Single Aisle
TECHNICAL TRAINING MANUAL
GENERAL FAMILIARIZATION COURSE - T4 (CFM 56)
PART 2 OUT OF 2

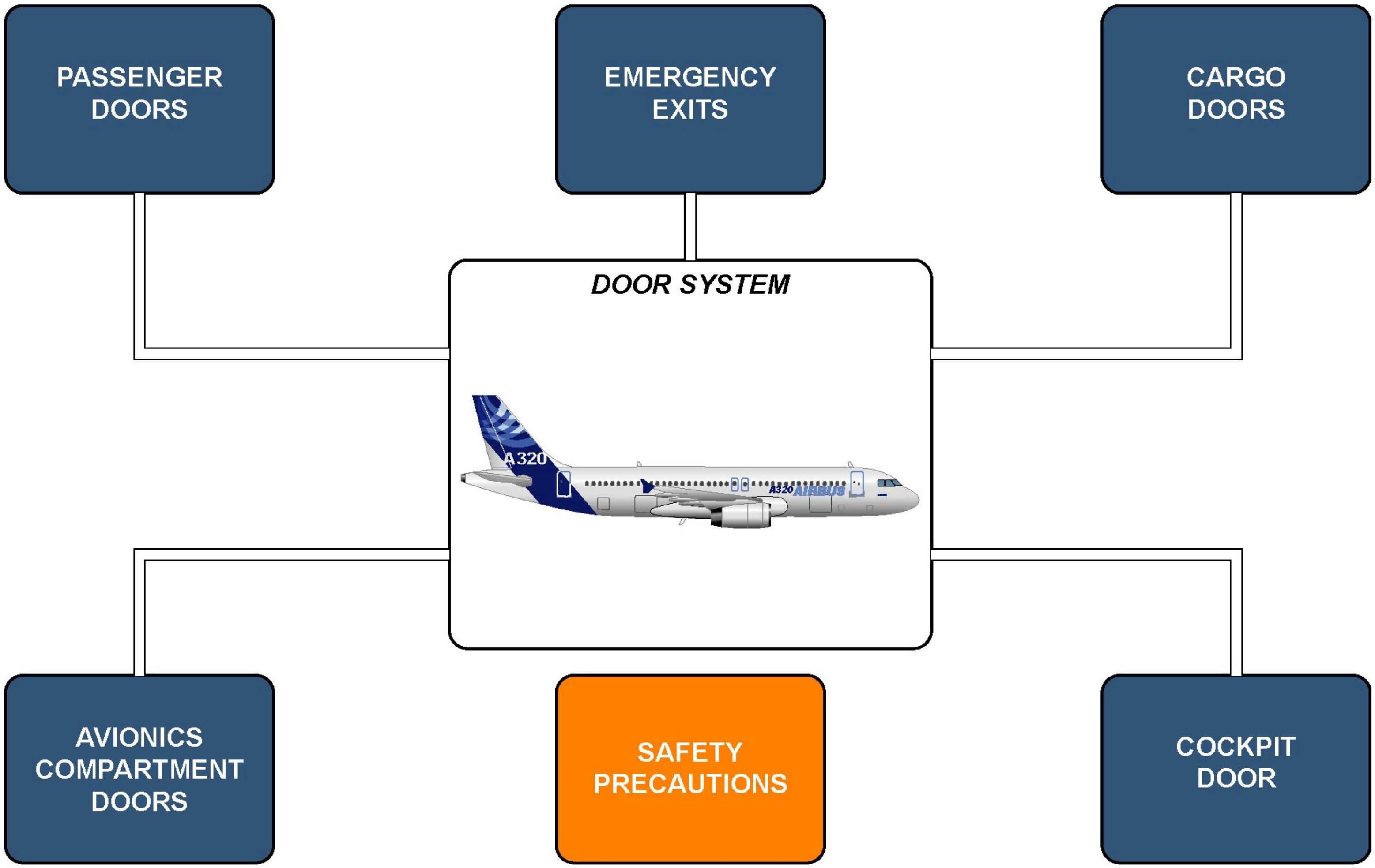
PART 2 OUT OF 2

UAJ09471 - U19T4T0

52 DOORS PRESENTATION (1)

SYSTEM INTRODUCTION

The different doors are:
- passenger doors,
- emergency exits,
- cargo doors,
- avionics compartment doors,
- cockpit door.



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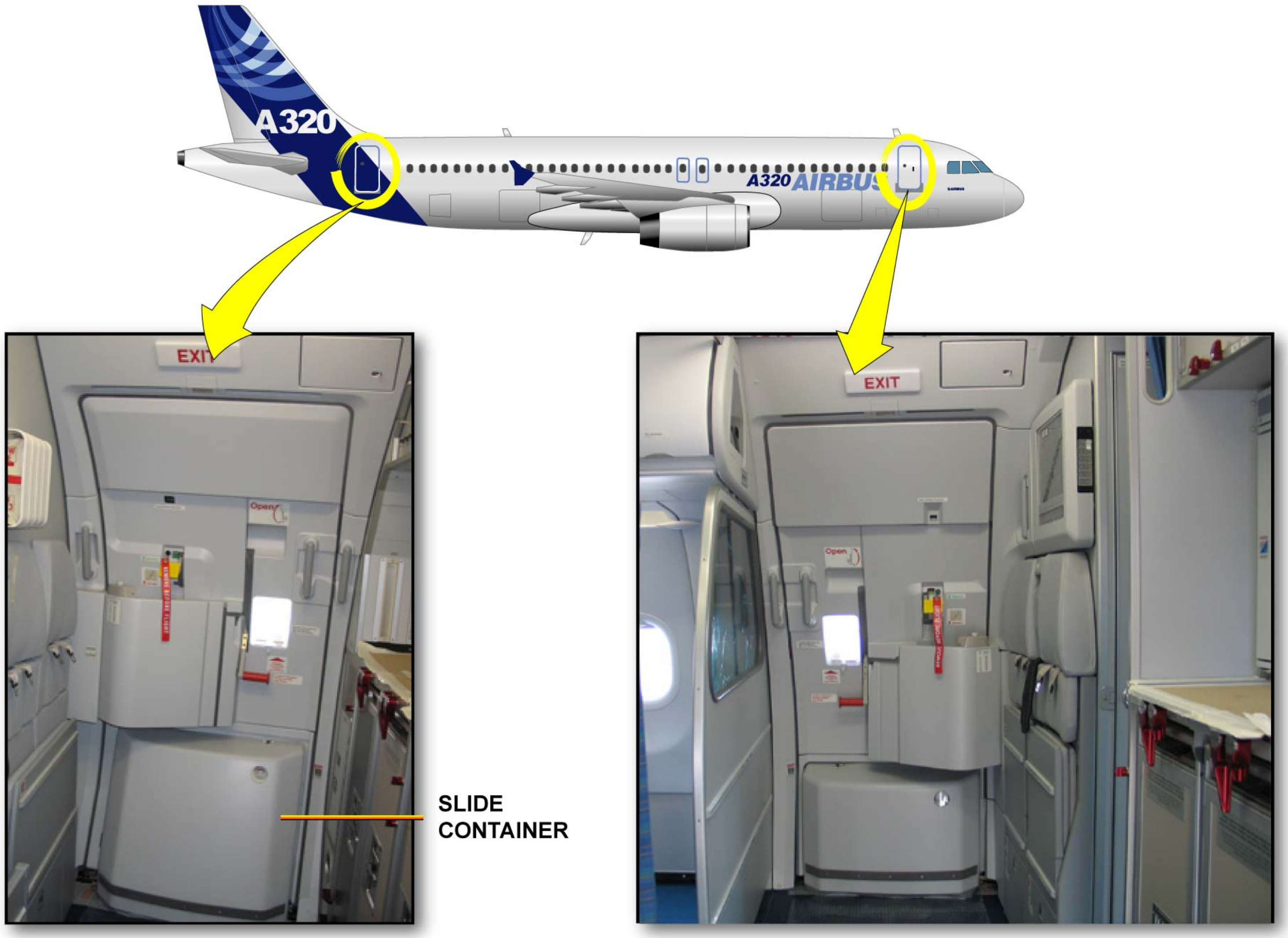
SYSTEM INTRODUCTION

52 DOORS PRESENTATION (1)

PASSENGER DOORS

The single aisle family is equipped with two forward and two aft passenger doors.
The normal door operation is fully manual.
They are plug type doors, which open upward, outward and forward parallel to the fuselage.
The door can be operated from inside or outside the aircraft.
Each door is equipped with an emergency opening system:
- an escape slide or slide raft stowed in a container attached to the inboard lower side of the door,
- a door damping and emergency operation cylinder that assist normal door operation, but in an emergency acts as an actuator for automatic door opening,
- a slide ARMING/DISARMING lever.

When the slide arming lever is in the ARMED position, the slide is connected to the floor.
When the door is opened, the escape slides inflates automatically.
Opening the door from the outside will disarm the door and the escape slide.
The ECAM page indicates the door locking/unlocking and the escape slide/slide raft armed/disarmed condition.



PASSENGER DOORS

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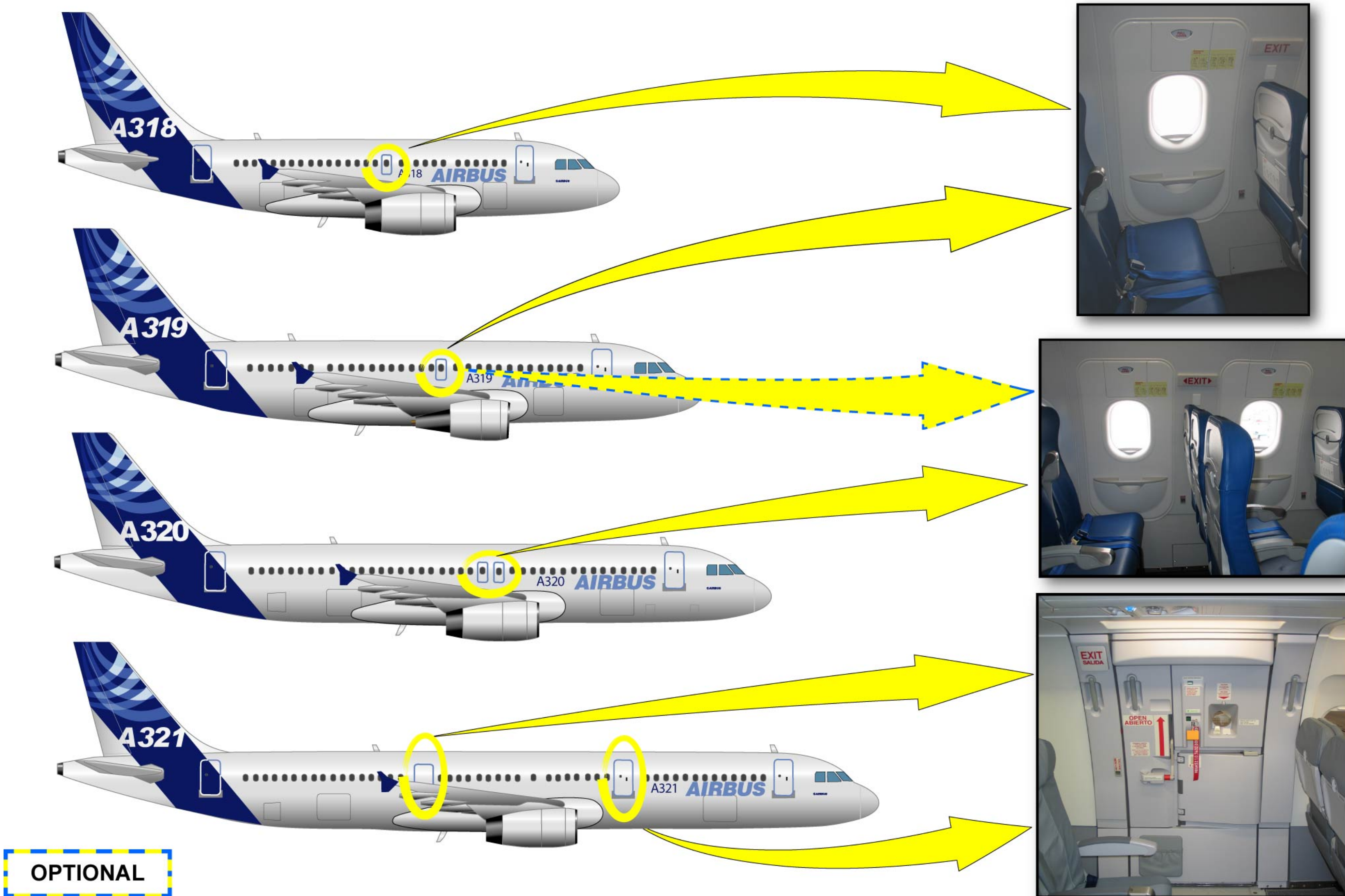
52 DOORS PRESENTATION (1)

EMERGENCY EXITS

The A318 and A319 have two overwing emergency exits (one on each side). The A319 can also have four overwing emergency exits optionally (two on each side).
The A320 has four overwing emergency exits (two on each side).
The A321 aircraft has four emergency exits doors (two on each side) located forward and aft of the wing.
On the A318, A319 and A320 aircraft, for emergency evacuation the exit can be opened from inside or outside the cabin to activate the evacuation system.
For normal operation, they are always armed.
To open the exit for maintenance work, authorized personnel must disarm it from inside the cabin.
The A321 exit can be opened from inside or outside.
These emergency exits are armed in flight but disarmed on ground.



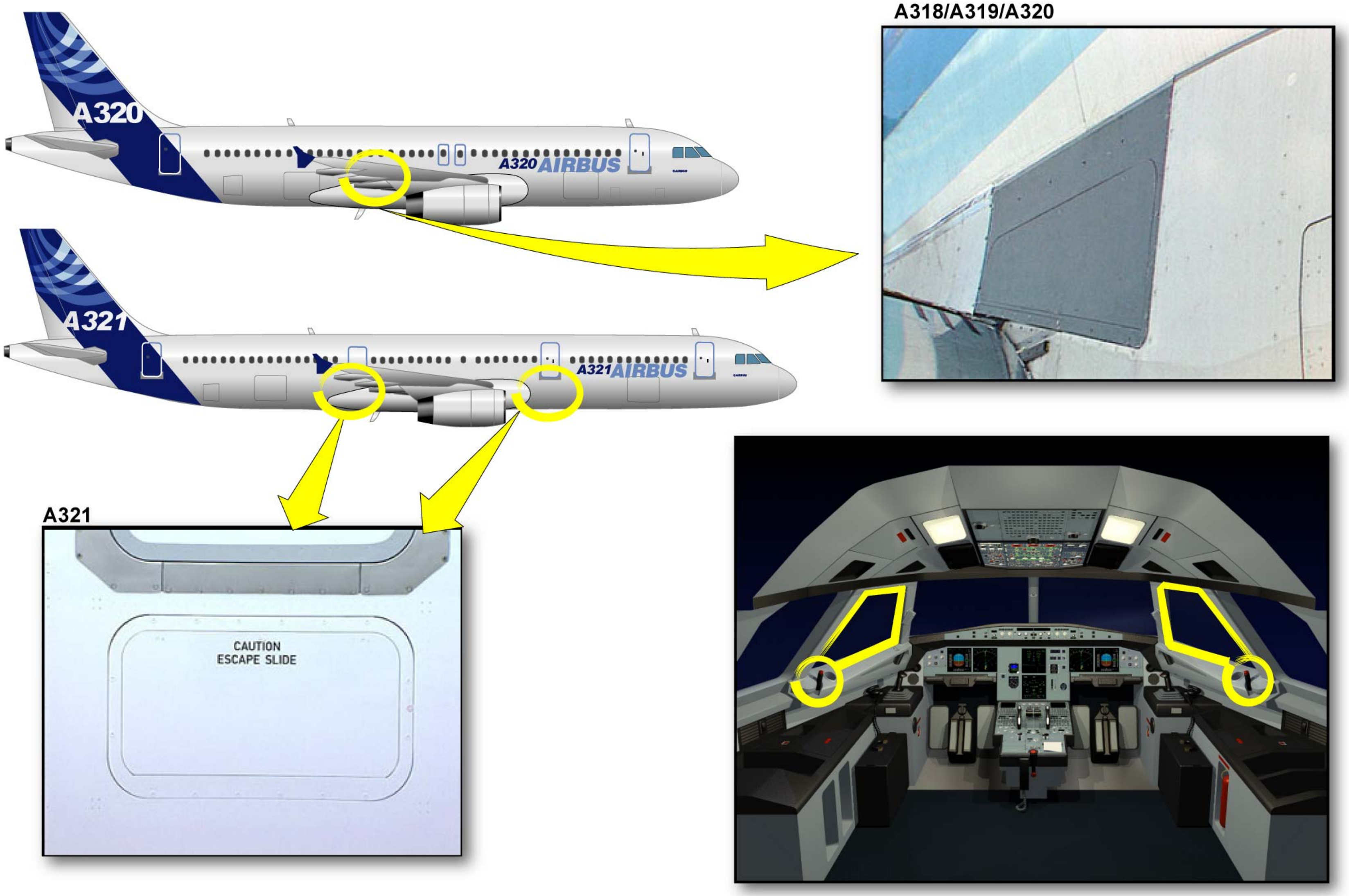
EMERGENCY EXITS

52 DOORS PRESENTATION (1)

EMERGENCY EXITS (continued)

ESCAPE SLIDE AND SLIDING WINDOWS

On the A318, A319 and A320, an overwing escape slide is installed on each side of the aircraft.
Each slide is stowed in a compartment at the wing root.
On the A321, an escape slide packed in a container is installed in the fuselage under each emergency exit.
The slide is deployed automatically as soon as a door is opened in armed configuration.
The ECAM page indicates the emergency exit locked/unlocked and escape slide armed/disarmed condition.
The two cockpit sliding windows, one on each side, provide emergency exit from the cockpit.



EMERGENCY EXITS - ESCAPE SLIDE AND SLIDING WINDOWS

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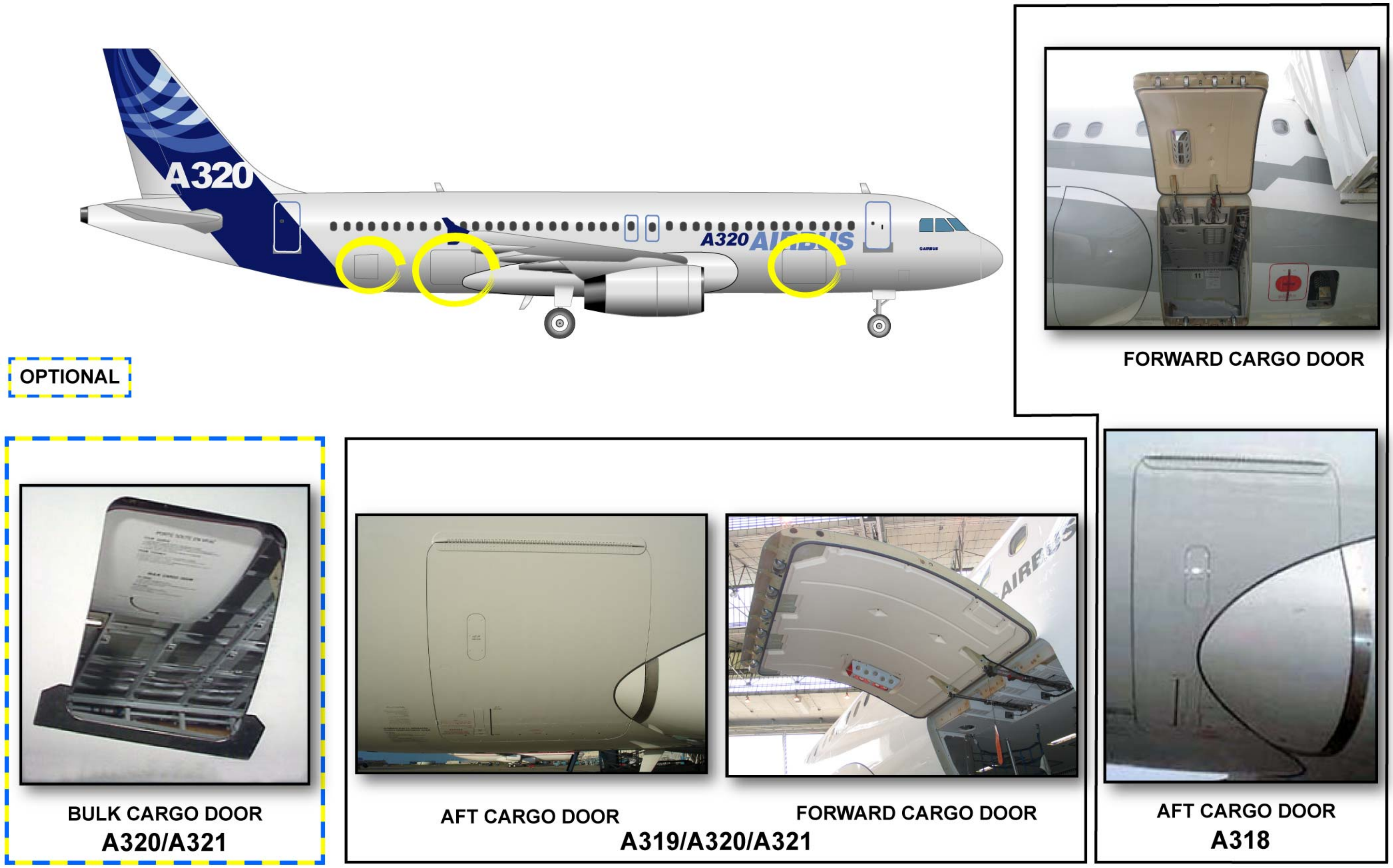
52 DOORS PRESENTATION (1)

CARGO DOOR

The cargo compartment doors, installed on the lower right hand side of the fuselage, give access to the forward and aft cargo compartments.
They open outwards and upwards from the fuselage.
They are manually locked and unlocked by a locking handle on the door.
The operation of the door is hydraulically powered by the yellow electric pump.
In case of electrical failure the door can be opened manually by using a hand pump.
The bulk cargo door is optionally installed for A320 and A321 in the rear of the aft cargo door and gives access to the bulk cargo compartment.
This door is manually operated and opens into the bulk cargo compartment.
The ECAM page indicates cargo doors closed/locked and unlock condition.



CARGO DOOR

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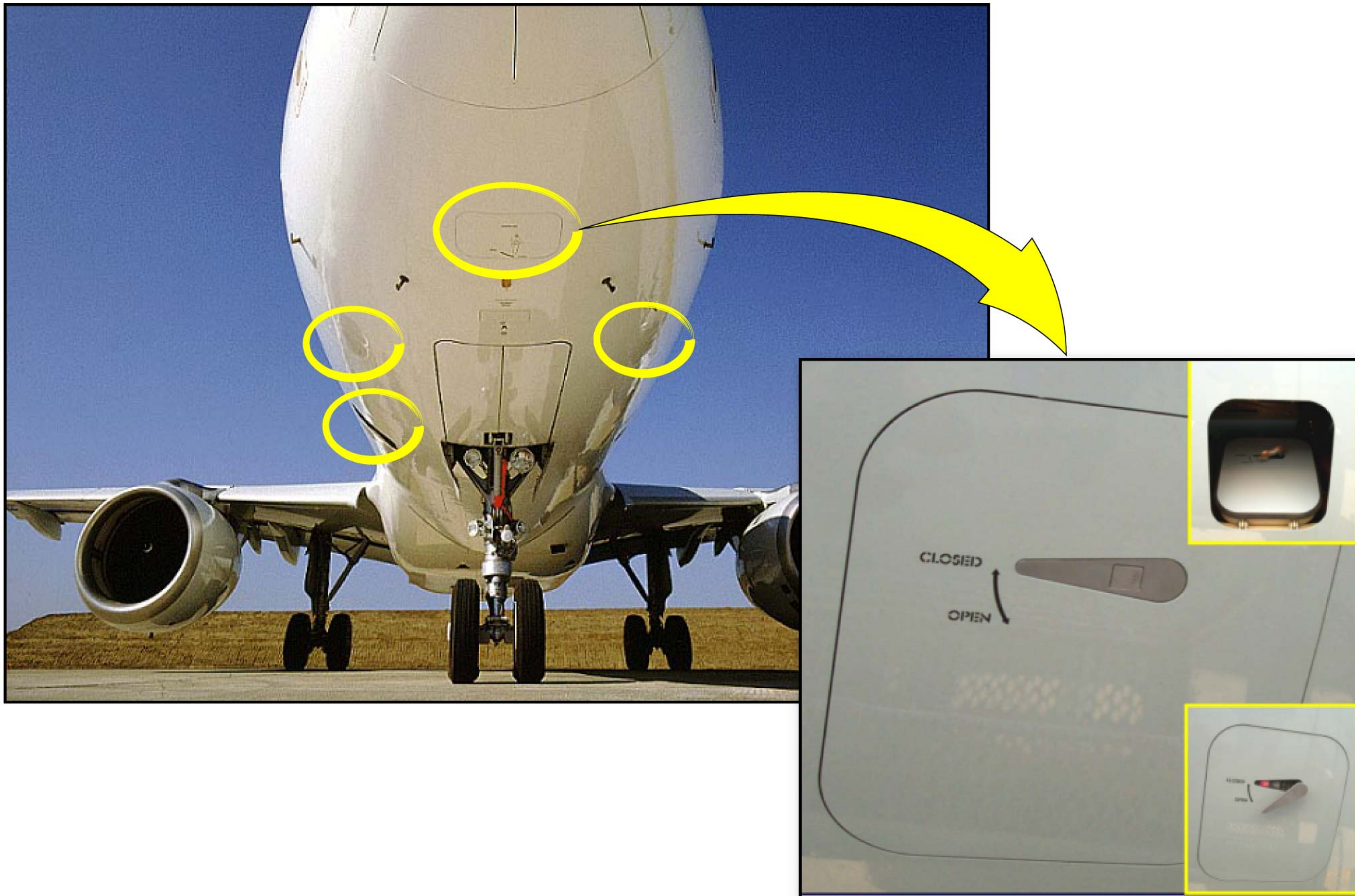
52 DOORS PRESENTATION (1)

AVIONICS COMPARTMENT DOORS

There are four avionics compartment doors in the lower fuselage around the nose landing gear bay.
These doors are manually operated and open inward.
The locking mechanism is identical on each door.
Each avionics compartment door is monitored by a proximity switch, which sends a signal to the ECAM system.



AVIONICS COMPARTMENT DOORS

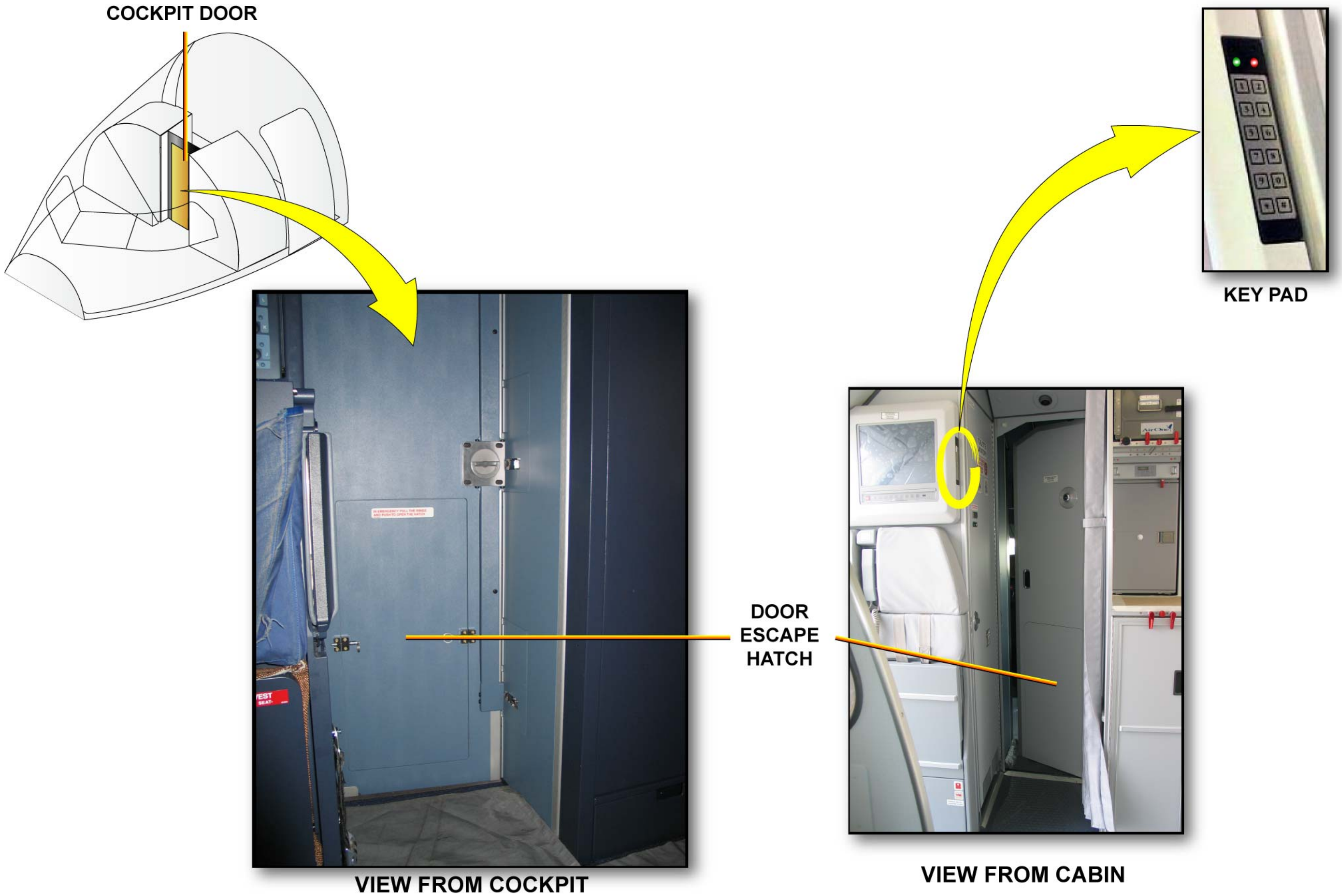
52 DOORS PRESENTATION (1)

COCKPIT DOOR

The cockpit door separates the cockpit from the cabin.

GENERAL

It is an armored and bulletproof door made to prevent a hijacking attempt and protect the flight compartment against an intrusion.
A Cockpit Door Lock System (CDLS) controls its electrical release and prevents an unwanted access into the cockpit.
The door also has a door escape hatch, with two pip-pins which keep the hatch in position.



COCKPIT DOOR - GENERAL

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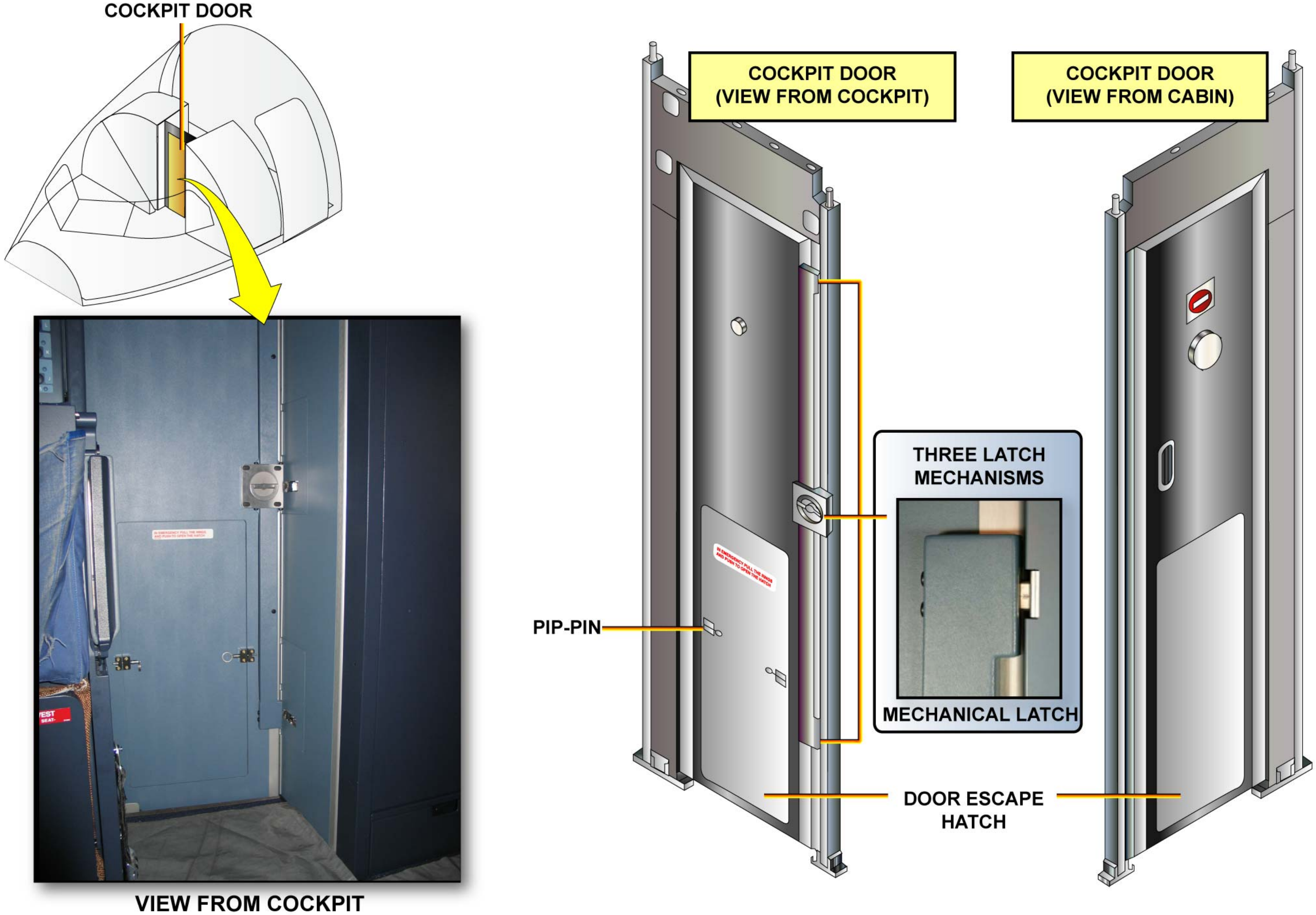
52 DOORS PRESENTATION (1)

COCKPIT DOOR (continued)

DOOR ELEMENTS

The door has an escape hatch which has the same structure as the door. The hatch is manually operable only from the flight deck for pilot emergency exit in case of cockpit door jamming.
Three mechanical latches engage in electrical release strikes actuated by solenoids. The door is always locked when closed and the A/C is powered.
During maintenance activity there is a magnetic door stop to keep the door fully open.



COCKPIT DOOR - DOOR ELEMENTS

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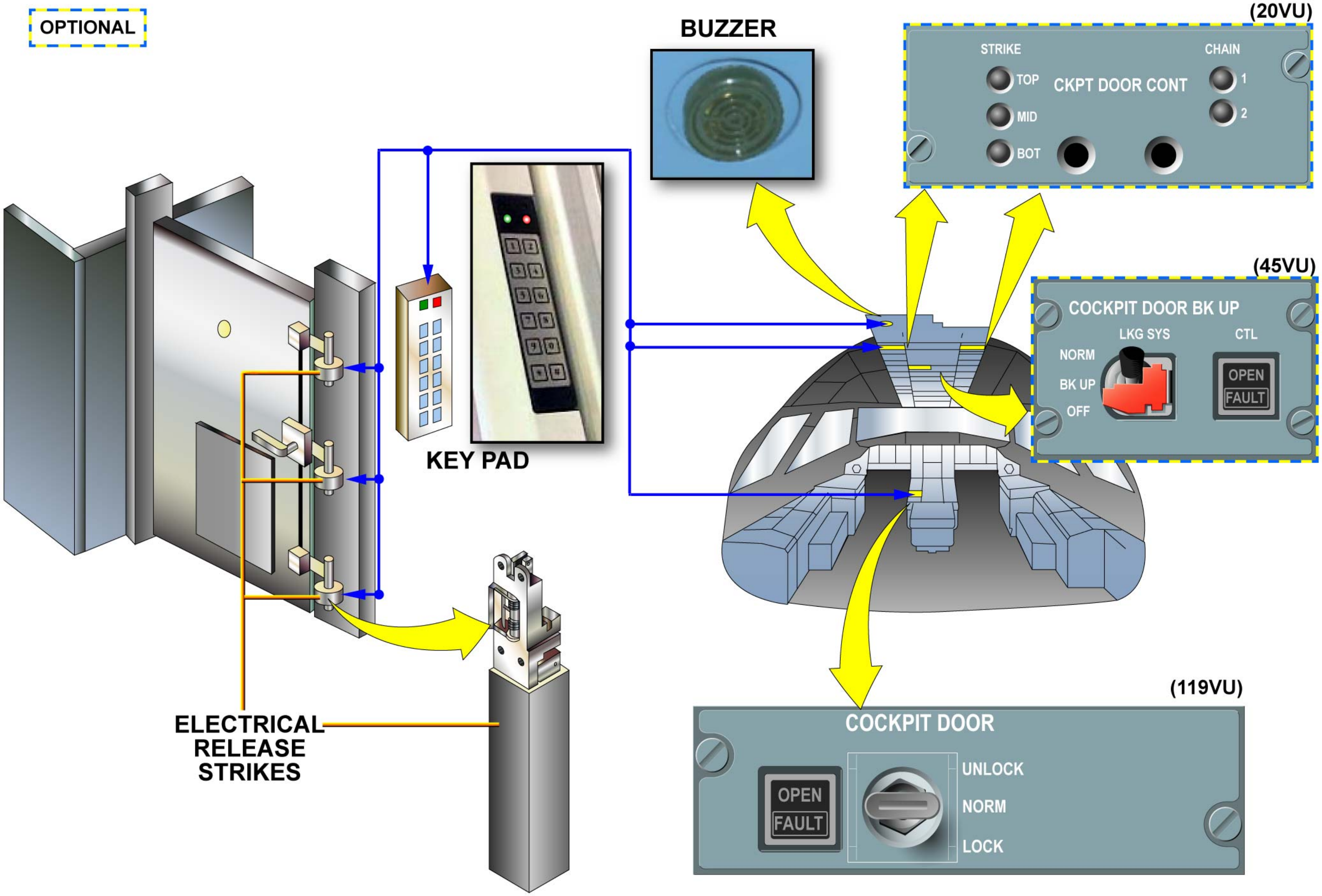
52 DOORS PRESENTATION (1)

COCKPIT DOOR (continued)

COCKPIT DOOR LOCK SYSTEM

The CDLS controls the locking and unlocking of the cockpit door. It also monitors the door locking and unlocking system for faults. The system has different parts:
- the control unit on the overhead panel with an integrated pressure sensor part for cockpit decompression detection and integrated maintenance lights,
- the cockpit door panel on the center pedestal with a toggle switch to control the cockpit door and a fault indicator,
- the buzzer on the overhead panel,
- the keypad in the cabin for cockpit access authorization,
- three electrical release strikes,
- an optional back-up system may be installed to override an inadvertent mal function of the CDLS. It has an additional control unit, and a back-up control panel with a back-up switch and a fault light.



COCKPIT DOOR - COCKPIT DOOR LOCK SYSTEM

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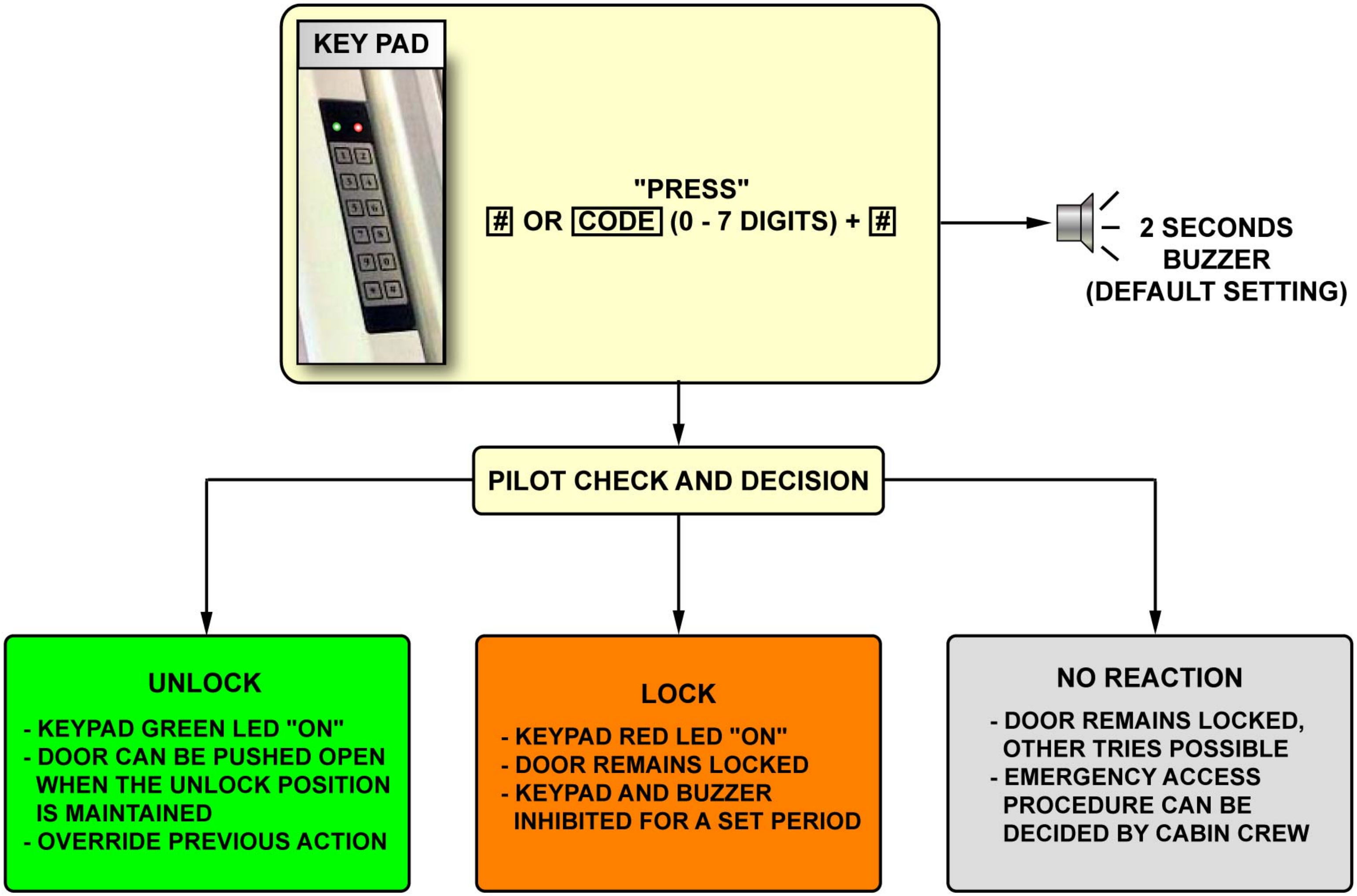
52 DOORS PRESENTATION (1)

COCKPIT DOOR (continued)

OPERATING MODES

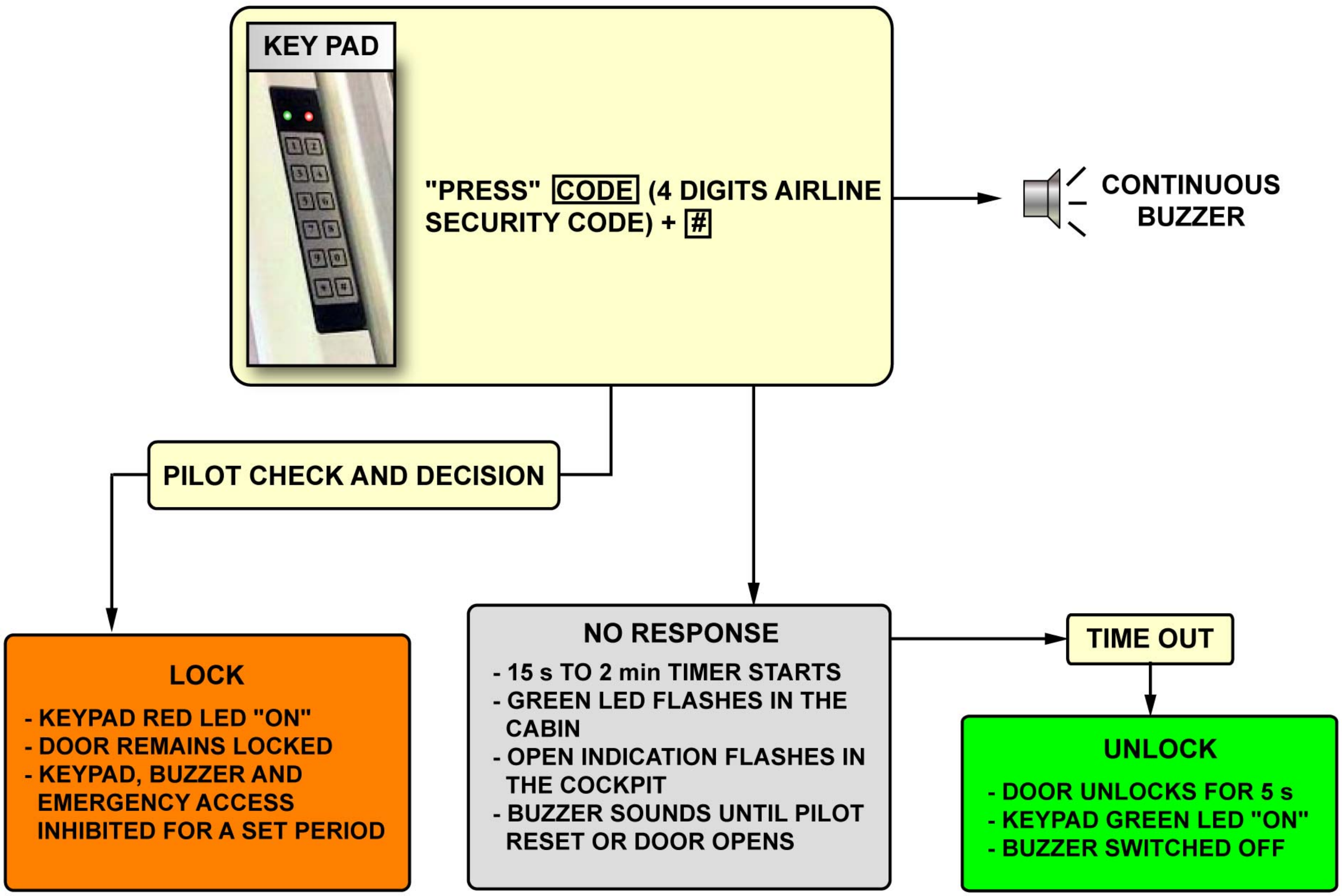
The CDLS has two access modes.
The first access mode is a Routine Access mode triggered by a single P/BSW from the cabin keypad (# key), to request entry in the cockpit via a buzzer.
The request can be allowed or denied via the P/BSW of the cockpit door panel on the center pedestal.
In case of no response, the cockpit door remains closed.
The second access mode is the Emergency Access mode activated by a four-digit code (plus the # key) entered on the keypad.
If the pilots deny the request, the keypad and the buzzer are inhibited for a defined time.
In case of no action from the pilots, the cockpit door unlocks after a preset time.

NORMAL MODE ROUTINE ACCESS



COCKPIT DOOR - OPERATING MODES

EMERGENCY ACCESS MODE



COCKPIT DOOR - OPERATING MODES

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52 DOORS PRESENTATION (1)

CONTROL AND INDICATING

In this topic the door control and indication will be presented.

PASSENGER DOORS

Two different indicating systems are installed on the door:
- a mechanical indicating system,
- an electrical indicating system.

The mechanical indicating are:
- a visual indicator on the top of the door shows if the door is LOCKED or UNLOCKED,
- a visual indicator on the slide arming lever shows if the slide is ARMED or DISARMED.

The electrical indicating are:
- two warning lights installed below the door window,
- they are visible from the inside and the outside.

When a person tries to open the door the white SLIDE ARMED light indicates that the escape slide is in the ARMED mode.
The red CABIN PRESSURE light flashes when there is a residual pressure in the cabin with the slide disarmed.

WARNING: Do not open a door when the aircraft is pressurized. This will cause explosive decompression, and kill or cause injury to persons and material.

NOTE: Note: The A321 emergency exit doors have the same control indicating as the passenger doors.

CONTROL AND INDICATING - PASSENGER DOORS

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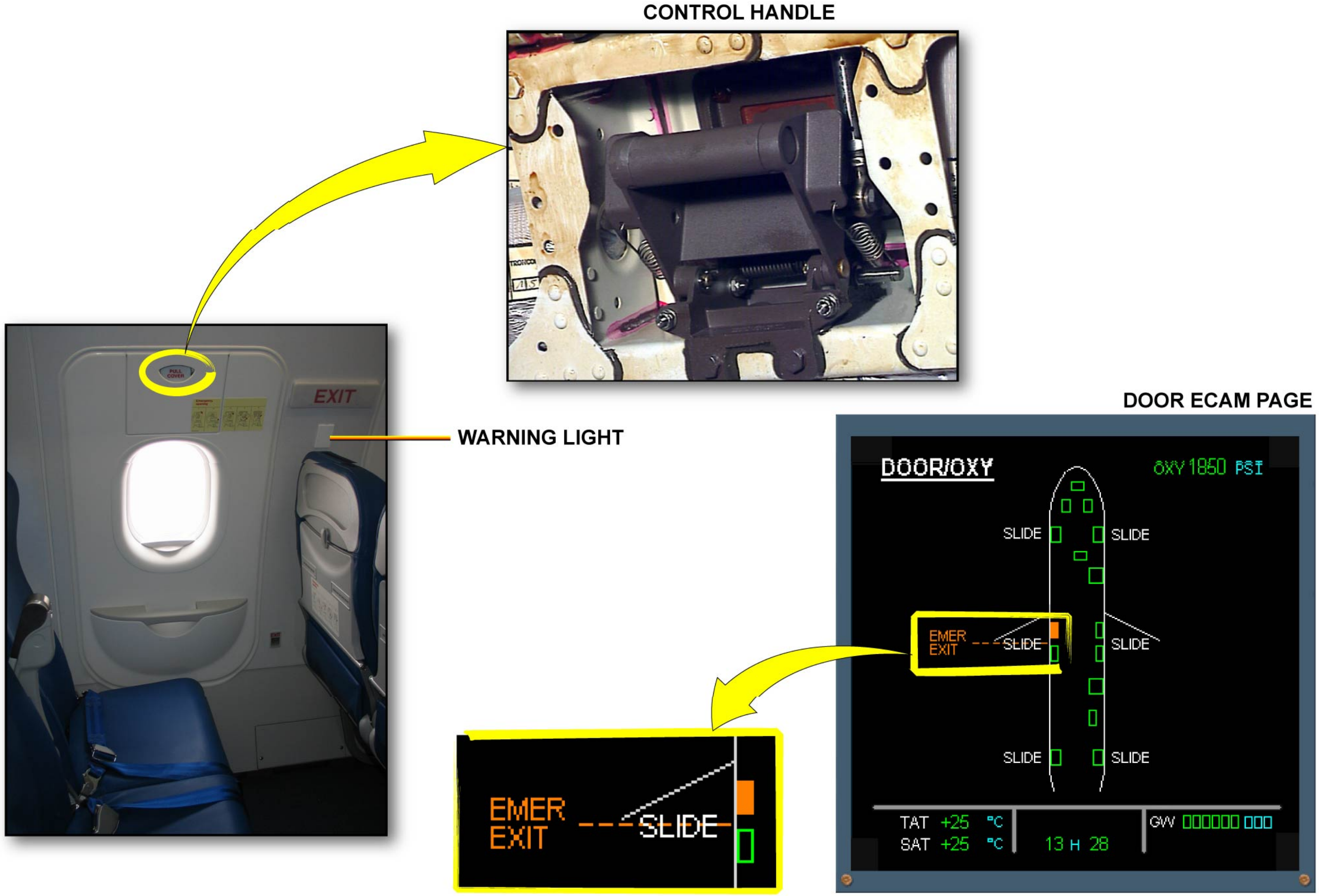
52 DOORS PRESENTATION (1)

CONTROL AND INDICATING (continued)

EMERGENCY EXITS

Accidental opening of the cover flap for access to the inner control handle will automatically activate the white indication light beside the exit.
The ARMED/DISARMED condition of the exit is indicated on the ECAM DOOR/OXY Page (DISARMED position only for maintenance work).



CONTROL AND INDICATING - EMERGENCY EXITS

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52 DOORS PRESENTATION (1)

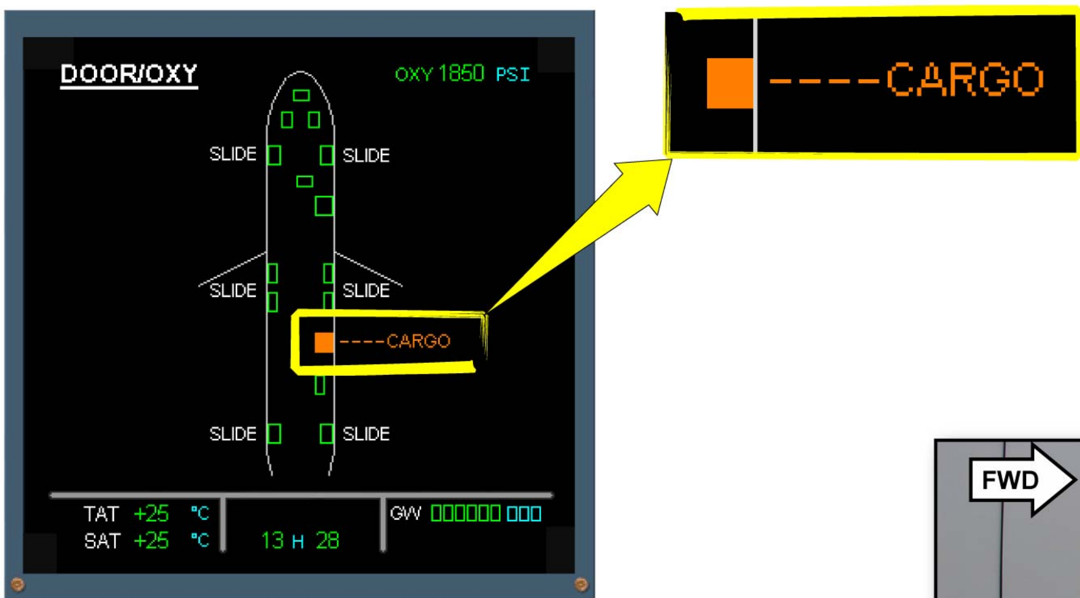
CONTROL AND INDICATING (continued)

CARGO DOORS

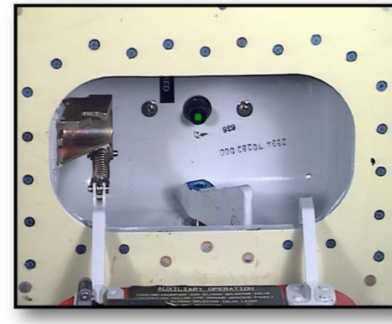
Two different indicating systems are installed on the cargo door:
- a mechanical indicating system,
- an electrical indicating system.

In the access panel at the bottom of the door, there are indication windows to check if the door is correctly locked.
- red marks: door not correctly locked,
- green marks: door correctly locked.

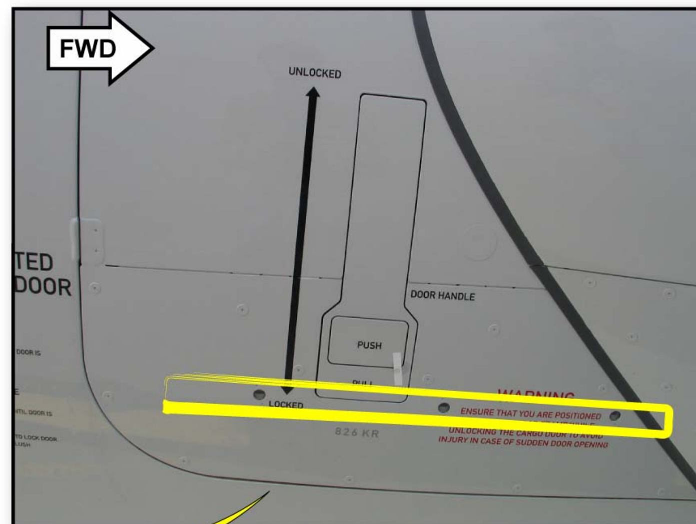
When the door is fully open and locked, a green indicator light comes on, on the cargo door control panel. The cargo door control panel is installed on the centre line of the aircraft near each door.



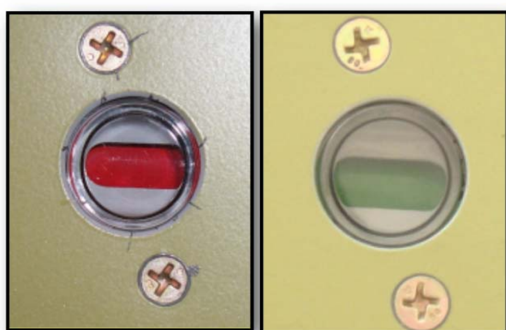
DOOR ECAM PAGE



CONTROL PANEL



FWD CARGO DOOR



MECHANICAL INDICATOR

CONTROL AND INDICATING - CARGO DOORS

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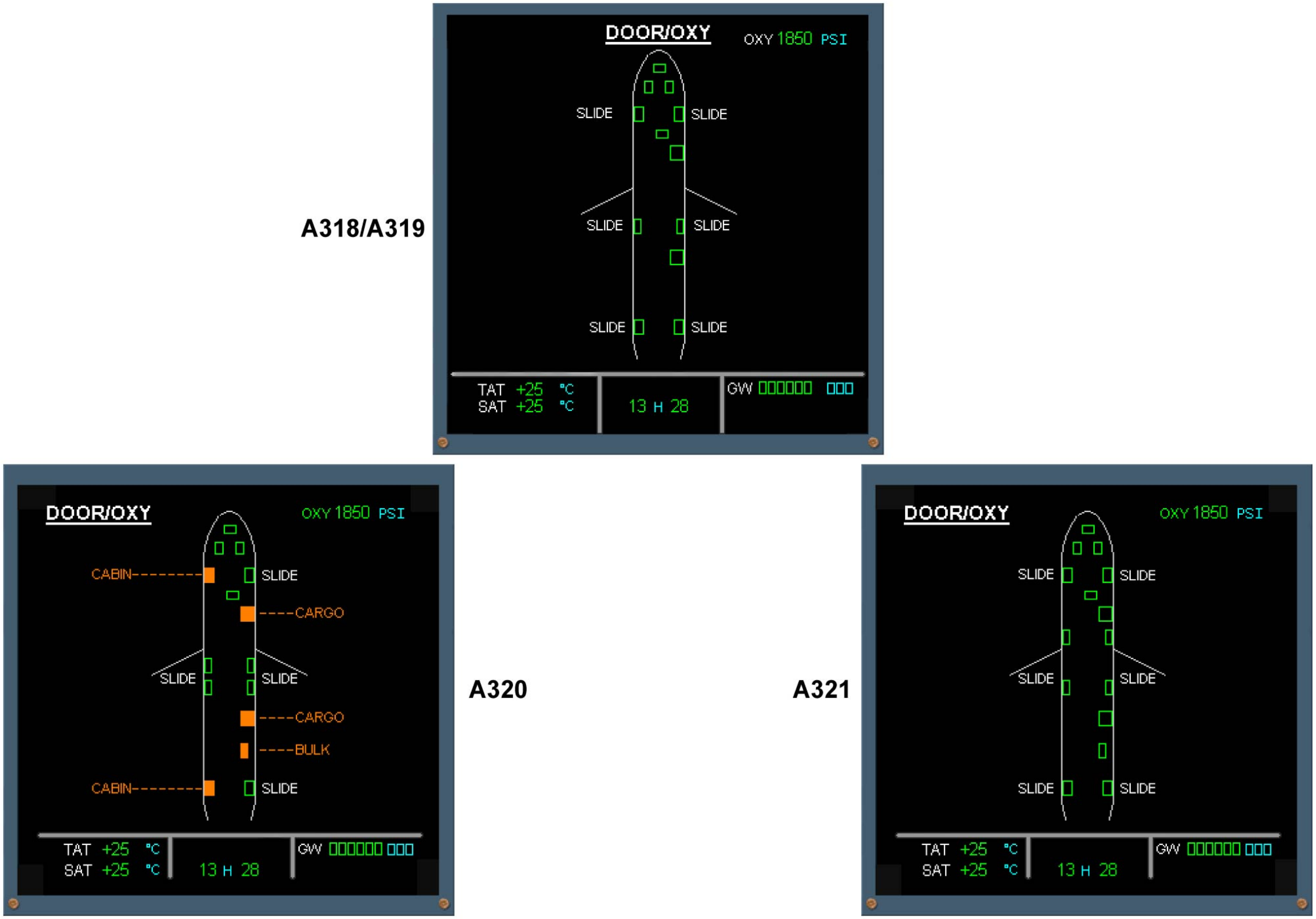
52 DOORS PRESENTATION (1)

CONTROL AND INDICATING (continued)

ECAM DOOR/OXY PAGE

The ECAM page - DOOR/OXY monitors the status of all the doors and the escape slide/slide raft.
The indications on the ECAM page are:
- green when the door is closed and locked,
- amber when the door is unlocked.

The white SLIDE indications on the ECAM DOOR page means that the slides are armed.
When the slide is disarmed on any door no indication is displayed.



CONTROL AND INDICATING - ECAM DOOR/OXY PAGE

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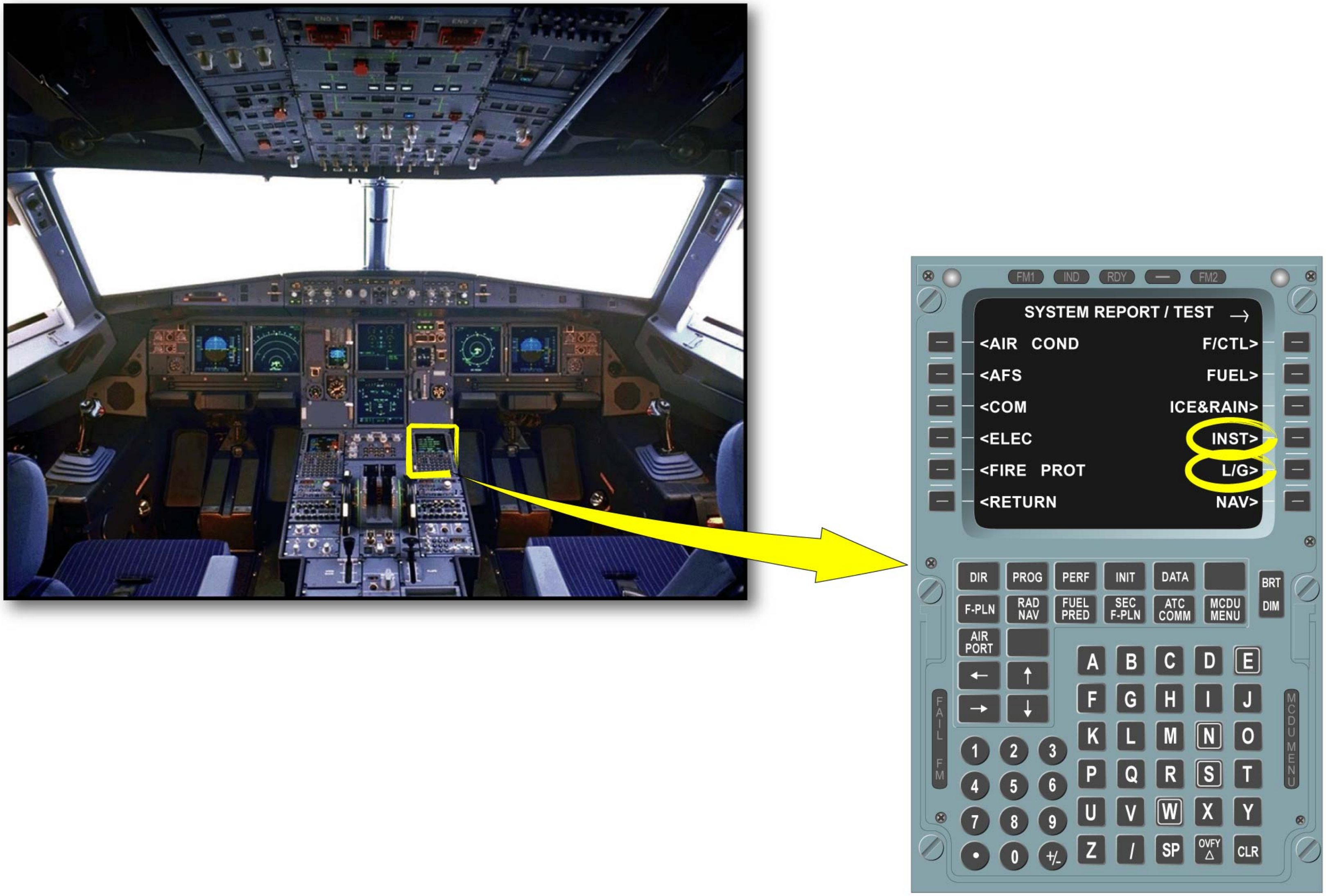
52 DOORS PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

The MCDU is used to trouble shoot the monitored components through the INST and L/G keys. The proximity sensors, which monitor the status of the doors, are connected to the ECAM system or Landing Gear Control Interface Units (LGCIUs).

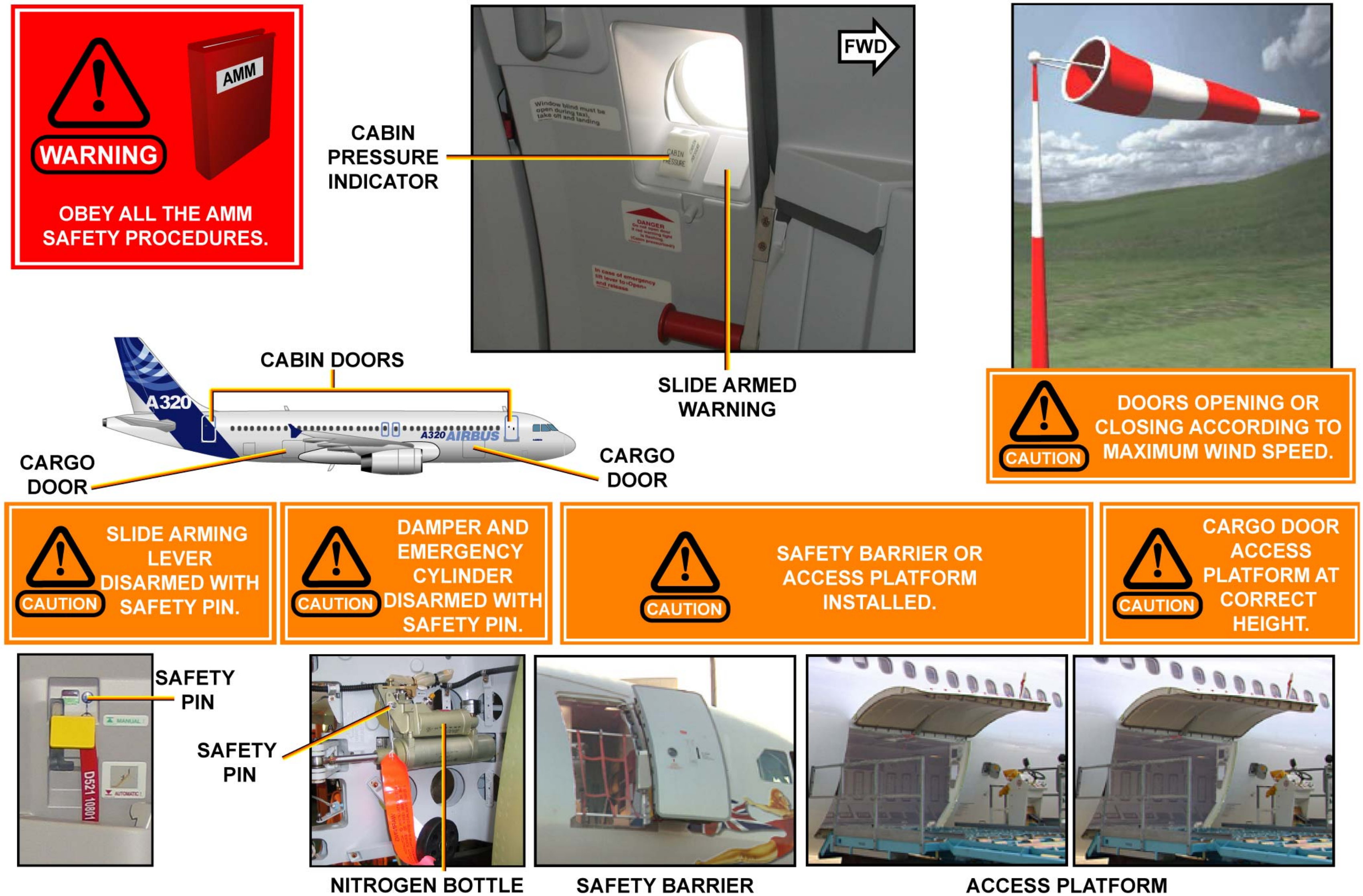


MAINTENANCE/TEST FACILITIES

52 DOORS PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on the aircraft, make sure that you obey all the AMM safety procedures. This will prevent injury to personnel and/or damage to the aircraft. Here is an overview of main safety precautions about the door system.
Be careful before opening a cabin door. Make sure that the red warning light does not flash. If it flashes, it means a residual pressure remains in the cabin. When you open in this configuration a door it could kill or cause serious injury to persons and cause damage to the aircraft.
Make sure that when you work on a cabin door the emergency control handle is in the disarmed position with the safety pin installed. Check that the percussion lever of the door damper and emergency operation cylinder is in disarmed position with the safety pin installed.
Install a safety barrier or an access platform before opening any cabin door. When opening or closing a cargo door, make sure that the access platform is at the correct height.
When the wind speed is expected to exceed 40 knots do not open the forward or aft cargo door and if open close the doors immediately.
Stay beside the cargo door during opening or closing. Use protective clothes Use solvents/cleaning agents, sealants and other special materials only with a good flow of air through the work area. Put on protective clothing, rubber gloves, goggles and mask. Obey the manufacture's instructions when you use these materials.



SAFETY PRECAUTIONS

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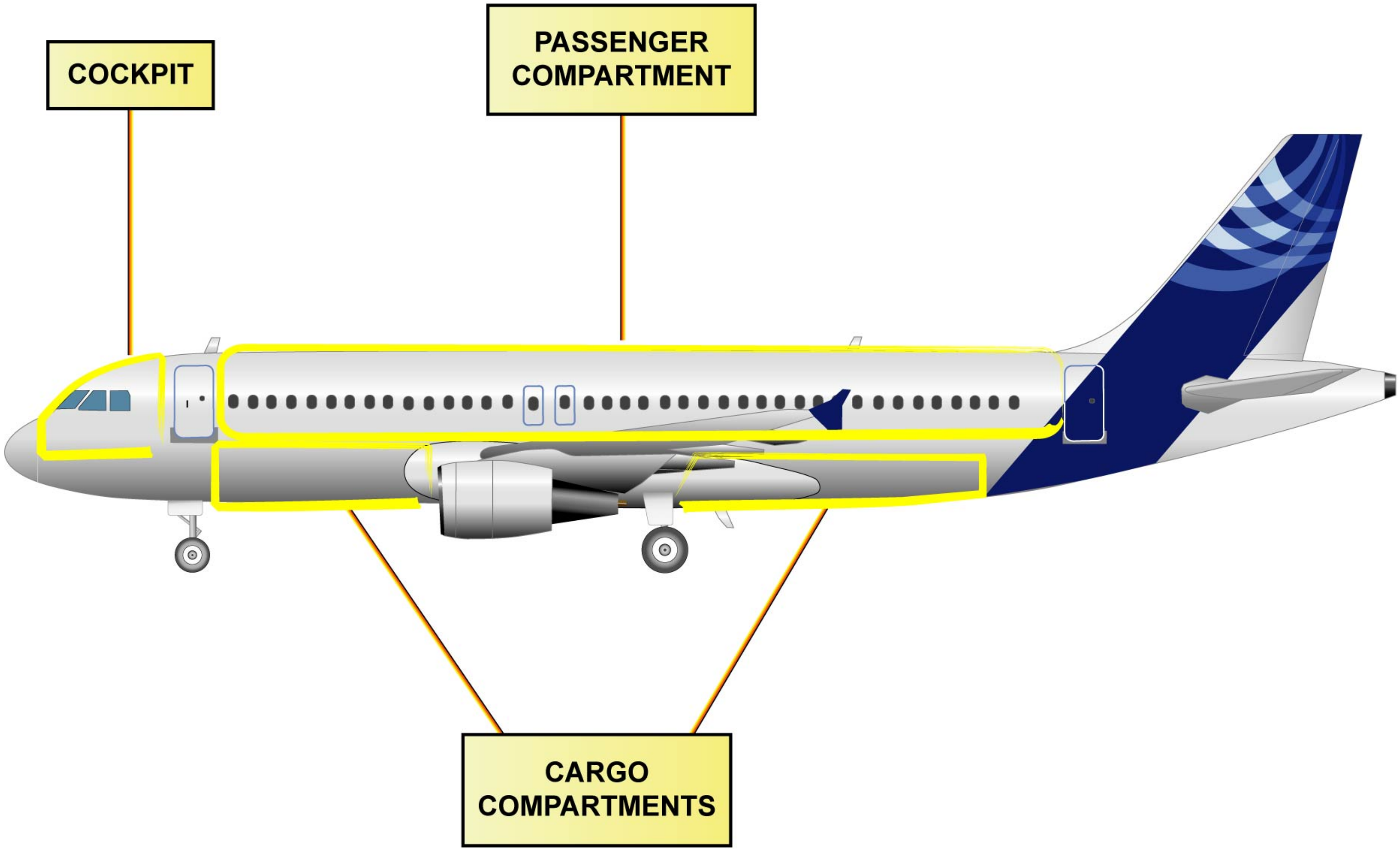
25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

GENERAL

The equipment and furnishings are installed in different compartments:
- the cockpit,
- the passenger compartment,
- the cargo compartments.



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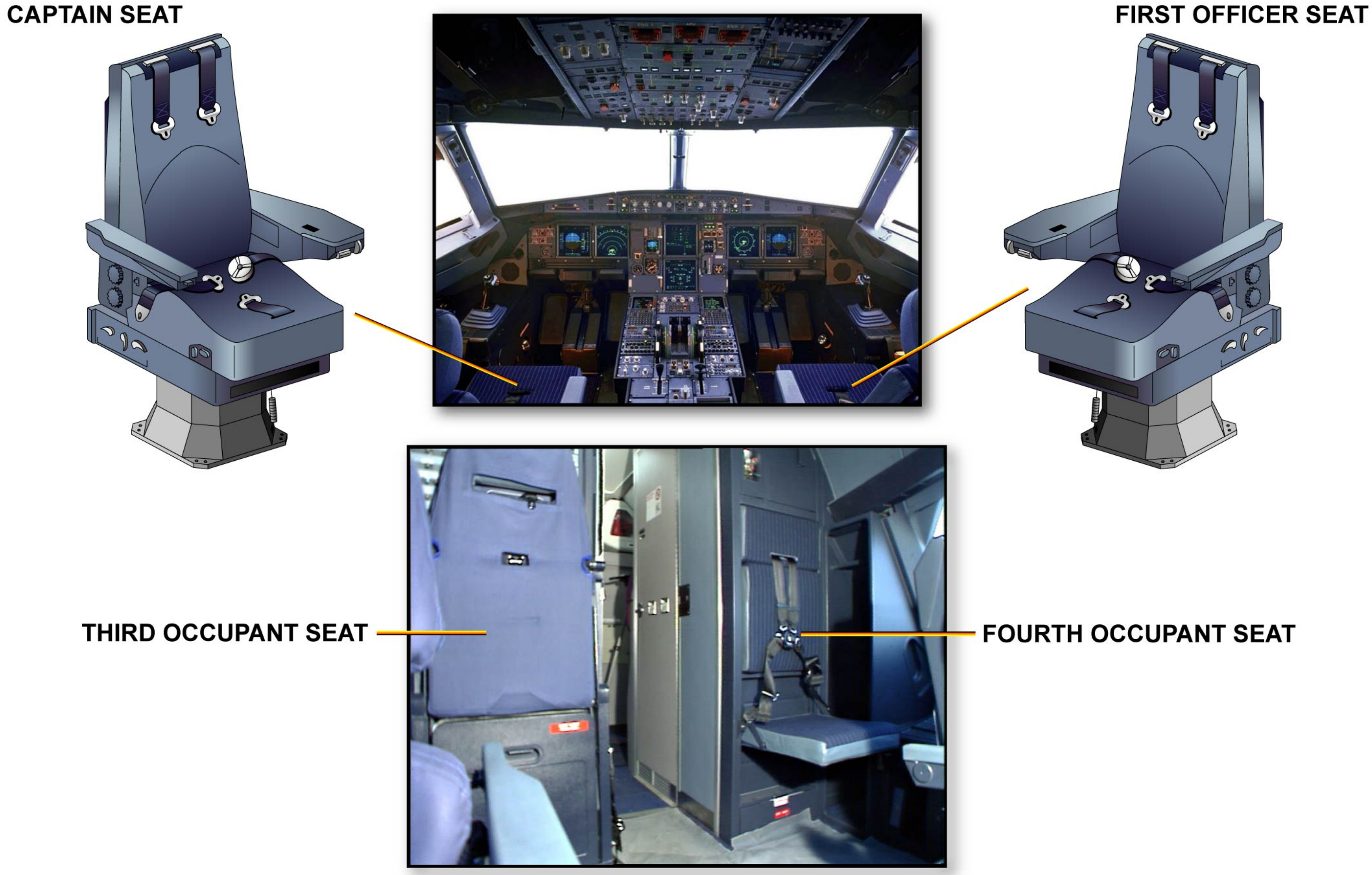
GENERAL

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

COCKPIT SEATS

The CAPT and F/O seats are symmetrical and their operation identical.
They are electrically or manually operated.
They are not interchangeable.
The seats are secured onto the cockpit floor.
The Third Occupant seat is a folding seat attached to the right rear panel in the cockpit.
Position adjustment is only possible in lateral direction.
The Fourth Occupant seat is a folding seat installed against the left rear partition in the cockpit.
This seat is optionally installed and is not adjustable.



COCKPIT SEATS

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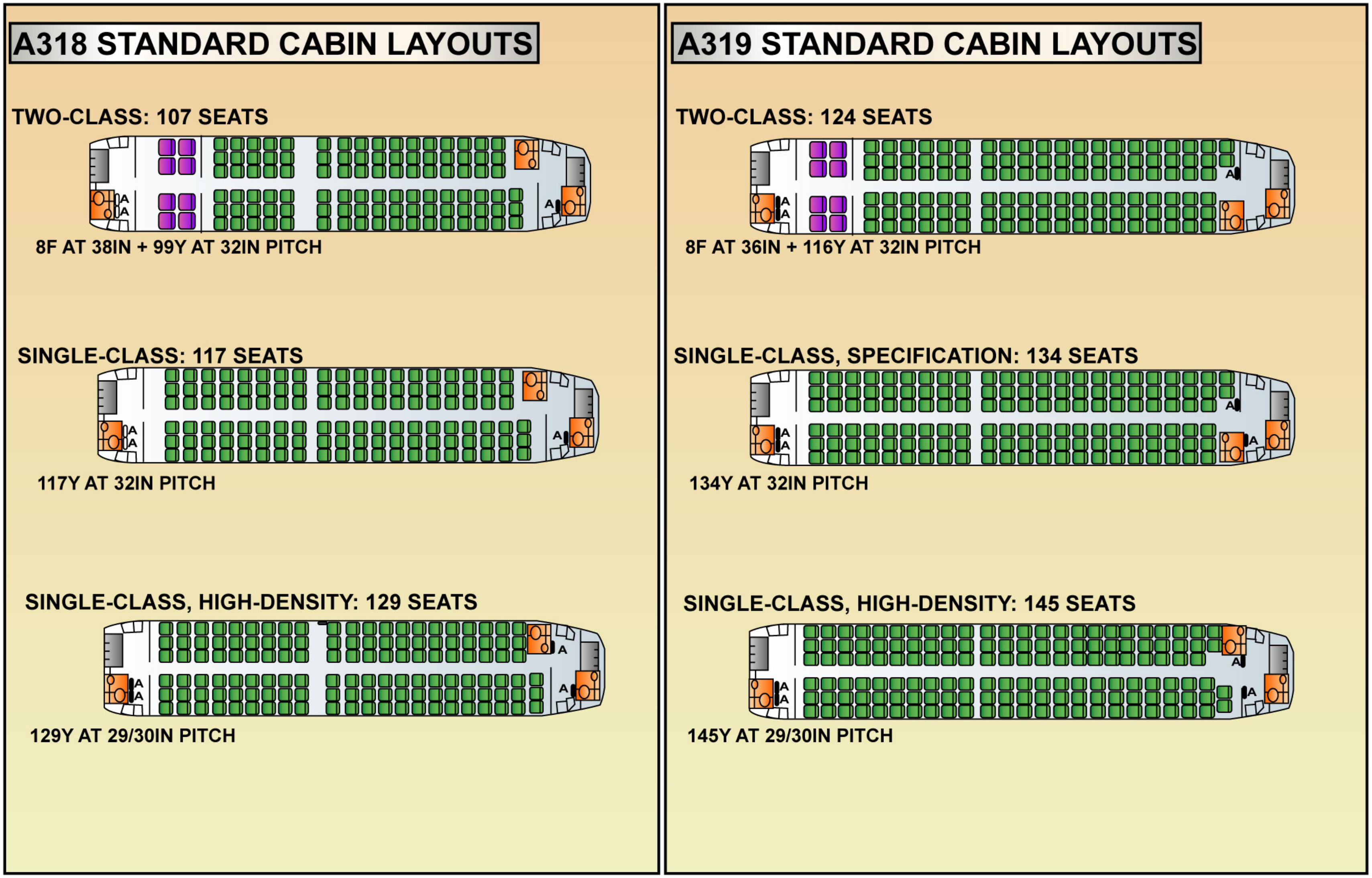
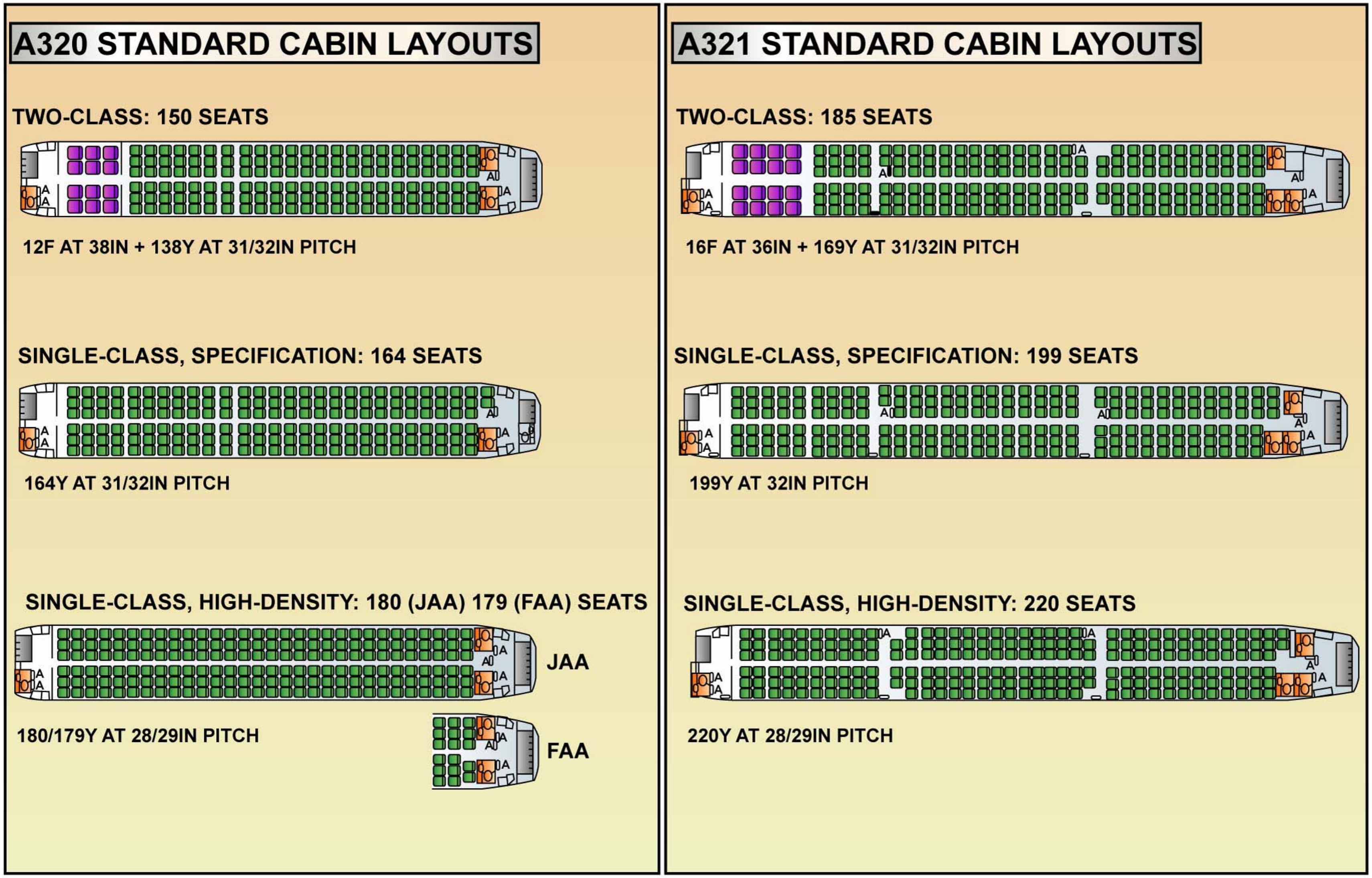
25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

CABIN LAYOUTS

Here are shown the typical cabin layouts.



CABIN LAYOUTS



CABIN LAYOUTS

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25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

PASSENGER SEATS

The passenger seats are mounted on standard tracks, which allow quick removal and installation.

CABIN ATTENDANT SEATS

Cabin attendant seats are attached to partitions or lavatory walls.
Depending on the cabin configuration, the number and location of cabin attendant seats can vary.
All are folding seats.

PASSENGER SEATS

CABIN ATTENDANT SEATS

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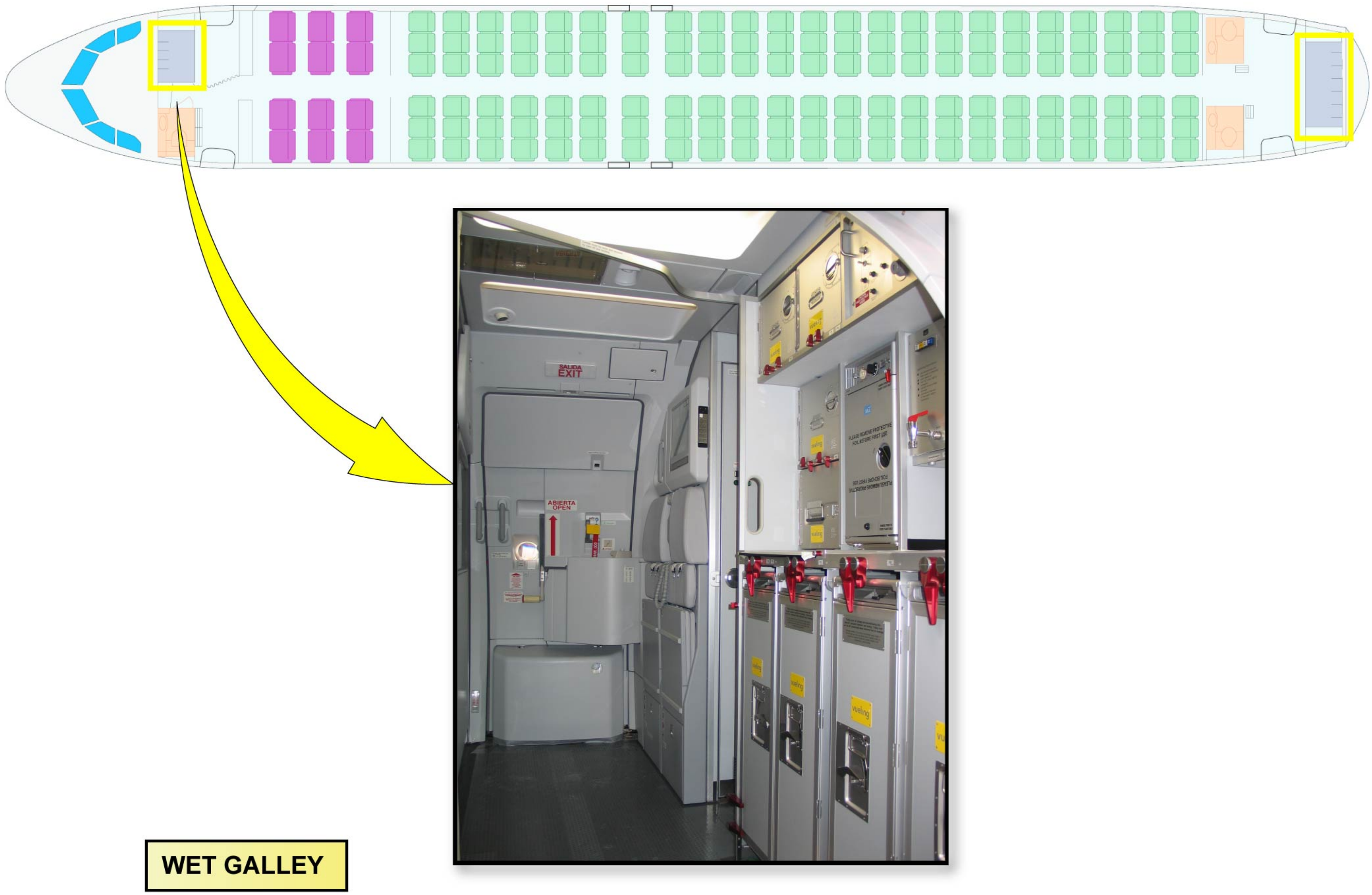
PASSENGER SEATS & CABIN ATTENDANT SEATS

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

GALLEYS

The number and location of the galleys vary with the cabin configuration and the aircraft utilization.
There are dry galleys and wet galleys installed.



