02.10 GENERAL

02.20 AIR CONDITIONING

02.30 PRESSURIZATION

02.40 VENTILATION

R 02.50 MAINTENANCE PANEL

The air conditioning and pressurization systems maintain the air in the pressurized compartments at the desired level of pressure, temperature and freshness.

R Bleed air is cooled, conditioned and distributed to the individual compartments (flight compartment, passenger compartment, avionics compartment and cargo compartments) and then discharged overboard through outflow valves (pressure regulating valves) and fixed vent holes. A part of the cabin air is recirculated.

The required bleed air for the system is supplied either by engine compressors or APU or a high pressure ground air supply unit. (See chapter 16 – Pneumatic).

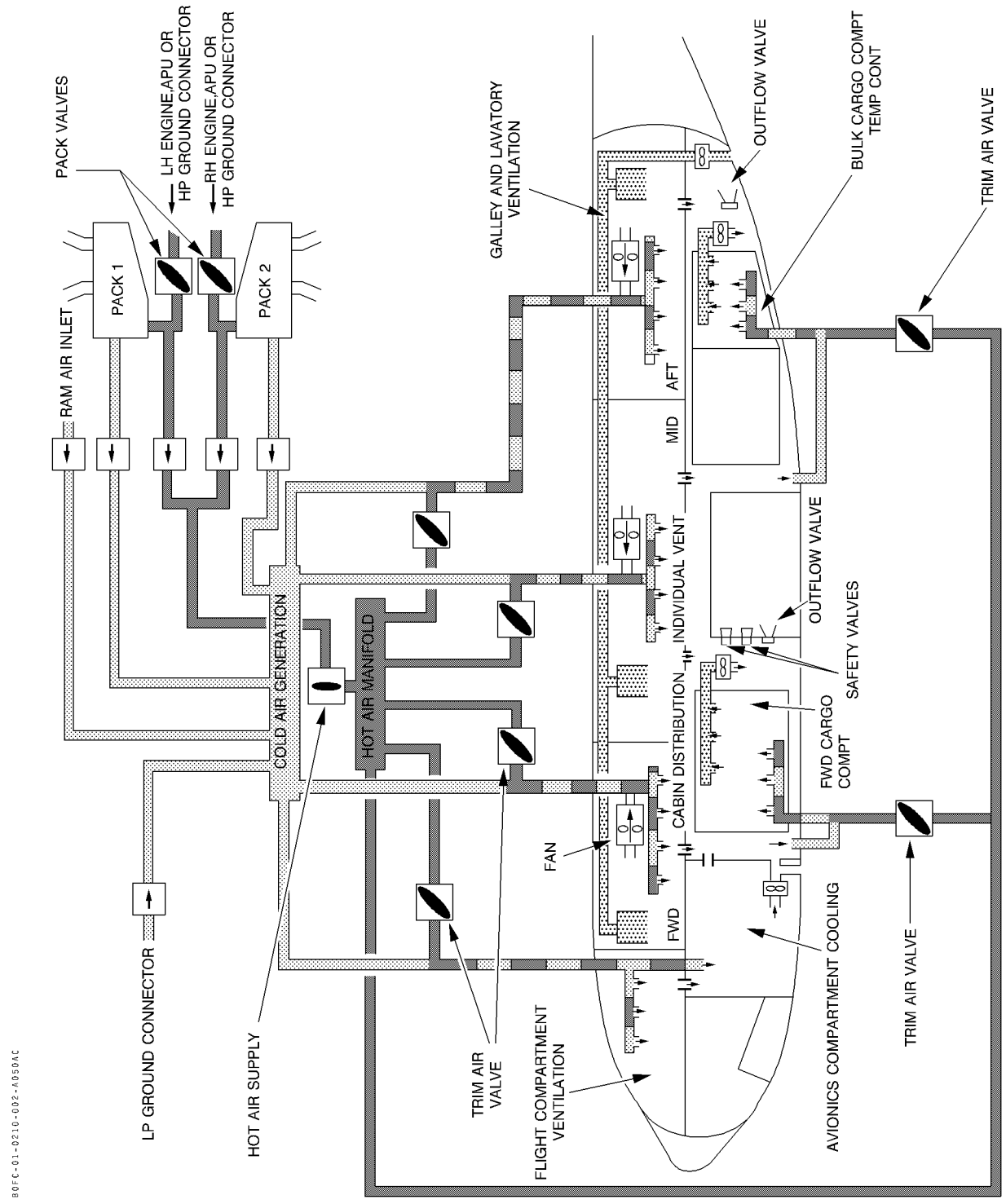
R R R *Note : it is recommended not to use external HP air for conditioning due to possible refrigeration pack contamination.*

Conditioned air can also be supplied directly to the cabin air distribution system by a low pressure ground connection.

A ram air inlet is also provided for fresh air ventilation, in flight when the air conditioning systems are not operating.

Pressure and pressure variations in the pressurized compartments are controlled automatically by adjusting the outflow valves.

The underfloor air is used for ventilation of the electronics racks, in the cargo compartment heating and ventilation systems, and for general ventilation of other underfloor areas inside the pressurized fuselage.




Mod. : 2989 + 3881

## GENERAL

The bleed air supplied to the air conditioning system is hot compressed air processed through two air conditioning packs which regulate air flow and temperature as required. This cooled regulated air is then fed to a cold air manifold.

A part of the unconditioned hot air is tapped upstream of the two packs, just downstream of the pack valve and directly fed to a hot air manifold, through a single hot air supply valve.

The air supplied to the pressurized compartments is temperature controlled by mixing, for each compartment, cold air with hot air from the two manifolds.

## AIR CONDITIONING PACKS

Each pack includes :

– *A pack valve* which is a pneumatically operated, electrically controlled butterfly valve, delivers air to the pack, and in normal operation, regulates an approximately constant volumetric airflow.

R Two levels of air flow are available :
R Normal flow and Econ flow (68 % of normal flow).
R Selection of Econ flow in cruise reduces the quantity of
R bleed air required, thus resulting in a fuel saving. On
R ground, or in single pack operation, selection of Econ flow
R has no effect, normal flow will continue.

*Note : The information « ECON FLOW SELECTED » is displayed on the ECAM MEMO page.*

In the absence of air pressure, and independently from any electrical supply, the pack valve is spring-loaded closed. It remains open in the absence of electrical supply, provided it is pneumatically supplied.

– *A refrigeration unit,* consisting of a compressor, a turbine and a fan mounted on a common shaft, and an air to air heat exchanger located between the compressor and turbine. The energy provided by the expansion of the air in the turbine is used mainly to cool the air already cooled in the heat exchanger, and to drive the compressor and fan.

Fusible plugs and thermostats at the compressor outlet and turbine inlet, protect the system in case of excessive temperature.

– *A turbine bypass valve* which admits more or less flow through the turbine.

– *A water separator* collecting small droplets of water, after separation from the air by inertia in a coalescer : this water is then sprayed through an injector at the inlet of the air to air heat exchanger cooling side.

– *A cooling airflow system* to modulate the precooled flow of the conditioning air in the heat exchanger. The cooling air inlet is closed by a deflect door during the takeoff and landing phases, and is open during flight and on the ground. The cooling air outlet is equipped with a modulation flap which is linked to the turbine bypass valve and modulates the flow of cooling air as required. R

– *An emergency ram air inlet* located forward of the air conditioning pack 1 cooling air inlet, provides for ventilation of the pressurized fuselage with ram air. The opening of the ram air inlet is only authorised in flight when the cabin differential pressure is lower than 1 PSI.

## TEMPERATURE CONTROL

The system is designed to regulate and limit :
– The temperature of the air discharged from the packs.
– The temperature of the air supplied to the different compartments (or zones).

The temperature control is automatic, relative to the temperature selection on the COMPT TEMP overhead panel for the four zones : COCKPIT, FWD CABIN, MID CABIN and AFT CABIN.

To establish the required temperature (pack outlet temperature and zone ambient temperature), the amount of added hot air, mixed with cool air, is varied through the four trim air valves.

*Pack temperature control system*

Each pack discharge temperature is controlled by a temperature controller associated with the pack outlet temperature transmitter and a demand signal from the APU and pack temperature demand controller. The pack discharge temperature is adjusted according to a predetermined sequence to open or close the temperature control valve and the associated flap modulating the heat exchanger cooling air.

In automatic mode, the pack temperature controller :
– limits the pack discharge temperature,
– modulates the pack discharge temperature according to the zone ambient temperature demands.

With both packs operating :
– if, of all zones, the flight compartment demands the lowest temperature :
Pack 1 temperature is controlled by the flight compartment
Pack 2 temperature is controlled by that of the cabin zones (one of three) demanding the lowest temperature,
– if, of all zones, a cabin zone demands the lowest temperature :
Pack 1 and 2 temperatures are controlled by that zone.

With one pack only operating :
– pack temperature is controlled by the zone demanding the lowest temperature.

In case of failure of the automatic control, manual control can be selected by means of the PACK MODE SELpushbutton switch, on the PACK TEMP overhead panel.

Maximum cooling is obtained by fully closing the turbine bypass valve and fully opening the heat exchanger cooling air modulation flap.

*Flight compartment and cabin temperature control system*

The flight compartment and the three cabin zones are each provided with an independent temperature control system, capable of automatic or manual operation.

In automatic control, the compartment temperature controller receives inputs from the zone inlet and zone ambient temperature control sensors, signals from the APU and pack temperature demand controller and from the COMPT TEMP selectors.

The controller modulates the trim air valve, which mixes hot air with cold air to obtain the required air temperature.

The hot air comes from the LH and RH hot air manifolds, through a single hot air supply valve, regulating at 4 PSI over the cabin pressure.

The compartment temperature controller limits the maximum duct inlet temperature to $74^0$ C, with an overheat protection rated at $88^0$ C, causing the hot airsupply valve to close.

In case of automatic control failure, the zone temperatures may be manually controlled by direct operation of the trim air valves and manual adjustment of the pack discharge temperatures, using controls provided on the overhead panel.

## COMPARTMENT AIR DISTRIBUTION

Air distribution through the pressurized fuselage is provided for :
– Delivering conditioned air to the main compartments : i.e. flight compartment and cabin, with an air recirculation system.
– Heating the cargo compartments.
– Ventilating and cooling different parts of the aircraft (See chapt. 02.40).

*Flight compartment air distribution*

The air distribution ducting delivers air through the following points :
– below the windshield panels, from the ceiling at the rear of the compartment and at floor level, on the LH side, where air is flow controllable by manual controls,
– to each crew member (4) through individual air outlets, flow controllable in quantity and direction.

Air is then extracted by differential pressure and distributed to the underfloor compartments, through the circuit breaker panel and orifices at floor level.

*Cabin air distribution*

Cabin air distribution system is divided into three main compartments, each one supplied from the hot and cold manifolds, by separate pipework routed between the cabin skin and sidewall panels. Then the air is distributed above the lateral overhead stowage compartments and doors.

A part of the air is recirculated by three electrical fans (one in each zone) situated above the ceiling panel in the cabin axis.

Air is then extracted near the floor level, next to the cabin sidewall panels, over full cabin length and directed to the underfloor compartments, where it is used for cooling the avionics compartment and ventilating the cargo compartments.

## BULK AND FWD CARGO COMPARTMENT TEMPERATURE CONTROL R

The cargo compartment temperature control uses airflow from the cabin for ventilating the cargo compartment. The heating system includes :
– The ventilation system.
– The temperature control system.

*In the ventilation system,* the mixed air enters the compartment at floor level, on the LH side, and is equally distributed over the full compartment length. On the opposite side, and in the aircraft centerline, the air is extracted, near the compartment ceiling, by an electrical fan, and is exhausted under the compartment itself, thus providing temperature control of the compartment floor, and also, of the compartment sidewall panels using a part of the air evacuated from the cabin. R

In the event of a smoke warning, the cargo compartment is automatically isolated by closure of the isolation valve.

