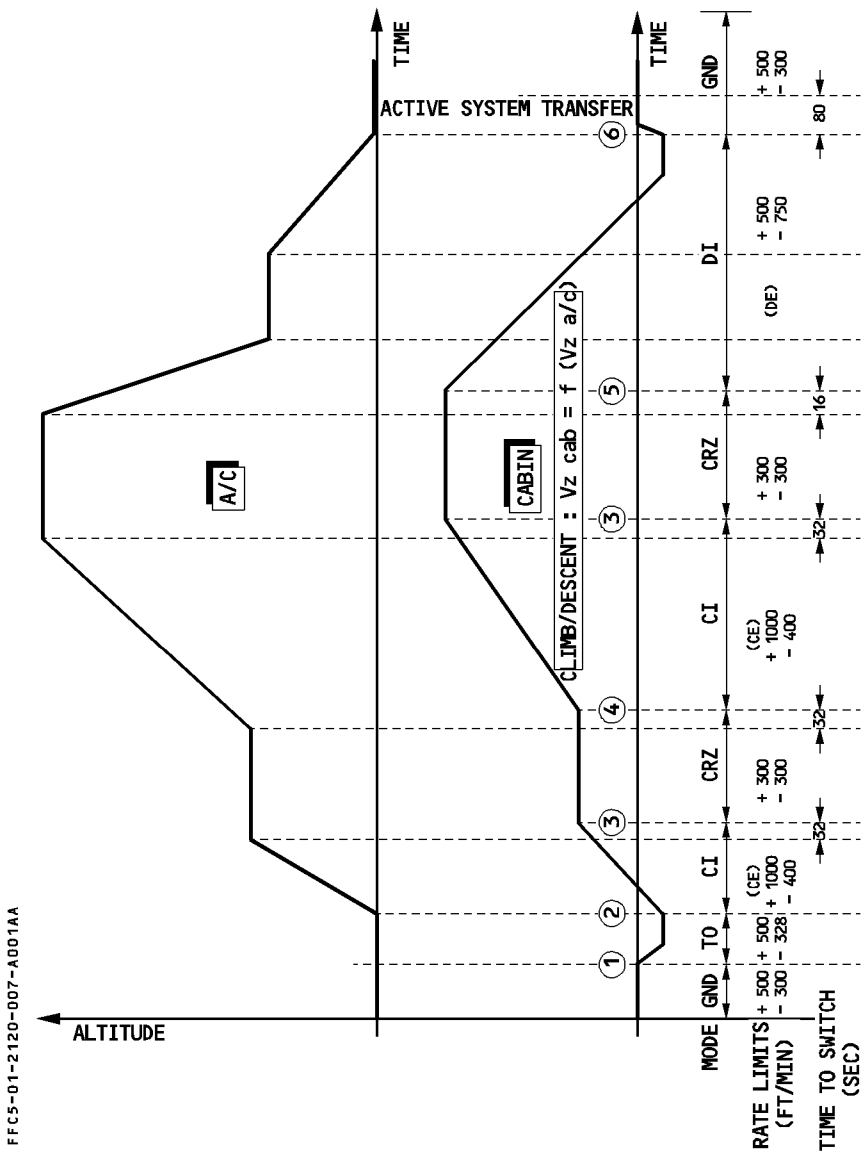
The abort mode prevents the cabin altitude from climbing, if the aircraft does not climb after takeoff.

R Cabin pressure is set back to the takeoff altitude + 0.1 psi.

FOR INFO

CPC INTERNAL MODE

R



FFCS-01-2120-007-A001AA

PRESSURIZATION MODES SWITCHING

FROM		GND	TO	GND	CL	AB	TO	CL	CRZ	CRZ	DES	DES	AB
TO	TO	CL	CL	AB	GND	GND	CL	CRZ	CL	DES	CL	GND	CL
C O N D I T I O N S	ENG 2 and ENG 3 TLA \geq CL (Engine Running)	1					0						
	MAIN L/G SYS1 and SYS2 COMPRESSED	1	0	0									
	MAIN L/G SYS1 or SYS2 COMPRESSED					1	1					1	
	All Doors Closed	1		1									
	A/C ALT < 8000Ft and A/C ALT change since TO > 5000Ft							1a					
	A/C ALT < 8000Ft or A/C ALT change since TO > 5000Ft					1							
	A/C Rate of Climb > 50 SLFPM for 32 seconds												1
	A/C Rate of Climb > 50 SLFPM for 48 seconds										1		
	A/C Rate of Climb > 250 SLFPM for 32 seconds								1				
	A/C Rate of Climb < 50 SLFPM for 32 seconds							1					
	A/C Rate of Descent > 150 SLFPM for 32 seconds												
	A/C Rate of Descent > 250 SLFPM for 16 seconds					1				1			
	A/C ALT > A/C ALT at switch into CRZ + 380 SLFT								1				
A/C ALT > CRZ FL + 180 SLFT								1b					
End of Cruise Flag set					0								
Special Function f (ALT, LFE)										1			

0: CONDITION NOT VALID a: ONLY CLIMB INTERNAL
 1: CONDITION VALID b: ONLY CLIMB EXTERNAL

(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 8.70 psi, the CPC maintains the Δp constant, to avoid over-pressurization. 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 ; this 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.

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.20	P 9
	PRESSURIZATION	SEQ 100	REV 17

MANUAL PRESSURE CONTROL MODE

If both automatic systems fail, the flight crew may use the CABIN PRESS control panel to manually control 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.
- According to 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.