GALLEYS

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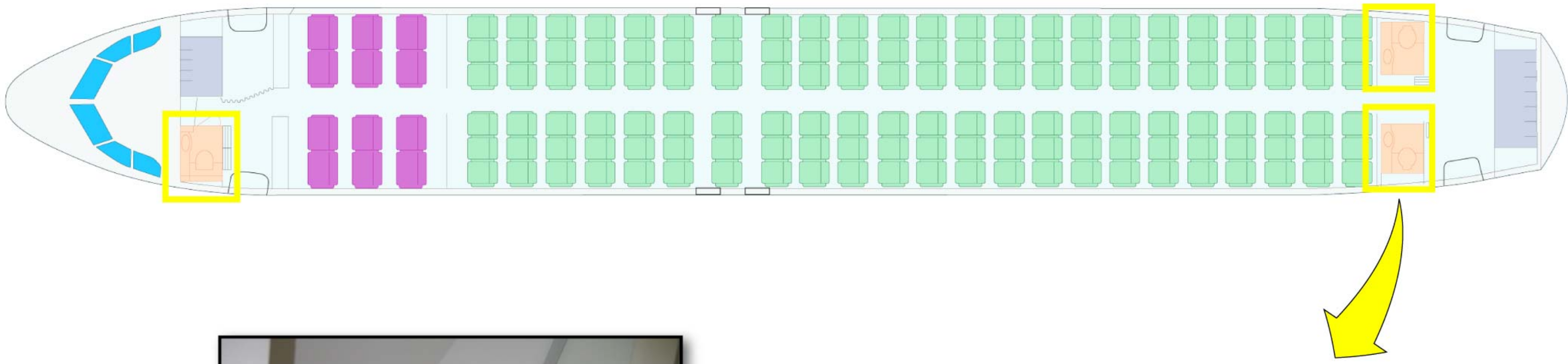
25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

LAVATORIES

The number and location of the lavatories change with the cabin configuration.

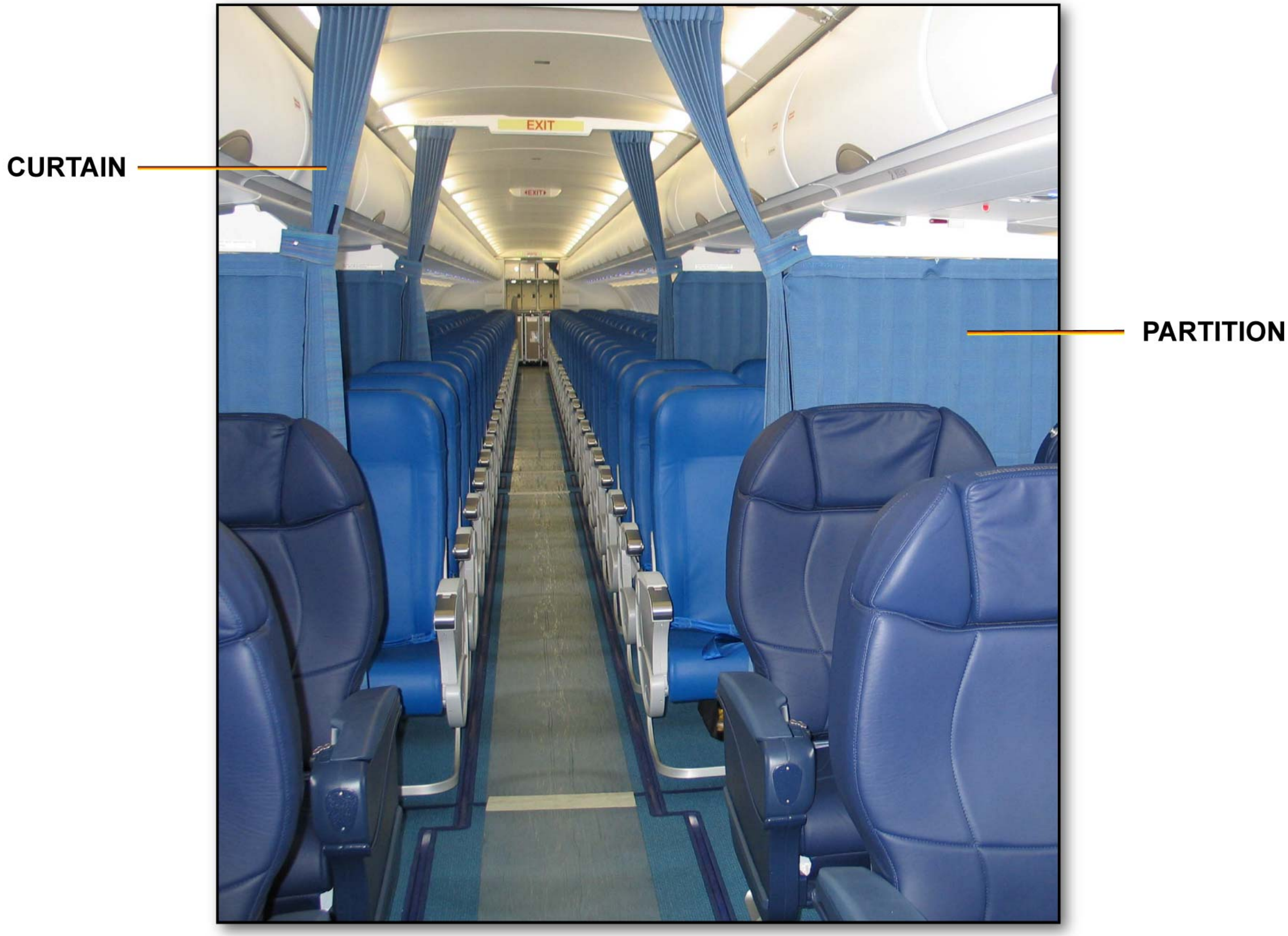


LAVATORIES

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

CURTAINS AND PARTITIONS

Classes and zones are divided with floor mounted partitions and ceiling mounted curtains.



CURTAINS AND PARTITIONS

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25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

CABIN PANEL LAYOUT

The cabin interior has removable panels. The lining design customizes the cabin interior.

LOWER SIDE WALL PANELS

The lower side wall panels are mounted between the cabin floor and the upper side wall panels.
They provide the rapid decompression function.

UPPER SIDE WALL PANELS

The upper side wall panels are mounted on the side of the cabin. They include the window contour.
Inner window panels and sun visors are installed onto the upper side wall panel.

COVE LIGHT PANELS

The cove light panels cover the space between the upper side wall panels and the overhead stowage compartments.
The cove light panels are removable to enable cabin light replacement.

OVERHEAD STOWAGE COMPARTMENT

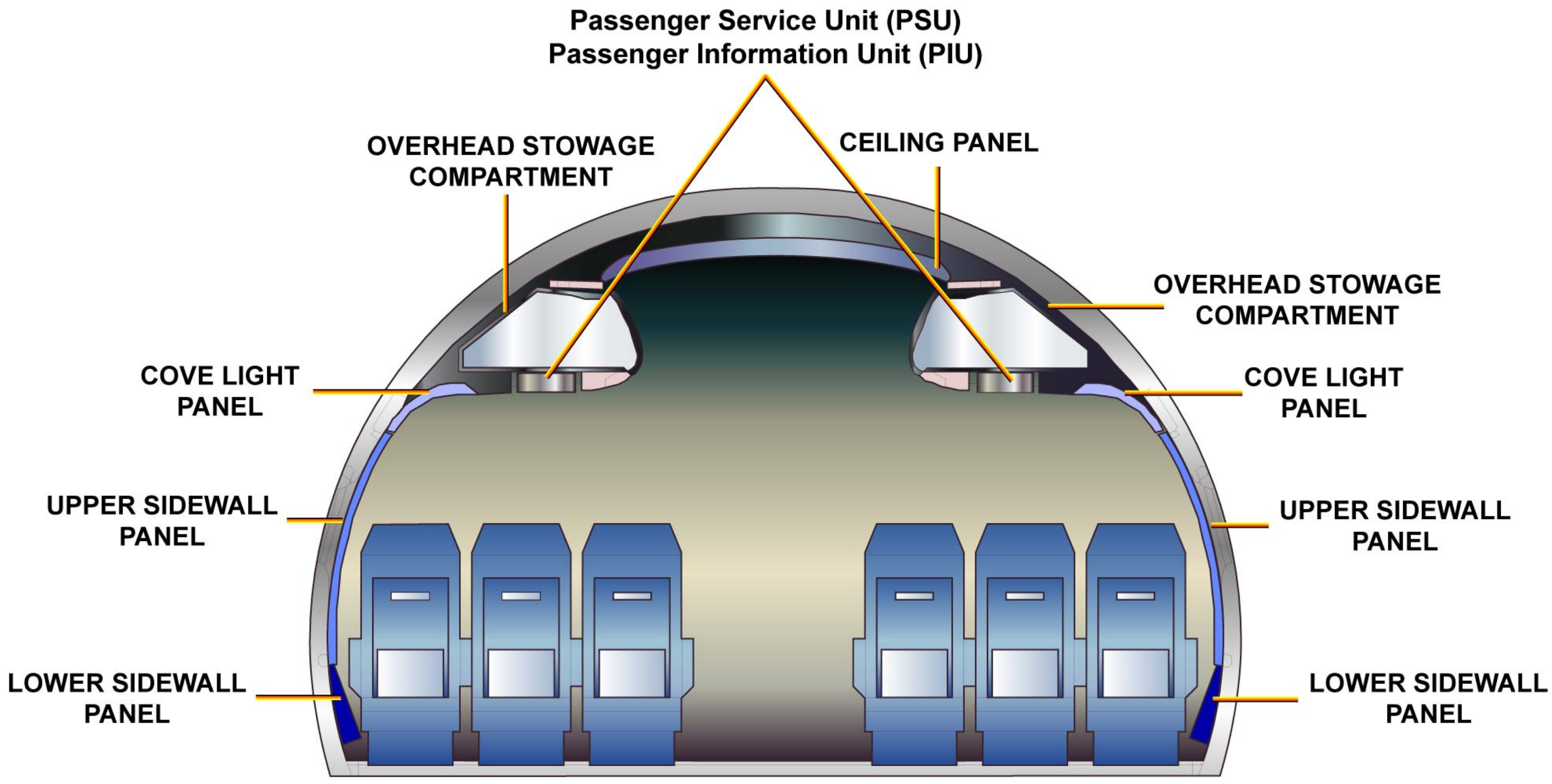
The overhead stowage compartments are installed above the cabin seat rows.
They extend from the first seat row to the last seat row on the left and right hand side of the cabin.
The overhead stowage compartments are of different sizes and are arranged to fit the cabin layout.

CEILING PANELS

Removable ceiling panels are mounted in the cabin.
They are installed over the full length of the cabin and the utility areas.

PSU/PIU

The passenger service information units comprise the Passenger Service Units (PSUs) and Passenger Information Units (PIUs).
They are installed in the service channel, above the seat row.
The PSUs and PIUs have different lengths to fit with the aircraft furnishing configuration.
These units are:
- information panel,
- attendant call panel,
- emergency oxygen mask and generator container,
- reading light panel,
- individual air outlet panel.



CABIN PANEL LAYOUT - LOWER SIDE WALL PANELS ... PSU/PIU

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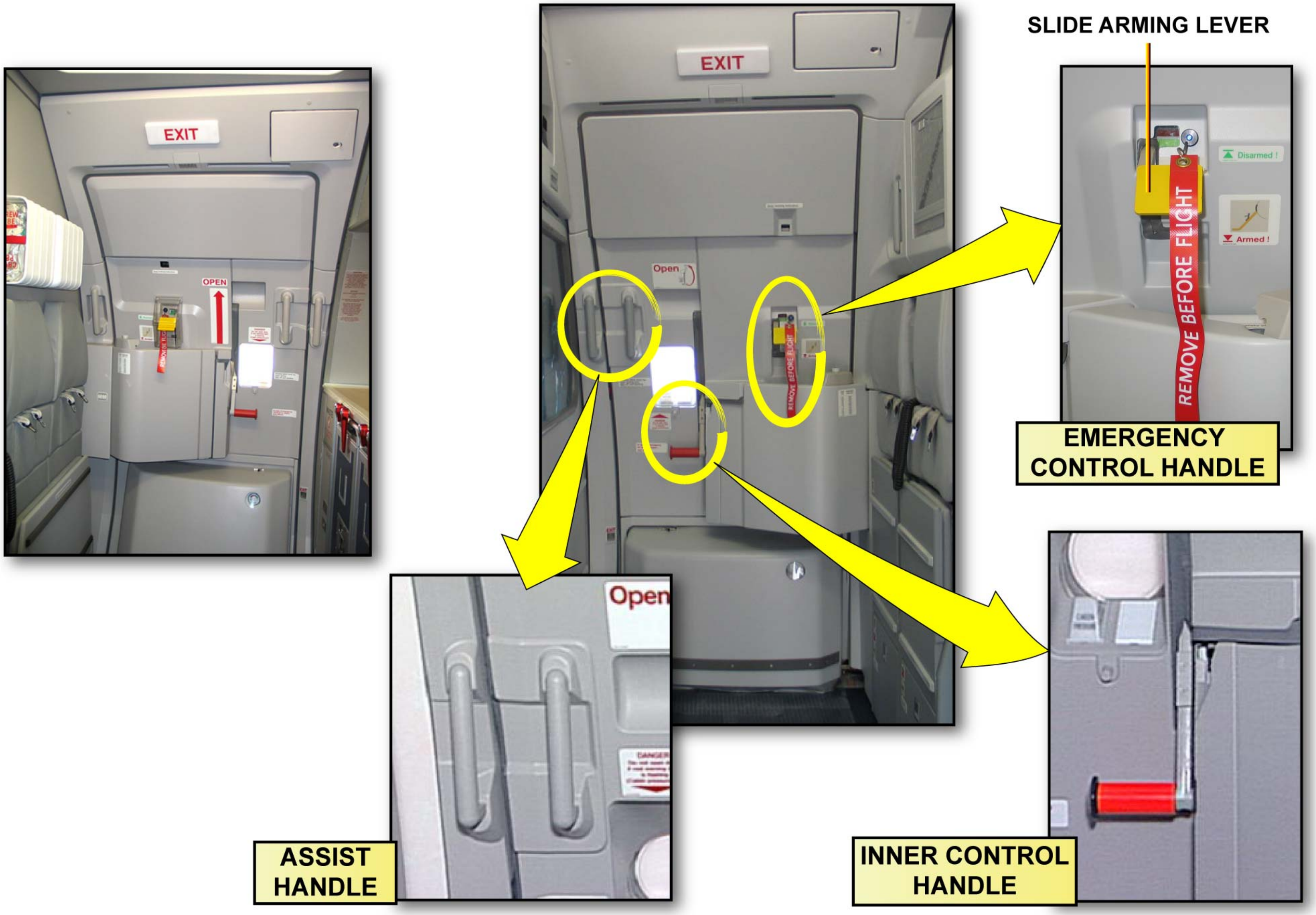
25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

PASSENGER DOOR AND ESCAPE SLIDE

The aircraft has two forward and two aft passenger doors.
Three assist handles enhance safety during door operation.
The two forward and the two aft cabin doors have either a single lane escape slide (as shown on the picture) or a slide raft.
The inflation and deployment is automatically initiated when the cabin door is opened in the armed mode. If the escape slide does not inflate automatically, the red manual inflation handle located on the right hand side of the girt bar must be pulled.



PASSENGER DOOR AND ESCAPE SLIDE

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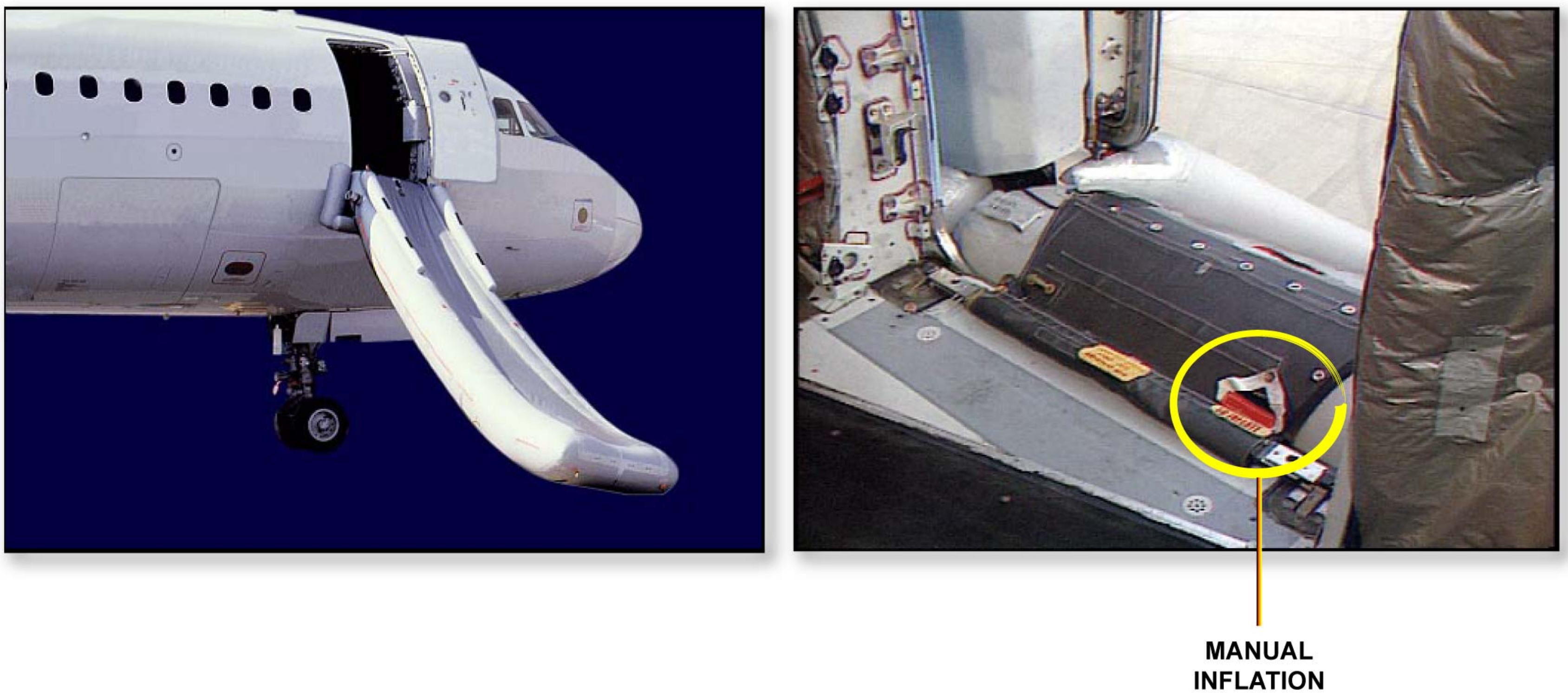

PASSENGER DOOR AND ESCAPE SLIDE

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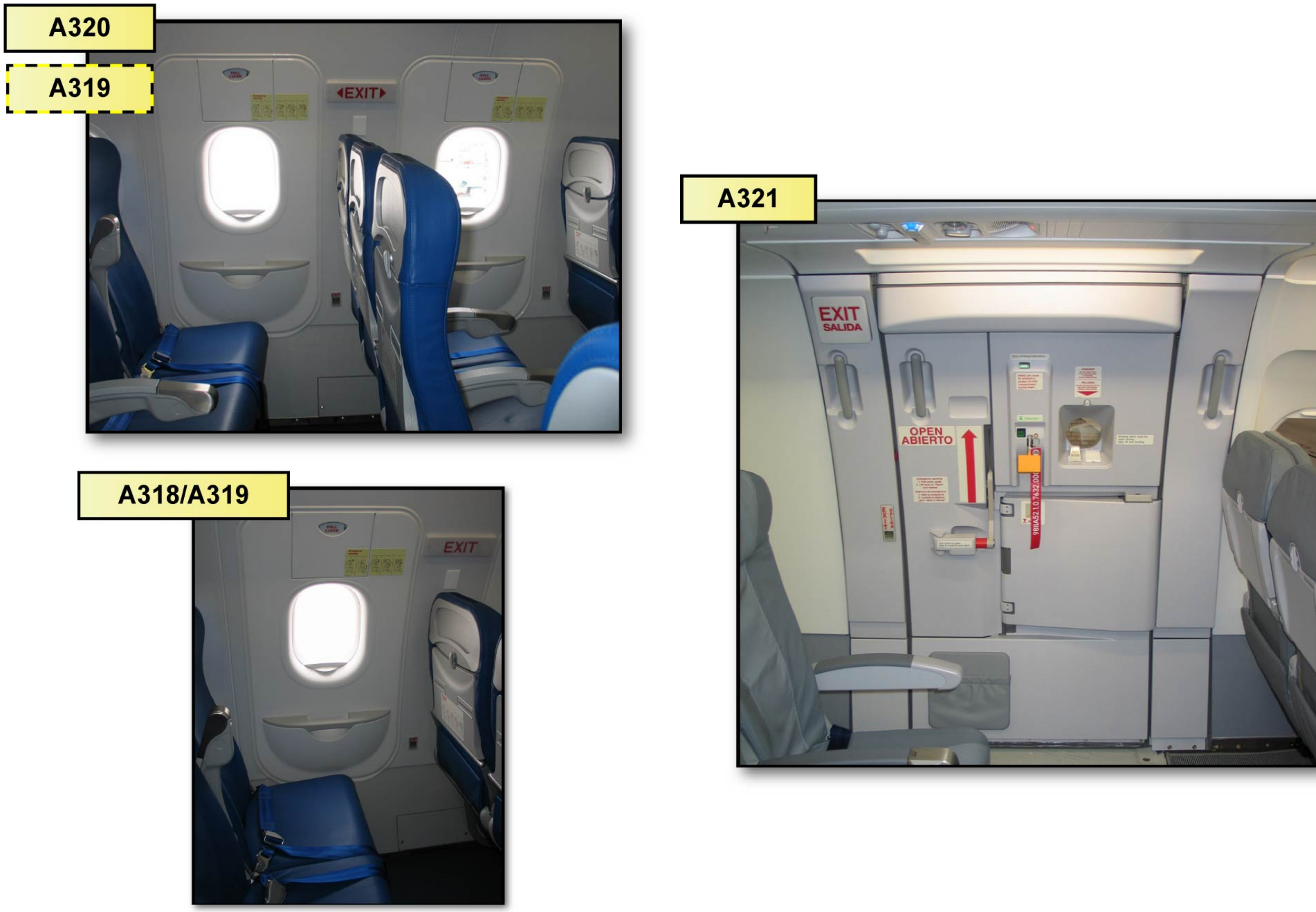
25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

EMERGENCY EXITS

The A318 and A319 have two overwing emergency exits (one on each side).
The A320 (and the A319 as an option) has four overwing exits (two on each side).
The A321 has four emergency exits, two in front and two aft the wing.

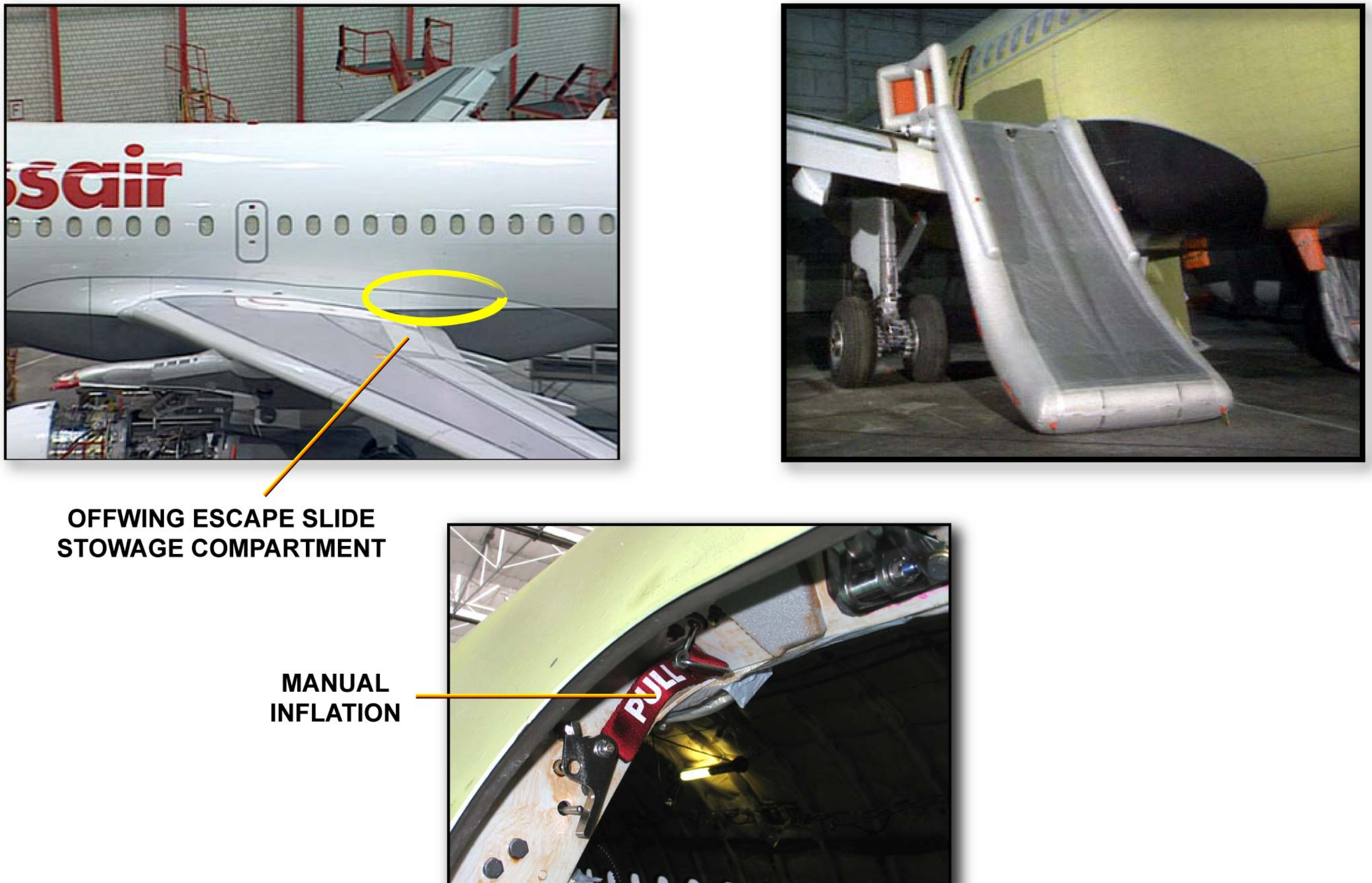


EMERGENCY EXITS

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

EMERGENCY EXIT ESCAPE SLIDE

A dual lane escape slide will deploy automatically by the opening of a left hand or right hand overwing exit.
If the automatic inflation fails, a red handle installed at each exit frame, when pulled, activates the manual inflation.
The emergency exit escape slide containers are installed in the wing root fairing and the inflation reservoirs are in the aft cargo compartment. The inflation reservoirs are accessible from the aft cargo compartment.



EMERGENCY EXIT ESCAPE SLIDE

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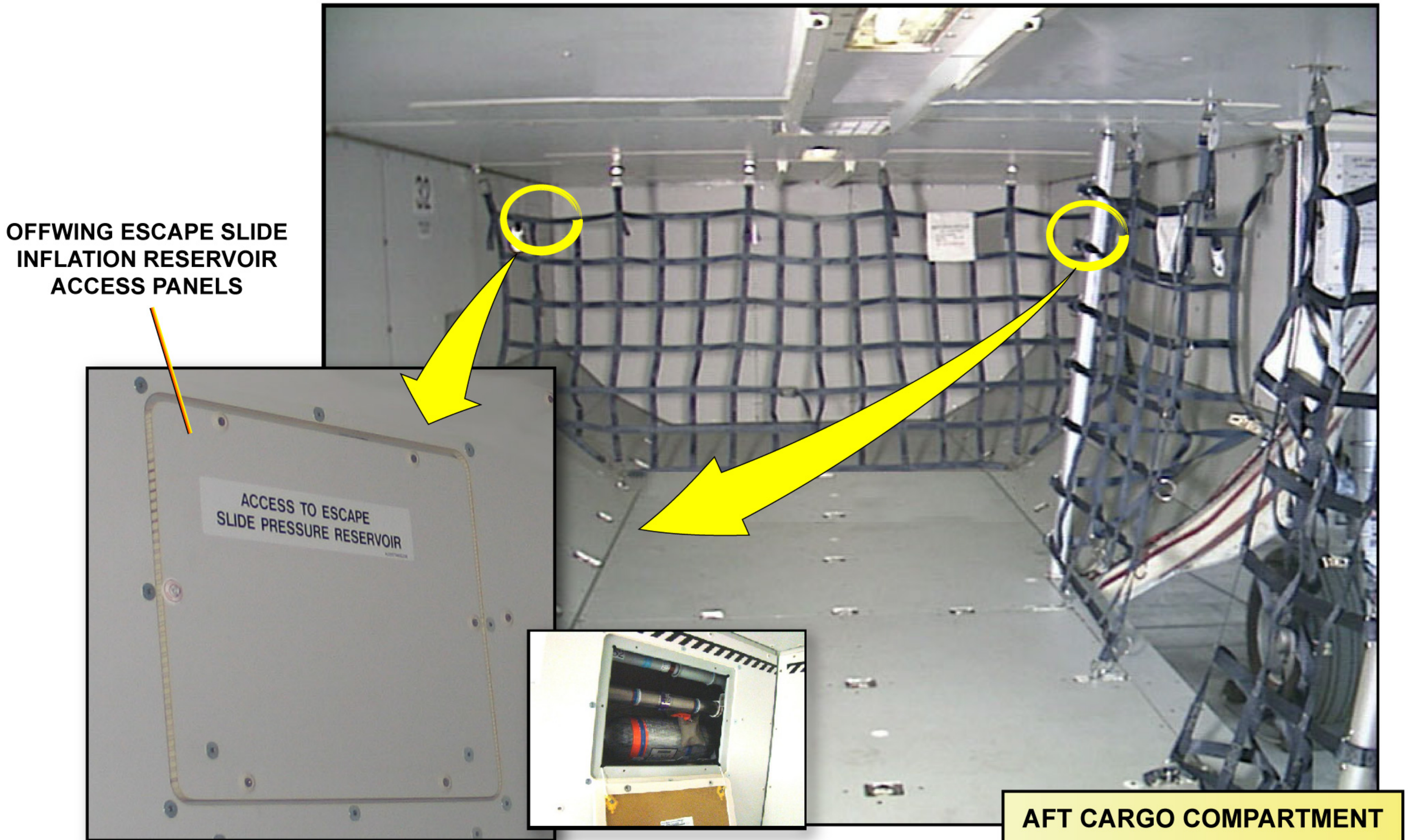

EMERGENCY EXIT ESCAPE SLIDE

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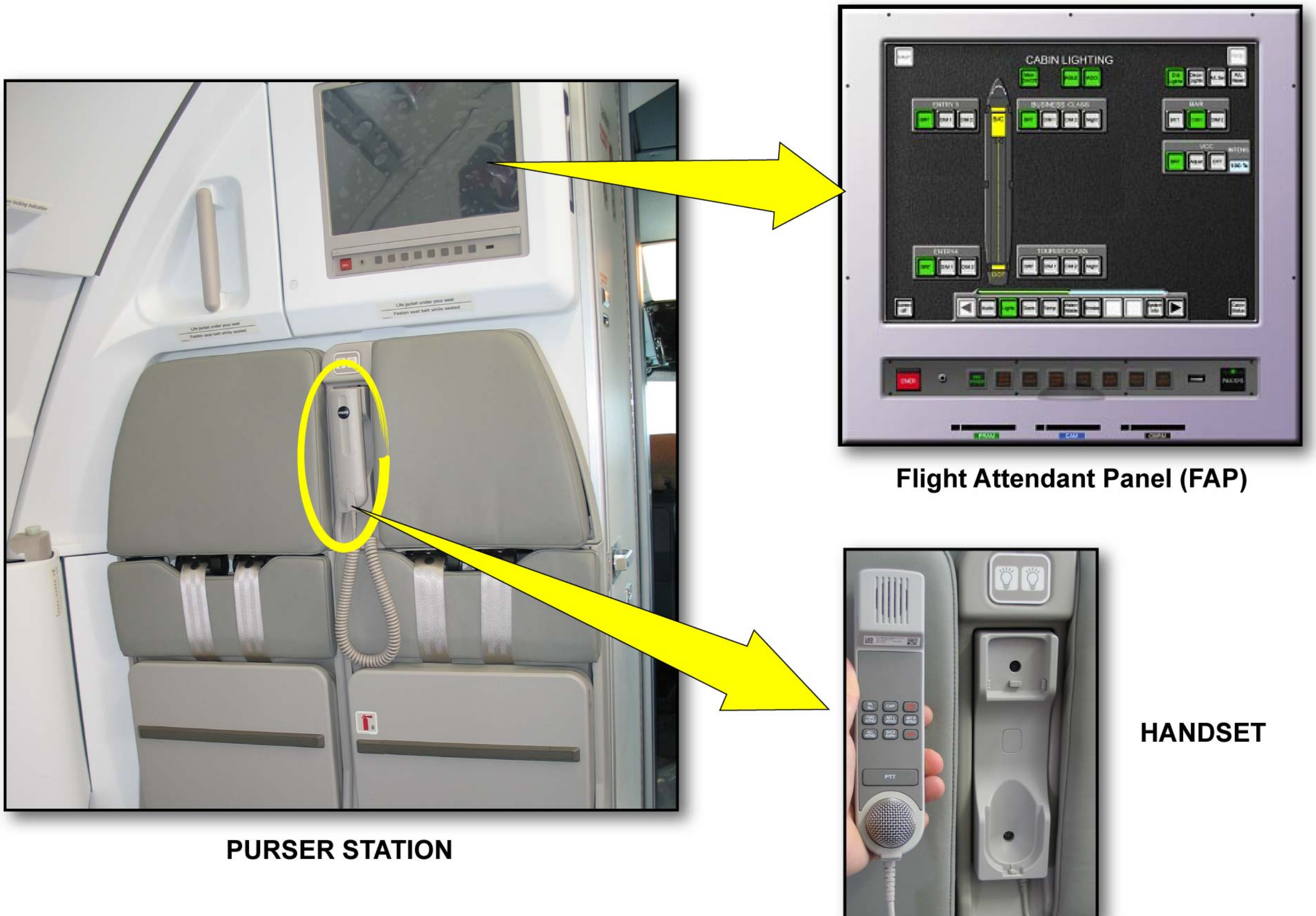
25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

PURSER STATION

The Flight Attendant Panel (FAP) location is at the purser station.
The FAP displays different pages related to the different systems connected to the Cabin Intercommunication Data System (CIDS).
The FAP is used for control and programming.
All handsets are identical; they can be used for passenger announcements and for interphone calls.



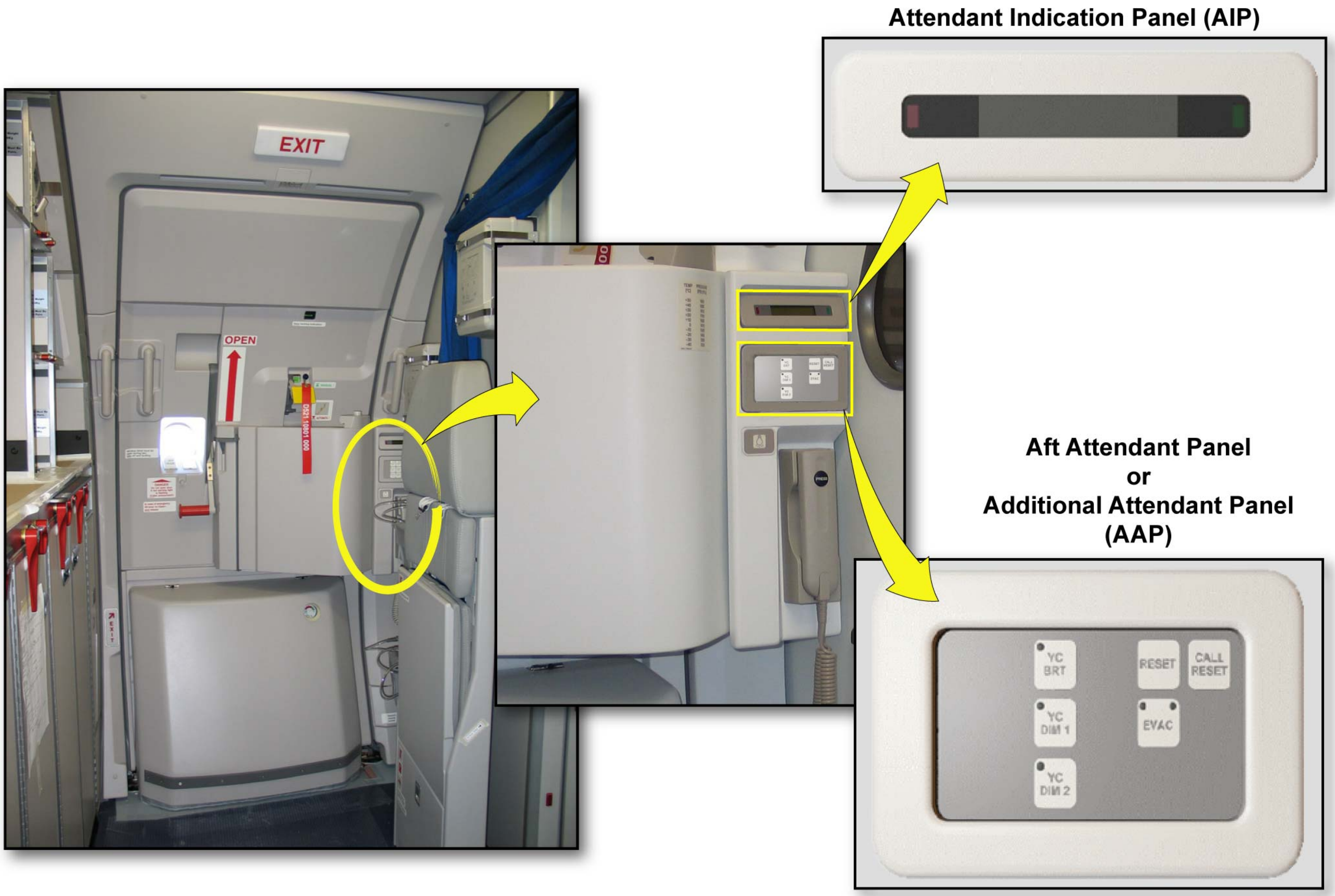
PURSER STATION

UAJ09471 - U19T4T0 - UM25PZ000000002

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

AFT CREW STATION

The Aft Attendant Panel also called Additional Attendant Panel (AAP) is installed at the rear left crew station. It controls some cabin systems.
The AAPs have different number of buttons depending on different aircraft configurations.
The Attendant Indication Panel (AIP) is part of the communication system and is installed near each main cabin crew station. It displays communication and system related messages.

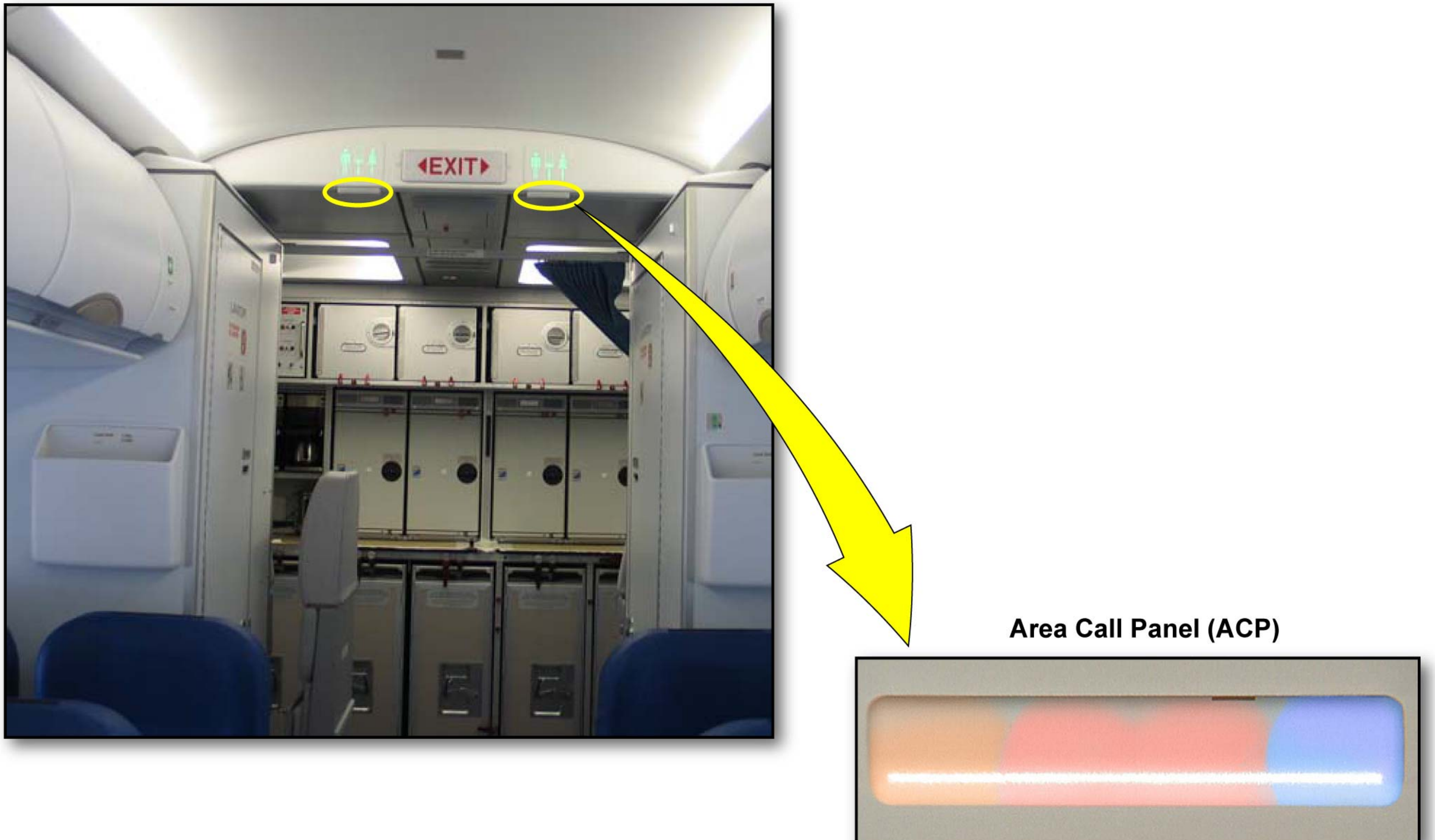


AFT CREW STATION

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

AREA CALL PANEL

The Area Call Panels (ACPs) are installed in the cabin ceiling of the passenger compartment and indicate:
- Crew communication (pink steady or flashing),
- Passenger call (blue steady),
- Lavatory call (amber steady),
- Lavatory smoke detection (amber flashing).



AREA CALL PANEL

UAJ09471 - U19T4T0 - UM25PZ000000002

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

LOWER DECK CARGO COMPARTMENT

The lower deck is divided into three cargo compartments:
- the FWD cargo compartment,
- the AFT cargo compartment,
- and the bulk cargo compartment.

FWD AND AFT CARGO COMPARTMENT

The forward and aft cargo compartment is basically equipped to be loaded with bulk and loose baggage.

AFT CARGO COMPARTMENT BULK VERSION

LOWER DECK CARGO COMPARTMENT - FWD AND AFT CARGO COMPARTMENT

UAJ09471 - U19T4T0 - UM25PZ000000002

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

LOWER DECK CARGO COMPARTMENT (continued)

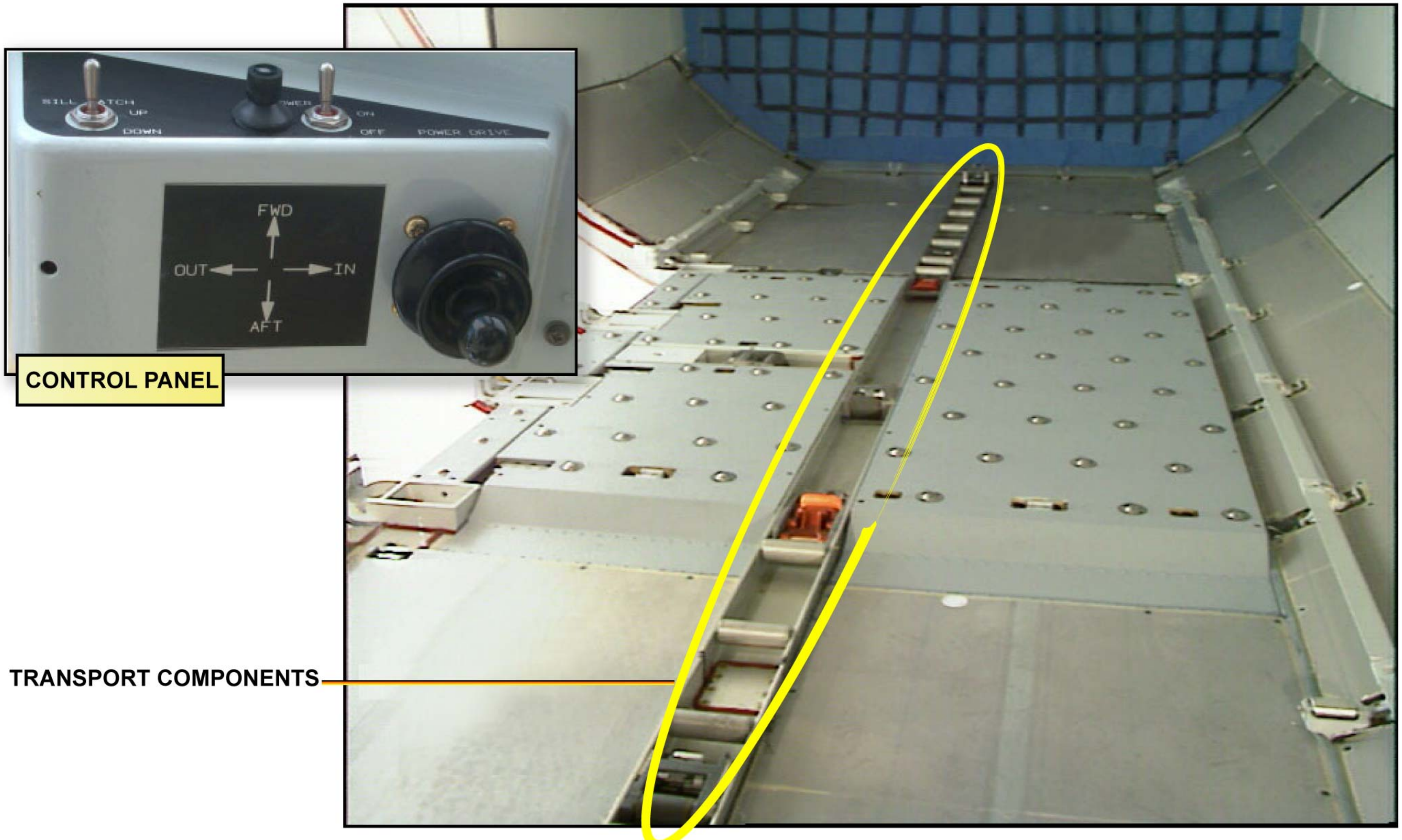
CARGO LOADING

The optional semi-automatic cargo loading system transports pallets and containers and is operated from a control panel installed on the cargo door.

BULK CARGO COMPARTMENT

The bulk cargo compartment can only be loaded with bulk and loose baggage.
A divider net with a screen separates the bulk cargo compartment from the AFT cargo compartment.

SEMI AUTOMATIC CARGO LOADING SYSTEM



UAJ09471 - U19T4T0 - UM25PZ000000002

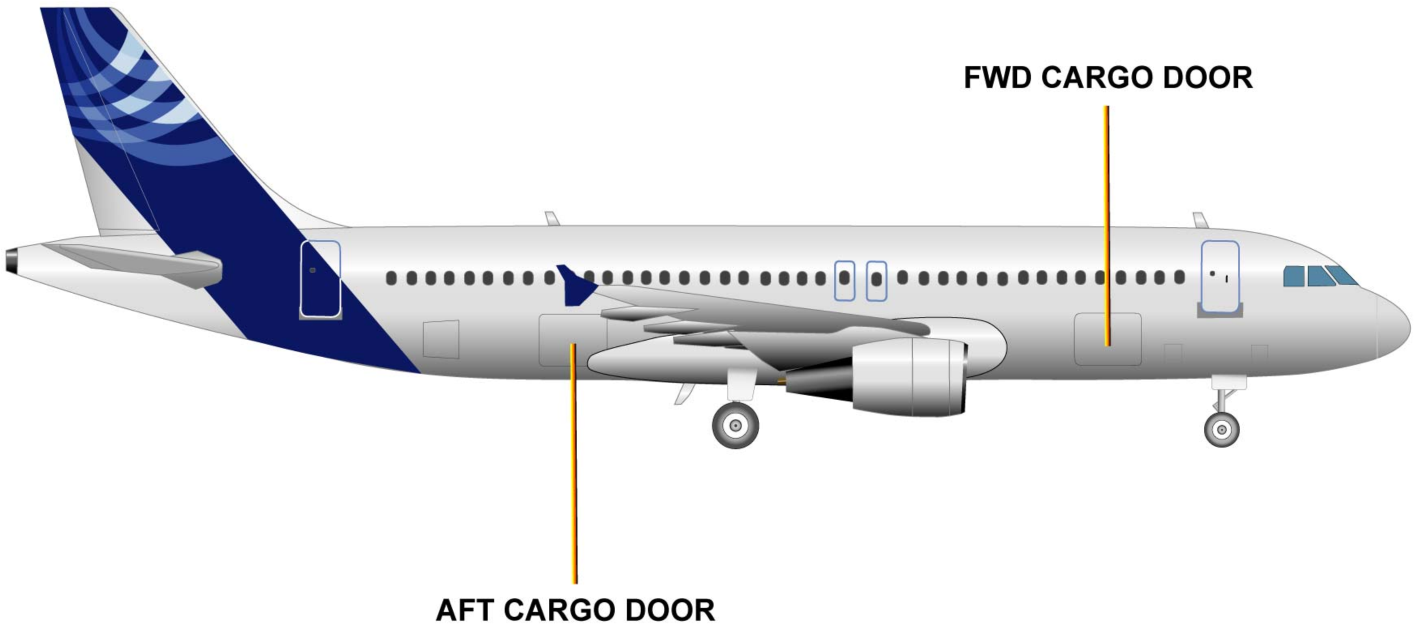
LOWER DECK CARGO COMPARTMENT - CARGO LOADING & BULK CARGO COMPARTMENT

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

LOWER DECK CARGO COMPARTMENT (continued)

CARGO COMPARTMENT DOORS

Access to the FWD, aft cargo compartment is gained by two outwards opening doors.
The cargo doors are installed on the right hand side of the fuselage.
The FWD and aft cargo doors are operated upwards by two hydraulic actuators with pressure supplied by the yellow electric pump (normal operation) or by a hand pump (manual operation).



LOWER DECK CARGO COMPARTMENT - CARGO COMPARTMENT DOORS

UAJ09471 - U19T4T0 - UM25PZ000000002

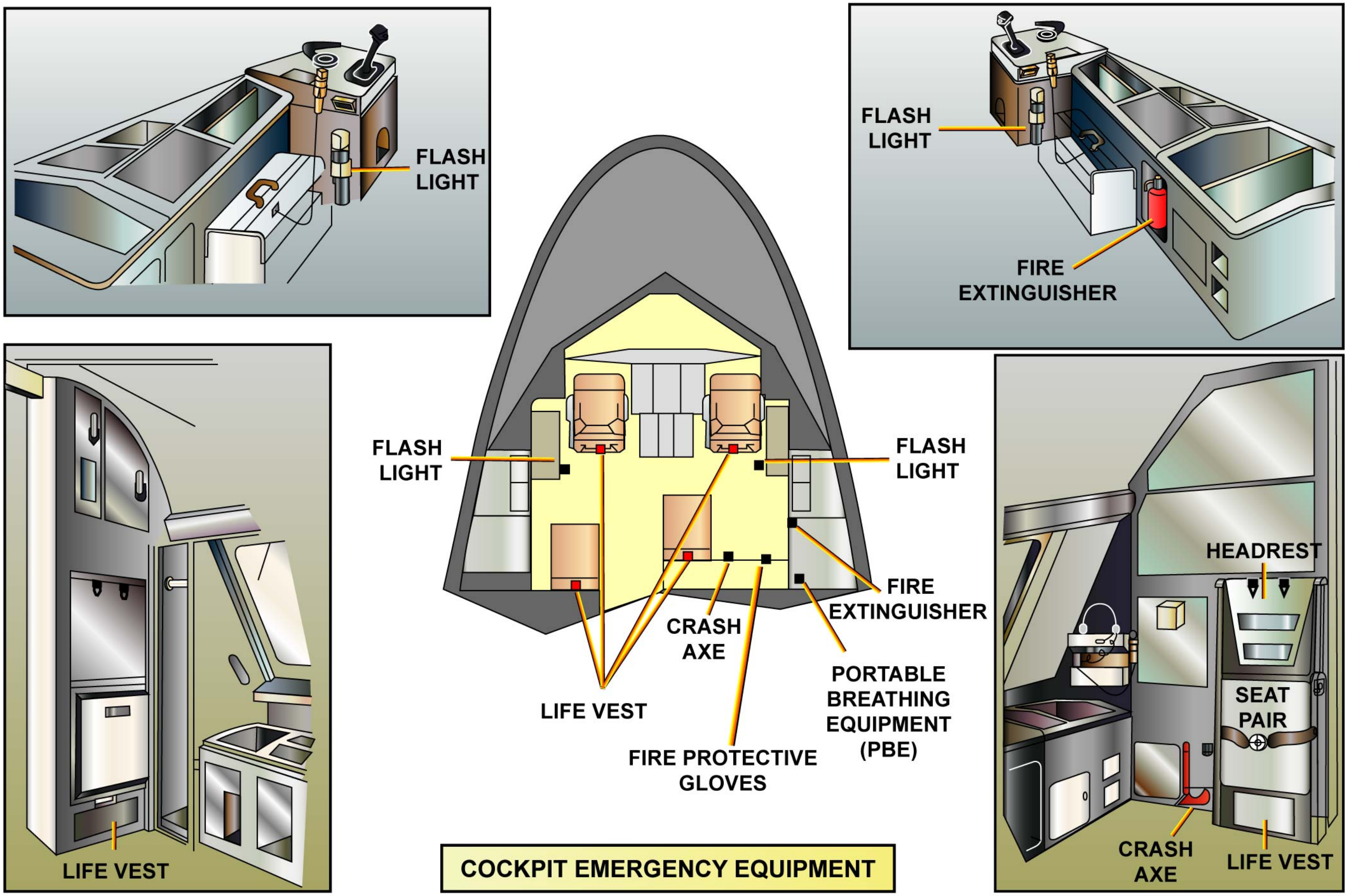
25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

EMERGENCY EQUIPMENT

The function of emergency equipment is to give to crew and passengers efficient means to handle safely hazardous situations that could occur in the aircraft.

COCKPIT EMERGENCY EQUIPMENT LIST

The standard cockpit emergency equipment components are:
- flash light,
- portable Halon fire extinguisher,
- life vest for flight crew,
- Protective Breathing Equipment (PBE),
- crash axe,
- fire proof gloves.



EMERGENCY EQUIPMENT - COCKPIT EMERGENCY EQUIPMENT LIST

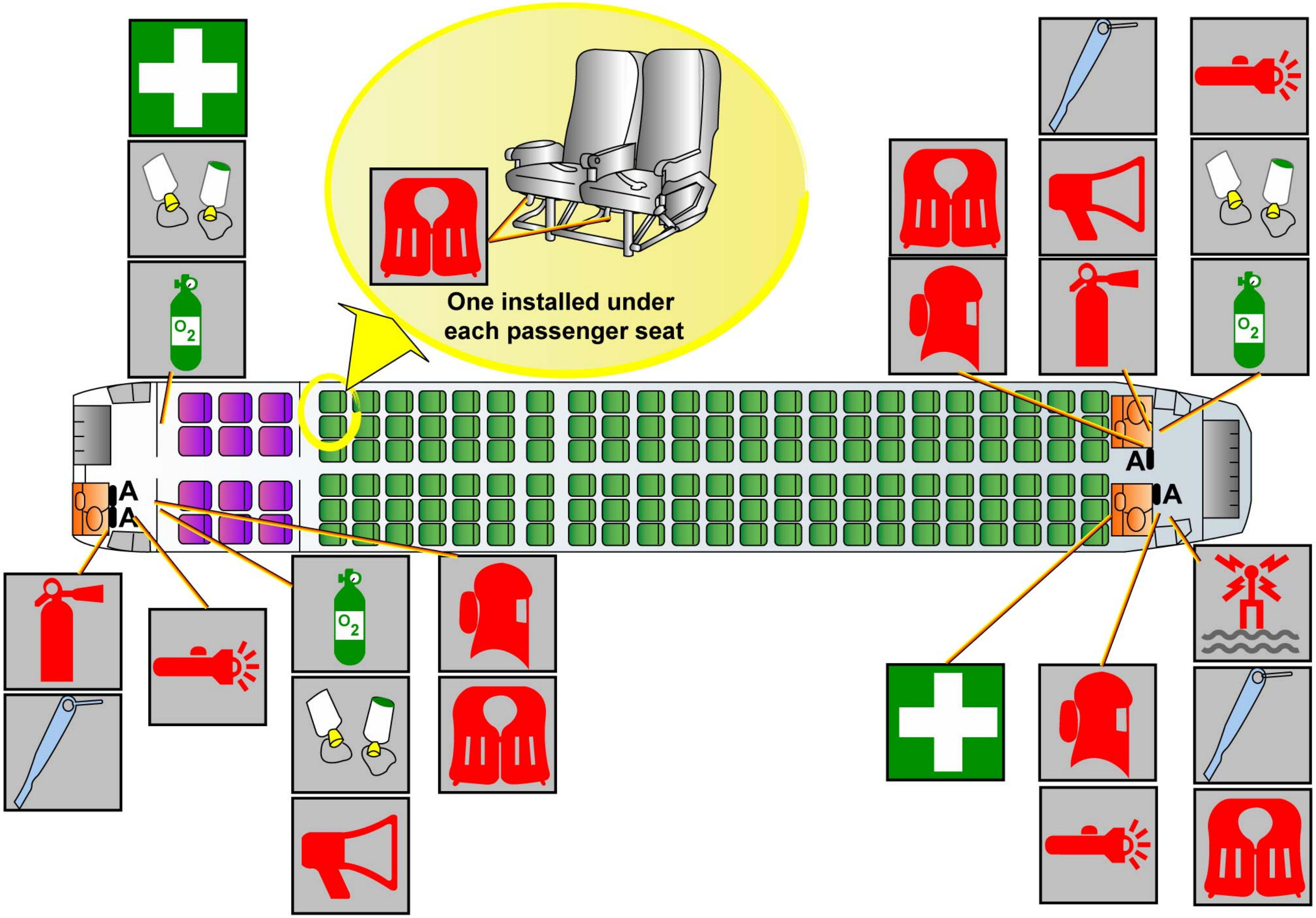
UAJ09471 - U19T4T0 - UM25PZ000000002

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

EMERGENCY EQUIPMENT (continued)

CABIN EMERGENCY EQUIPMENT LIST

The standard cabin emergency equipment components are:
- portable Halon extinguisher,
- portable oxygen cylinder and portable oxygen mask,
- PBE,
- first aid kit,
- megaphone,
- portable ELT survival beacon,
- flash light,
- manual release tool,
- demo kit,
- life vest for infant,
- spare life vest,
- life vest for passenger (one stowed under each seat),
- life vest for cabin crew (one stowed under each cabin attendant seat).



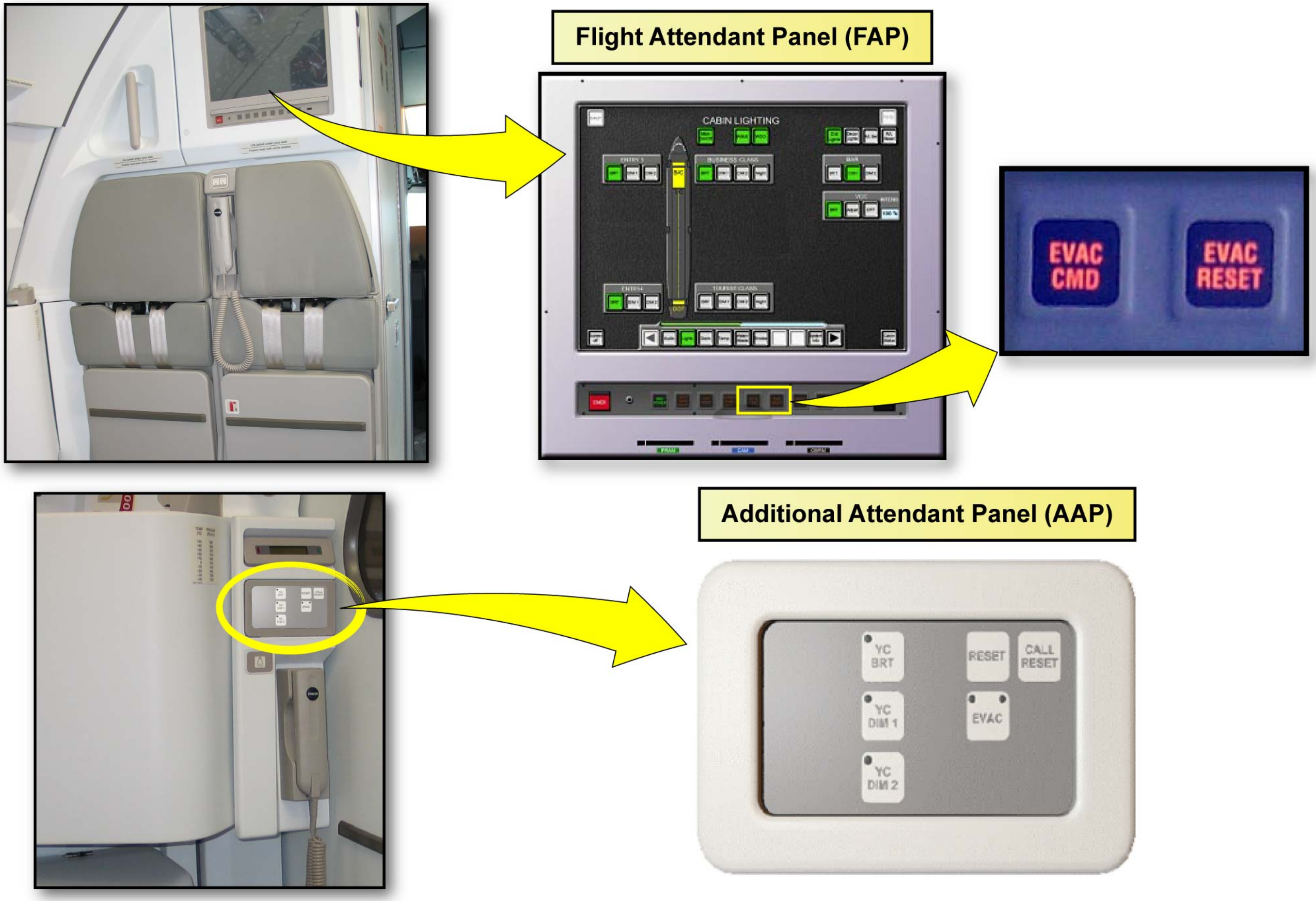
EMERGENCY EQUIPMENT - CABIN EMERGENCY EQUIPMENT LIST

UAJ09471 - U19T4T0 - UM25PZ000000002

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

EVACUATION COMMAND SYSTEM

The Emergency evacuation alert system may be activated either from the cockpit or the purser station.
On the sub panel of the FAP, two evacuation function hard keys are installed:
- EVAC CMD to start an emergency evacuation,
- EVAC RESET to reset the evacuation lights and audio alert.



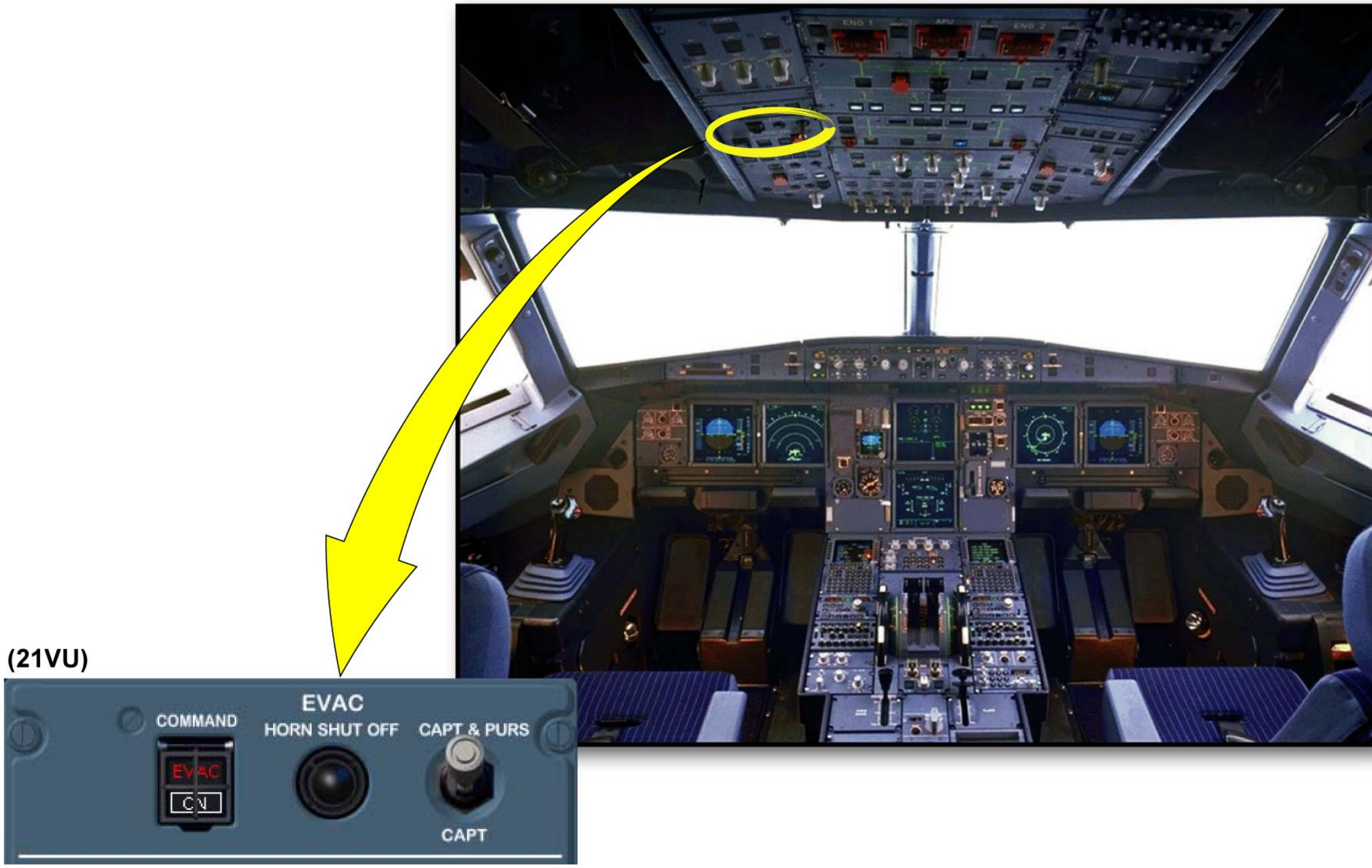
EVACUATION COMMAND SYSTEM

UAJ09471 - U19T4T0 - UM25PZ000000002

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

COCKPIT EVACUATION PANEL

On the EVAC panel in the cockpit, a switch lets the evacuation command be activated from the purser station and the cockpit, or from the cockpit only.



COCKPIT EVACUATION PANEL

UAJ09471 - U19T4T0 - UM25PZ000000002

25 EQUIPMENT/FURNISHINGS PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on the aircraft, make sure that you obey all the AMM safety procedures. This will prevent injury to persons and/or damage to the aircraft. Here is an overview of main safety precautions relative to the Equipment/Furnishing system.
Use only the specified materials and obey the instructions from the manufacturers. Other materials can cause damage to the surface protection of components and related areas.
Use solvents/cleaning agents, sealant and other special materials only with a good flow of air through the work area. Do not smoke and do not breathe the gas. Those materials are poisonous, flammable and skin irritants, put on protective clothing, rubber gloves, goggles and mask, If you get one of these materials on your skin, in your mouth or in your eyes flush it away with a flow of clean water. Get medical help if your skin or eyes become irritated.
Before you start working on the escape slide make sure that the slide and door are safetied. This prevents sudden movement of the door and accidental deployment of the escape slide when you open the door.

UAJ09471 - U19T4T0 - UM25PZ000000002

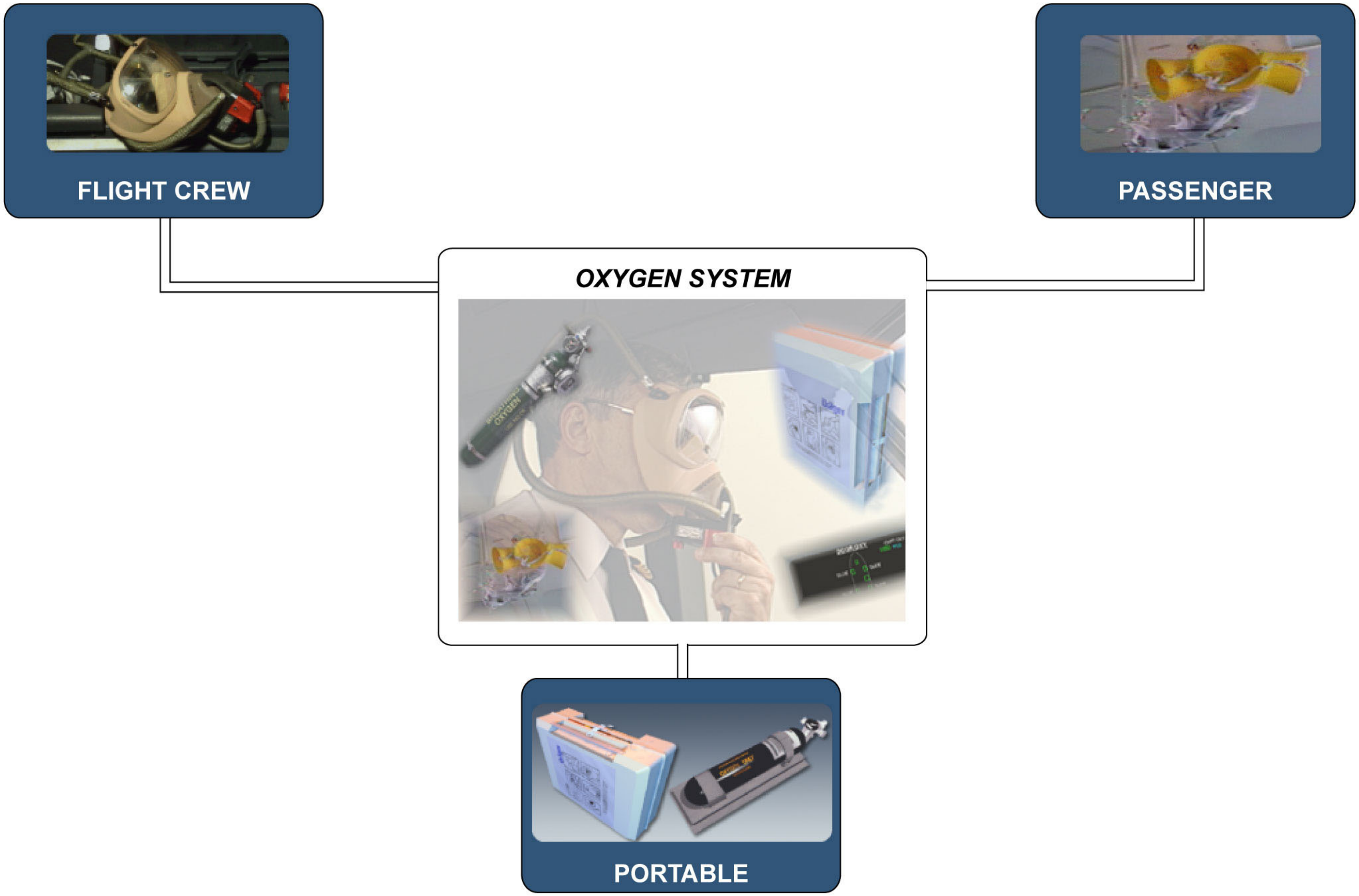
UAJ09471 - U19T4T0 - UM25PZ000000002

SAFETY PRECAUTIONS

35 OXYGEN PRESENTATION (1)

GENERAL

The oxygen system supplies crew and passengers with oxygen in case of cabin depressurization.
The oxygen system has three different subsystems:
- cockpit Crew Oxygen System: the oxygen is supplied from a high pressure oxygen cylinder to quick donning masks in the cockpit,
- passenger Oxygen System: the passenger and cabin attendant oxygen system is supplied by chemical oxygen generator units,
- portable Oxygen System: it has a high pressure portable cylinders with continuous flow type masks and smoke hoods.



GENERAL

UAJ09471 - U19T4T0 - UM35PZ000000001

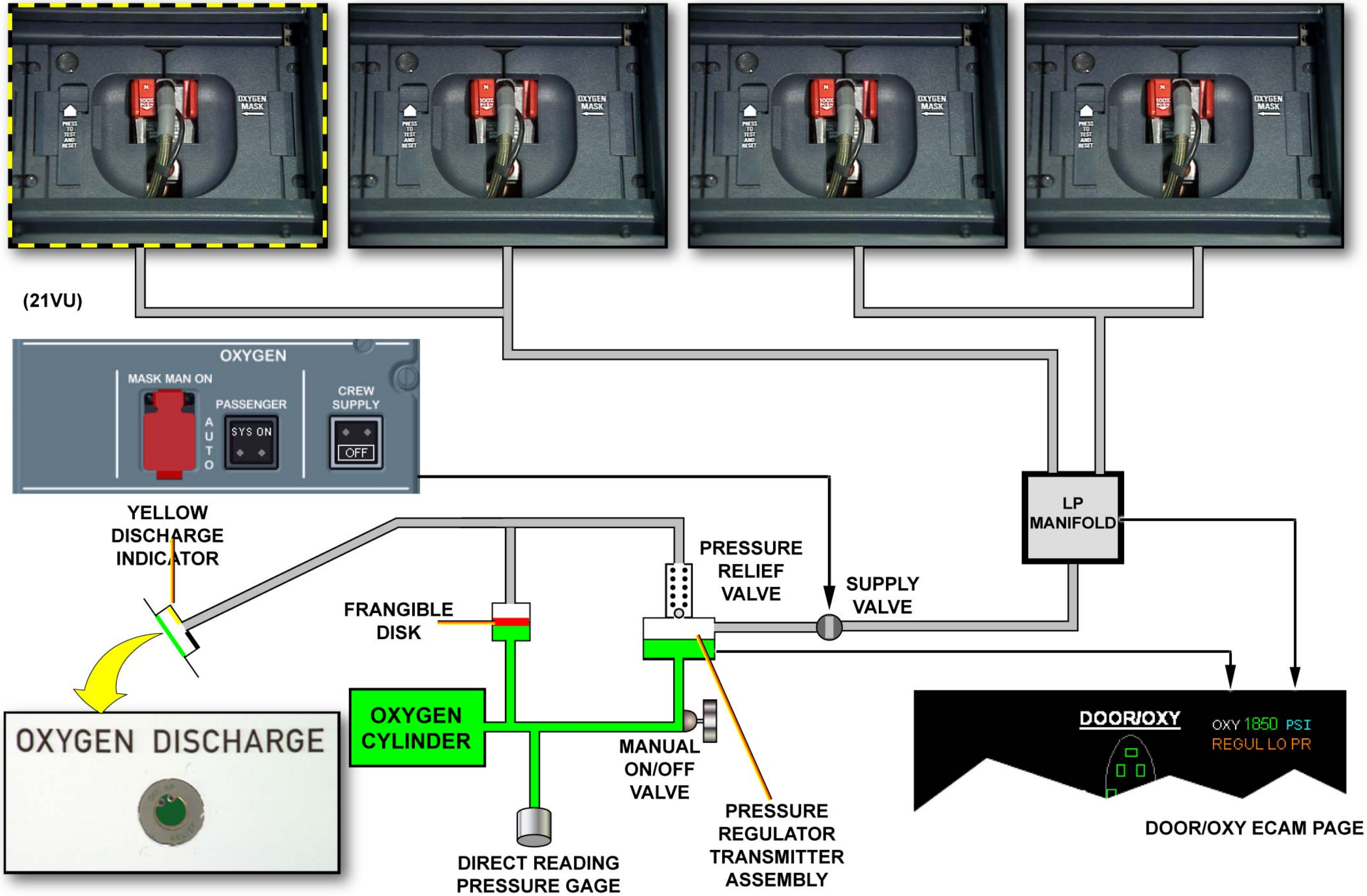
35 OXYGEN PRESENTATION (1)

COCKPIT CREW OXYGEN SYSTEM

The cockpit crew oxygen system supplies oxygen to the flight crew, in case of a sudden decrease in cabin pressurization or if there are smoke or dangerous gases in the cockpit.

CREW OXYGEN SUPPLY

The cockpit crew oxygen system has a high-pressure oxygen cylinder that can be isolated for maintenance by an ON/OFF valve. A pressure regulator reduces the high pressure to a supply low pressure to the masks via a supply valve.
The supply valve can be switched off from the cockpit for maintenance action as well as in ground configuration. The system is protected if an overpressure occurs in a high or low-pressure circuit. The overpressure is vented overboard. The oxygen pressure condition is indicated on the DOOR/OXY page of the ECAM system.



COCKPIT CREW OXYGEN SYSTEM - CREW OXYGEN SUPPLY

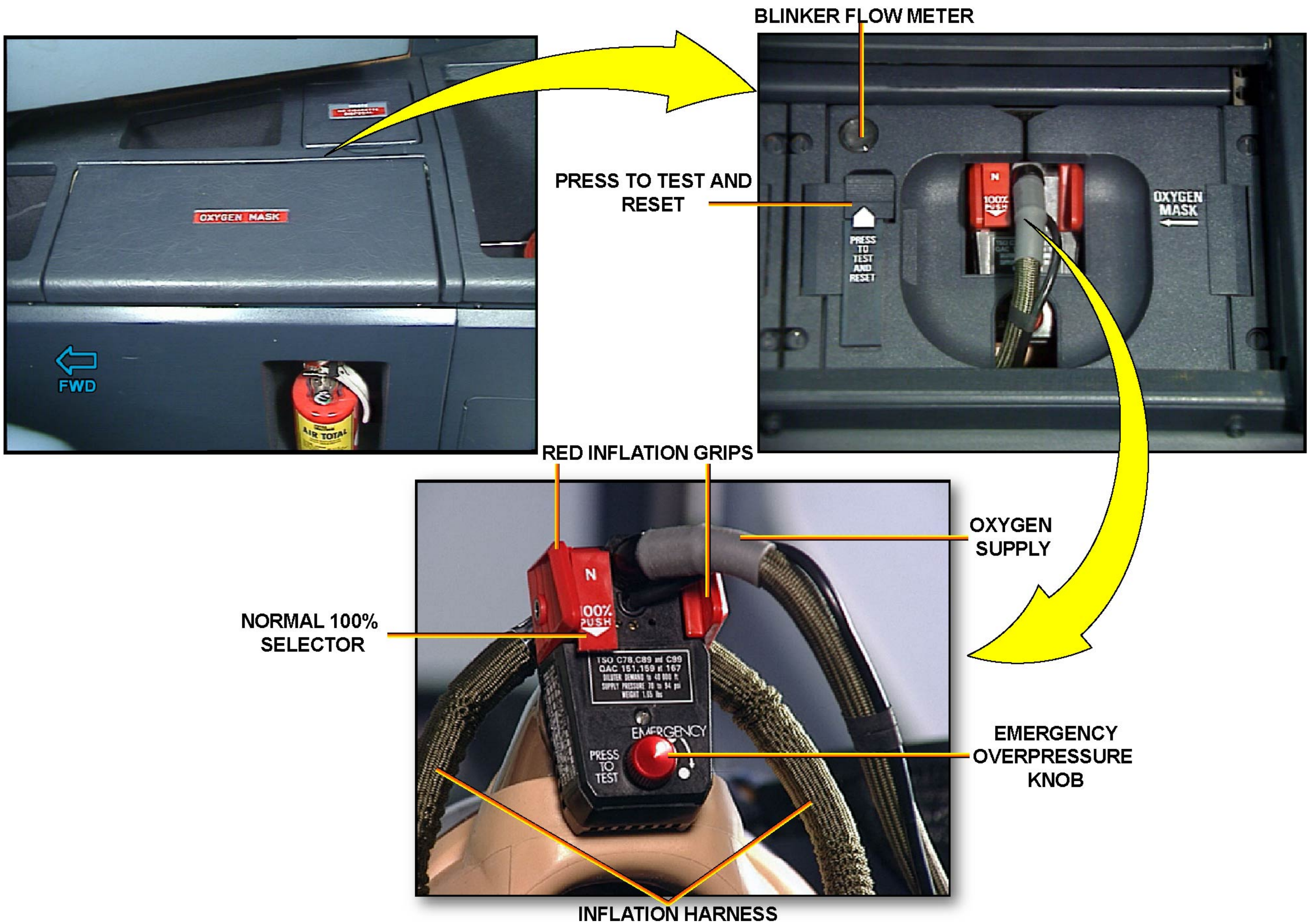
UAJ09471 - U19T4T0 - UM35PZ000000001

35 OXYGEN PRESENTATION (1)

COCKPIT CREW OXYGEN SYSTEM (continued)

CREW OXYGEN MASKS

The pilots oxygen masks are located in a storage box on both side consoles.
To use the mask the crew member squeezes the red grips to pull the mask out of the box, and this action causes the mask harness to inflate to put the mask on. With the mask in position and the red grips released, the oxygen mask will be supplied with oxygen.
A mask-mounted regulator supplies a mixture of air and oxygen or pure oxygen, or gives emergency pressure control.
With the regulator set to NORMAL, the user breathes a mixture of cabin air and oxygen up to the cabin altitude at which the regulator supplies 100% oxygen.
The user can select 100%, in that case the regulator supplies pure oxygen at all cabin altitudes.
Depending on the situation, the user can use the emergency rotating knob and receive a maximum of oxygen or with the button pressed the oxygen system can be tested.
A microphone is installed in the mask. A flow blinker flashes when there is an oxygen flow.
The TEST AND RESET control enables the oxygen flow to be tested as well as to reset the oxygen system.

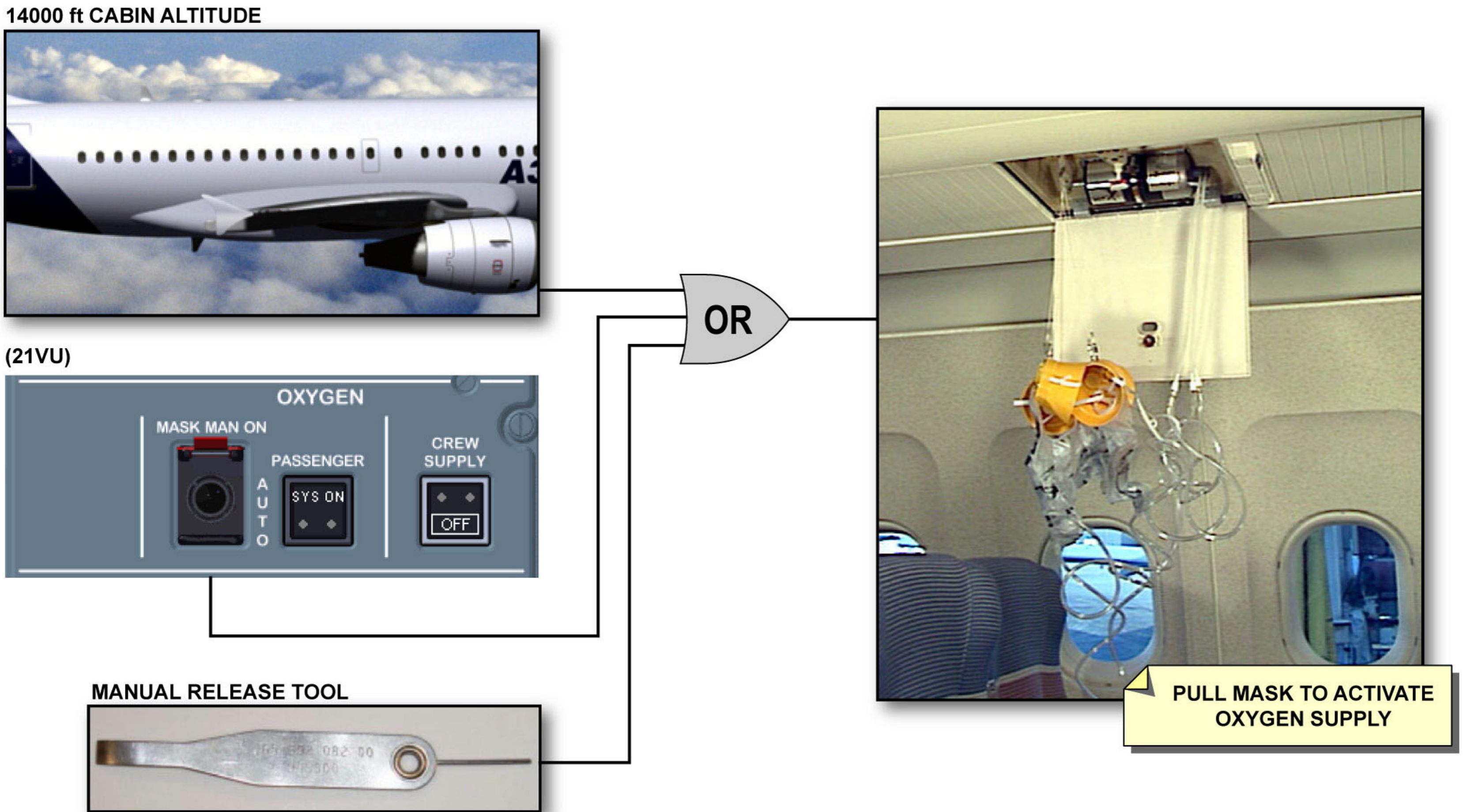


COCKPIT CREW OXYGEN SYSTEM - CREW OXYGEN MASKS

35 OXYGEN PRESENTATION (1)

CABIN OXYGEN SYSTEM

The fixed oxygen system in the cabin supplies oxygen to passengers and cabin crew in case of cabin depressurization.
It has containers with two to four masks and a chemical oxygen generator.
The oxygen containers are located above the passenger seats, in the lavatories, in each galley and at each cabin attendant station.
In case of cabin depressurization the container doors open automatically and the oxygen masks drop out.
The container doors can also be opened from the cockpit or manually with a special tool located in the cabin crew workstation.
By pulling the mask the oxygen generator is activated and produces pure oxygen to the masks for a limit time.



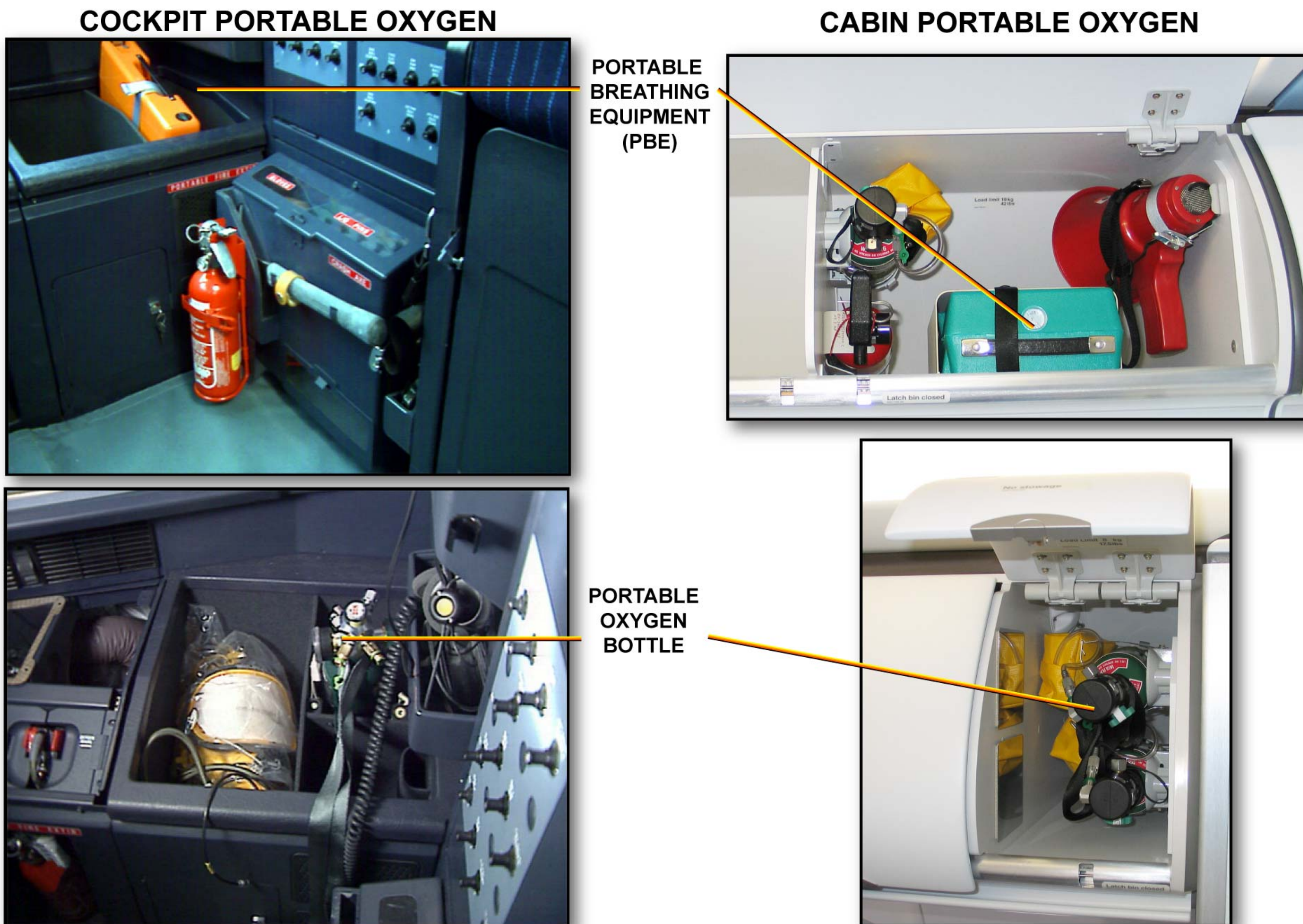
CABIN OXYGEN SYSTEM

UAJ09471 - U19T4T0 - UM35PZ000000001

35 OXYGEN PRESENTATION (1)

PORTABLE OXYGEN SYSTEM

A portable oxygen bottle and Portable Breathing Equipment (PBE) are located in the cockpit.
Portable oxygen bottles and PBE are located in the cabin.