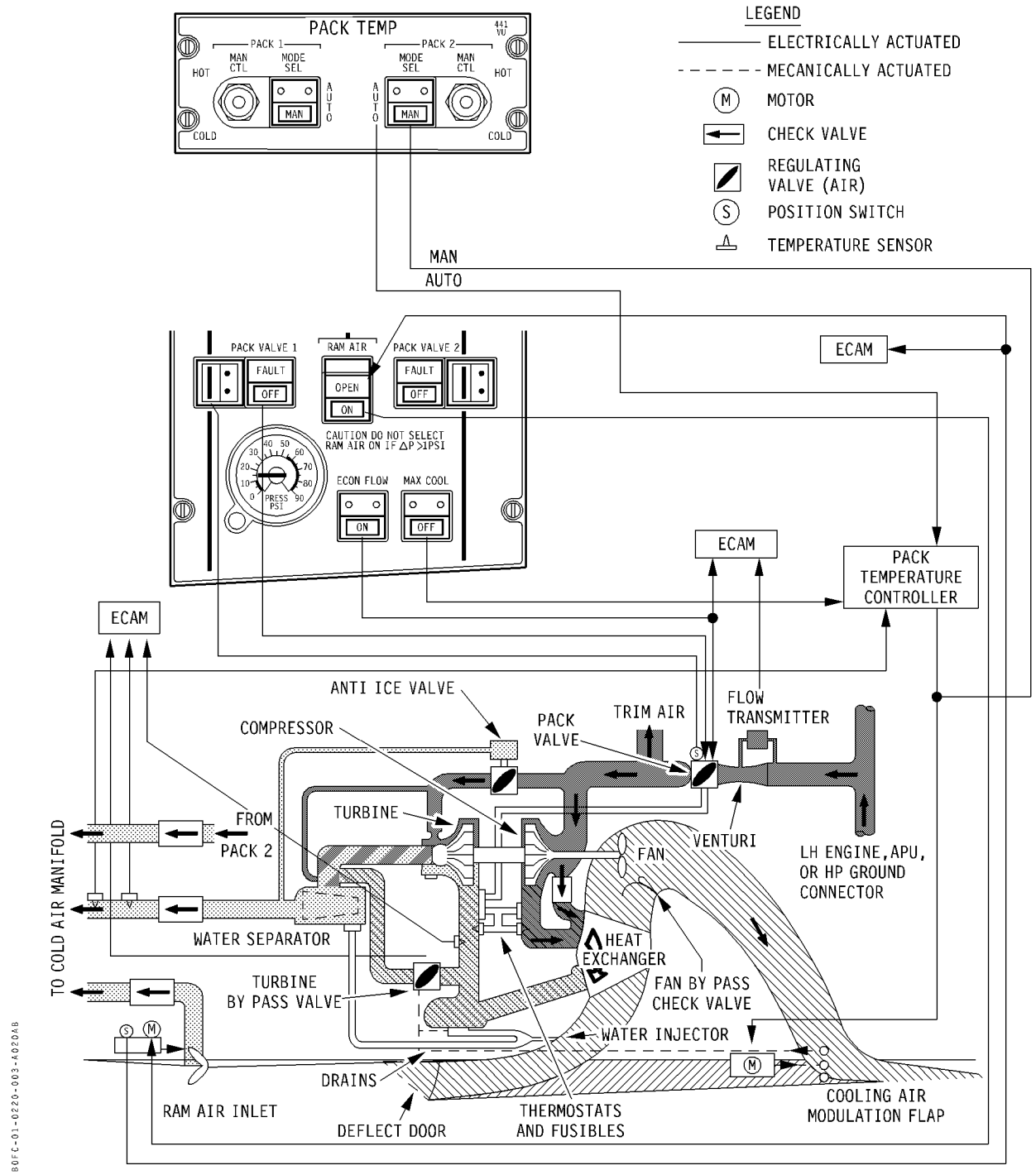
*The compartment temperature control system* includes for each cargo compartment, a temperature controller, a trim air valve, a zone inlet temperature sensor, a zone temperature control sensor, and an overheat thermal switch in the compartment inlet duct.

In automatic control, the controller, associated with the sensors and the selector regulates the compartment temperature to the selected level, by modulating the hot air supply through the trim air valve, with limitation of the maximum temperature of the blown air by closing the hot air valve in the event of overheat.

In case of automatic control failure, manual control can be achieved by acting directly on the trim air valve.