- R 2. As the pressurization system is manually-controlled, the outflow valves do not
R automatically open at touchdown.

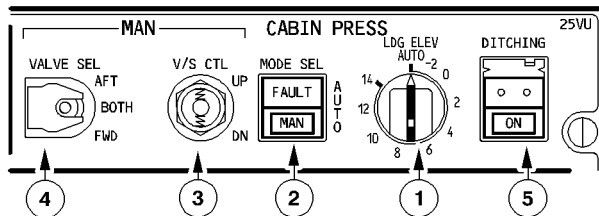
DITCHING

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 inlet and extract valves, 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**

FFCS-01-2.120-010-A 100AA

① LDG ELEV sel

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

Other positions : The pressurization schedule does not use the landing elevation from the FMGS, 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 valves.

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 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 only comes on when both automatic systems are faulty.

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

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT PRESSURIZATION	1.21.20	P 11
		SEQ 100	REV 09

R 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 via 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.

R 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.

R ⑤ DITCHING guarded pb sw

R Normal : The system functions normally.

R ON : The outflow valves, emergency ram air inlet, avionics ventilation overboard valve, cargo compartment isolation valves and pack flow control valves close.

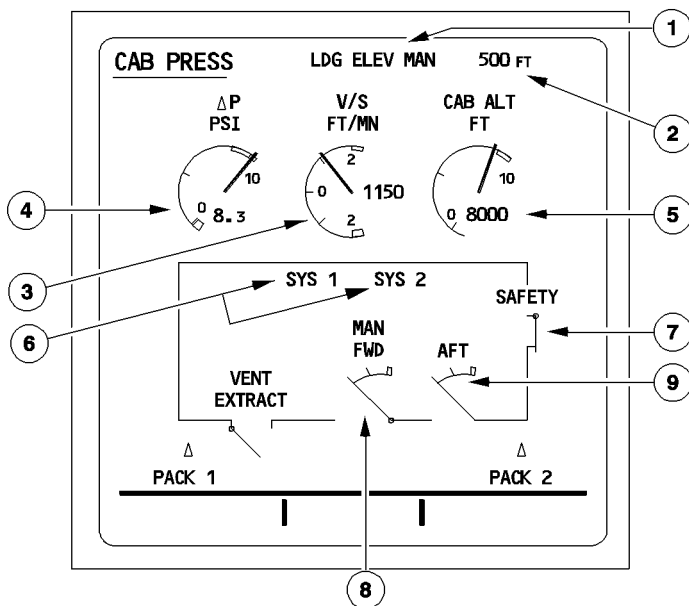
R The ON light appears in white.

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

R

CAUTION

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

ECAM CAB PRESS PAGE

FFCS-01-2120-012-A001AA

① LDG ELEV AUTO / MAN


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

② Landing Elevation

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 position and the VALVE SEL is in BOTH position).

③ V/S FT/MIN (cabin vertical speed)

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 less than 1800 feet/
 R minute.

AIRBUS TRAINING  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.20	P 13
	PRESSURIZATION	SEQ 001	REV 15

④ ΔP PSI (cabin differential pressure)

R The scale is displayed in white. The needle and the ΔP digital value appear in green when
 R ΔP is in the normal range. They appear in amber when $\Delta P < -0.2$ psi or $\Delta P > 8.85$ psi.
 The digital presentation pulses if $\Delta p > 1.5$ psi during final approach (flight phase 7).

⑤ CAB ALT FT (cabin altitude)

R The scale is displayed in white. The needle and the altitude appear in green in normal
 R range. They appear in red, if the cabin altitude goes above 9550 feet.
 R The cabin altitude value and the needle pulse in green when $8800 \text{ ft} < \text{CAB ALT} < 9550 \text{ ft}$.
 R

⑥ Active system indication (SYS 1 or SYS 2)

SYS 1 or SYS 2 appears in green when active, and in amber when faulty.

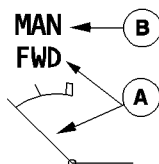
⑦ Safety valve position

R SAFETY appears in white and the indication in green when all safety valves are fully
 closed. SAFETY and the indication appear in amber when either valve is not closed.

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

⑧ Forward outflow valve position

FFCS-01-2120-013-A001AA



① When the valve is operating normally, the needle is green and the FWD indication
 appears in white. Both become amber when the valve :
 · Opens more than 95 % during flight, or
 · Fails under automatic control.

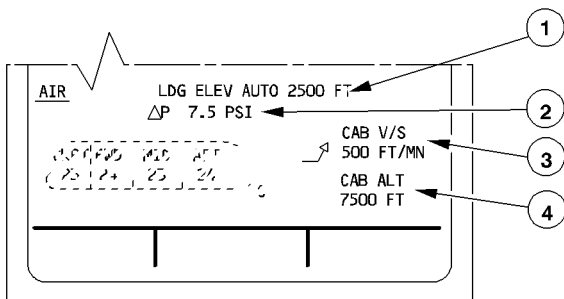
② When the valve is under manual control, the MAN indication appears in green.

⑨ Aft outflow valve position

Identical to the forward outflow valve.

R ECAM CRUISE PAGE

FFCS-01-2120-014-A001AA

**① LDG ELEV AUTO / MAN**

Identical to the CAB PRESS page.