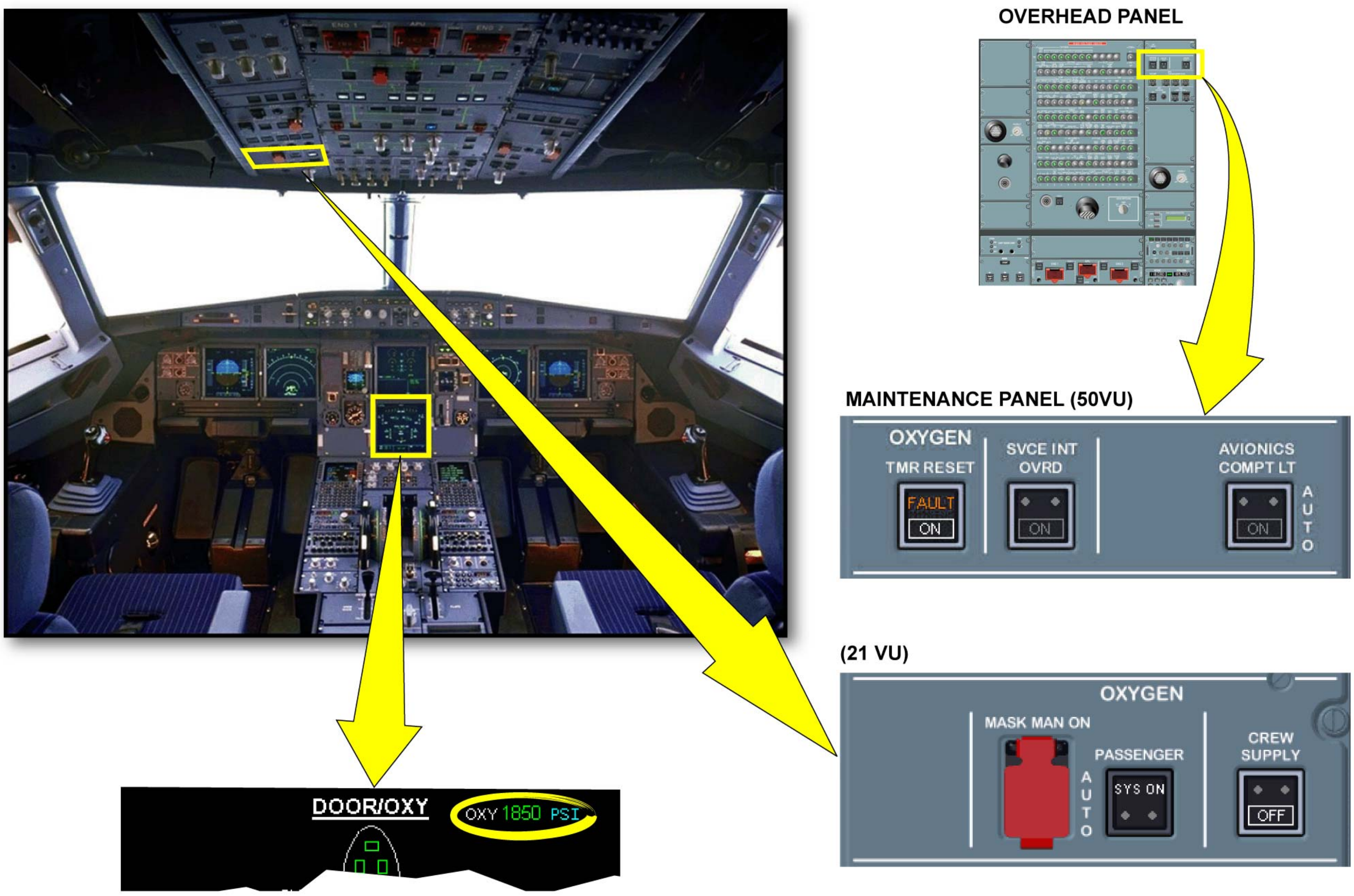


PORTABLE OXYGEN SYSTEM

35 OXYGEN PRESENTATION (1)

CONTROL AND INDICATING

The oxygen control panel, for crew and passengers, is located on the cockpit overhead panel.
The CREW SUPPLY P/B in OFF position shuts off the supply from the oxygen cylinder to the crew masks.
The MASK MAN ON P/B electrically controls the opening of the oxygen container doors. This will be indicated by the SYS ON light.
To reset the passenger oxygen system the TMR RESET P/B has to be pressed. The P/B also indicates a fault in the system.

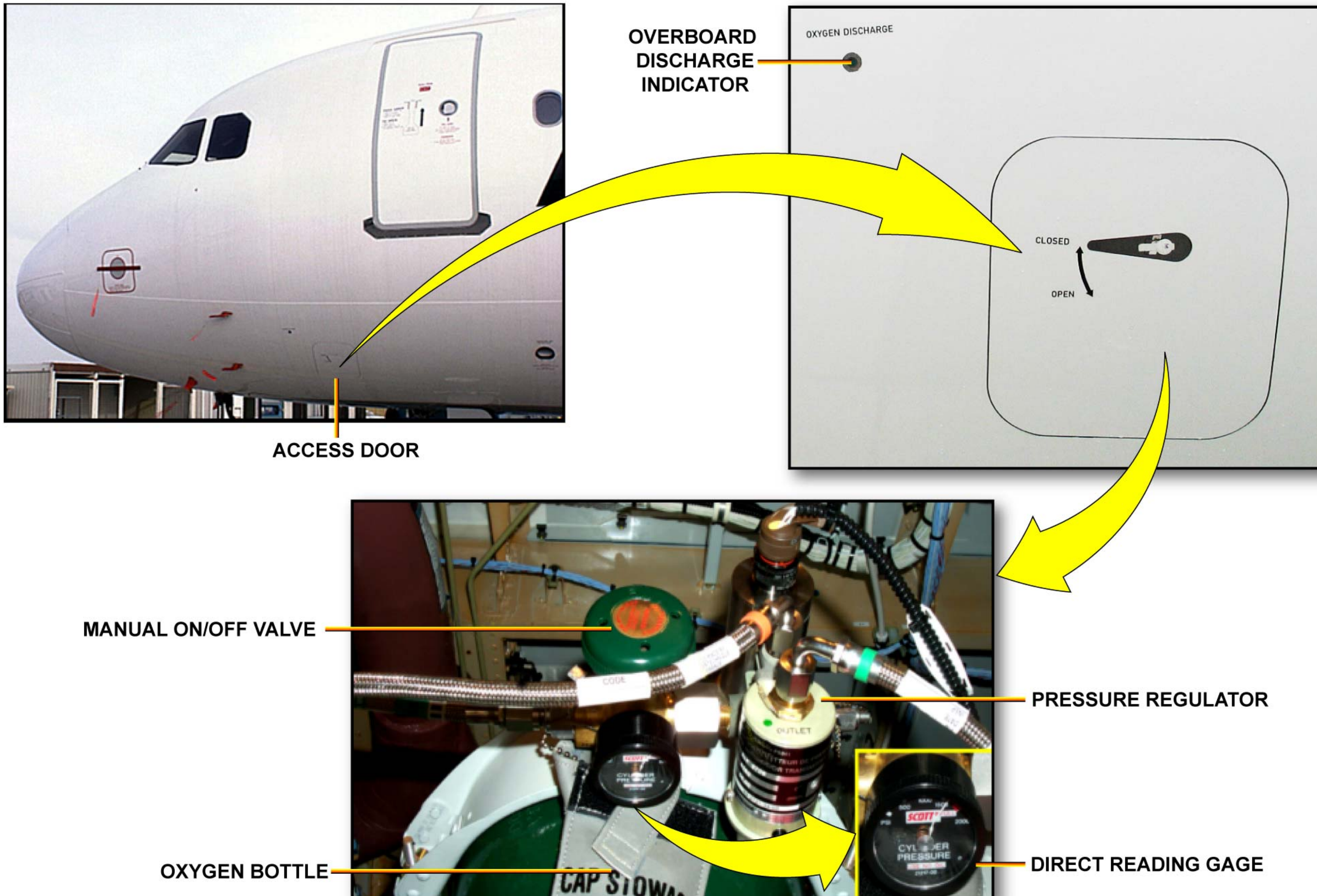


CONTROL AND INDICATING

35 OXYGEN PRESENTATION (1)

COMPONENT LOCATION

The cockpit crew oxygen system is located in the forward area of the aircraft on the LH side.
The Passenger and cabin crew oxygen containers are located above the seats in the hatracks, the lavatories, galleys, and cabin attendant stations.
The portable oxygen cylinders and the smoke hoods are located in the cockpit and in the cabin near the cabin attendant station.



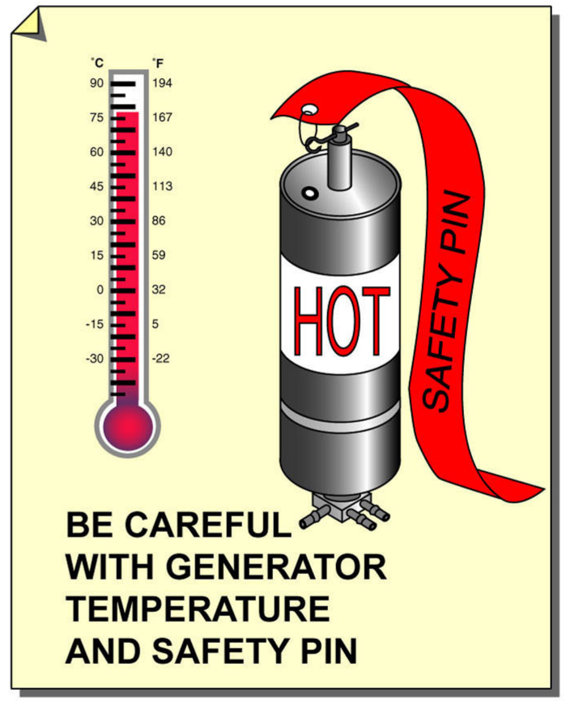
COMPONENT LOCATION

UAJ09471 - U19T4T0 - UM35PZ000000001

35 OXYGEN PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on the oxygen system, make sure that you obey all the Aircraft Maintenance Manual (AMM) safety procedures.
This will prevent injury to persons and/or damage to the aircraft. Here is an overview of main safety precautions relative to the oxygen system.
Clean the tools and make sure that your hands are clean (no grease) to prevent risk of contamination of the oxygen system. Be sure that no unwanted particles go into the oxygen system, they can cause damage to the system.
Be carefully during removal / installation or transportation of the oxygen chemical generator. Do not pull the safety pin, which will activate the oxygen chemical generator (when activated the generator becomes very hot).



SAFETY PRECAUTIONS

38 WATER AND WASTE PRESENTATION (1)

SYSTEM INTRODUCTION

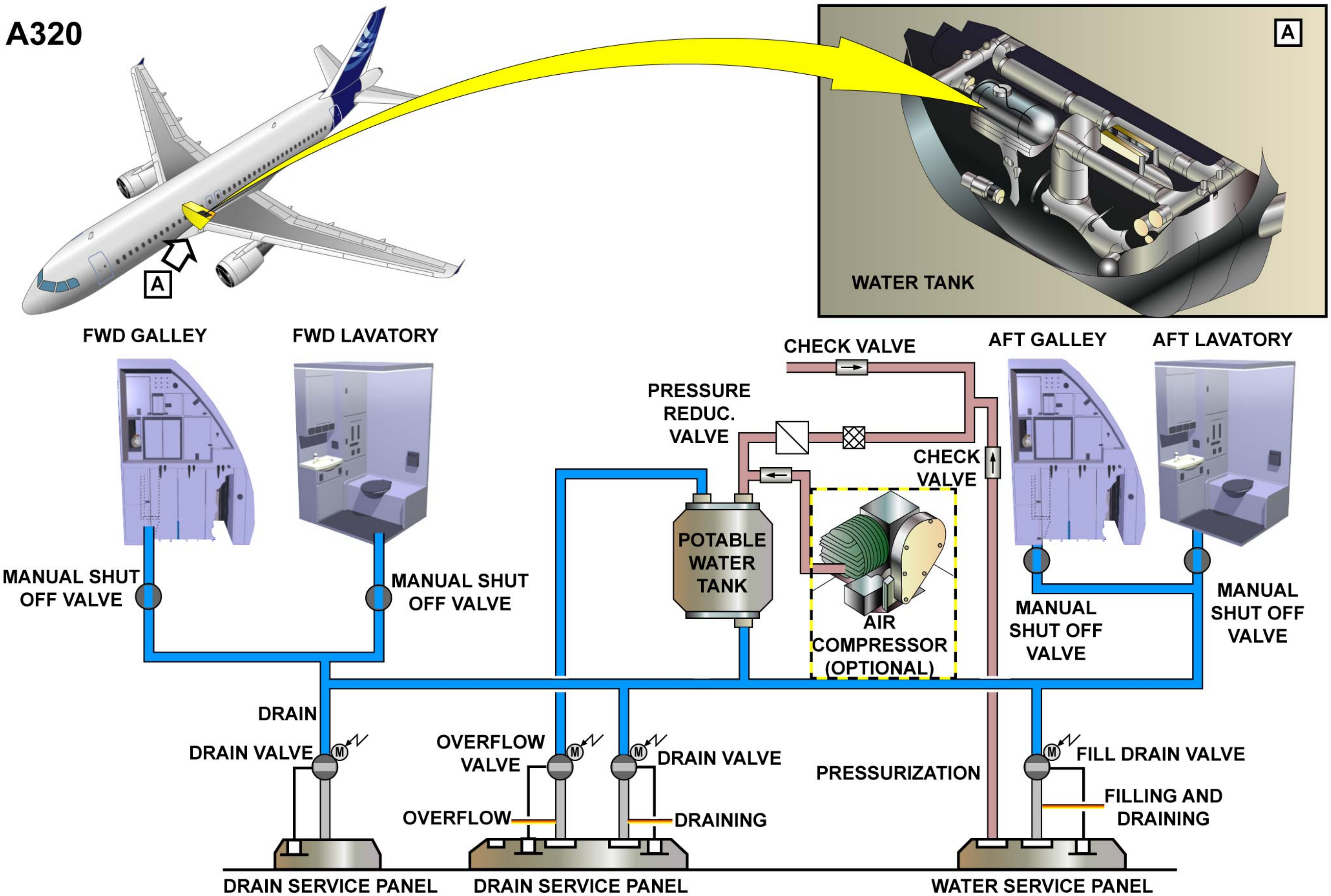
The water and waste system has:
- a potable water system,
- a waste water system,
- a toilet system.

POTABLE WATER SYSTEM

The potable water system supplies water from the water tank through a distribution system to the users.
The users are the water faucets in the galleys and lavatories and the vacuum toilet units.
A water heater is installed under the washbasin in each toilet unit to supply hot water to the water tap.
The potable water system is pressurized by the bleed air system.
A compressor (optional) can be installed to pressurize the water system with air on the ground.
Manual shut off valves are installed to isolate any galley or lavatory.

A320

The potable water system can be serviced with or without electrical power available.
The A320 has one water servicing panel and due to water tank location two drain servicing panels.



SYSTEM INTRODUCTION & POTABLE WATER SYSTEM

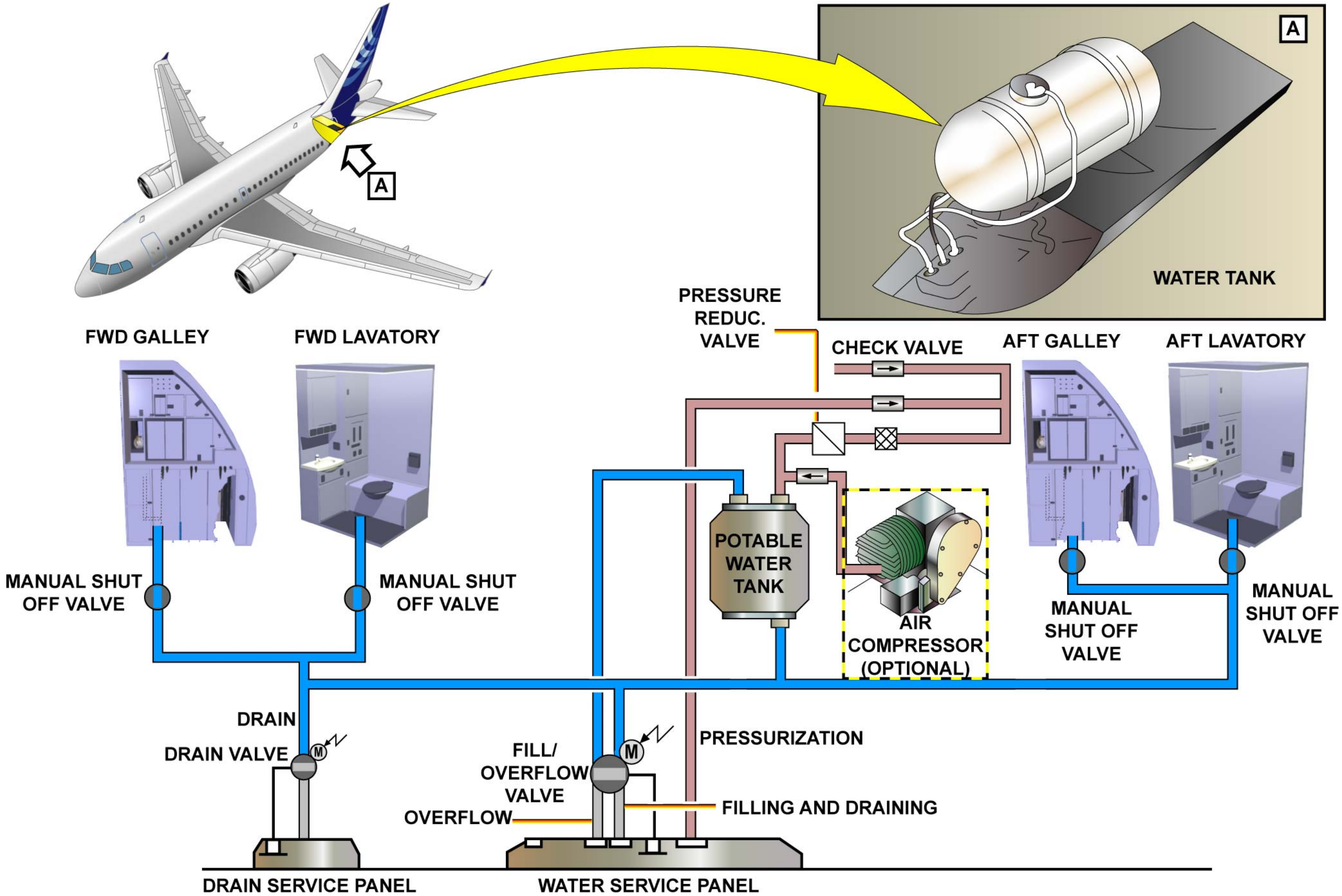
UAJ09471 - U19T4T0 - UM38PZ000000002

38 WATER AND WASTE PRESENTATION (1)

POTABLE WATER SYSTEM (continued)

A318/A319/A321

The A/C is serviced from a water servicing panel and a single drain servicing panel.



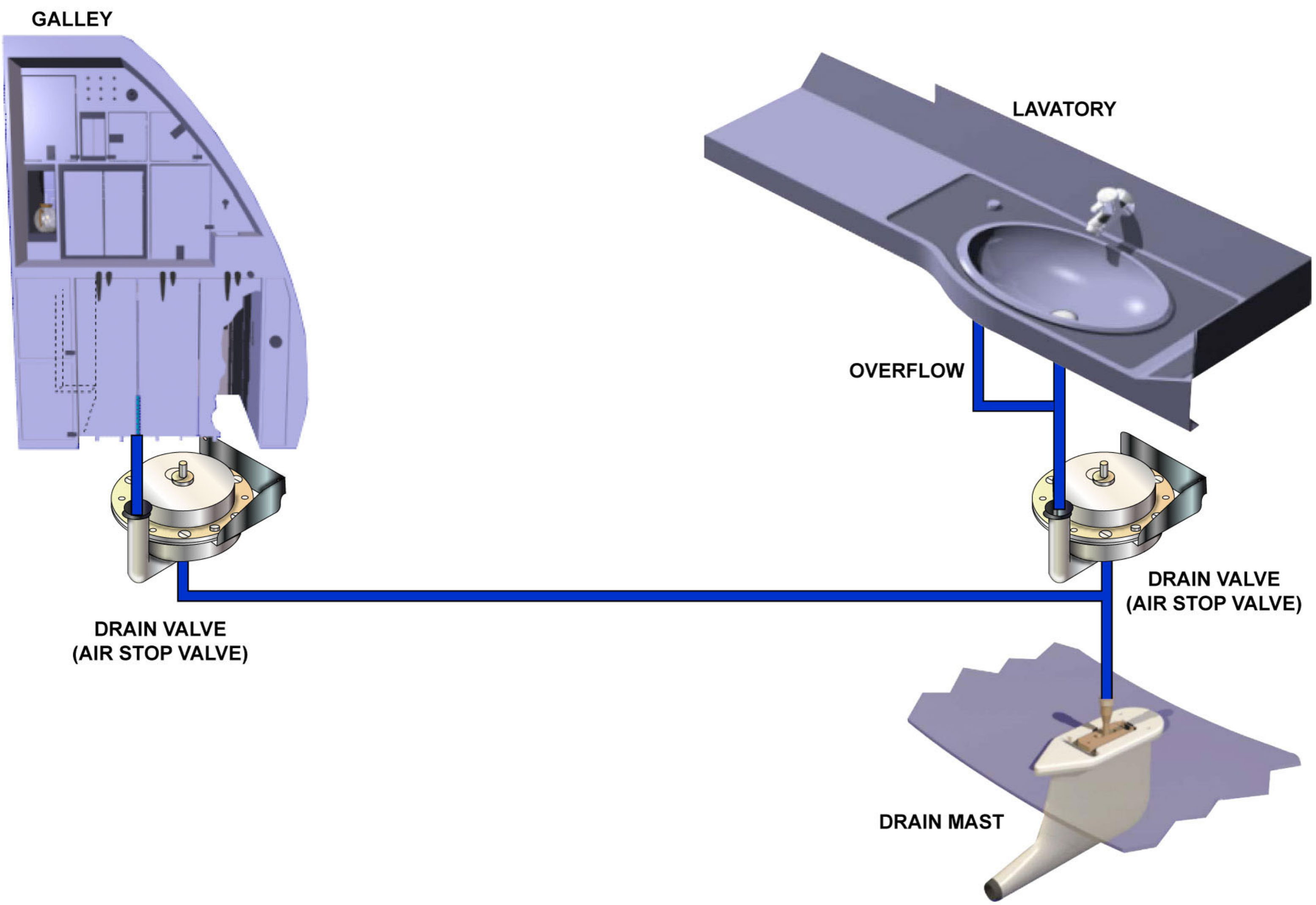
POTABLE WATER SYSTEM - A318/A319/A321

UAJ09471 - U19T4T0 - UM38PZ000000002

38 WATER AND WASTE PRESENTATION (1)

WASTE WATER SYSTEM

The waste water drain system collects the waste water from the lavatory washbasins and the galley sinks.
The waste water is discarded outside through the drain valve (air stop valve) and the heated drain mast.
Air stop valves avoid constant cabin depressurization by opening only when a certain amount of water is collected.



WASTE WATER SYSTEM

UAJ09471 - U19T4T0 - UM38PZ000000002

38 WATER AND WASTE PRESENTATION (1)

VACUUM TOILET SYSTEM

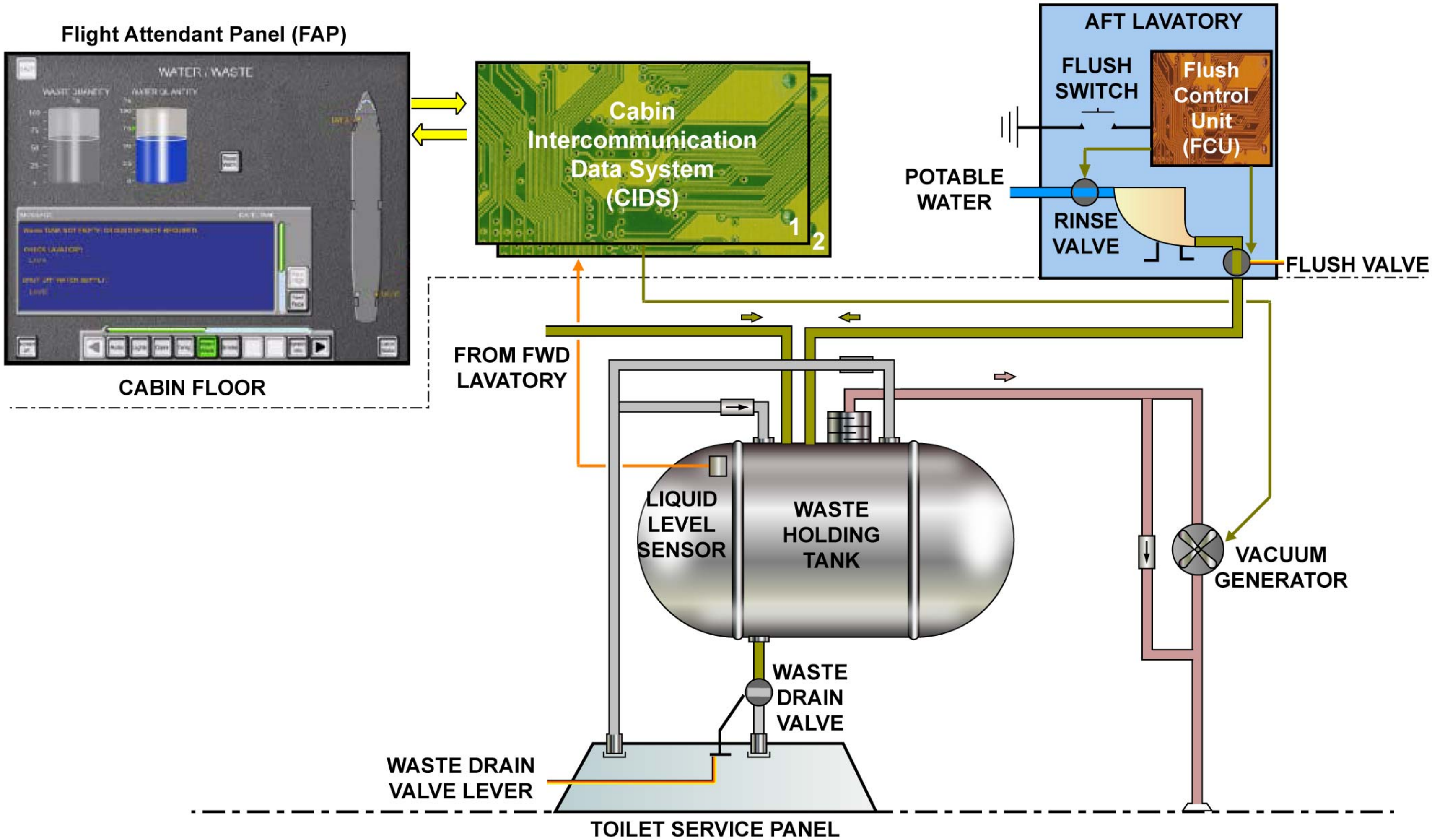
During toilet flushing, the waste from the toilet bowl is sent under the effect of cabin differential pressure to the under floor waste holding tank.
Waste holding tank servicing is done from the toilet servicing panel.
On ground and in flight below 16,000 ft, a vacuum generator is used to generate the necessary delta pressure.
The overall toilet system operation, monitoring and fault indication are controlled by the Vacuum System Controller Function (VSCF) integrated in the Cabin Intercommunication Data System (CIDS).

FLUSHING

When the flush switch is pressed, the Flush Control Unit (FCU) starts the flush sequence.
The rinse valve and the flush valve open in sequence, controlled by the FCU, to evacuate the waste material.
At the same time the FCU sends a signal to the VSCF, which will operate the vacuum generator.
The vacuum generator creates the necessary differential pressure between the cabin and the waste holding tank to move the waste from the toilet bowl.
Above 16,000 ft, the vacuum generator will not be started by the VSCF as the differential pressure is sufficient.

CONTROL AND MONITORING

The VSCF integrated in CIDS, controls and monitors the vacuum toilet system.
It is connected to the Centralized Fault Display System (CFDS).



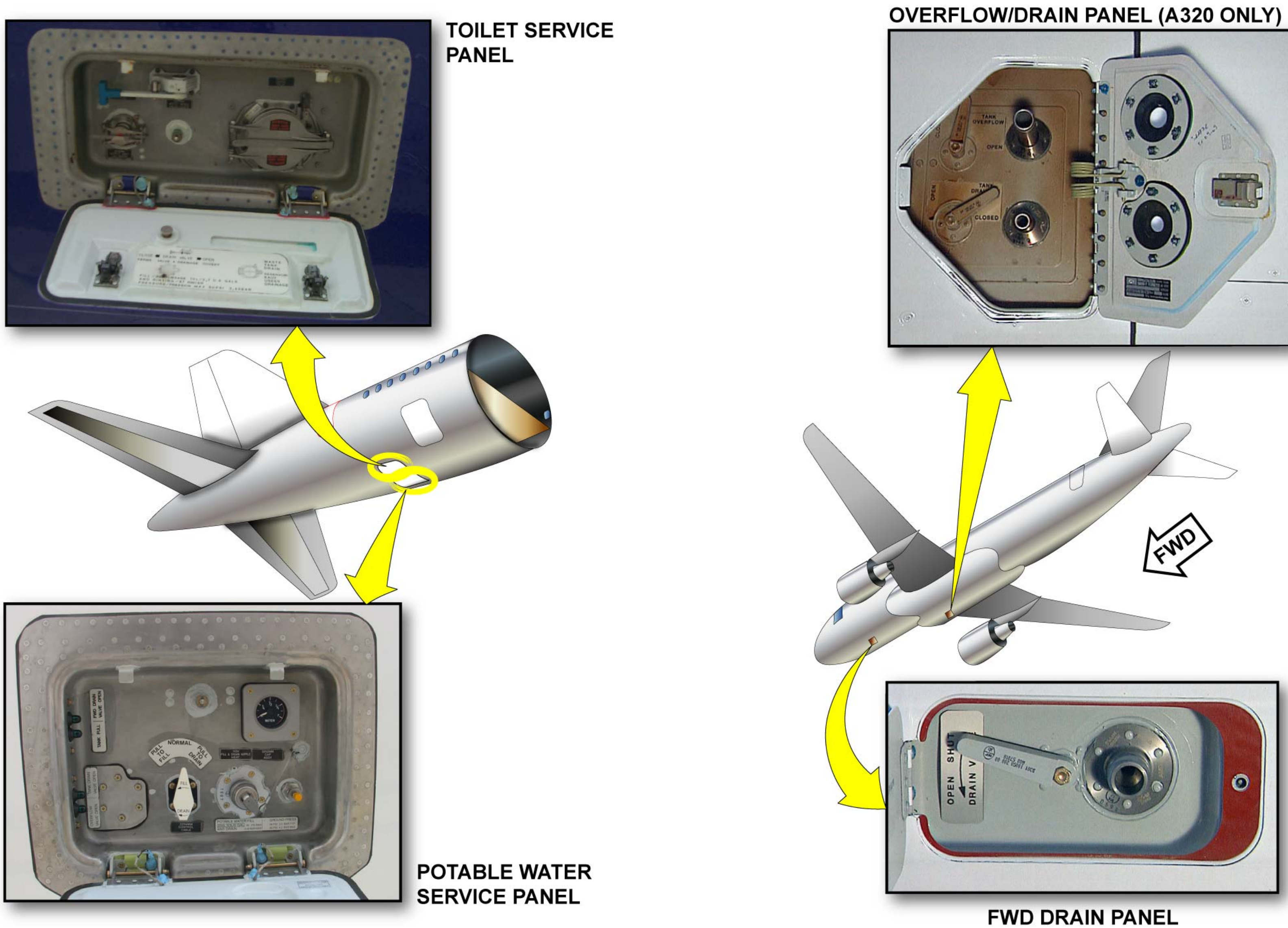
UAJ09471 - U19T4T0 - UM38PZ000000002

VACUUM TOILET SYSTEM - FLUSHING & CONTROL AND MONITORING

38 WATER AND WASTE PRESENTATION (1)

SERVICE PANEL LOCATION

The potable water service panel is installed in the rear lower fuselage on the LH side.
It is used to fill and drain the potable water tank.
The A320 has two drain panels, installed in the lower part of the fuselage.
The A318, A319 and A321 have one drain panel, installed in the lower part of the fuselage.
The toilet service panel is installed in the rear lower fuselage on the RH side.



SERVICE PANEL LOCATION

UAJ09471 - U19T4T0 - UM38PZ000000002

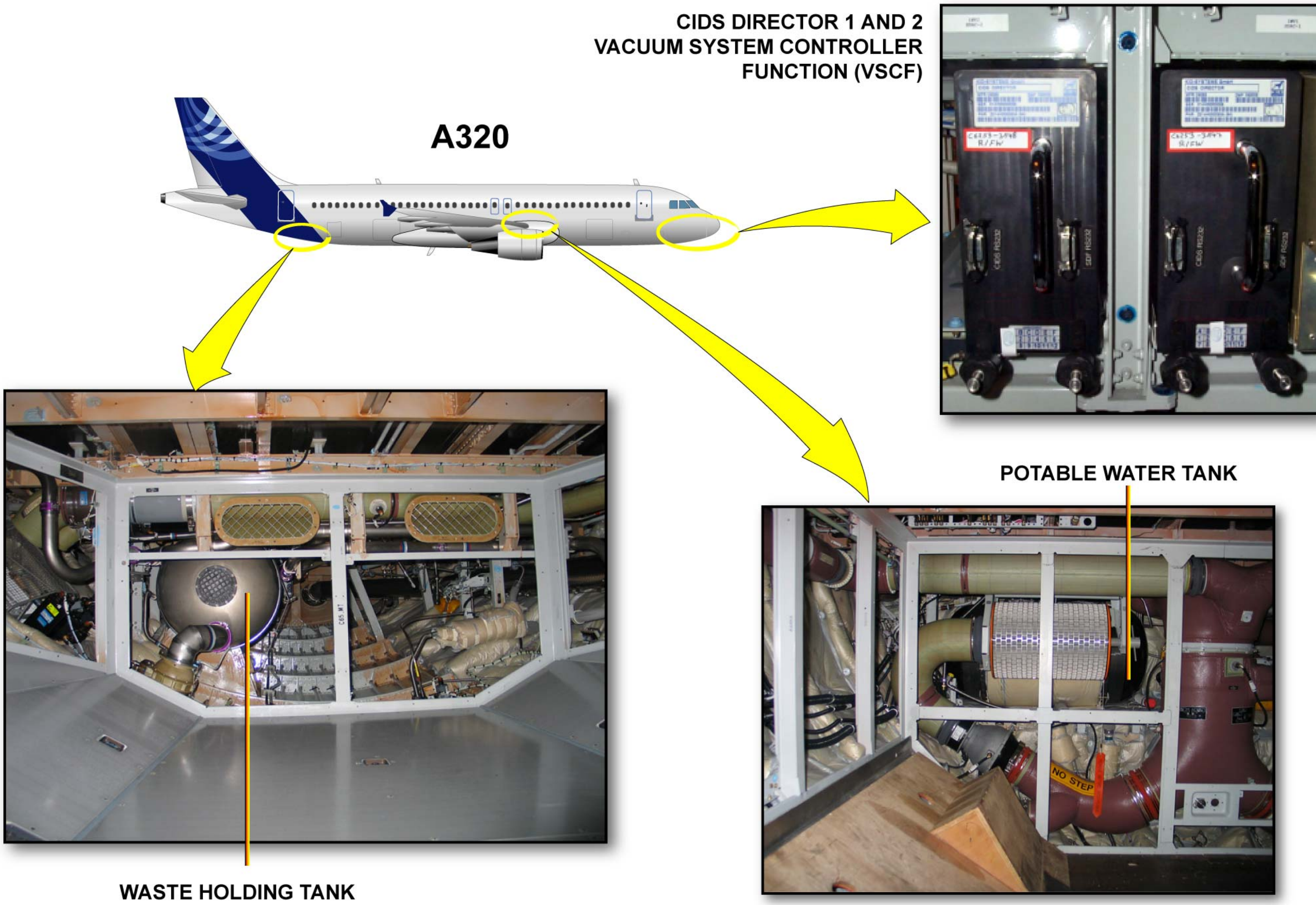
38 WATER AND WASTE PRESENTATION (1)

COMPONENT LOCATION

The waste holding tank is installed in the aft fuselage on the RH side.
The VSCF integrated in the CIDS is installed in the avionics compartment.

A320

The A320 potable water tank is installed in the lower RH fuselage behind the forward cargo compartment.



COMPONENT LOCATION - A320

UAJ09471 - U19T4T0 - UM38PZ000000002

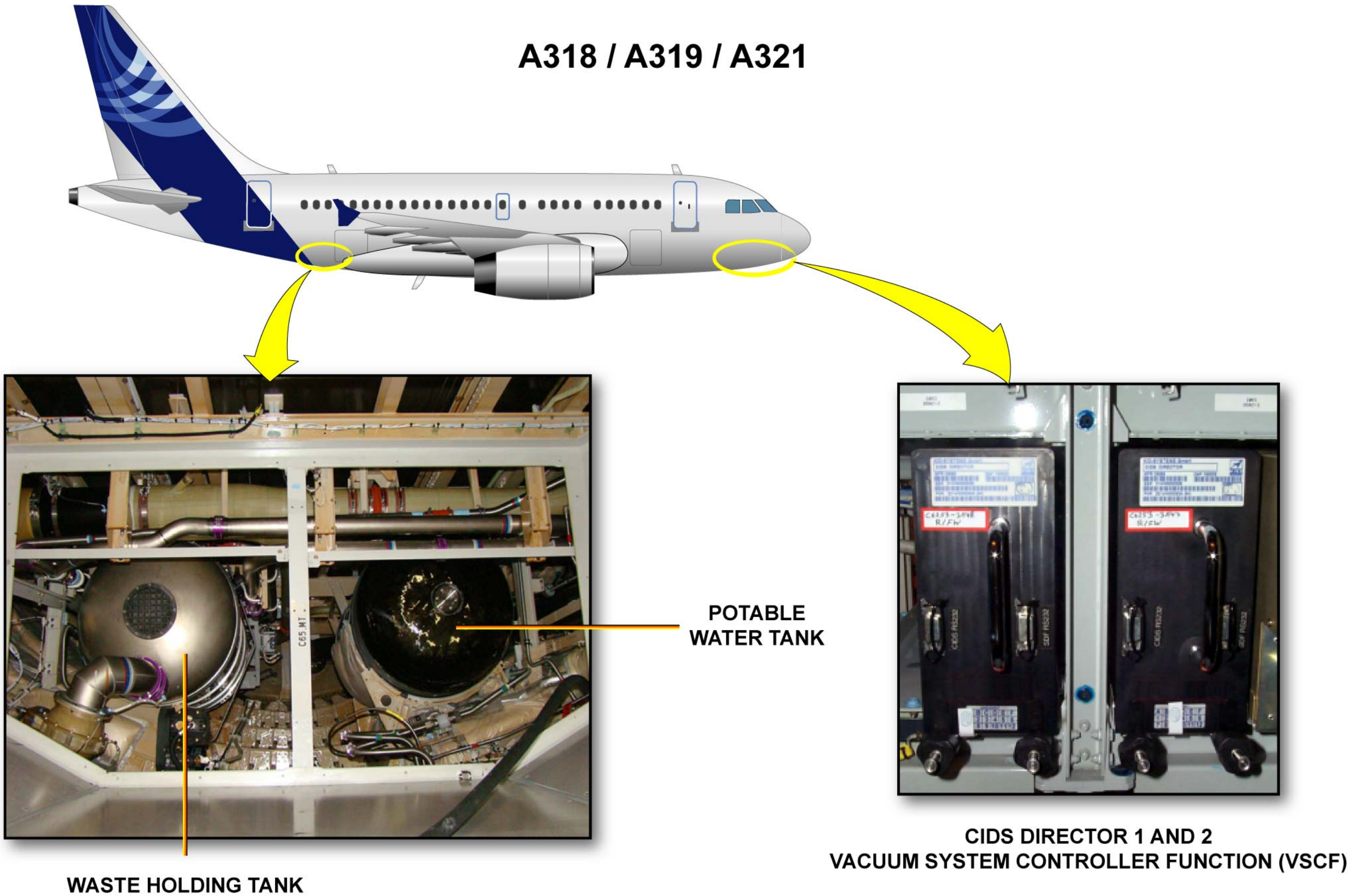
38 WATER AND WASTE PRESENTATION (1)

COMPONENT LOCATION (continued)

A318/A319/A321

The A318, A319 and A321 potable water tank is installed in the lower LH aft fuselage beside the waste holding tank.

UAJ09471 - U19T4T0 - UM38PZ000000002



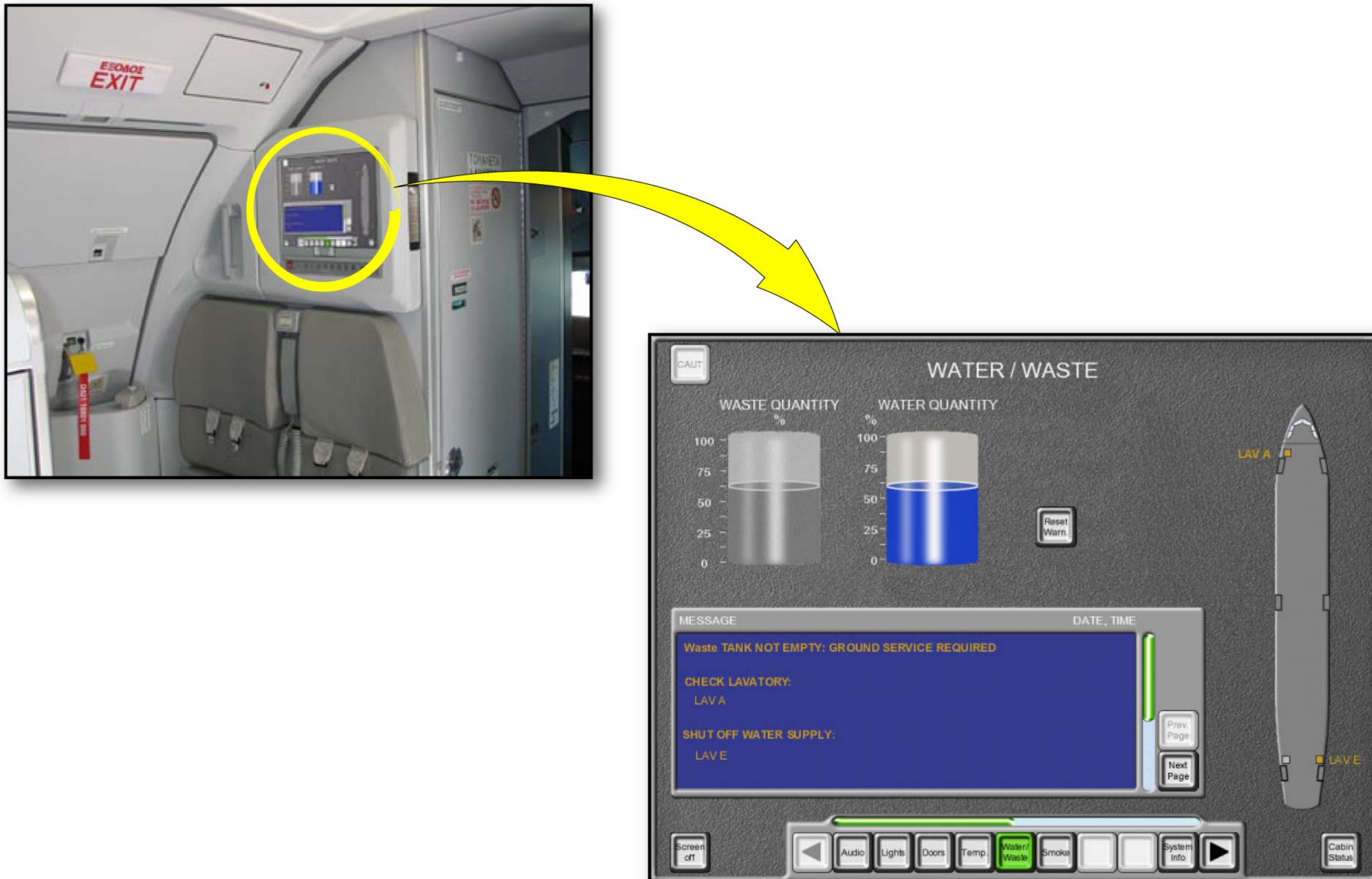
COMPONENT LOCATION - A318/A319/A321

UAJ09471 - U19T4T0 - UM38PZ000000002

38 WATER AND WASTE PRESENTATION (1)

CONTROL AND INDICATING

The water and waste indications are displayed on the Flight Attendant Panel (FAP).



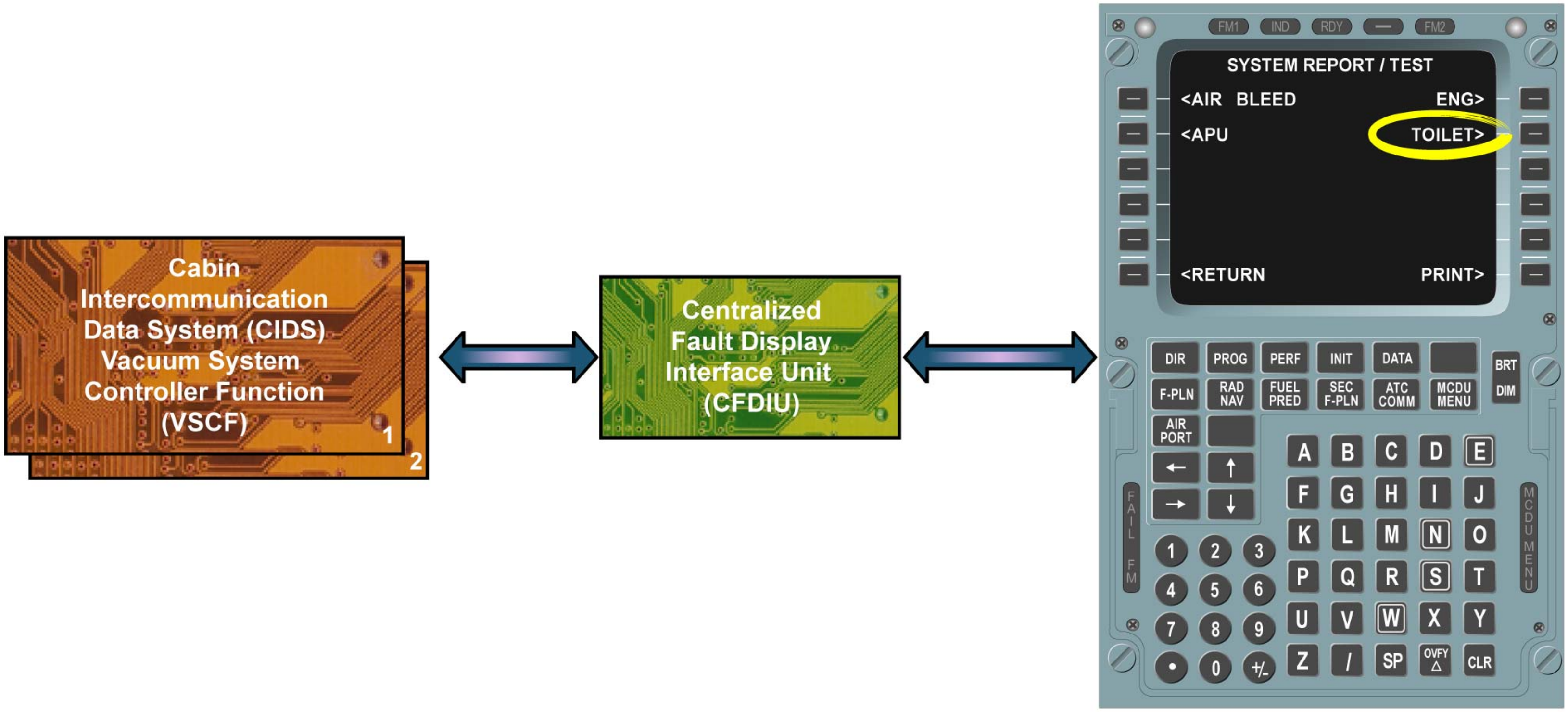
FLIGHT ATTENDANT PANEL WATER/WASTE PAGE

CONTROL AND INDICATING

38 WATER AND WASTE PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

Each FCU monitors the operation of a toilet and transmits any fault to the VSCF.
The VSCF sends the failure data, concerning the vacuum toilet system to the CFDS.
The CFDS fault messages of the toilet system are accessible by using the MCDU.

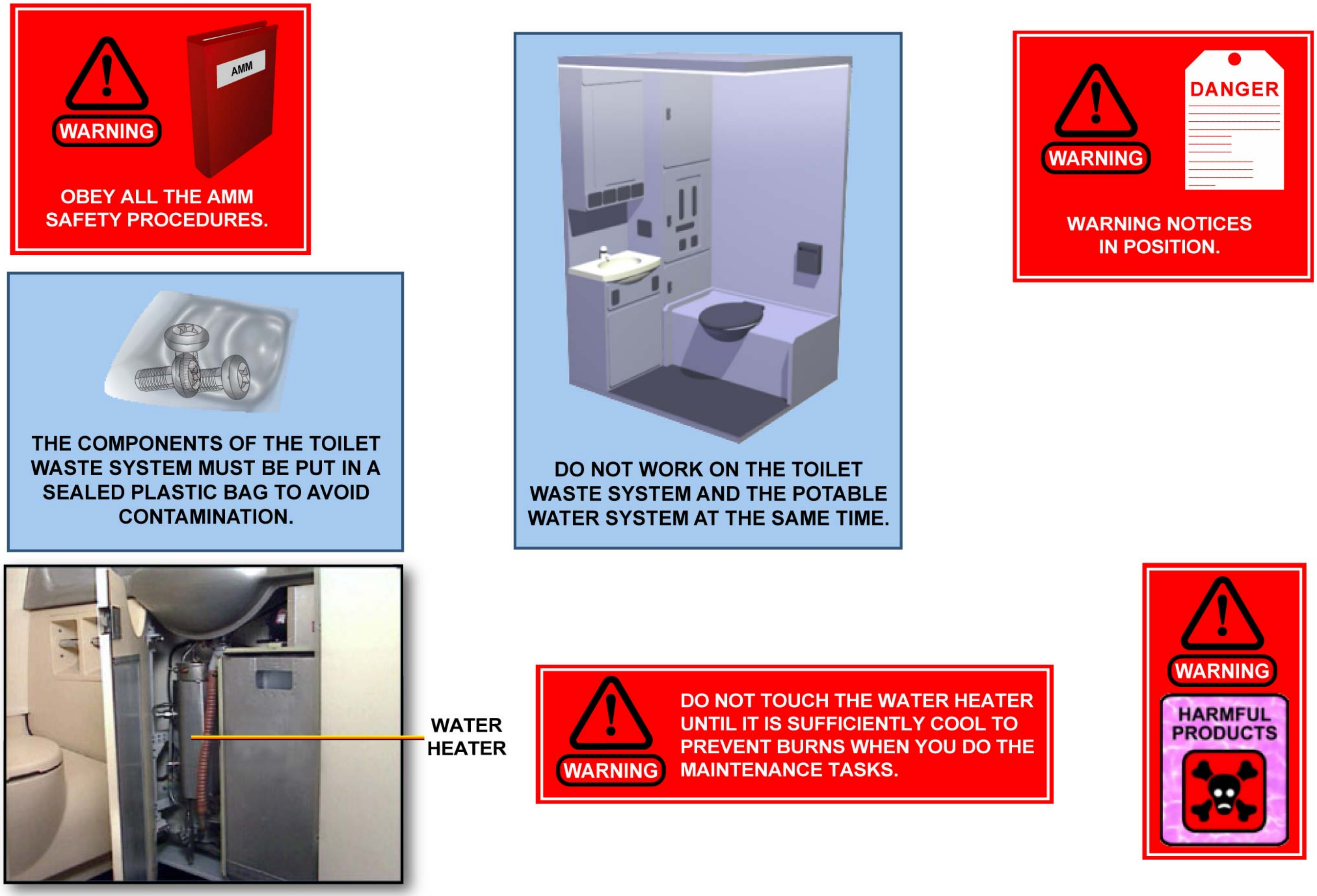


MAINTENANCE/TEST FACILITIES

38 WATER AND WASTE PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on aircraft, make sure that you obey all the Aircraft Maintenance Manual (AMM) safety procedures.
This will prevent injury to persons and/or damage to the aircraft. Here is an overview of main safety precautions relative to the water and waste system.
Before you start a task make sure that the warning notices are in position.
When you complete the work procedure, clean your hands with soap and water. This will prevent infection (toilet waste is dangerous for health).
Do not work on the waste system and the portable water system at the same time. This will prevent contamination of the potable water system.
When you remove a component of the toilet waste system, always put it in a plastic bag, then seal the bag.
Do not put documents into the plastic bag. Seal the bag first, then attach the document to it.
When you work on the potable water system make sure that the equipment you use for the procedure is clean and approved for this system. If not it can cause contamination.
Do not touch the water heater until it is sufficiently cool to prevent burns when you do the maintenance tasks.



SAFETY PRECAUTIONS

UAJ09471 - U19T4T0 - UM38PZ000000002

38 WATER AND WASTE PRESENTATION (1)

ENVIRONMENTAL PRECAUTIONS

Do not discharge products such as oil, fuel, solvent, lubricant either in trash bins, soil or into the water network (drains, gutters, rain water, waste water, etc...).
Sort waste fluids and use specific waste disposal containers.
Each product must be stored in an appropriate and specific cabinet or room such as a fire-resistant and sealed cupboard.

STORE PRODUCTS IN APPROPRIATE CONTAINER/CUPBOARD/ROOM

SORT WASTE FLUIDS IN CONTAINERS

AVOID FLUID SPILLAGE
USE APPROPRIATE STORAGE EQUIPMENT FOR CHEMICAL PRODUCTS

FLUID SPILL CLEANUP KIT

USE SPECIFIC WASTE DISPOSAL CONTAINERS

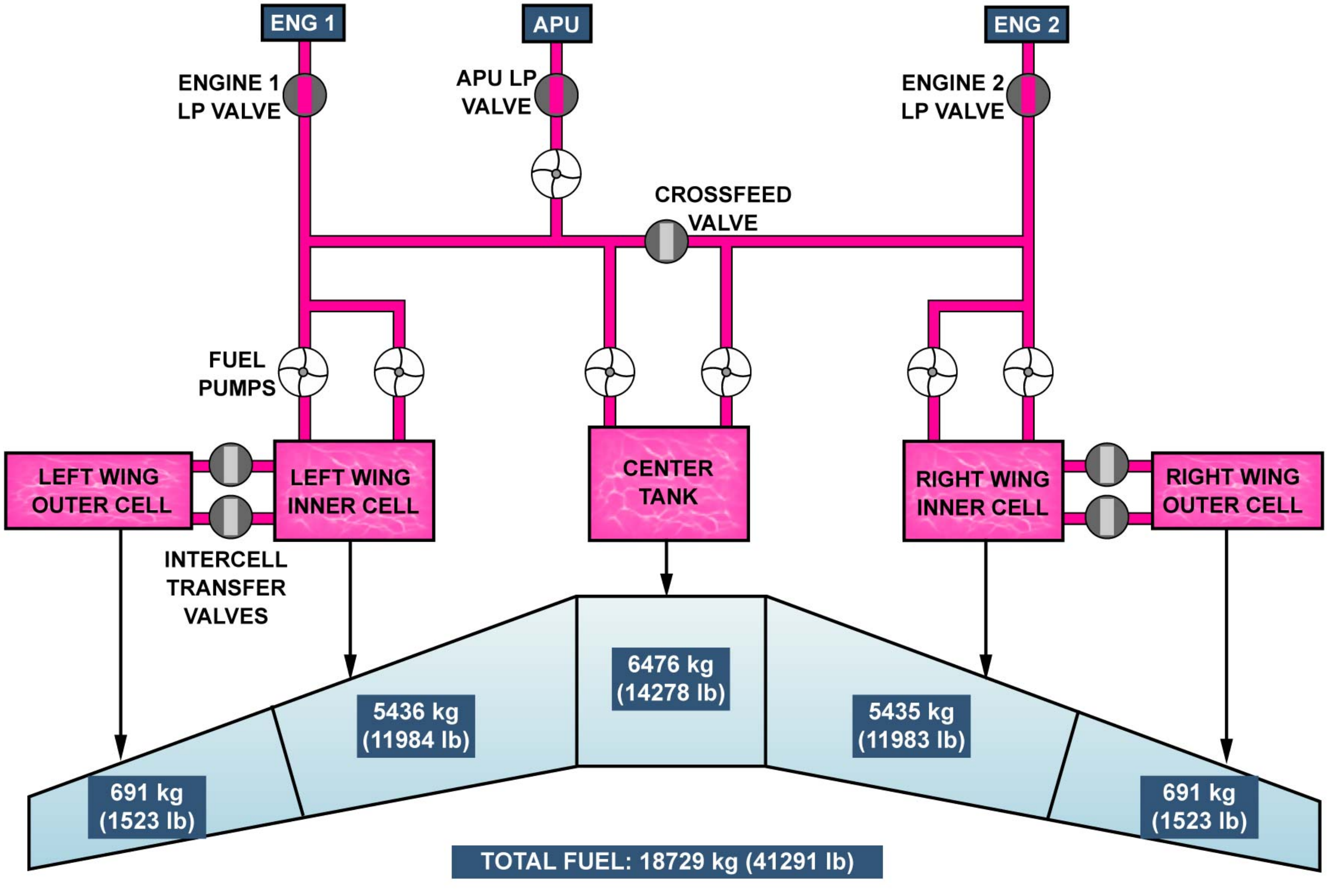
ENVIRONMENTAL PRECAUTIONS

UAJ09471 - U19T4T0 - UM38PZ000000002

28 FUEL SYSTEM PRESENTATION (1)

SYSTEM INTRODUCTION

The A318, A319, and A320 share a common fuel system design.
The fuel tanks are integrated into the center fuselage area and the wings. The center tank is part of the center wing box. The wing tanks are divided into inner and outer cells. To reduce the structural load on the wings, the fuel in the outer cells is not used until the fuel load in the inner cells decreases to a low level.
Two fuel pumps are installed in the center tank, two fuel pumps are installed in each wing tank inner cell and one fuel pump is installed for the APU. Fuel is supplied to the engines from the center tank first. After the center tank is empty, fuel is supplied from the wing inner cells. There is no direct supply from the outer cells to the engines. Two intercell transfer valves in each wing let the fuel transfer from the outer cells to the inner cells when the low level is reached.
Two engine Low Pressure (LP) valves are installed to supply or cut off fuel to the engines. The LP valve is closed when the related engine is shut down or when the engine fire pushbutton is released.
A crossfeed valve is installed to connect or isolate the left and right hand sides. It enables engine to be fed from any available fuel pump. On the ground, the crossfeed valve enables fuel to be transferred from tank to tank. The valve is closed for normal operation.
The fuel system also feeds the APU directly from the left hand side. The APU LP valve is installed to supply or cut off fuel to the APU. It closes when the APU is shut down or when the APU FIRE pushbutton is released out.



SYSTEM INTRODUCTION

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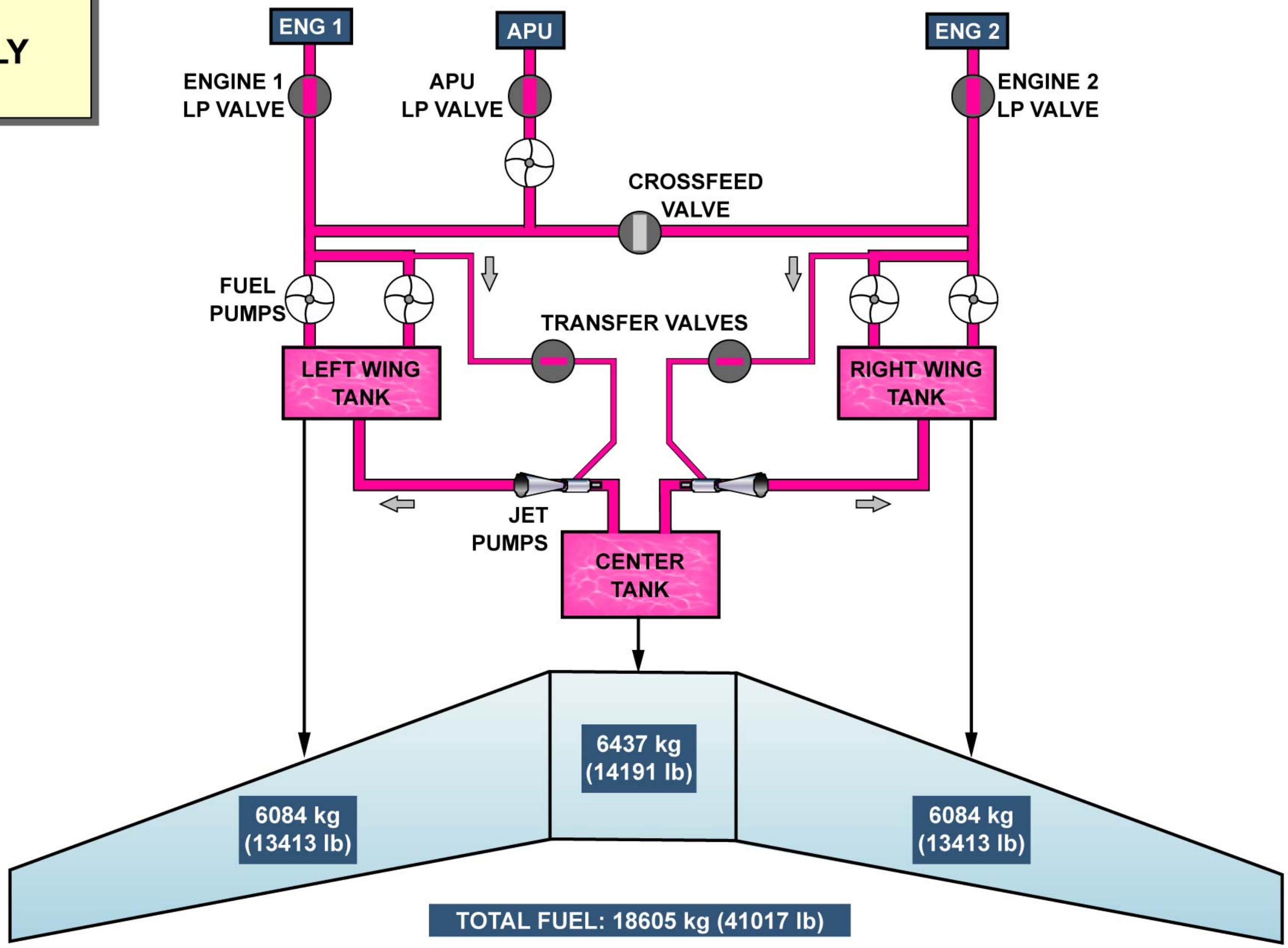
28 FUEL SYSTEM PRESENTATION (1)

SYSTEM INTRODUCTION (continued)

A321

The A321 fuel tanks are integrated into the center fuselage area and the wings. Like the A318/A319/A320, the center tank is part of the center wing box but unlike the A318/A319/A320, the wing tanks are not divided. The tanks are simply called left and right wing tanks.
Two fuel pumps are installed in each wing tank. One fuel pump is installed for the APU. Fuel is supplied to the engines from the wing tanks only. As the fuel level in the wing decreases, the center tank fuel is transferred to the wing tanks until the center tank is empty.
Fuel transfer from the center tank to the wing tanks is controlled by transfer valves. The transfer valves supply pressure for two jet pumps. These pumps are located in the center tank and transfer the fuel from the center to the wings.
Two engine LP valves are installed to supply or cut off fuel to the engines. The LP valve is closed when the related engine is shut down or when the engine fire pushbutton is released.
A crossfeed valve is installed to connect or isolate the left and right hand sides. It enables engine to be fed from any available fuel pump. On the ground, the crossfeed valve enables fuel to be transferred from tank to tank. The valve is closed for normal operation.
The fuel system also feeds the APU directly from the left hand side. The APU LP valve is installed to supply or cut off fuel to the APU. It closes when the APU is shut down or when the APU FIRE pushbutton is released out.

A321 ONLY



SYSTEM INTRODUCTION - A321

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28 FUEL SYSTEM PRESENTATION (1)

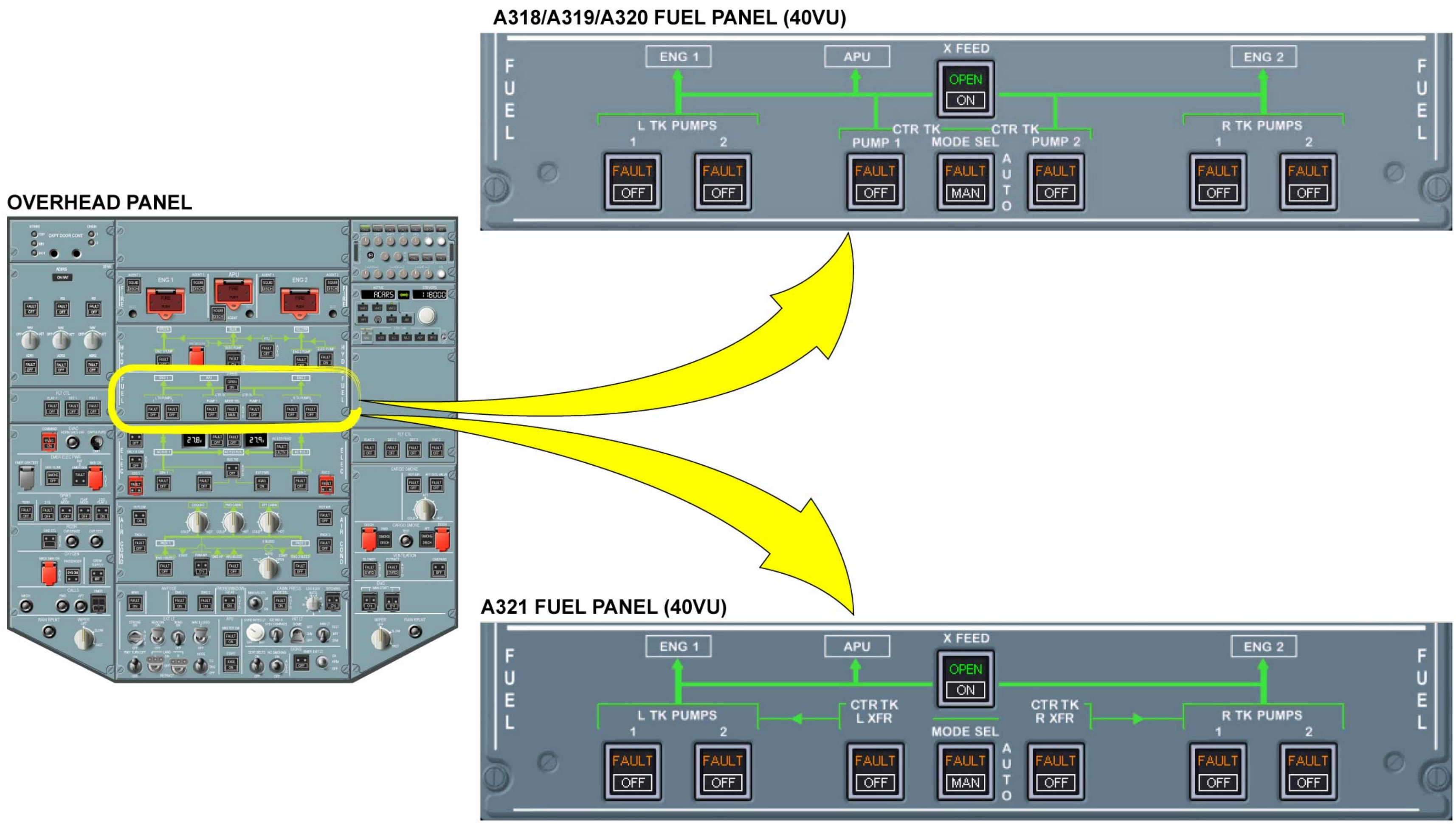
CONTROL AND INDICATING

This section will highlight the control panels and indications for the fuel system.

CONTROL PANELS

The FUEL control panel is located on the overhead panel.
The A321 FUEL control panel is very similar to the A318/A319/A320, except:
- the fuel transfer link between the center and wing tanks is indicated,
- CTR TK XFR is indicated instead of CTR TK PUMPS.

The wing tank pumps are controlled manually but the center tank pumps are normally controlled automatically. On the A318/A319/A320 fuel control panel, the MODE SEL P/BSW enables the pilot to select automatic or manual mode for the center tank pumps.
The MODE SEL P/BSW on the A321 FUEL control panel enables the pilot to select manual or automatic mode for the CTR TK XFR valves.



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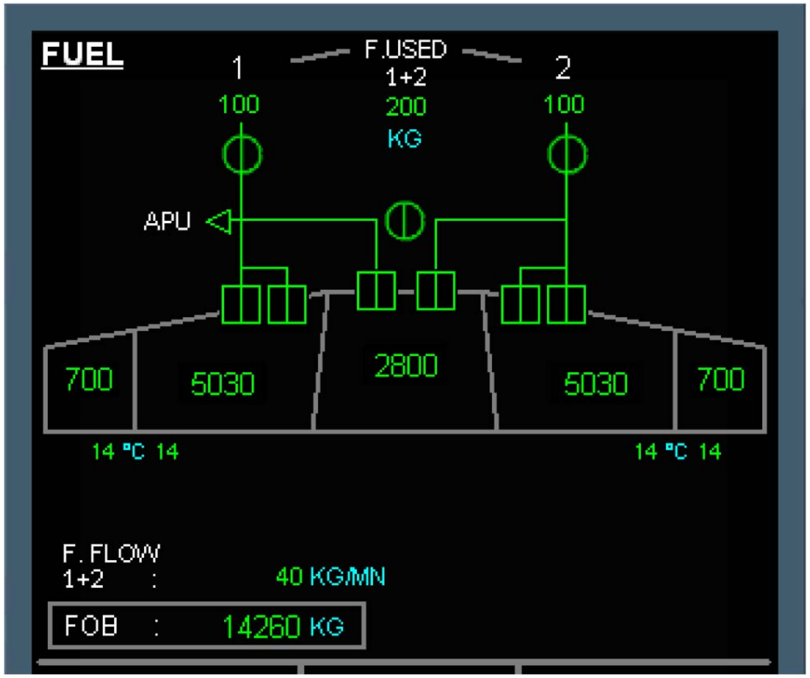
CONTROL AND INDICATING - CONTROL PANELS

28 FUEL SYSTEM PRESENTATION (1)

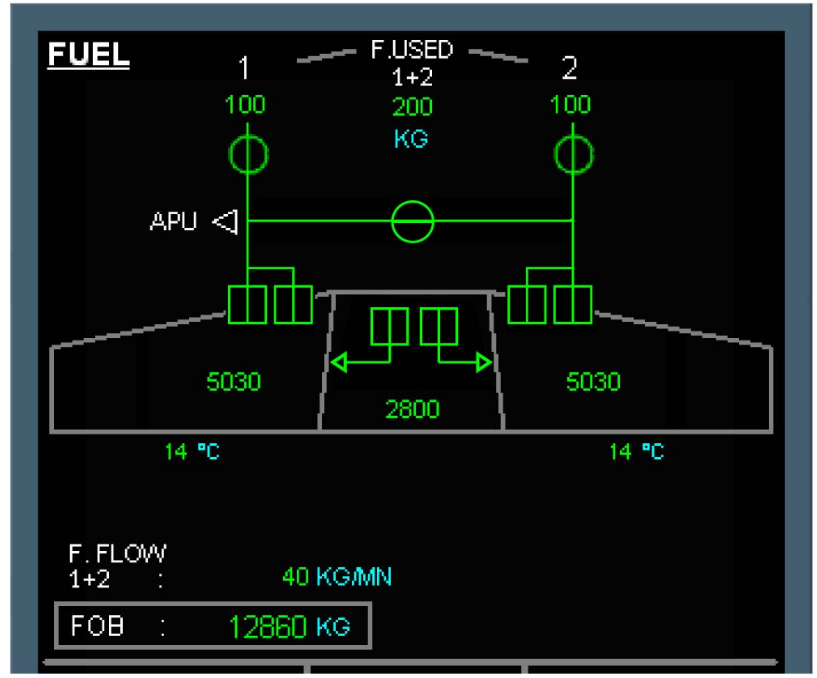
CONTROL AND INDICATING (continued)

ECAM FUEL PAGE

The configuration of the fuel system valves and pumps as well as quantity indications are displayed on the ECAM FUEL system page.
The total Fuel On Board (FOB) indication is duplicated on the Engine/Warning Display.
Let's briefly review all the A321 differences using the ECAM FUEL page:
- there is no inner and outer cells in the wing tanks,
- fuel is transferred from the center tank to the wing tanks via two jet pumps and transfer valves,
- fuel is always fed to the engines from the wing and not from the center tank.



A318/A319/A320 FUEL PAGE



A321 FUEL PAGE

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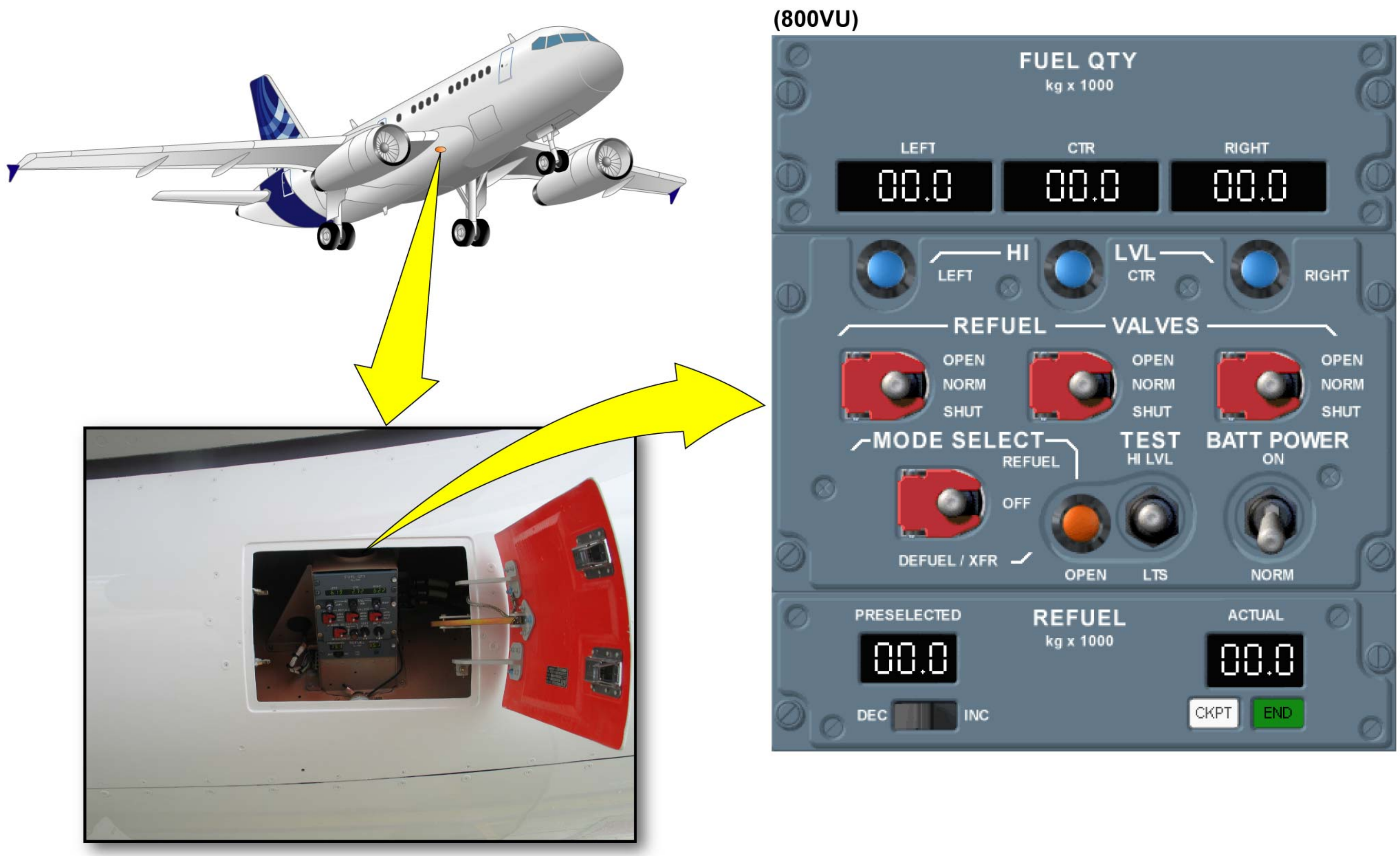
CONTROL AND INDICATING - ECAM FUEL PAGE

28 FUEL SYSTEM PRESENTATION (1)

REFUEL/DEFUEL

The Refuel/Defuel panel is located on the right hand side of the fuselage in the belly fairing.
The Refuel/Defuel panel functions are:
- automatic or manual refueling,
- high level test,
- defueling,
- fuel transfer,
- refueling on batteries.

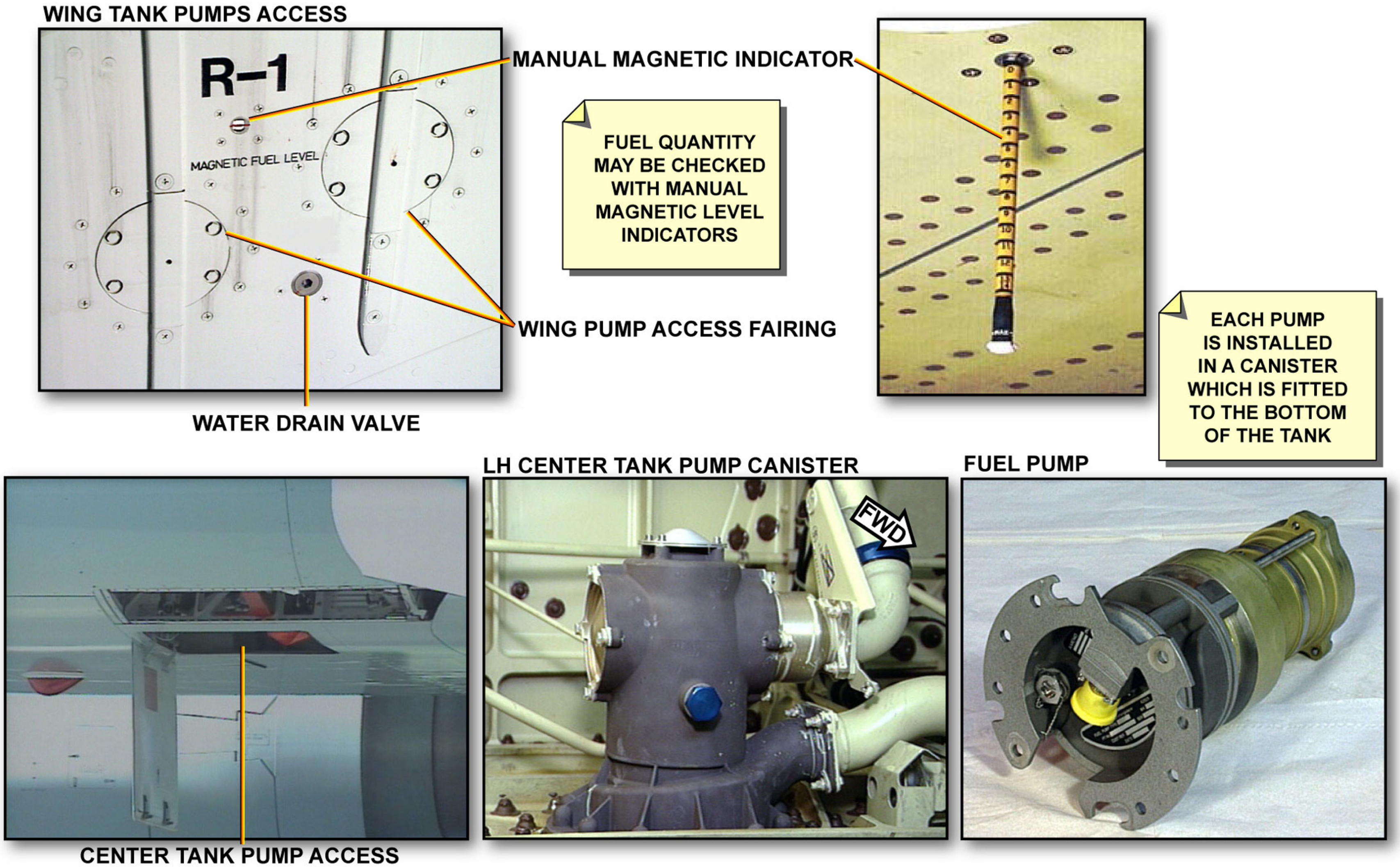


REFUEL/DEFUEL

28 FUEL SYSTEM PRESENTATION (1)

COMPONENT LOCATION

The wing fuel feed pumps are replaced from the wing lower surface. The center tank pumps are replaced through access panels in the belly fairing.
The water drain valves let you remove water, which could collect in quantities sufficient to cause malfunction to the engines.
The manual Magnetic Level Indicators are used to calculate the tank fuel quantities if a failure has an unwanted effect on the Fuel Quantity Indicating System.



COMPONENT LOCATION

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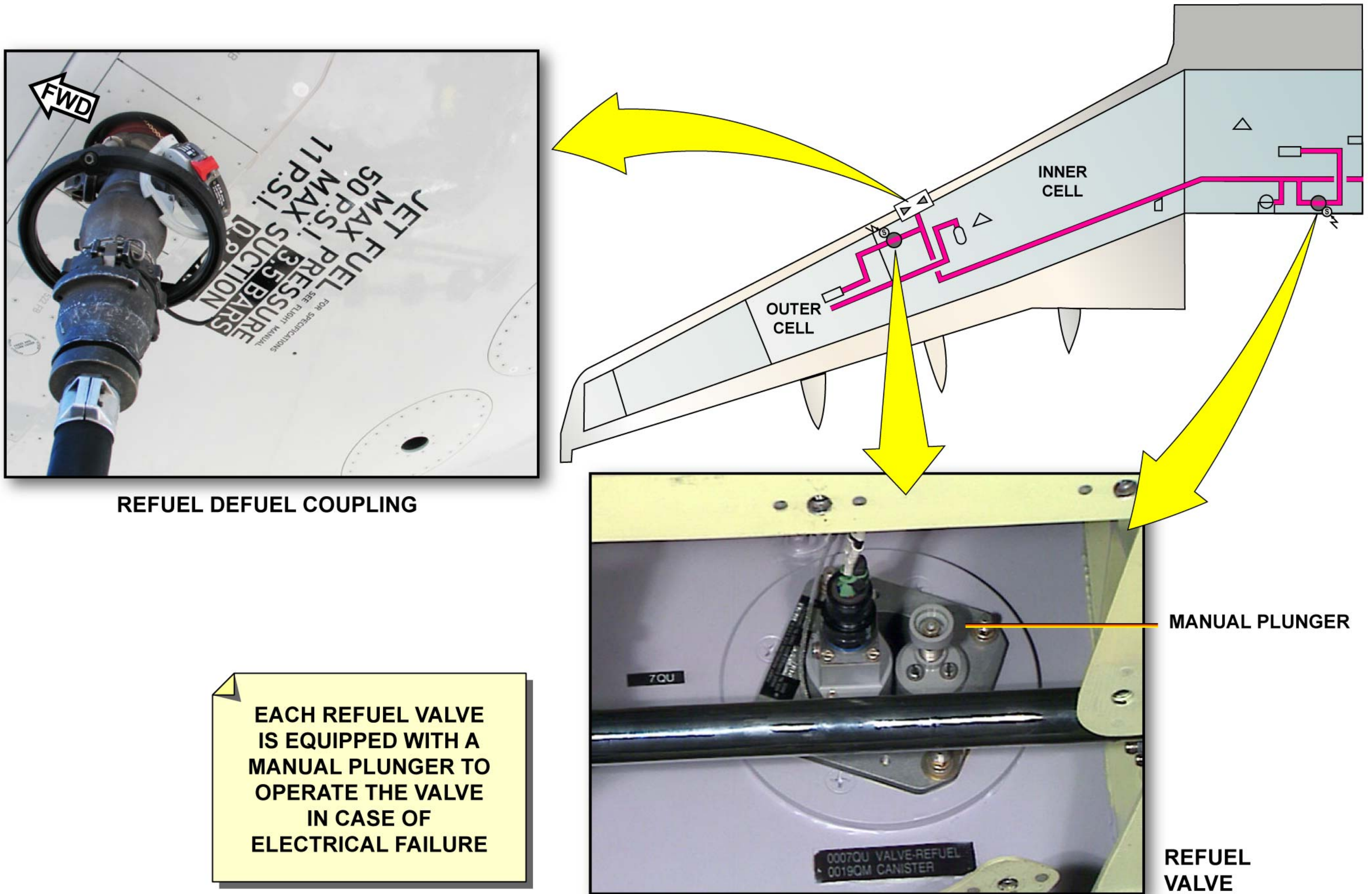
28 FUEL SYSTEM PRESENTATION (1)

COMPONENT LOCATION (continued)

REFUEL/DEFUEL COUPLING AND REFUEL VALVE

The Refuel/Defuel coupling is located beneath the RH wing leading edge.
There is one refuel valve per tank. Each of the three refuel valves are equipped with a manual plunger. When pressed, the plunger holds the valve open in case of a valve electrical failure during refueling.

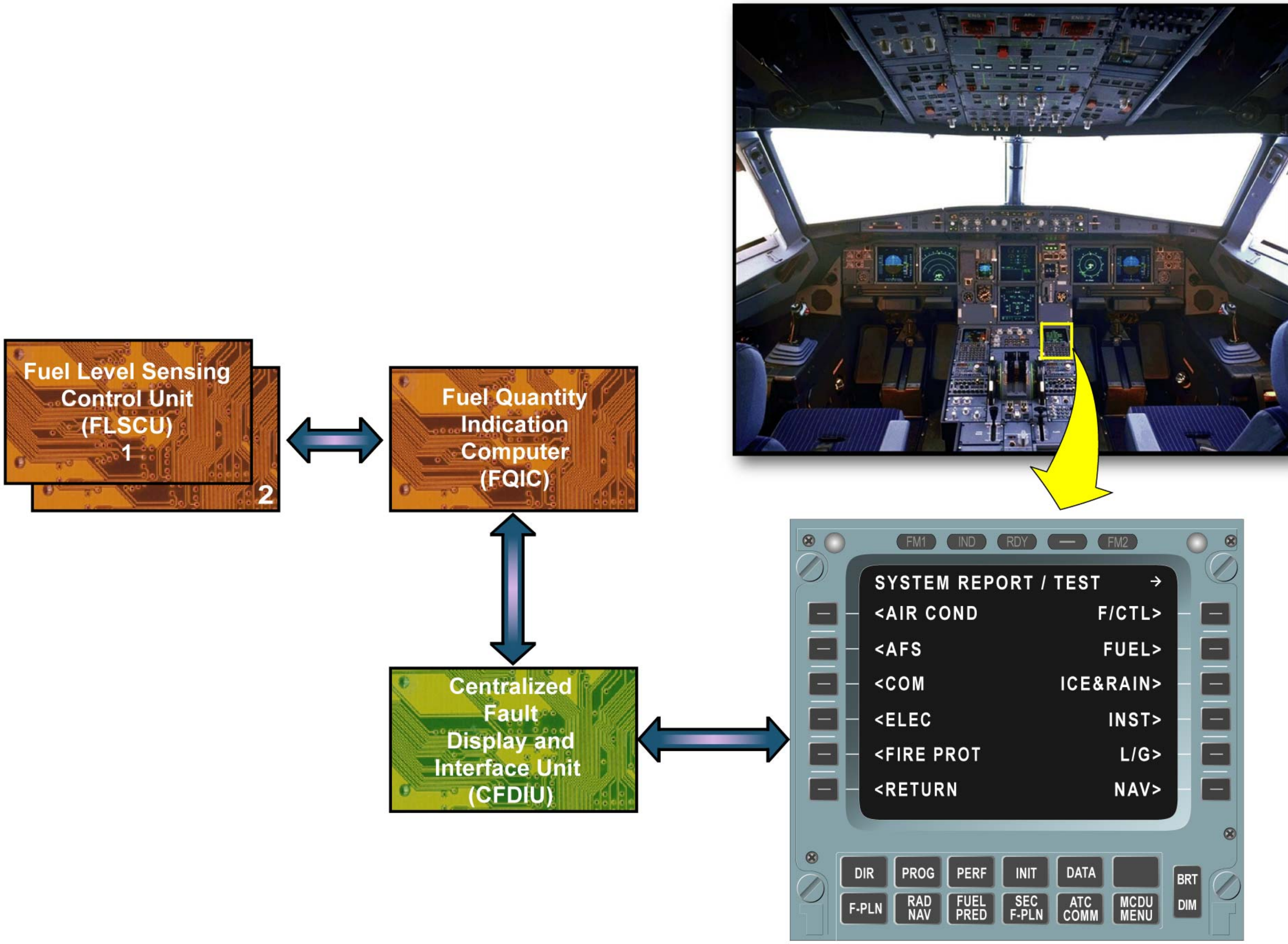


COMPONENT LOCATION - REFUEL/DEFUEL COUPLING AND REFUEL VALVE

28 FUEL SYSTEM PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

The 2-channel Fuel Quantity Indication Computer (FQIC), located in the avionics compartment, calculates the fuel mass, controls automatic refueling and monitors the system by means of various interfaces.
The Fuel Level Sensing Control Units (FLSCUs), also installed in the avionics compartment, send fuel level signals to the FQIC and to various aircraft circuits and systems.
The BITE test of the FQIC checks the Fuel Quantity Indicating System and the Fuel Level Sensing System (FLSS). The FLSCUs do not interface directly with the Centralized Fault Display System (CFDS).