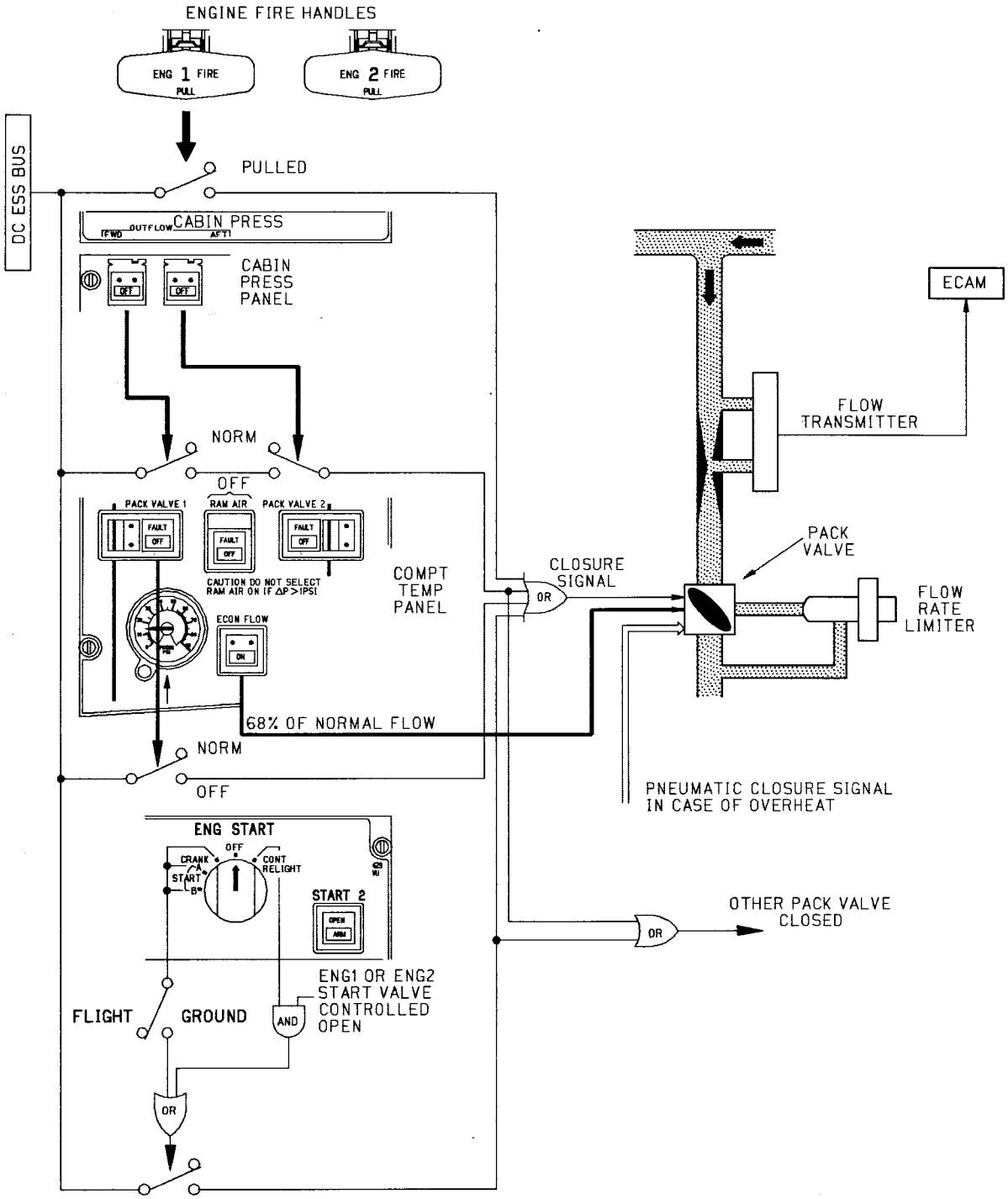
Mod. : 2989

## AIR CONDITIONING PACK




Mod. : 5289

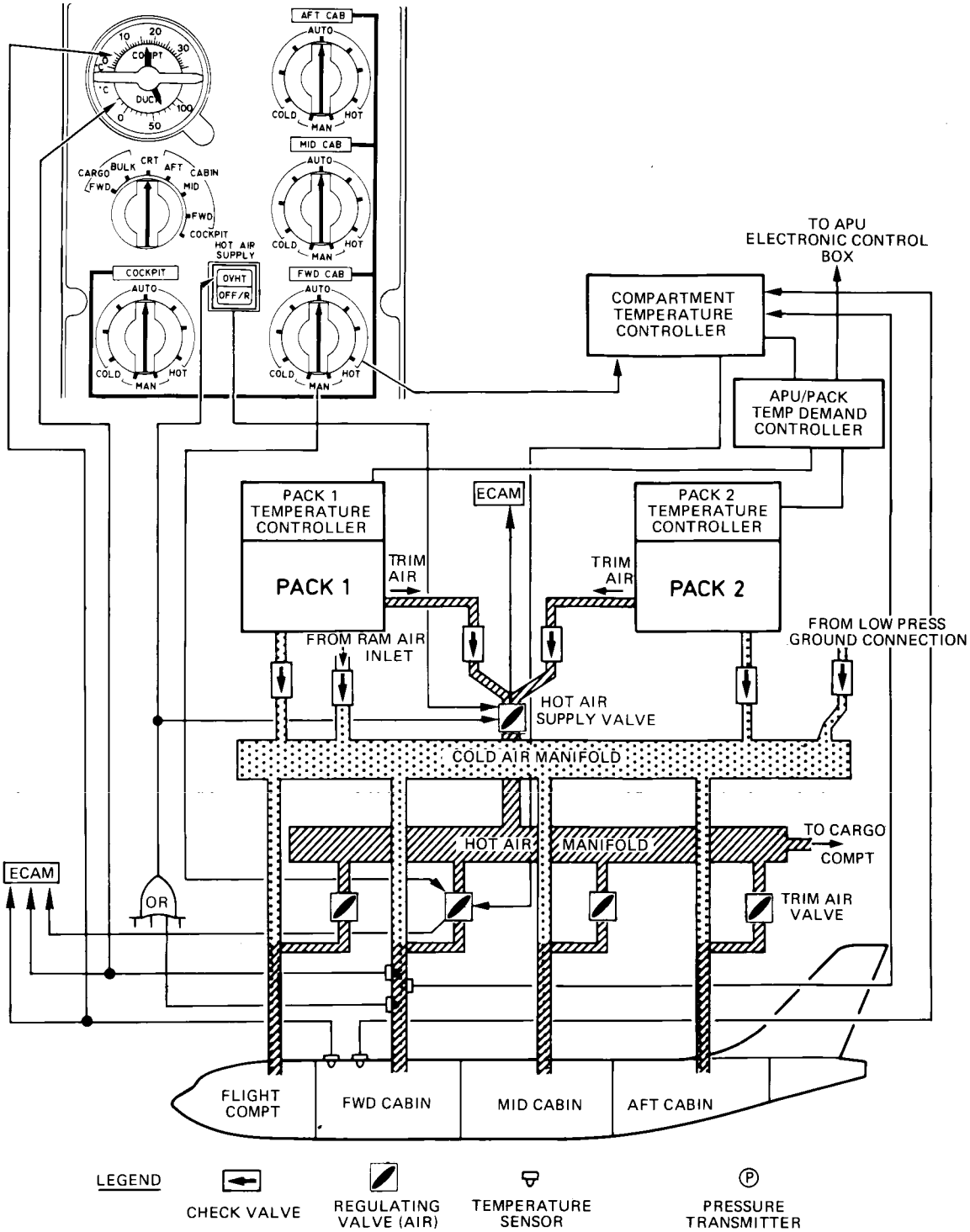
## PACK VALVE CONTROL LOGIC




OPS.FCO.B1.0220.004-00.040

Mod. : 3881 + 6334

## COMPT AIR DISTRIBUTION AND TEMP CONTROL

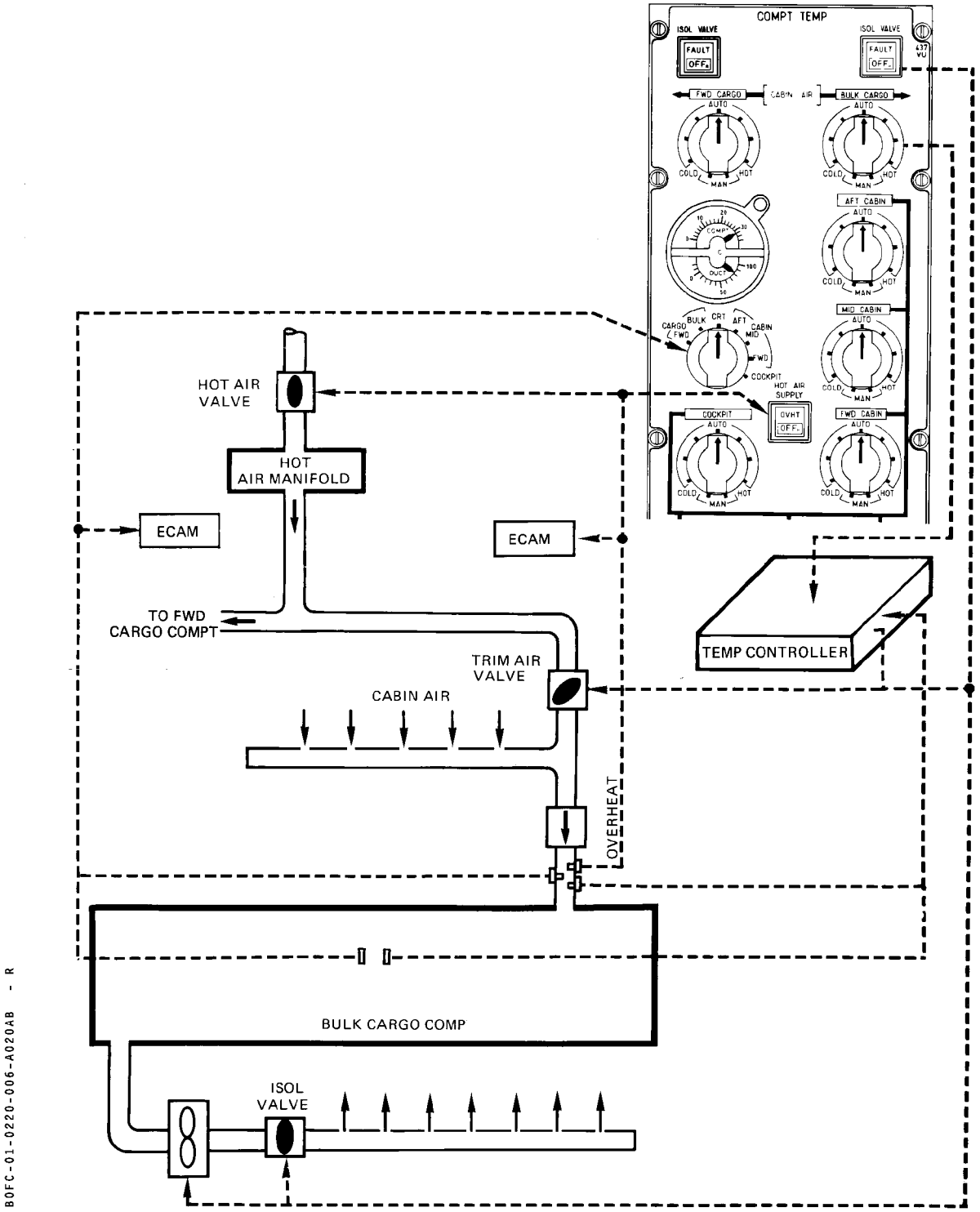



OPS.FCO.B1.0220.005-AA.001

Vers. : All

Eng. : All

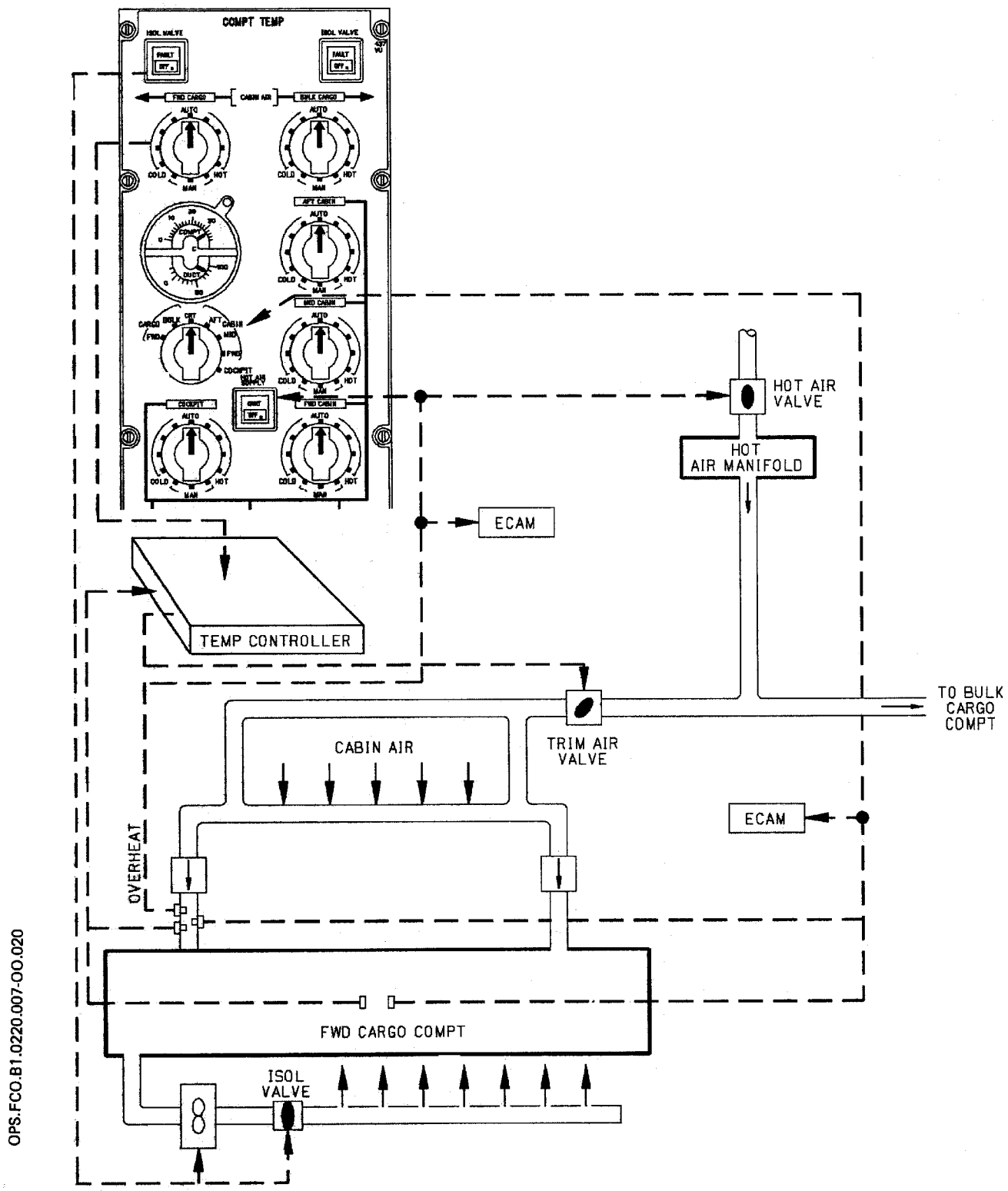
## BULK CARGO COMPT HEATING




R

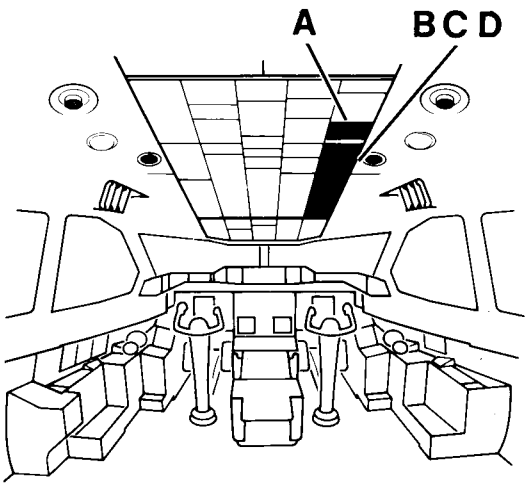
Mod. : 2989

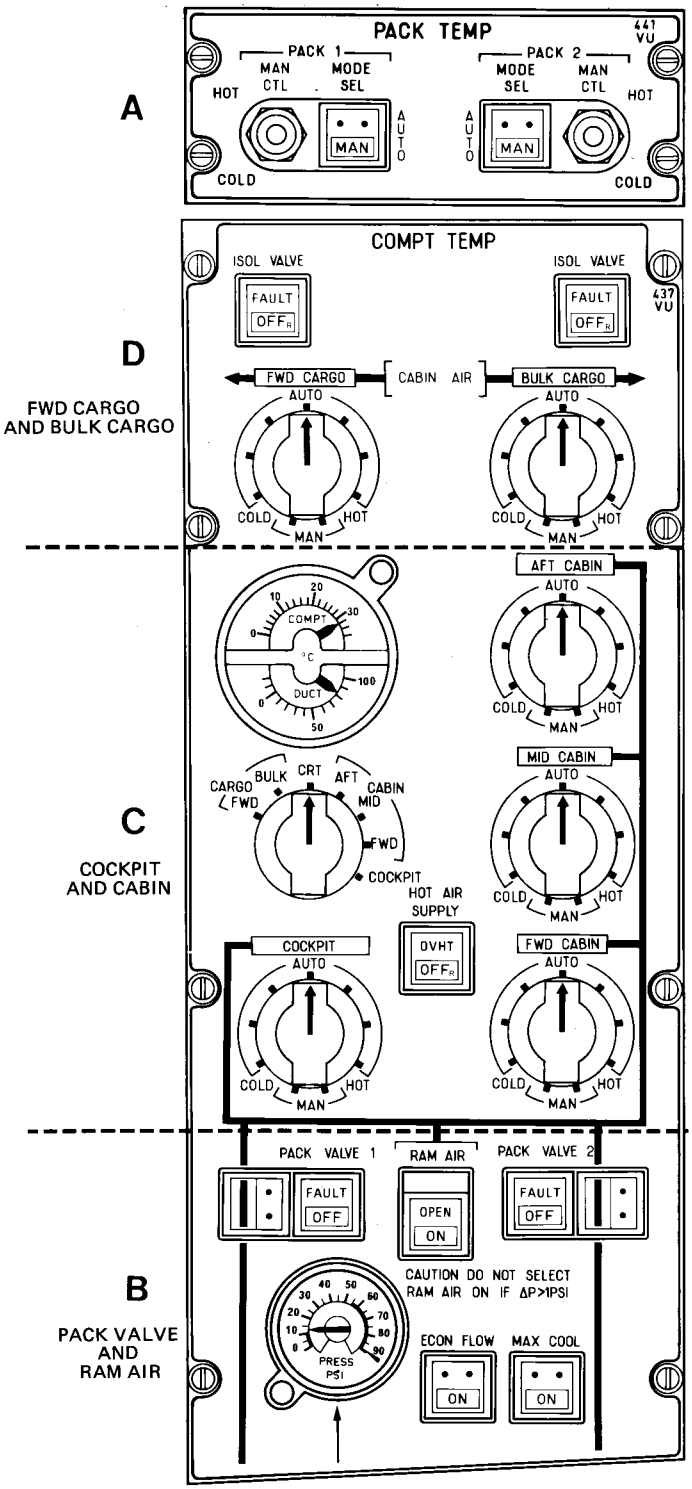
## FORWARD CARGO COMPT HEATING




Mod. : 2989

## LOCATION OF CONTROLS

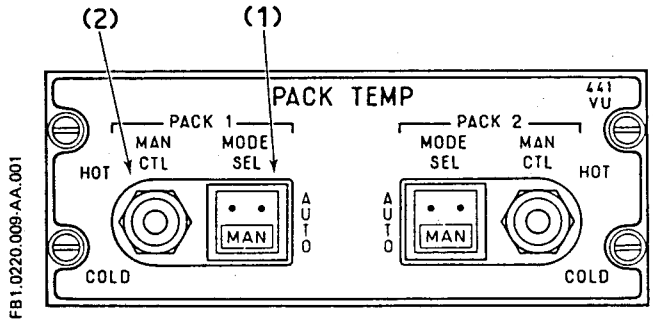



PLN.FCO.B1.0220.008-00.020

R Code : 0220D

## A. PACK TEMP PANEL




### (1) PACK 1 (PACK 2) MODE SEL Pushbutton Switch

Pack temperature control mode (operation of turbine by pass valve and cooling air modulation flap) is selected by P/B switch operation.

- **AUTO (P/B switch pressed – in)**

  Pack discharge temperature is automatically controlled between $-7^{\circ}$ C and $63^{\circ}$ C, according to the compartment demands as processed by the APU and pack temperature demand controller.

- **MAN (P/B switch released – out)**

  MAN light comes on white, pack discharge temperature is manually controlled by adjustment of the turbine by pass valve through the pack discharge COLD/HOT selector.

### (2) Pack Discharge COLD/HOT Selector

When the respective PACK MODE SEL P/B switch is selected MAN, turbine by pass valve is adjusted by selector operation.
The switch is spring-loaded to neutral.

- **COLD**

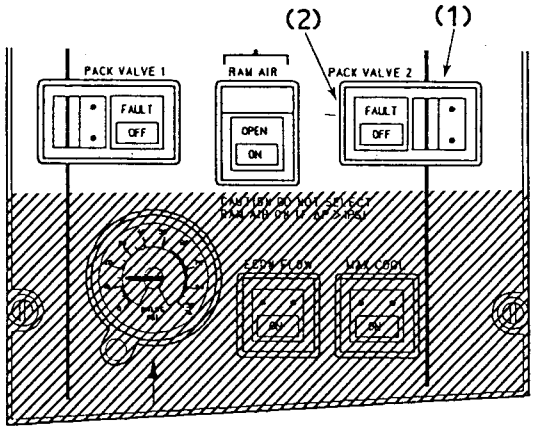
  Turbine by pass valve closes, pack discharge temperature decreases.

- **HOT**

  Turbine by pass valve opens, pack discharge temperature increases.

## B. COMPT TEMP PANEL

– Pack valve and RAM air




### (1) PACK VALVE Indicator

Flowbar on : valve is open.
Flowbar off : valve is closed.

### (2) PACK VALVE 1 (2) Pushbutton Switches

Select automatic operation or manual closure of the respective pack valve.

- **Auto (P/B switch pressed – in)**

  Valve is pneumatically controlled.
  The valve is electrically closed when
  - the ENG FIRE handle is pulled,
  - CABIN PRESS OUTFLOW VALVE P/B switches are selected OFF
  - the ENG START selector is on CONT RELIGHT position and one of the two START valves is controlled open.

  The valve is pneumatically closed, when overheat occurs at compressor outlet or turbine inlet exceeding the limit of the fusible plugs. The valve is closed by spring force, if it is not supplied with pneumatic pressure.

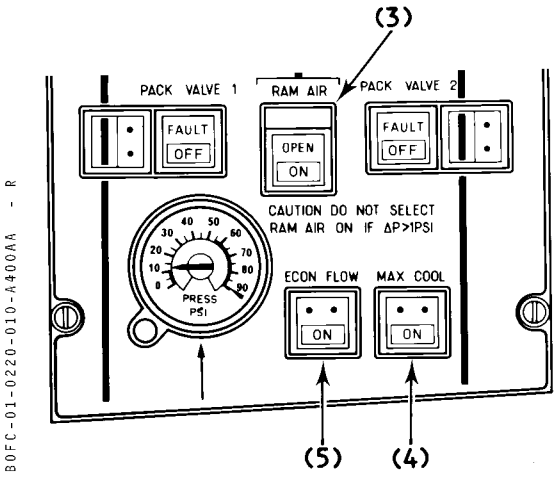
- **OFF (P/B switch released – out)**

  The valve is electrically closed. The OFF light comes on white.

- **FAULT**

  Illuminates amber, when the position of the pack valve disagrees with the commanded position.
  If the FAULT light remains on for more than 5 sec., the ECAM system is activated.

  Momentary illumination occurs, when valve is in transit.




### (3) RAM AIR Pushbutton Switch (guarded)

Controls the ram air inlet which supplies ambient air to the cold air manifold, if required.

- **ON (pushbutton switch depressed – in)**

  ON light comes on white.
  The ram air inlet will open, provided both CABIN PRESS OUTFLOW VALVES pushbutton switches are not selected OFF.

R When cabin pressure is in AUTO mode, the FWD and
R AFT outflow valves will open simultaneously to permit
R unrestricted ventilation.

- **OPEN**

  Will come on green, when the ram air inlet is fully open.

- **Off (pushbutton switch released – out)**

  The ram air inlet closes. The FWD and AFT outflow valves return to normal regulation.

### (4) MAX COOL Pushbutton Switch

- **ON (pushbutton switch pressed – in)**

  ON light comes on blue.
  Pack discharge temperature lower limit is decreased from + 4° C to – 7° C.