② ΔP indication

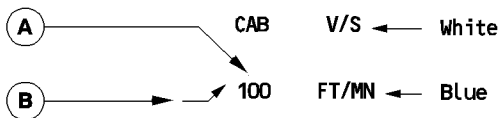
- It is normally in green.
- It pulses green between 1.5 and 8.85 psi, when the aircraft is in final approach.
- It becomes amber below -0.2 psi, or above + 8.85 psi.



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

In AUTO PRESS mode

FFCS-01-2120-015-A001AA

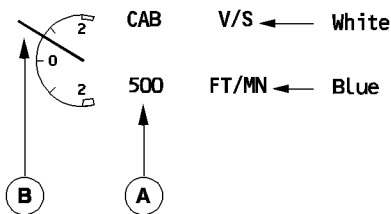


R (A) Absolute value of cabin vertical speed is normally green.
It pulses green above 1800 feet/minute or below - 1800 feet/minute

R (B) ↗ : 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.

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

FFCS-01-2120-015-B001AA

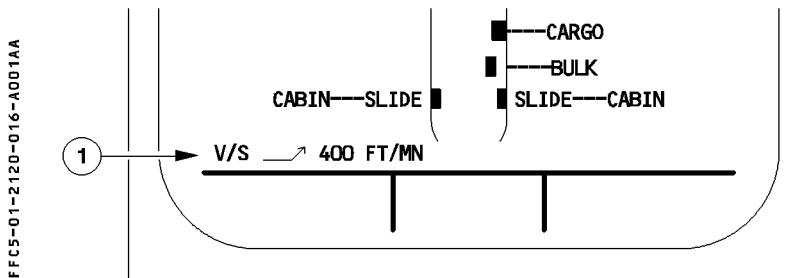


R (A) Identical to AUTO PRESS mode, but minus sign is added for negative values.

R (B) 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.

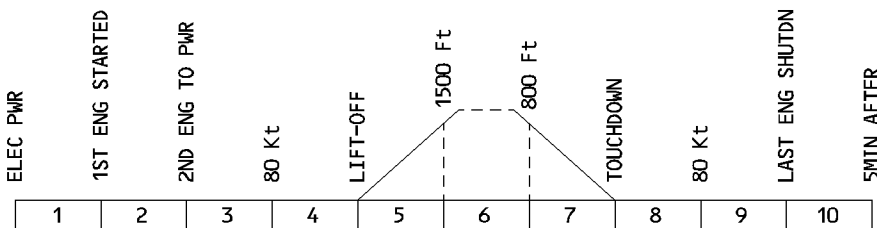
ECAM DOOR/OXY PAGE

- ① identical with cabin vertical speed indication on cruise page when in AUTO PRESS mode.



WARNINGS AND CAUTIONS

FFCS-01-2120-017-A100AA



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 $\Delta P = 0 < 1.5$ minutes 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 (or 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.

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT VENTILATION	1.21.30	P 1
		SEQ 100	REV 09

GENERAL

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

R Note : For a description of the 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 operate continuously, as long as the aircraft's electrical system is supplied. These fans can be simultaneously cutoff via 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

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

EXTRACT FAN

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

R

R 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.

R

Air is blown overboard through the overboard extract valve.

R

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

AIRBUS TRAINING  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT VENTILATION	1.21.30	P 3
		SEQ 001	REV 07

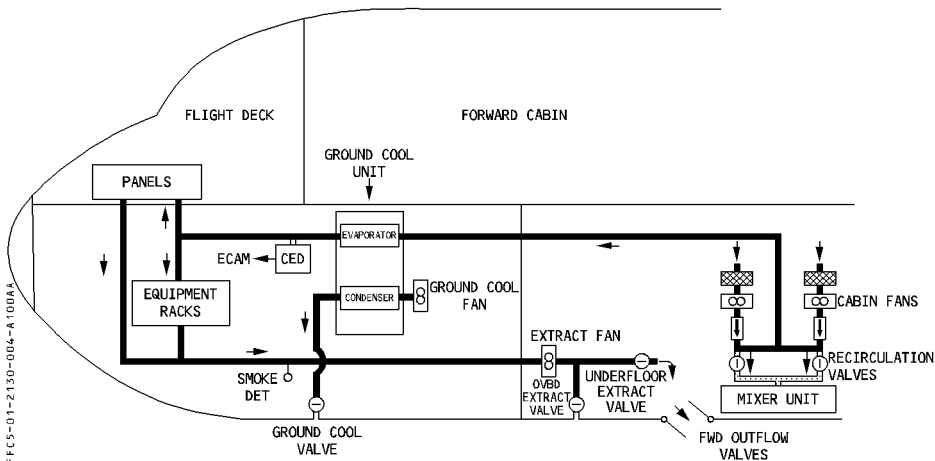
COOLING EFFECT DETECTOR (CED)

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)

The Computer controls the position of the INBD and OVBD valves.

R



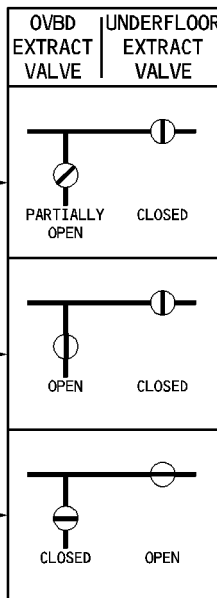
FFCS-01-2130-004-A 100AA

FOR INFO

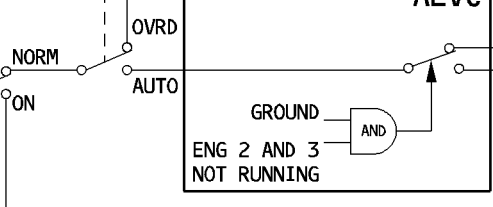
DITCHING



EXTRACT



DC ESS



FFCS-01-2130-004-B 100AA

 A340 <small>SIMULATOR</small> FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT	1.21.30	P 5
	VENTILATION	SEQ 204	REV 16

SYSTEM OPERATION

The cabin and the 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 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 inner 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 (the 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 cool 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 GND COOL pushbutton is at AUTO position

Ground cool unit starts when :

- the above conditions are met, and
- the temperature of air recirculated from the cabin increases above 27° C.