MAINTENANCE/TEST FACILITIES

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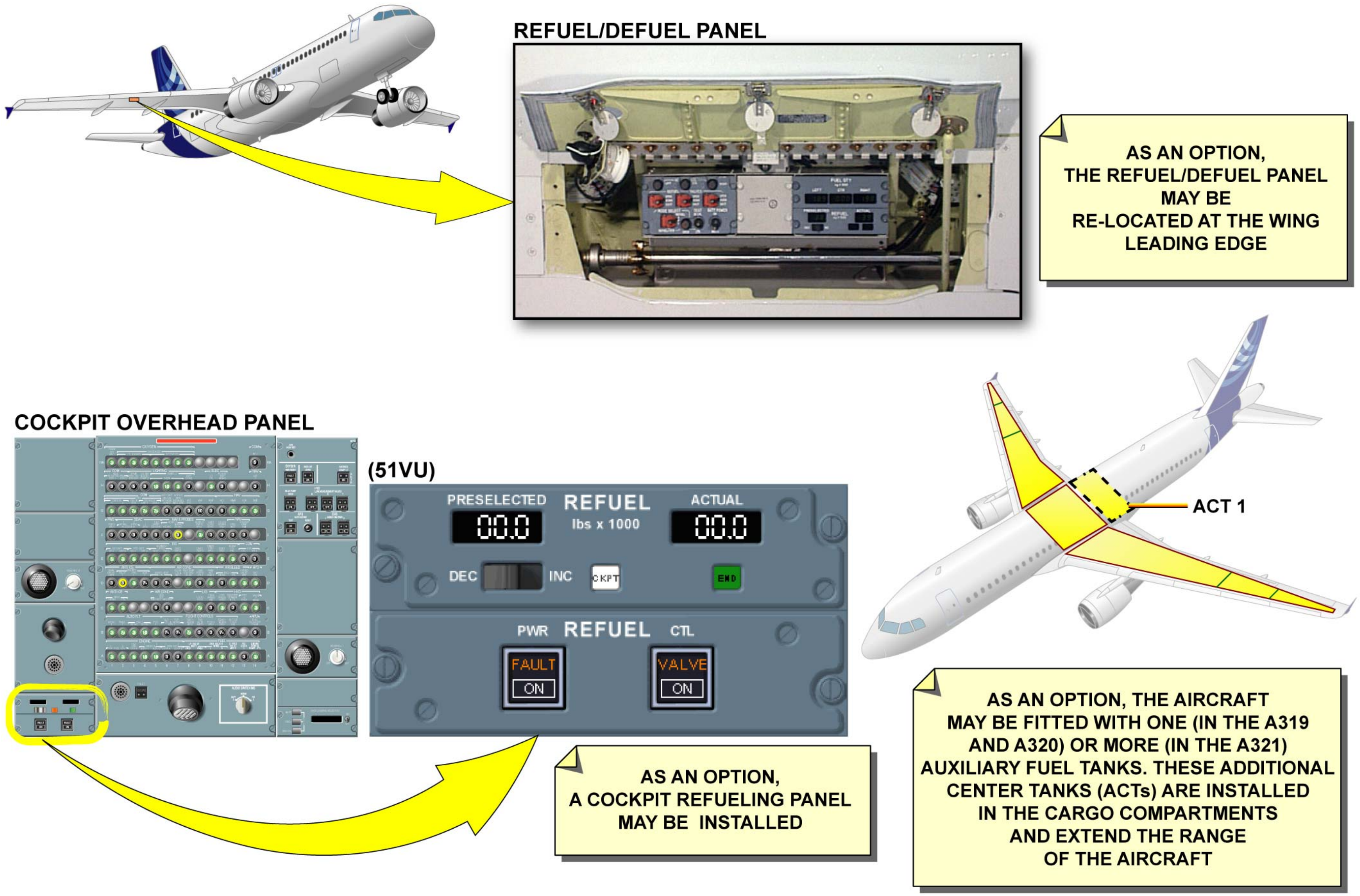
28 FUEL SYSTEM PRESENTATION (1)

OPTIONS

There are some options for the fuel system which may be selected by operators.
The Refuel/Defuel panel may be re-located at the wing leading edge.
A cockpit Refuel panel may be installed. It will always take priority over the external Refuel/Defuel panel.
The aircraft may be installed with auxiliary fuel tanks. These Additional Center Tanks (ACTs) are installed in the cargo compartments and extend the range of the aircraft.



OPTIONS

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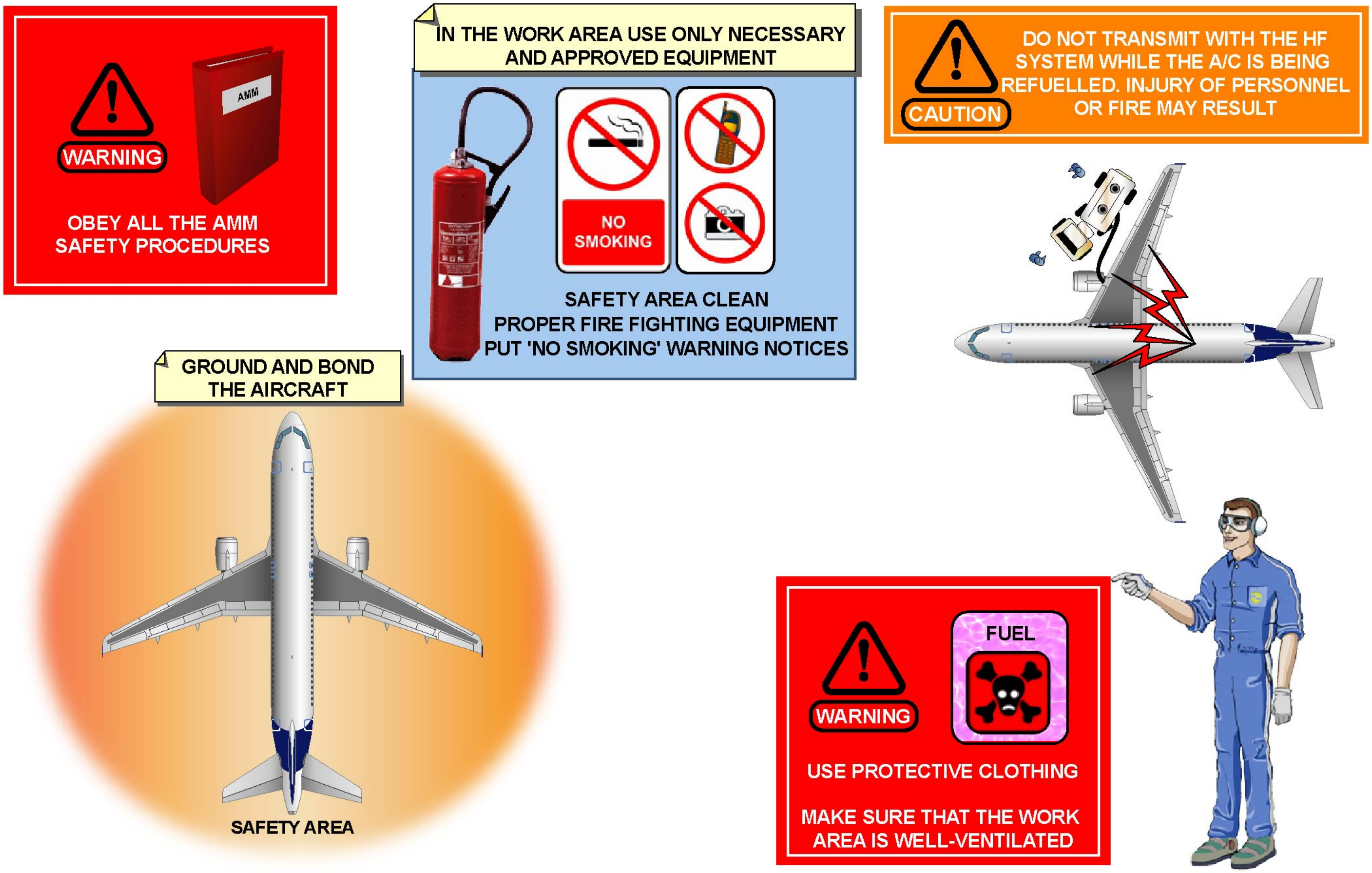
28 FUEL SYSTEM PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on aircraft, make sure that you obey all the Aircraft Maintenance Manual (AMM) safety procedures. This will prevent injury to persons and/or damage to the aircraft. Here is an overview of the main safety precautions related to the fuel system.
Aircraft fuel is poisonous. Do not splash aircraft fuel in your eyes, mouth, nose, ears or on your skin.
Use solvents, cleaning agents, sealants or other special materials only with good ventilation in the work area. Use protective clothing to prevent personal contamination and formation of static electricity.
Make sure that proper fire fighting equipment is available.
Make sure that the safety area is clear and clean. Respect the safety precautions within the safety area.
Put "NO SMOKING" warning notices around the work area.
Ground and bond the aircraft.
In the work area:
- do not use flames without protection and do not use any material or tools which may cause sparks,
- use only approved electrical / electronic equipment,
- make sure that the ventilation air flow is sufficient to work safely, otherwise use a respirator,
- do not pull or move metal objects along the ground,
- immediately flush away or remove any fuel leakage.

During refueling, do not transmit with the HF system. Fire or injury to personnel may occur.



SAFETY PRECAUTIONS

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28 FUEL SYSTEM PRESENTATION (1)

FUEL TANK SAFETY

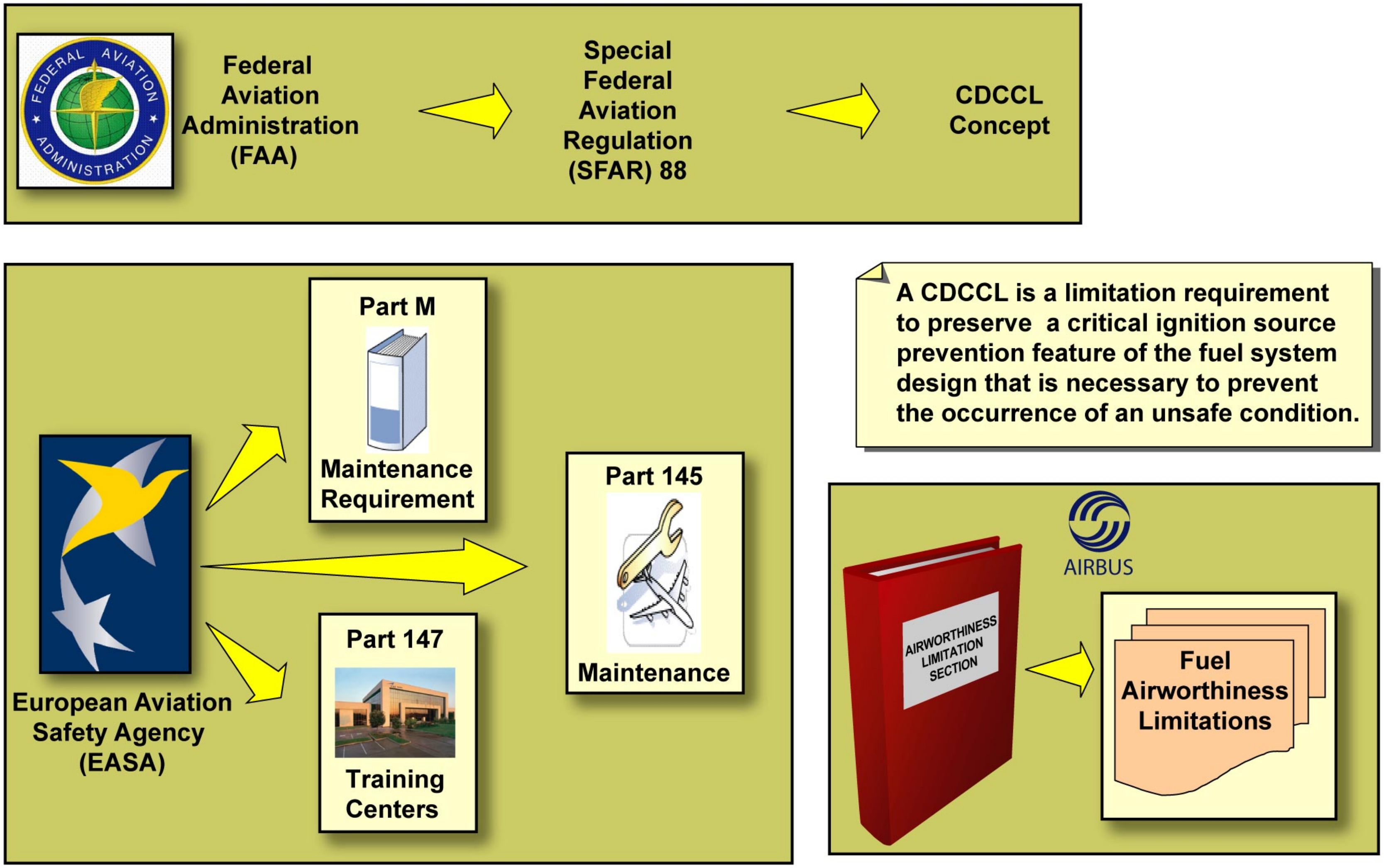
Following three fuel tank explosions over the past 14 years, which resulted in 346 fatalities, the U.S Department of Transportation Federal Aviation Administration (FAA), have introduced new regulations to improve fuel tank safety.
These regulations relate to the prevention of ignition sources within fuel tanks of current type certificated aircraft. They require carrying out a one-time fuel system safety and design review.

CRITICAL DESIGN CONFIGURATION CONTROL LIMITATIONS (CDCCL)

The FAA issued Special Federal Aviation Regulation (SFAR) 88, which gives a detailed description of the CDCCL concept.
The EASA requested the SFAR 88 (TGL 47) to be added to PART 145, PART M and PART 147 to reinforce the application of these regulations.
This includes:
- a conception part intended to aircraft design features,
- a maintenance part.

A CDCCL is a limitation requirement to preserve a critical ignition source prevention feature of the fuel system design that is necessary to prevent the occurrence of an unsafe condition.
The function of the CDCCL is to give instructions to prevent critical ignition source feature from alterations, repairs or maintenance actions during configuration change.
The aircraft manufacturers have to emit a document to their customers giving the list of all the maintenance tasks impacted by the CDCCL.
For AIRBUS this document is called the Fuel Airworthiness Limitations and it is added to the Airworthiness Limitation Section part 5.
CDCCL items are listed in Airworthiness Limitations Form.

CRITICAL DESIGN CONFIGURATION CONTROL LIMITATIONS (CDCCL)



FUEL TANK SAFETY - CRITICAL DESIGN CONFIGURATION CONTROL LIMITATIONS (CDCCL)

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28 FUEL SYSTEM PRESENTATION (1)

FUEL TANK SAFETY (continued)

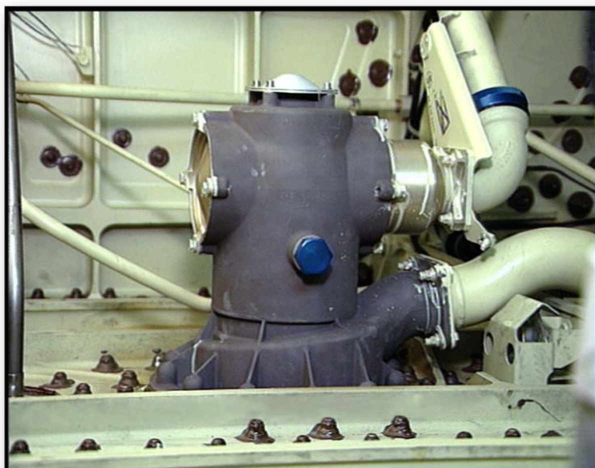
FUEL SYSTEM DESIGN CONFIGURATION

The Airbus aircraft fuel systems have, by design, a number of features that are intended to protect the system from inadvertent ignition.

EXAMPLES OF AIRBUS FUEL SYSTEM DESIGN

Electrical harnesses in the tanks use very low voltage current (less than 5 VDC) and are far enough for the surrounding equipment and structure (segregated routing).

Fuel pumps are the only electrical equipment using high power current (115 VAC). Consequently, pumps harnesses are located under the lower wing skin panels outside the fuel tanks.



Fuel pumps are installed in a self-contained explosive canister.

FUEL TANK SAFETY - FUEL SYSTEM DESIGN CONFIGURATION

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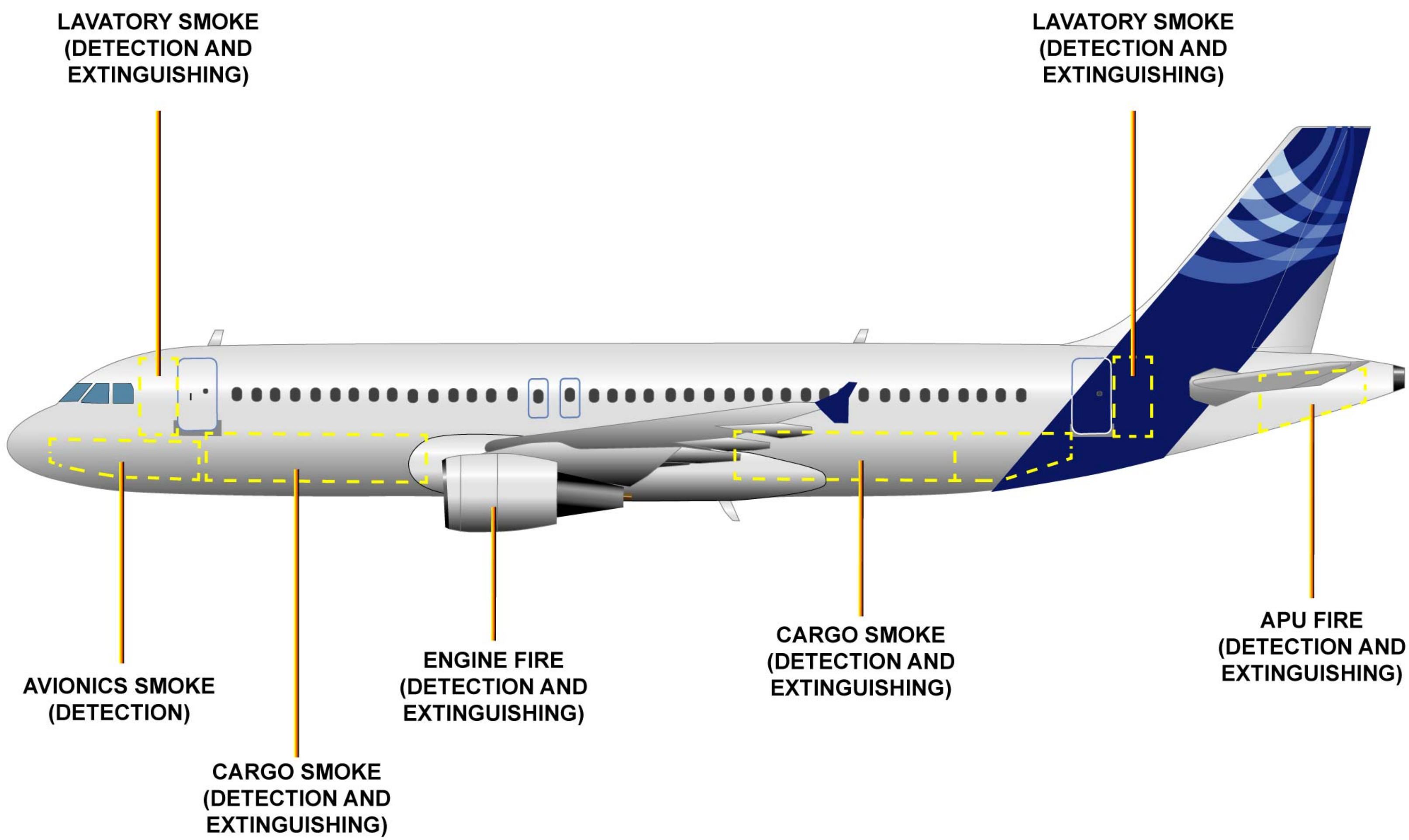
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

GENERAL

The A320 family fire protection systems have:
- fire detection and extinguishing systems for the engines and APU,
- smoke detection for the avionics equipment and compartment,
- smoke detection and fire extinguishing for the cargo compartments and lavatories,
- portable fire extinguishers for the flight compartment and the cabin.



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GENERAL

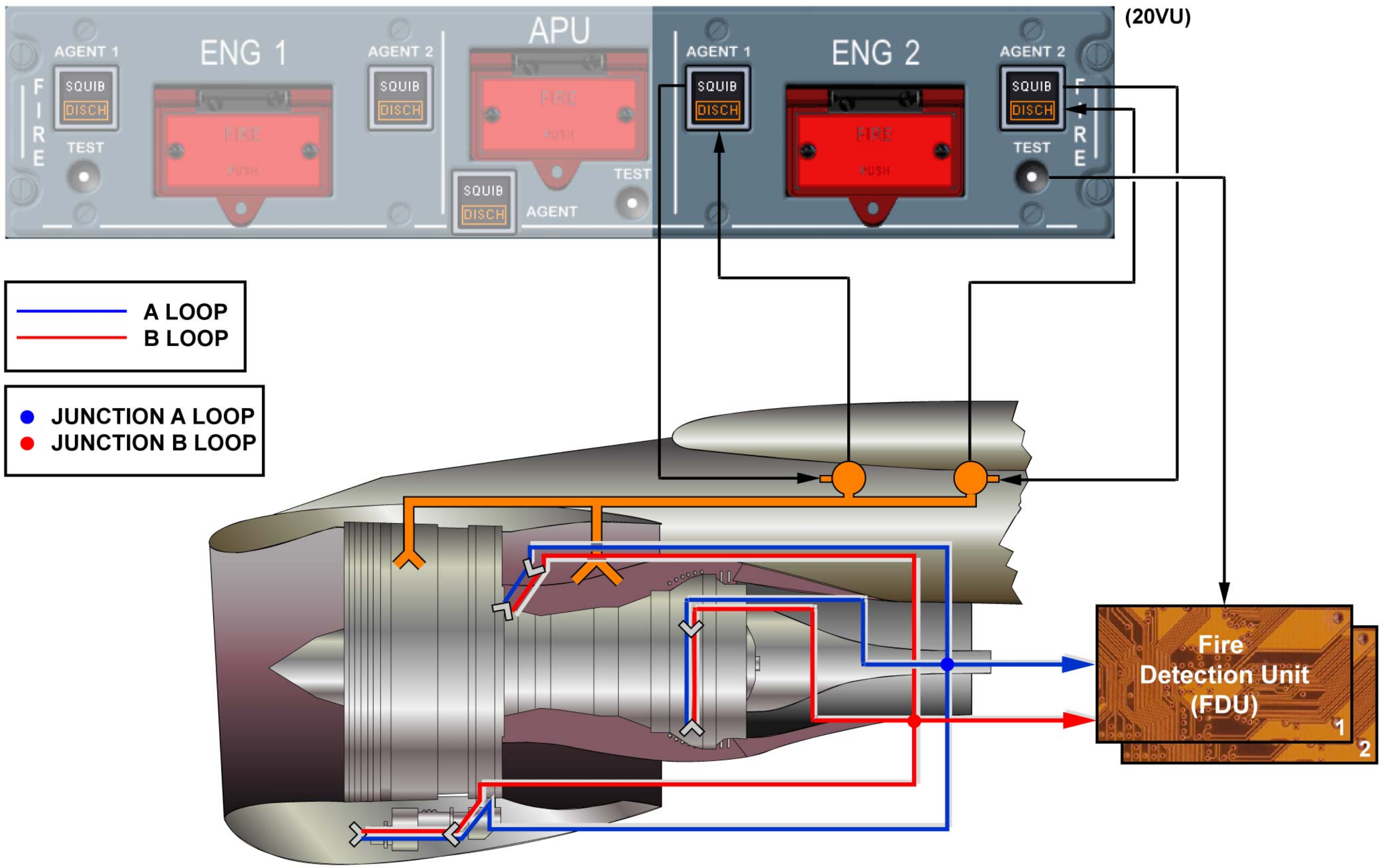
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

ENGINE FIRE PROTECTION

The engine fire protection is fulfilled by two sub-systems: the FIRE detection system and the FIRE extinguishing system.

DETECTION AND EXTINGUISHING

The engines have individual fire detection systems.
Each system has two identical detection loops (A and B) mounted in parallel. Each loop is made of 3 detector elements. Both loops are monitored by a Fire Detection Unit (FDU). The FDU sends FIRE and FAULT signals to the Flight Warning Computer (FWC) for display on ECAM.
The guarded FIRE P/B switches give FIRE indication and the means to isolate affected systems. When the FIRE P/B is released out, fuel supply, hydraulic supply, electrical power and bleed supply are cut off. This also arms the extinguishing system.
Each engine is equipped with 2 fire bottles located in the pylon.
Each bottle is discharged by an associated AGENT P/B switch. The P/B switches are located on the overhead FIRE panel.
The TEST buttons are used to test the respective fire detection and extinguishing system operation.



ENGINE FIRE PROTECTION - DETECTION AND EXTINGUISHING

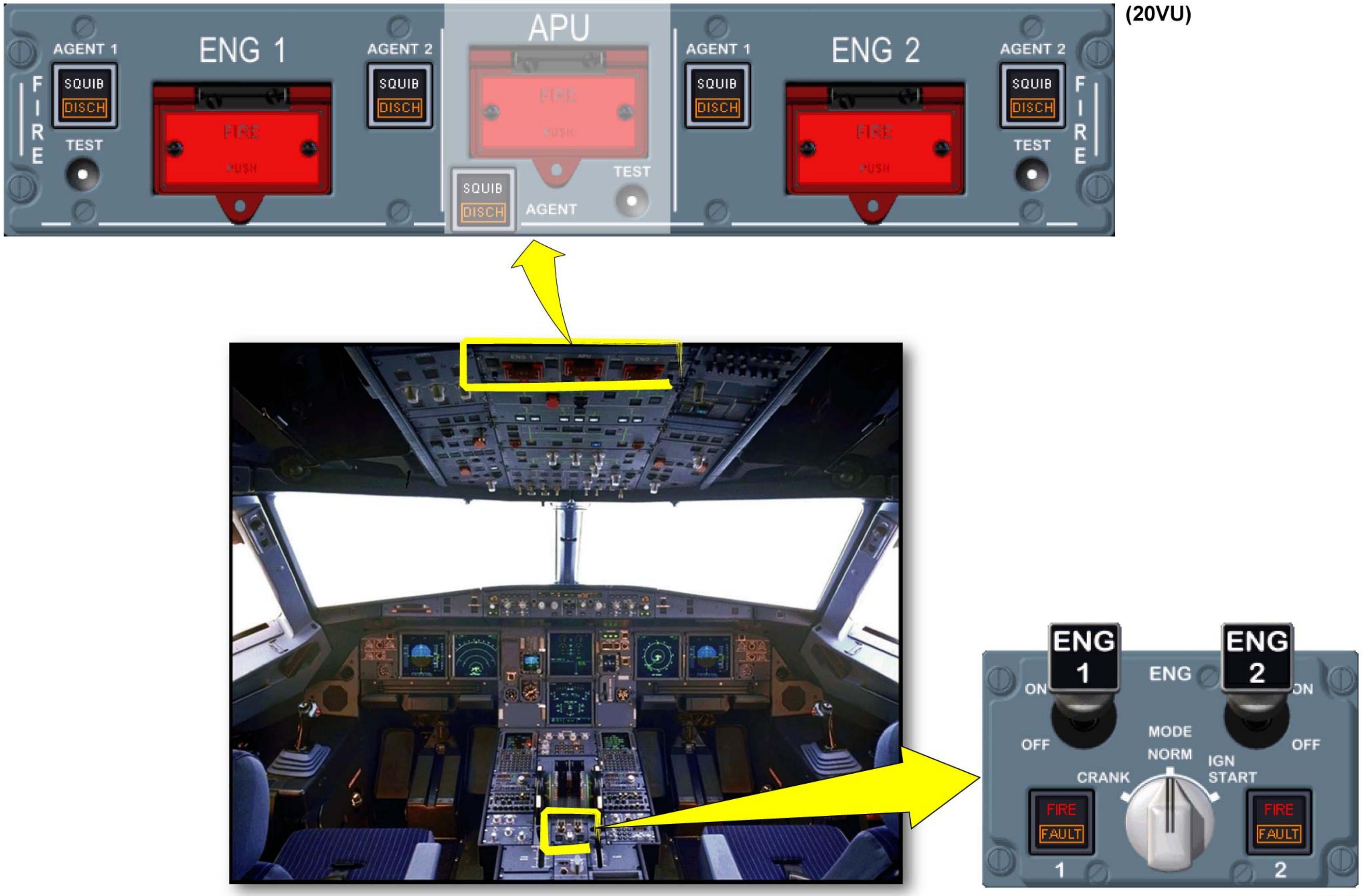
UAJ09471 - U19T4T0 - UM26PZ000000002

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

ENGINE FIRE PROTECTION (continued)

CONTROL AND INDICATING

The overhead FIRE panel handles both detection and extinguishing functions. In addition to the indications on the FIRE panel, the ENG panel located on the pedestal is equipped with a red FIRE indicator light for each engine.



ENGINE FIRE PROTECTION - CONTROL AND INDICATING

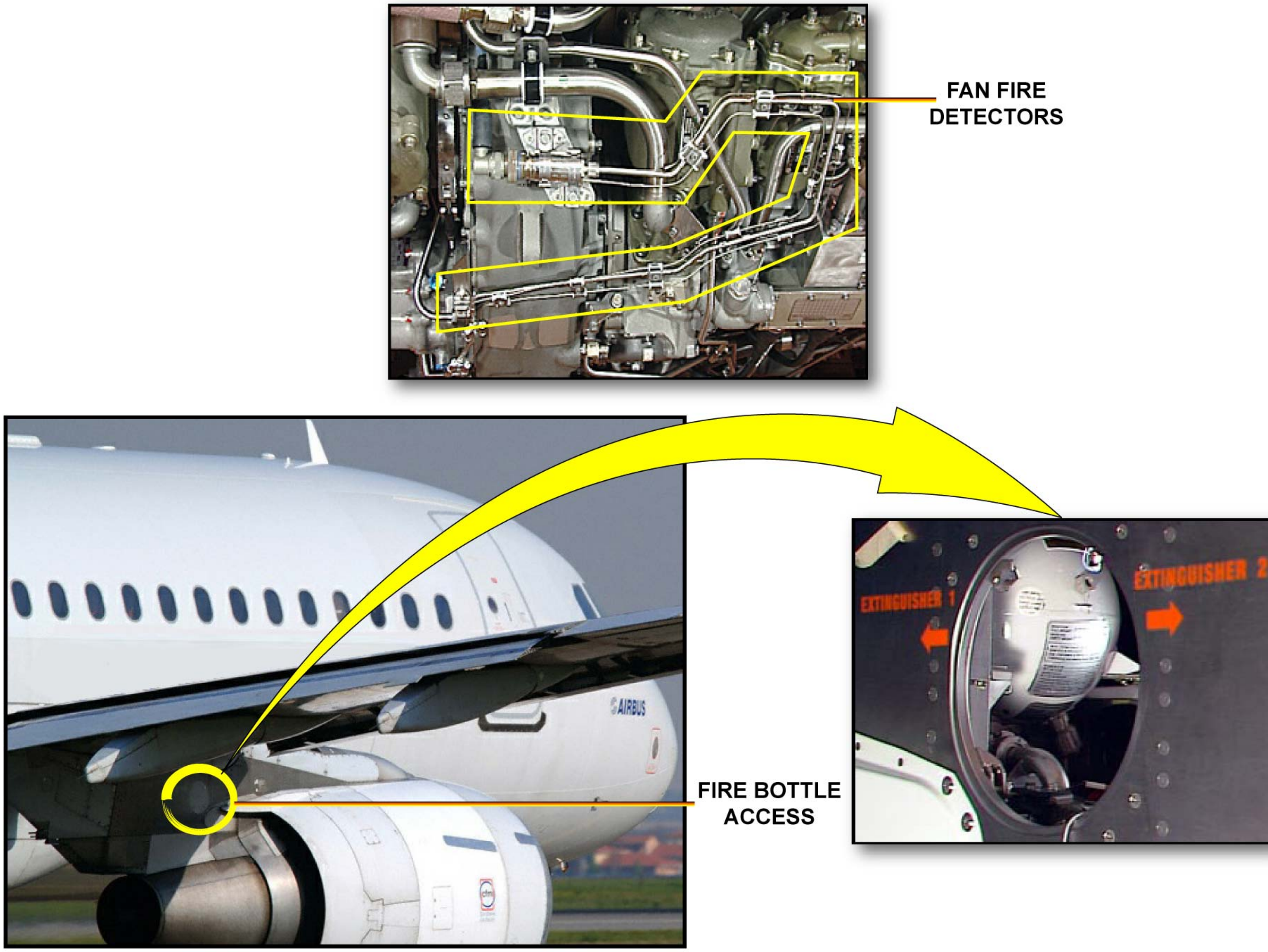
UAJ09471 - U19T4T0 - UM26PZ000000002

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

ENGINE FIRE PROTECTION (continued)

COMPONENT LOCATION

Each fire detection loop contains 3 detector elements connected in parallel.
The engine fire extinguishing bottles are located in the pylon. There are access panels on both sides of the pylon.



ENGINE FIRE PROTECTION - COMPONENT LOCATION

UAJ09471 - U19T4T0 - UM26PZ000000002

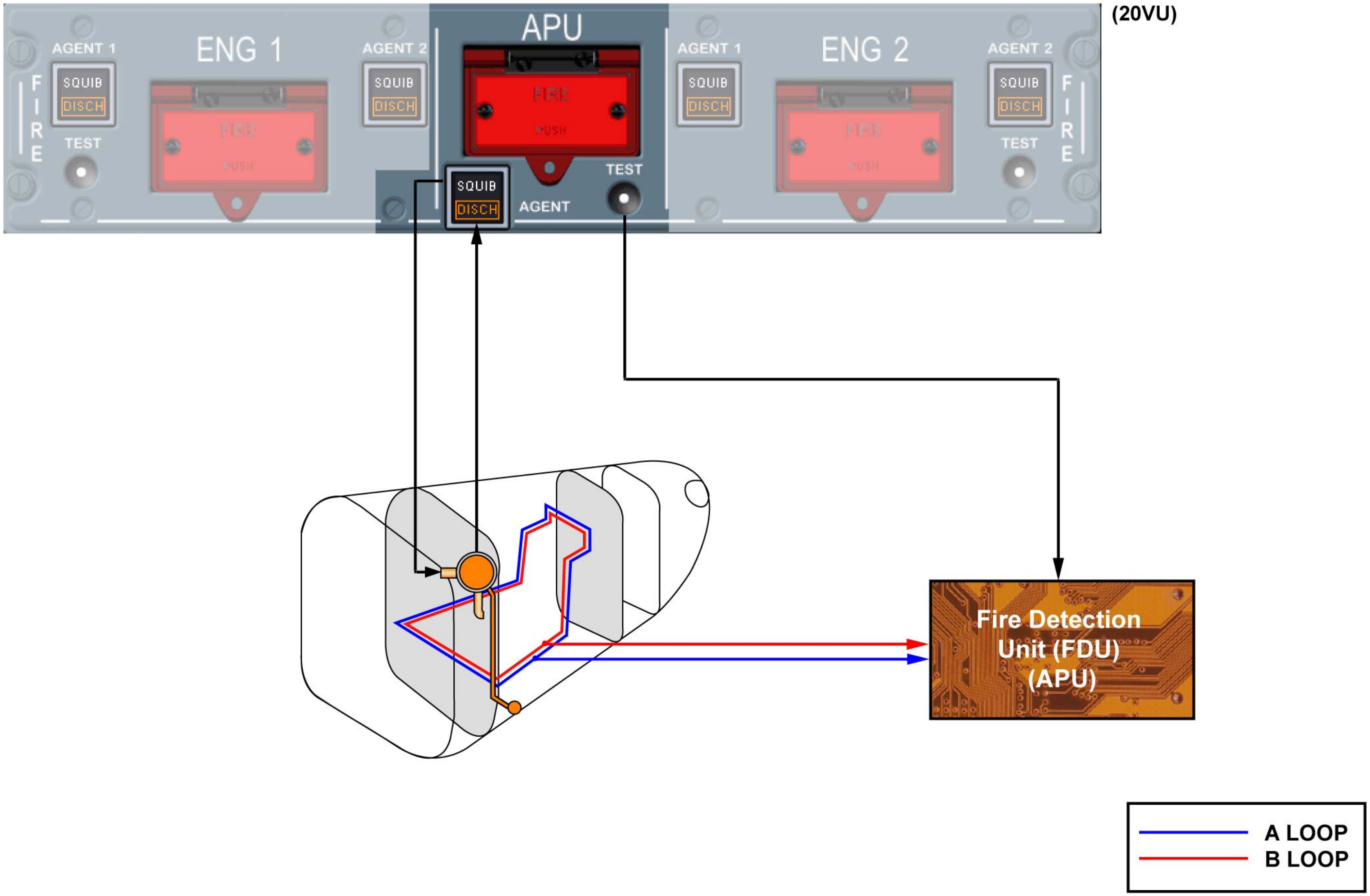
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

APU FIRE PROTECTION

The APU fire protection is fulfilled by two sub-systems: the FIRE detection system and the FIRE extinguishing system.

DETECTION AND EXTINGUISHING

The detection system has two identical detection loops (A and B) mounted in parallel. Each loop has a single detector element. Both loops are monitored by a FDU. The FDU sends FIRE and FAULT signals to the FWC for display on ECAM.
The guarded FIRE P/B switches give a FIRE indication and the means to isolate affected systems. When the FIRE P/B is released out, fuel, electrical power and bleed supply are cut off and the APU is immediately shut down. This also arms the extinguishing system.
For the APU, there is just one fire extinguisher bottle. It is discharged by a single AGENT P/B switch. On the ground, an APU FIRE will trigger an APU automatic shutdown and discharge the bottle automatically.
The TEST button is used to test the fire detection and extinguishing system operation.



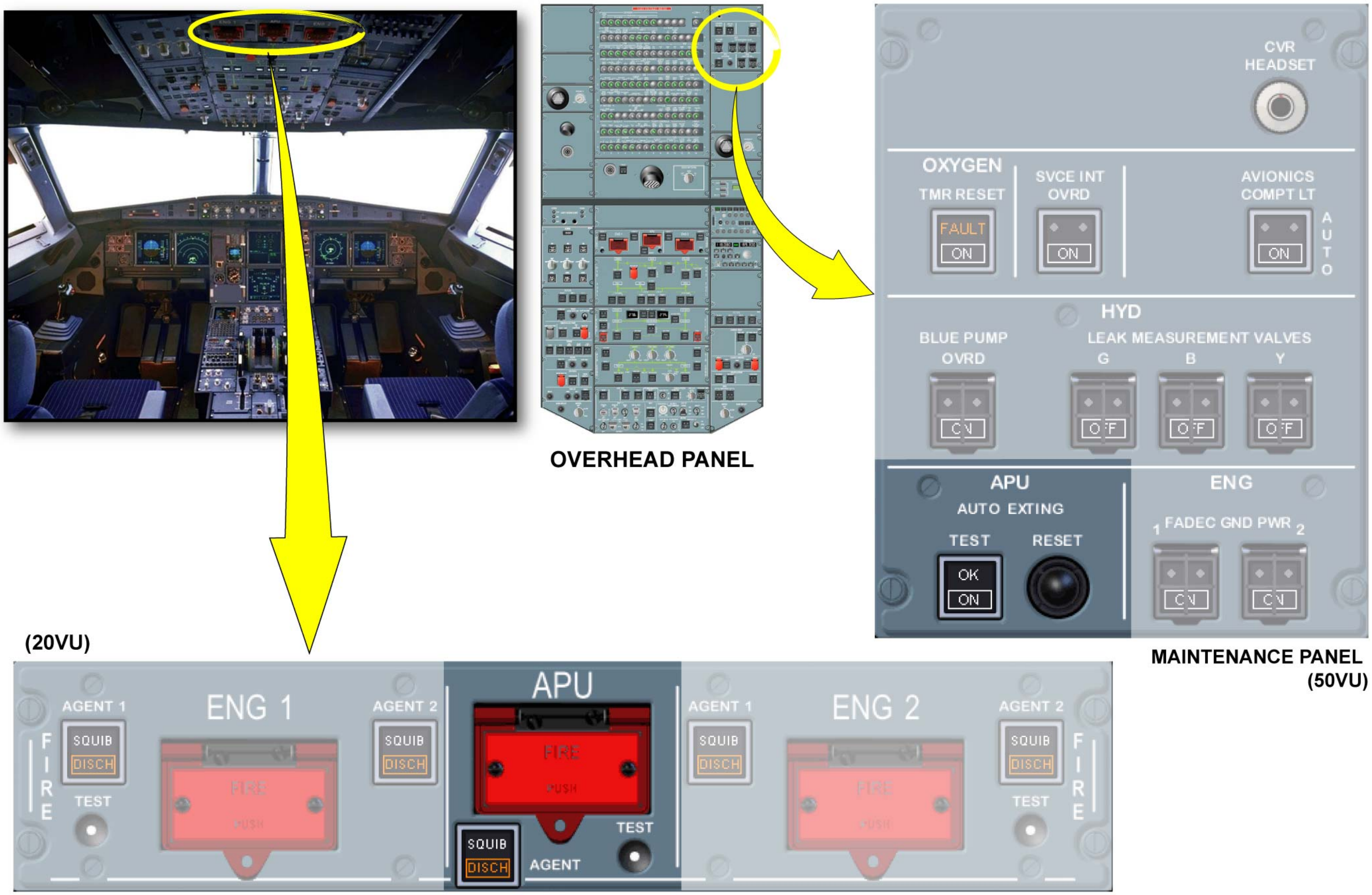
APU FIRE PROTECTION - DETECTION AND EXTINGUISHING

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

APU FIRE PROTECTION (continued)

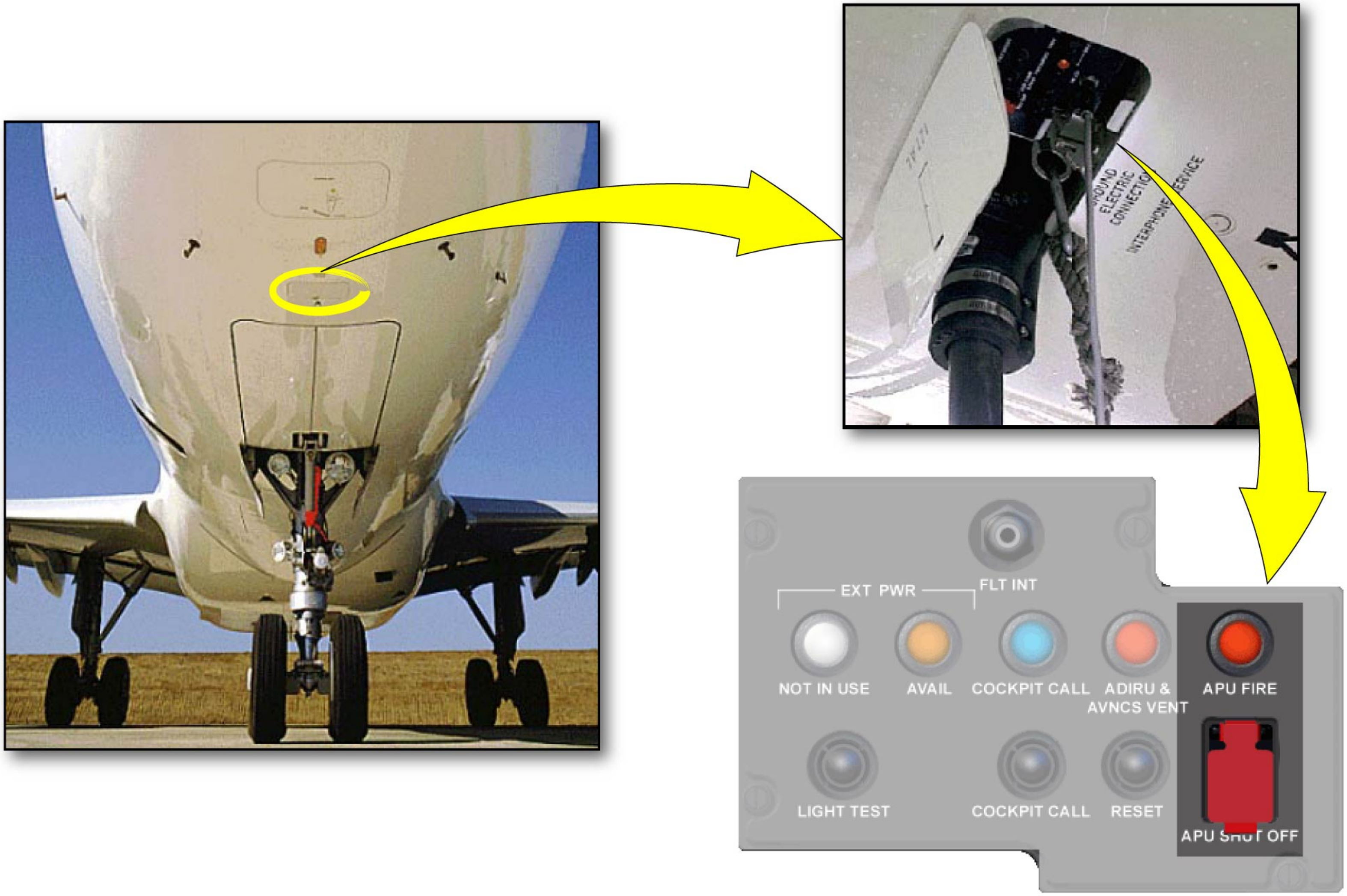
CONTROL AND INDICATING

The overhead FIRE panel handles both detection and extinguishing functions.
In case of an APU FIRE on the ground, ground personnel are alerted by a warning horn in the nose wheel well and an APU FIRE indicator light on the external power panel on the lower fuselage.



APU FIRE PROTECTION - CONTROL AND INDICATING

UAJ09471 - U19T4T0 - UM26PZ000000002



EXTERNAL POWER CONTROL PANEL (108VU)

APU FIRE PROTECTION - CONTROL AND INDICATING

UAJ09471 - U19T4T0 - UM26PZ000000002

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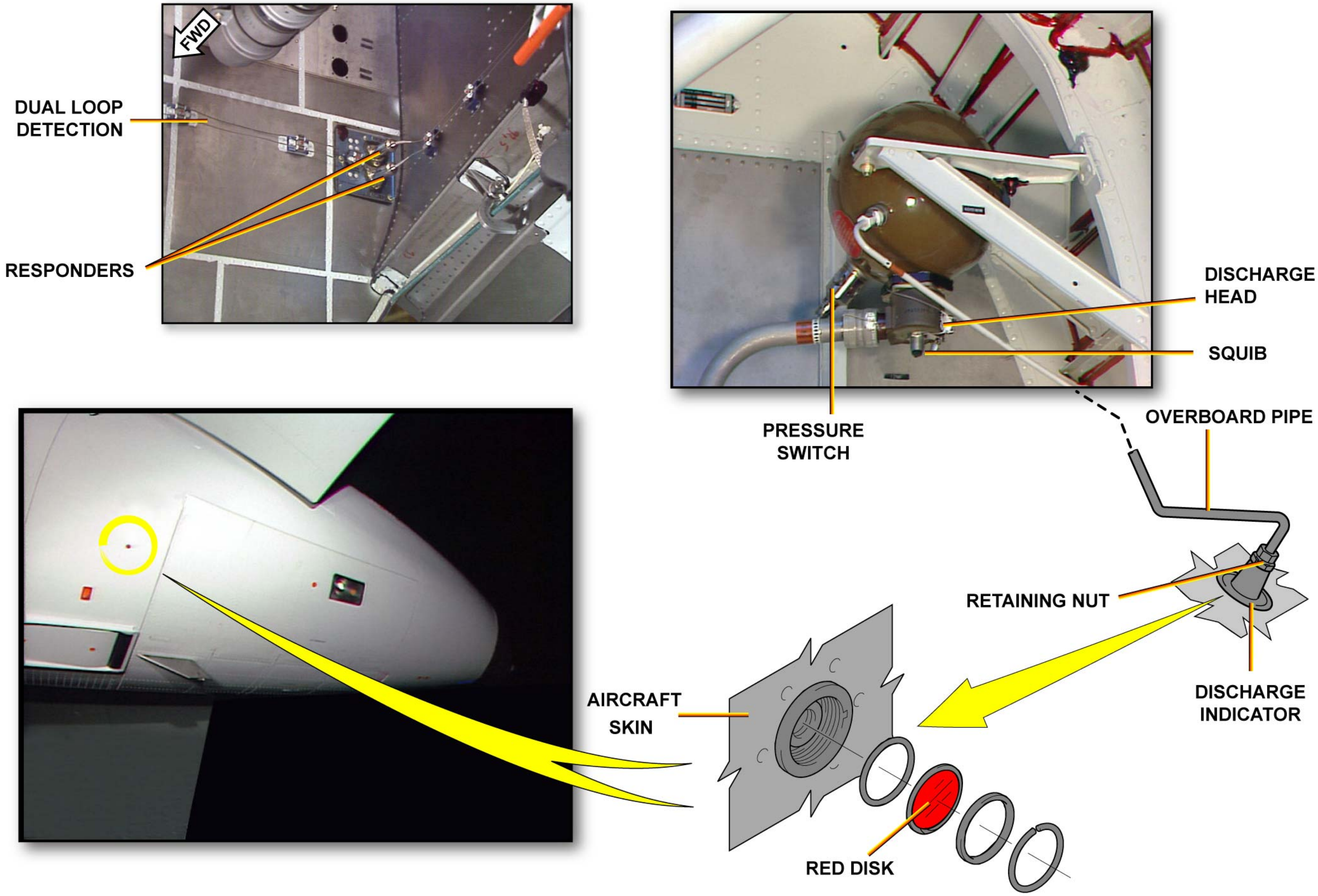
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

APU FIRE PROTECTION (continued)

COMPONENT LOCATION

Each APU fire detection loop is a single detector element installed around the interior of the APU compartment.
The APU fire extinguishing bottle is located in the aft fuselage forward of the APU firewall. There is an access panel on the lower fuselage.

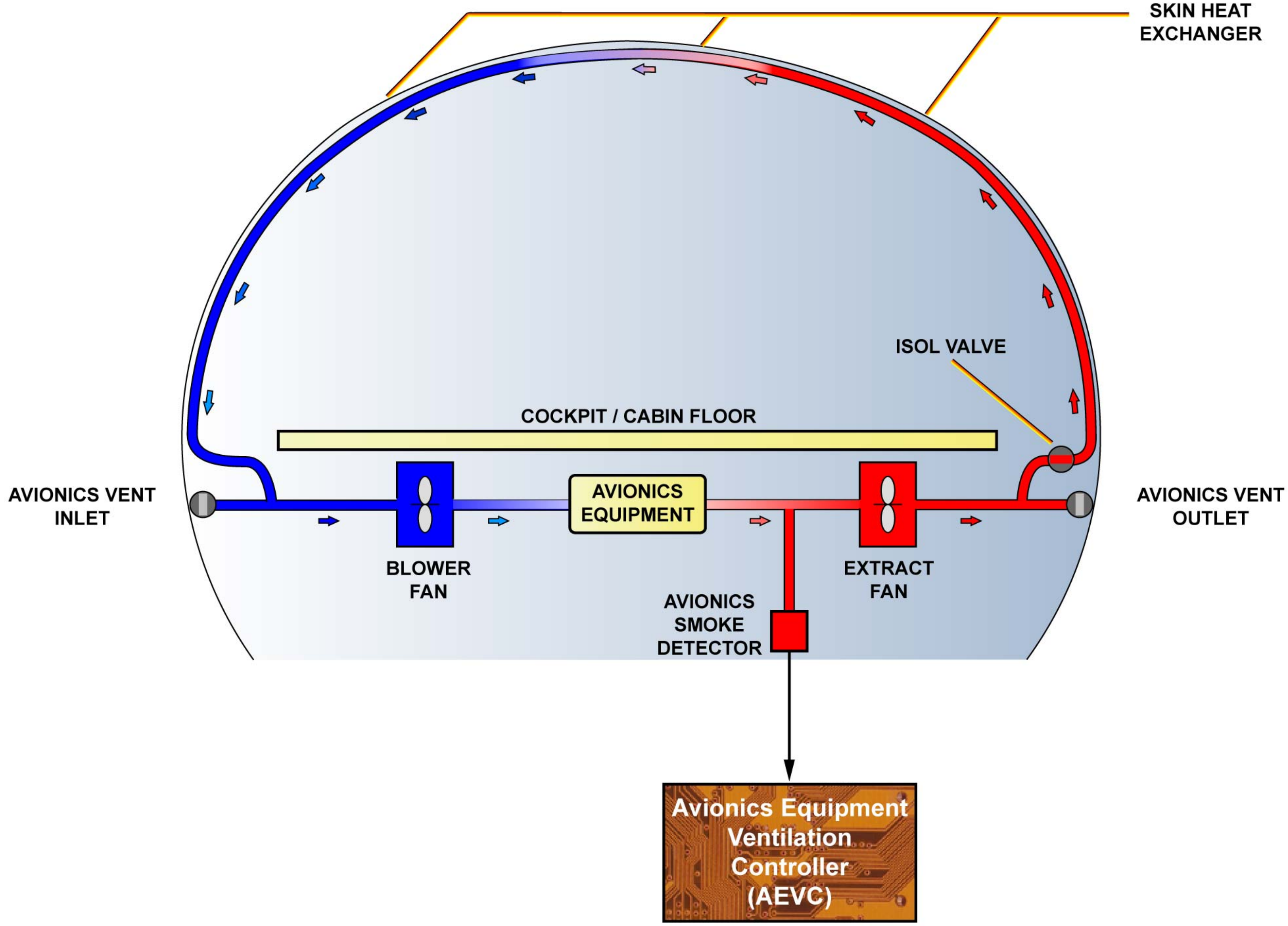


APU FIRE PROTECTION - COMPONENT LOCATION

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

AVIONICS COMPARTMENT SMOKE DETECTION

The aircraft has a cooling system for the avionics equipment. The cooling system is controlled and monitored by the Avionics Equipment Ventilation Controller (AEVC). The air is circulated through the system by a blower fan (cool air supply) working together with an extraction fan (warm air removal).
The extraction airflow is downstream of the avionics equipment, so the avionics SMOKE detector is installed in the extraction duct and will detect smoke coming from the computers and control boxes. The detector is monitored by the AEVC. The AEVC signals the FWC to show the AVIONICS SMOKE warning in the cockpit.



AVIONICS COMPARTMENT SMOKE DETECTION

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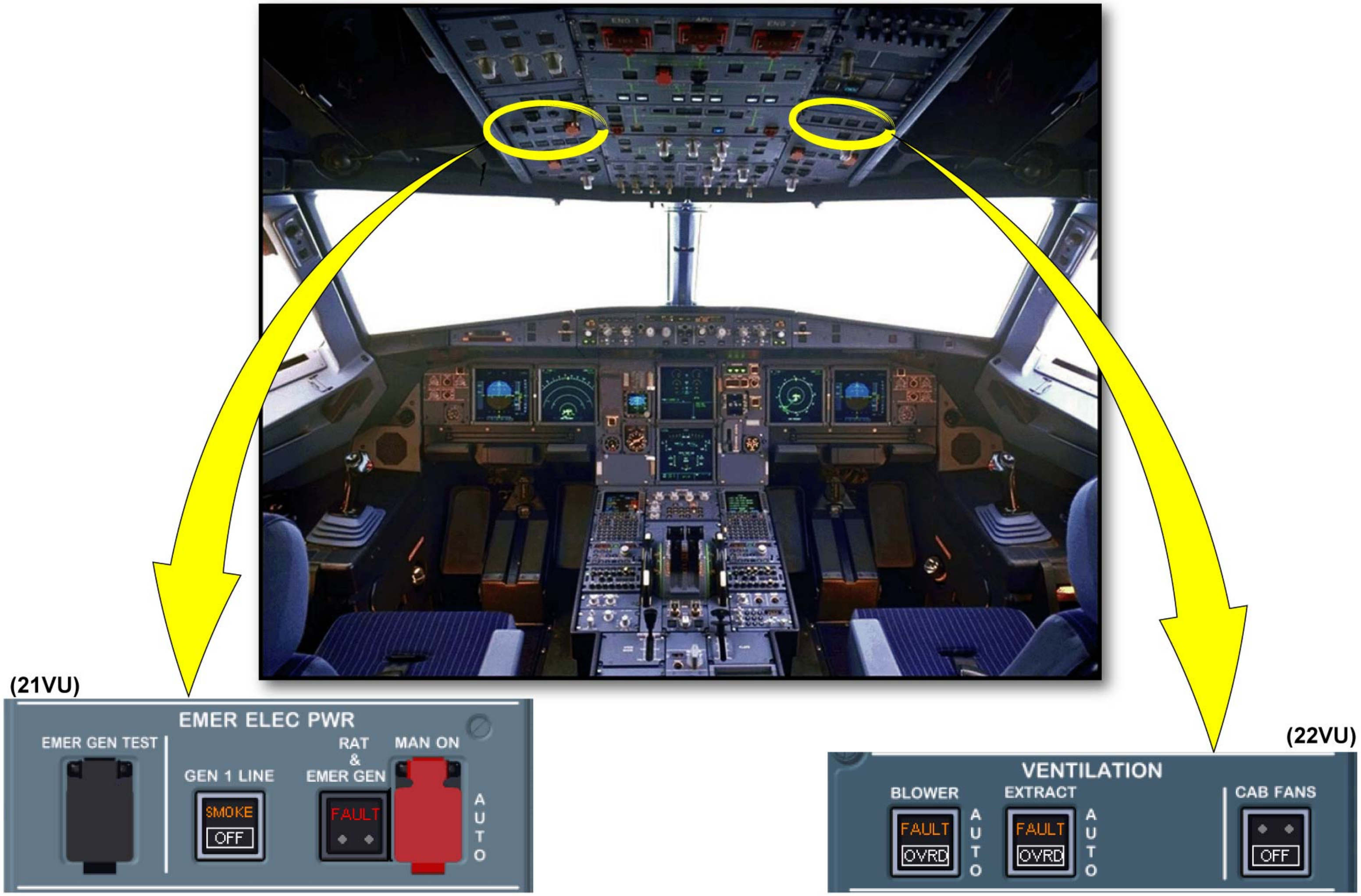
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

AVIONICS COMPARTMENT SMOKE DETECTION (continued)

CONTROL AND INDICATING

Avionics SMOKE is indicated on two overhead panels in the cockpit. Pilot action on both panels is required as part of the AVIONICS SMOKE procedure in flight.
- On the EMER ELEC PWR panel, the SMOKE light comes on in the GEN 1 LINE P/B switch.
- On the VENTILATION panel, the FAULT light comes on in both BLOWER and EXTRACT P/B switches.



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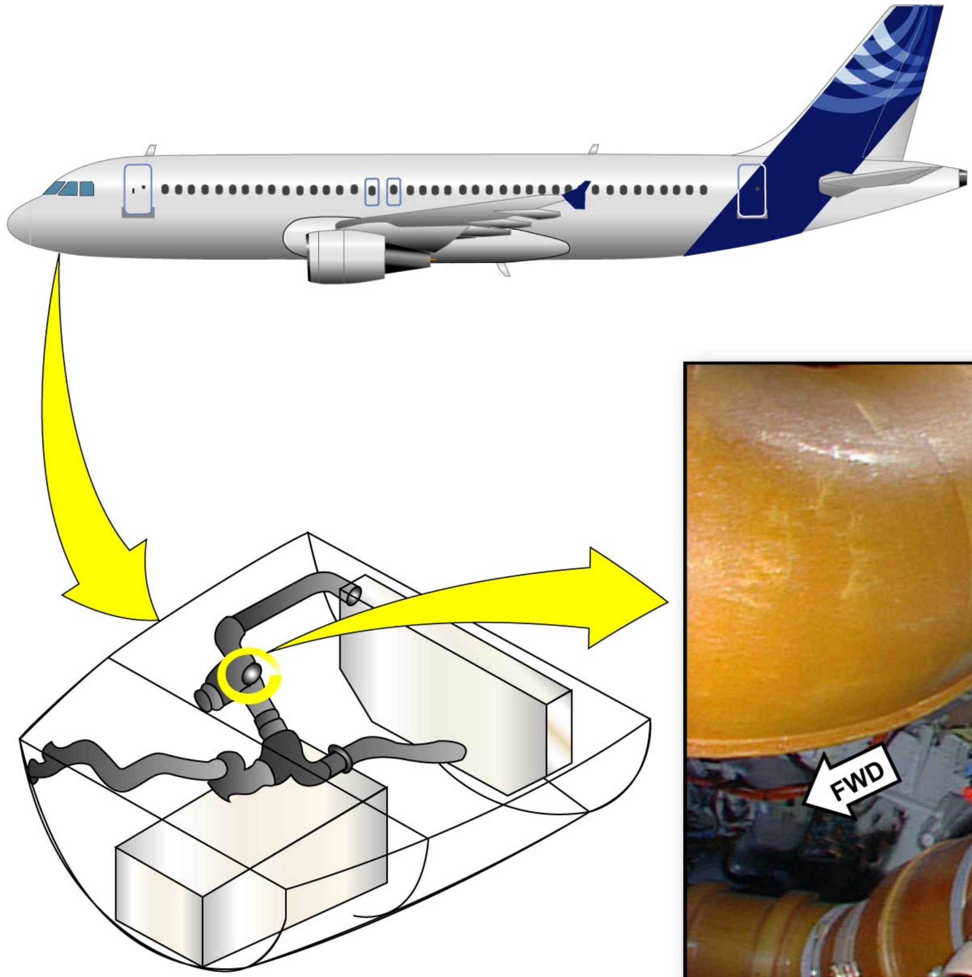
AVIONICS COMPARTMENT SMOKE DETECTION - CONTROL AND INDICATING

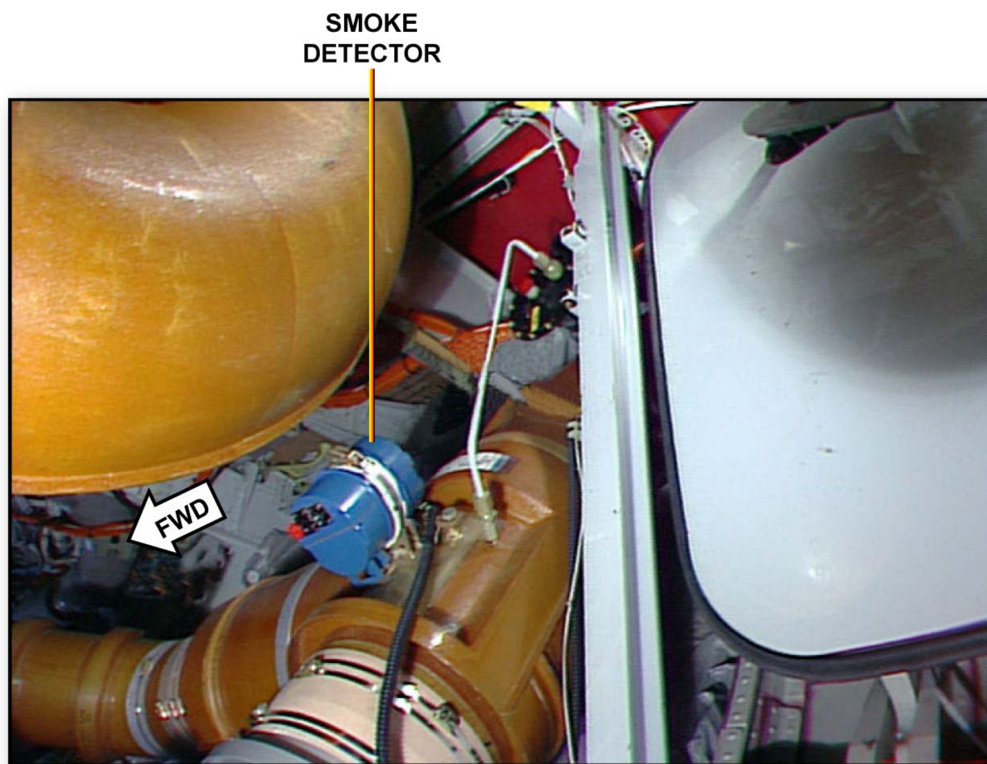
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

AVIONICS COMPARTMENT SMOKE DETECTION (continued)

COMPONENT LOCATION

The single avionics smoke detector is located in the avionics compartment in the ventilation extraction duct.





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AVIONICS COMPARTMENT SMOKE DETECTION - COMPONENT LOCATION

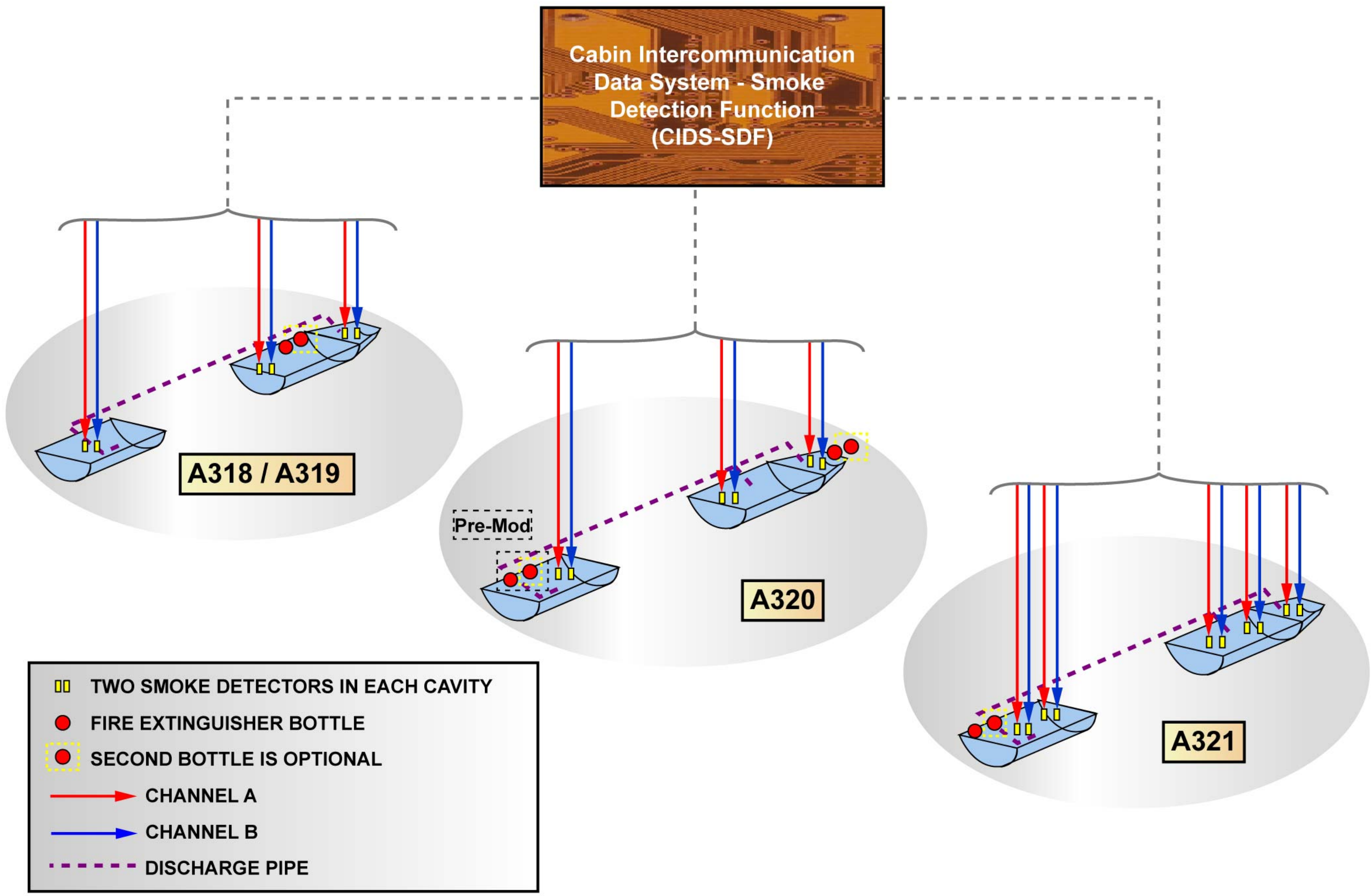
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

CARGO COMPARTMENT SMOKE PROTECTION

The cargo compartments are protected by both smoke detection and fire extinguishing systems.

DETECTION AND FIRE EXTINGUISHING

Each cargo compartment has cavities, and each cavity holds 2 smoke detectors. The cargo compartments are ventilated by an air extraction system. Air continuously circulates through the compartment and across the detectors and is extracted out through the rear wall. The smoke detectors are monitored by the Smoke Detection Function (SDF) which is integrated in the Cabin Intercommunication Data System (CIDS). The SDF receives signals from the detectors and sends SMOKE or FAULT warnings to the FWC to alert the flight crew.
The cargo compartment fire extinguishing agent is discharged into the FWD compartment through one nozzle (two for the A321) or into the AFT compartment using two nozzles (three for the A321). The standard system includes one extinguishing bottle. An optional system includes two bottles. The second bottle is required for extended range operations.



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CARGO COMPARTMENT SMOKE PROTECTION - DETECTION AND FIRE EXTINGUISHING

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

CARGO COMPARTMENT SMOKE PROTECTION (continued)

CONTROL AND INDICATING

The cargo smoke panel on the overhead handles both detection and extinguishing functions. The standard and optional panels are shown.

(OPTIONAL: 2-BOTTLE SYSTEM PANEL)

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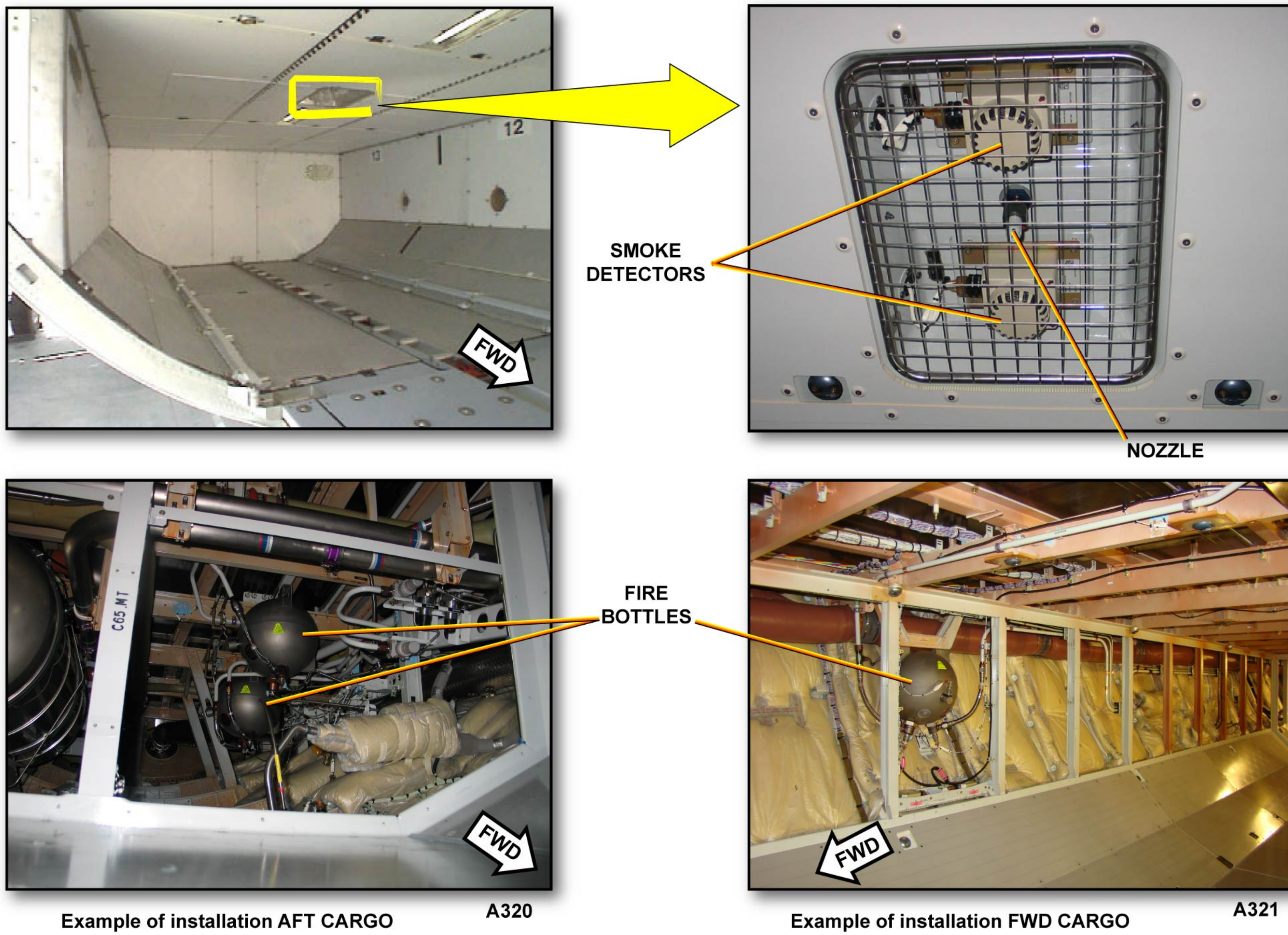
CARGO COMPARTMENT SMOKE PROTECTION - CONTROL AND INDICATING

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

CARGO COMPARTMENT SMOKE PROTECTION (continued)

COMPONENT LOCATION

Each cargo compartment is equipped with 2 smoke detectors in each cavity located in recessed panels in the compartment ceiling.

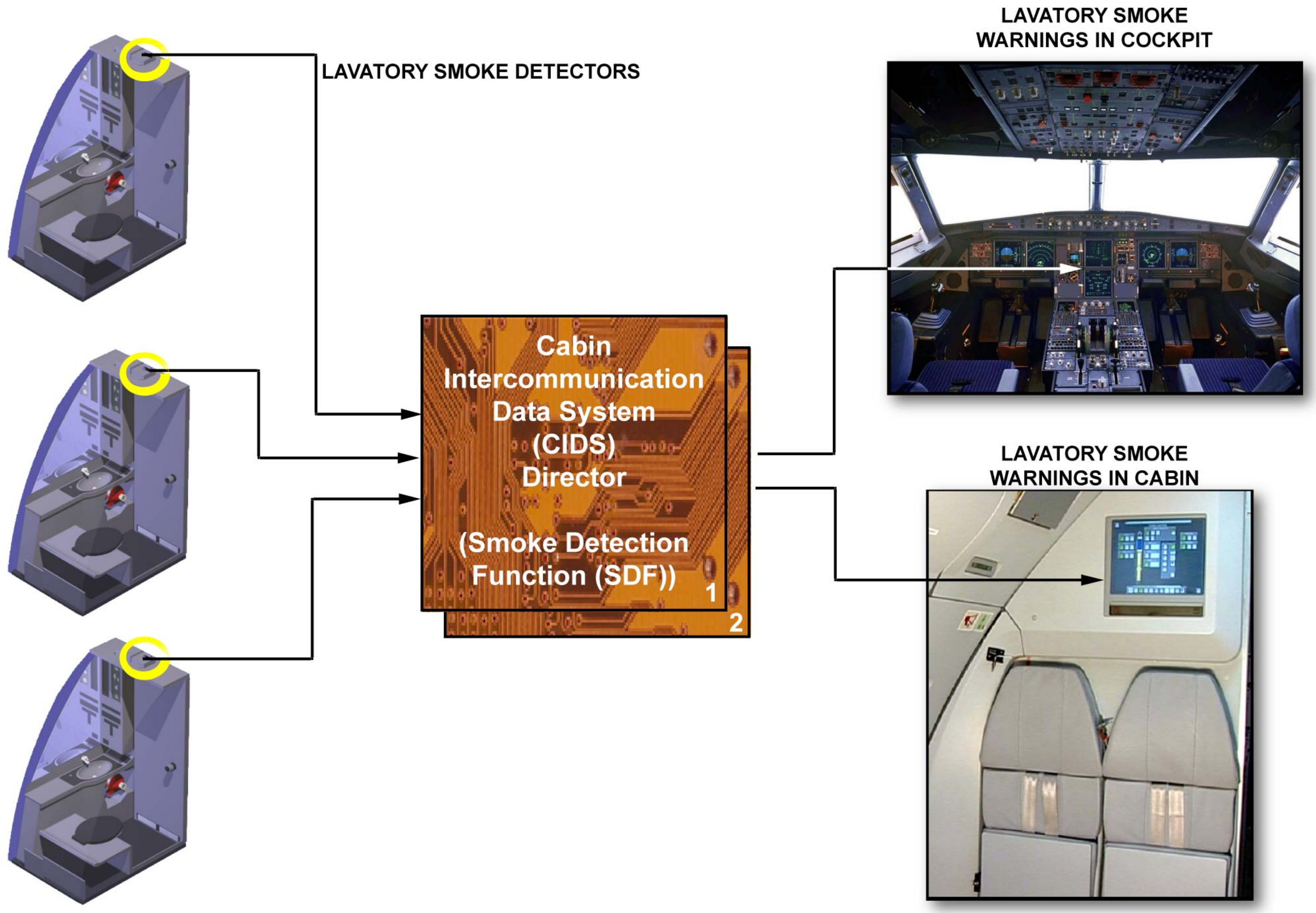


CARGO COMPARTMENT SMOKE PROTECTION - COMPONENT LOCATION

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

LAVATORY SMOKE PROTECTION

Each lavatory has one smoke detector. The lavatories and galleys on the aircraft are ventilated by an air extraction system. Air continuously circulates through the lavatories and is extracted out through the ceiling and across the smoke detectors.
The lavatory smoke detectors are monitored by the SDF, which is integrated into the CIDS computer(s) called the Director 1(2). The SDF receives signals from the detectors and sends SMOKE or FAULT warnings to the FWC to alert the flight crew. In addition, LAV SMOKE warnings are sent to the CIDS to alert the cabin crew.



LAVATORY SMOKE PROTECTION

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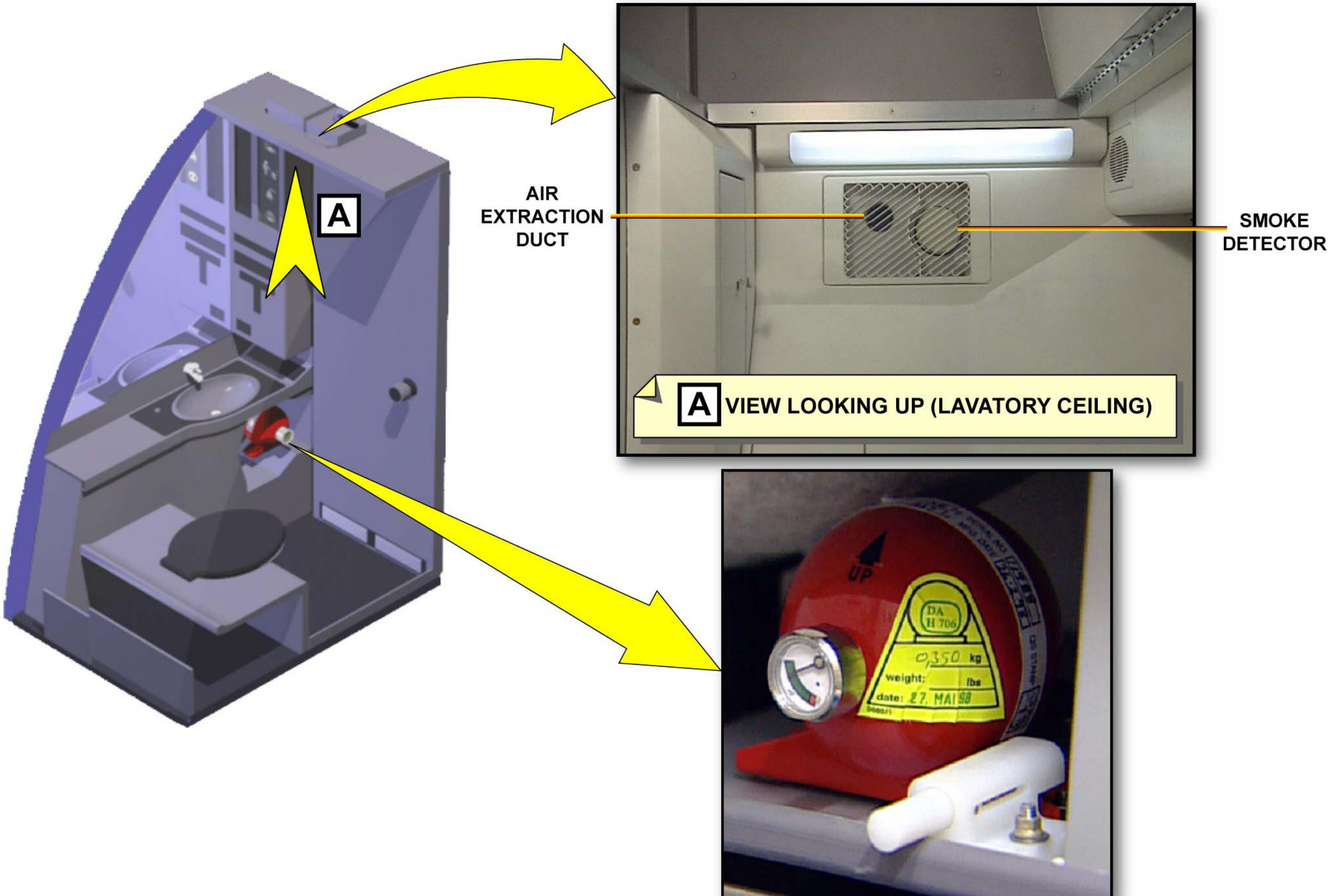
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

LAVATORY SMOKE PROTECTION (continued)

COMPONENT LOCATION

Each lavatory is equipped with a single smoke detector located in the air extraction duct in the lavatory ceiling.
Each lavatory waste bin is protected by an automatic fire extinguishing system. A small pressurized extinguisher will automatically discharge into the waste bin in case of fire.



LAVATORY SMOKE PROTECTION - COMPONENT LOCATION

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

CABIN FIRE PROTECTION

There are portable fire extinguishers in the cockpit and the cabin.
The quantity, type and location of the portable extinguishers depends on the each customer's interior configuration.

TYPICAL COCKPIT INSTALLATION

TYPICAL CABIN INSTALLATION
(FLIGHT ATTENDANT SEAT)

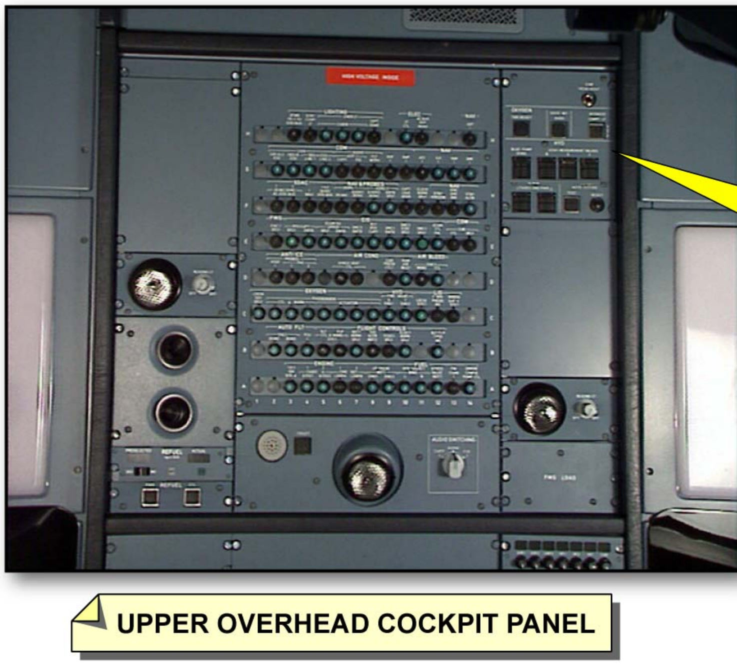
UAJ09471 - U19T4T0 - UM26PZ000000002

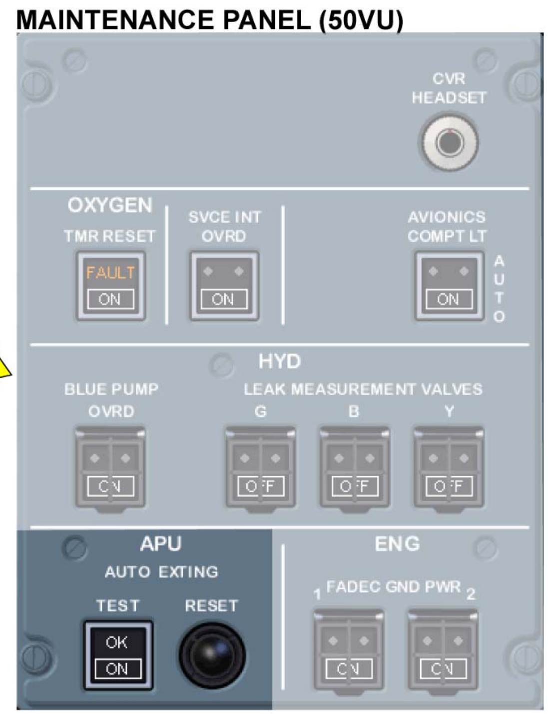
CABIN FIRE PROTECTION

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

SPECIFIC FUNCTION

In case of an APU FIRE detected on the ground, an auto-extinguishing system will automatically shut down the APU and discharge the fire bottle into the APU compartment. The auto-extinguishing system can be tested through the maintenance test panel located on the overhead panel.



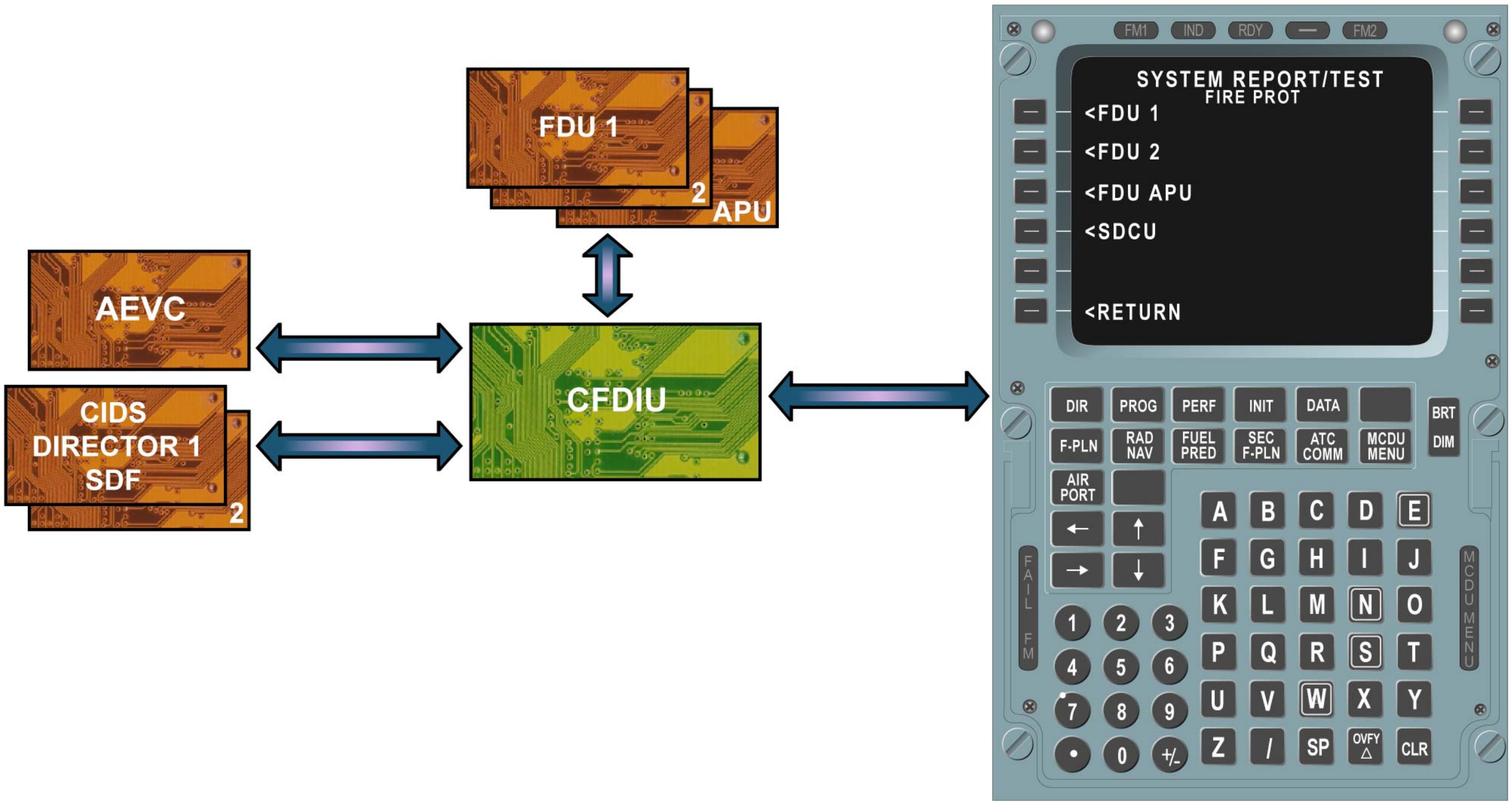


SPECIFIC FUNCTION

26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

The FDU processes signals issued from the sensing element responder and continuously transmits messages to the Centralized Fault Display Interface Unit (CFDIU).
The AEVC tests the smoke detector of the avionics compartment.
The two CIDS directors (SDF) monitor the smoke detectors installed in the cargo compartment and in the lavatories. FAULT information is sent to the CFDIU.