### (5) ECON FLOW Pushbutton Switch

- **ON (pushbutton switch pressed – in)**

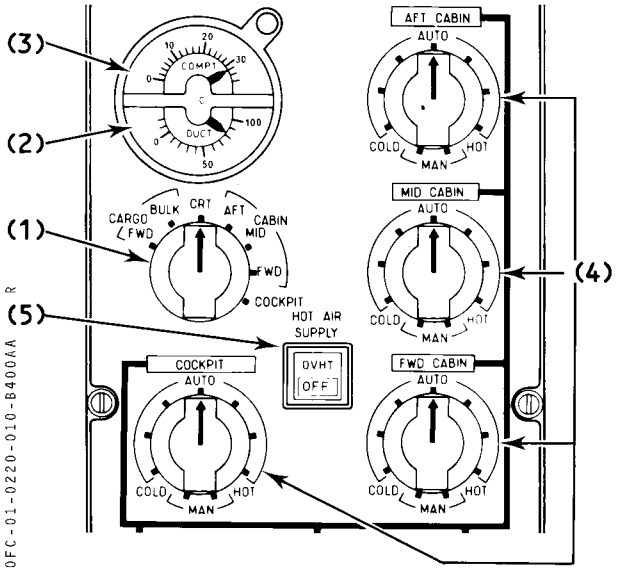
  ON light comes on blue.
  In flight, pack valves are controlled automatically to give 68 % of normal flow (economic flow).

*Note : the indication « ECON FLOW SELECTED » is displayed on the MEMO page.*

Mod. : 2989 + 5289 + 6106 + 6444

## C. COMPT TEMP PANEL

– Cockpit and cabin




### (1) COMPT/DUCT Temp Selector %

Selects the zone for which temperature (COMPT and DUCT) reading is desired on COMPT/DUCT indicator. On the CRT position indications are displayed on ECAM. When an other position is selected, temperature indications are replaced by amber XX.

### (2) DUCT Indicator

For the selected compartment the temperature of the conditioned air before leaving the duct is indicated in ° C. The duct temperature is automatically limited to max. 74° C in AUTO mode.

### (3) COMPT Indicator

The air temperature in the selected compartment is indicated in ° C.

### (4) COMPT TEMP Selectors

For the related compartment the temperature is either automatically controlled to a level relative to the selector position or is manually selected by direct operation of the trim air valve through the selector.

- **AUTO**

  In this range the compartment temperature is automatically controlled between COLD 18° C and HOT 30° C relative to the selector position. In the center position AUTO the temperature is controlled to 24° C. The pack discharge temperature is automatically controlled via the APU and pack temperature demand controller to suit the demand.

- **MAN**

  When a selector is turned to the bottom quadrant, it is spring-loaded to the center MAN position. The temperature is manually controlled.
  COLD – Trim air valve closes.
  HOT – Trim air valve opens.

  To obtain the desired compartment temperature it may be necessary to manually adjust PACK TEMP.

### (5) HOT AIR SUPPLY Pushbutton Switch

Controls the supply of hot air to the hot air manifold by activating the hot air supply valve. The hot air manifold pressure is controlled to 4 PSI above compartment pressure.

- **ON**

  (P/B switch pressed –in) : Valve operates automatically, hot air is supplied and regulated.
  If an overheat condition is detected in one of the compartment or cargo ducts, the valve is automatically closed and latched.

- **OFF/R**

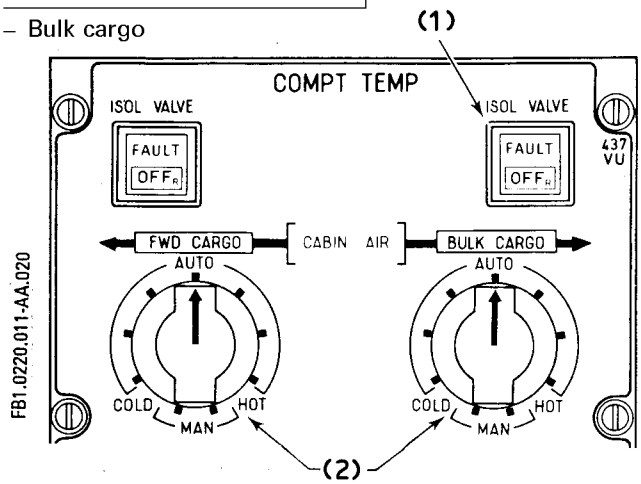
  (P/B switch released – out) : OFF/R light comes on white, valve closes.
  Overheat circuit is reset.

- **OVHT** :

  Light comes on amber associated with ECAM activation, when temperature in one of the compartment ducts exceeds 88° C. The hot air supply valve closes automatically. After selecting the HOT AIR SUPPLY P/B switch OFF/R the light will go off, when the duct temperature drops below 88° C.

## D. COMPT TEMP PANEL

– Bulk cargo




### (1) ISOL VALVE Pushbutton Switch

Operates the isolation valve and the fan for the air extraction from the cargo compartment.

- **ON**

  (P/B switch pressed – in) : The valve is open and the fan runs.
  If smoke is detected in the cargo compartment, the isolation valve and the trim air valve will automatically close.

- **OFF/R**

  (P/B switch released – out) : The isolation valve closes, the fan stops operating and the trim air valve closes. R
  OFF/R light comes on white. Smoke detection circuit is reset.

- **FAULT**

  The light comes on amber when disagreement between P/B switch selection and isolation valve position exists.

### (2) BULK CARGO Temperature Selector

The cargo compartment air is automatically heated to a level relative to the selector position. The heating can be manually controlled by direct operation of the trim air valve through the selector, if required.

- **AUTO**

  Automatic heating relative to selector position from COLD 5° C up to HOT 25° C approximately.

- **MAN**

  When the selector is turned to the bottom quadrant, it is spring-loaded to the center MAN position.
  Heating control is manual.
  COLD – Trim air valve closes.
  HOT – Trim air valve opens.

Mod. : 2989 Vers. : All Eng. : All

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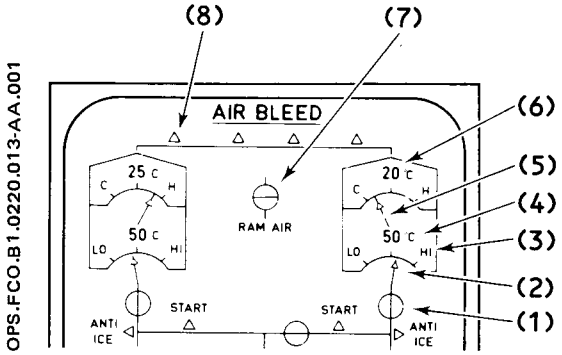
## SYSTEM DISPLAY

### AIR BLEED




### (1) Pack Valve Position Indication

| | | |
|---|---|---|
| ⊕ | Green | Pack valve is open |
| ⊖ | Amber | Pack valve is closed |

### (2) Pack Flow Indication

Index comes on green in normal operation. It comes on
R amber when the pack flow is below a preset value.

### (3) Pack Symbol Indication

In normal operation, pack symbols come on white. They come on amber when pack valve is closed, and engine START not selected.

### (4) Turbine Inlet Temperature Indication

Turbine inlet temperature indication comes on green in normal operation. Indication comes on amber when T° ⩾ 120° C and flashes when T° ⩾ 95° C.

### (5) Pack Temperature Control Valve Position Indication

Indication comes on green. C = cold, valve closed and H = hot, valve fully open.

### (6) Pack Discharge Temperature Indication

Indication comes on green ; it comes on amber when T° ⩽ – 18° C.

### (7) Ram Air Inlet Valve Indication

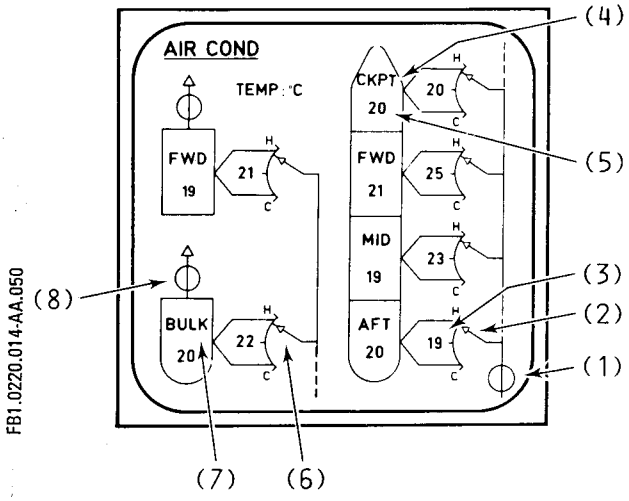
| | | |
|---|---|---|
| ⊕ | Green | Ram air inlet is open |
| ⊖ | Green | Ram air inlet is closed |

### (8) Cold Air Duct Supply Indication

Indication comes on green ; it comes on amber when no cold air is supplied.

## SYSTEM DISPLAY

### – AIR COND




### (1) Hot Air Supply Valve Position Indication

| | | |
|---|---|---|
| ⊕ | Green | Hot air supply valve is open |
| ⊖ | Amber | Hot air supply valve is closed |

### (2) Trim Air Valve Position Indication

Indication comes on green.
H = hot, valve 100 % open.
C = cold, valve fully closed.
Indication comes on amber when hot air supply valve is closed.

### (3) Cabin/Cargo Duct Temperature Indication

Indication comes on green ; it comes on amber when duct $T^0 \geq 88^0$ C.

### (4) Zone indication

AFT, MID, FWD and CKPT indications come on white. They come on amber when duct temperature of concerned zone is $\geq 88^0$ C.

R *Note : Same indication is given on the CRUISE page.*

Mod. : 2989 + 6041

### (5) Zone Ambient Air Temperature Indication

Indication comes on green for each zone.

*Note : Same indication is given on the CRUISE page.*

### (6) Cargo Compartment Trim Air Valve Indication

Indication comes on green.
H = hot, valve 100 % open.
C = cold, valve fully closed.
Indication comes on amber when cargo hot air valve is closed.

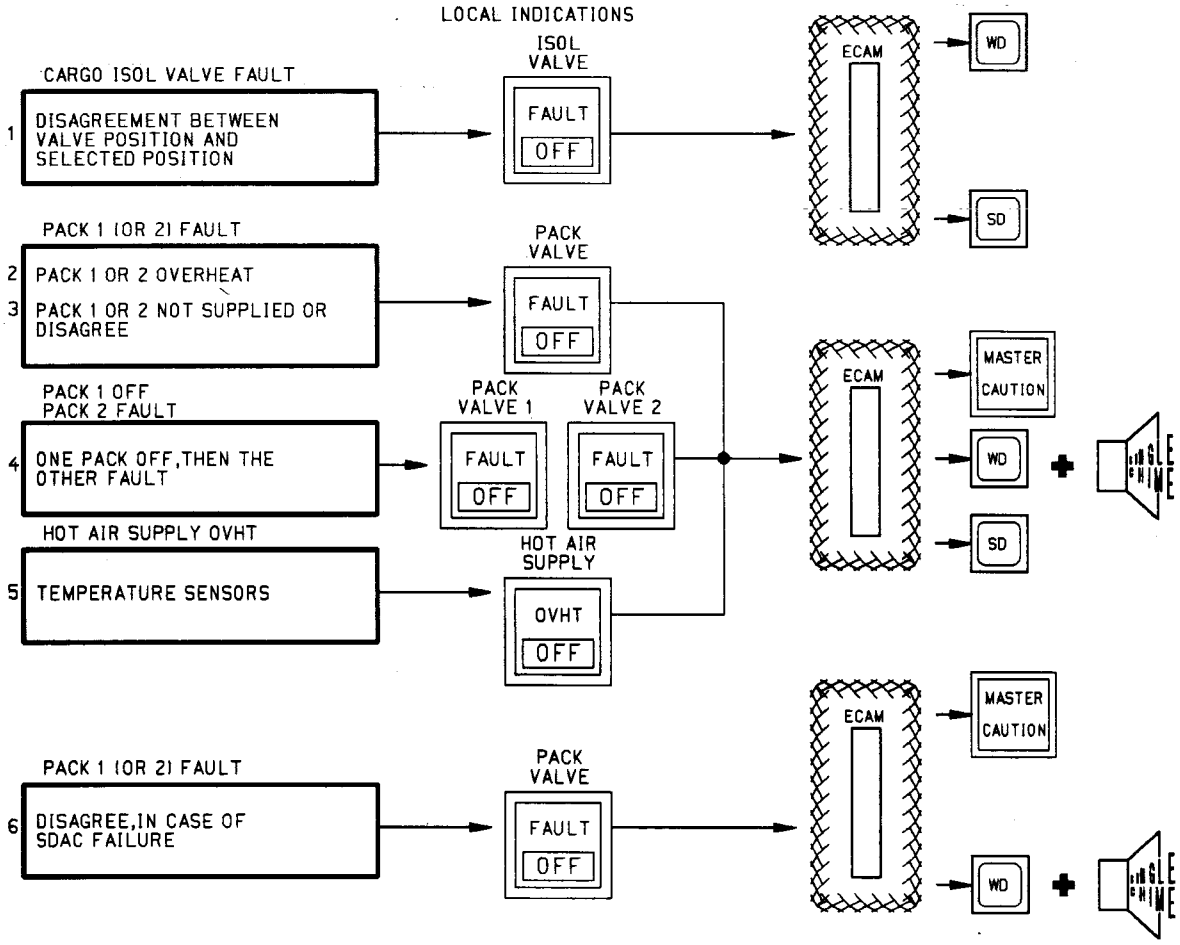
### (7) Cargo Compartment Ambient Air Temperature Indication

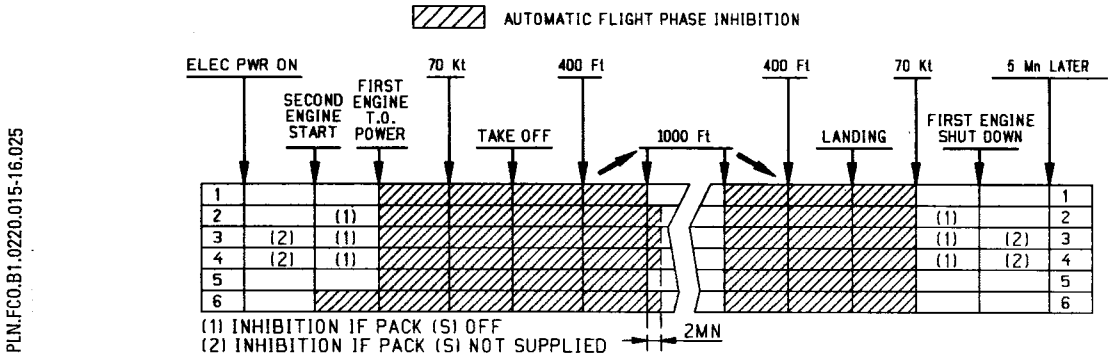
Indication comes on green.