Ground cool unit stops when :

- the engines start
- the temperature of air recirculated from the cabin decreases below 18°C or increases above 50°C
- at least one pack is operating

In case of system failure the GND COOL FAULT light illuminates associated with an ECAM caution plus ground crew call.

BATTERY VENTILATION

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

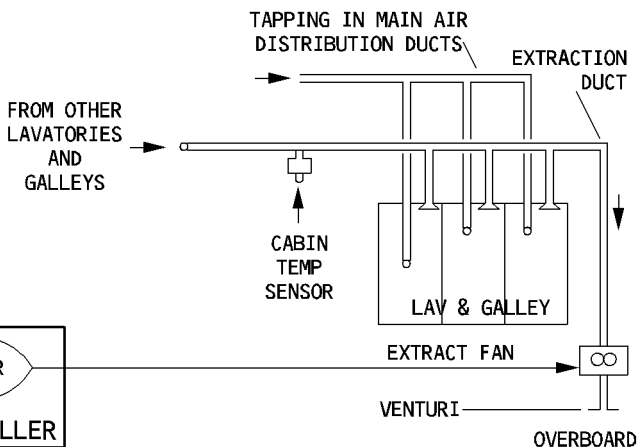
LAVATORY AND GALLEY VENTILATION

The lavatory and galley are ventilated with air from main cabin distribution system.

Air is discharged outside through a venturi. On ground, or when $\Delta P < 1$ psi, it is extracted by an electrical fan controlled by the ventilation controller.

Ventilation of the cabin temperature sensors is connected to the extraction duct.

FOR INFO



FFCS-01-2130-006-1203AA



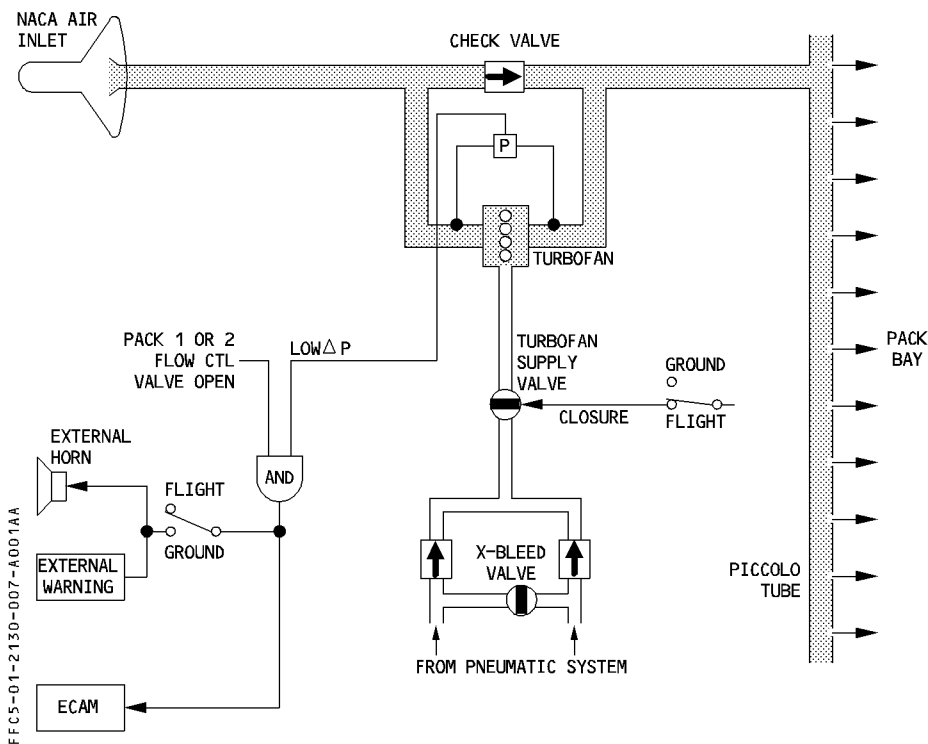
LEFT INTENTIONALLY BLANK

PACK BAY VENTILATION

- R 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 the outside flows into the pack bay through a NACA air inlet.
- R On ground, a turbofan provides 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).