AEVC - Avionics Equipment Ventilation Computer
FDU - Fire Detection Unit
CFDIU - Centralized Fault Display Interface Unit
CIDS - Cabin Intercommunication Data System
SDF - Smoke Detection Function

MAINTENANCE/TEST FACILITIES

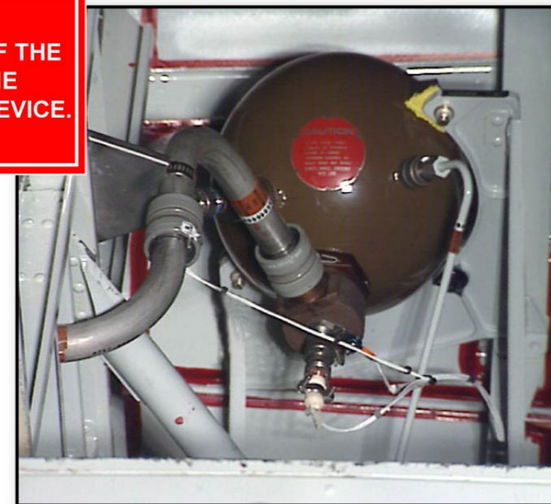
26 FIRE PROTECTION SYSTEMS PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on aircraft, make sure that you obey all the Aircraft Maintenance Manual (AMM) safety procedures. This will prevent injury to personnel and/or damage to the aircraft. Here is an overview of main safety precautions related to the fire protection system.
Do not try to open or repair the smoke detectors. Only workshops authorized by the manufacturer can do work on the smoke detectors.
The cartridge is an explosive device. To prevent explosion of the cartridge, install the applicable protective device. This will protect the electrical connector of the cartridge. Do not use a foil shunt.
When installing engine or APU fire detection elements, be careful not to bend or damage the element.
The engine and APU fire extinguishing bottles are connected to a HOT BUS. Make sure to pull all applicable C/Bs when doing maintenance on these systems, even without electrical power supplied to the aircraft.

ENGINE AND APU FIRE PANEL (20VU)

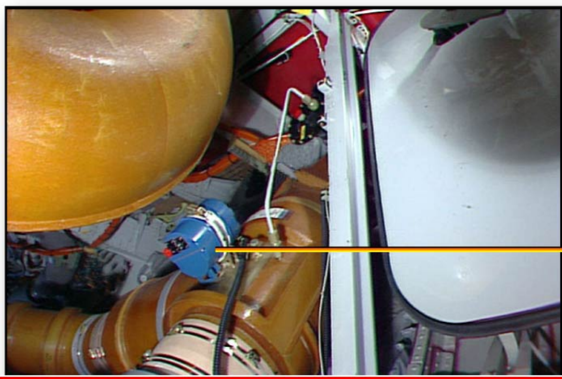
WARNING
TO PREVENT EXPLOSION OF THE CARTRIDGE INSTALL THE APPLICABLE PROTECTIVE DEVICE.



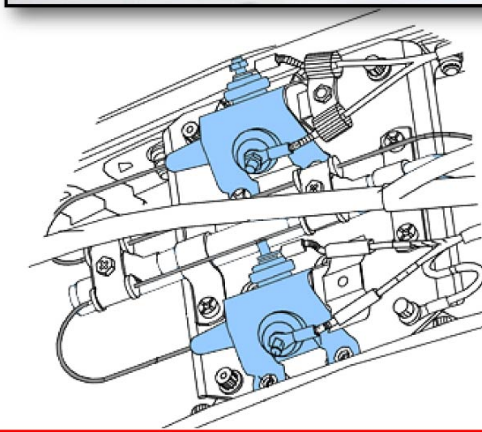
WARNING
THE ENGINE AND APU FIRE EXTINGUISHING BOTTLES ARE CONNECTED TO A HOT BUS. MAKE SURE TO PULL ALL APPLICABLE C/BS.

WARNING

OBEY ALL THE AMM SAFETY PROCEDURES.



SMOKE DETECTOR



WARNING
DO NOT TRY TO OPEN OR REPAIR THE SMOKE DETECTORS. ONLY AUTHORIZED WORKSHOPS CAN WORK ON THE SMOKE DETECTORS.

WARNING
WHEN INSTALLING ENGINE OR APU FIRE DETECTION ELEMENTS, BE CAREFUL NOT TO BEND OR DAMAGE THE ELEMENT.

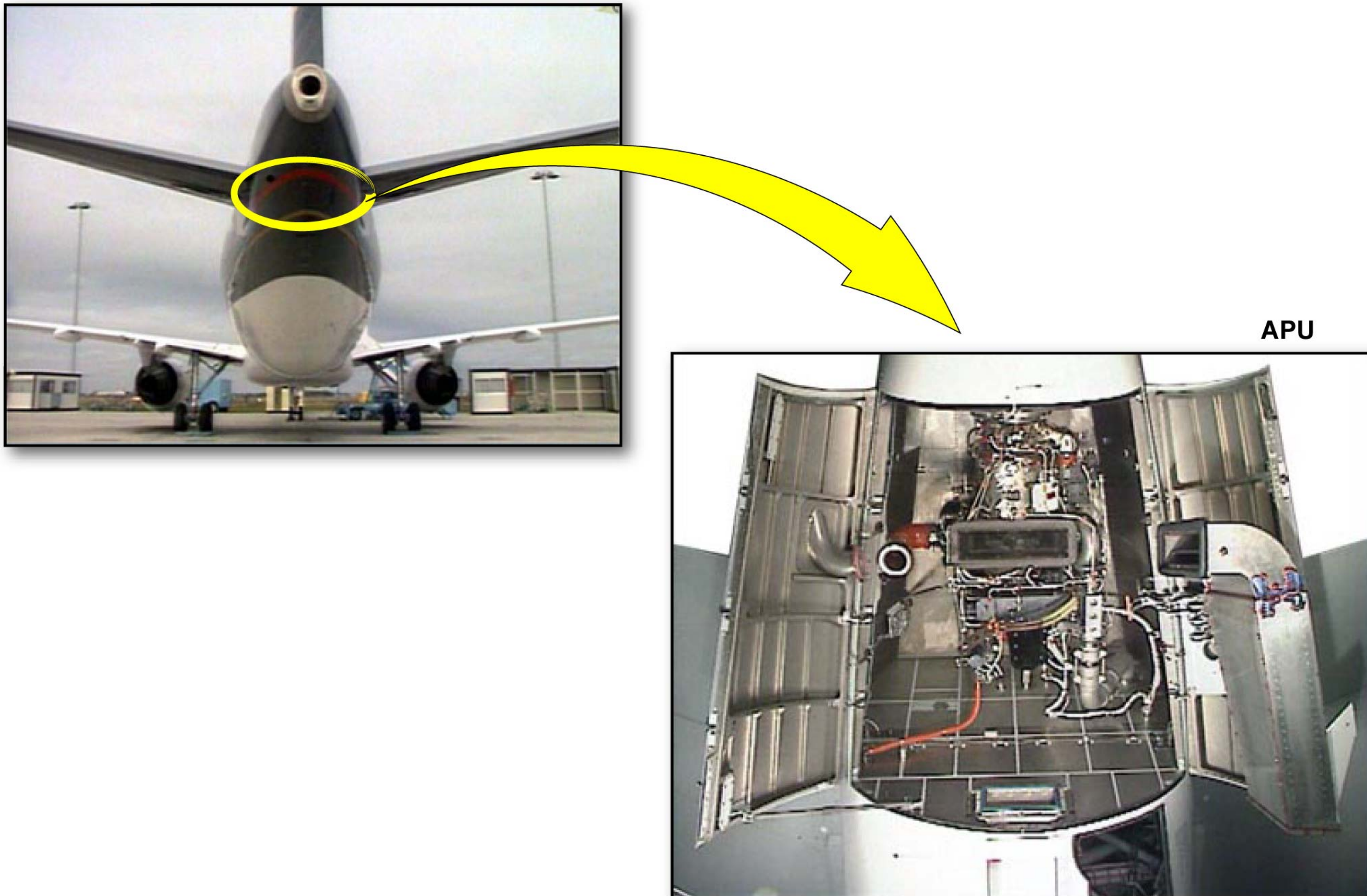
SAFETY PRECAUTIONS

49 APU PRESENTATION (1)

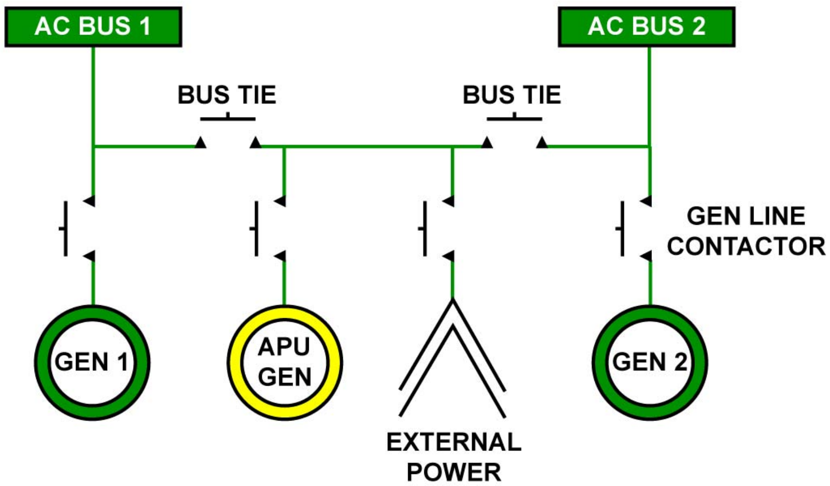
GENERAL

The Auxiliary Power Unit (APU) is a constant-speed gas turbine engine installed in the unpressurized tail cone. The APU is a self-contained unit, which enables the A/C to be independent of external pneumatic and electrical power sources.
The APU is designed to operate throughout the entire flight envelope.
Electrical power is available whenever the APU operates, but APU bleed air, if required as a back-up bleed source in flight, is available up to FL200 for the APIC 3200 (up to FL225 for the Honeywell 131-9).
The APU is able to supply:
- electrical power for the A/C systems,
- bleed air for engine starting and air conditioning on the ground,
- bleed air for air conditioning/pressurization and wing anti-ice in flight.

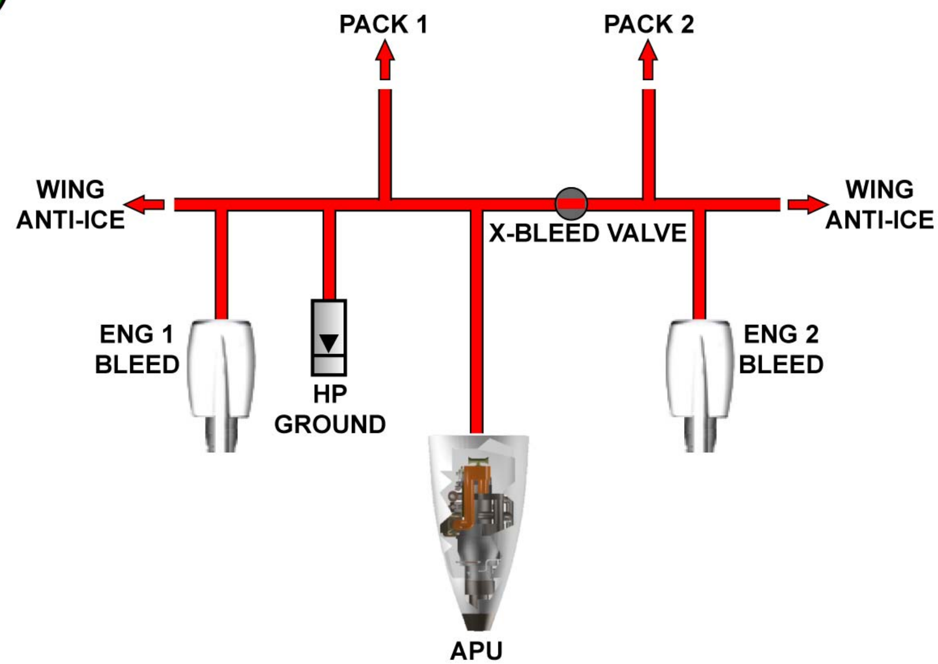
The APU is installed in its compartment in the tail cone.
The Air Intake Flap and Duct assembly allow air to reach the APU air inlet plenum.
Various systems including the APU Bleed duct, the APU Generator output feeder cable, and the APU fuel supply manifold go through the front firewall.
The Air Intake Flap actuator and the Fire Bottle are installed forward of the front firewall.
The hot gases from the power section and un-used APU bleed air are released through the Exhaust pipe.



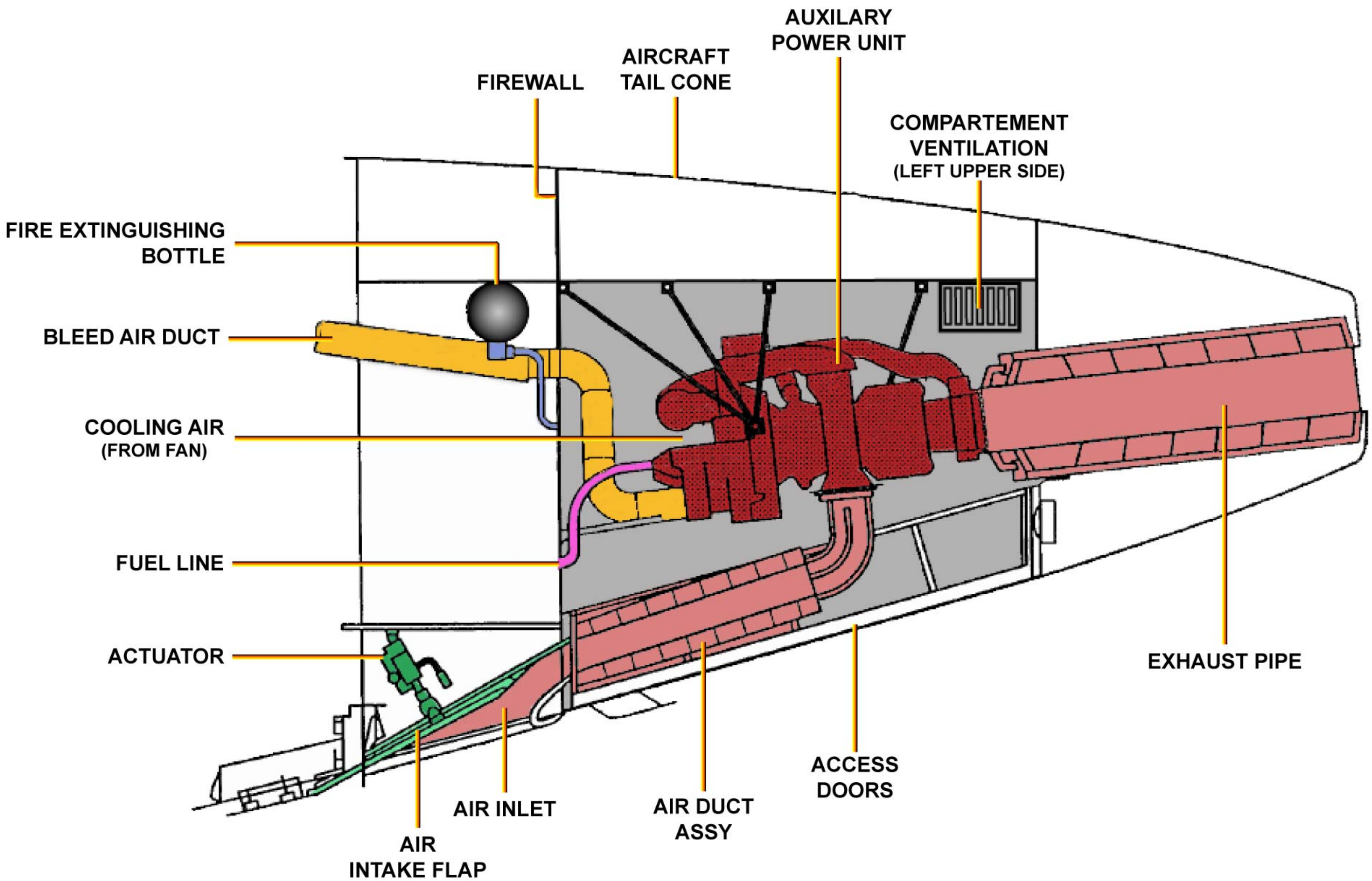
GENERAL



The APU supplies electrical power and bleed air on the ground and in flight



GENERAL



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GENERAL

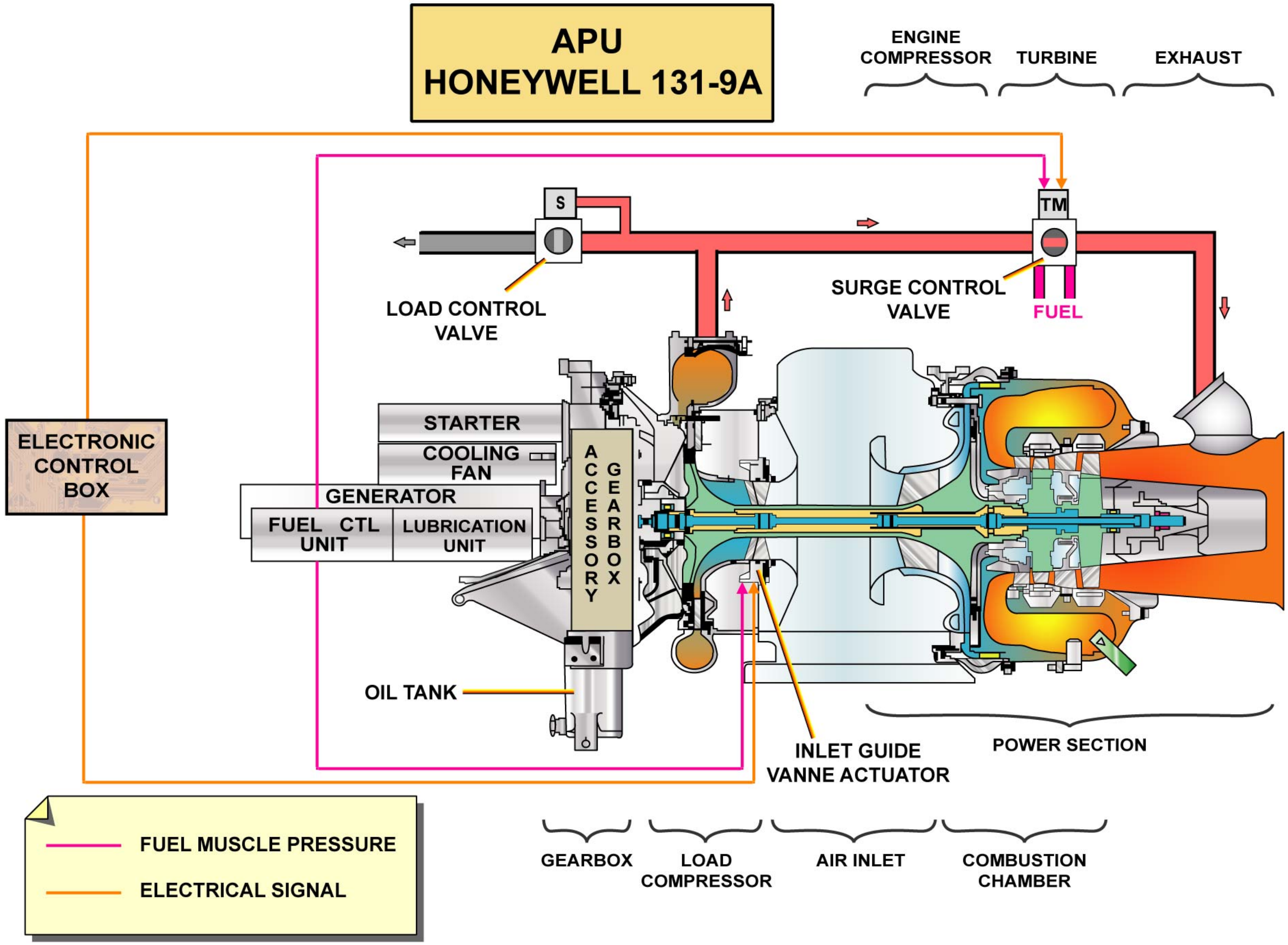
49 APU PRESENTATION (1)

GENERAL (continued)

ENGINE DESCRIPTION - HONEYWELL

The APU is a constant speed, single-shaft gas turbine engine that delivers mechanical shaft power to drive an accessory gearbox and a load compressor. The gearbox drives the APU generator.
The Load Control Valve supplies pneumatic power to start the air conditioning. Additionally a Surge Control Valve protects the load compressor against insufficient flow.
The APU operation is controlled and monitored by the Electronic Control Box (ECB). The ECB has full authority over the following APU functions:
- starting,
- acceleration,
- speed governing,
- indication,
- fault monitoring,
- interface with A/C systems.

The APU is capable of unattended operation; therefore, the ECB automatically shuts down the APU in case of a FAULT to protect the APU. Based on regulations, in-flight protective shutdowns may be inhibited, except for critical FAULTs.



GENERAL - ENGINE DESCRIPTION - HONEYWELL

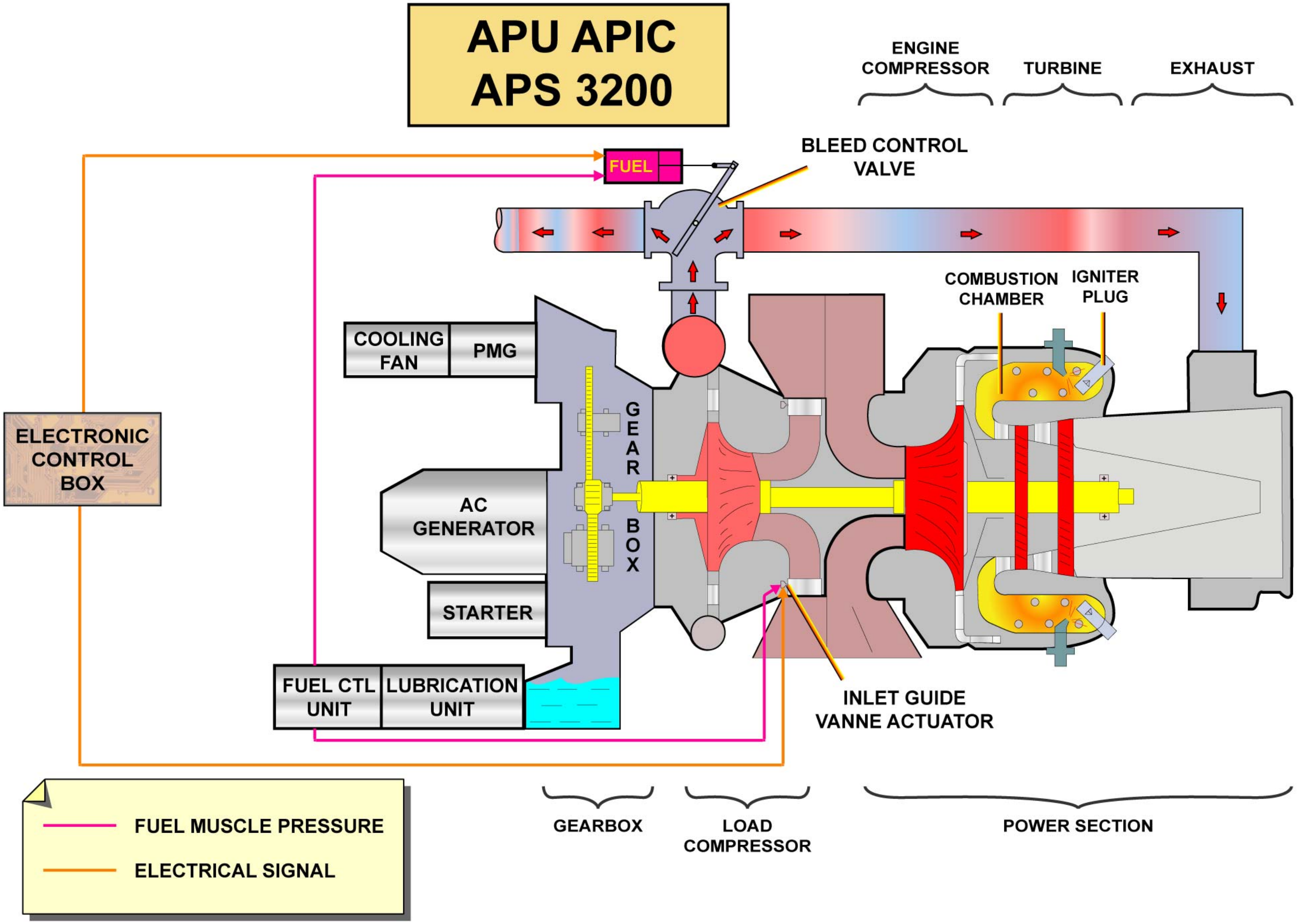
49 APU PRESENTATION (1)

GENERAL (continued)

ENGINE DESCRIPTION - APIC

The APU is a constant speed, single-shaft gas turbine engine that delivers mechanical shaft power to drive an accessory gearbox and a load compressor. The APU generator is driven by the gearbox.
The Bleed Control valve provides the pneumatic power for starting, air conditioning and it integrates the protective Surge Control function required to protect the load compressor against insufficient flow.
The APU operation is controlled and monitored by the Electronic Control Box (ECB). The ECB has full authority over the following APU functions:
- starting,
- acceleration,
- speed governing,
- indication,
- fault monitoring,
- interface with A/C systems.

The APU is capable of unattended operation; therefore, the ECB automatically shuts down the APU in case of a FAULT to protect the APU. Based on regulations, in-flight protective shutdowns may be inhibited, except for critical FAULTs.



UAJ09471 - U19T4T0 - UM49PZ000000001

GENERAL - ENGINE DESCRIPTION - APIC

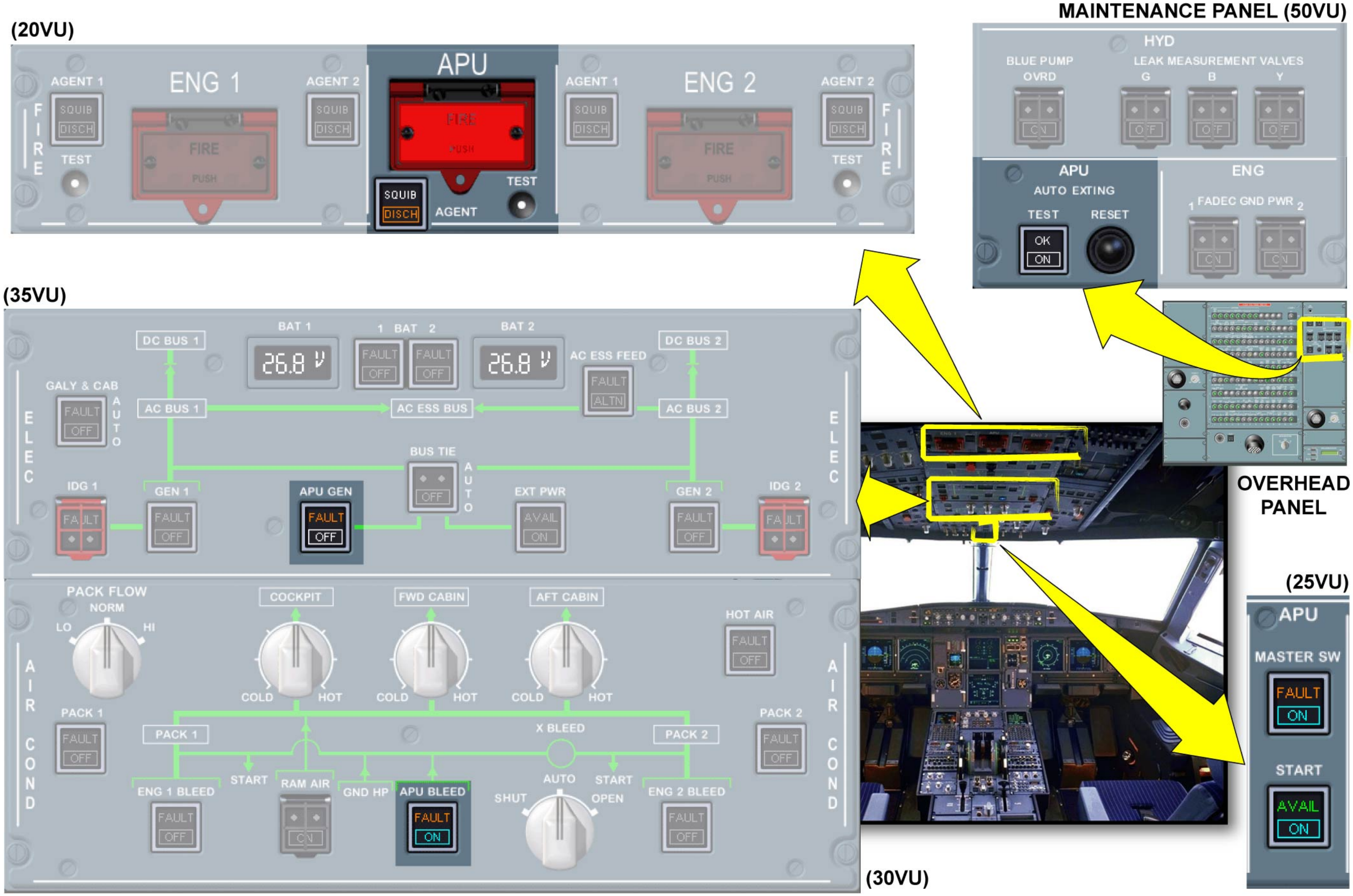
49 APU PRESENTATION (1)

CONTROL AND INDICATING

This section will highlight the control panels and indications for the APU.

CONTROL PANELS

The controls used to operate the APU are:
- the APU MASTER SWitch and START P/BSW, on the APU control panel,
- the APU fire controls, on the FIRE panel,
- additionally, P/BSWs to deliver the electrical or pneumatic power, and to test the APU auto extinguishing circuits.



CONTROL AND INDICATING - CONTROL PANELS

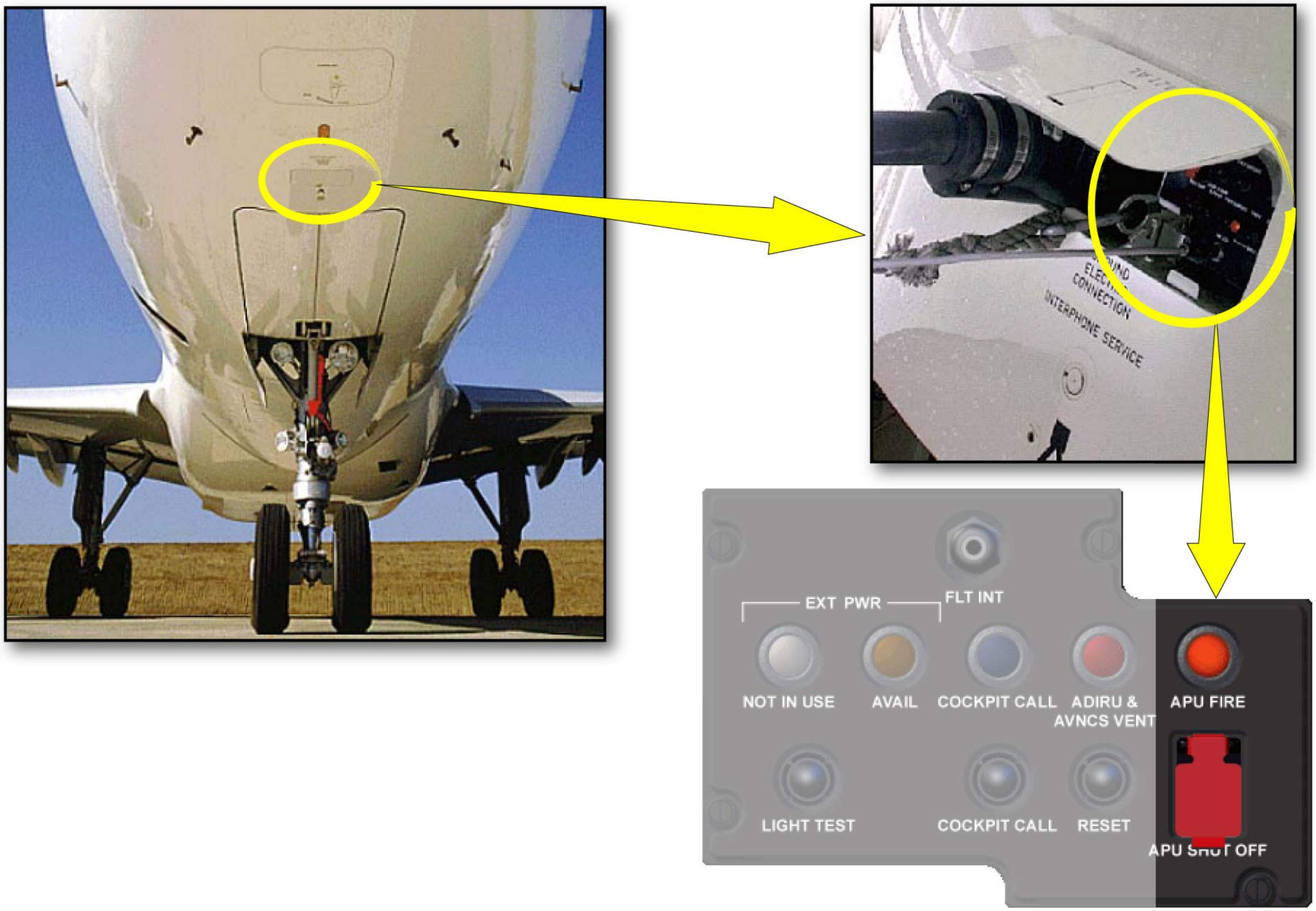
UAJ09471 - U19T4T0 - UM49PZ000000001

49 APU PRESENTATION (1)

CONTROL AND INDICATING (continued)

EXTERNAL CONTROLS

In case of an APU FIRE warning on the ground, a loud horn will sound in the nose wheel well to tell ground personnel. Associated with the horn, a red APU FIRE light will come on, on the external power control panel on the lower fuselage. It is possible to do an EMERGENCY shut down of the APU from this panel by lifting the guard and pushing the APU SHUT OFF P/BSW.



EXTERNAL POWER CONTROL PANEL (108VU)

CONTROL AND INDICATING - EXTERNAL CONTROLS

49 APU PRESENTATION (1)

CONTROL AND INDICATING (continued)

ECAM APU PAGE

APU parameters are displayed on the ECAM APU page. The APU generator parameters are duplicated on the ECAM ELEC page and the APU pneumatic parameters are duplicated on the ECAM BLEED page.

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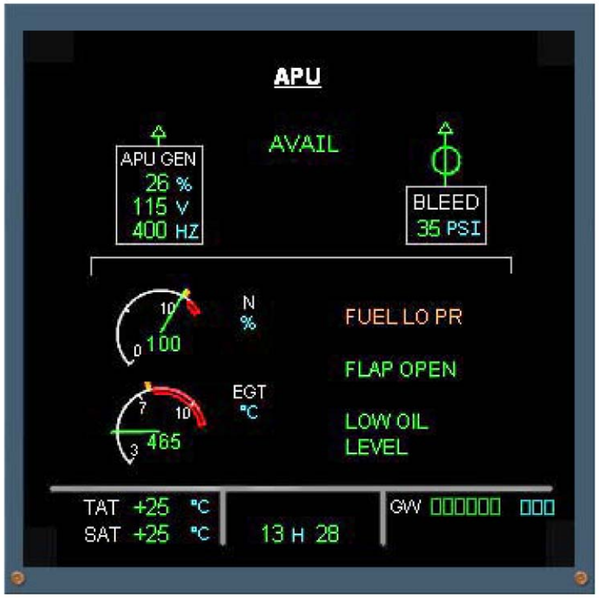


SYSTEM DISPLAY (SD)

CONTROL AND INDICATING - ECAM APU PAGE

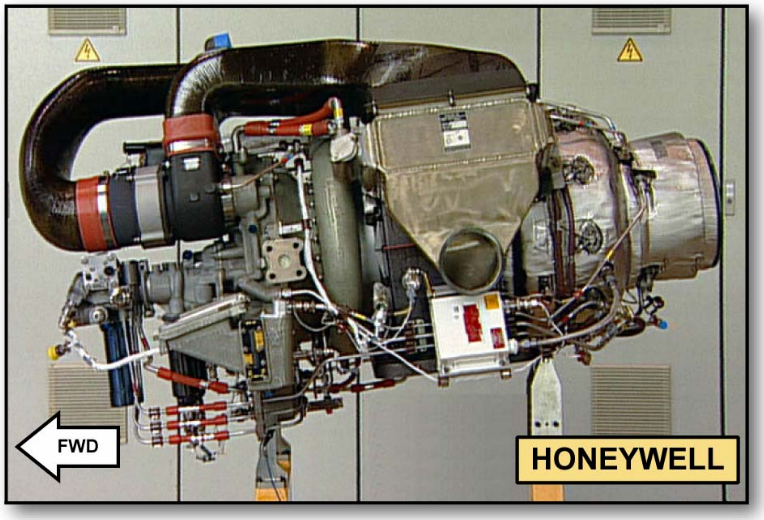
49 APU PRESENTATION (1)

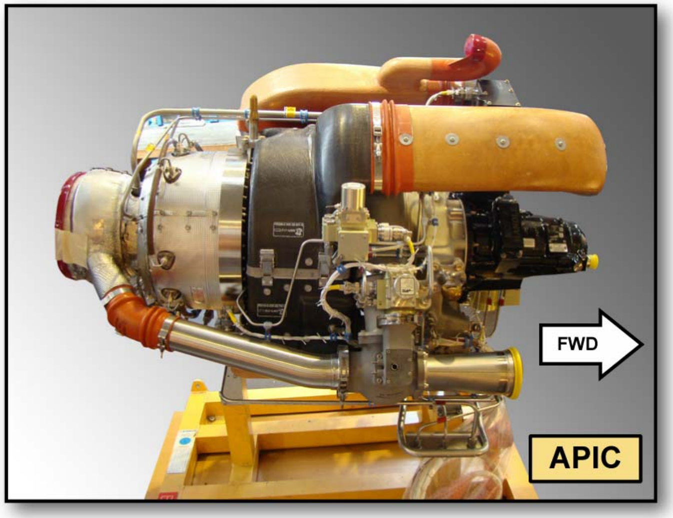
COMPONENT LOCATION

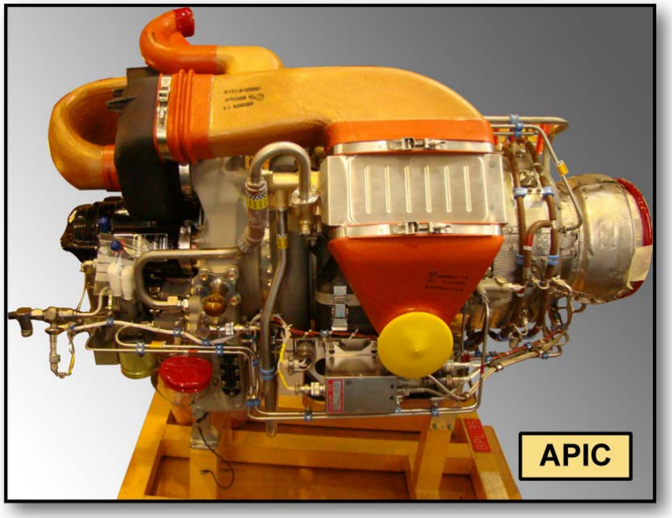
The APU is installed in the tail section of the fuselage.

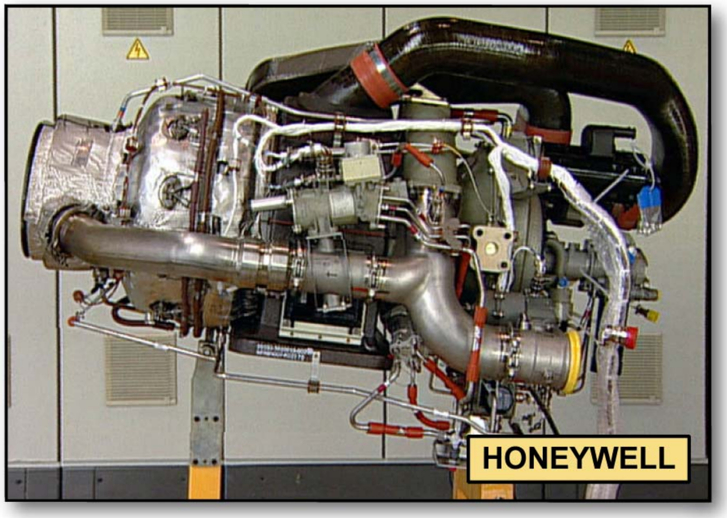
ENGINE VIEW

The left and right hand sides of the APIC 3200 APU are shown.
The left and right hand sides of the Honeywell 131-9 [A] APU are shown.









COMPONENT LOCATION - ENGINE VIEW

UAJ09471 - U19T4T0 - UM49PZ000000001

49 APU PRESENTATION (1)

COMPONENT LOCATION (continued)

ELECTRONIC CONTROL BOX (ECB)

The ECB is in the aft cargo compartment, RH side.

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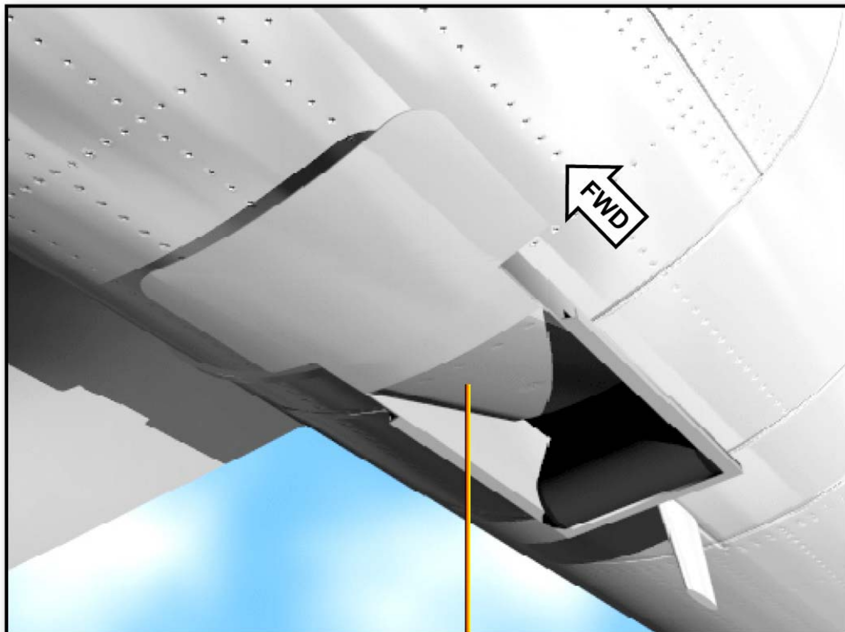
COMPONENT LOCATION - ELECTRONIC CONTROL BOX (ECB)

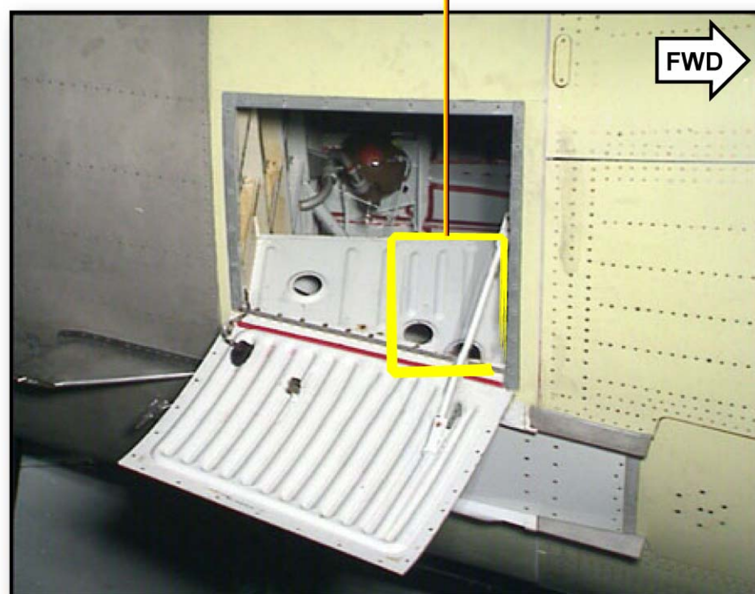
49 APU PRESENTATION (1)

COMPONENT LOCATION (continued)

AIR INTAKE FLAP

The APU has an air intake flap. The intake flap is open when the APU MASTER SWitch is selected ON and closes when the MASTER SWitch is selected OFF. When open, supplies air to the APU inlet for combustion and pneumatic supply.





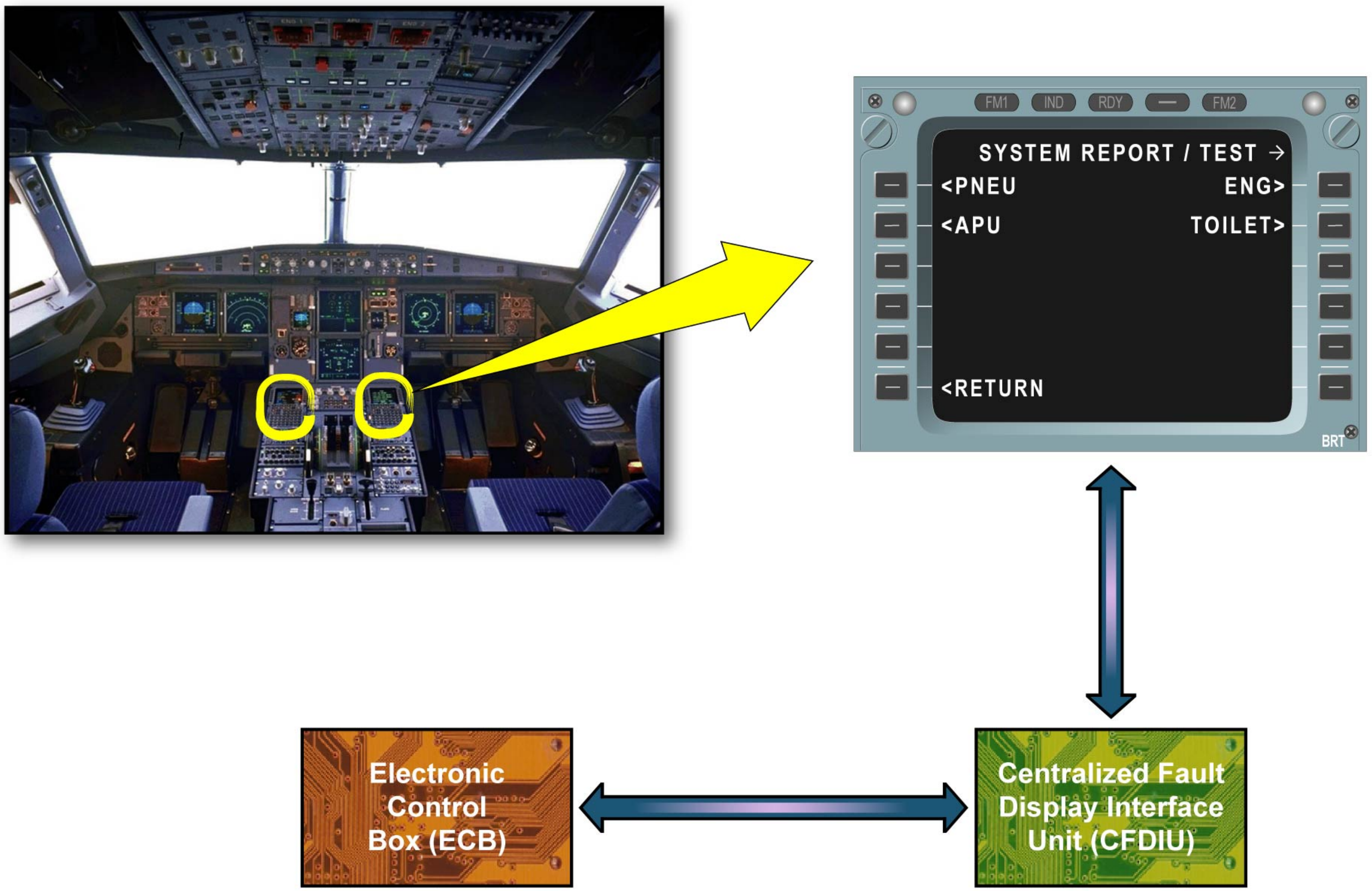
COMPONENT LOCATION - AIR INTAKE FLAP

UAJ09471 - U19T4T0 - UM49PZ000000001

49 APU PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

Using the MCDU, you can have access to the Centralized Fault Display System (CFDS) fault messages of the APU system. Specific Built-In Test Equipment (BITE) tests are available as well.



MAINTENANCE/TEST FACILITIES

UAJ09471 - U19T4T0 - UM49PZ000000001

49 APU PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on A/C, make sure that you obey all the Aircraft Maintenance Manual (AMM) safety procedures. This will prevent injury to persons and/or damage to the A/C. Here is an overview of main safety precautions related to the APU.
Make sure that you use the correct personal protection when you work on the APU, as fuel and oil are poisonous.
Do not touch the APU until it is sufficiently cool.
If you operate the APU with the APU access doors open or removed, make sure that you have the correct fire fighting equipment available. The onboard APU fire extinguishing system is not sufficient when these doors are not closed.

SAFETY PRECAUTIONS

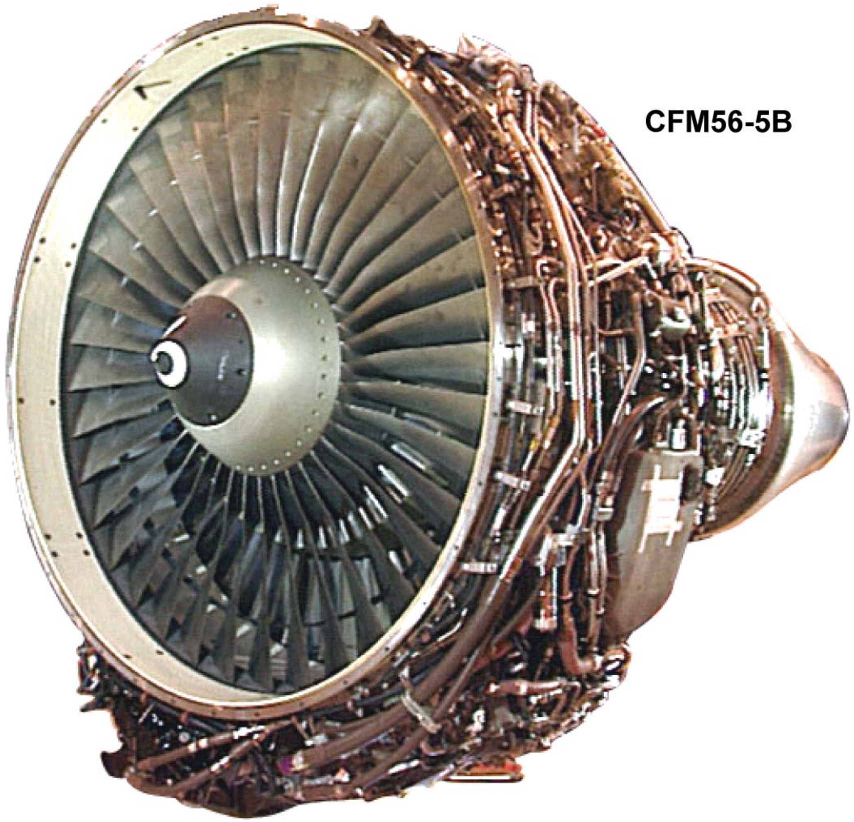
UAJ09471 - U19T4T0 - UM49PZ000000001

70 POWER PLANT CFM 56 PRESENTATION (1)

INTRODUCTION

The CFM56-5B engine is a dual-rotor, variable stator, high bypass ratio turbo fan power plant. The CFM56-5B powers the complete single aisle family of aircraft. CFM56-5B engines are available in several thrust ratings.
All the engines are basically the same. A programming plug on the Electronic Control Unit (ECU) changes the available thrust.

A/C	ENGINE	THRUST (lbs)	THRUST (kg)
A318	CFM56-5B8 CFM56-5B9	21,600 lbs 23,300 lbs	9,800 kg 10,570 kg
A319	CFM56-5B5 CFM56-5B6	22,000 lbs 23,500 lbs	9,980 kg 10,660 kg
A319 CJ	CFM56-5B7	27,000 lbs	12,250 kg
A320	CFM56-5B4	27,000 lbs	12,250 kg
A321	CFM56-5B1 CFM56-5B2 CFM56-5B3	30,000 lbs 31,000 lbs 33,000 lbs	13,610 kg 14,060 kg 14,970 kg



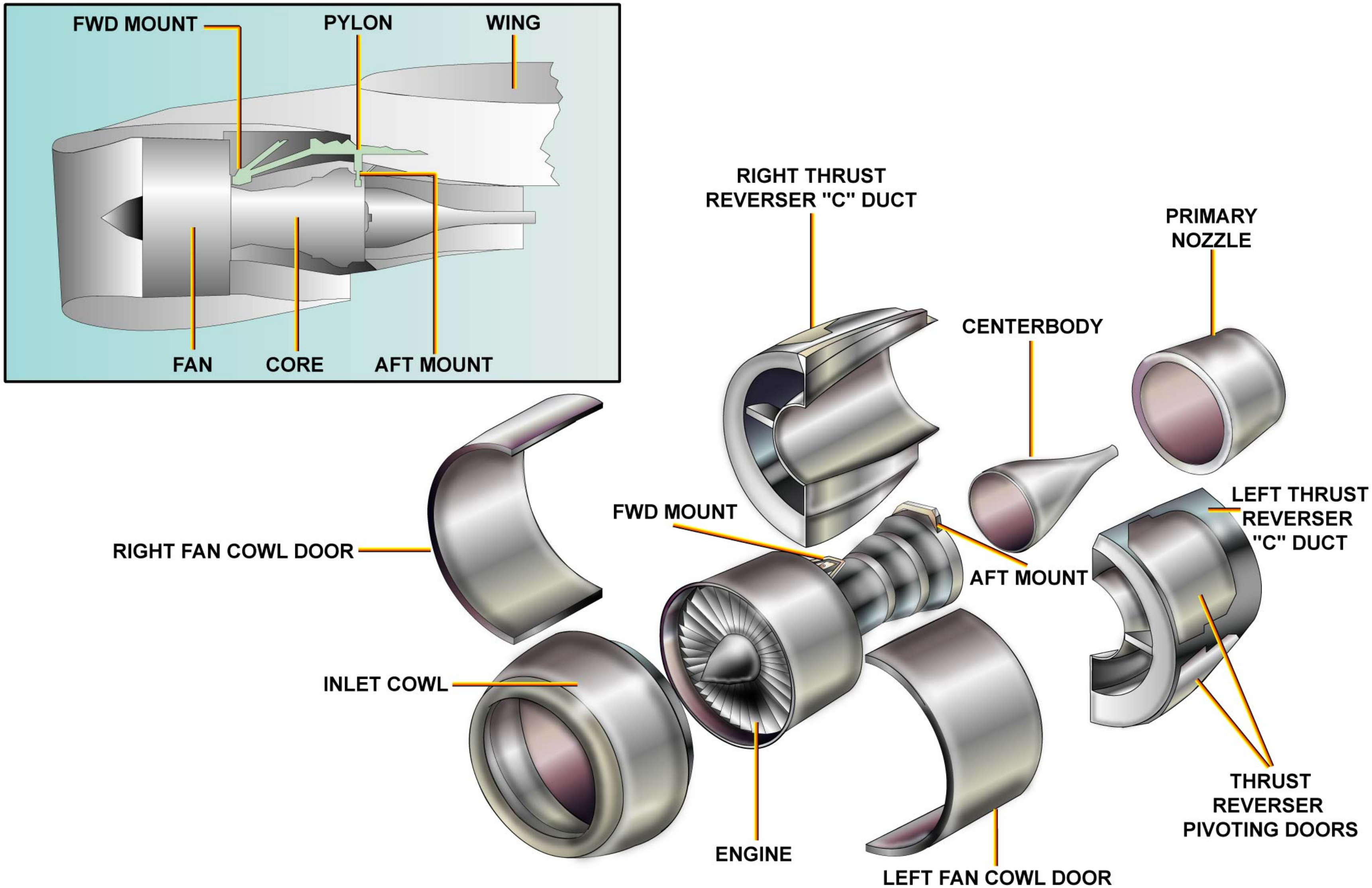
UAJ09471 - U19T4T0 - UM70PZ000000004

INTRODUCTION

70 POWER PLANT CFM 56 PRESENTATION (1)

INSTALLATION

The power plant installation includes the engine, the engine inlet, the exhaust, the fan cowls and the reverser assemblies. The pylon connects the engine to the wing structure. The engine is attached to the pylon by forward and aft mounts.



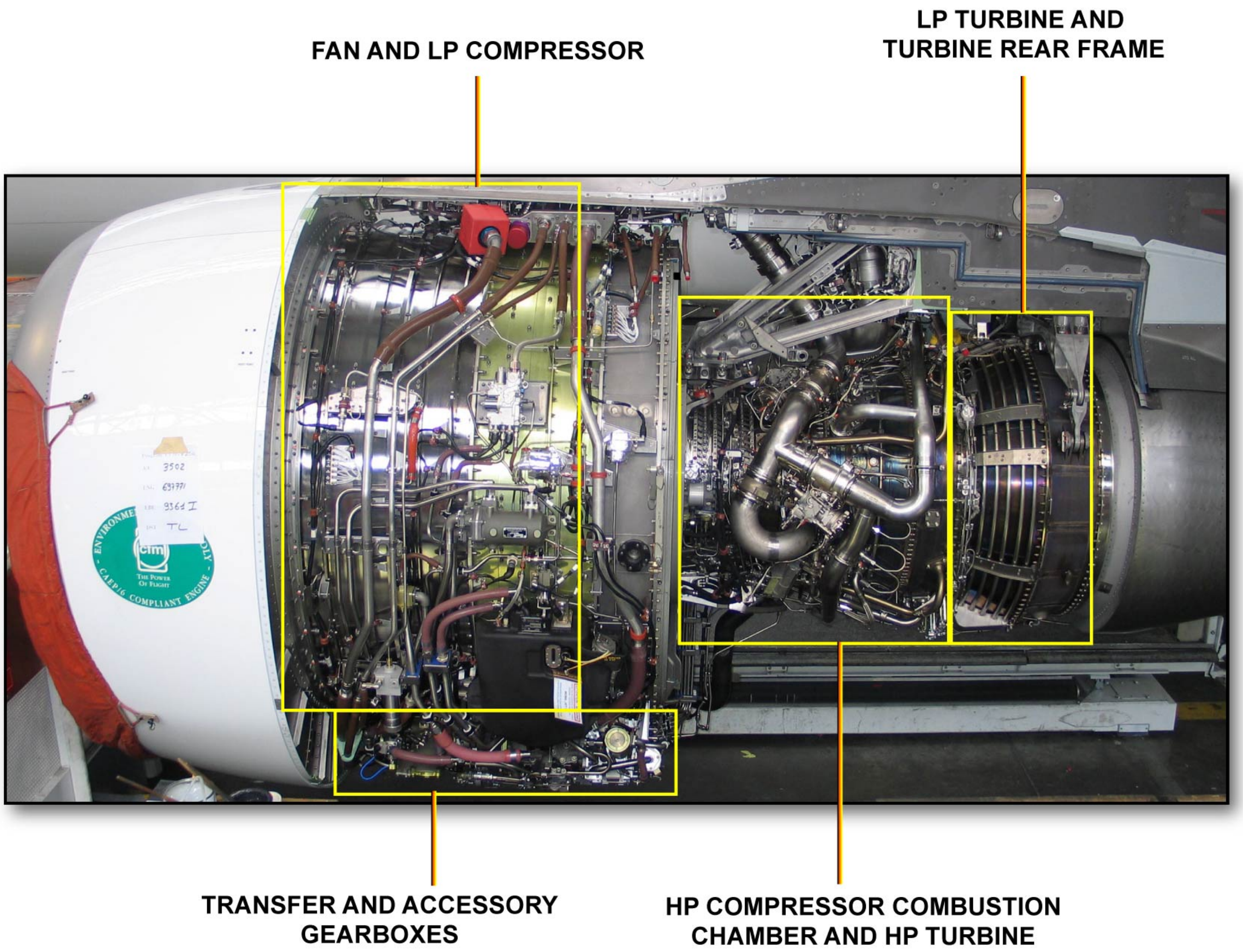
INSTALLATION

UAJ09471 - U19T4T0 - UM70PZ000000004

70 POWER PLANT CFM 56 PRESENTATION (1)

MODULAR CONCEPT

The CFM56-5B is designed using a modular concept. For easy maintenance and quicker return-to-service, the engine is made of 4 primary modules:
- fan and Low Pressure (LP) compressor,
- High Pressure (HP) compressor, combustion chamber and HP turbine,
- LP turbine and Turbine Rear Frame (TRF),
- transfer and accessory gearboxes.



MODULAR CONCEPT

UAJ09471 - U19T4T0 - UM70PZ000000004

70 POWER PLANT CFM 56 PRESENTATION (1)

MODULAR CONCEPT (continued)

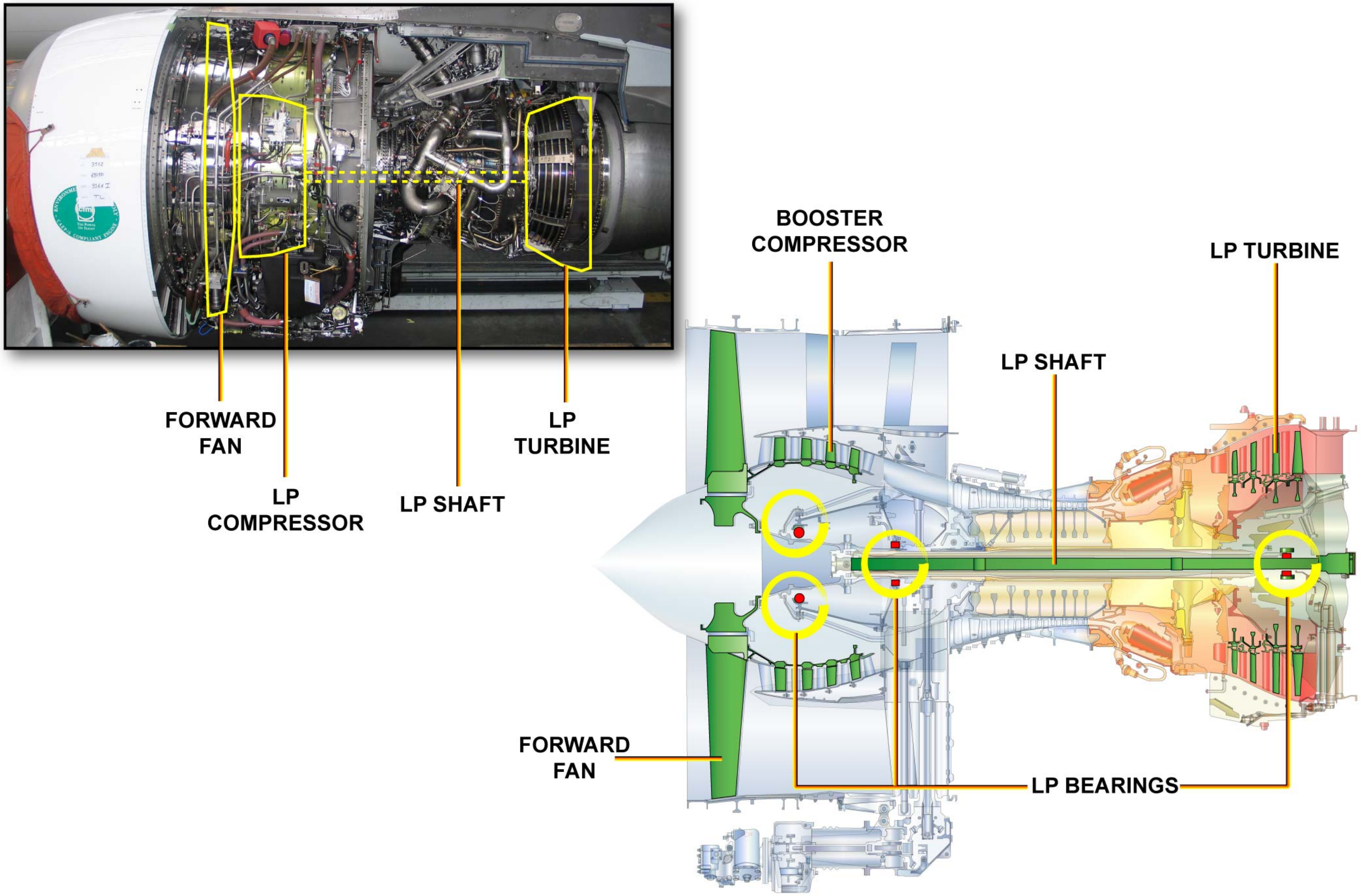
LP ROTOR

The Low Pressure (LP) rotor has the forward fan, the booster compressor and the LP shaft, all driven by the LP turbine. The speed of the LP rotor is indicated on ECAM as N1.

The forward fan supplies most of the engine thrust. The air produced by the fan is known as secondary airflow or bypass airflow. The 4-stage booster compressor supplies air to the engine core. This is primary airflow. The fan and LP compressor are supported by the fan frame which is also the location for the forward engine mount.

The 4-stage LP turbine drives the forward fan and the booster compressor. It is supported by the TRF which is also the location for the rear engine mount.

The LP rotor is supported by roller and ball bearings which are lubricated and cooled.



MODULAR CONCEPT - LP ROTOR

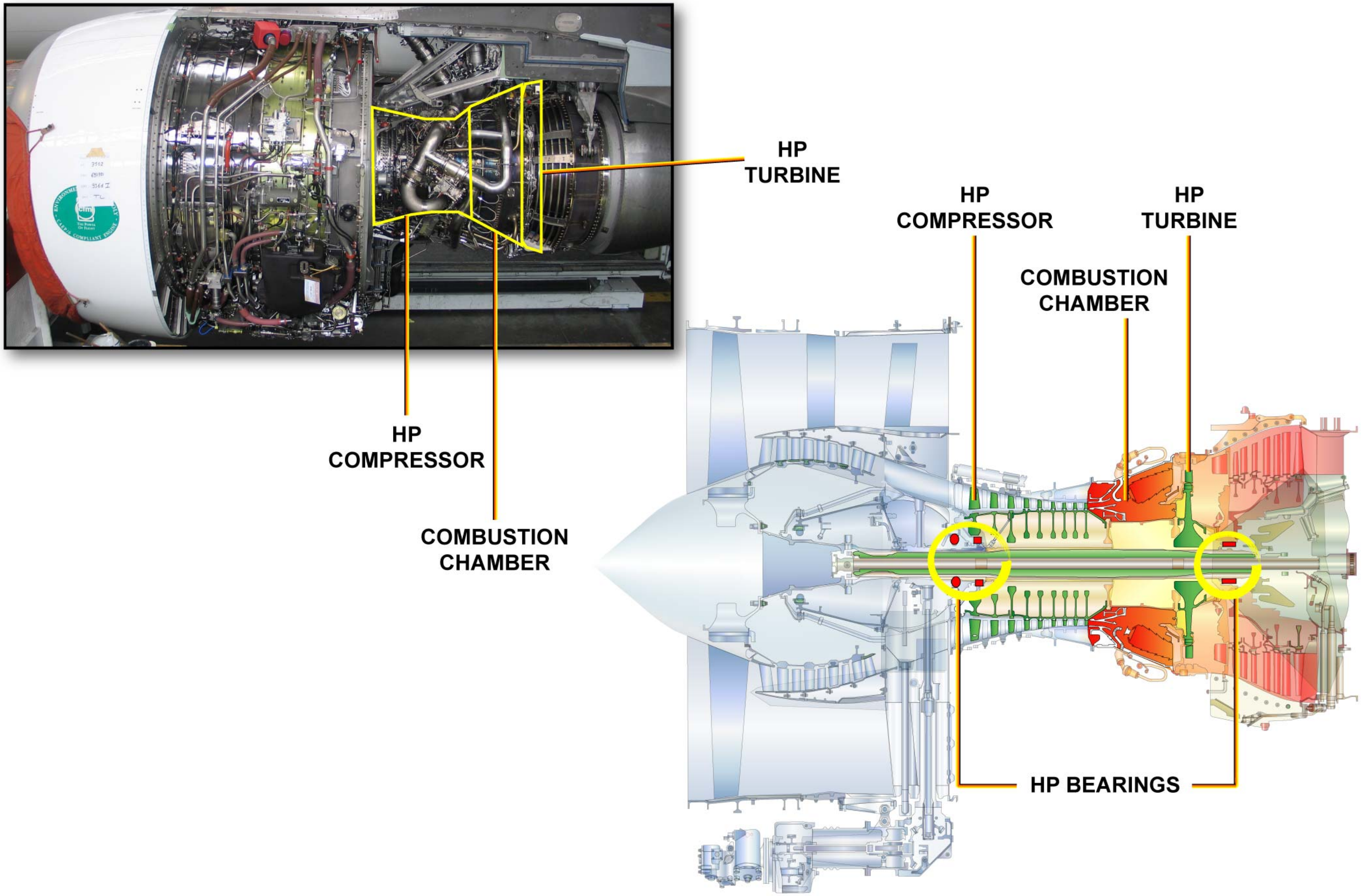
70 POWER PLANT CFM 56 PRESENTATION (1)

MODULAR CONCEPT (continued)

HP ROTOR AND COMBUSTION CHAMBER

The High Pressure (HP) rotor is made up of a 9-stage HP compressor driven by a single-stage HP turbine. The speed of the HP rotor is indicated on the ECAM as N2.
The HP compressor is also the source of customer bleed air.
The HP rotor is supported by roller and ball bearings, which are lubricated and cooled.
The annular combustion chamber is located between the HP compressor and HP turbine. It is equipped with ports for 20 fuel nozzles and 2 igniter plugs.

UAJ09471 - U19T4T0 - UM70PZ000000004



MODULAR CONCEPT - HP ROTOR AND COMBUSTION CHAMBER

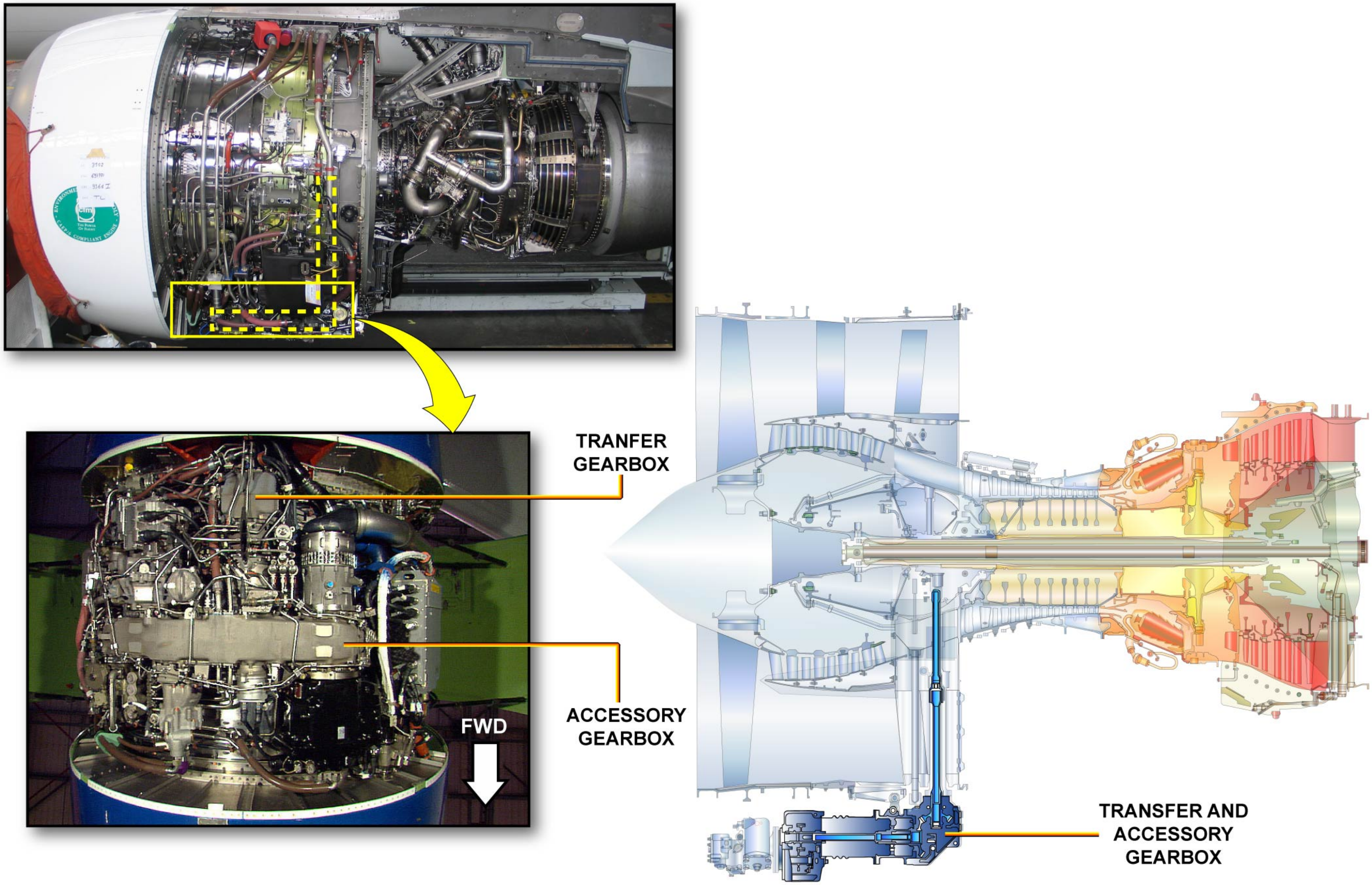
UAJ09471 - U19T4T0 - UM70PZ000000004

70 POWER PLANT CFM 56 PRESENTATION (1)

MODULAR CONCEPT (continued)

TRANSFER & ACCESSORY GEARBOXES

The accessory gearbox is located at the bottom of the fan case and is driven by the HP rotor through the transfer gearbox.
The fuel pumps, oil pumps, hydraulic pump, Integrated Drive Generator and FADEC alternator are all driven by the gearbox.
During engine starting, the starter rotates the HP compressor through the gearboxes.



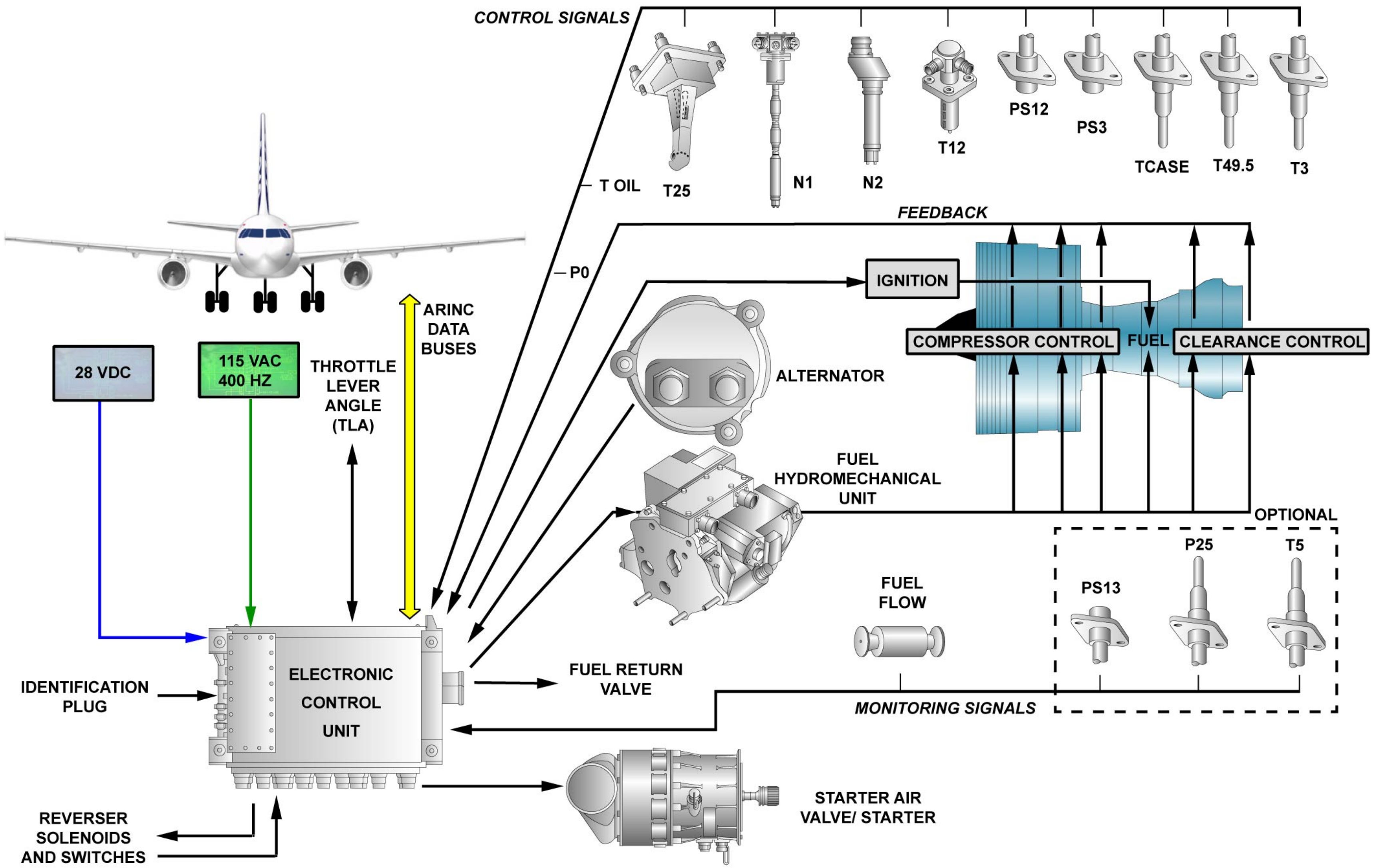
MODULAR CONCEPT - TRANSFER & ACCESSORY GEARBOXES

UAJ09471 - U19T4T0 - UM70PZ000000004

70 POWER PLANT CFM 56 PRESENTATION (1)

FADEC

In order to increase engine reliability and efficiency, the Full Authority Digital Engine Control (FADEC) gives the full range of engine control to achieve steady state and transient engine performances when operated in combination with aircraft subsystems.
Each engine is controlled by an ECU, a dual channel computer located on the engine fan case. The ECU controls the engine during start and all operations. The ECU manages engine thrust and protects against overspeed and overtemperature by controlling the engine sub-systems. The ECU also monitors all engine subsystems and sensors for failure.
When the engine is running, power for FADEC operation is supplied by a dual-output FADEC alternator driven by the gearbox.
The FADEC system has a dual channel ECU and the following peripherals:
- hydromechanical unit,
- dedicated FADEC alternator,
- compressor control systems,
- clearance control systems,
- start system (starter shutoff valve, ignition exciters),
- thrust reverser system,
- oil/fuel temperature control system,
- fuel return valve,
- engine sensors,
- electrical harnesses.

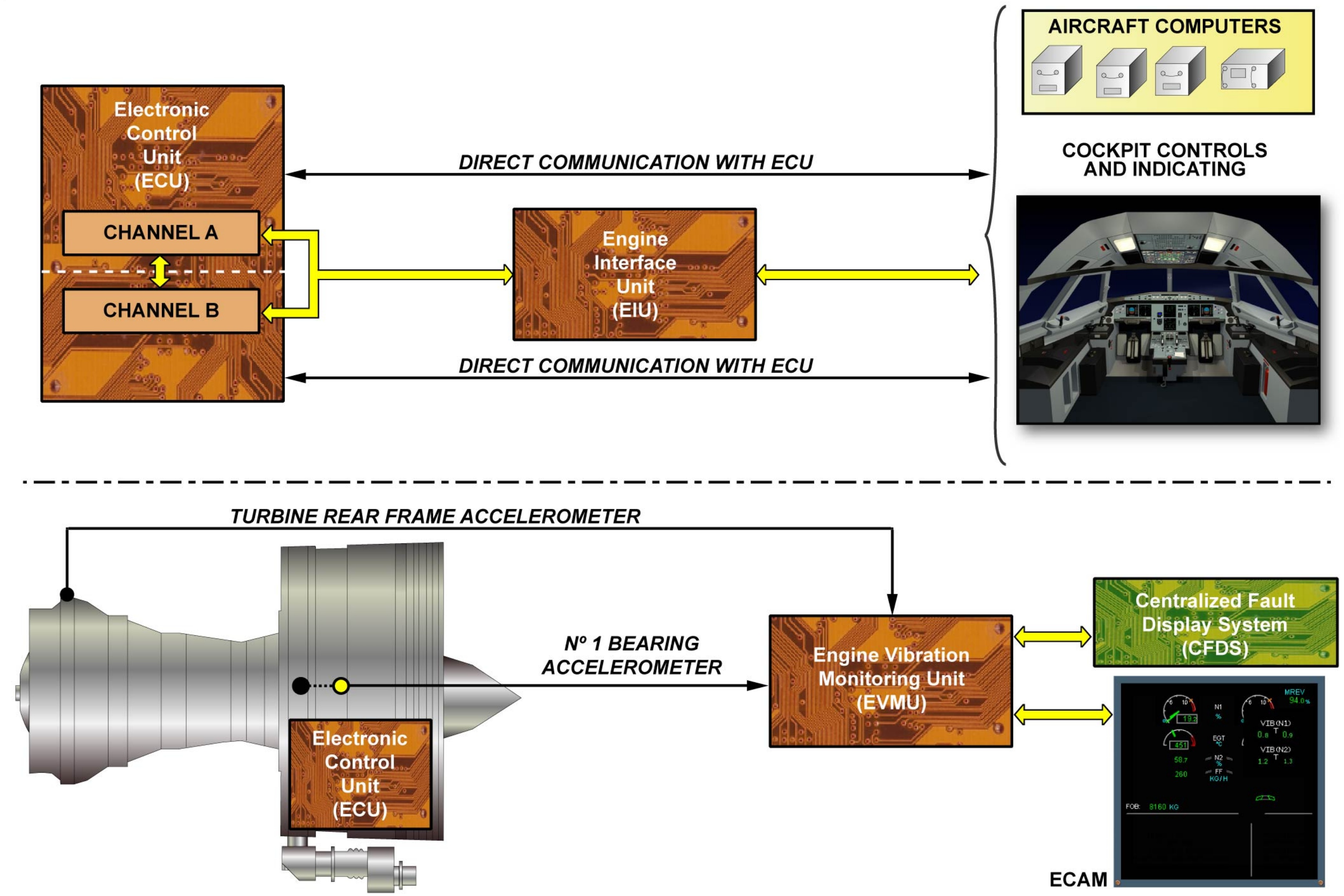

CONTROL SIGNALS
T OIL
T25
N1
N2
T12
PS12
PS3
TCASE
T49.5
T3
FEEDBACK
P0
IGNITION
COMPRESSOR CONTROL
FUEL
CLEARANCE CONTROL
ARINC
DATA
BUSES
ALTERNATOR
28 VDC
115 VAC
400 HZ
THROTTLE
LEVER
ANGLE
(TLA)
FUEL
HYDROMECHANICAL
UNIT
OPTIONAL
P25
T5
PS13
FUEL
FLOW
ELECTRONIC
CONTROL
UNIT
IDENTIFICATION
PLUG
FUEL RETURN
VALVE
MONITORING SIGNALS
STARTER AIR
VALVE/ STARTER
REVERSER
SOLENOIDS
AND SWITCHES

FADEC

70 POWER PLANT CFM 56 PRESENTATION (1)

EIU/EVMU

The ECU interfaces with various aircraft systems. Essential communication with the ECU (thrust lever position, air data, etc.) is direct to and from the applicable systems and controls. Non-essential communication (autothrust, Centralized Fault Display System (CFDS), etc) is routed through the Engine Interface Unit (EIU) of each engine. The EIUs interface with various aircraft circuits and systems. The data is then transmitted in a single stream to each ECU channel.
Engine vibration monitoring is accomplished by the Engine Vibration Monitoring Unit (EVMU). The EVMU collects vibration data from both engines. The vibration information is displayed on the ECAM and is also available through the CFDS for troubleshooting.

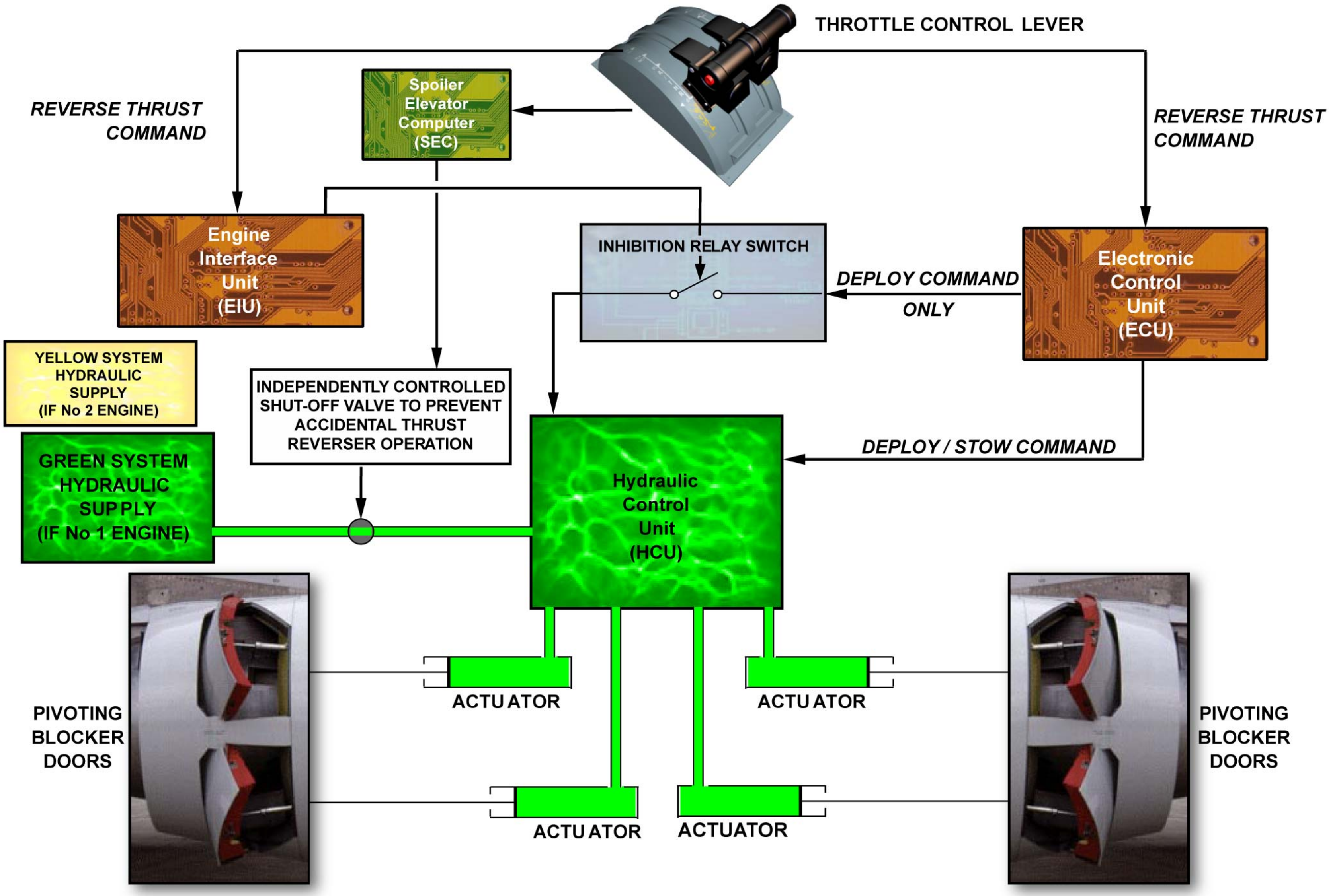

AIRCRAFT COMPUTERS
COCKPIT CONTROLS AND INDICATING
Electronic Control Unit (ECU)
CHANNEL A
CHANNEL B
DIRECT COMMUNICATION WITH ECU
Engine Interface Unit (EIU)
DIRECT COMMUNICATION WITH ECU
TURBINE REAR FRAME ACCELEROMETER
Nº 1 BEARING ACCELEROMETER
Engine Vibration Monitoring Unit (EVMU)
Centralized Fault Display System (CFDS)
Electronic Control Unit (ECU)
ECAM

EIU/EVMU

70 POWER PLANT CFM 56 PRESENTATION (1)

THRUST REVERSER SYSTEM

The flight crew manually selects reverse thrust by lifting the latching levers on the throttle control levers. The Spoiler Elevator Computer (SEC) opens the hydraulic shut-off valve to enable operation of the thrust reverser. The reverse thrust command is sent to the ECU and the Engine Interface Unit (EIU). The signal from the ECU to the directional valve is fed to an inhibition relay controlled by the Engine Interface Unit (EIU) according to throttle control lever position.
According to commands from the ECU and the EIU, a Hydraulic Control Unit (HCU) supplies hydraulic power to operate the thrust reverser. The thrust reverser uses 4 hydraulically actuated pivoting blocker doors to redirect the engine fan airflow.
Reverse thrust is only available on the ground.