### (8) Isolation Valve Indication

| | | |
|---|---|---|
| ⊕ | Green | Isolation valve is open |
| ⊖ | Amber | Isolation valve is closed |

## WARNING LOGIC




PLN.FCO.B1.0220.015-16.025

Mod. : 5051

## GENERAL

Cabin pressure and rate of change control system is composed of :

– two independent automatic control systems,

– one manual control system.

They control two electrical regulating valves (outflow valves).
Two pneumatically operated safety valves are provided to avoid over or under pressure.

The two automatic systems will alternately operate.
Change over occurs automatically in case of failure of one system and before each flight.

## AUTOMATIC CONTROLLER

Based upon information from the LANDING ELEVATION selector, the RATE LIMIT selector and the Captain or F/O altimeter setting, the automatic controller generates signals for positioning of outflow valves during all phases of flight. The other parameters used for signal computation are cabin pressure, aircraft static pressure, cabin pressure rate of change and static pressure rate of change.

The controller contains a computation circuit for determining theoretical cabin altitude relative to existing pressure altitude, taking into account the maximum performance of the aircraft (rate of climb, max. altitude). The control tendency is to adjust the actual cabin altitude towards either the theoretical cabin altitude or the landing elevation altitude selecting the higher of the two.

## MANUAL OPERATION R

The manual control of the aircraft pressurization is performed R
by selecting ON the MAN PRESS pushbutton switch and R
then action on the V/S CTL switch. When in manual mode R
the movement of the outflow valves is significantly slower R
than in automatic mode, and there is no automatic R
depressurization of the aircraft upon landing. R

## OUTFLOW VALVES

One of them is located forward of the air conditioning bay, the other one, aft of the bulk cargo compartment. Each valve is operated by three electric motors, which are independently controlled by one of the two automatic systems or the manual system.
Each outflow valve can be closed from the overhead panel, where its position is displayed.

*Note : In some ABNORMAL/EMERGENCY procedures* R
*where evacuation is requested, the RAM AIR is* R
*selected ON to open OUTFLOW valves. When the* R
*pressurization system is being operated in the* R
*manual mode, the RAM AIR switch does not* R
*control the OUTFLOW valves and does not depressurize* R
*the aircraft.* R

Mod : 3881 + 4765

## PRESSURE CONTROL

*Preflight*

Since the pressure control is fully automatic, the crew action is reduced to setting the LANDING ELEVATION selector and to checking the indications and switch settings on the CABIN PRESS panel.

*Prepressurization*

Before takeoff, in the following configuration :

- aircraft on the ground (landing gear shock absorbers compressed)
- two engines running (oil pressure normal)
- one throttle control lever beyond 22°.

The automatic system, operating the regulating valves ensure the cabin pressurization at a rate of – 500 ft/mn until the cabin ΔP reaches 0.22 PSI.

15 seconds after takeoff (shock absorbers extended), prepressurization signals are cancelled, normal pressure control is started through the active system.

*Inflight Regulation*

- Generally :

  The cabin altitude is regulated towards the theoretical cabin pressure altitude determined by the controller, or to the landing field elevation, whichever is the higher.

The △P increases with the increase of pressure altitude up to the operating ceiling.

When the theoretical altitude is higher than the landing elevation, the rate of change is the lowest of the two following values :

- RATE theoretical
- RATE limit (selected on the RATE LIMIT selector)

When the landing elevation is higher than the theoretical altitude the rate of change is the RATE limit.

In the particular case of :
– landing elevation selected before takeoff is lower than T.O. elevation and
– the rate of climb of the aircraft is lower than 750 ft/mn for more than 1 minute,
the cabin altitude starts decreasing in order to reach either the selected landing elevation or the theoretical cabin altitude (whichever is higher) with a rate of change of 500 ft/mn.
When the T.O. altitude is reached by the theoretical cabin altitude, the system works as in the general case.

*Depressurization*

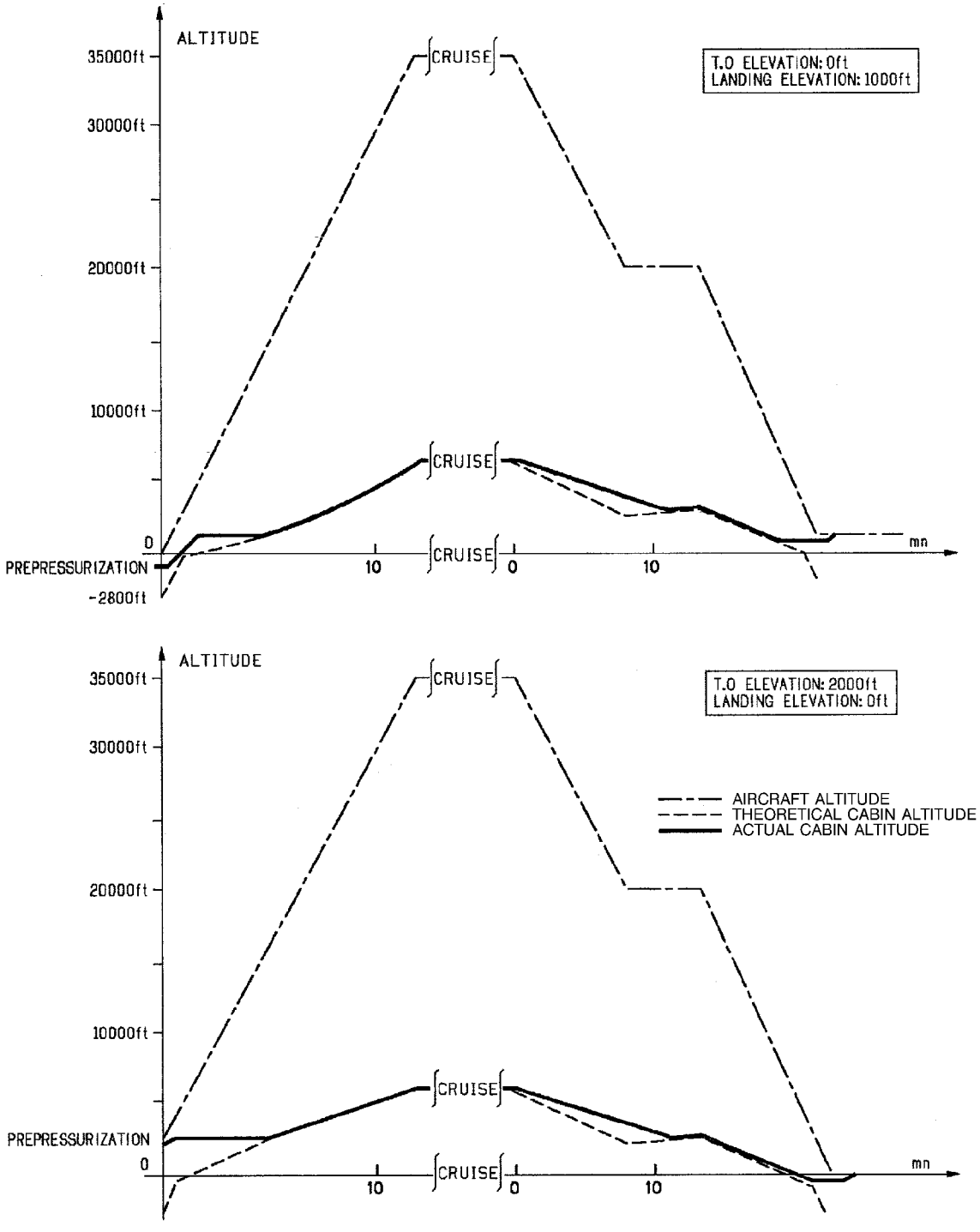
After touchdown, when the depressurization signal – L/G shock absorbers compressed, both throttle levers at idle – is received by the controllers, the cabin is depressurized by the active system at a rate of 500 ft/mn. 45 seconds after touchdown both outflow valves will completely open for full depressurization.

RATE LIMIT SETTING

| CABIN ALTITUDE | SELECTOR POSITION | | | |
|---|---|---|---|---|
| | MIN | **NORM** | HI | MAX |
| Increase | + 170 ft/mn | + 850 ft/mn | + 1130 ft/mn | + 1670 ft/mn |
| Decrease | — 70 ft/mn | — 350 ft/mn | — 470 ft/mn | — 1170 ft/mn |

Mod : 3881 or 5282 or (3881 + 5282)

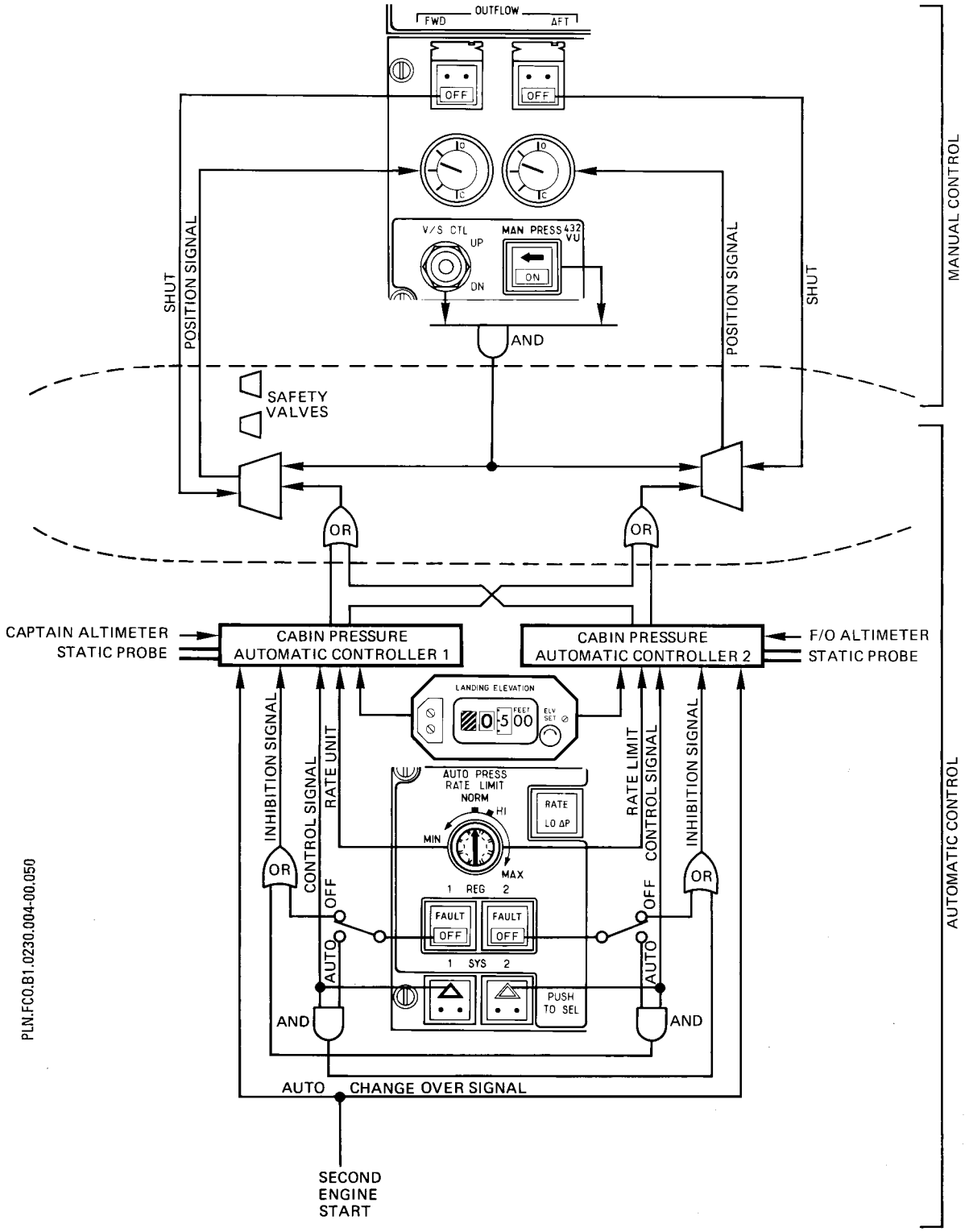
## TYPICAL CABIN ALTITUDE PATTERNS




B0FC-01-0230-003-A100AA - R

Mod : 3881 or 5282 or (3881 + 5282)