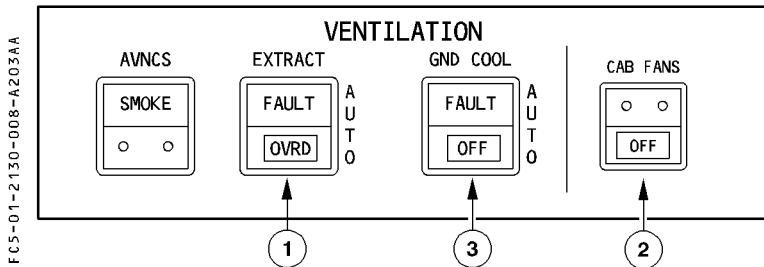
FOR INFO

R



CONTROLS AND INDICATORS

OVERHEAD PANEL



① EXTRACT pb

- R AUTO : On ground, with Engines 2 and 3 not running, the underfloor extract valve is closed and the OVBD extract valve is open, provided DITCHING is not selected.
- R In flight, or on ground with Engine 2 or 3 running, the underfloor extract valve is open and the OVBD extract valve is closed.
- R OVRD : The underfloor extract valve closes and the OVBD extract valve partially opens, provided DITCHING is not selected.
- R 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

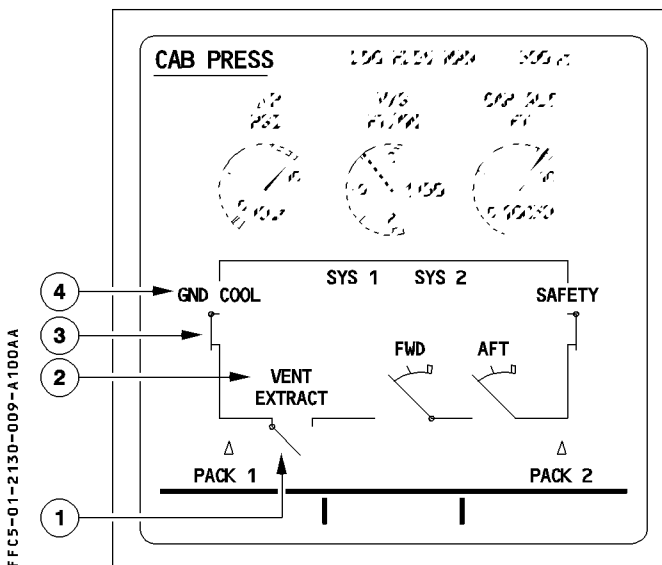
- AUTO : The ground cool valve opens. The ground cool fan and the ground cool unit will automatically start, provided the aircraft is on ground, the engines are stopped, and the temperature of cabin recirculated air is above 27°C. The ground cool unit stops when at least one pack is operating.
- OFF : The ground cool unit stops, the valve closes, and the fan stops.
- FAULT It : The amber light, associated ECAM caution, and ground crew call system activate when a fault is detected in the ground cool unit, valve or fan.

<p>AIRBUS TRAINING  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL</p>	<p>AIR COND/PRESS/VENT VENTILATION</p>	<p>1.21.30 P 8a</p>	
		<p>SEQ 001</p>	<p>REV 18</p>

LEFT INTENTIONALLY BLANK



ECAM CAB PRESS PAGE



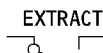
R ① OVBD extract valve position indication

R

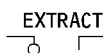
FFCS-01-2130-009-B100AA



This indicates that the OVBD extract valve is fully closed.



This indicates that the OVBD extract valve is partially open.



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.

R ③ GND COOL VALVE position

FFCS-01-2130-010-A100AA

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

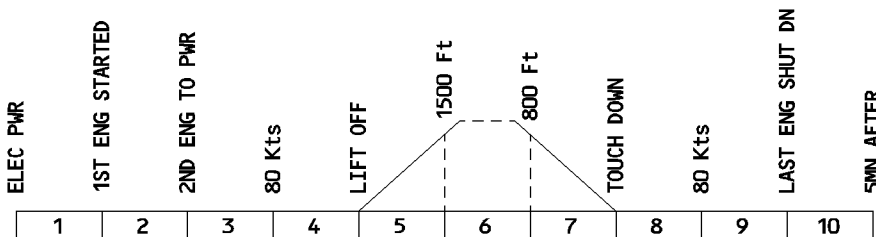
④ GND COOL indication

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



WARNINGS AND CAUTIONS

FFCS-01-2130-011-A200AA



E / WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
AVIONICS 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 ΔP detected across 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					

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

AIRBUS TRAINING  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT CARGO	1.21.40	P 1
		SEQ 001	REV 07

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 through the aft outflow 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 BULK ISOL VALVE pushbutton to the on position. The controller closes the isolation valves and stops the extraction fan when :