THRUST REVERSER SYSTEM

UAJ09471 - U19T4T0 - UM70PZ000000004

THRUST REVERSERS STOWED
-PIVOTING BLOCKER DOORS CLOSED-

THRUST REVERSERS DEPLOYED
-PIVOTING BLOCKER DOORS OPEN-

UAJ09471 - U19T4T0 - UM70PZ000000004

THRUST REVERSER SYSTEM

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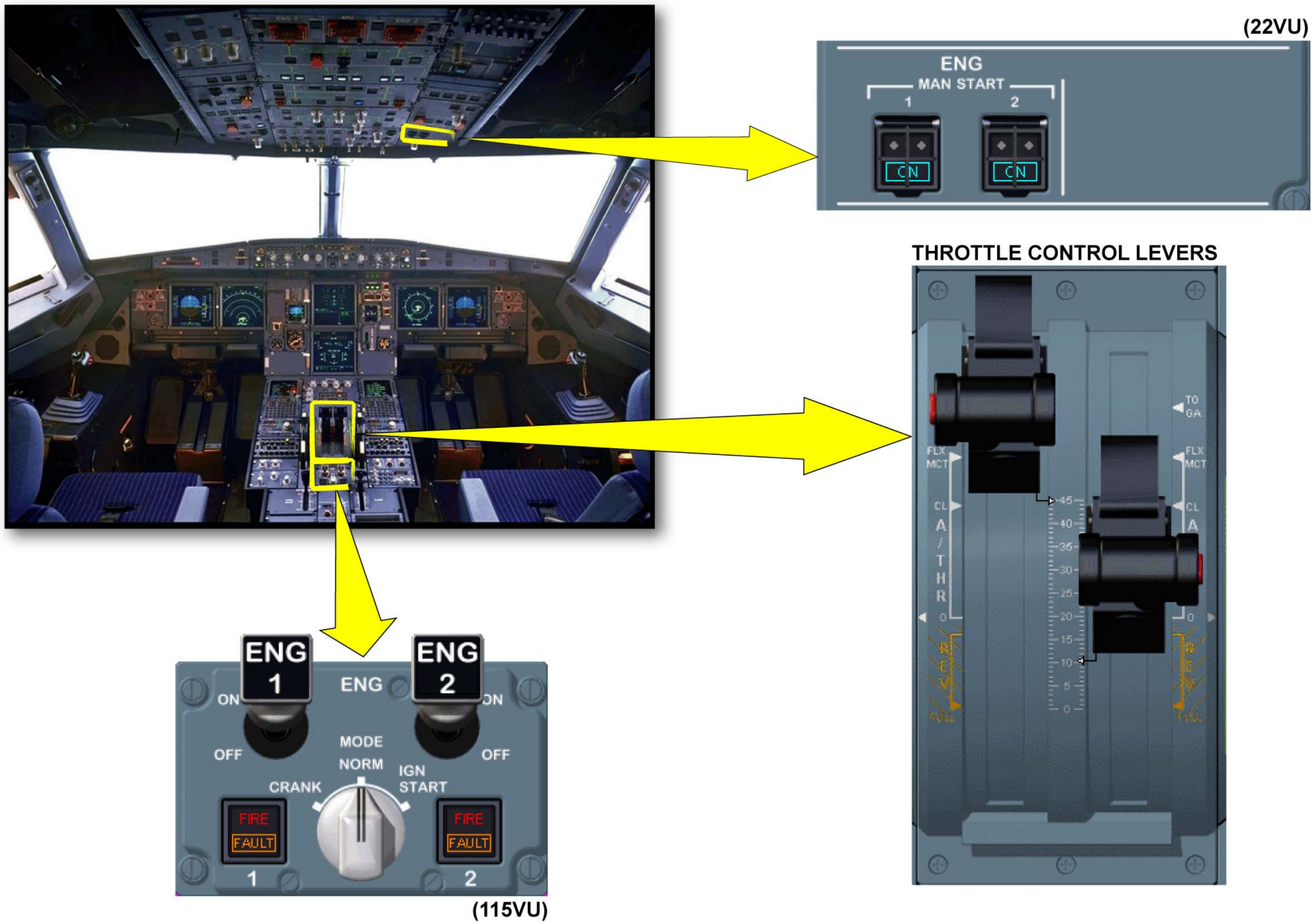
70 POWER PLANT CFM 56 PRESENTATION (1)

CONTROL AND INDICATING

This section will highlight the control panels and indications for the engines.

CONTROL PANELS

The engines are controlled by throttle control levers which are located on the center pedestal. They can only be moved manually.
For reverse thrust operation, two latching levers let the throttle control levers move rearward into the reverse thrust section.
The A320 family aircraft normally operate in autothrust mode in flight. The autothrust can be disconnected by using the two instinctive disconnect pushbuttons. These 2 red buttons are located on the outside of each throttle control lever. This lets the engines be controlled in manual thrust mode.
The controls for engine starting and shut down are located on the center pedestal just behind the throttle control levers.
The engine MAN START switches are located on the overhead panel. These switches are used to initiate an engine manual start procedure. They are also used to initiate an engine dry or wet motoring procedure.



CONTROL AND INDICATING - CONTROL PANELS

UAJ09471 - U19T4T0 - UM70PZ000000004

70 POWER PLANT CFM 56 PRESENTATION (1)

CONTROL AND INDICATING (continued)

ECAM ENGINE

The engine primary parameters are permanently displayed on the upper ECAM.
The engine secondary parameters are presented on the lower ECAM ENGINE page when selected or displayed automatically during engine start or a fault.
Some engine parameters are permanently displayed on the CRUISE page in flight.

CONTROL AND INDICATING - ECAM ENGINE

UAJ09471 - U19T4T0 - UM70PZ000000004

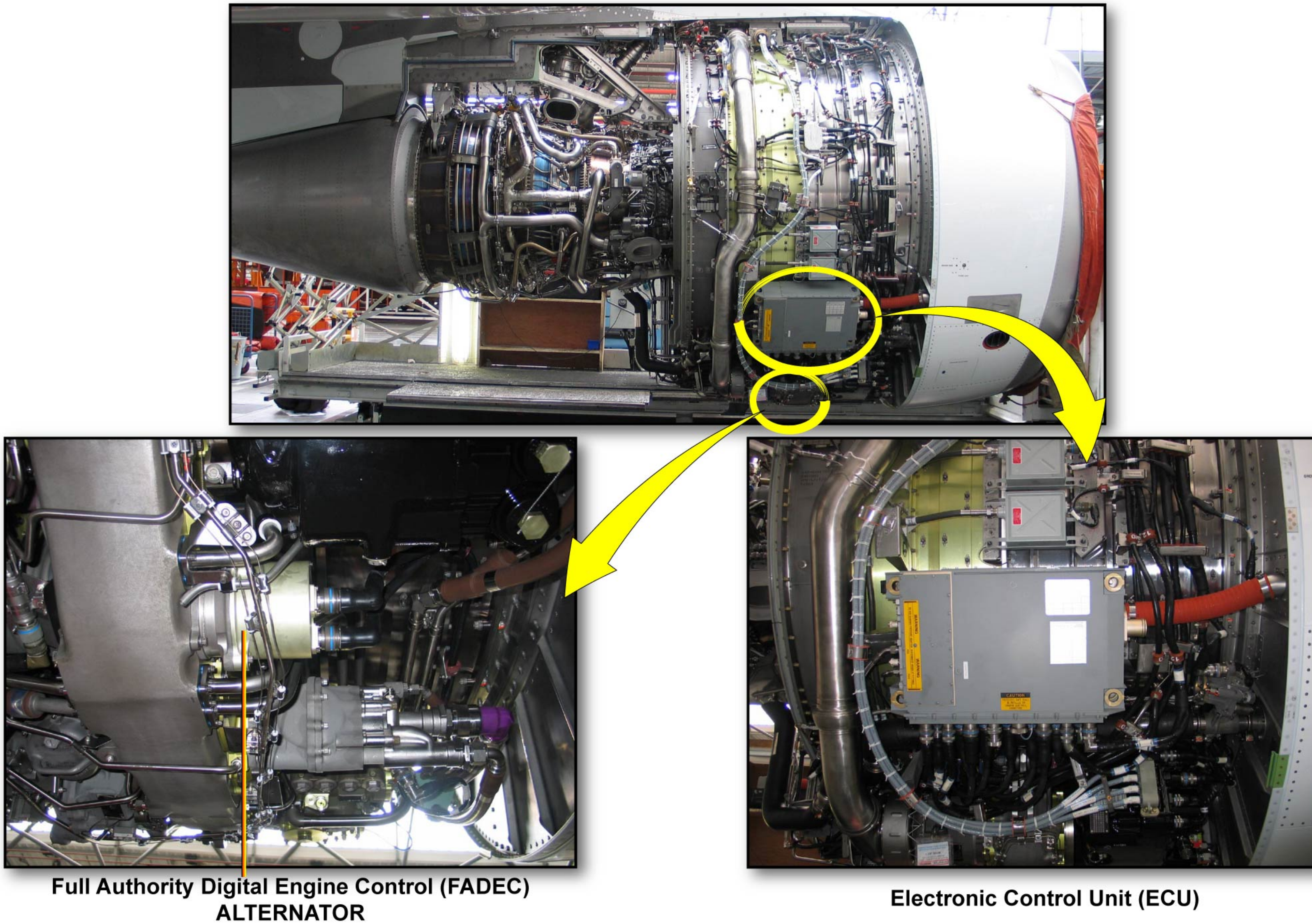
70 POWER PLANT CFM 56 PRESENTATION (1)

COMPONENT LOCATION

The engine system components are at the following locations.

FADEC

The ECU is located on the RH side of the fan case. The FADEC alternator is located on the gearbox.



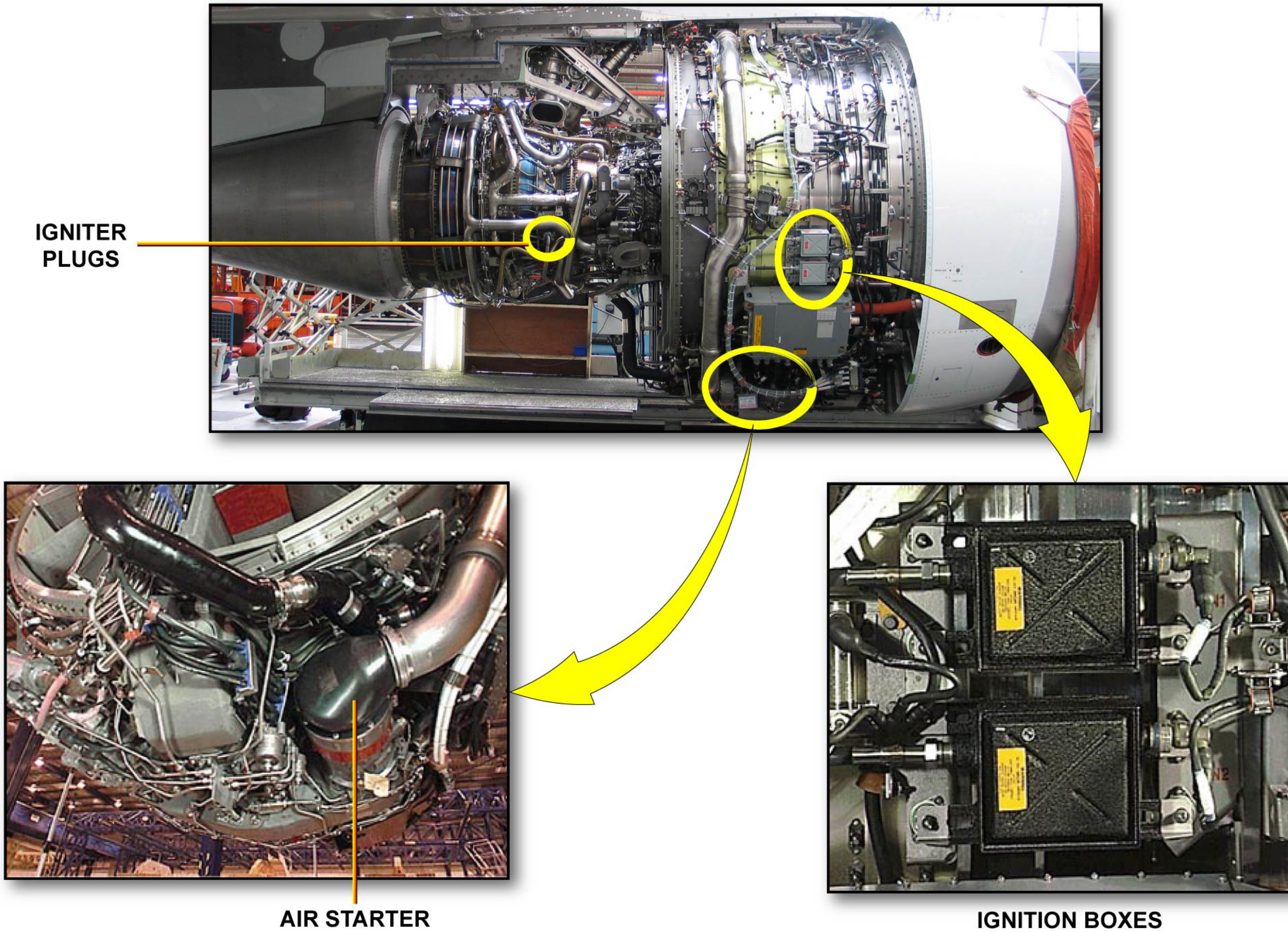
COMPONENT LOCATION - FADEC

70 POWER PLANT CFM 56 PRESENTATION (1)

COMPONENT LOCATION (continued)

STARTING

Two ignition boxes are located on the RH side of the engine core and the air starter is located on the RH side of the gearbox rear face.



COMPONENT LOCATION - STARTING

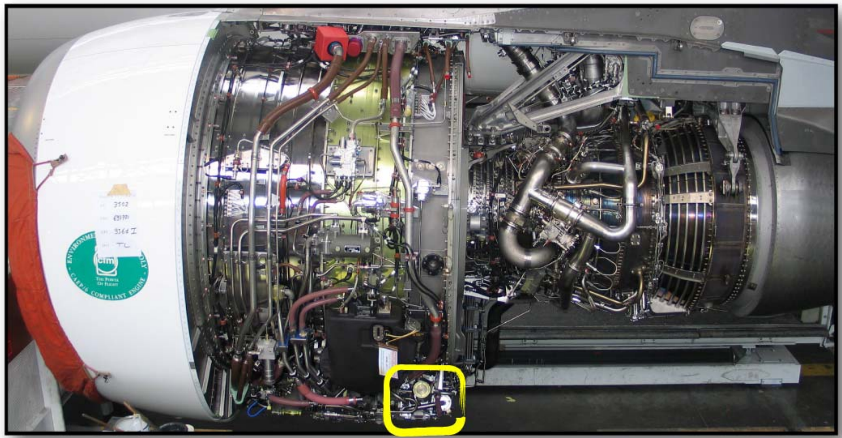
UAJ09471 - U19T4T0 - UM70PZ000000004

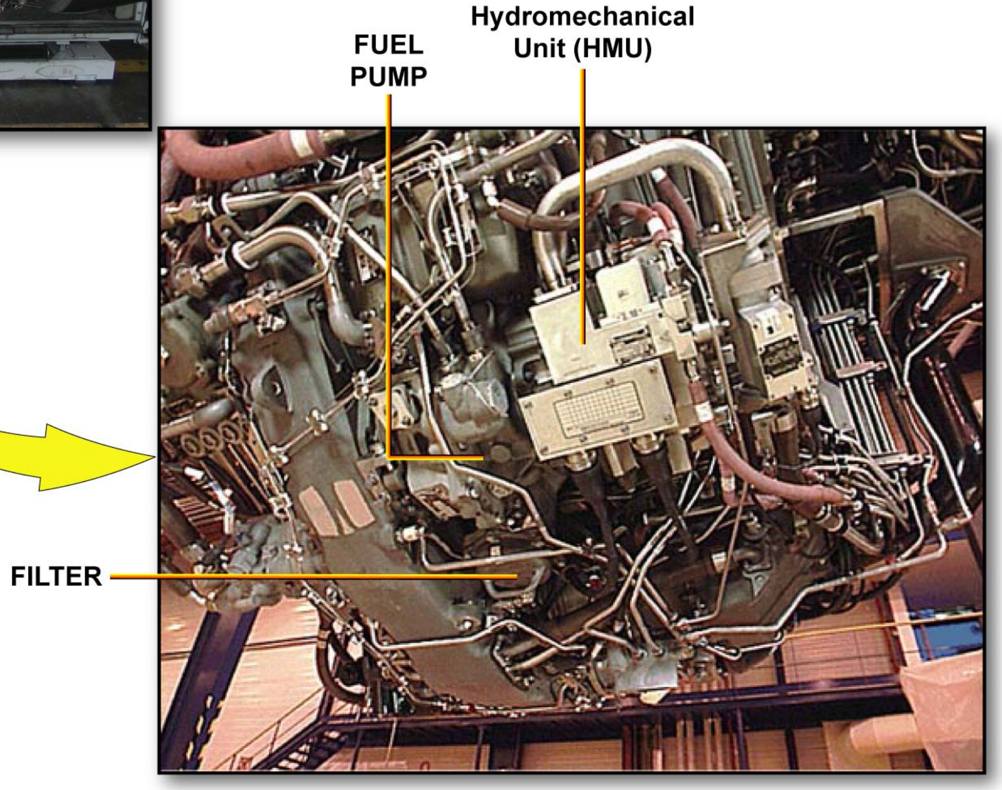
70 POWER PLANT CFM 56 PRESENTATION (1)

COMPONENT LOCATION (continued)

FUEL

The main components of the fuel system are located on the LH side of the fan compartment.
The fuel pump is driven by the gearbox. The HydroMechanical Unit (HMU) and the filter are installed with the pump.





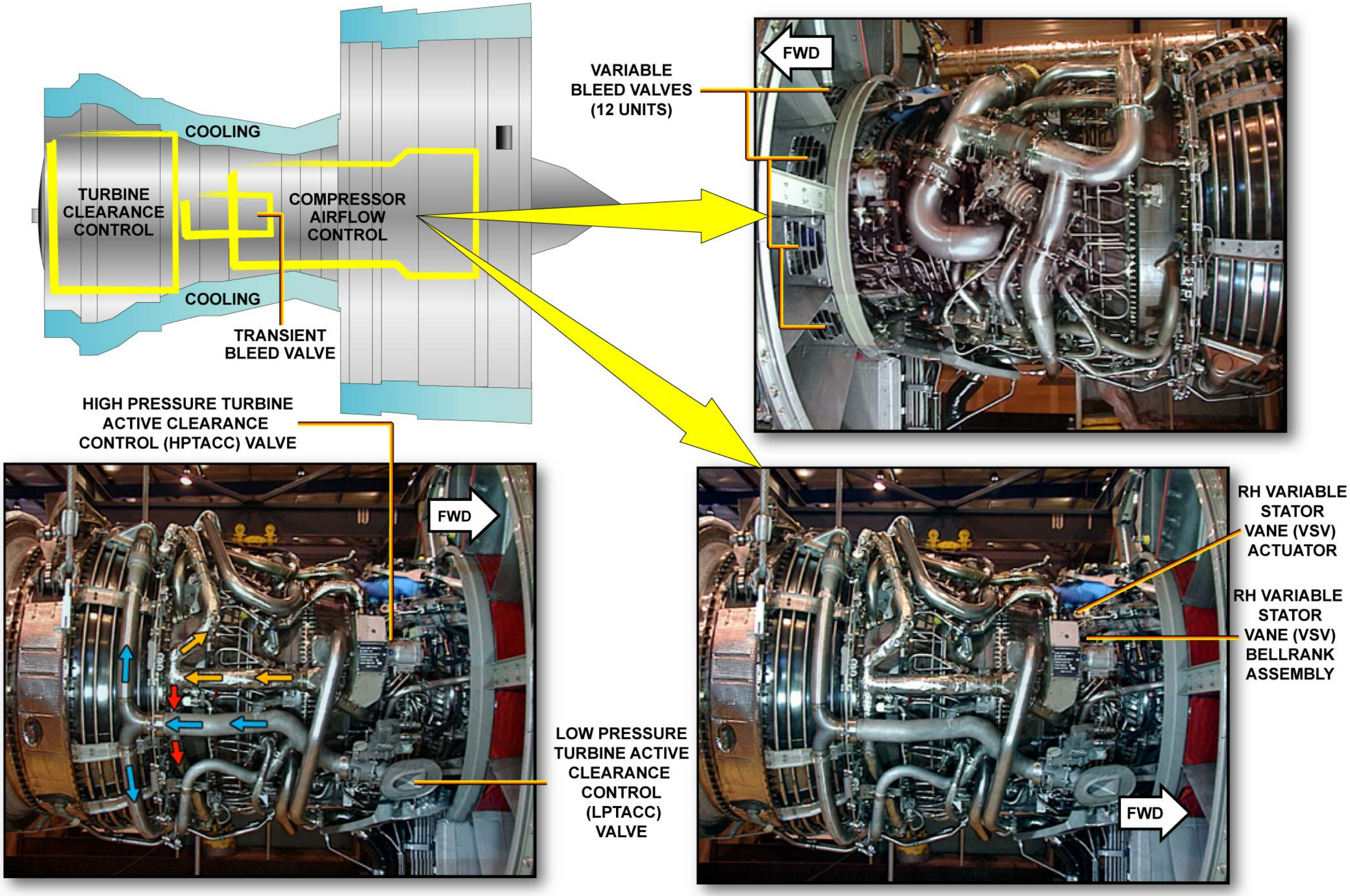
COMPONENT LOCATION - FUEL

70 POWER PLANT CFM 56 PRESENTATION (1)

COMPONENT LOCATION (continued)

AIR

The compressor airflow control, turbine clearance control, and transient bleed valve systems are shown.



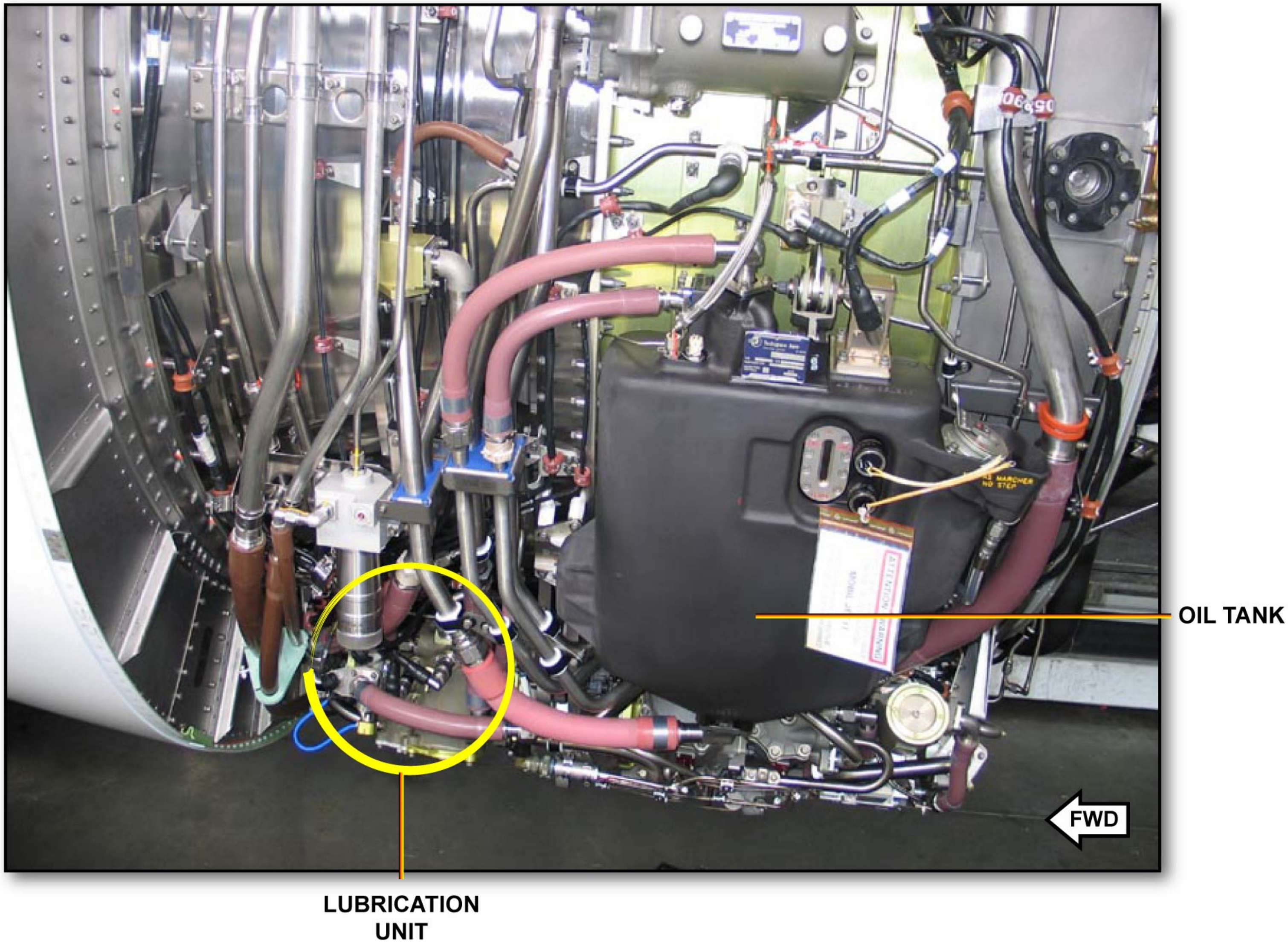
COMPONENT LOCATION - AIR

70 POWER PLANT CFM 56 PRESENTATION (1)

COMPONENT LOCATION (continued)

OIL

The oil tank is located on the LH side of the fan case.
The lubrication unit is driven by the gearbox.



COMPONENT LOCATION - OIL

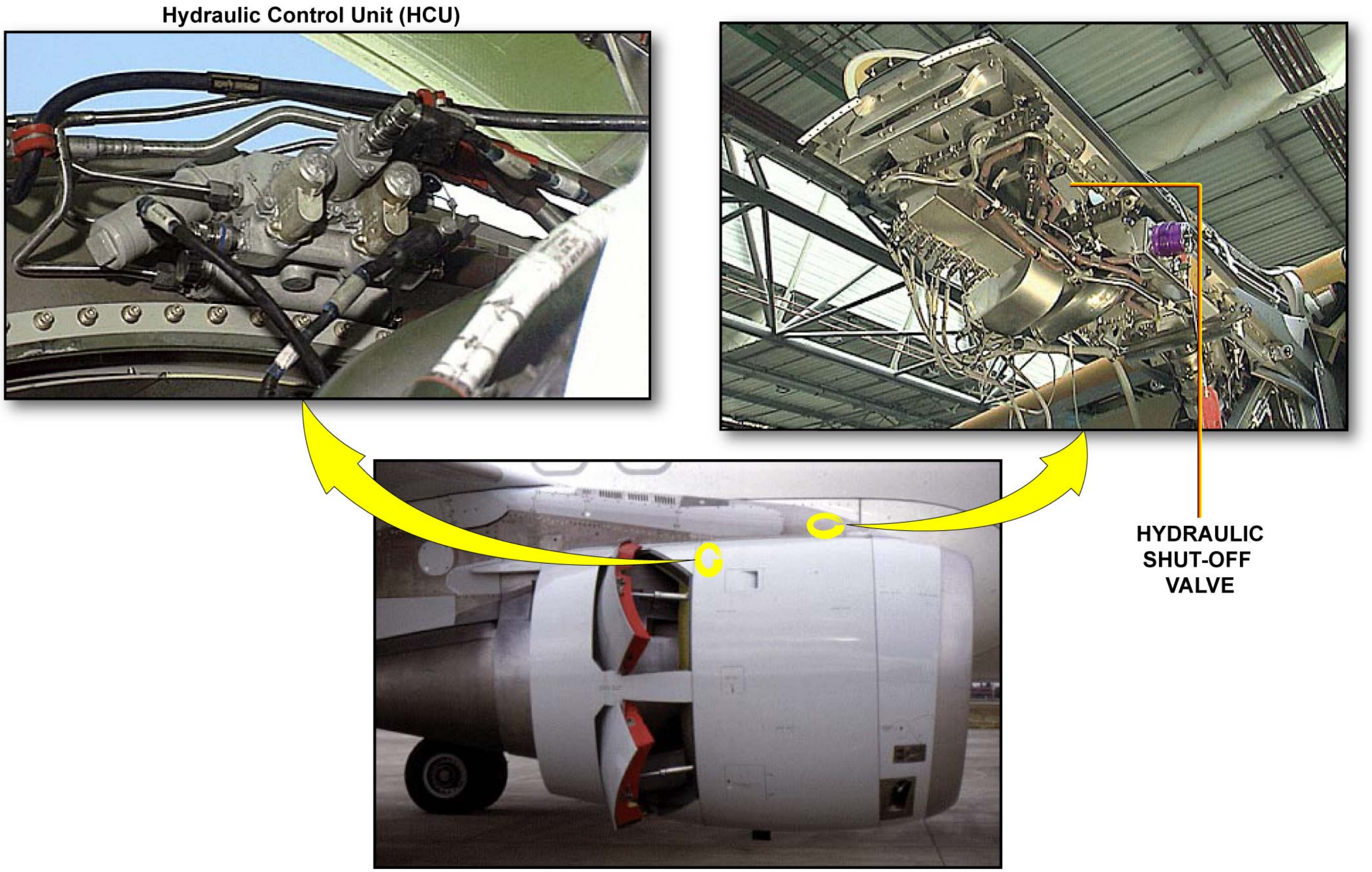
UAJ09471 - U19T4T0 - UM70PZ000000004

70 POWER PLANT CFM 56 PRESENTATION (1)

COMPONENT LOCATION (continued)

THRUST REVERSER

The hydraulic shut-off valve is located in the forward part of the pylon.
The HCU is mounted on the front of the RH side of the 'C' duct.

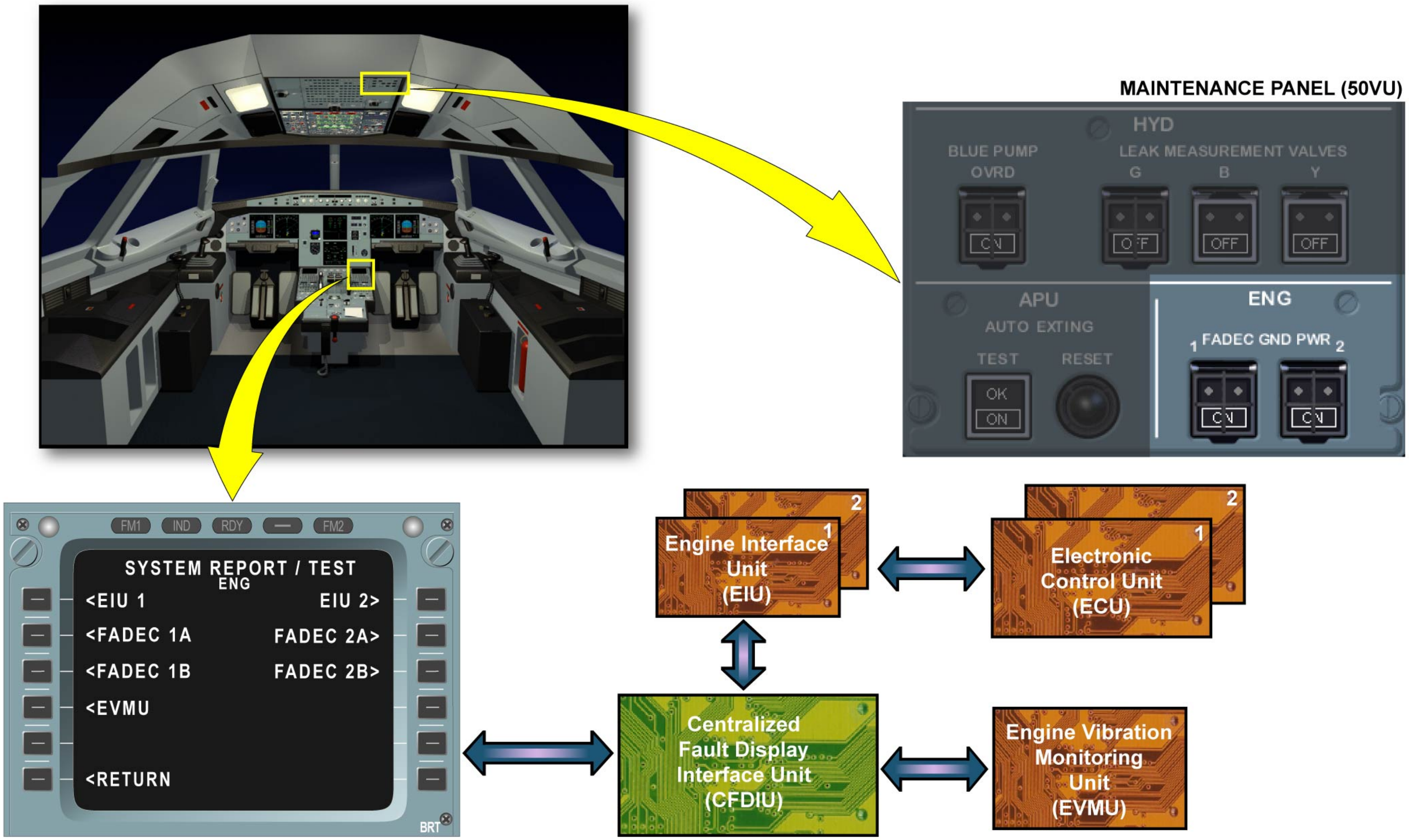


COMPONENT LOCATION - THRUST REVERSER

70 POWER PLANT CFM 56 PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

On the maintenance panel, the ENG FADEC GND PWR is used to supply the FADEC system for maintenance purposes, when the engines are not running.
The MCDU is used to do tests and for trouble shooting monitored components (computers, sensors, actuators).

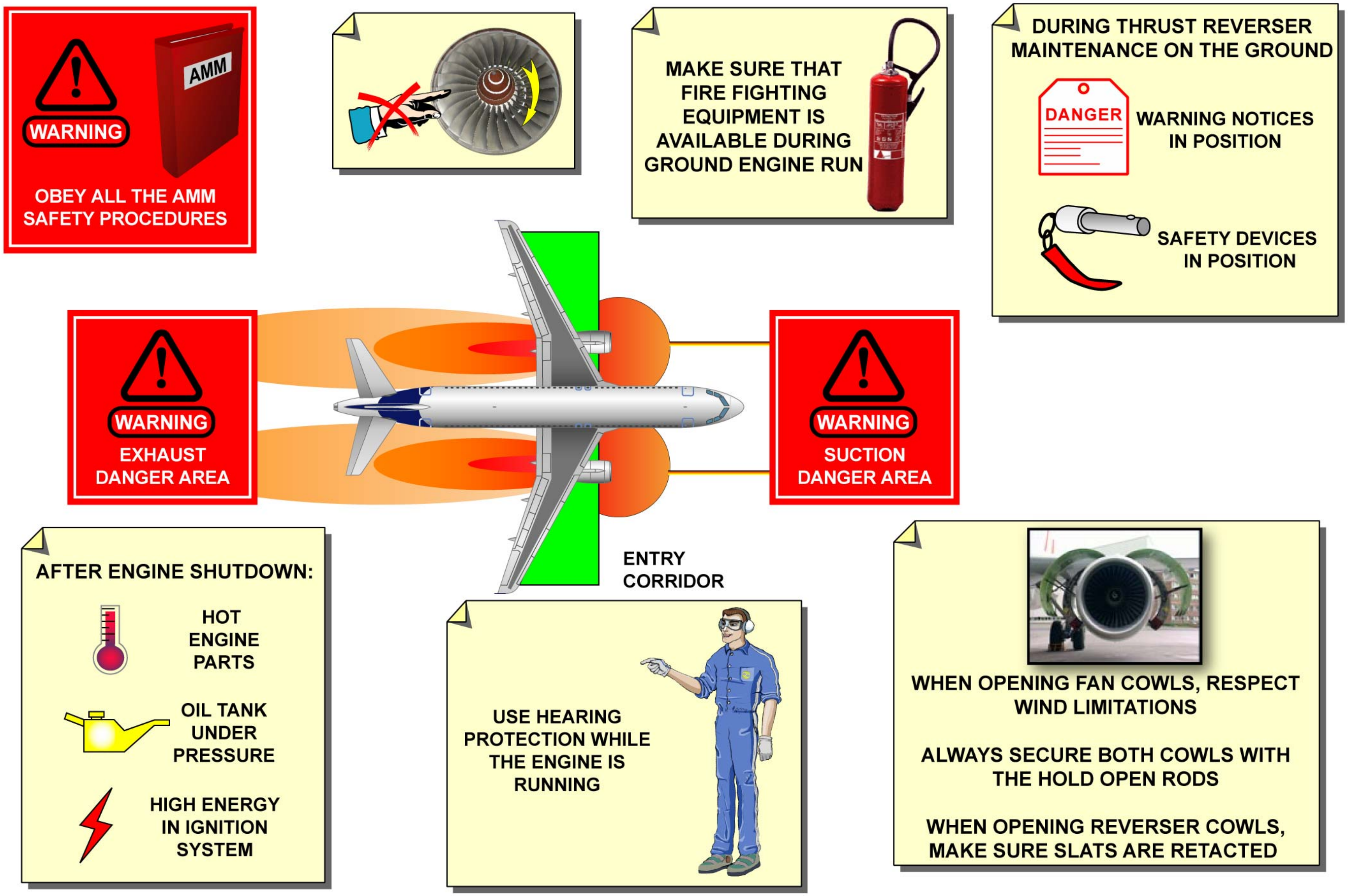


MAINTENANCE/TEST FACILITIES

70 POWER PLANT CFM 56 PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on aircraft, make sure that you obey all the Aircraft Maintenance Manual (AMM) safety procedures.
This will prevent injury to persons and/or damage to the aircraft. Here is an overview of main safety precautions related to the engines.
Make sure that all engine danger areas are as clear as possible to prevent damage to the engine, the aircraft or persons in the area.
Make sure that you have fire fighting equipment available.
Do not try to stop the fan from turning by hand.
After engine shutdown, let the oil tank pressure bleed off for a minimum of 5 minutes before you remove the tank filler cap. If you do not, pressurized oil can flow out of the tank and cause dangerous burns.
The engine ignition system is an electrical system with high energy. You must be careful to prevent electrical shock. Injury or death can occur to you. Do not do maintenance on the ignition system while operating the engine.
Make sure that the engine shutdown occurred for a minimum of 5 minutes before you proceed.
Make sure that the thrust reverser is deactivated during maintenance. If not, the thrust reverser can operate accidentally and cause injury to personnel and/or damage to the reverser.
When opening the engine cowls:
- respect the wind limitations and the opening/closing sequence,
- always secure cowls with the hold-open rods,
- make sure that the slats are retracted and install a warning notice to prevent slat operation.



SAFETY PRECAUTIONS

UAJ09471 - U19T4T0 - UM70PZ000000004

70 POWER PLANT CFM 56 PRESENTATION (1)

LUBRICANTS AND FUELS

The list of the materials required for the aircraft service and maintenance can be found in the AMM, Chapter 20 STANDARD PRACTICES or Chapter 70 STANDARD PRACTICES for the engines.

AMM ATA 20 STANDARD PRACTICES
20-31-00 LIST OF MATERIALS

ITEM	DESIGNATION	SPECIFICATIONS
.	.	.
.	.	.
.	.	.
01-001	FUEL, TURBO	REF JET A-1
.	.	.
.	.	.

AMM ATA 70 STANDARD PRACTICES
70-30-00 (IAE) LIST OF MATERIALS

ITEM Nº	MATERIAL DESIGNATION	SPECIFICATIONS	CODE SUPPLIER
.	.	.	.
V10-077A	APPROVED ENGINE OIL	MOBIL JET II	19135 K1932
V10-077C	APPROVED ENGINE OIL	AEROSHELL 560	K1315 5427
V10-077C	APPROVED ENGINE OIL	BP TURBO OIL 2380	29700 K1274
.	.	.	.
.	.	.	.

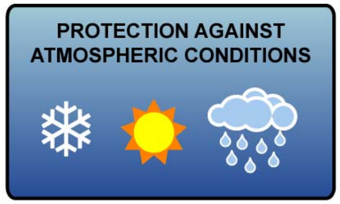
LUBRICANTS AND FUELS

70 POWER PLANT CFM 56 PRESENTATION (1)

STORAGE AND PRESERVATION

Storage and preservation procedures must be applied to engines, which are not operated for more than 30 days. The preservation procedures protect the engine against corrosion, liquid and debris entering the engine, and atmospheric conditions during period of inactivity.

STORAGE AND PRESERVATION PROCEDURES MUST BE APPLIED FOR ENGINES WHICH ARE NOT OPERATED FOR MORE THAN 30 DAYS.



THE PRESERVATION PROCEDURES PROTECT THE ENGINE AGAINST CORROSION, LIQUID AND DEBRIS ENTERING THE ENGINE, AND ATMOSPHERIC CONDITIONS DURING PERIOD OF INACTIVITY.

CAUTION

UNDER NO CIRCUMSTANCES SHALL PRESERVATIVE OIL OR EQUIVALENT BE SPRAYED INTO THE ENGINE INLET, CORE COMPRESSOR OR TURBINE, OR ENGINE EXHAUST. DIRT PARTICLES DEPOSITED ON THE WET BLADES AND VANES MAY ADVERSELY AFFECT ENGINE PERFORMANCE DURING SUBSEQUENT OPERATION.

STORAGE AND PRESERVATION

UAJ09471 - U19T4T0 - UM70PZ000000004

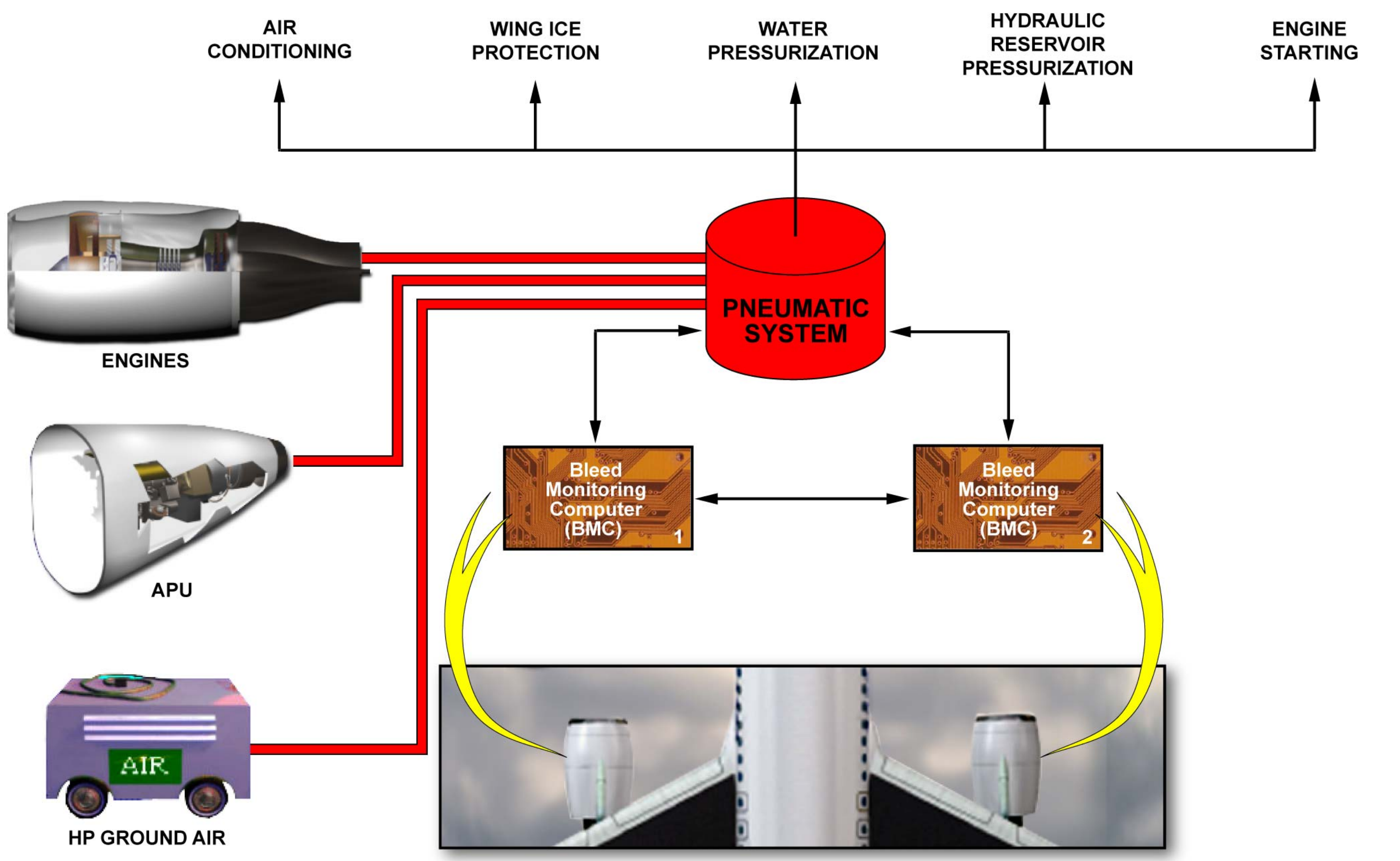
36 PNEUMATIC SYSTEM PRESENTATION (1)

SYSTEM INTRODUCTION

The Airbus single aisle family pneumatic system supplies High Pressure (HP) air for:
- air conditioning,
- wing ice protection,
- water pressurization,
- hydraulic reservoir pressurization,
- engine starting.

High Pressure air can be supplied from three sources:
- the engine bleed system,
- the APU,
- a HP ground power unit.

The pneumatic system operates pneumatically and is monitored by 2 Bleed Monitoring Computers (BMC 1 & 2).
There is one BMC for each engine bleed system.
Both BMCs exchange data. If one BMC fails, the other BMC takes over most of its monitoring functions.



SYSTEM INTRODUCTION

UAJ09471 - U19T4T0 - UM36PZ000000002

36 PNEUMATIC SYSTEM PRESENTATION (1)

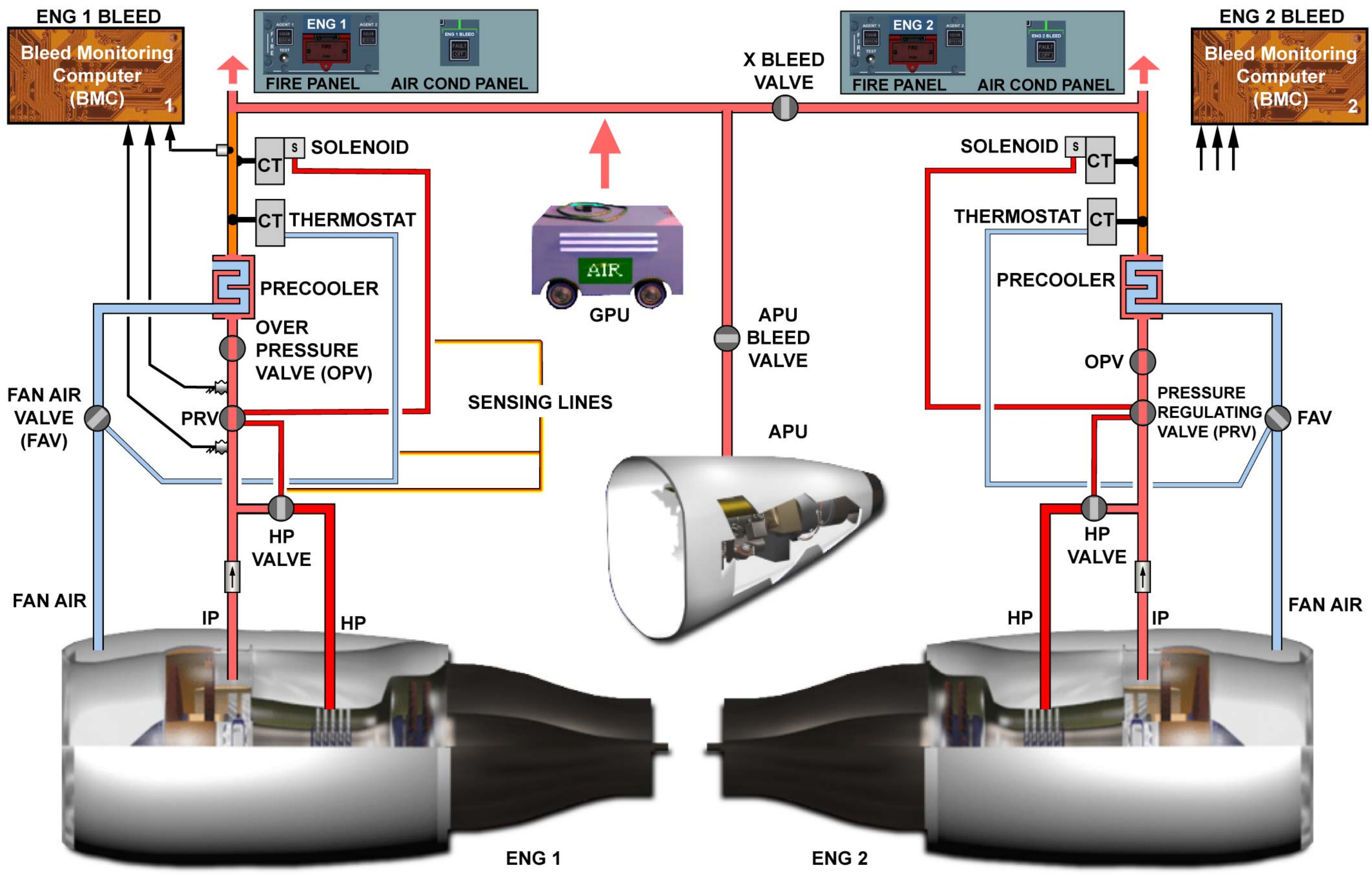
SYSTEM INTRODUCTION (continued)

ENGINE BLEED

The engine bleed air is pressure and temperature regulated prior to supplying the pneumatic system. Air is bled from either the Intermediate Pressure (IP) stage or the HP stage using the High Pressure Valve (HPV) that regulates pneumatically.
The HP bleed is only used when the engines are at low power and for engine efficiency the High Pressure Valve (HPV) is maintained closed during cruise.
All the engine bleed air is regulated and supplied to the pneumatic system by each Pressure Regulating Valve (PRV) that pneumatically regulates the airflow according to the Bleed demand.
The PRV acts as a protective shut off valve (in case of abnormal parameters).
The shut off protective function uses sensing lines connected to a Control Solenoid to close pneumatically the Pressure Regulating Valve (PRV) and the High Pressure Valve (HPV)
Such control solenoid is wired to the BMC and to the Bleed and Fire panels in the cockpit.
An Overpressure Valve (OPV) is installed downstream from the bleed valve to protect the system in case of overpressure.
The Fan Air Valve (FAV) modulates Fan discharge air through an air-to-air heat exchanger called the precooler, in order to regulate the Bleed temperature.
The Fan Air Valve (FAV) regulated position is connected to Control Thermostat (CT) (downstream of the precooler) via a sensing line.
The pneumatic system operates pneumatically and is monitored by two Bleed Monitoring Computers (BMC1 and BMC2)
Each BMC monitors the relevant Engine Bleed system by reading two pressure transducers (upstream / downstream of the PRV) and the Precooler downstream temperature sensor.

APU BLEED/EXTERNAL AIR

The left and right bleed systems are connected by a crossbleed duct. A crossbleed valve enables their interconnection or isolation.
The APU can also be used for bleed air supply. This is usually done on the ground for air conditioning and for engine start.
However, APU BLEED air could also be used in flight, depending on altitude. The APU bleed supply is connected to the left side of the crossbleed duct.
On the ground, a HP ground power unit can be connected to the left side pneumatic system. The right side may be supplied by opening the crossbleed valve.



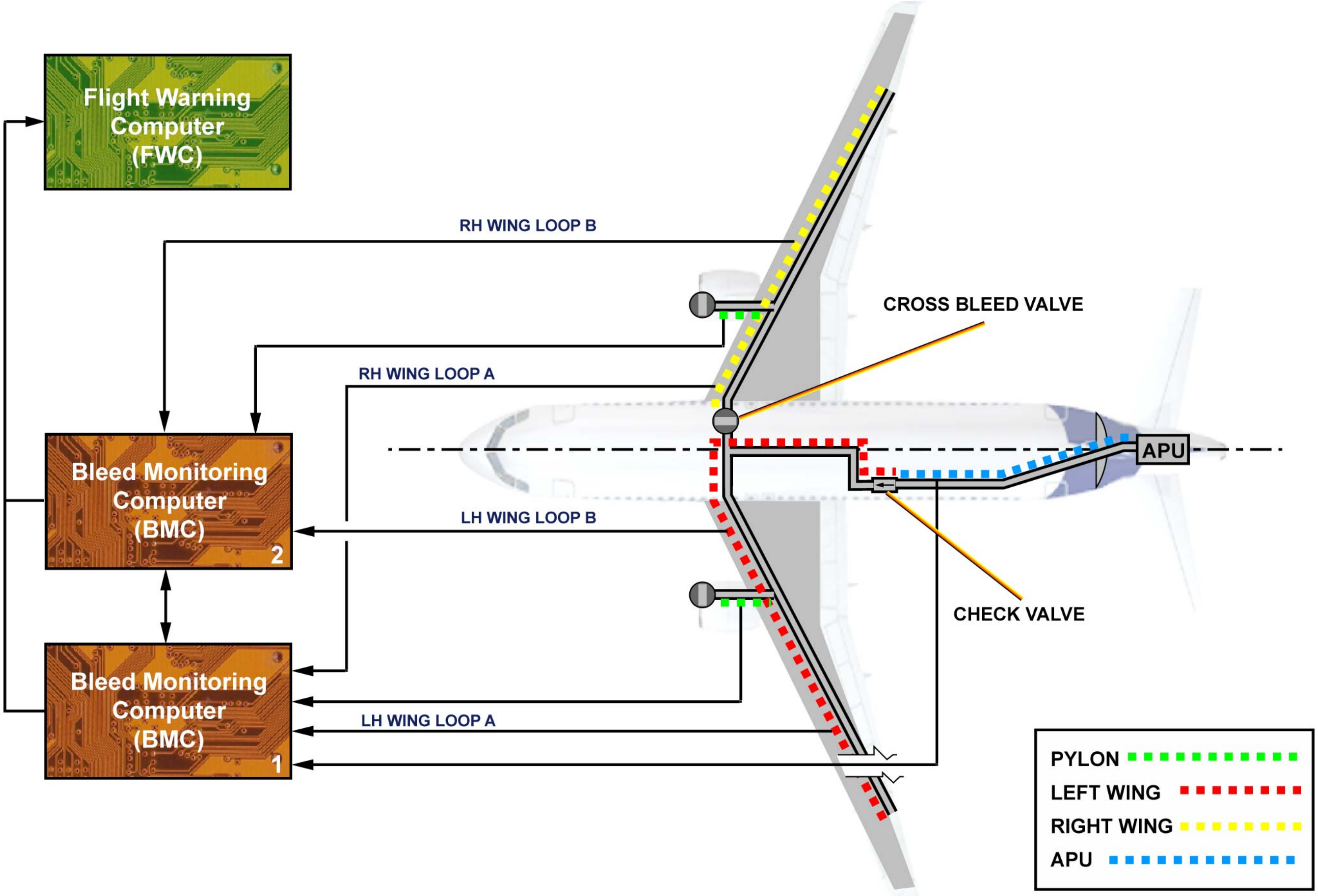
SYSTEM INTRODUCTION - ENGINE BLEED & APU BLEED/EXTERNAL AIR

36 PNEUMATIC SYSTEM PRESENTATION (1)

SYSTEM INTRODUCTION (continued)

LEAK DETECTION

Leak detection loops are installed along the hot air supply ducts of the pneumatic system. The loops are made of multiple sensing elements connected in series. The leak detection loops are connected to the BMCs. If a leak is detected, a signal is sent to the BMC 1 or 2 which automatically isolates the affected area by closing the crossbleed valve and shutting off the engine bleed on the affected side. The leak detection system is organized into three loops. Here are the loops and the protected areas: - pylon: from the precooler to the wing leading edge,
- wing: wing leading edge including the wing air inlet supply, and belly fairing (cross bleed duct, pack supply ducts and APU forward supply duct).
- APU: APU aft supply duct (left hand side of the fuselage) from APU firewall to wheel well area.



UAJ09471 - U19T4T0 - UM36PZ000000002

SYSTEM INTRODUCTION - LEAK DETECTION

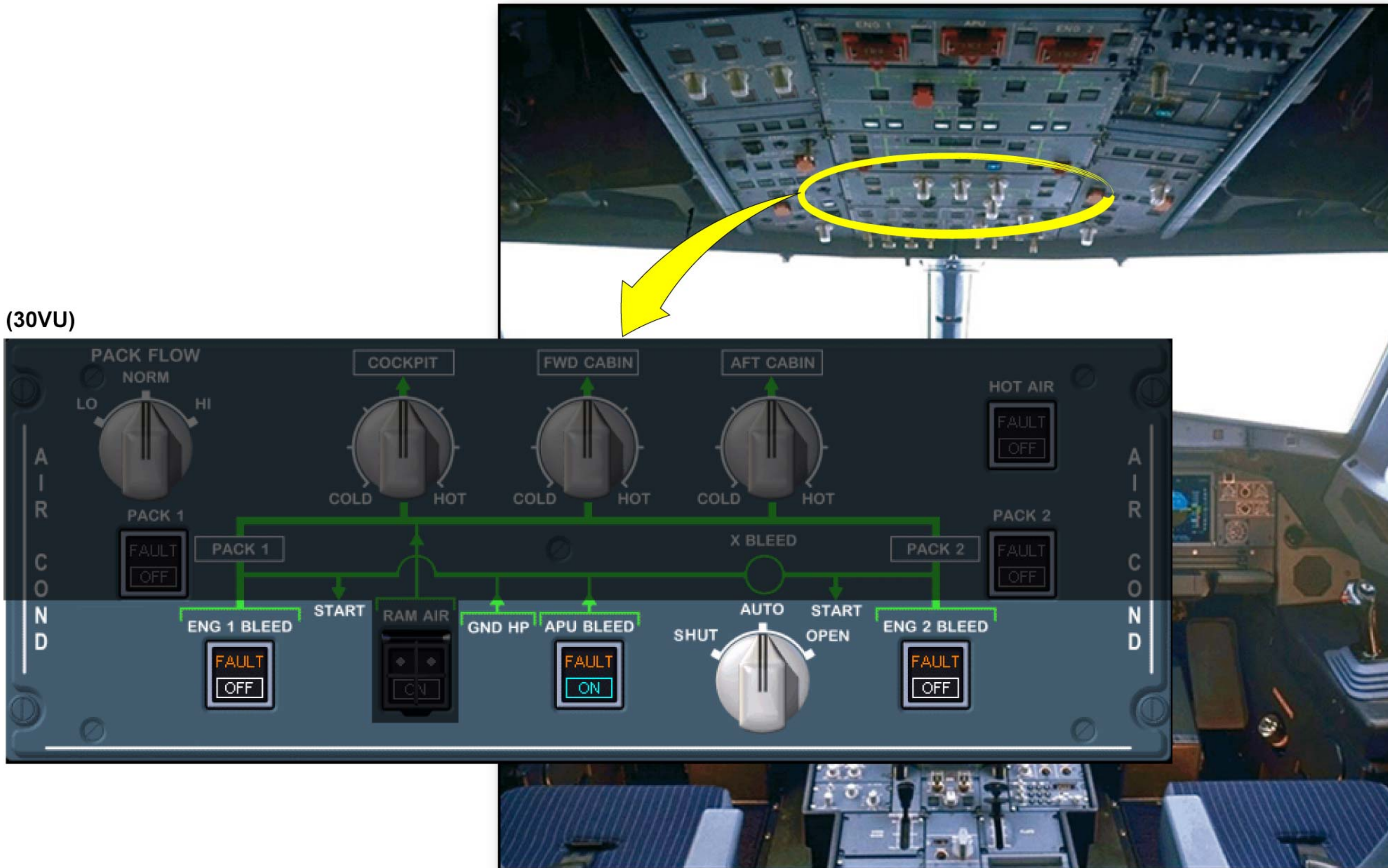
36 PNEUMATIC SYSTEM PRESENTATION (1)

CONTROL & INDICATING

This section highlights the control panels and indications for the pneumatic system.

CONTROL PANEL

Controls for the pneumatic system are part of the AIR COND panel, located on the overhead panel.



CONTROL & INDICATING - CONTROL PANEL

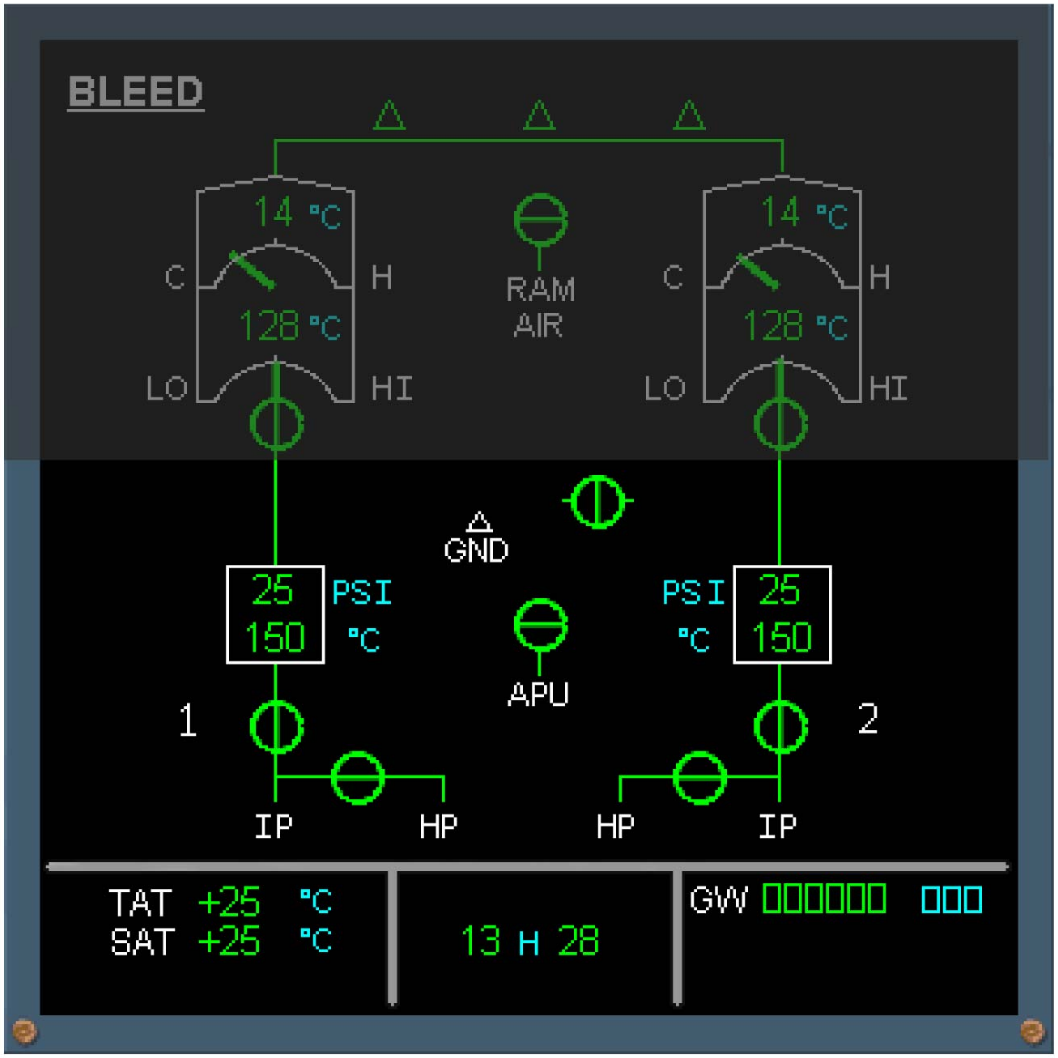
UAJ09471 - U19T4T0 - UM36PZ000000002

36 PNEUMATIC SYSTEM PRESENTATION (1)

CONTROL & INDICATING (continued)

ECAM INDICATION

The pneumatic system indications are displayed on the lower part of the ECAM BLEED page.



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CONTROL & INDICATING - ECAM INDICATION

36 PNEUMATIC SYSTEM PRESENTATION (1)

COMPONENT LOCATION

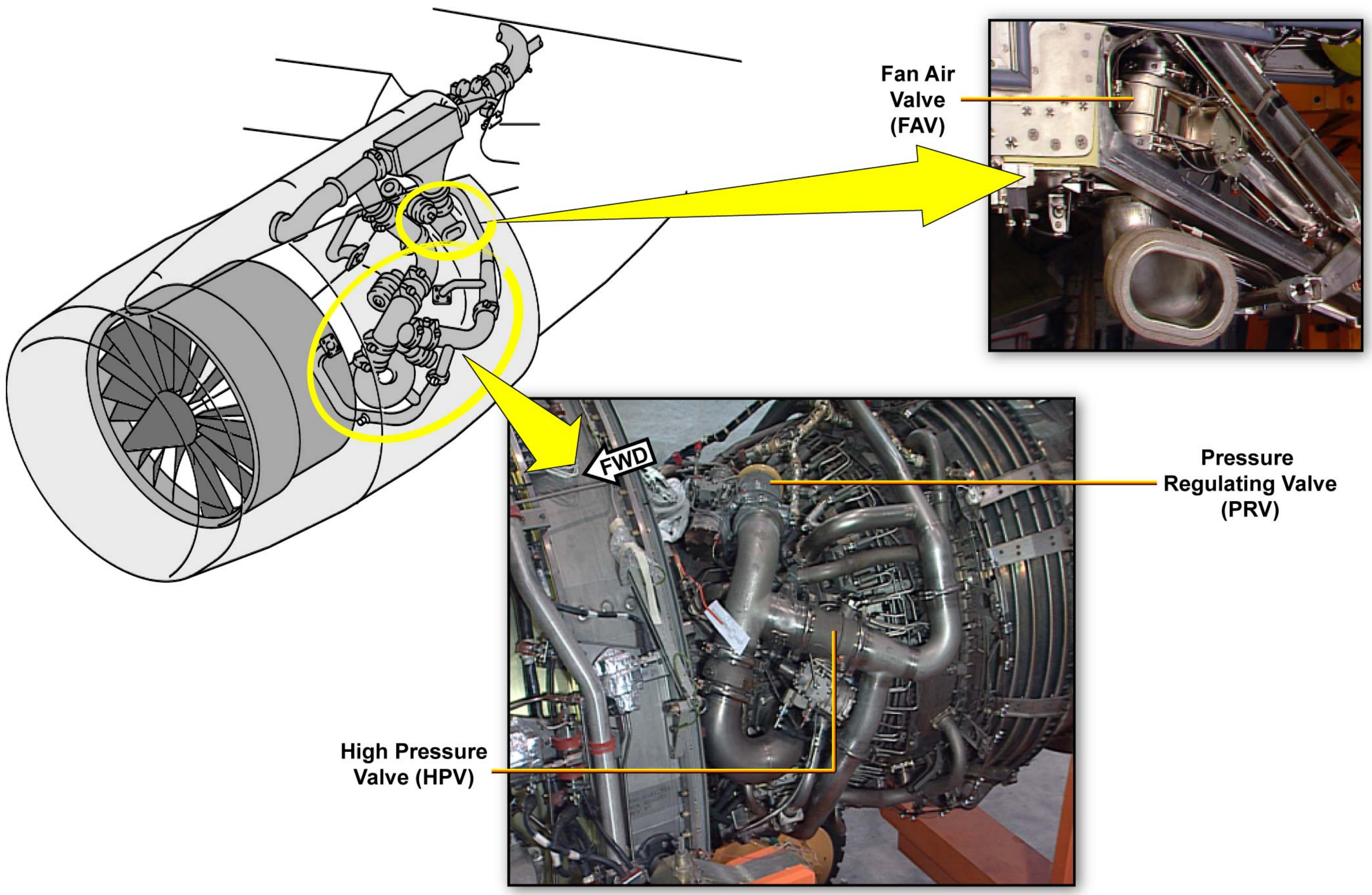
The main components of the pneumatic system are located on the engines and in the pylons.

PRESSURE REGULATION COMPONENTS

The pressure regulation components are located on the engines:
- the Engine High Pressure Valve (HPV),
- the Engine BLEED PRV,
- the OPV.

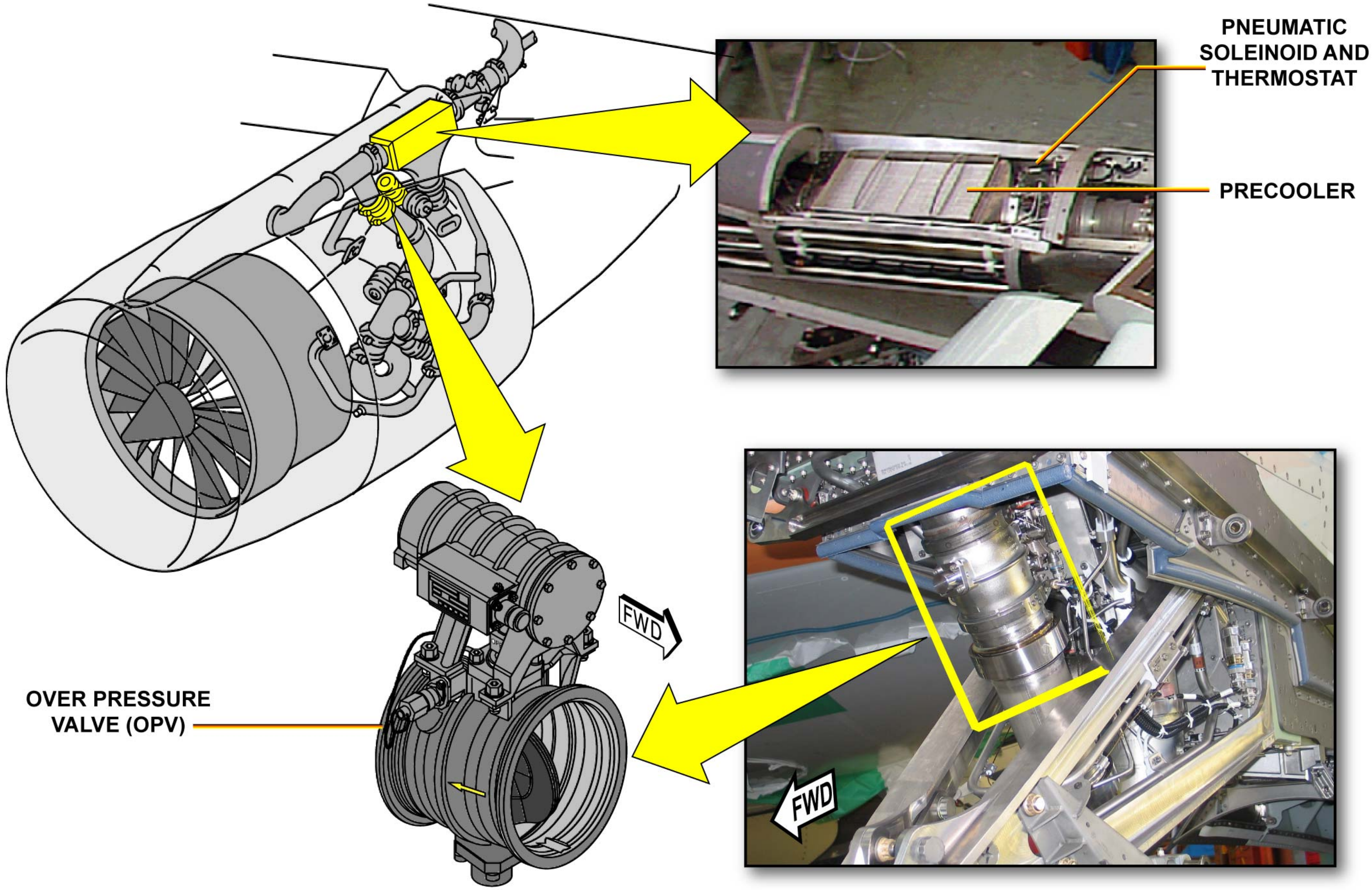
TEMPERATURE REGULATION COMPONENTS

The temperature regulation components are located on the engines and in the pylons:
- the FAV,
- the Precooler.



COMPONENT LOCATION - PRESSURE REGULATION COMPONENTS & TEMPERATURE REGULATION COMPONENTS

UAJ09471 - U19T4T0 - UM36PZ000000002



UAJ09471 - U19T4T0 - UM36PZ000000002

COMPONENT LOCATION - PRESSURE REGULATION COMPONENTS & TEMPERATURE REGULATION COMPONENTS

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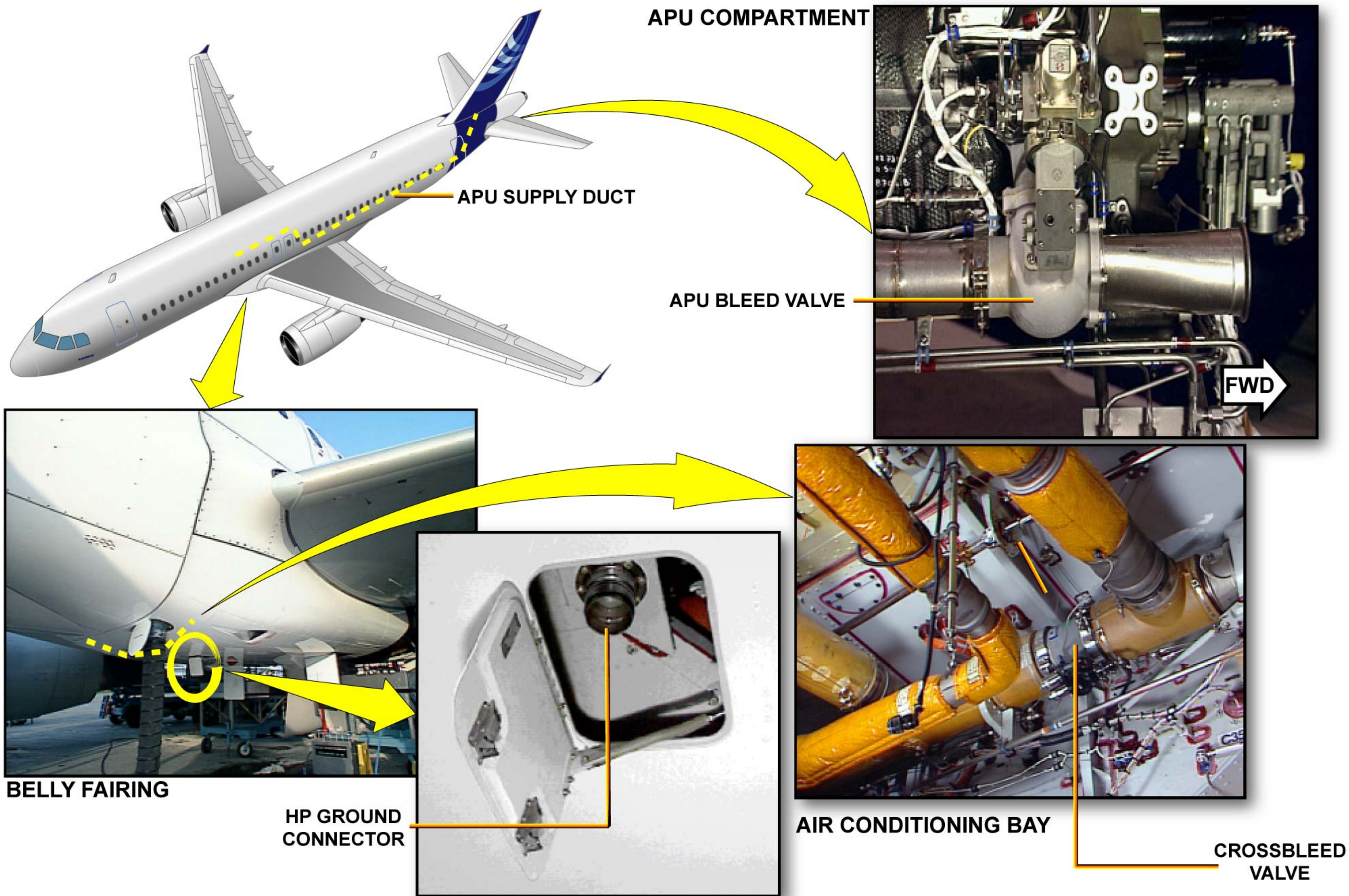
36 PNEUMATIC SYSTEM PRESENTATION (1)

COMPONENT LOCATION (continued)

OTHER COMPONENTS

The crossbleed valve is located in the forward section of the lower fuselage belly fairing area.
Get access to the HP ground connector through a small access door located on the lower fuselage belly fairing.
The APU bleed valve is located on the APU.
The APU supply duct runs along the left hand side of the fuselage to the wheel well area. It then crosses at the aircraft centerline and continues forward to be connected to the crossbleed duct in the forward belly fairing area.



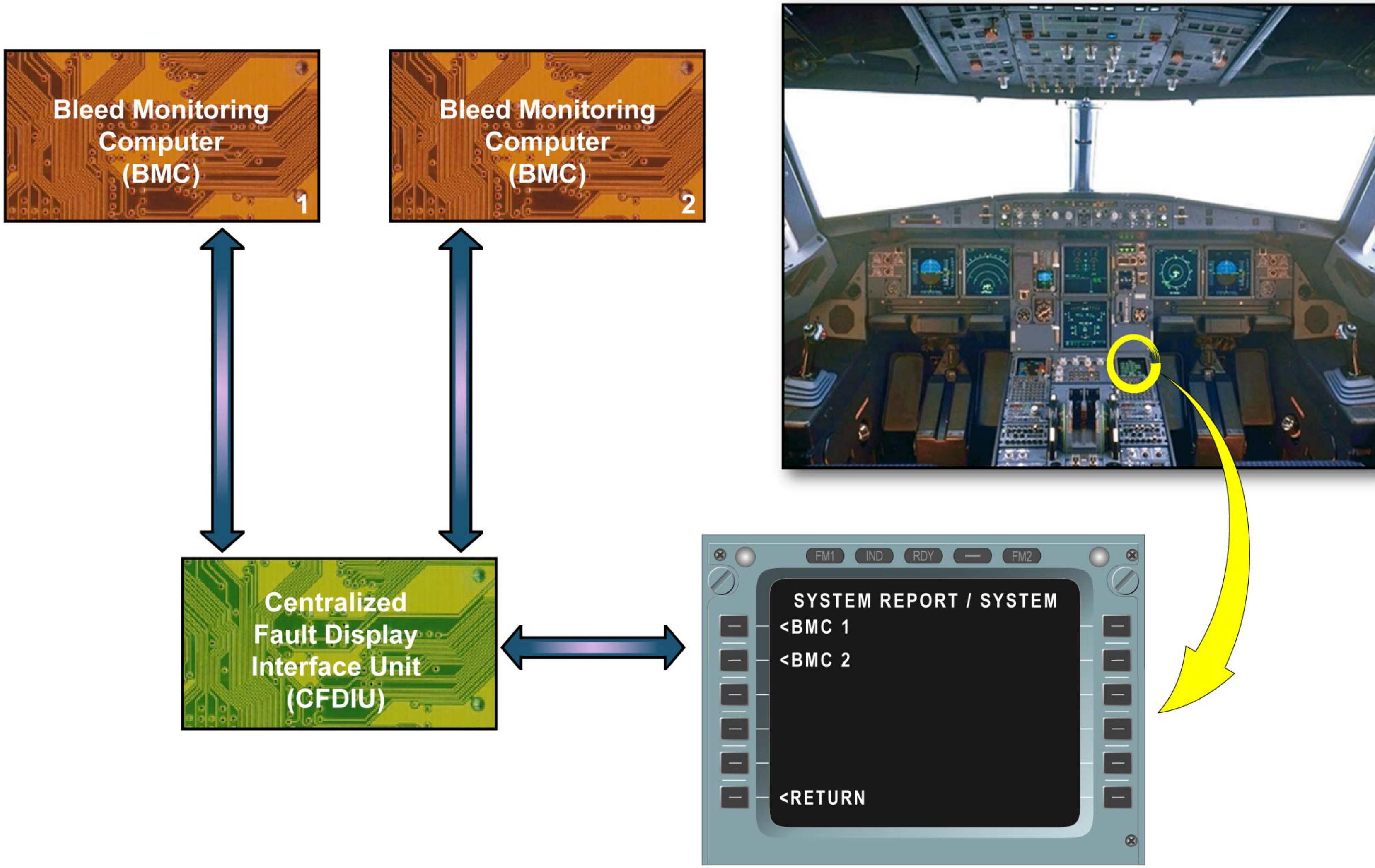
COMPONENT LOCATION - OTHER COMPONENTS

UAJ09471 - U19T4T0 - UM36PZ000000002

36 PNEUMATIC SYSTEM PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

Using the Multipurpose Control and Display Unit (MCDU), you can have access to the Centralized Fault Display System (CFDS) fault messages of the PNEUMATIC system. Specific BMC Built-In Test Equipment (BITE) is also available for BMC 1 and 2.



MAINTENANCE/TEST FACILITIES

UAJ09471 - U19T4T0 - UM36PZ000000002

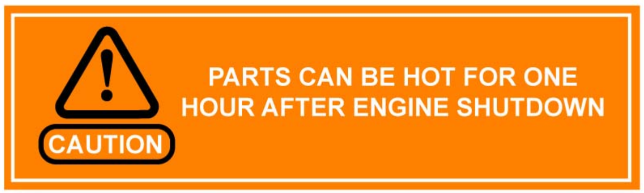
36 PNEUMATIC SYSTEM PRESENTATION (1)

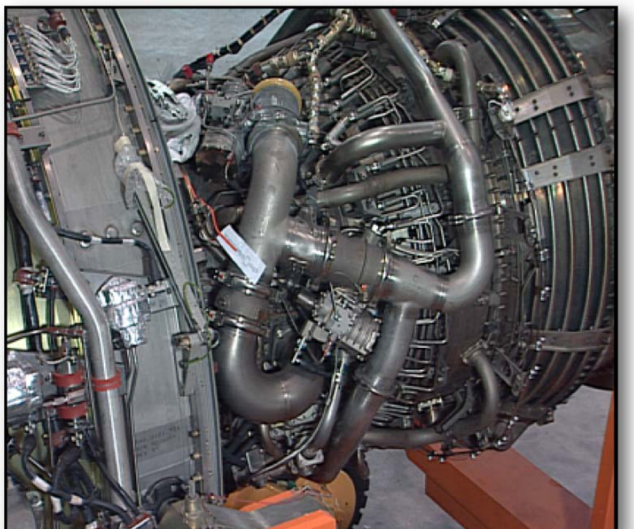
SAFETY PRECAUTIONS

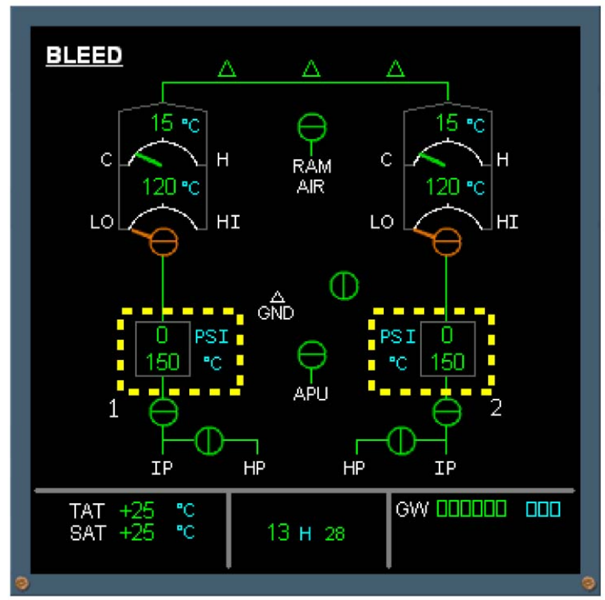
When you work on aircraft, make sure that you obey all the Aircraft Maintenance Manual (AMM) safety procedures. This will prevent injury to people and / or damage to the aircraft. Here is an overview of the main safety precautions related to the pneumatic system.

Make sure that the pneumatic system is depressurized before starting the work. HP air can cause unwanted pressurization of the aircraft, and injury to personnel.

Be careful when you work on the engine components immediately after the engine is shutdown. The engine components can stay hot for up to one hour.







SAFETY PRECAUTIONS

UAJ09471 - U19T4T0 - UM36PZ000000002

21 AIR CONDITIONING SYSTEM PRESENTATION (1)

AIR CONDITIONING, VENTILATION AND PRESSURIZATION INTRODUCTION

This chapter covers the air conditioning, ventilation and pressurization systems.
The basic airflow through the pressurized part of the fuselage starts with the pneumatic system.
Hot, high pressure air is supplied to two packs. The packs are responsible for basic temperature regulation.
From the packs the air is distributed throughout the aircraft.
The pressurization system controls the airflow overboard to maintain the cabin pressurization within safe limits.

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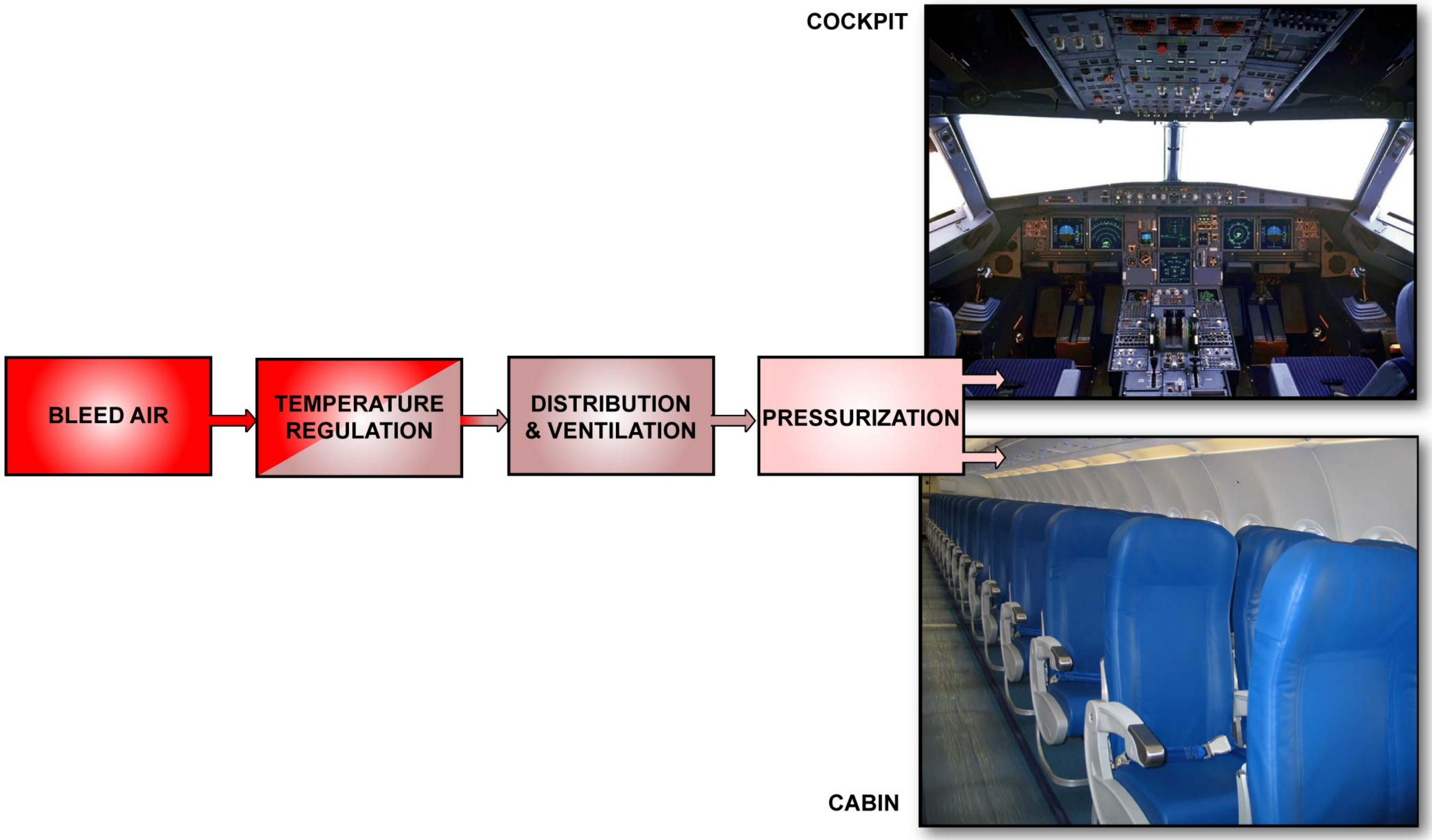
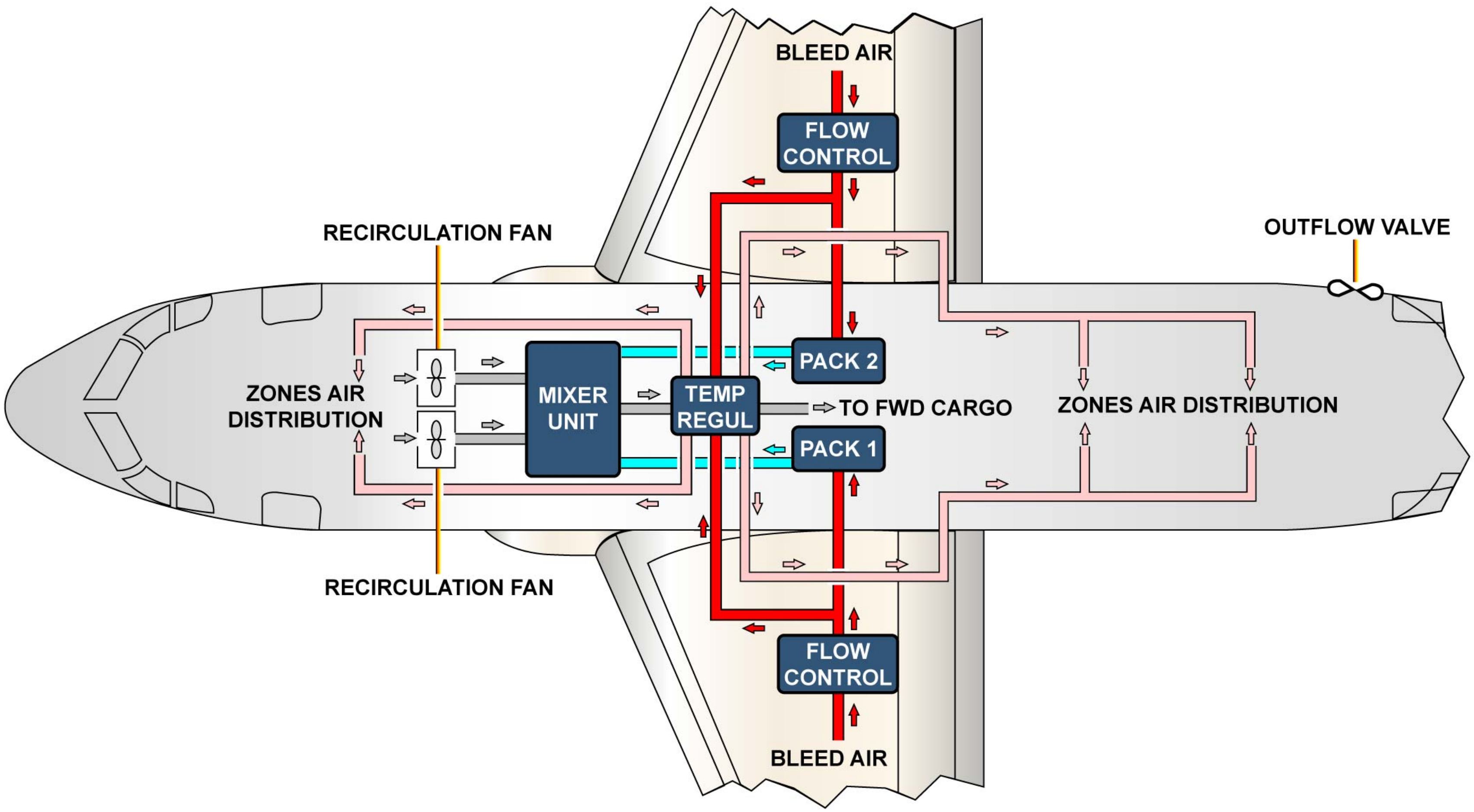


AIR CONDITIONING, VENTILATION AND PRESSURIZATION INTRODUCTION

21 AIR CONDITIONING SYSTEM PRESENTATION (1)

BASIC AIR CONDITIONING SYSTEM INTRODUCTION

The pneumatic system supplies air to each pack. The packs are responsible for BASIC temperature regulation.
Temperature regulated pack discharge air is sent to the mixer unit.
At the mixer unit, the air is mixed with air re-circulated from the main cabin. This reduces the overall bleed demand and saves fuel.
From the mixer unit, the air is distributed to the cockpit and the forward and aft cabin zones.
Some of the air from the pneumatic system is used for the OPTIMIZED temperature regulation system. This hot air is mixed with the air from the mixer unit to adjust the temperature in each zone independently.
The air is distributed throughout the cabin and finally, discharged overboard through the outflow valve to maintain pressurization.