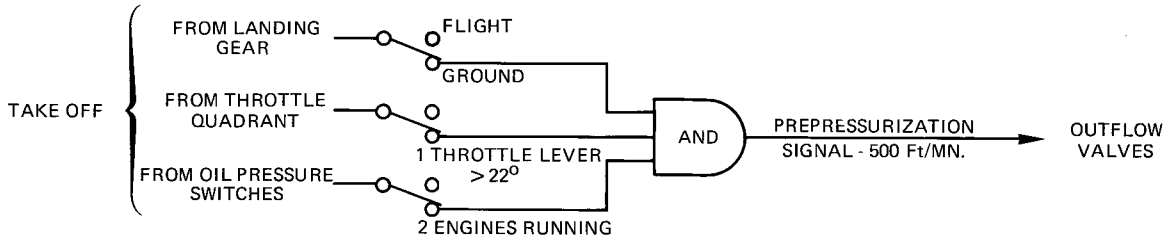
## PRESSURIZATION CONTROL LOGIC



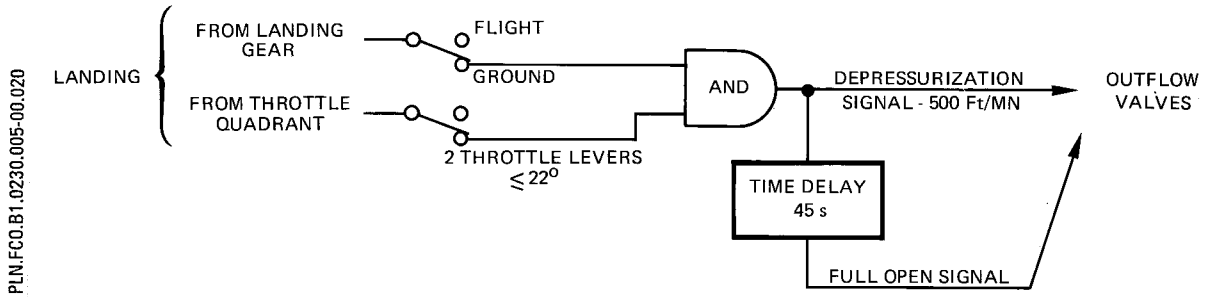

R
R

Mod. : 3881 + 4765 Vers. : All Eng. : All

## PREPRESSURIZATION LOGIC



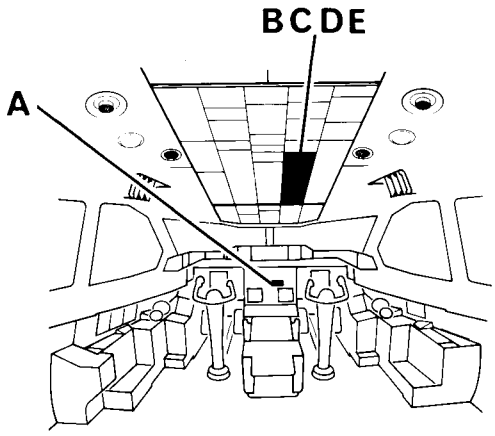

## DEPRESSURIZATION LOGIC

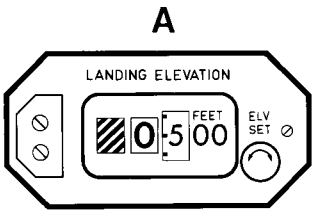



PLN.FCO.B1.0230.005-00.020

Mod. : 3881 Vers. : All Eng. : All

## LOCATION OF CONTROLS



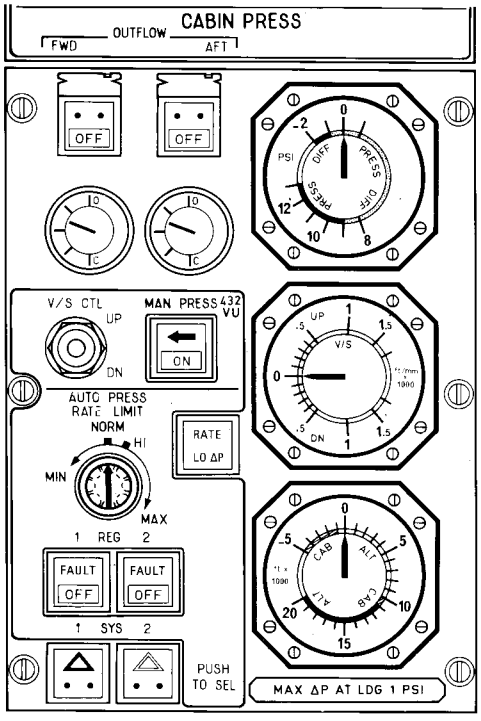




**E**
INDICATIONS

**B**
OUTFLOW VALVES

**D**
MAN PRESS

**C**
AUTO PRESS

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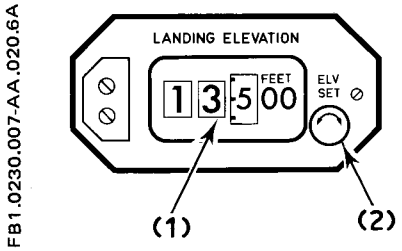
Mod. : 3881 + 4765 Vers. : All Eng. : All

## A. LANDING ELEVATION SELECTOR




### (1) LANDING ELEVATION Counter

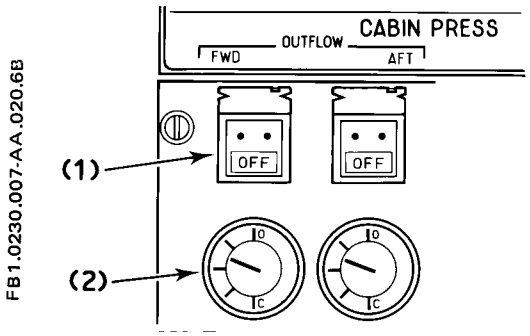
The setting of the landing elevation is displayed in hundreds, thousands and tenthousand feet.

### (2) ELV SET Knob

The rotation of the knob sets the landing elevation.

## B. CABIN PRESS PANEL

– Outflow Valves.




### (1) OUTFLOW Pushbutton Switches (guarded)

The pushbutton switches are operated to close the related valves if required. When both pushbutton switches are selected OFF, (used for ditching), the two outflow valves, the two pack valves, the overboard extract valve, the ram air inlet, and the safety valves are controlled closed.

- **Normal (Pushbutton Switch pressed-in)**

  The valve is controlled by the operating control system.

- **OFF (Pushbutton Switch released out)**

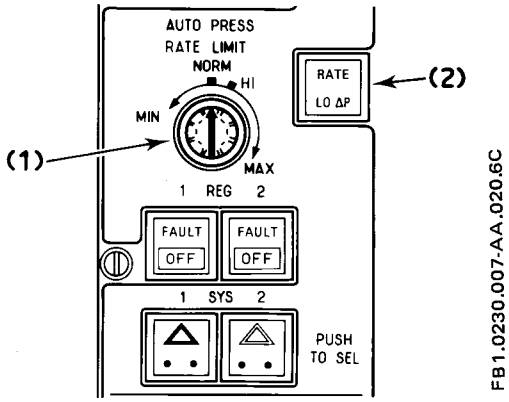
  The light illuminates.
  The valve is closed.

### (2) OUTFLOW VALVE position indicator :

Indicates the outflow valve position.

## C. CABIN PRESS PANEL

– Auto Press




### (1) RATE LIMIT Selector

Selects the limiting rate of change in cabin altitude to any value between MIN and MAX.

- **MIN**
  Rate of change limits + 170 ft/mn and – 70 ft/mn.
- **NORM**
  Rate of change limits + 850 ft/mn and – 350 ft/mn.
- **HI**
  Rate of change limits + 1 130 ft/mn and – 470 ft/mn.
- **MAX**
  Rate of change limits + 1 670 ft/mn and – 1 170 ft/mn.

### (2) RATE/LO ΔP Lights

- **RATE**

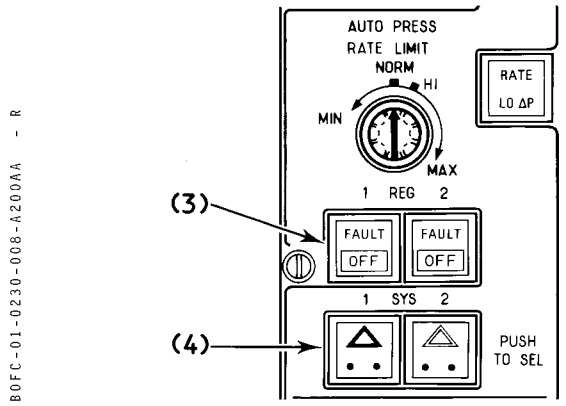
  The light illuminates blue to indicate the AUTO PRESS/ RATE LIMIT selector is not in NORM position.

- **LO ΔP**

  The light illuminates amber, when following conditions are reached :

  1) Differential pressure below 0.7 PSI
  2) Aircraft rate of descent above 2 000 ft/mn
  3) CAB ALT greater than selected altitude plus 1 500 ft.

R Mod. : 3881 or (3881 + 5282)




### (3) REG 1 (2) Pushbutton Switches

Operated to confirm the disconnection between the system controller output and the associated outflow valve torque motor.

- **Normal (P/B switch pressed-in)** :
  The system controller output 1 (or 2) is connected to the outflow valve torque motors provided the green triangle integrated into the SYS 1 (or 2) P/B switch is on.
  The pressure control system 1 (or 2) ensures pressure control.
- **OFF (P/B switch released-out)** :
  The system 1 (or 2) is no longer operative. There is an automatic transfer to the system 2 (or 1) and the triangle integrated into the SYS 2 (or 1) P/B switch comes on green. The OFF light comes on white.
  *Note : When both regulators are on OFF position, the message « CAB PRESS MAN CTL » is displayed on MEMO page.*
- **FAULT** :
  The light comes on amber in the event of :

  system 1 (or 2) control failure.

  An automatic transfer to the system 2 (or 1) is performed.
  Illumination of the FAULT light is associated with ECAM activation.
  The light goes off when the REG 1 (or 2) P/B switch is selected OFF.

### (4) SYS 1 and SYS 2/PUSH TO SEL Momentary Action Pushbutton Switches

If SYS 1 (SYS 2) P/B switch is momentarily pressed, this allows to select manually the active system for pressurization control provided the associated REG P/B switch is pressed-in (Normal) and the integrated FAULT light is off.

The triangle integrated into the selected P/B switch comes on green to indicate that the associated system is operative. The activation of a system deactivates automatically the other.

The transfer from one system to the other is automatic :

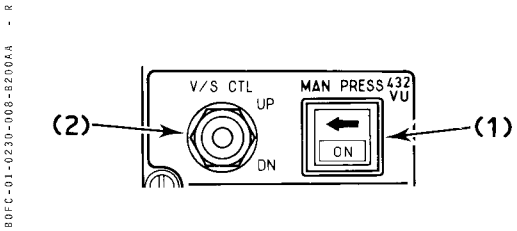
– after second engine start.

– if the associated REG P/B switch is selected OFF.

– if the associated REG FAULT light comes on.

## D. CABIN PRESS PANEL

– Man Press




### (1) MAN PRESS Pushbutton Switch

The P/B switch selects the manual operation mode of the pressure regulating valves.

- **ON (P/B switch pressed-in)** :
  The ON light comes on green and the arrow comes on amber to indicate that the V/S CTL switch is operative and controls the operation of the regulating valves by activating the motors in manual mode.
  Automatic regulation, pressurization and depressurization is no longer available. R R
- **Off (P/B switch released-out)** :
  The V/S CTL switch is inoperative as long as the arrow is not on.
- **Arrow** :
  The arrow comes on amber when :
  – Both OFF lights integrated into REG 1 and REG 2 P/B switches are on,
  – or the MAN PRESS P/B switch is selected ON
  The V/S CTL is operative.

*Note : In this configuration, EXCESS CAB ALT warning and cabin pressure indication on ECAM display are lost.*

### (2) V/S CTL Switch

The switch controls the regulating valve position by activating the motors in manual mode when the amber arrow is ON.

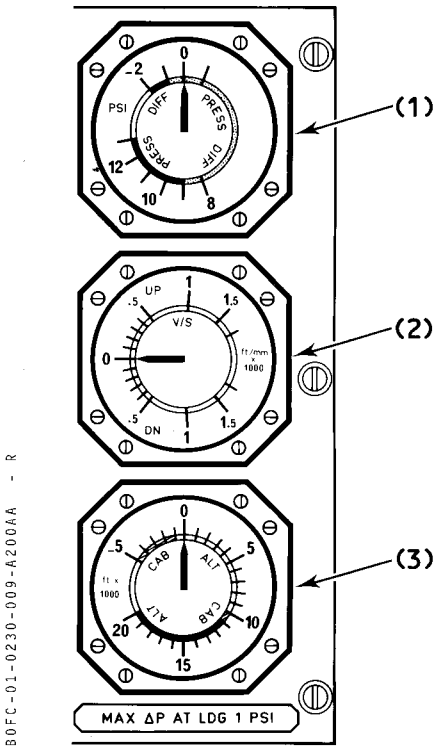
The switch is spring-loaded to neutral.

- **UP** : The valves move towards open position.
- **DN** : The valves move towards closed position.

Mod. : 3881 + 5448

## E. CABIN PRESS PANEL

– Indications




### (1) Cabin DIFF PRESS Indicator

Indicates the differential pressure between cabin and static pressure. From – 2 to 1 and from 8 to 13 the scale is graduated in PSI for reading of limiting values.

### (2) Cabin V/S Indicator

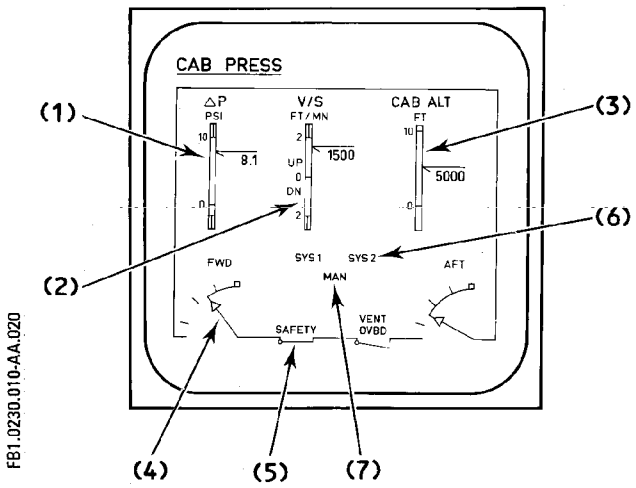
Indicates the direction and the rate of change of cabin altitude in ft/min.