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

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

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

HEATING

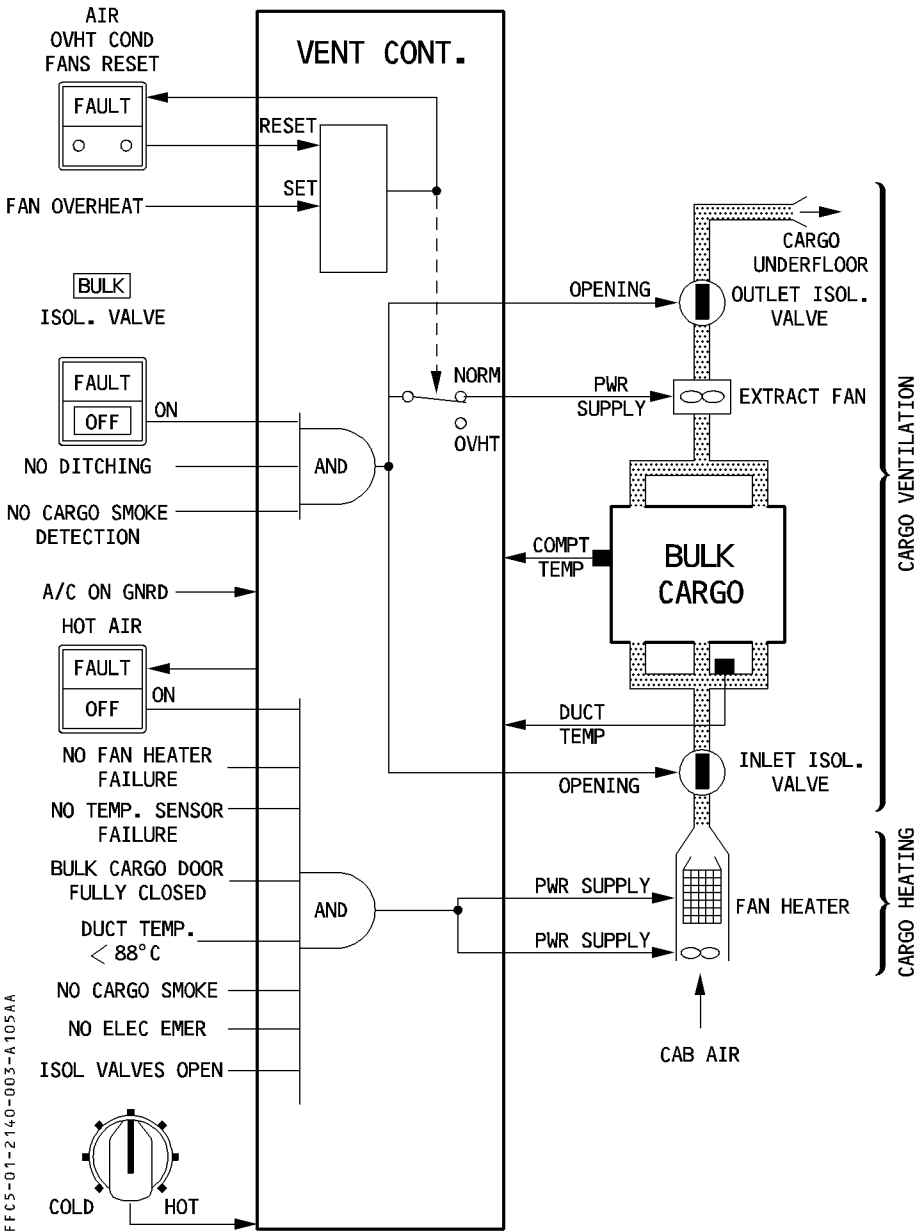
Bulk cargo compartment heating is performed by an electrical fan heater. Air from the cabin, driven by the electrical fan, goes into the compartment through a heating element. The temperature is selected from the cockpit.

– **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, 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

Due to the 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 the 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, set the AFT ISOL VALVE pushbutton to the ON position.

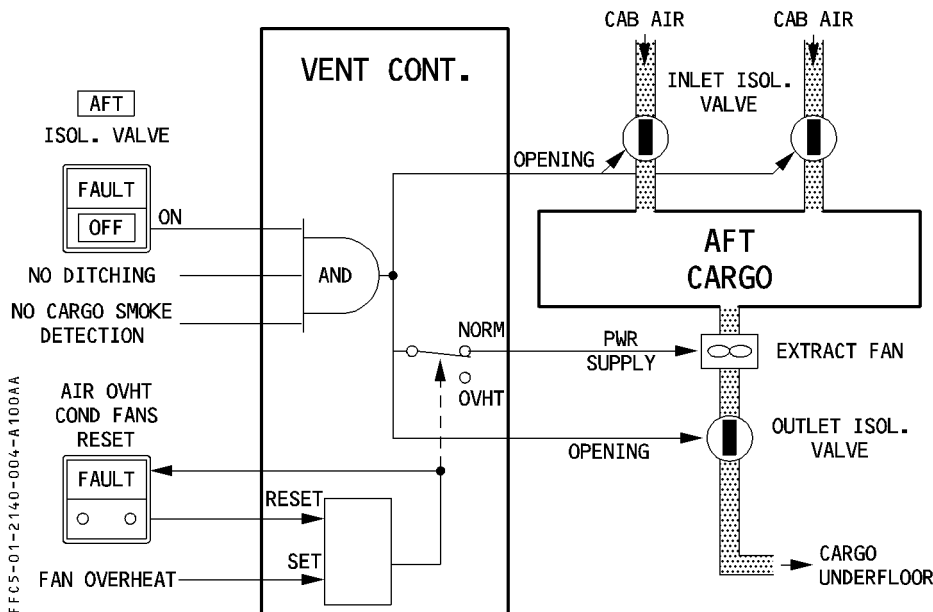
The controller closes the isolation valves and stops the extraction fan, when :

- 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.



 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT CARGO	1.21.40	P 5
		SEQ 200	REV 19

FORWARD CARGO COMPARTMENT

R VENTILATION AND COOLING

Due to extract fan suction, the cabin air flows through the 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 to adjust the quantity of cooled conditioned air that is mixed with the ventilation air. 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 20000 feet, pack 2 outlet temperature is limited to 5° C, in order to avoid ice accumulation on the cold air valve.

– Normal operation

Operation starts automatically, when the isolation valves are fully open. To open the isolation valves, the FWD ISOL VALVE pushbutton is set to ON. The extract fan starts to operate continuously.

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

- a) The FWD ISOL VALVE pushbutton is switched OFF, or
- b) The forward cargo smoke detection system is triggered, or
- c) DITCHING pushbutton on CABIN PRESS panel is switched ON.

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

The cold air valve will be 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) The forward cooling system fails, or
- e) At least one pack is off.

HEATING

- R To provide variable temperature, inlet air is mixed with hot air from the hot air manifold. The forward cargo trim air valve controls the quantity of hot air added. 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 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 OFF stops the heating.