BASIC AIR CONDITIONING SYSTEM INTRODUCTION

UAJ09471 - U19T4T0 - UM21PZ000000002

21 AIR CONDITIONING SYSTEM PRESENTATION (1)

PACK INTRODUCTION

The Single Aisle family is equipped with two air conditioning packs located in the wing root area forward of the landing gear bay. The packs supply dry air to the cabin for air conditioning, ventilation and pressurization.
The main component of each pack assembly is the air cycle machine. Hot air from the pneumatic system is supplied to the pack through the pack Flow Control Valve (FCV). The FCV adjusts the flow rate through the pack and is the pack Shut-Off Valve (SOV).
Two Air Conditioning System Controllers (ACSC) 1 and 2. ACSC 1 sends the pack outlet temperature demand to pack 1. ACSC 2 sends the pack outlet temperature demand to pack 2. To control the pack outlet temperature, the ACSC modulates the BYPASS VALVE and the RAM-AIR INLET doors. For maximum cooling, the ram-air doors are fully open and the bypass valve is fully closed. For maximum heating, the ram-air doors are nearly closed and the bypass valve is fully open. During takeoff and landing, the ram air inlet doors will be driven fully closed to stop the ingestion of foreign matter.

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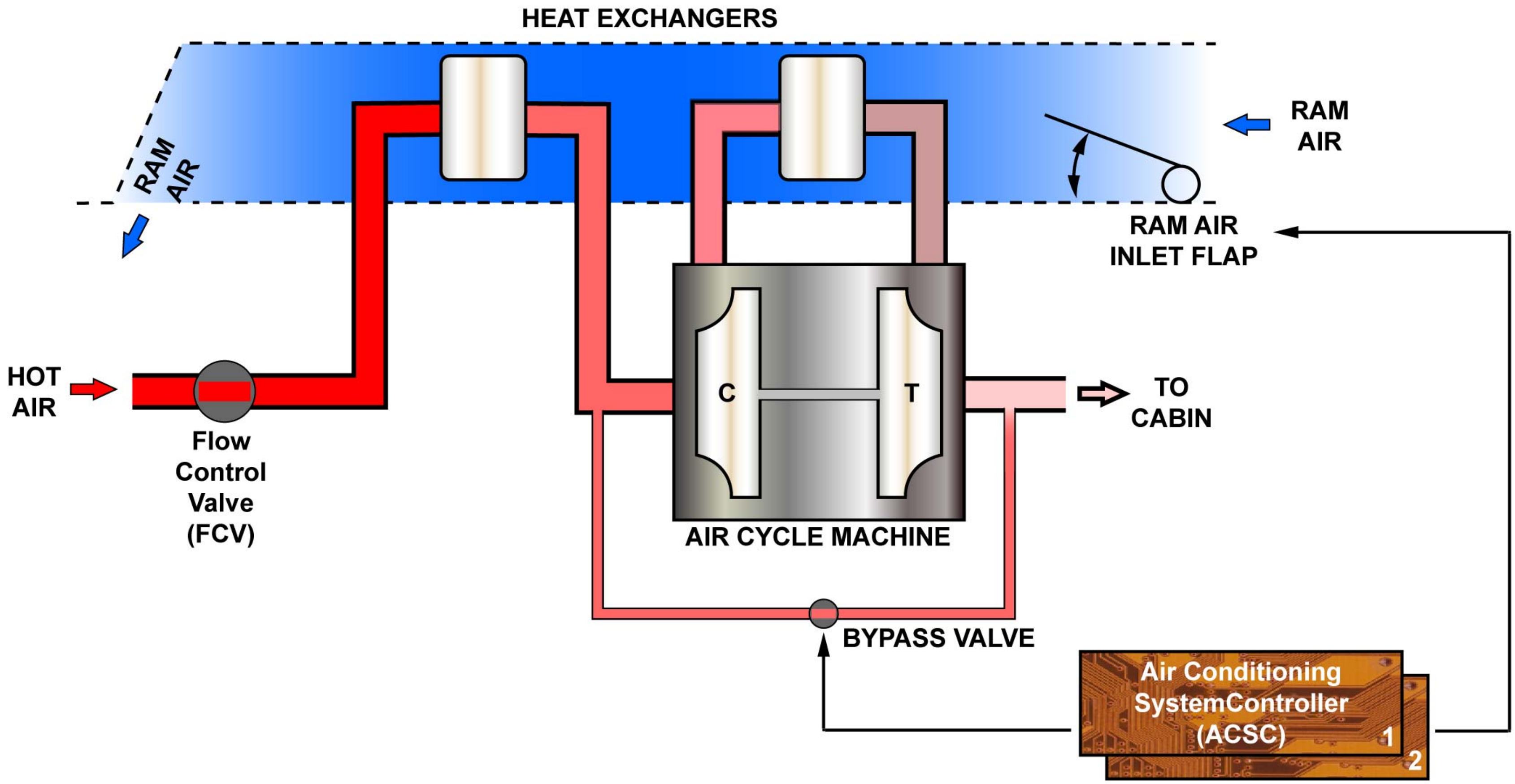


PACK INTRODUCTION

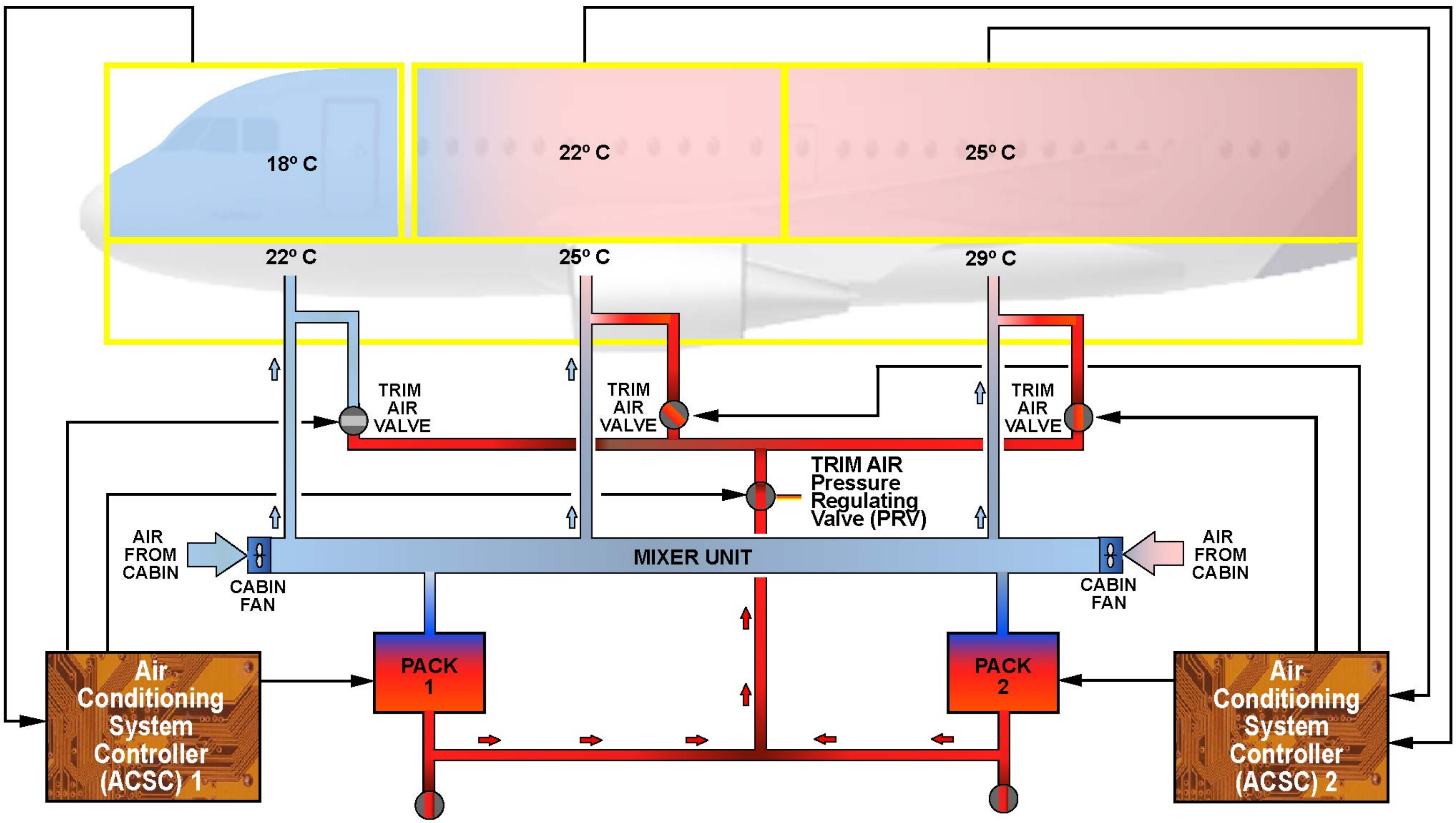
UAJ09471 - U19T4T0 - UM21PZ000000002

21 AIR CONDITIONING SYSTEM PRESENTATION (1)

ZONE TEMPERATURE REGULATION SYSTEM INTRODUCTION

The packs supply the mixer unit. Three separate aircraft zones are supplied from the mixer unit:
- cockpit,
- forward cabin,
- aft cabin.

Two cabin recirculation fans are installed to reduce the bleed air demand and therefore save fuel. These fans establish a recirculation flow of air from the cabin zones to the mixer unit. In normal operation, there are no ECAM indications associated with the cabin fans.
The ACSC control and monitor the temperature regulation system for the cabin zones. On the overhead AIR CONDitioning panel, the flight crew selects the desired individual compartment temperature. The ACSC compares the demand to the actual temperature in each zone. ACSC 1 monitors the temperature of the flight deck zone and sends the pack outlet temperature demand to pack 1. ACSC 2 monitors the temperature of the forward and aft cabins and sends the pack outlet temperature demand to pack 2.
The trim air Pressure Regulating Valve (PRV) and the trim air valves are controlled by the ACSCs. In the case of any duct overheat, the Trim air PRV and the trim air valves will automatically close to isolate the system. The system can be reset when the overheat disappears.



ZONE TEMPERATURE REGULATION SYSTEM INTRODUCTION

UAJ09471 - U19T4T0 - UM21PZ000000002

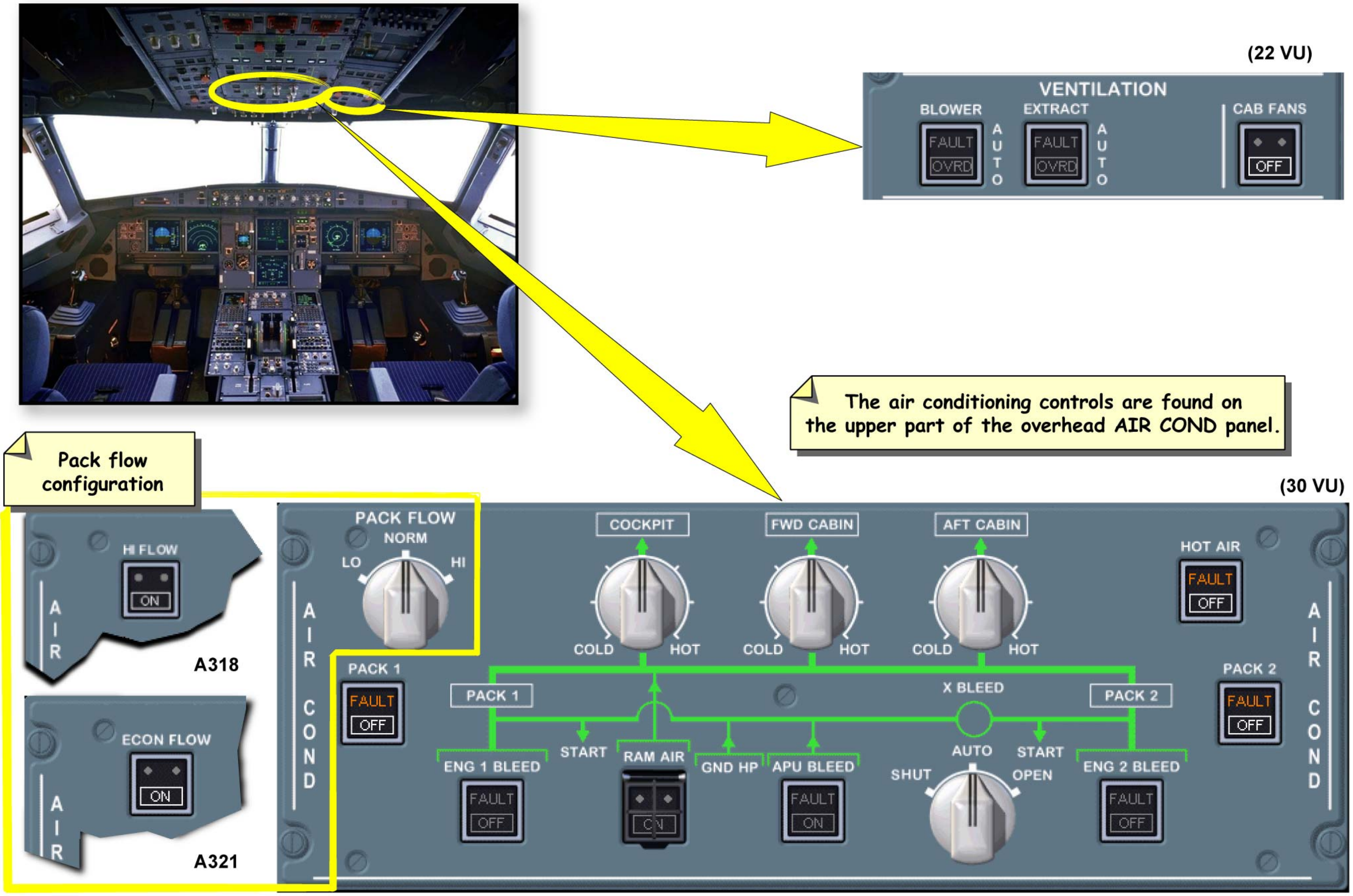
21 AIR CONDITIONING SYSTEM PRESENTATION (1)

CONTROL AND INDICATING

This section will highlight the control panels and indications for the air conditioning system.

CONTROL PANELS

On the overhead panel, the AIR COND panel is used by the pilot to control the air conditioning system. This panel contains the PACK switches, the zone temperature selectors, the PACK FLOW control, and the HOT AIR control switch.
On the overhead, the VENTILATION panel contains the CABin FANS pushbutton switch. The switch is used to select the recirculation fans OFF.



CONTROL AND INDICATING - CONTROL PANELS

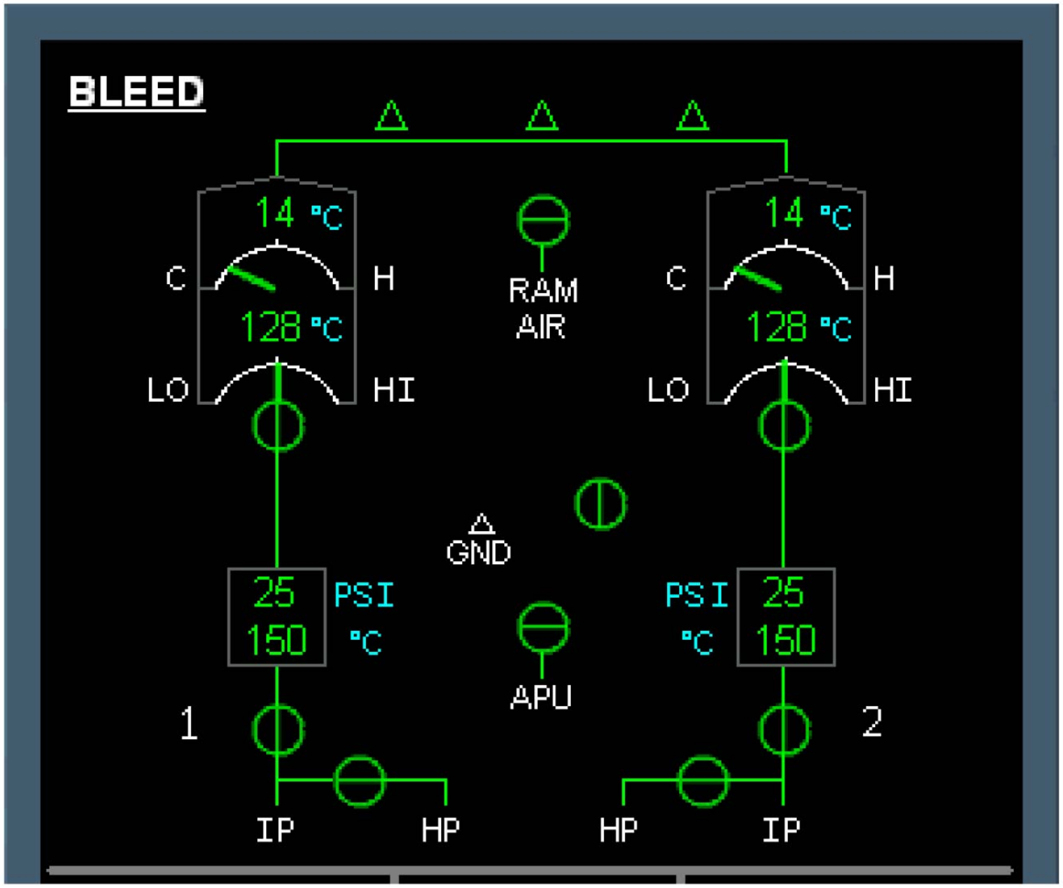
21 AIR CONDITIONING SYSTEM PRESENTATION (1)

CONTROL AND INDICATING (continued)

ECAM PAGES

Basic temperature regulation is accomplished by the packs. Pack parameters, such as pack flow and bypass valve position are found on the upper section of the ECAM BLEED page.
The ECAM AIR COND page contains the optimized temperature regulation parameters, such as duct temperature, zone temperature and trim air system indications.
The ECAM CRUISE page also contains zone temperature indications.

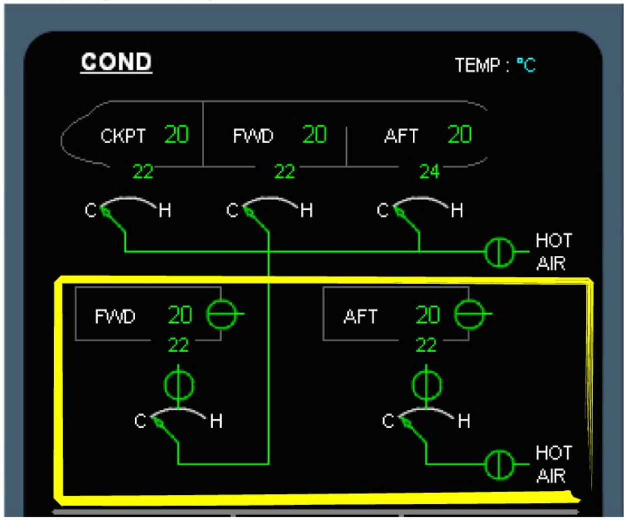
BLEED PAGE



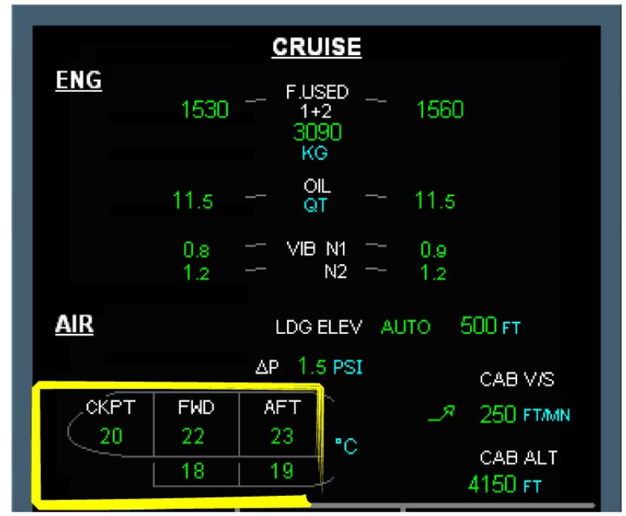
The indications for the air conditioning system (packs) are located on the upper part of the BLEED page.

CONTROL AND INDICATING - ECAM PAGES

AIR COND PAGE



CRUISE PAGE



FWD and aft cargo ventilation and heating are both optional systems.

Customers can select fahrenheit (f) or celsius (c) duct and zone temperature indications on these pages. Cabin / cargo zone temperature indications repeated on the cruise page

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CONTROL AND INDICATING - ECAM PAGES

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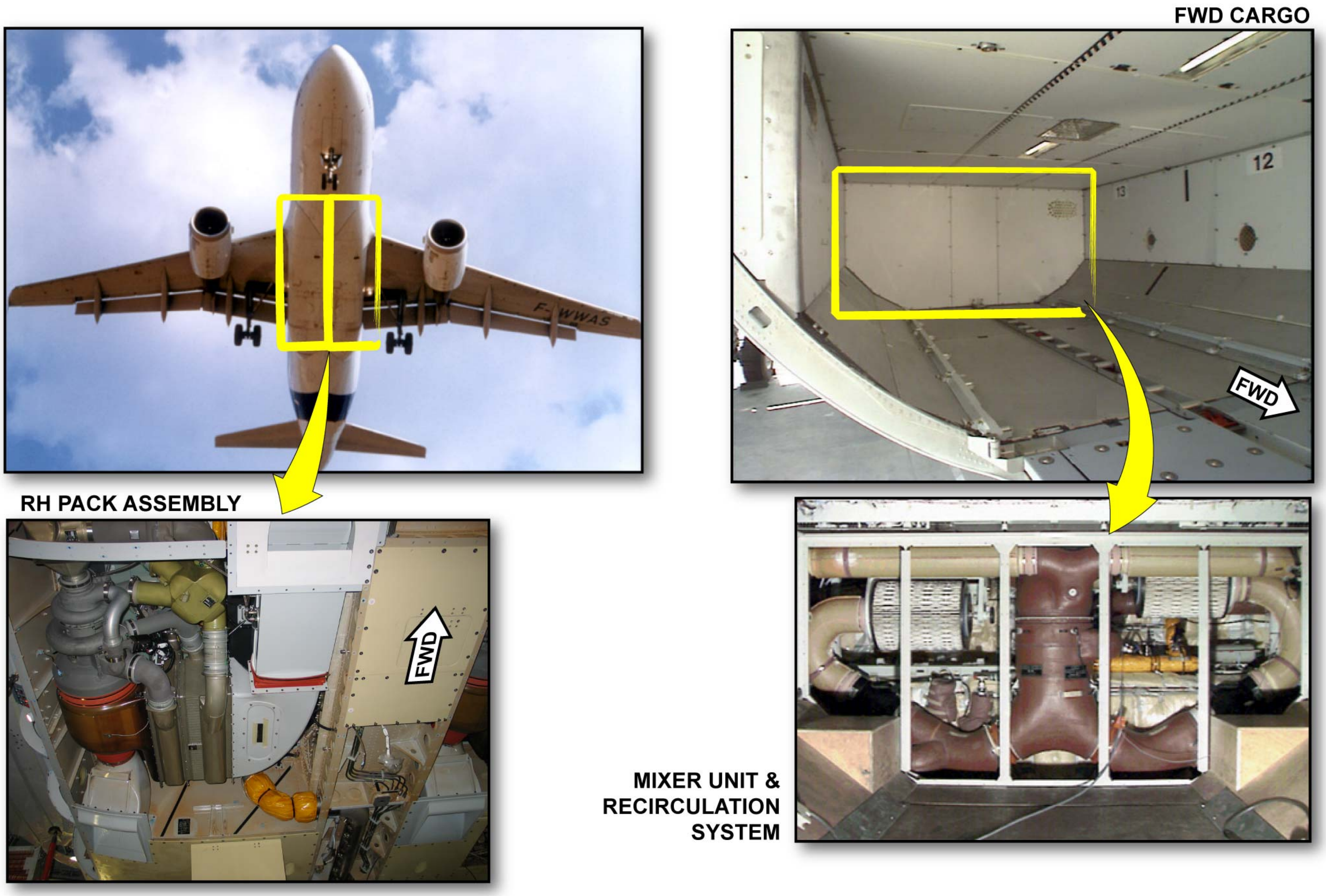
21 AIR CONDITIONING SYSTEM PRESENTATION (1)

COMPONENT LOCATION

The left and right packs are located in the air conditioning bay. The air conditioning bay is located in the unpressurized belly fairing forward of the wheel well on the lower fuselage. The belly fairing has inlets for pack and compartment cooling.

The packs supply air to the mixer unit. The mixer unit is installed at the rear of the forward cargo compartment. It mixes air from the packs and re-circulated air from the cabin prior to distribution to each zone.

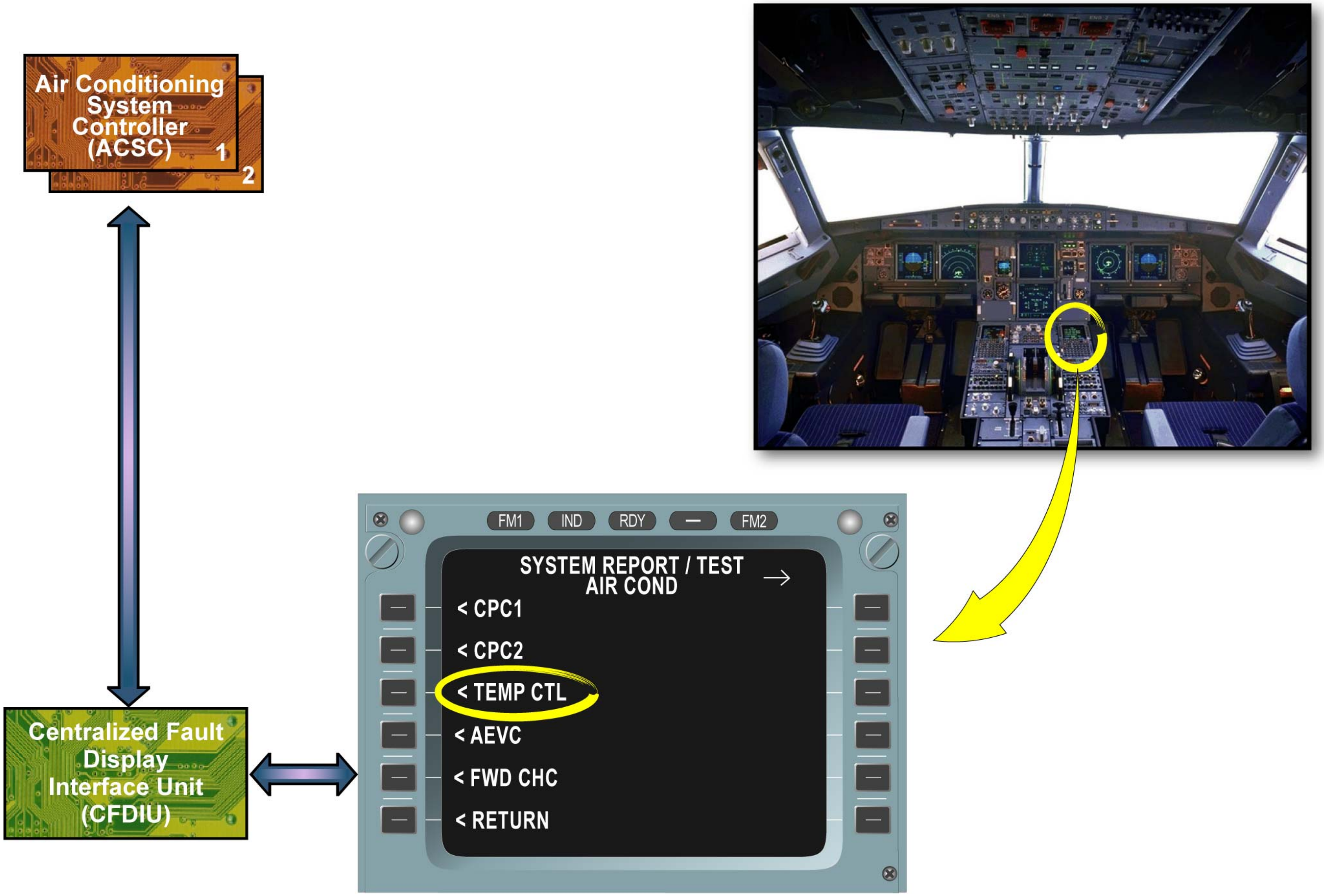


COMPONENT LOCATION

21 AIR CONDITIONING SYSTEM PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

The ACSC are connected to the CFDIU for test purposes and fault reporting, available on the MCDU.



MAINTENANCE/TEST FACILITIES

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21 AIR CONDITIONING SYSTEM PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on the aircraft, make sure you obey all the AMM procedures. This will prevent injury to personnel and/or damage to the aircraft. Here is an overview of the main safety procedures related to the air conditioning system.
Make sure that air is not supplied to the air conditioning system from the main engine, the APU or a ground source during maintenance. Hot compressed air can cause injury to personnel.
When you are working with harmful products, use protective clothing, rubber gloves and goggles as necessary.
Do not touch a component until it is sufficiently cool to prevent burns.
Make sure that there are no personnel or equipment near the ram air outlets (if installed) and inlets. Hot exhaust gases can cause injury to persons and/or damage to equipment.
Keep away from the moving and energized parts when you operate or test the valves and the flaps.

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SAFETY PRECAUTIONS

21 VENTILATION SYSTEM PRESENTATION (1)

GENERAL

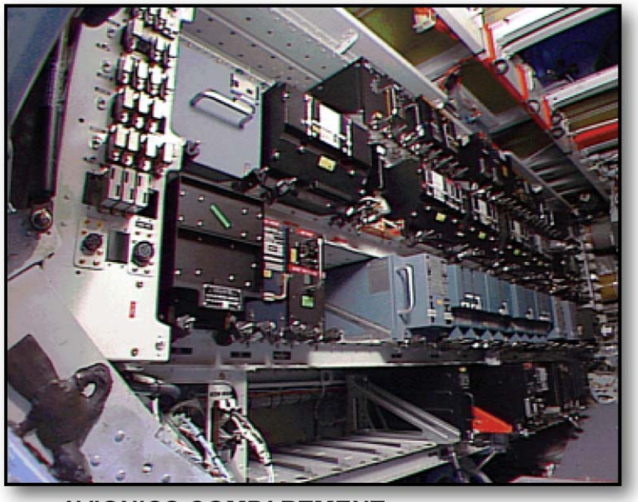
There are two ventilation systems on the Single Aisle (SA) family, avionics ventilation and lavatory and galley ventilation.

AVIONICS VENTILATION

The avionics ventilation system supplements the air conditioning system to supply cooling air to the avionics equipment. This equipment includes the avionics compartment, the flight deck instruments and the circuit breaker panels.
A blower fan and an extraction fan circulate the air through the avionics equipment.

NOTE: Note: these fans operate continuously as long as the A/C electrical system is supplied.

The Avionics Equipment Ventilation Computer (AEVC) controls the fans and the configuration of the skin valves in the avionics ventilation system based on flight/ground logic and fuselage skin temperature.
There are 3 configurations for the skin air inlet and outlet valves:
- open circuit: both valves open (on ground only),
- closed circuit: both valves closed (in flight or low outside air temperature on ground). The air is cooled in the skin heat exchanger. The skin heat exchanger is a chamber, which lets the air contact the fuselage skin in flight,
- intermediate circuit: inlet closed, outlet partially open (smoke removal in flight or low ventilation airflow condition).



AVIONICS COMPARTMENT

FLIGHT DECK INSTRUMENTS

CIRCUIT BREAKER PANELS

GENERAL & AVIONICS VENTILATION

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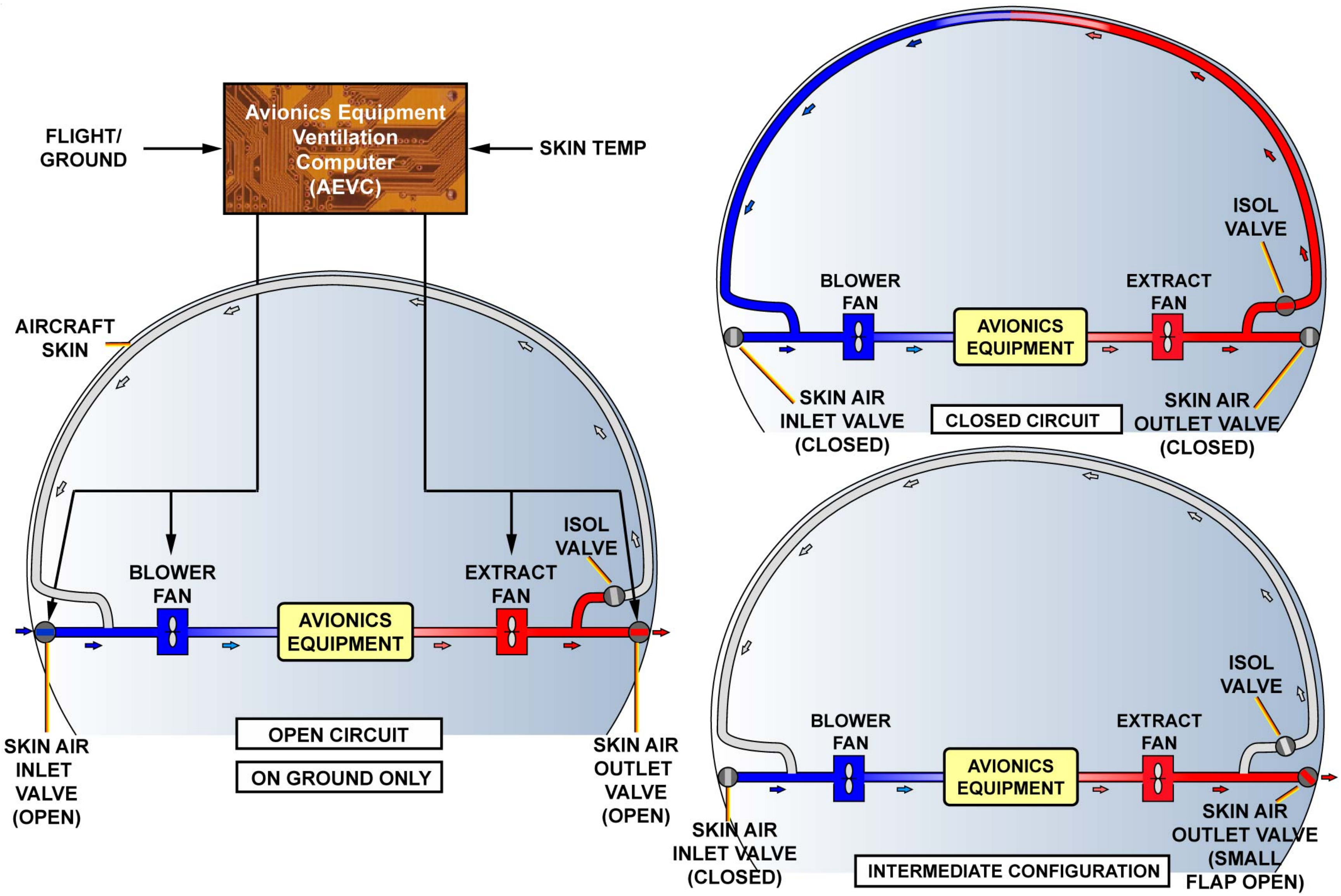

GENERAL & AVIONICS VENTILATION

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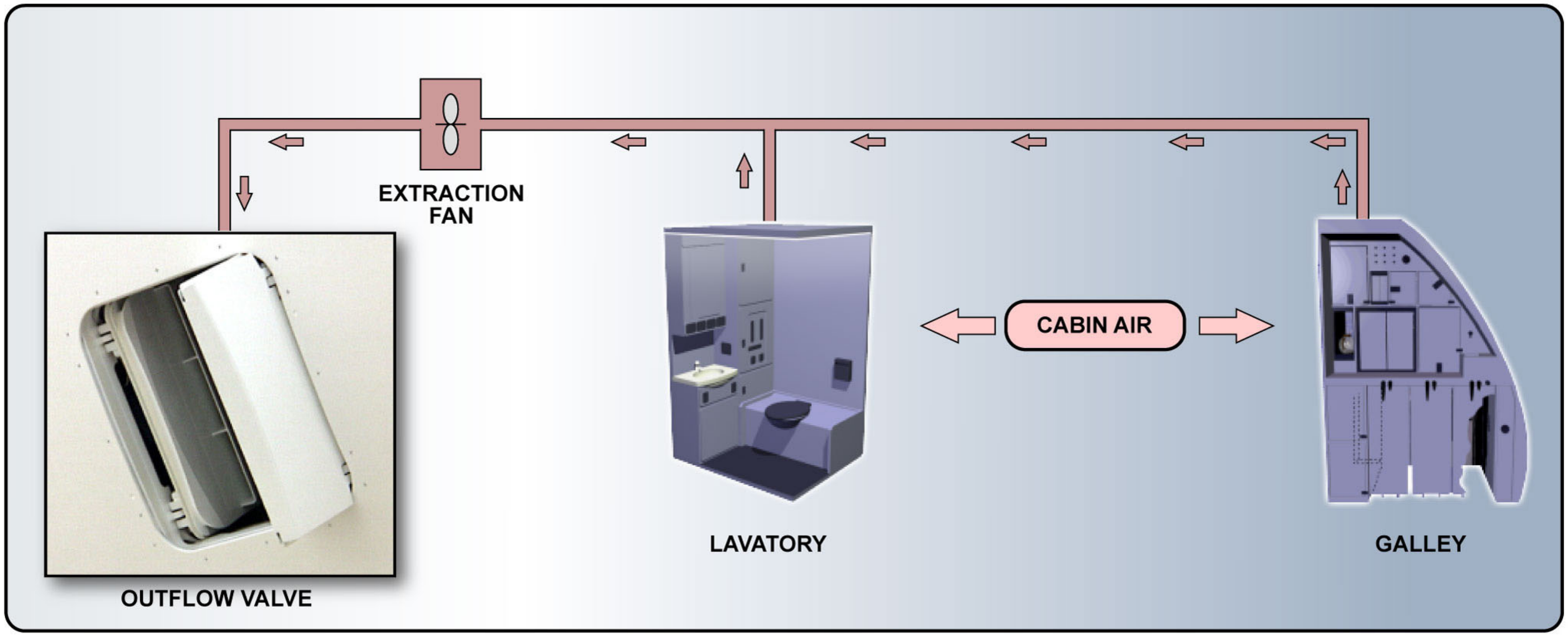
21 VENTILATION SYSTEM PRESENTATION (1)

LAVATORY AND GALLEY VENTILATION

The lavatory and galley ventilation system is completely automatic. Conditioned cabin air is supplied through the lavatory and galley areas and is removed from these areas by an extraction fan. The fan pulls air through the ceiling into an extraction duct. The air is then discharged overboard through the outflow valve.

NOTE: the extraction fan runs continuously, provided electrical power is available.



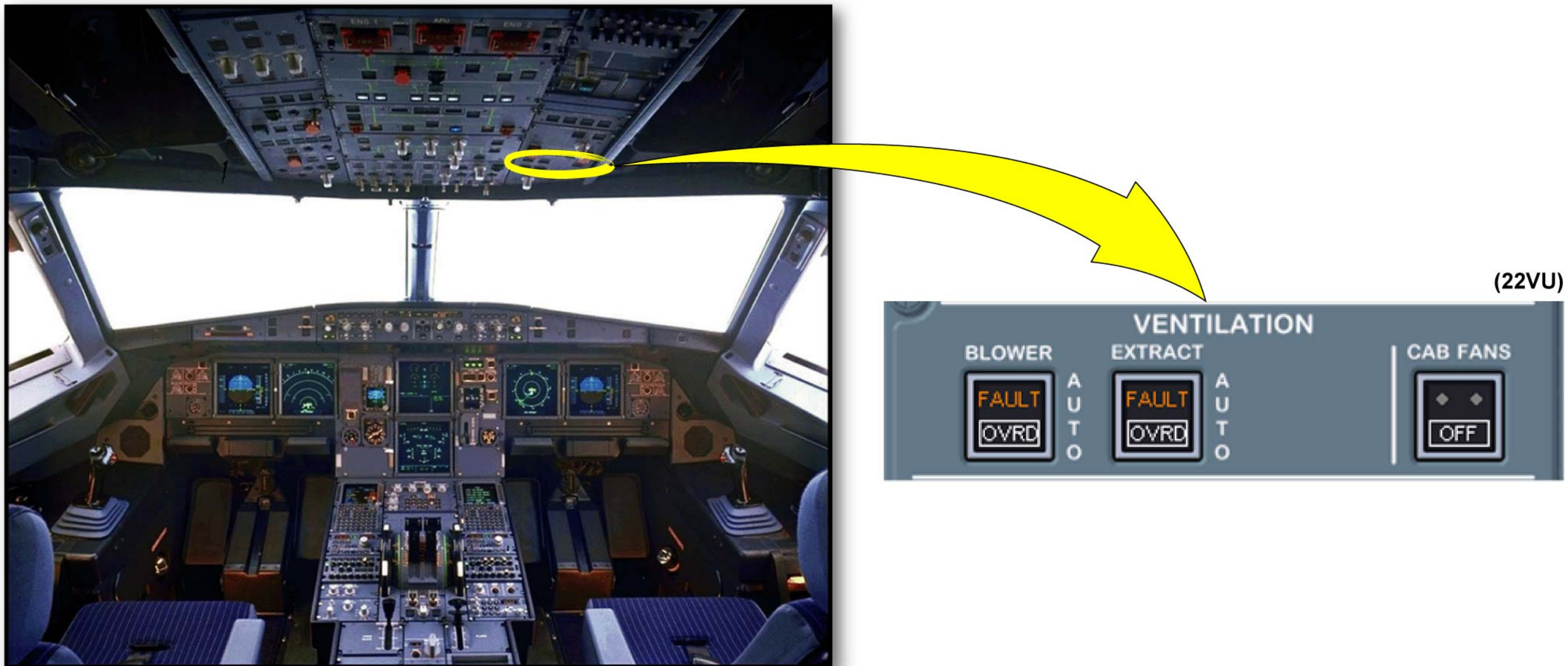
UAJ09471 - U19T4T0 - UM21PY000000002

LAVATORY AND GALLEY VENTILATION

21 VENTILATION SYSTEM PRESENTATION (1)

VENTILATION PANEL

The VENTILATION panel, on the overhead panel contains two P/Bs associated with the ventilation system. With the BLOWER and EXTRACT switches in the AUTO position (lights out), the avionics ventilation system is fully automatic and requires no pilot input.



VENTILATION PANEL

UAJ09471 - U19T4T0 - UM21PY000000002

21 VENTILATION SYSTEM PRESENTATION (1)

ECAM CAB PRESS PAGE

A section of the ECAM CABin PRESSure page displays avionics ventilation system information. The skin valve configuration is displayed on this page.

OPEN CIRCUIT

INTERMEDIATE

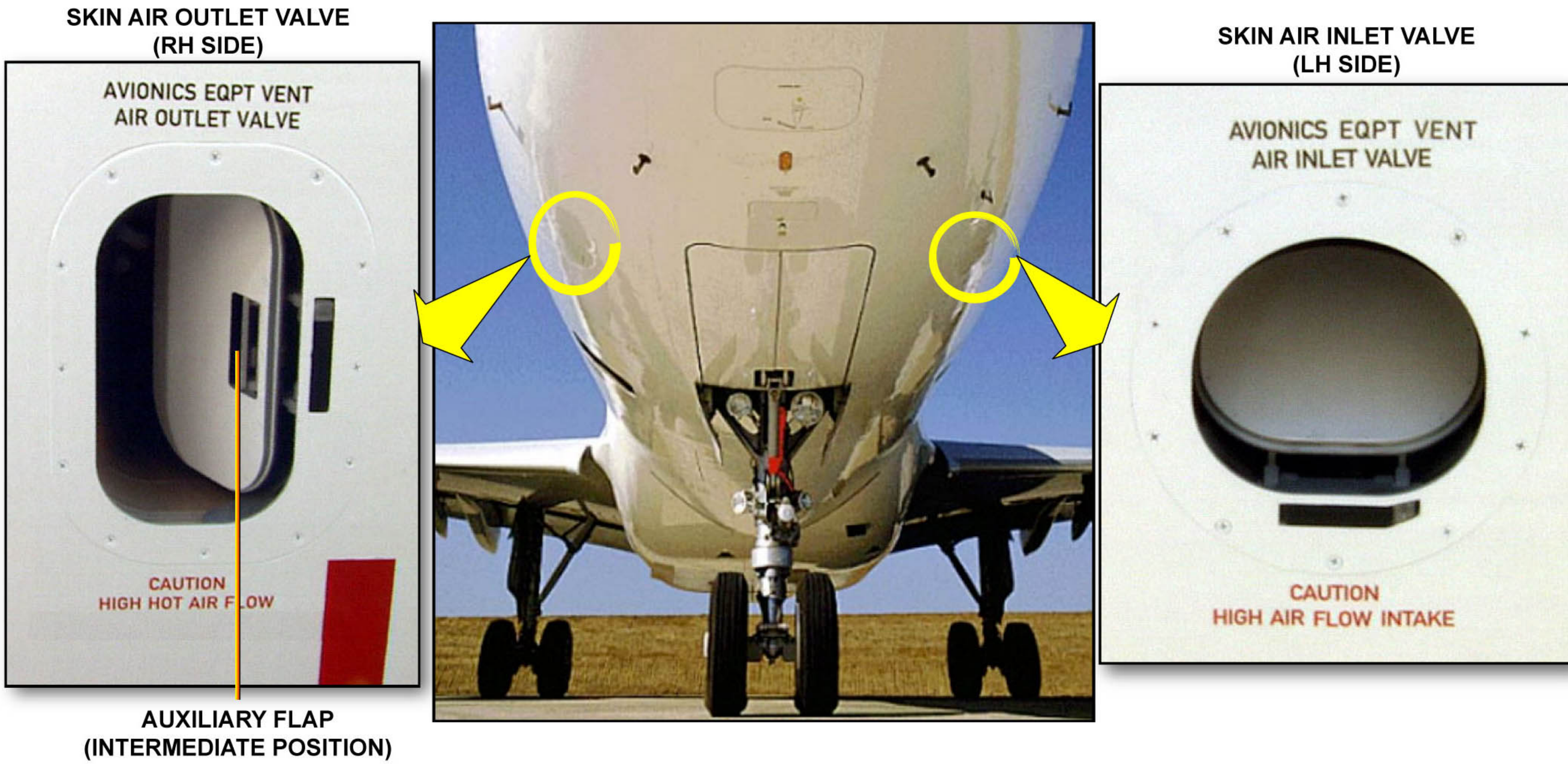
CLOSED CIRCUIT

ECAM CAB PRESS PAGE

21 VENTILATION SYSTEM PRESENTATION (1)

COMPONENT LOCATION

The skin air inlet valve is located on the LH side of the fuselage.
The skin air outlet valve is on the RH side of the fuselage. A small auxiliary flap will open for the intermediate circuit configuration. This is thought to be the partially open position.
Both skin valves have a manual override and deactivation device.



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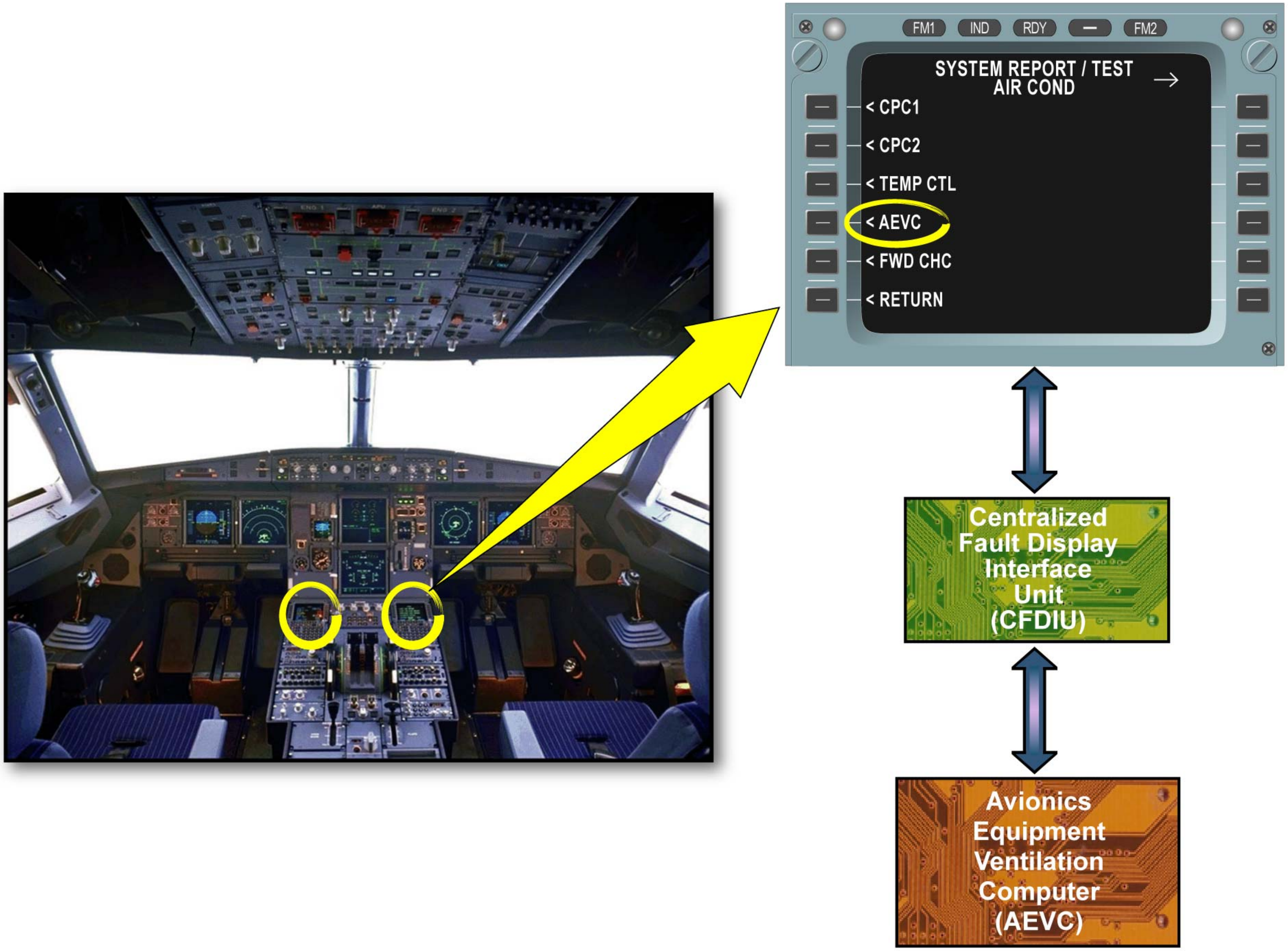
COMPONENT LOCATION

21 VENTILATION SYSTEM PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

The AEVC is connected to the Centralized Fault Display Interface Unit (CFDIU) for test purposes and fault reporting, available on the MCDUs.



MAINTENANCE/TEST FACILITIES

UAJ09471 - U19T4T0 - UM21PY000000002

21 VENTILATION SYSTEM PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on A/C, make sure you obey all the AMM procedures. This will prevent injury to personnel and/or damage to the A/C. Here is an overview of the main safety procedures related to the ventilation system.
Do not use force to turn the manual handles of the valves. There are shear pins in the handles.
Do not use your fingers to operate the deactivation switches. If the system is energized, the valves could move.

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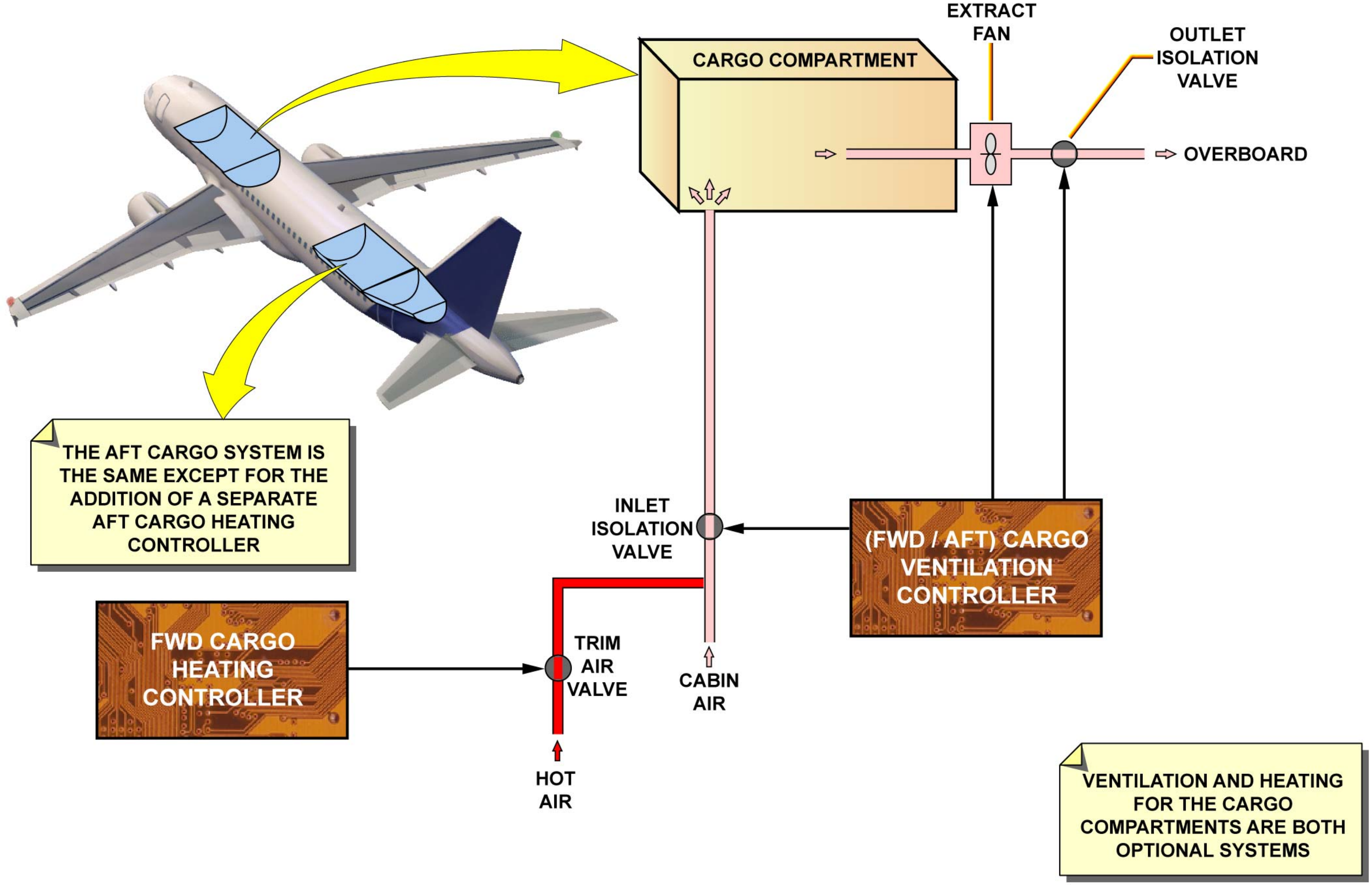
SAFETY PRECAUTIONS

21 CARGO VENTILATION & HEATING SYS PRES. (1)

SYSTEM INTRODUCTION

As an option on the Airbus single aisle family, the forward and aft cargo compartments can have a ventilation system. In addition, a heating system may be installed in either or both compartments. Note that the heating system will only be installed along with a ventilation system.
The operation for both compartments is similar so we will only look at the forward cargo compartment. Air from the main cabin is drawn down into the cargo compartment by the extract fan or by differential pressure in flight. After circulating through the compartment, the air is discharged overboard.
The operation of the two isolation valves and the extract fan is controlled automatically by the cargo Ventilation Controller (VC). One VC is able to control either or both compartments.
For the heating of the cargo compartment, the pilots select the desired compartment temp and hot bleed air is mixed with the air coming from the main cabin to increase the temperature if necessary. The supply of hot air is controlled by the Cargo Heating Controller. Each heated compartment has a dedicated Cargo Heating Controller. Note that there is NO direct air conditioning supply to the cargo compartments. The pilots cannot add "cold" air to the compartments.



SYSTEM INTRODUCTION

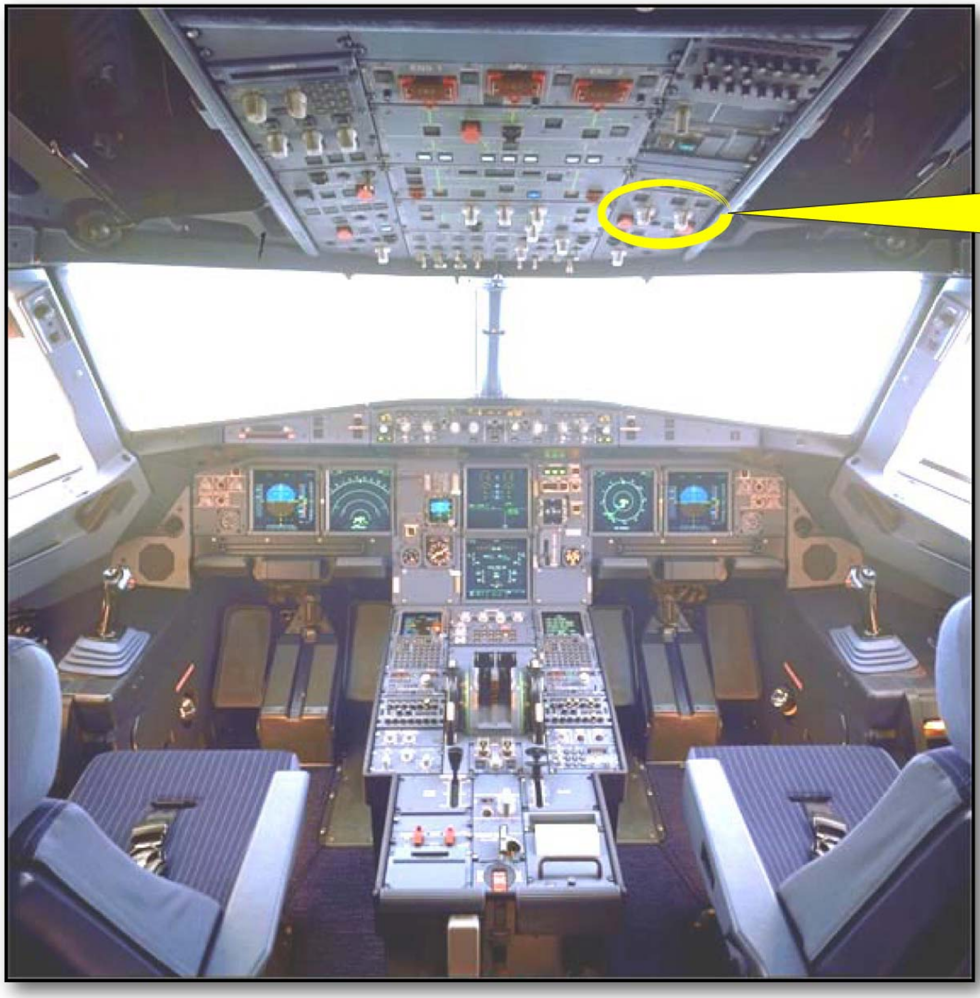
21 CARGO VENTILATION & HEATING SYS PRES. (1)

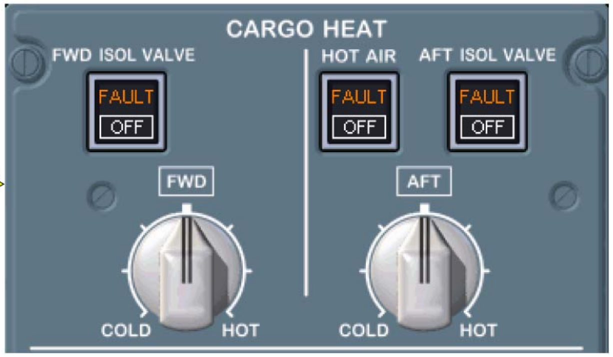
CONTROL AND INDICATING

This section will highlight the control panels and indications for the cargo ventilation and heating systems.

CONTROL PANELS

On the cockpit overhead panel, the CARGO HEAT panel contains the controls associated with cargo ventilation and heating. Again, based on the customer options, several variations may be found: ventilation in either one compartment or both, or ventilation and heating in one compartment or both.
For each ventilated cargo compartment there is an ISOLATION VALVE P/B switch that controls the isolation valves. In the auto position the cargo VC will automatically open and close the isolation valves.
In case of cargo smoke detected, the cargo ventilation controller will automatically close the related isolation valves.
For each heated compartment, the temperature selectors signal the associated Cargo Heating Controller to move the trim air valves to adjust the temperature of the air entering the compartment.
The forward cargo trim air system is fed from the cabin hot air valve but the HOT AIR P/B switch controls the aft cargo compartment hot air valve.





(22VU)

VENTILATION AND HEATING FOR THE CARGO COMPARTMENTS ARE BOTH OPTIONAL SYSTEMS

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CONTROL AND INDICATING - CONTROL PANELS

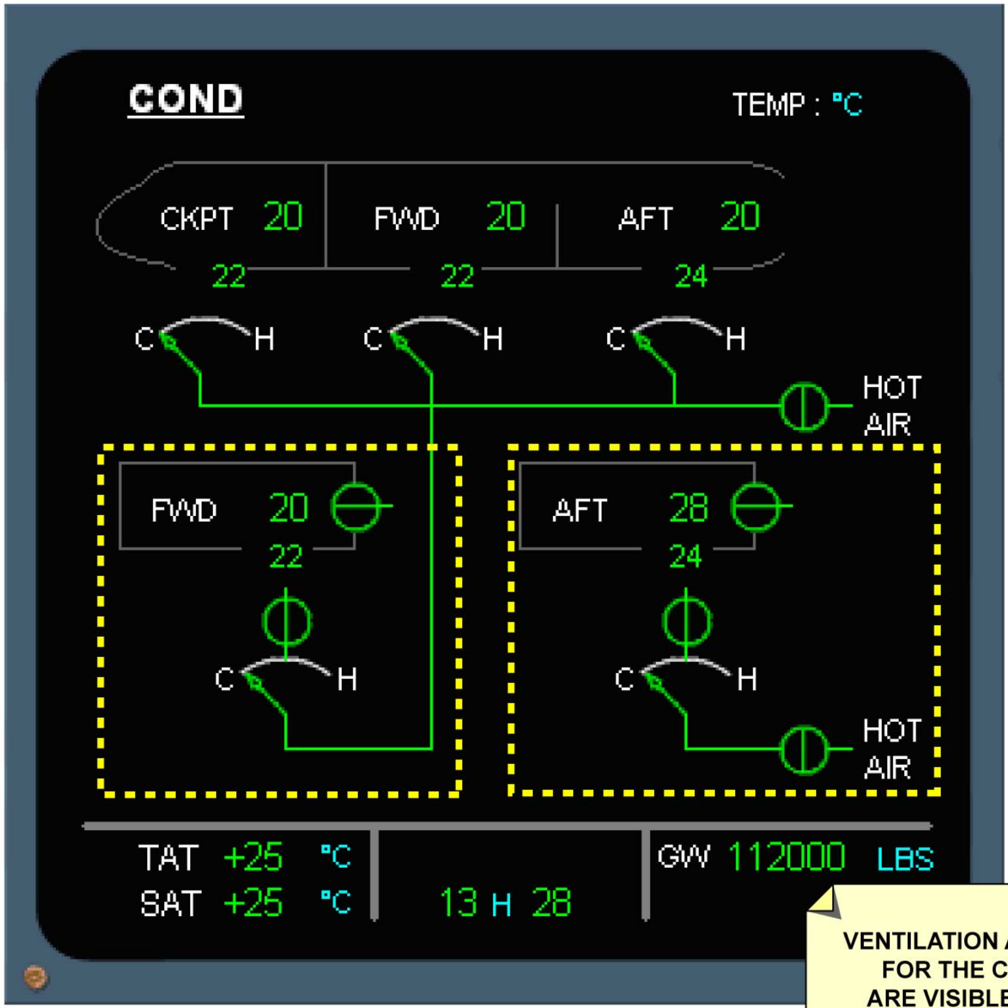
21 CARGO VENTILATION & HEATING SYS PRES. (1)

CONTROL AND INDICATING (continued)

ECAM COND PAGE

The indications linked to the cargo compartments are displayed on the ECAM COND page. Note that the indications are only displayed if the system is installed.

SD



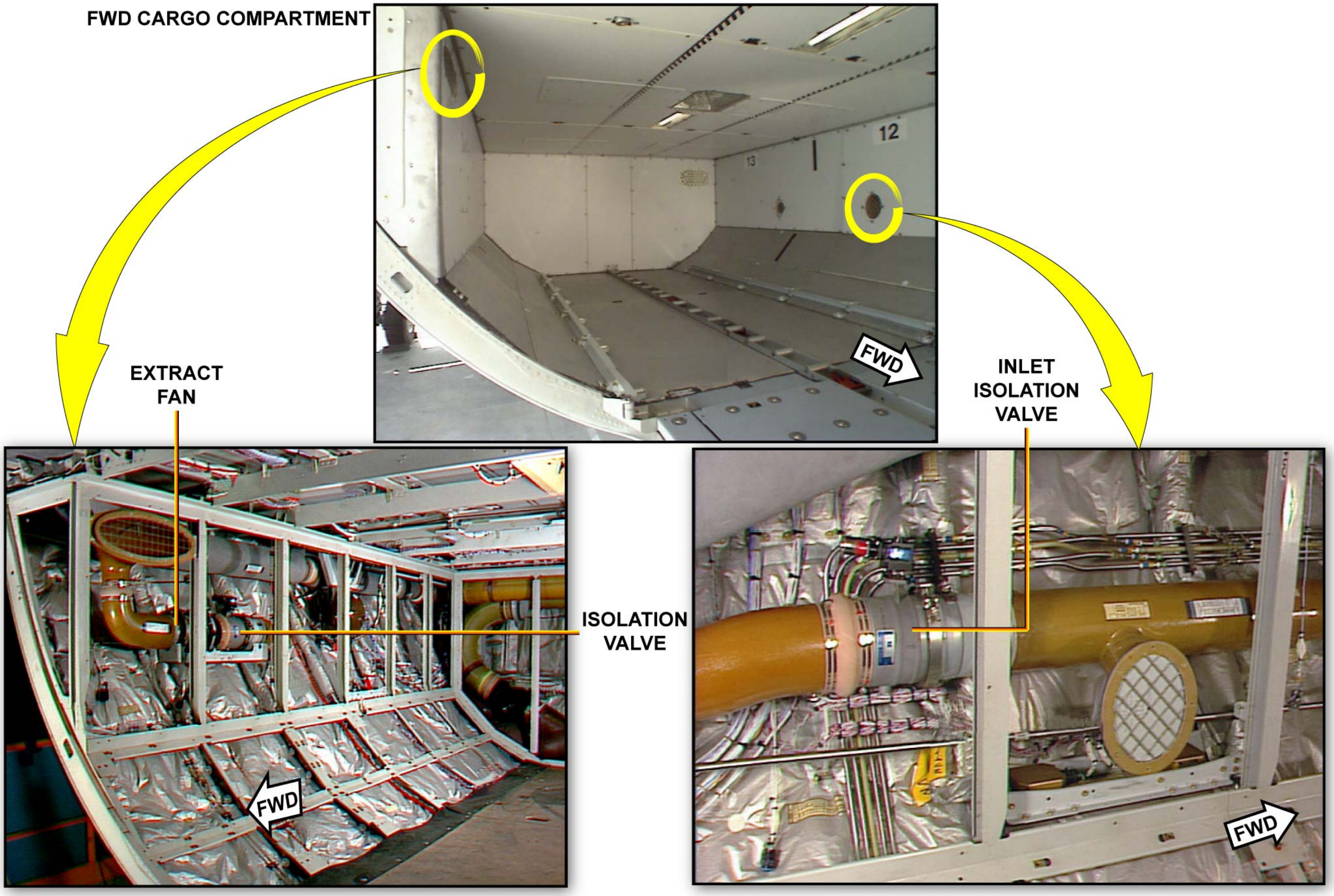
VENTILATION AND HEATING INDICATIONS FOR THE CARGO COMPARTMENTS ARE VISIBLE ONLY IF THE SYSTEM(S) IS(ARE) INSTALLED

CONTROL AND INDICATING - ECAM COND PAGE

21 CARGO VENTILATION & HEATING SYS PRES. (1)

COMPONENT LOCATION

The isolation valves and extract fans of the forward cargo compartment ventilation system are located behind the compartment sidewall panels. The air inlets and outlets are protected by grills.



COMPONENT LOCATION

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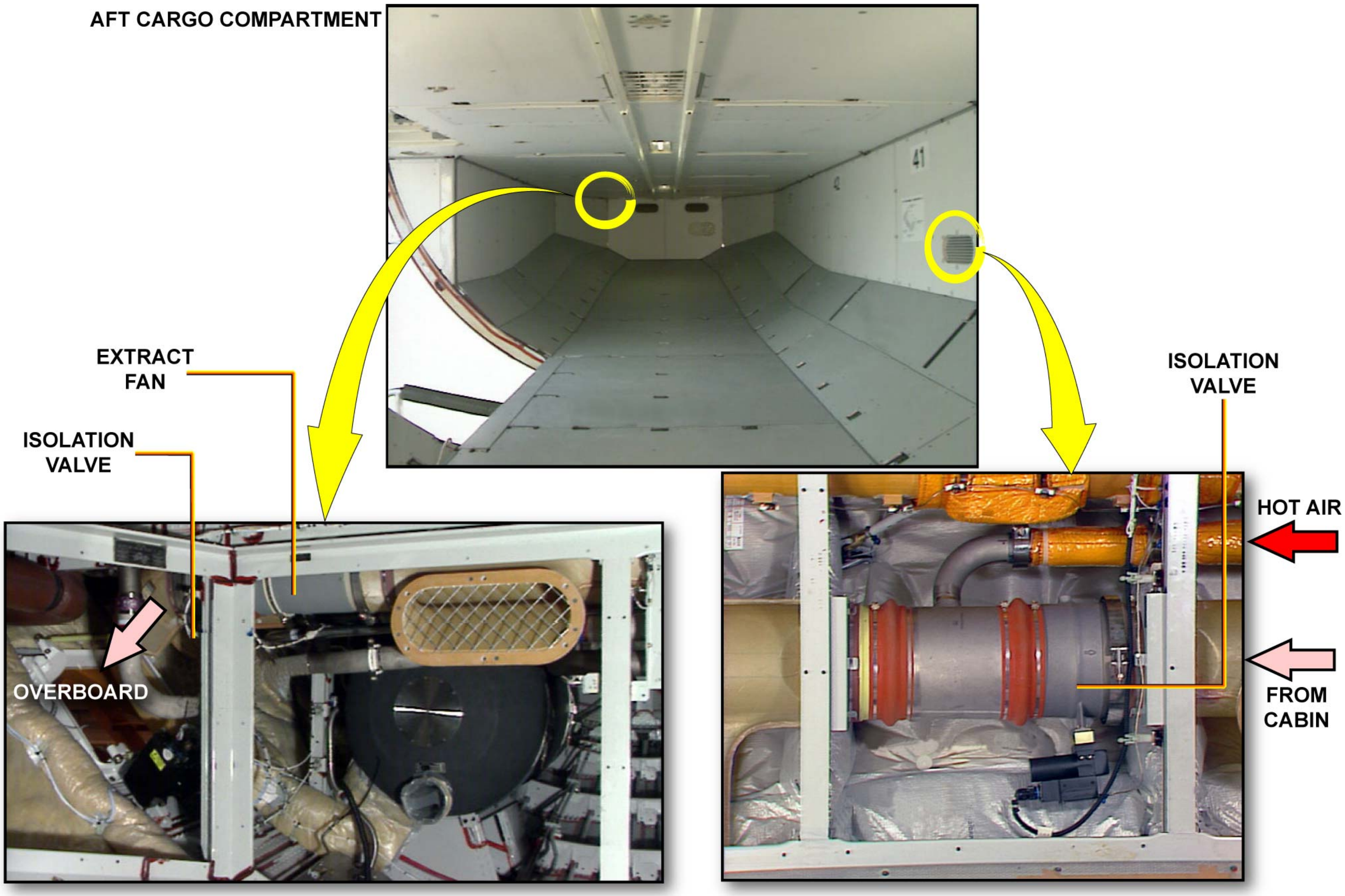
21 CARGO VENTILATION & HEATING SYS PRES. (1)

COMPONENT LOCATION (continued)

AFT CARGO COMPARTMENT COMPONENT LOCATION

In the aft cargo compartment the isolation valves and extract fans are installed in the left sidewall and near the compartment ceiling.



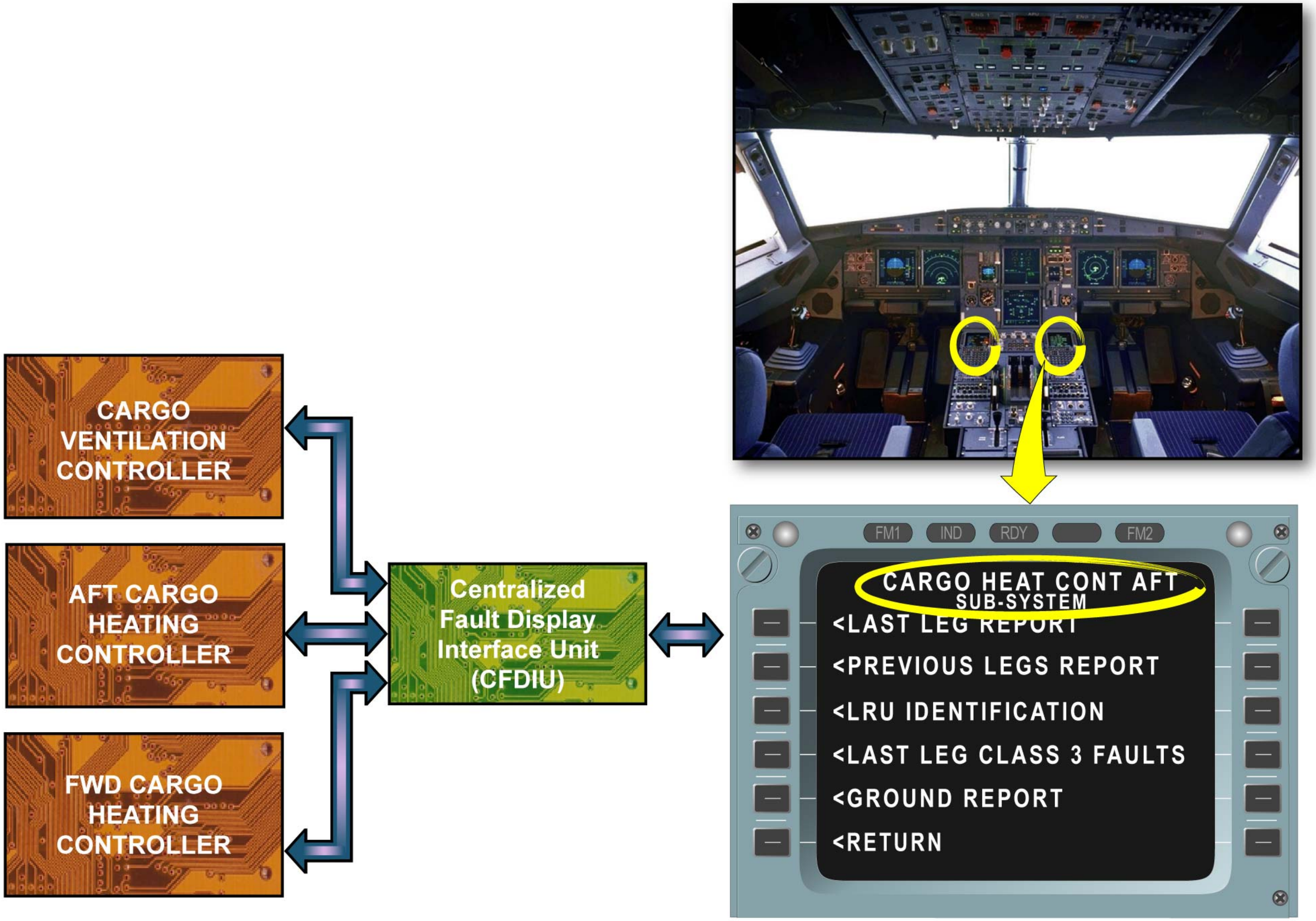
COMPONENT LOCATION - AFT CARGO COMPARTMENT COMPONENT LOCATION

UAJ09471 - U19T4T0 - UM21PX000000001

21 CARGO VENTILATION & HEATING SYS PRES. (1)

MAINTENANCE/TEST FACILITIES

The two cargo heating controllers and the cargo VC are connected to the Centralized Fault Display Interface Unit (CFDIU) for test purposes and fault reporting.



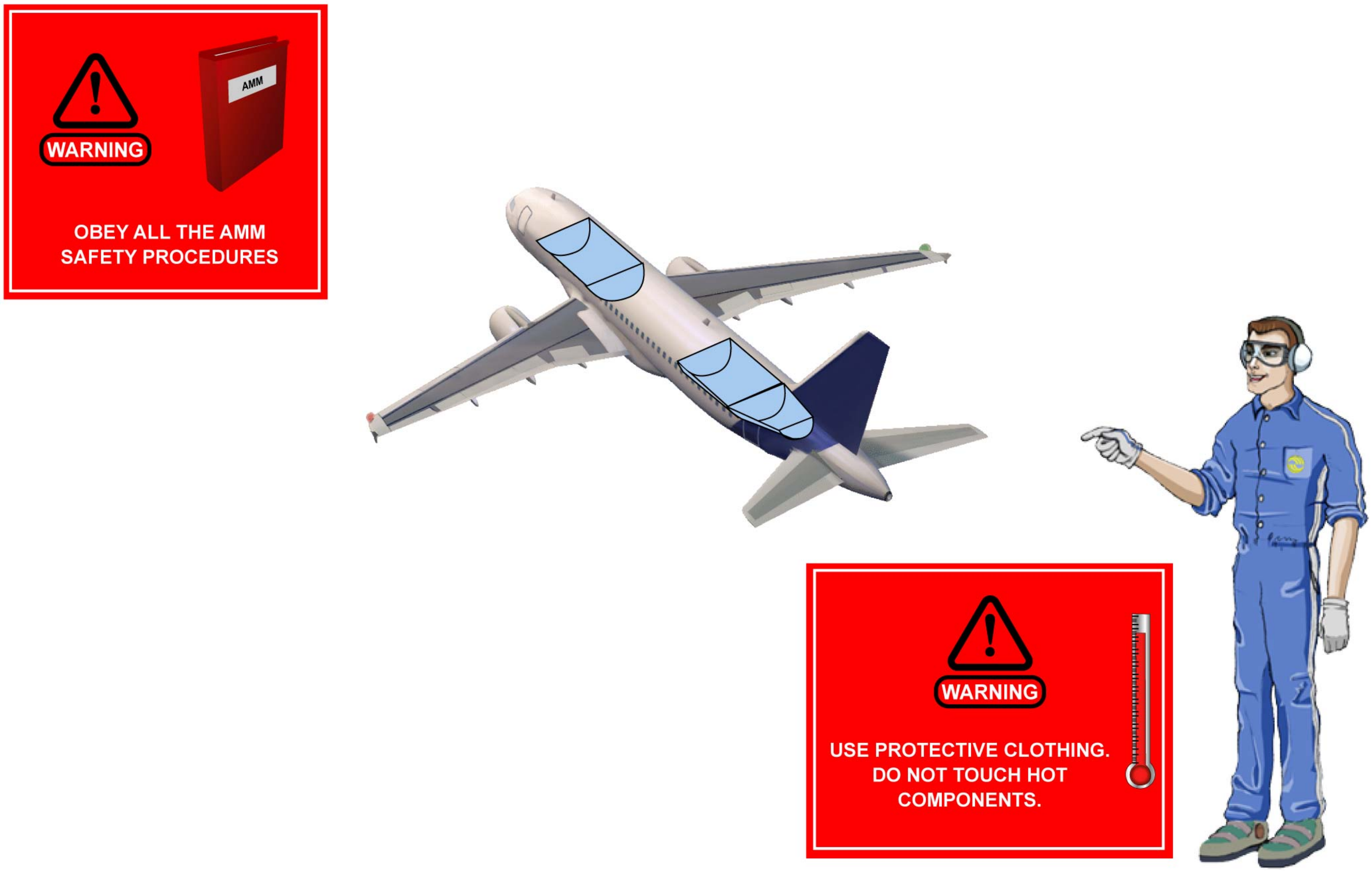
MAINTENANCE/TEST FACILITIES

UAJ09471 - U19T4T0 - UM21PX000000001

21 CARGO VENTILATION & HEATING SYS PRES. (1)

SAFETY PRECAUTIONS

When you work on aircraft, make sure that you obey all the AMM procedures. This will prevent injury to personnel and/or damage to the aircraft. Here is an overview of the main safety procedures related to the cargo compartment heating and ventilation system.
When you are in contact with harmful products, use protective clothing, rubber gloves and goggles.
Do not touch a component until it is sufficiently cool to prevent burns.



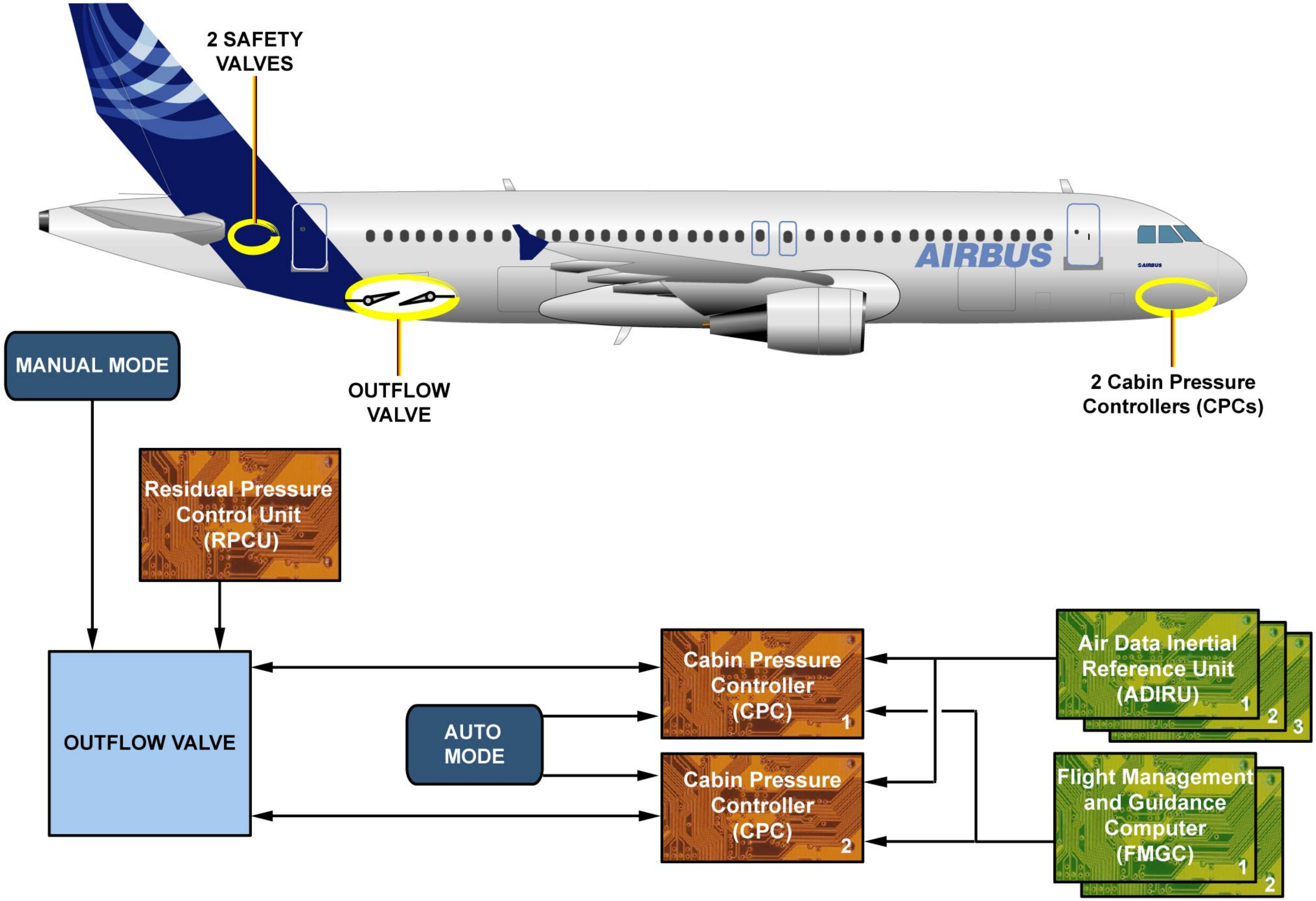
SAFETY PRECAUTIONS

21 PRESSURIZATION SYSTEM PRESENTATION (1)

SYSTEM INTRODUCTION

The pressurization system on the Single Aisle (SA) family normally operates automatically to adjust the cabin altitude and rate of climb to ensure maximum passenger comfort and safety.
The pressurized areas are:
- the cockpit,
- the avionics bay,
- the cabin,
- the cargo compartments.

The concept of the system is simple. Air is supplied from the air conditioning packs to the pressurized areas.
An outflow valve is used to regulate the amount of air allowed to escape from the pressurized areas.
Two Cabin Pressure Controllers (CPCs) carry out the automatic control of the outflow valve. Each CPC controls one electric motor on the outflow valve assembly. The CPC interfaces with other A/C computers to optimize the pressurization/depressurization schedule.
There are two automatic pressurization systems. Each CPC and its electric motor make one system. Only one system operates at a time with the other system acting as backup in case of a failure. The system in command will alternate each flight.
A third motor is installed for manual operation of the outflow valve in case both automatic systems fail.
To protect the fuselage against excessive cabin differential pressure, safety valves are installed on the rear pressure bulkhead. The safety valves also protect against negative differential pressure.
The Residual Pressure Control Unit (RPCU) controls the residual pressure in the cabin and takes over the control of the outflow valve automatically on ground by providing power directly to the manual motor of the outflow valve to open fully the valve.