### (3) Cabin Altimeter

Indicates the cabin pressure altitude based on ISA pressure
R 1 013 mb. The tolerance with the ECAM CAB ALT indication
R can reach +/– 790 ft.

Mod. : 3881 + 4765

## SYSTEM DISPLAY




### (1) Cabin Differential Pressure Indication

Indication comes on green. It flashes when $\Delta P \geq 8.6$ PSI.
Indication comes on amber when $\Delta P \leq -1$ PSI or $\Delta P \geq 10$ PSI.

### (2) Cabin Vertical Speed Indication

Indication comes on green. It flashes when V/S ≥ selected V/S + 50 %.
Indication comes on amber when V/S ≤ – 2 000 ft/mn or V/S ≥ 2 000 ft/mn.

### (3) Cabin Altitude Indication

Indication comes on green.
Indication comes on red when cabin altitude is above 10,000 ft.

*Note : This information is given on the CRUISE page in a digital form.*

### (4) FWD (or AFT) Regulating valve position indication

The indication is given in percent.
If flashes when the difference between the two regulating valve is greater than 40 %.
If becomes amber above 95 %.

### (5) Safety valve position indication :

R

: the two safety valves are not open.

: one at least of the two safety valves is open. R R

### (6) SYS 1 (or 2) indication :

The indication is
– green when the system is NOT FAULT and ACTIVE,
– amber when the system is FAULT or OFF,
– suppressed when the system is ON and NOT FAULT but NOT ACTIVE.

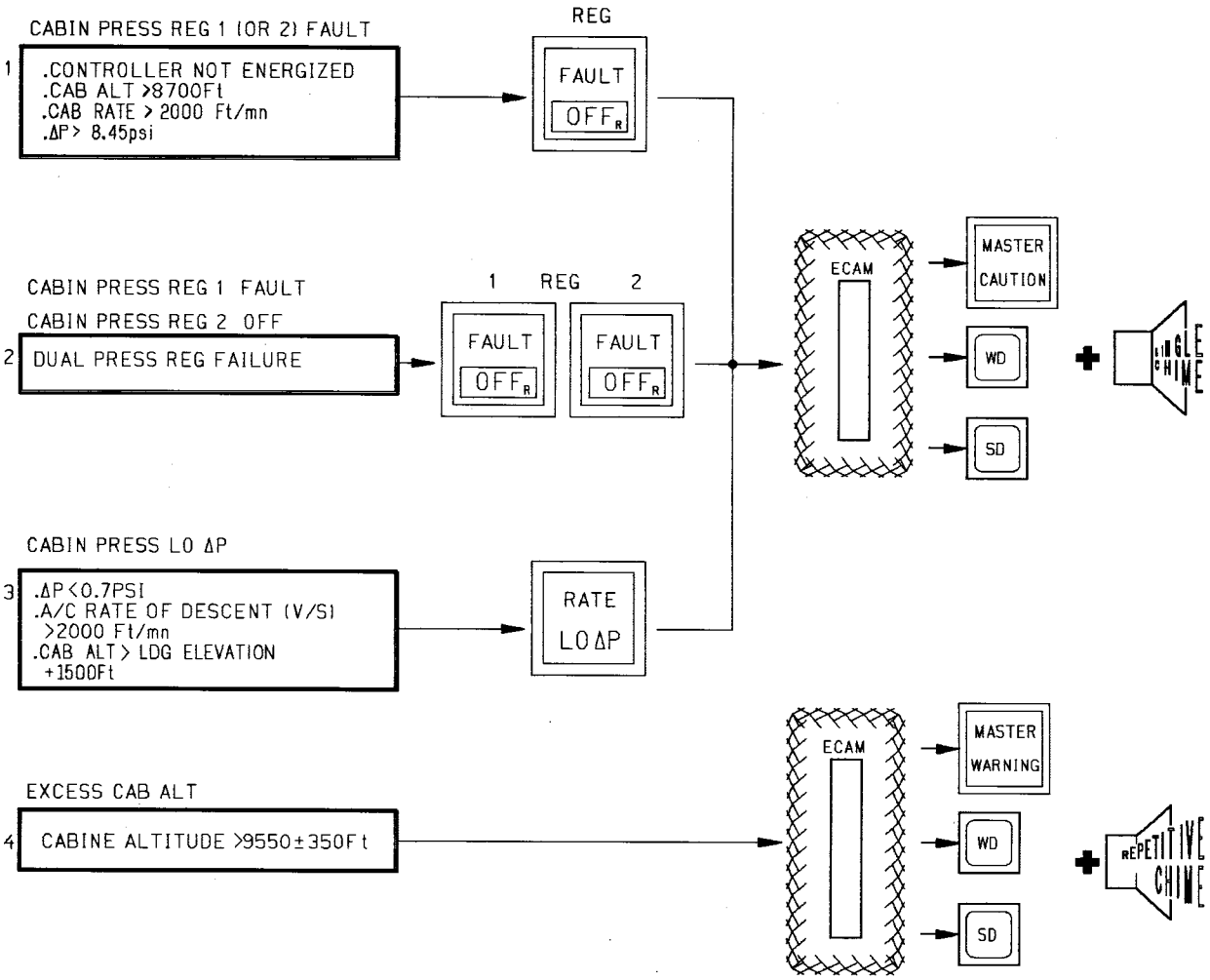
### (7) MAN indication (white)

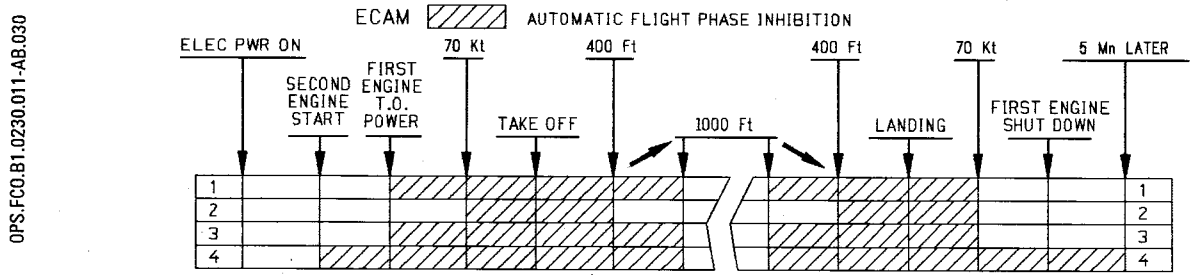
Displayed when the two automatic systems are FAULT or OFF.

Mod. : 3881

## WARNING LOGIC

LOCAL INDICATIONS

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Mod. : 3881 + 5051

## GENERAL

Electric and electronic equipment as well as lavatories and galleys are ventilated by an ambient/air conditioning mixed airflow, which is, most of the time, blown by a fan, upstream of the equipment and then, extracted by, either the cabin differential pressure or a fan.

## ELECTRIC AND ELECTRONIC EQUIPMENT VENTILATION

Avionics compartment ventilation is provided :

- for most of the main equipment racks, the radar transceiver, the IRS, the main instrument panels, the center pedestal and the overhead panel, by across or around the equipment, and extraction via appropriate outlet.
- for the radar indicators and the FCU panel, by air only.
- for the circuit breaker panel and various components located under the floor, by extraction of ambient air.

### BLOWERS

Two blowers are installed to provide for ventilation airflow. Only one blower is operating at a given time. The air used for blower ventilation is taken from the underfloor area, below the flight compartment.

*On the ground without air conditioning :*

Exterior air entering through the open avionics compartment door.

*On the ground with air conditioning on and in flight :*

Air coming from the flight compartment and cabin. Supplementary ventilation is provided by fresh air supplied from a tapping in the flight compartment air duct.

The suction air for the blowers is silenced and passed through a dust separator and a filter.
The blowers operate at two different speeds.

The blower operation is fully automatic ; switch over between the two blowers is automatically achieved at each engine start.

### BATTERY VENTILATION

The battery fan ensures sufficient ventilation when the normal ventilation flow induced by cabin differential pressure is less than 1 PSI.

### EXTRACTION CIRCUIT

The air extracted from the avionics compartment is entirely ducted through the ventilated zones towards, either the three-position overboard valve or the inboard valve.

The air is extracted by a fan which runs in the same conditions as the blowers.

In normal use, the three-position overboard valve and the inboard valve function automatically :

*On the ground, engines not running :*

The three-position overboard valve is fully open.
The inboard valve is closed.

*In flight, or on ground engines running :*

The three-position overboard valve is fully closed.
The inboard valve is open.

When the avionics compartment ventilation airflow is not sufficient, the three-position overboard valve can be partially opened.

## LAVATORY AND GALLEY VENTILATION

Individual ventilation in each lavatory and galley is provided from the main air distribution system through outlets which are adjustable in direction and flowrate.

Normal ventilation of the lavatories and galleys is provided from the ambient air in the cabin with extraction through the lavatories and toilet bowls, and over the galleys to the cabin ceiling, then directly overboard via a venturi.

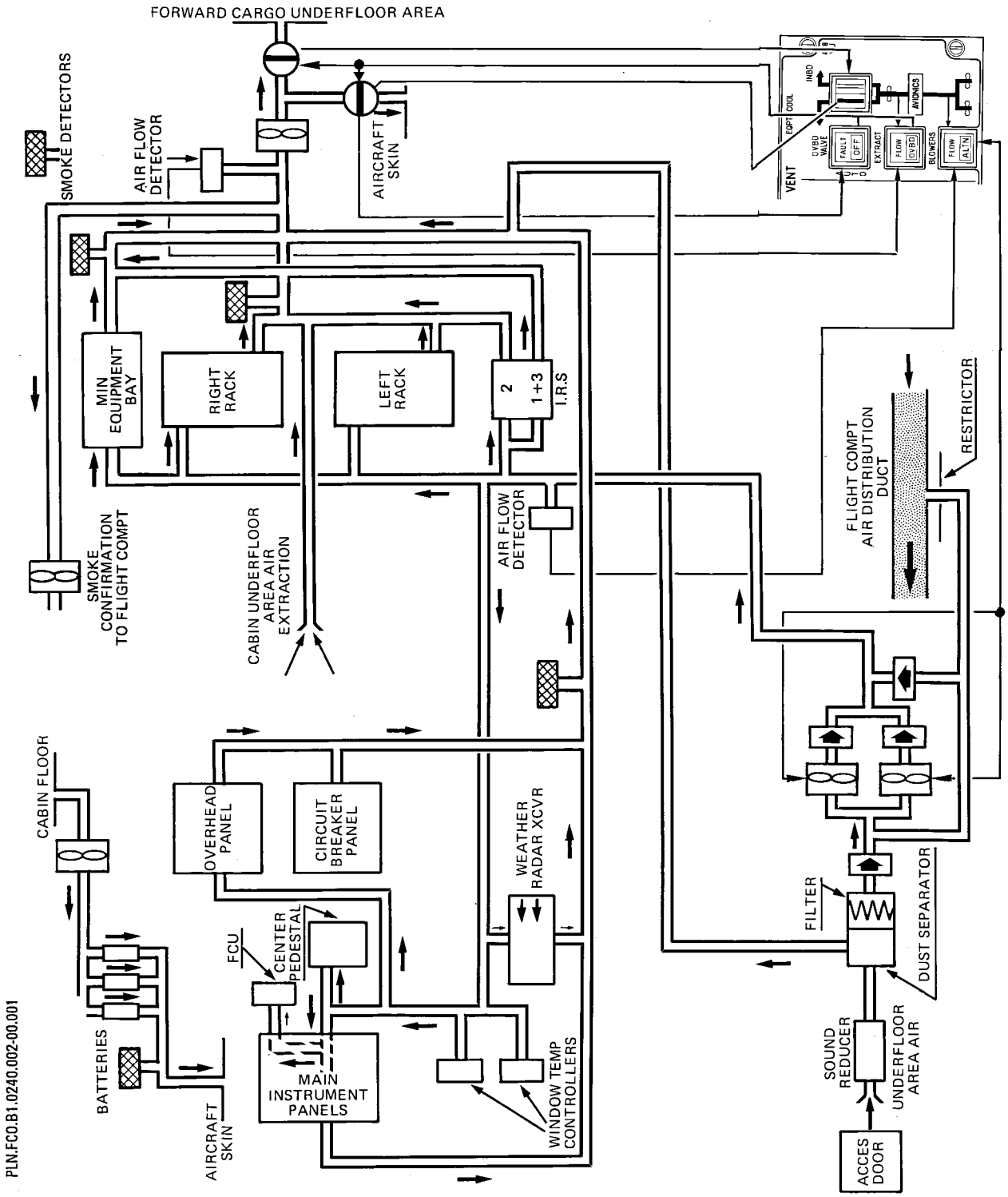
## VENTILATION OF OTHER UNDERFLOOR AREAS

Ventilation of other underfloor areas, such as the areas over the wing box, and aft of the bulk cargo compartment is provided by exhausted cabin air. There are no systems, as such, to force ventilate this area.

The aft cargo compartment has no forced ventilation or heating system. However, natural ventilation through flaps in the flexible wall between this compartment and the bulk cargo compartment, is possible.