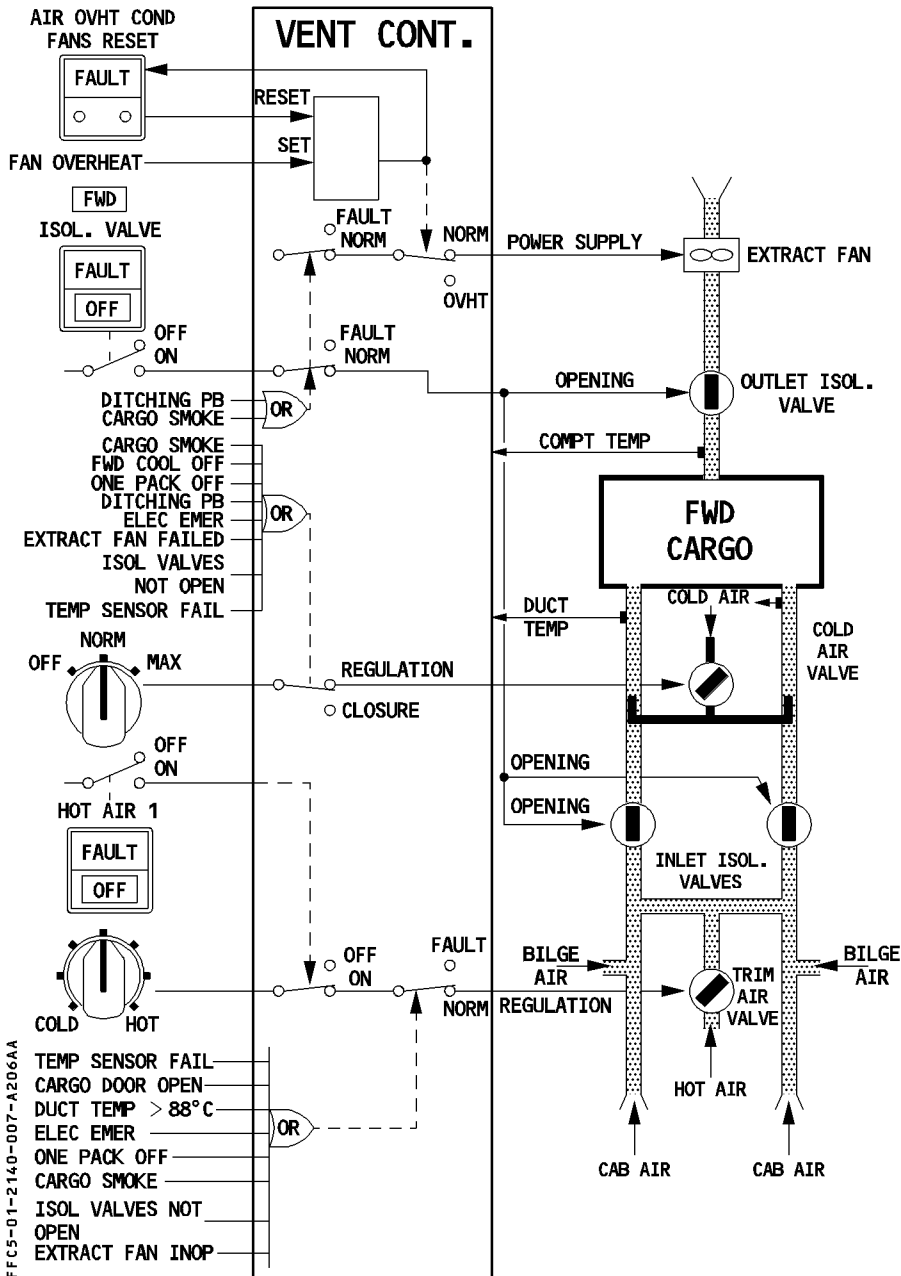
Note : If there is a failure in one of the hot air supplies, the hot air crossvalve opens. The forward cargo compartment supply remains, either through Channel 1 (Channel 2 failure), or through Channel 2 (Channel 1 failure).

If the forward cargo compartment heating system is stopped via 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.