Vers. : All Eng. : All

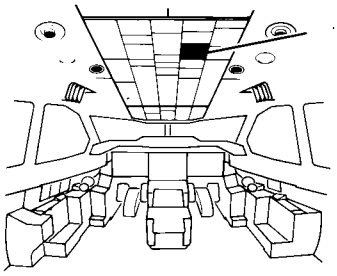
## AVIONICS VENTILATION LAYOUT

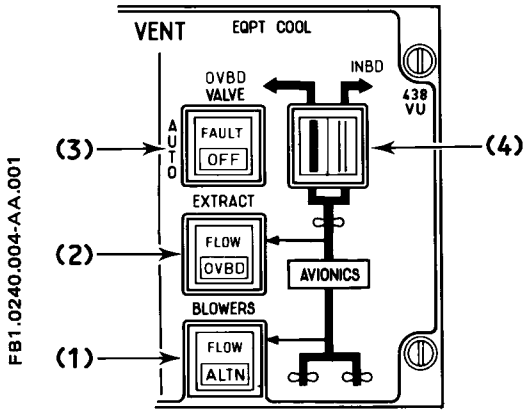



Vers. : All Eng. : All

## A. VENT PANEL

– Eqpt Cool




### (1) BLOWERS Pushbutton Switch

Enables to select manually the active blower.

- **Normal (P/BSwitch Pressed-in)**

  One of the two blowers is continuously running. The transfer from one blower to the other is automatic at each first engine start.

R

- **ALTN (P/B Switch Released-out)**

  Confirms the activation of the other blower after an automatic transfer due to a failure. Further retransfer, automatic or manual, is inhibited. The ALTN light comes on white.

- **FLOW**

  The light is triggered by an airflow detector in the blower ventilation duct. The detector has two levels, which correspond to the two blower speeds.

  The FLOW light comes on amber when the airflow in the blower duct is not sufficient for the actual demand. When the P/B switch is in normal position an automatic transfer is performed to the other blower.

  Illumination of the FLOW light is accompanied by ECAM activation, and on ground, by an external horn.

  The FOW light goes off after confirmation of automatic transfer by selecting the BLOWERS P/B switch ALTN.

### (2) EXTRACT Pushbutton Switch

Controls the three-positions overboard valve and inboard valve operation according to :

– the ground or flight configuration of the aircraft
– the OVBD VALVE P/B switch position.

- **Normal (P/B Switch Pressed-in)**

  The extraction fan runs continuously and has two levels of speed depending on the flight or ground configuration.
  The OVBD VALVE P/B switch is normally selected AUTO.

  *On the ground (engines not running)*

  The three positions overboard valve is fully open.
  The inboard valve is fully closed.

  *In flight (or on ground engines running)*

  The three positions overboard valve is fully closed.
  The inboard valve is fully open.

- **OVBD (P/B Switch Released-out)**

  The three positions overboard valve is partially open.
  The OVBD light comes on white.
  The INBD valve is fully closed.
  The extract fan runs at low speed.

- **FLOW**

  The light is triggered by an airflow detector in the extraction fan duct. The detector has two levels which correspond to the two fan speeds.

  The FLOW light comes on amber to indicate the airflow in the fan duct is not sufficient for the actual demand.

  Illumination of the FLOW light is accompanied by ECAM activation.

  The FLOW light goes off when the airflow is sufficient.

### (3) OVBD VALVE Pushbutton Switch

The switch is operated to close the three positions overboard valve if required. In normal configuration the switch is selected AUTO.

- **AUTO (P/B Switch Pressed-in)**

  The three positions overboard valve position depends on the EXTRACT P/B switch position.

- **OFF (P/B Switch Released-out)**

  The three positions overboard valve is closed. The OFF light comes on white.

Code : 0240G

- **FAULT**

The light comes on amber to indicate the three
R positions overboard valve remains open after engine
R starting.

Illumination of the FAULT light is accompanied by ECAM activation.

The FAULT light goes off when the OVBD VALVE P/B
R switch is selected OFF, provided the three positions
R overboard valve is closed.

### (4) OVBD VALVE/INBD Annunciator

The double indication annunciator displays the path taken by the extraction airflow.

- **OVBD VALVE Flowbar On, (INBD Flowbar Off)**

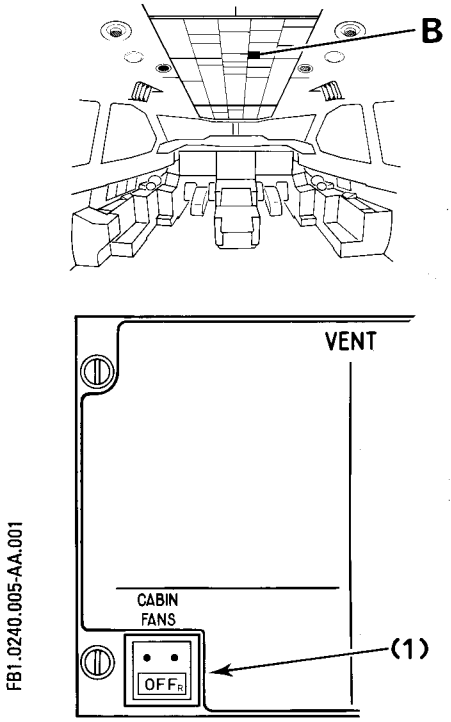
The airflow goes directly overboard through the three
R positions overboard valve which is fully or partially
R open.

- **INBD Flowbar On (OVBD VALVE Flowbar Off)**

The airflow goes directly in the cargo compartment
R through the inboard valve.

## B. VENT PANEL

– Cabin Fan




### (1) CABIN FANS Pushbutton Switch

Controls the activation of fans which allow a part of the cabin air to be recirculated.

- **On (P/B Switch Pressed-in)**

The fans are running and the cabin air is recirculated.

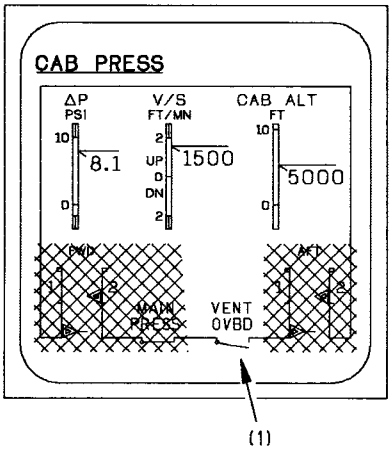
- **OFF/R (P/B Switch Released-out)**

The fans are stopped. The OFF/R light comes on white.

Vers. : All Eng. : All

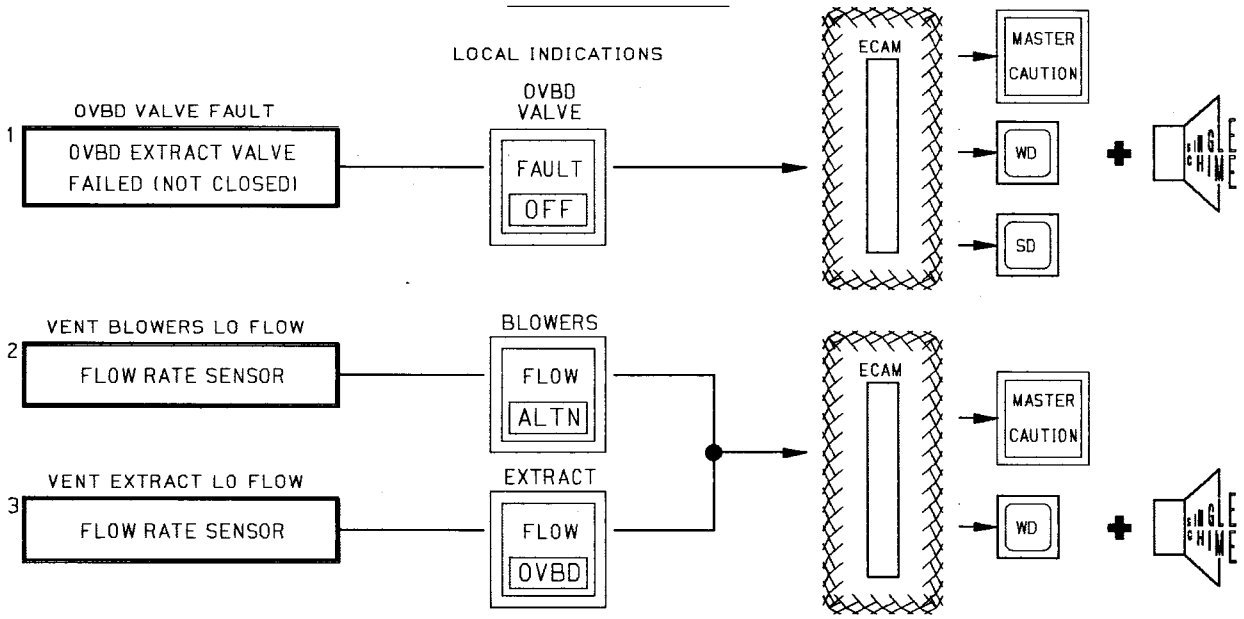
## SYSTEM DISPLAY

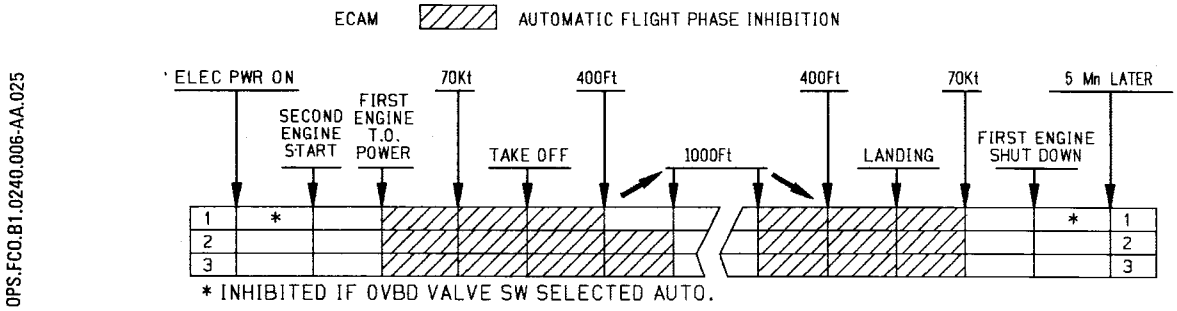
### (1) VENT OVBD Indication




| | | |
|---|---|---|
| VENT OVBD | White | OVBD valve is fully closed |
| | Green | |
| VENT OVBD | White | OVBD valve is partially open |
| | Green | |
| VENT OVBD | White on ground amber in flight | OVBD valve is fully open |
| | Green on ground amber in flight | |

## WARNING LOGIC

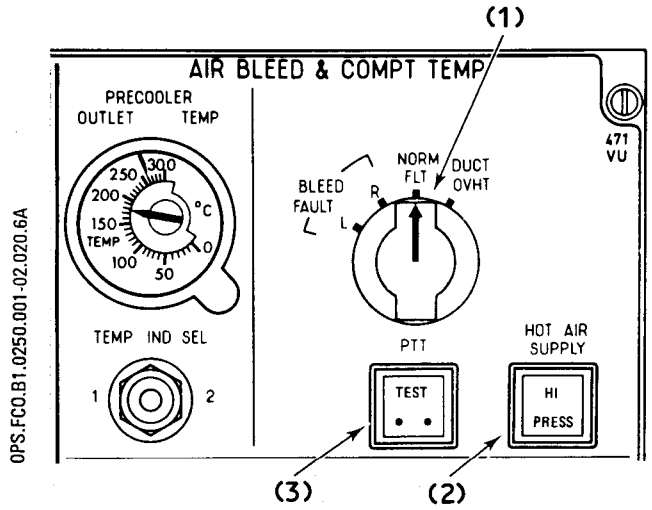



OPS.FCO.B1.0240.006-AA.025

Mod. : 5051

## A. AIR BLEED and COMPT TEMP PANEL




### (1) AIR BLEED and COMPT TEMP Test Selector Switch

Connects the PTT P/B switch to the warning circuits for test of overheat warning and automatic closure of the hot air supply valve.

### (2) HOT AIR SUPPLY memorized fault annunciator (MFA)

Comes on white, when the pressure in the hot air duct exceeds 12.5 PSI for one minute or more.

### (3) PTT Pushbutton Switch

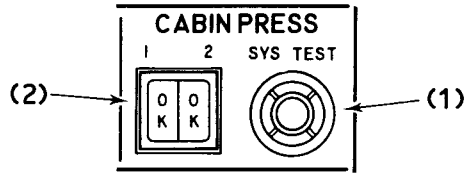
- **TEST**

  The light comes on white, when the test selector switch is not in NORM position.

- **Pressed and held**

  A simulated overheat signal is generated to test the selected overheat warning circuit. After test, systems must be reset.

## B. CABIN PRESS PANEL




### (1) SYS TEST Pushbutton Switch

The pressurization systems are tested one at a time as selected by the SYS 1 or SYS 2/PUSH TO SEL P/B switch on the CABIN PRESS panel.

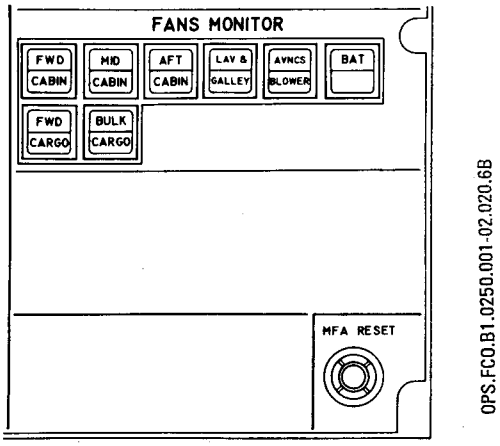
When the P/B switch is pressed and held, the active system is tested :

– Respective OK light comes on white if :
  . Electrical circuit integrity of controller, valves and aircraft is satisfactory.
  . All warning (ECAM) are satisfactory.

### (2) SYS 1 / SYS 2 / OK Annunciator

The light of the active system comes on, when SYS TEST pushbutton switch is pressed, to indicate successful test.

## C. FANS MONITOR PANEL




The memorized fault annunciators (MFAs) come on in case of functional failure of the corresponding fan, i.e : cabin recirculation fans, lavatory and galley fan, avionics blowers and battery fan, forward and bulk cargo fans. MFA's go off when MFA RESET p.b switch is pressed. R R

Mod. : 2989