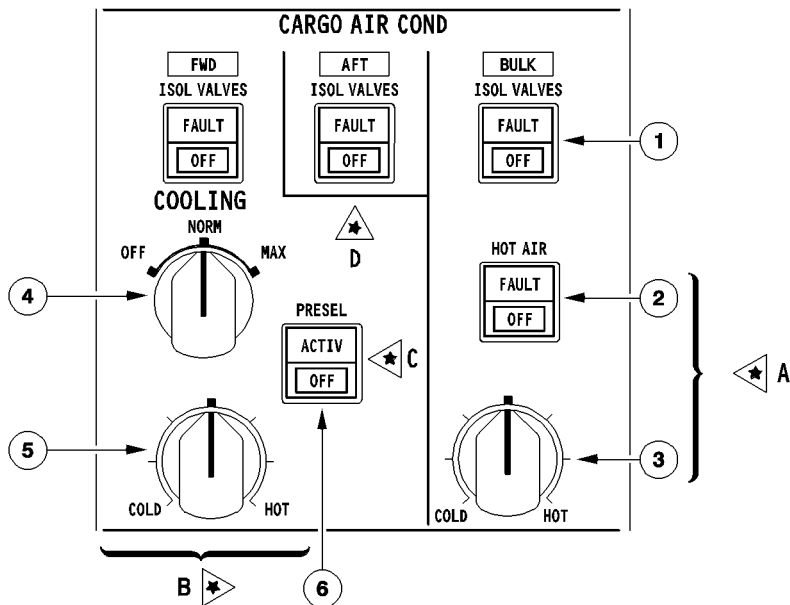
R







FFC5-01-2140-007-A206AA

CONTROLS AND INDICATORS

OVERHEAD CARGO AIR COND PANEL



FFCS-01-2140-008-A001AA

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

① ISOL VALVE pushbutton

- R On : The inlet and outlet isolation valves open, and the extraction fan run. If smoke is detected in the cargo compartment, or DITCHING is selected, the valves close, and the fan stops.
- R OFF : The inlet and outlet isolation valves close and the extraction fan stops.
- R FAULT It : The light comes on amber associated with ECAM caution when either inlet or outlet valve is not in the selected position.

 AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL	AIR COND/PRESS/VENT CARGO	1.21.40	P 9
		SEQ 002	REV 18

② HOT AIR pushbutton ◀

- 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 (above 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 ◀

- COLD : 5°C (41°F)
 HOT : 25°C (79°F)
 Middle position : 15°C (60°F)

R Note : Cargo compartment temperature may vary due to such factors as flight
 R duration, outside temperature, and cabin temperature. As a result, the actual
 R 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 : 5°C (41°F)
 HOT : 25°C (79°F)
 Middle position : 15°C (60°F)

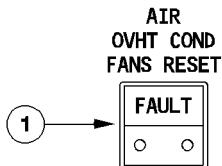
⑥ FWD PRESEL pushbutton ◀

- R ACTIV It : The light comes on green, when FWD PRESEL is set to ON, or the cargo
 R 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 a flight.

OVERHEAD MAINTENANCE PANEL

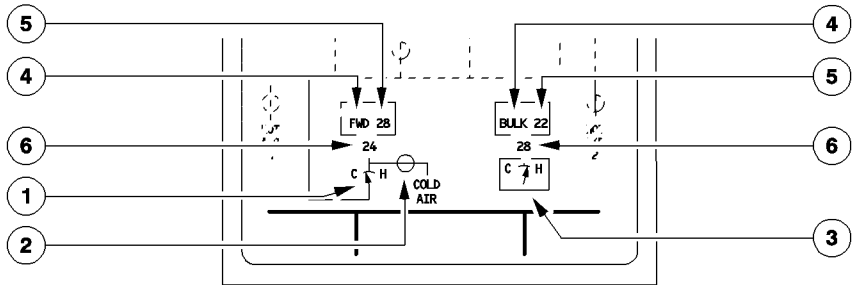
FFCS-01-2140-010-A001AA

**① OVHT COND FANS RESET pb sw**

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

ECAM COND PAGE

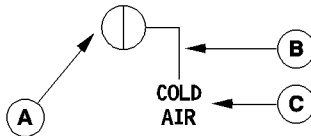
FFCS-01-2140-011-A200AA

**① Trim air valve (Heating)**

H - Hot (Green) : Valve is open.
 C - Cold (Green) : Valve is closed.
 R C - Cold (Amber) : Valve is failed.

② COLD AIR VALVE

FFCS-01-2140-011-B200AA



- R **Ⓐ** 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.

- Ⓑ** 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.
- Ⓒ** This indication is in white.

R ③ Bulk fan heater

R This normally green, it becomes amber if the valve is failed.

R C - cold : Heater working at its lowest level.

R H - hot : Heater working at its highest level.

R ④ Compartment indication

R This indication is displayed in white

R ⑤ Compartment temperature

R This indication is displayed in green

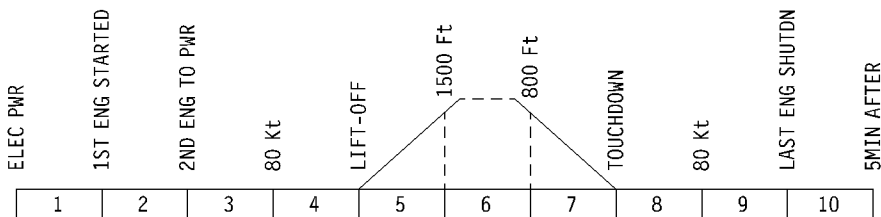
R ⑥ Duct temperature

R This is normally green, it becomes amber when the temperature is above 88°C.



WARNINGS AND CAUTIONS

FFCS-01-2140-013-A100AA



R

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



BUS EQUIPMENT LIST

			NORM			EMER ELEC		
			AC	DC	DC BAT	AC ESS	DC ESS	HOT
AIR COND	PACK CONTROLLER	1 channel 1	AC1-2	DC1				
		channel 2	AC1-2	DC1				
	ZONE CONTROLLER	2 channel 1	AC2-3	DC2				
		channel 2	AC2-3	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					
		2	AC2-3					
	AVIONIC	AEVC	AC1-2					
		EXTRACT FAN	AC1-2					
CARGO	VENT CONT			DC2			SHED	
	BULK	EXTRACT FAN	AC2-4					
		ISOL VALVES (3)	AC2-4					
		FAN HEATER	AC1-1					
	AFT	EXTRACT FAN	AC1-2					
		ISOL. VALVES	AC1-2					
	FWD	EXTRACT FAN	AC2-4					
		ISOL. VALVES	AC2-4					
		COLD AIR VALVE	AC2-4					
HOT AIR VALVE			DC2				SHED	