SYSTEM INTRODUCTION

UAJ09471 - U19T4T0 - UM21PW000000002

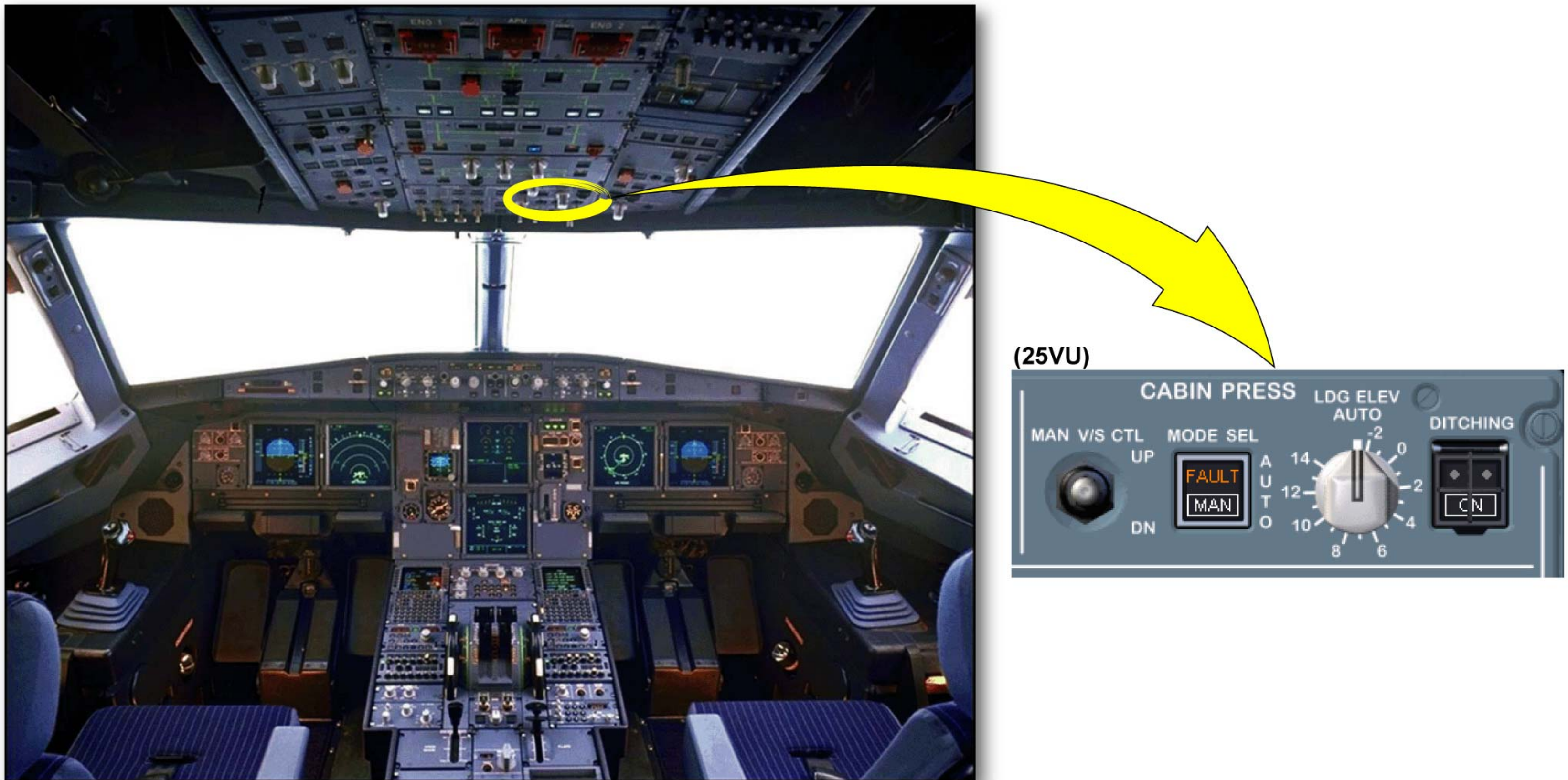
21 PRESSURIZATION SYSTEM PRESENTATION (1)

CONTROL AND INDICATING

This section will highlight the control panels and indications for the pressurization system.

CONTROL PANEL

The CABIN PRESSure control panel is installed on the overhead panel. The panel includes both automatic and manual pressurization controls.
The MODE SELect switch lets the system be used in automatic or manual mode, in case of failure of the automatic function.
When the manual mode is selected, the MANual Vertical Speed (V/S) ConTroL switch is used to directly control the outflow valve (indirectly, the cabin rate of climb) using the third motor.
The guarded DITCHING switch is used to close all lower fuselage valves so that the A/C can be sealed in the unlikely event of a ditching.



UAJ09471 - U19T4T0 - UM21PW000000002

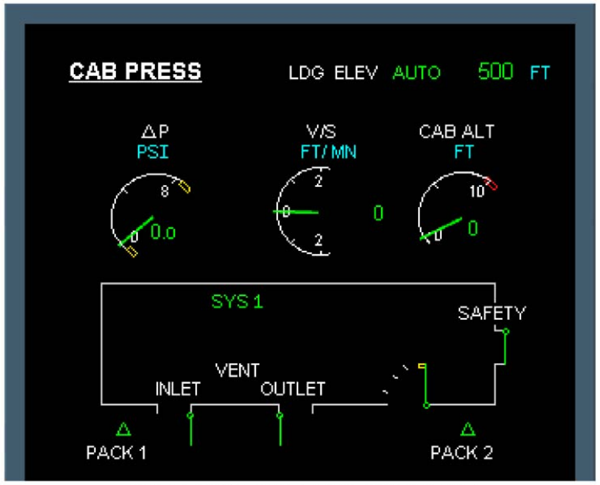
CONTROL AND INDICATING - CONTROL PANEL

21 PRESSURIZATION SYSTEM PRESENTATION (1)

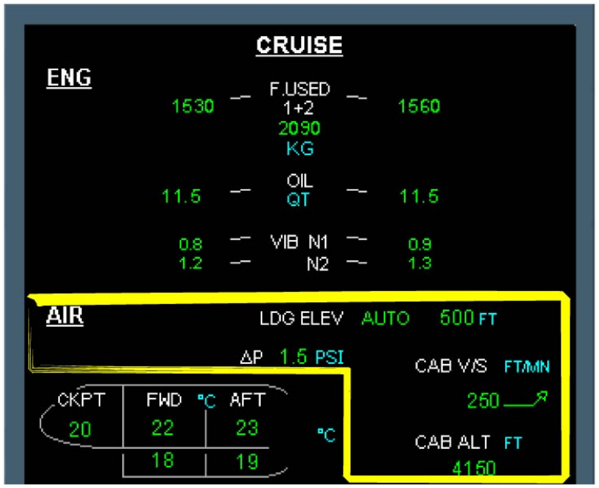
CONTROL AND INDICATING (continued)

ECAM PAGES

The crew can monitor all cabin pressure functions on the ECAM CABin PRESS page.
Some of the pressurization parameters are repeated on the ECAM CRUISE page.



SD ECAM CAB PRESS PAGE



SD ECAM CRUISE PAGE

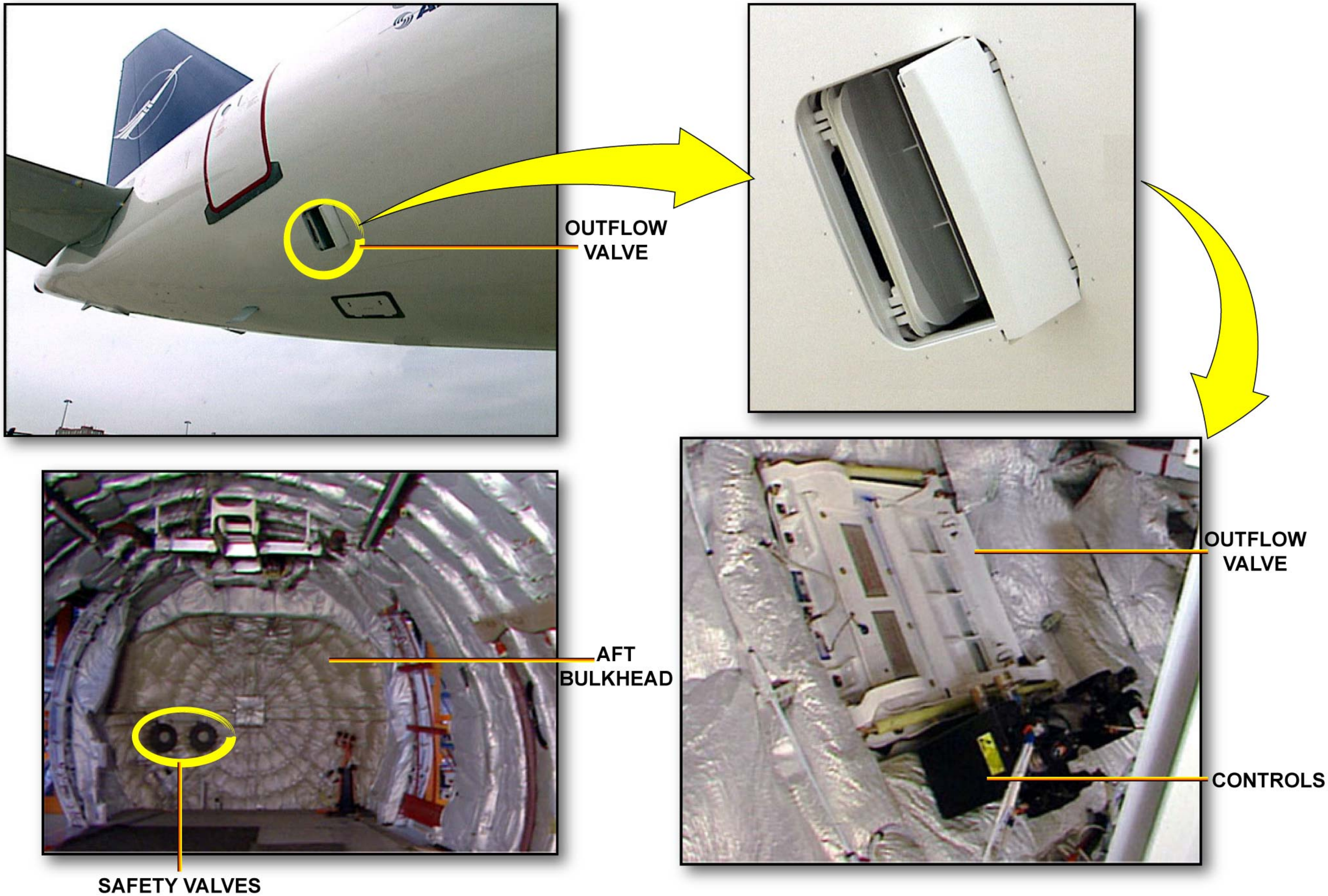
CONTROL AND INDICATING - ECAM PAGES

UAJ09471 - U19T4T0 - UM21PW000000002

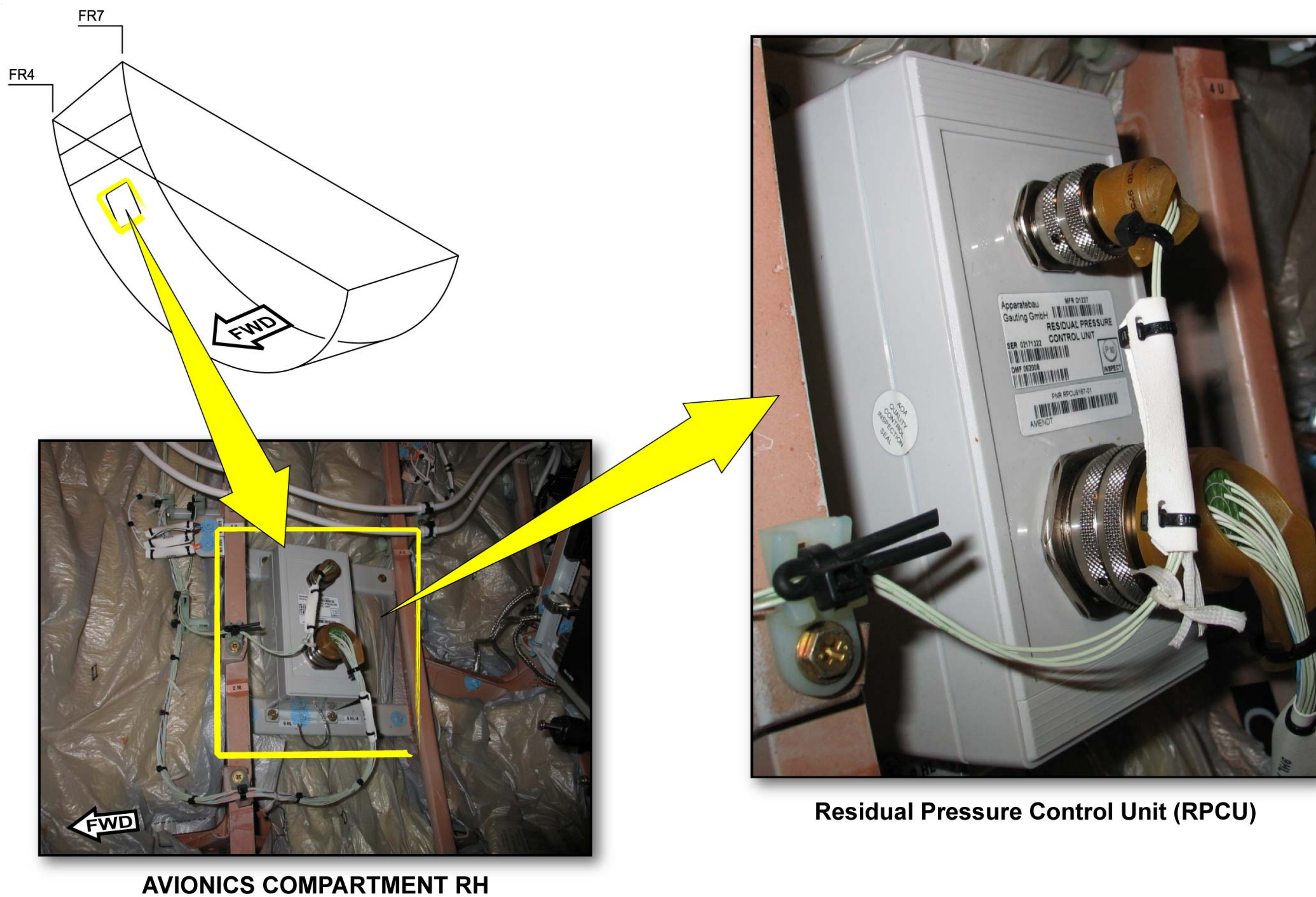
21 PRESSURIZATION SYSTEM PRESENTATION (1)

COMPONENT LOCATION

Pressurization is achieved by means of a dual gate type outflow valve.
The outflow valve is operated by three electrical motors; two for automatic mode and one for manual mode.
Two safety valves are installed on the pressure bulkhead at the rear of the cabin.
The RPCU is installed in the right-hand side of the avionics compartment.



COMPONENT LOCATION



COMPONENT LOCATION

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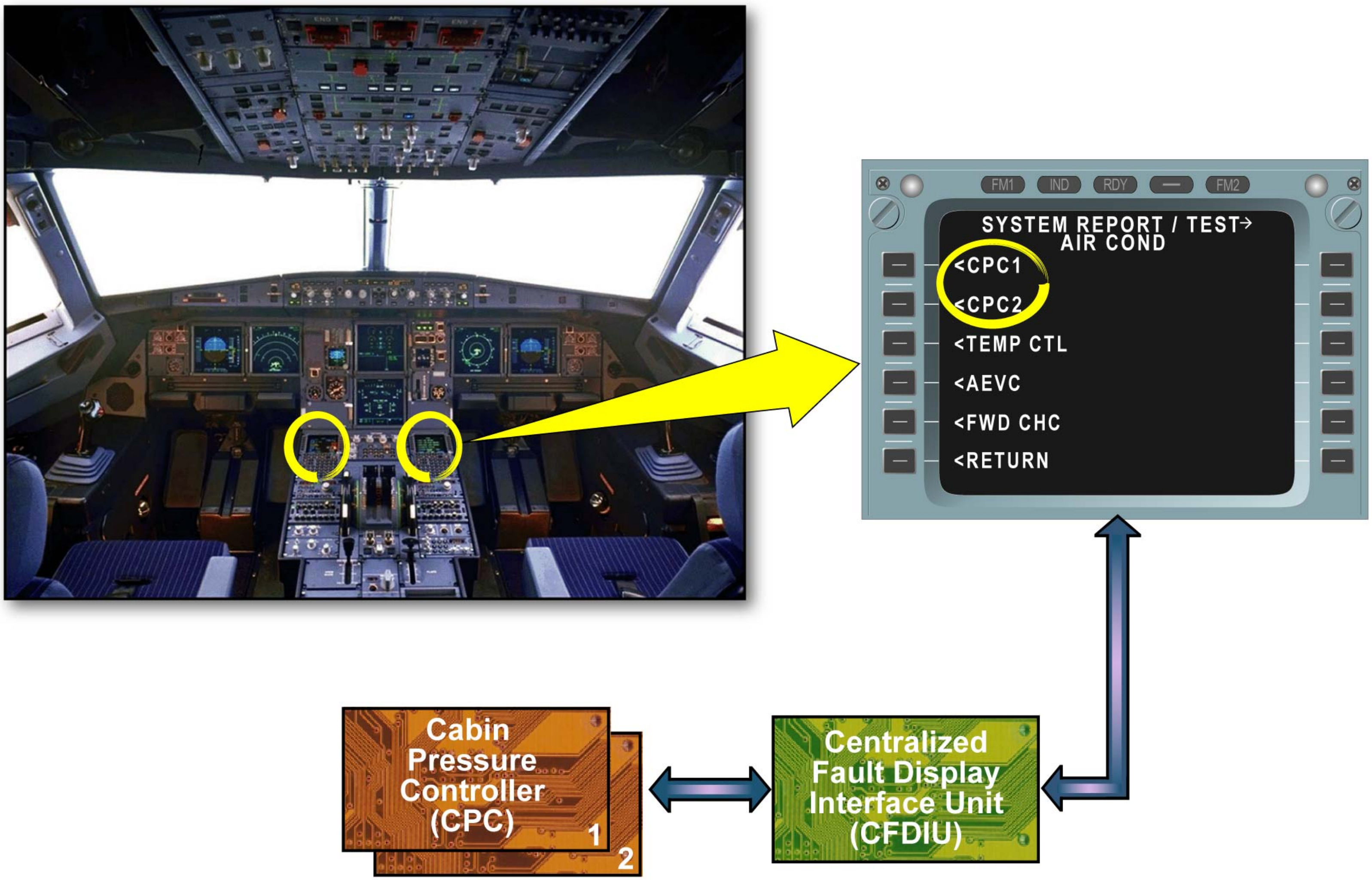
21 PRESSURIZATION SYSTEM PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

The two CPCs are connected to the Centralized Fault Display Interface Unit (CFDIU) for test purposes and fault reporting.



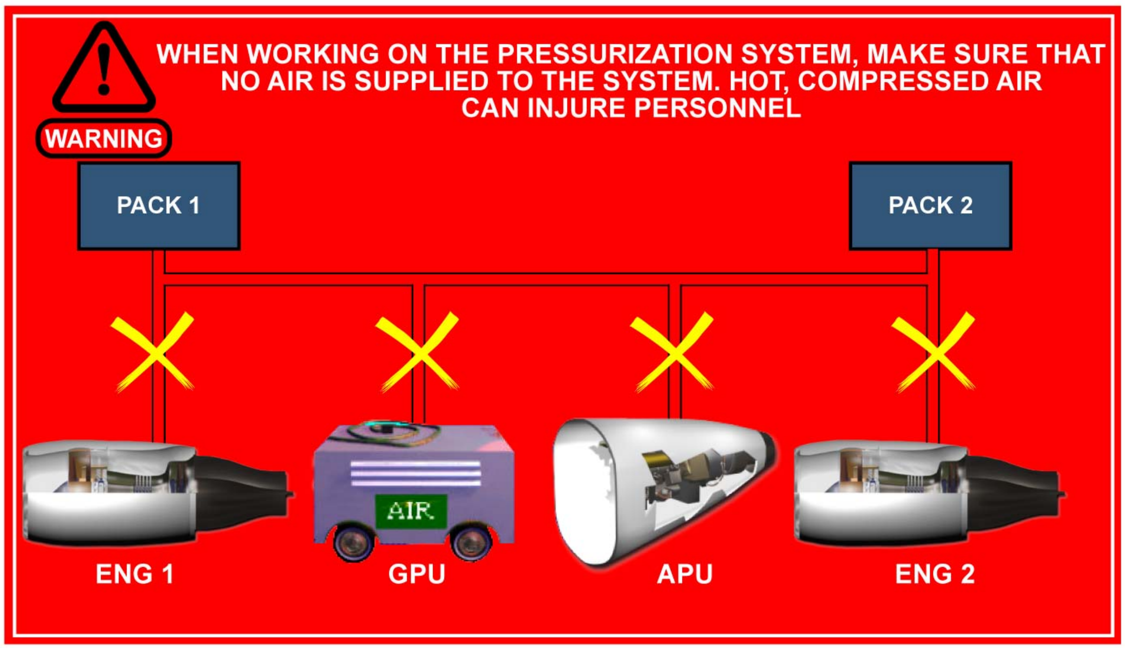
MAINTENANCE/TEST FACILITIES

UAJ09471 - U19T4T0 - UM21PW000000002

21 PRESSURIZATION SYSTEM PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on A/C, make sure you obey all the Aircraft Maintenance Manual (AMM) procedures. This will prevent injury to personnel and/or damage to the A/C. Here is an overview of the main safety procedures related to the pressurization system.
The outflow valve may be operated manually to pressurize the A/C on the ground.
Use caution when doing the CPC test from the MCDU. The outflow valve cycles closed during the test.



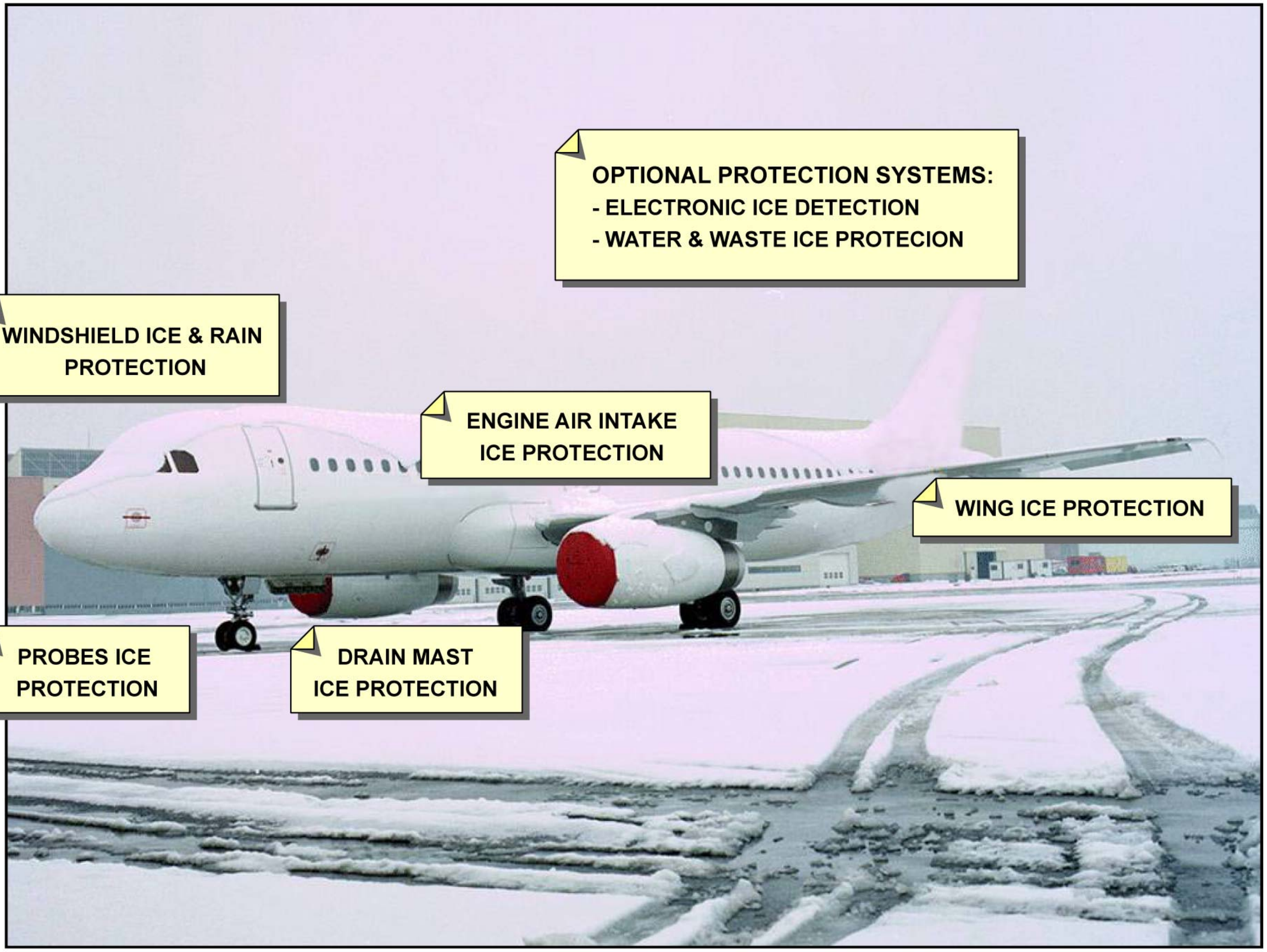
SAFETY PRECAUTIONS

UAJ09471 - U19T4T0 - UM21PW000000002

30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

SYSTEM INTRODUCTION

The ice and rain protection system enables unrestricted operation in icing conditions and heavy rain.
For anti-icing, hot air or electrical heating protects critical areas of the aircraft.
The different subsystems of the ice and rain protection system are:
- wing ice protection,
- engine air intake ice protection,
- probe ice protection,
- windshield ice and rain protection,
- drain mast ice protection,
- ice detection system (optional),
- water and waste system ice protection (some are optional).

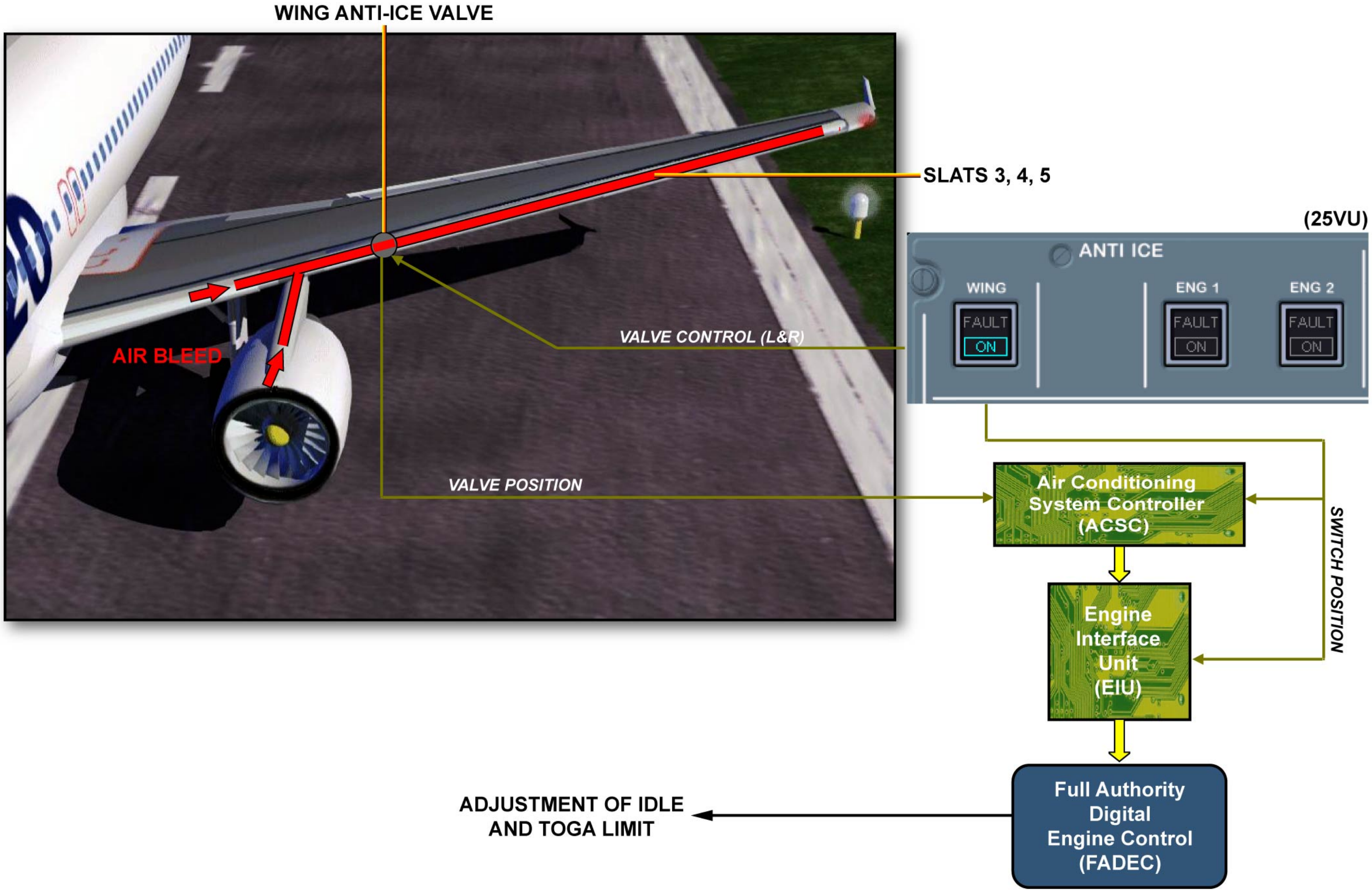


SYSTEM INTRODUCTION

30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

WING ICE PROTECTION

A single P/BSW on the overhead ANTI ICE panel controls WAI supply to both wings. WAI must be manually selected by the crew and is available in flight only.
Whenever WAI is selected, the engine idle is increased and the Takeoff/Go Around (TOGA) limit (max thrust) is decreased by the Full Authority Digital Engine Control (FADEC). This signal is sent to the FADEC through the Engine Interface Unit (EIU). For testing purposes, the WAI can be selected on the ground but will be automatically limited to 30 seconds operation to prevent damage to the wing leading edge.
Hot air from the pneumatic system is supplied for the anti-icing of the three outboard leading edge slats (3, 4 and 5) of each wing. Bleed air from the engines or the APU is supplied to each wing through a pressure regulating and shut off valve called Wing Anti-Ice (WAI) valve.



WING ICE PROTECTION

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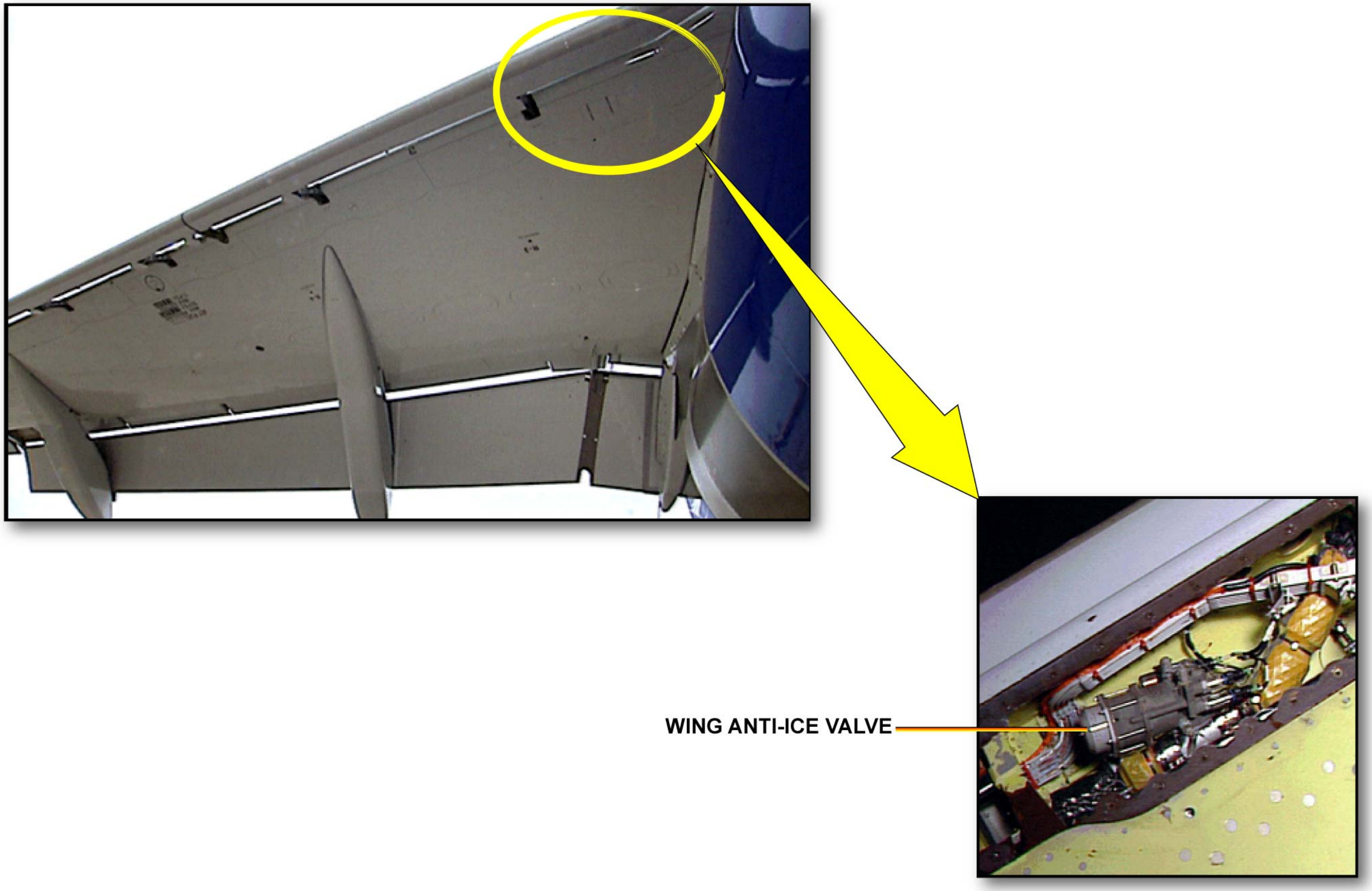

WING ICE PROTECTION

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30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

ENGINE AIR INTAKE ICE PROTECTION

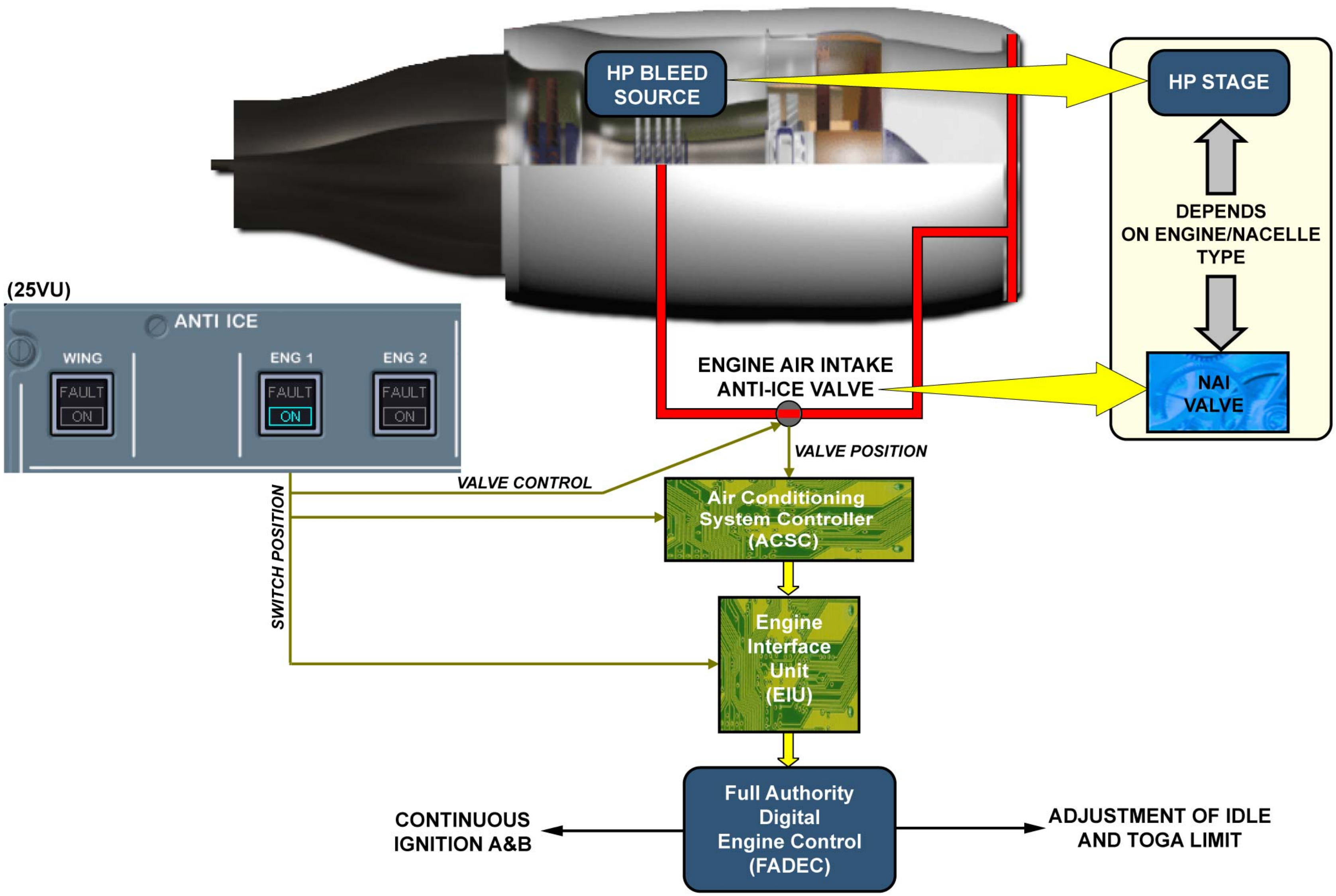
Engine anti-ice is manually selected by the crew and is available in flight or on the ground with the engine running. After circulating around the inlet, the air is ducted overboard.

NOTE: Note: In the event of an electrical power supply failure, this valve will automatically open when the engine is running.

Whenever engine anti-ice is selected, the engine idle speed is increased and the TOGA limit (max thrust) is decreased by the FADEC. This signal is sent to the FADEC through the EIU. The ignition system is automatically switched on at the PW6000 and V2500 engines. This is not applicable for the CFM engine.

Each engine air intake is protected from ice by an independent air bleed supply from the High Pressure (HP) compressor of that engine.

The air is supplied through the engine air intake anti-ice valve.



ENGINE AIR INTAKE ICE PROTECTION

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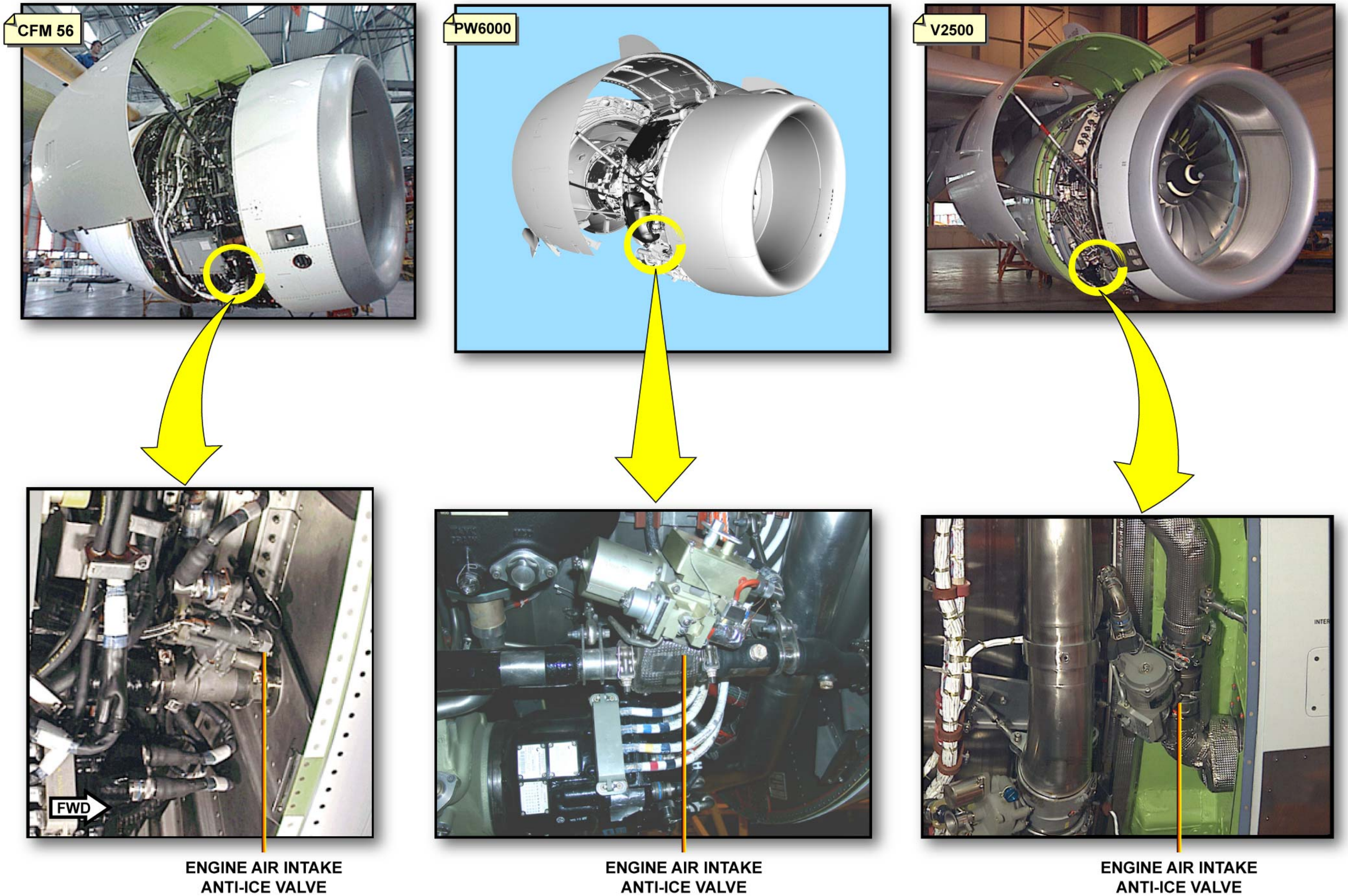

ENGINE AIR INTAKE ICE PROTECTION

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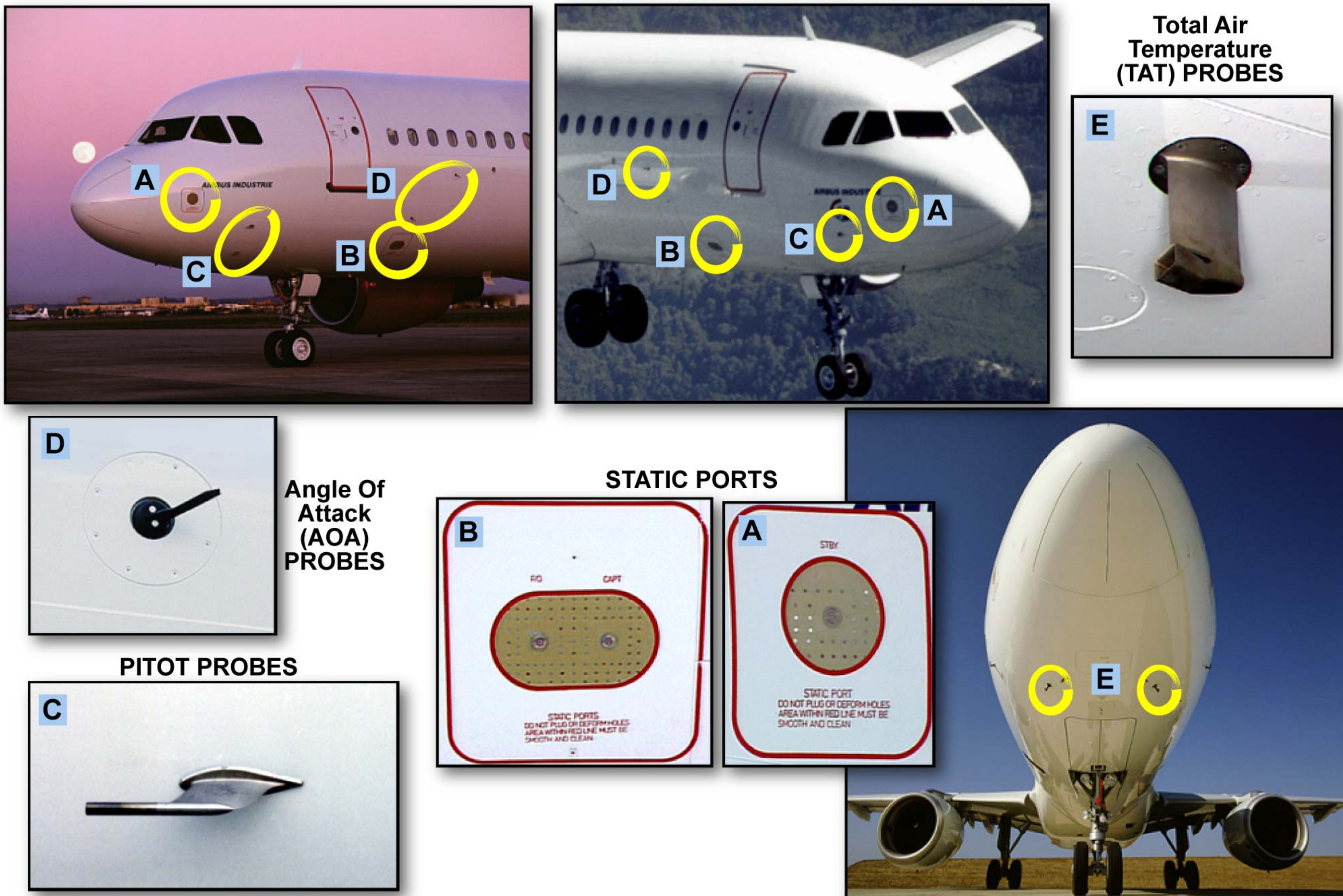
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

PROBE ICE PROTECTION

Ice protection of the Angle Of Attack (AOA) sensors, pitot probes, static ports, and Total Air Temperature (TAT) probes is achieved by electrical heating.
In order to give reliable information to the air data systems, the air data probes are heated automatically when at least one engine is running. The probes are arranged in three channels related to the three air data systems: CAPT, F/O and STBY (Air Data/Inertial Reference Unit (ADIRU) 1, 2, 3). The heating system for each channel is controlled by a Probe Heat Computer (PHC) 1, 2, 3.
The PROBE/WINDOW HEAT P/BSW (normally in the AUTO position) may be used to select the probe heating ON with the engines shut down.



PROBE ICE PROTECTION

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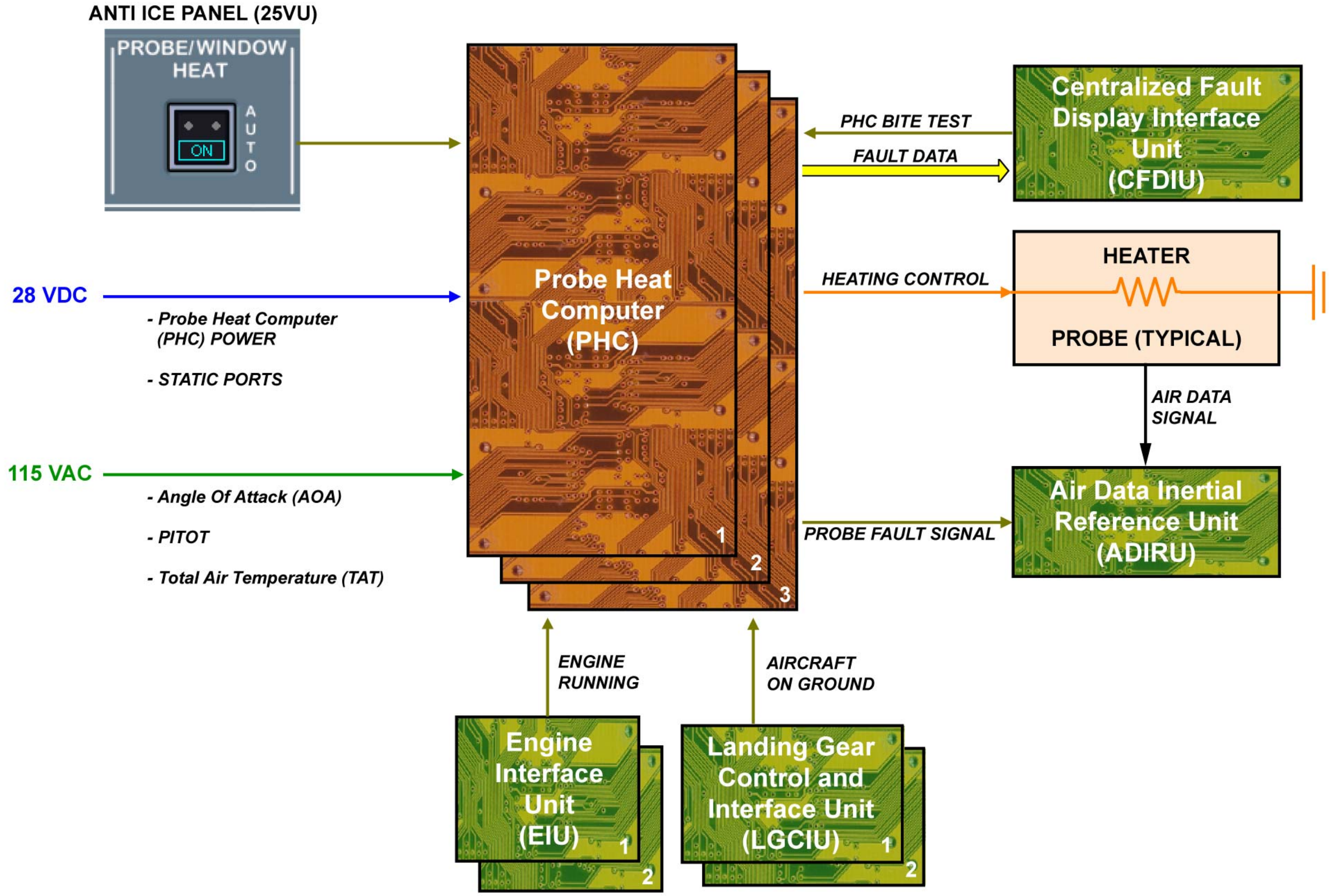

PROBE ICE PROTECTION

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30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

WINDOWS ANTI-ICING AND DEFOGGING

Electrical heating is supplied for windshield anti-icing and cockpit side window de-fogging.
The front windshields and side windows are heated automatically when at least one engine is running. The heating system for each side is controlled and monitored by a Window Heat Computer (WHC) 1, 2.
The PROBE/WINDOW HEAT P/BSW (normally in the AUTO position) may be used to select the window heating ON with the engines shut down.
The windows are protected against overheat by sensors and flight/ground logic. The sensors turn off the heat when the temperature reaches the limit and the windows are heated at a lower power on the ground than in flight.

WINDOWS ANTI-ICING AND DEFOGGING

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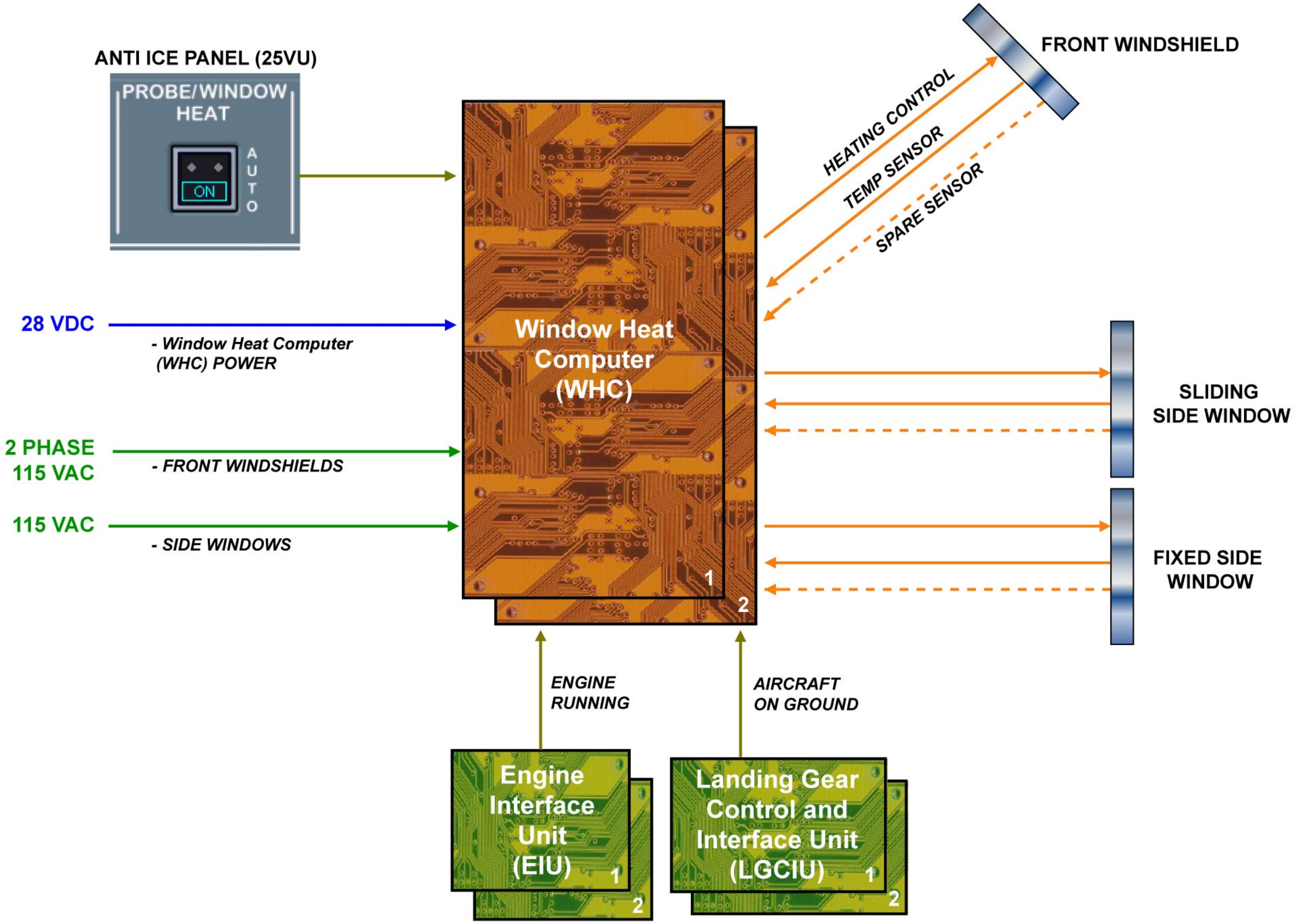

WINDOWS ANTI-ICING AND DEFOGGING

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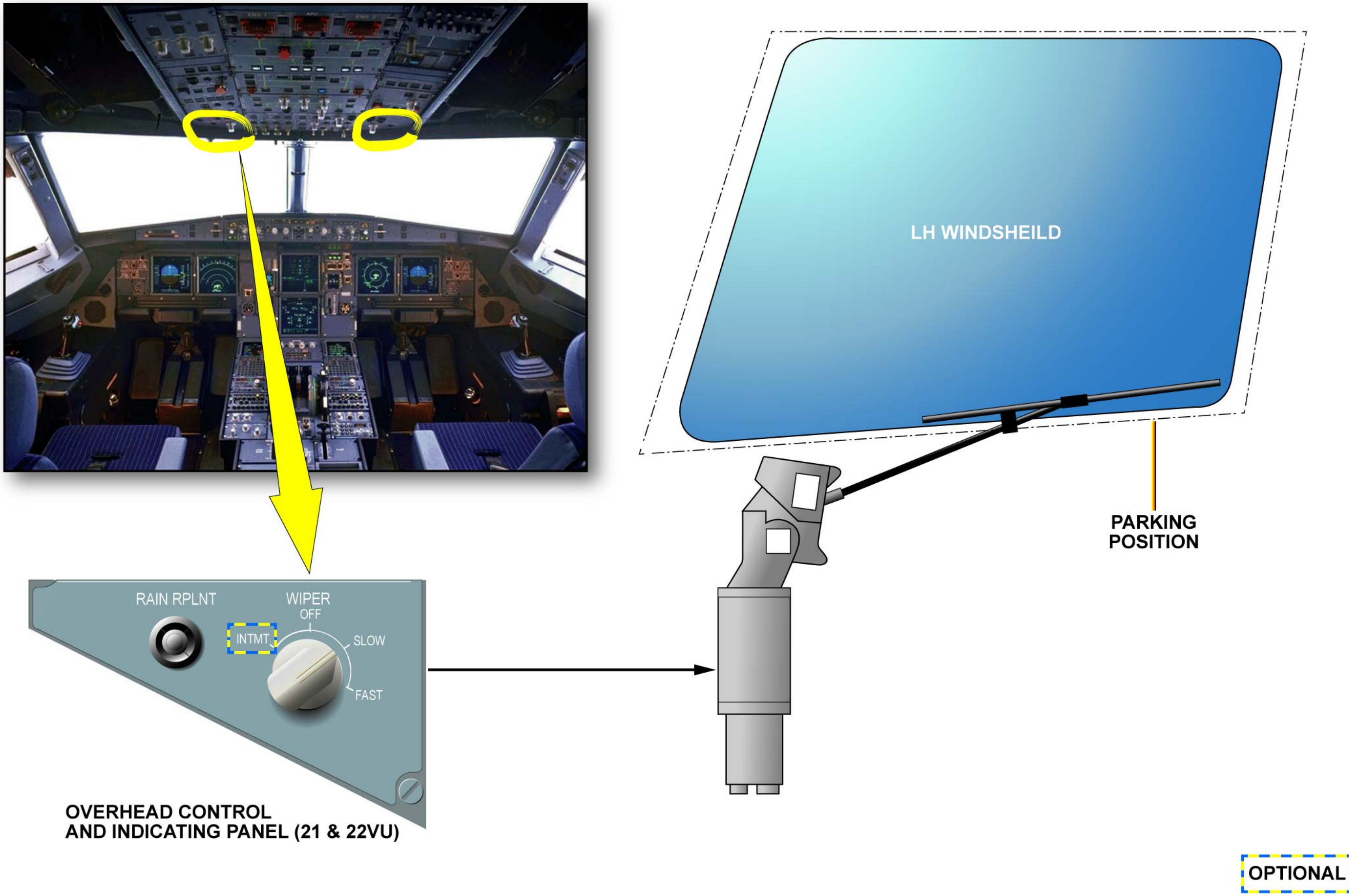
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

WIPER SYSTEM PRESENTATION

Two independent wipers powered by DC motors remove rain from the windshield. The wiper system is designed to work efficiently up to 200 knots.
A rotary selector located on the overhead panel controls each wiper. "SLOW" or "FAST" speed can be selected. The selector switch can optionally have an "INTerMiTtent" position. When the selector is set to "OFF", the wiper stops in the parking position and is lifted off the aircraft structure, at the bottom part of the windshield.
Do not operate the wipers on a dry windshield.

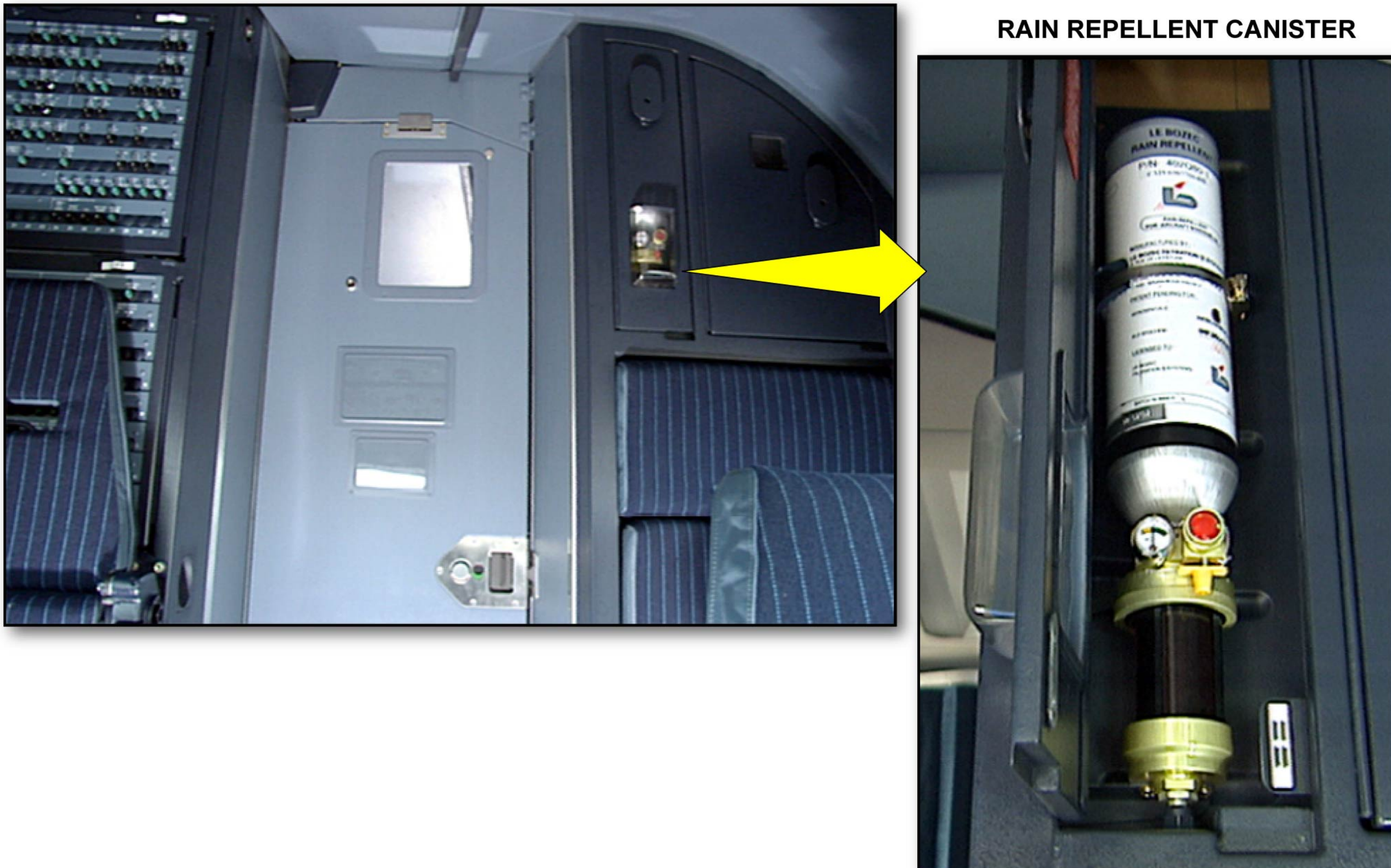


WIPER SYSTEM PRESENTATION

30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

RAIN REMOVAL

Two independent wipers with a rain repellent system remove heavy rain from the windshield. The wipers operate independently. The rain repellent is discharged onto the left or right windshield from a pressurized canister installed at the rear of the cockpit.

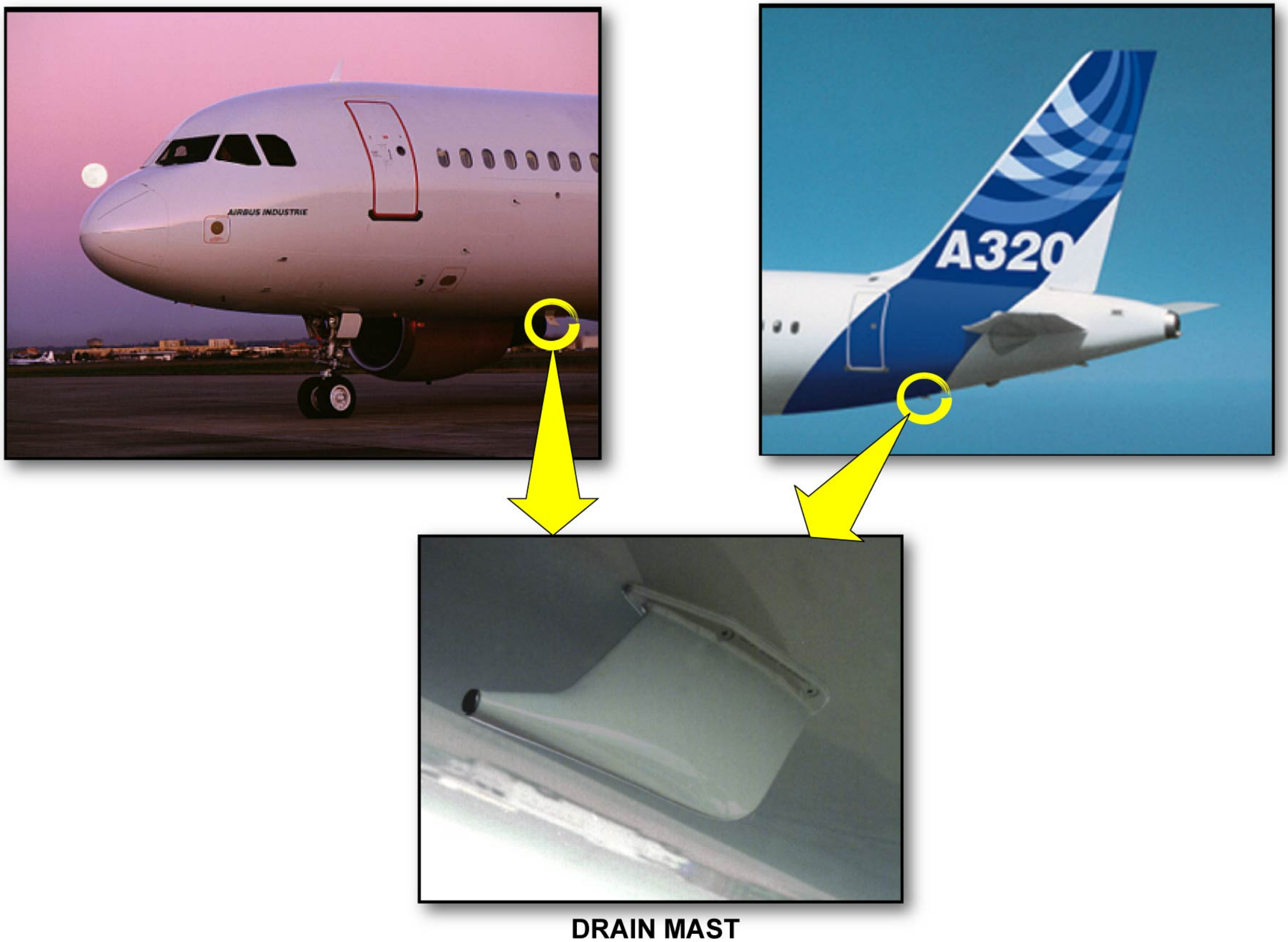


RAIN REMOVAL

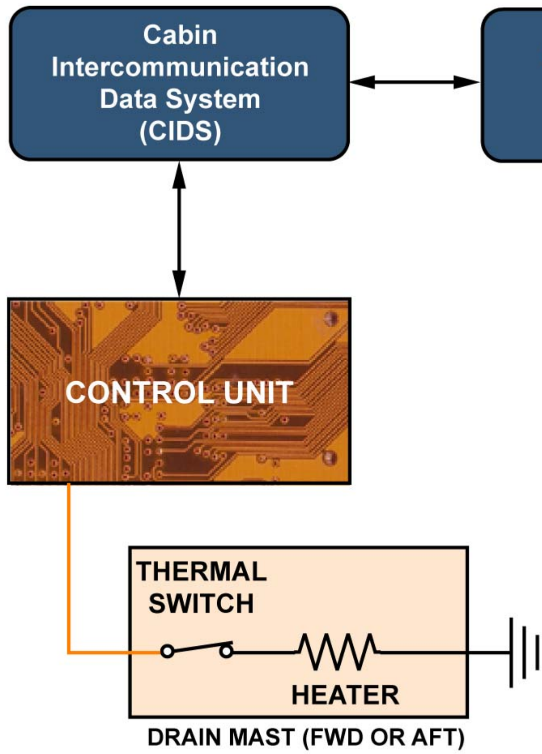
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

DRAIN MAST ICE PROTECTION

There are two drain masts installed on the lower fuselage forward and aft sections.
When the electrical system is powered, the waste water drain masts are also electrically heated. Two control units located in the cargo compartments control the heating of the forward and aft drain masts.



DRAIN MAST ICE PROTECTION



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DRAIN MAST ICE PROTECTION

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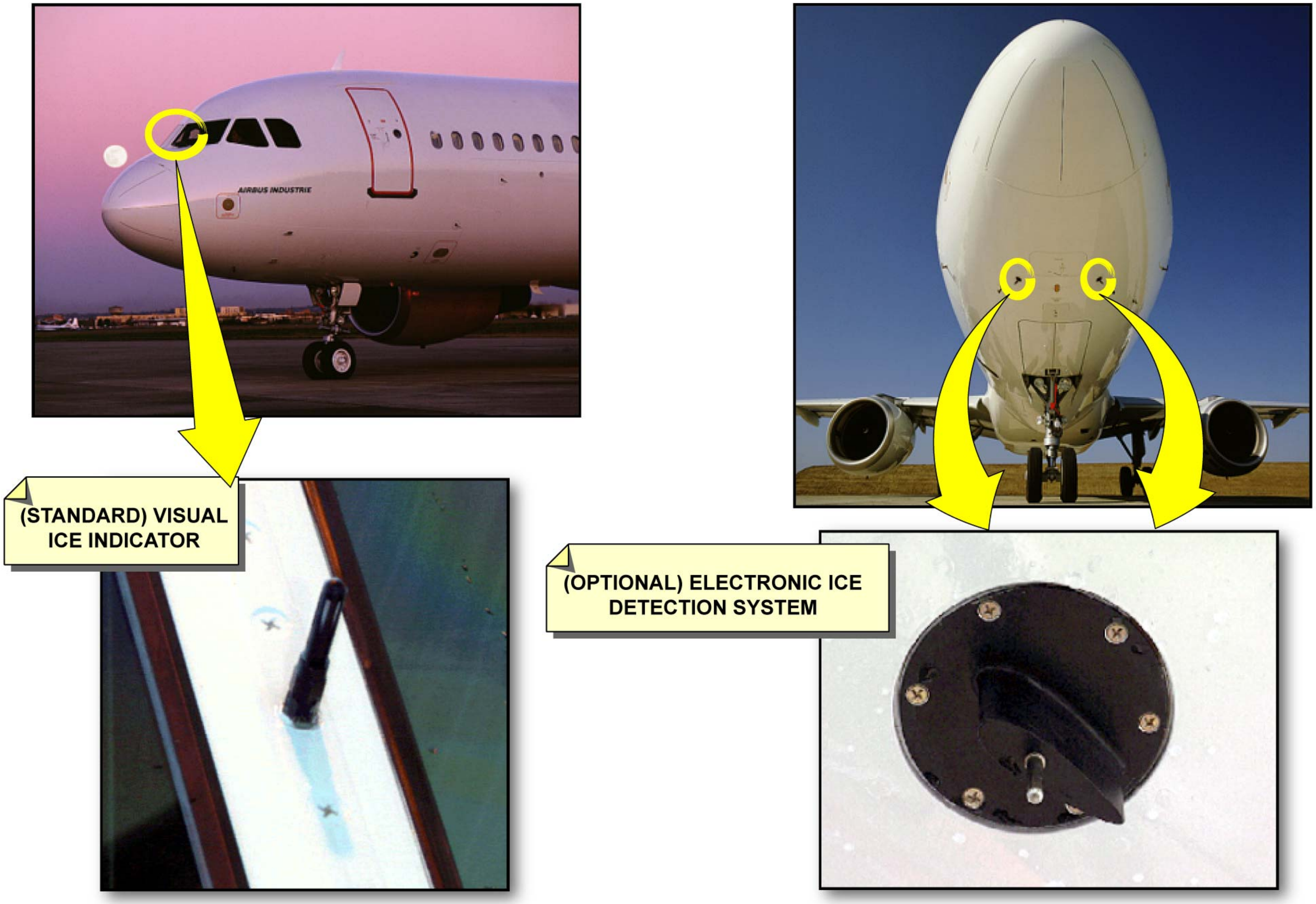
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

ICE DETECTION

An external visual ice indicator with an integral light is installed between the two windshields.
The ice detection system (if installed) has two separate ice detectors located on the forward lower section of the fuselage. The ice detectors send an "ice detected" signal directly to the Flight Warning Computers (FWCs).



ICE DETECTION

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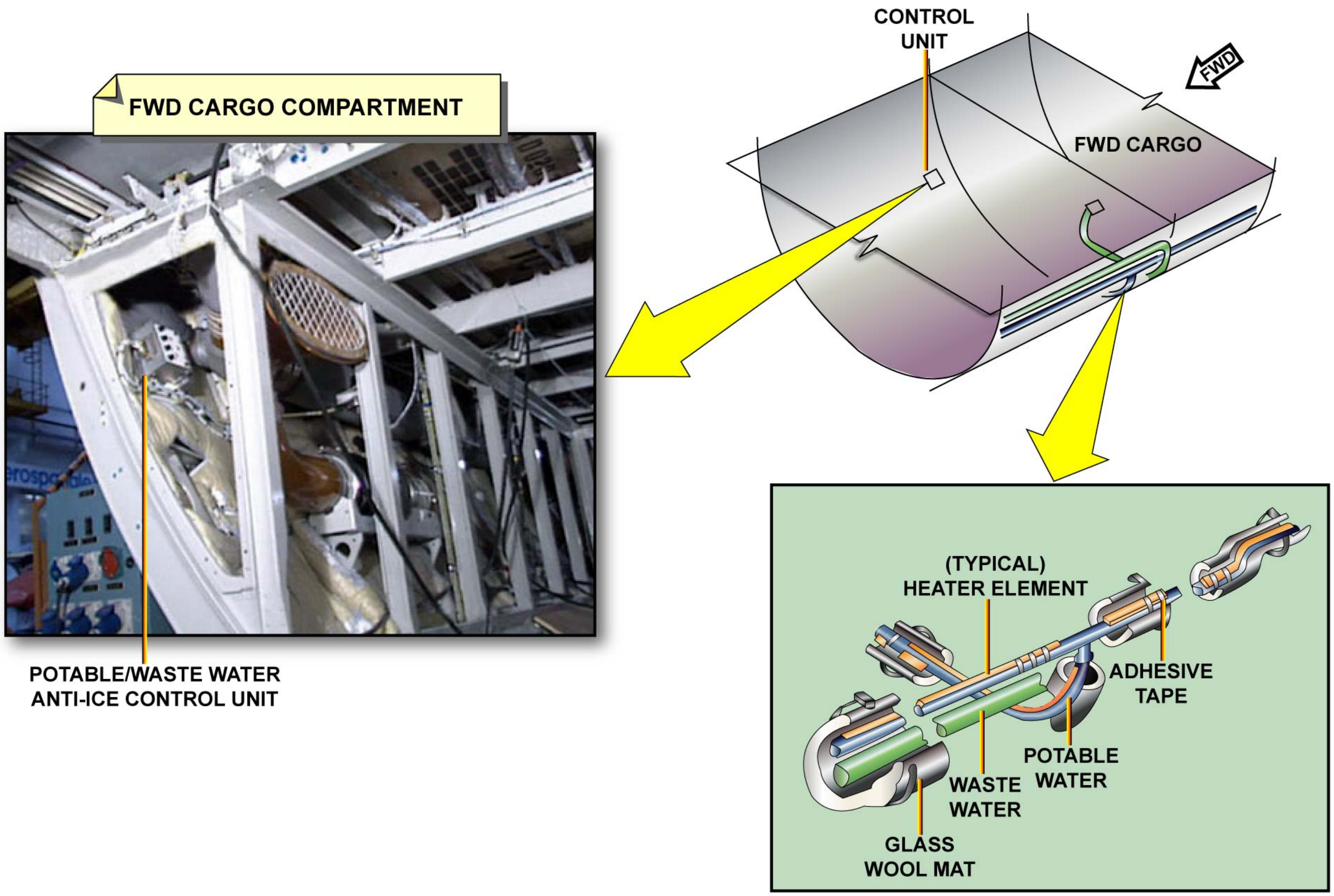
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

MISCELLANEOUS SYSTEMS

It is also possible for the aircraft to have electrical heating systems installed for:
- potable water supply lines,
- waste water lines,
- water servicing panels.

Control units connected to temperature sensors control automatically these heating systems. The control units control multiple heating elements and are installed in the cargo compartments.



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MISCELLANEOUS SYSTEMS

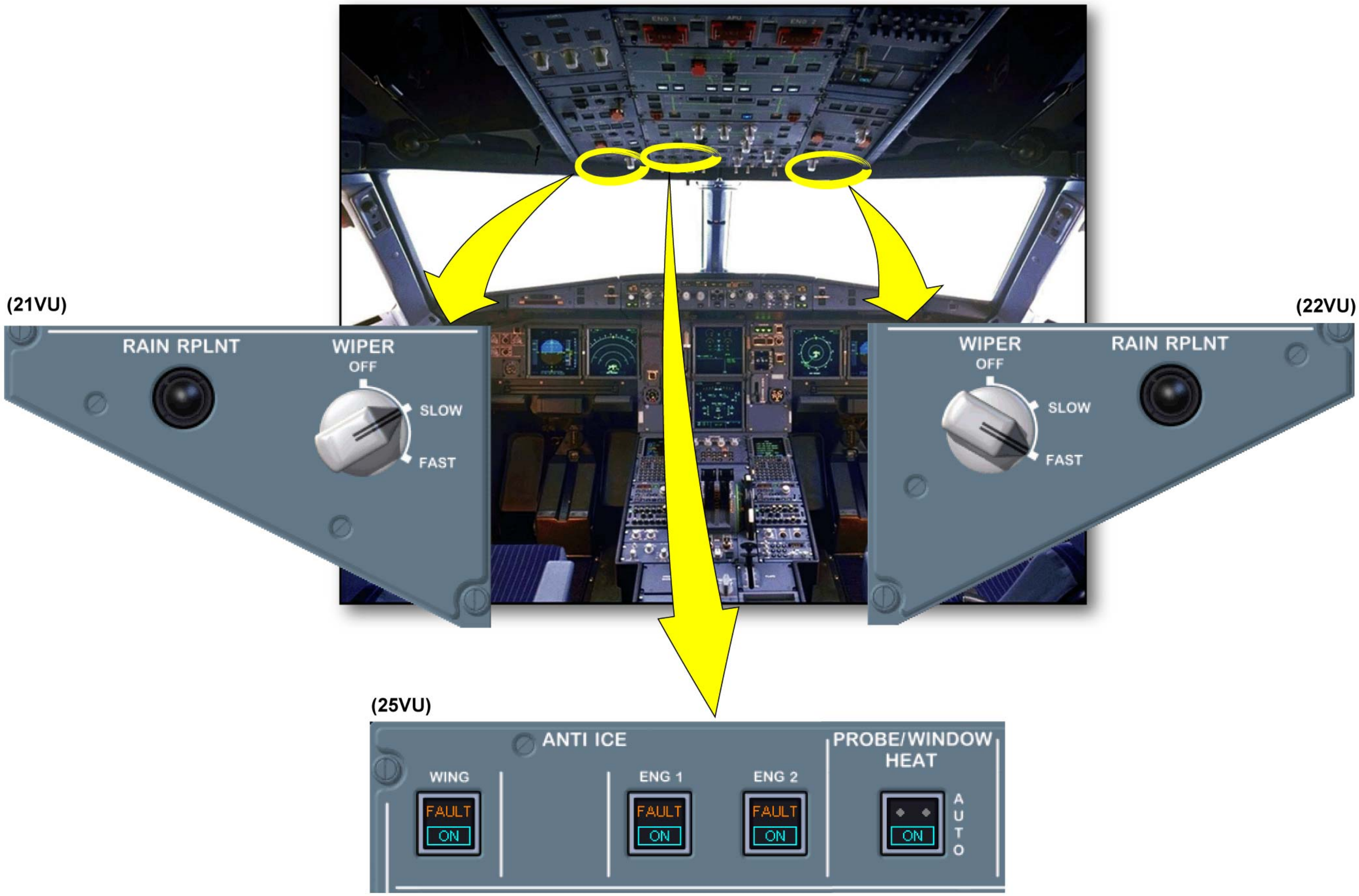
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

CONTROL AND INDICATING

This section will highlight the control panels and indications for the ice and rain protection systems.

CONTROL PANEL

The controls for the engine and wing anti-ice systems are located on the overhead ANTI ICE panel. The probes ice protection and windows anti-icing systems are controlled from the PROBE/WINDOW HEAT P/BSW.
Each rain removal system is independently controlled by individual selectors on the overhead panel, on the left and right hand sides.



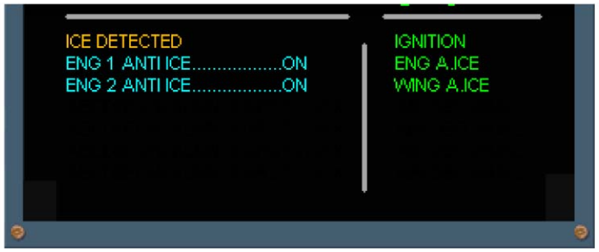
CONTROL AND INDICATING - CONTROL PANEL

30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

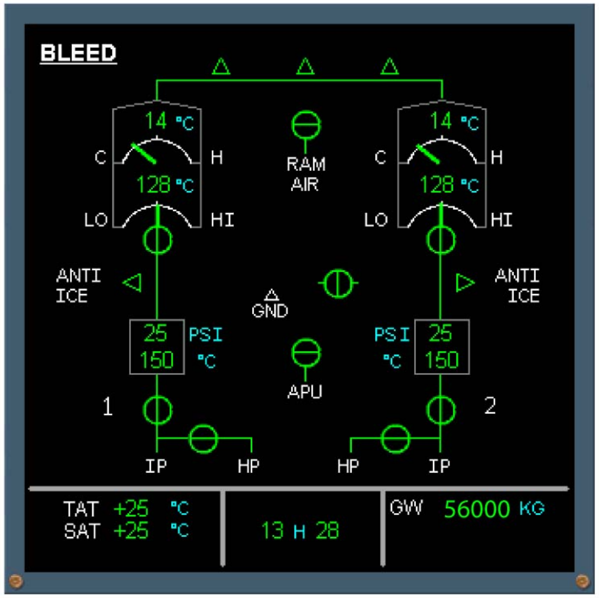
CONTROL AND INDICATING (continued)

ECAM INDICATION

A MEMO appears on the upper ECAM when engine anti-ice or WAI is selected. WAI valve position indication is available on the BLEED page when the system is selected.
The optional electronic ice detection system sends warnings directly to the ECAM though the FWCs.



E/WD



SYSTEM DISPLAY (SD)

CONTROL AND INDICATING - ECAM INDICATION

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30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

CONTROL AND INDICATING (continued)

DRAIN MAST MONITORING

Drain mast heating faults may be displayed either on the Flight Attendant Panel (FAP) or on the MCDU via the CFDS.

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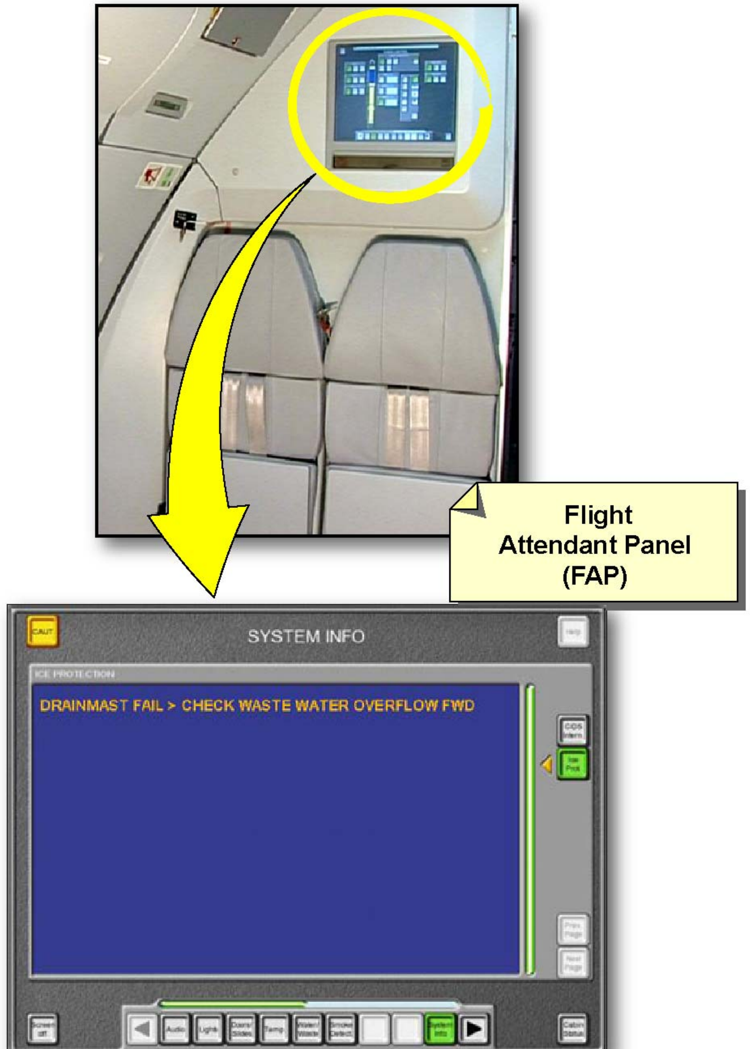

CONTROL AND INDICATING - DRAIN MAST MONITORING

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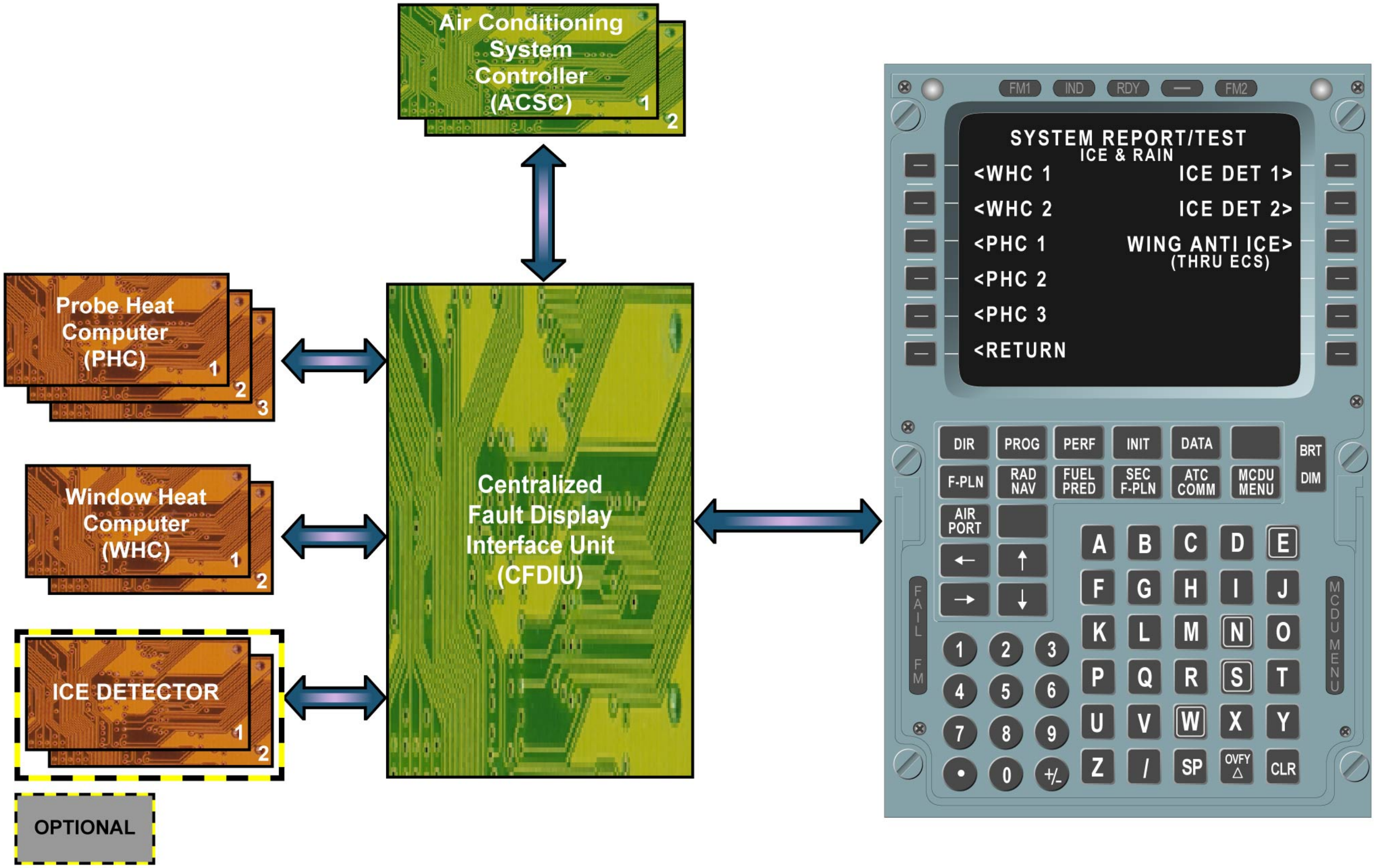
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

MAINTENANCE/TEST FACILITIES

The Air Conditioning System Controller (ACSC) monitors the wing and engine anti-ice valve position and the valves P/BSW position. The ACSC transmits this information to the Centralized Fault Display System (CFDS).
All 3 PHCs, both WHCs and the ice detectors are connected directly to the Centralized Fault Display Interface Unit (CFDIU). Each system menu is available through the MCDU.



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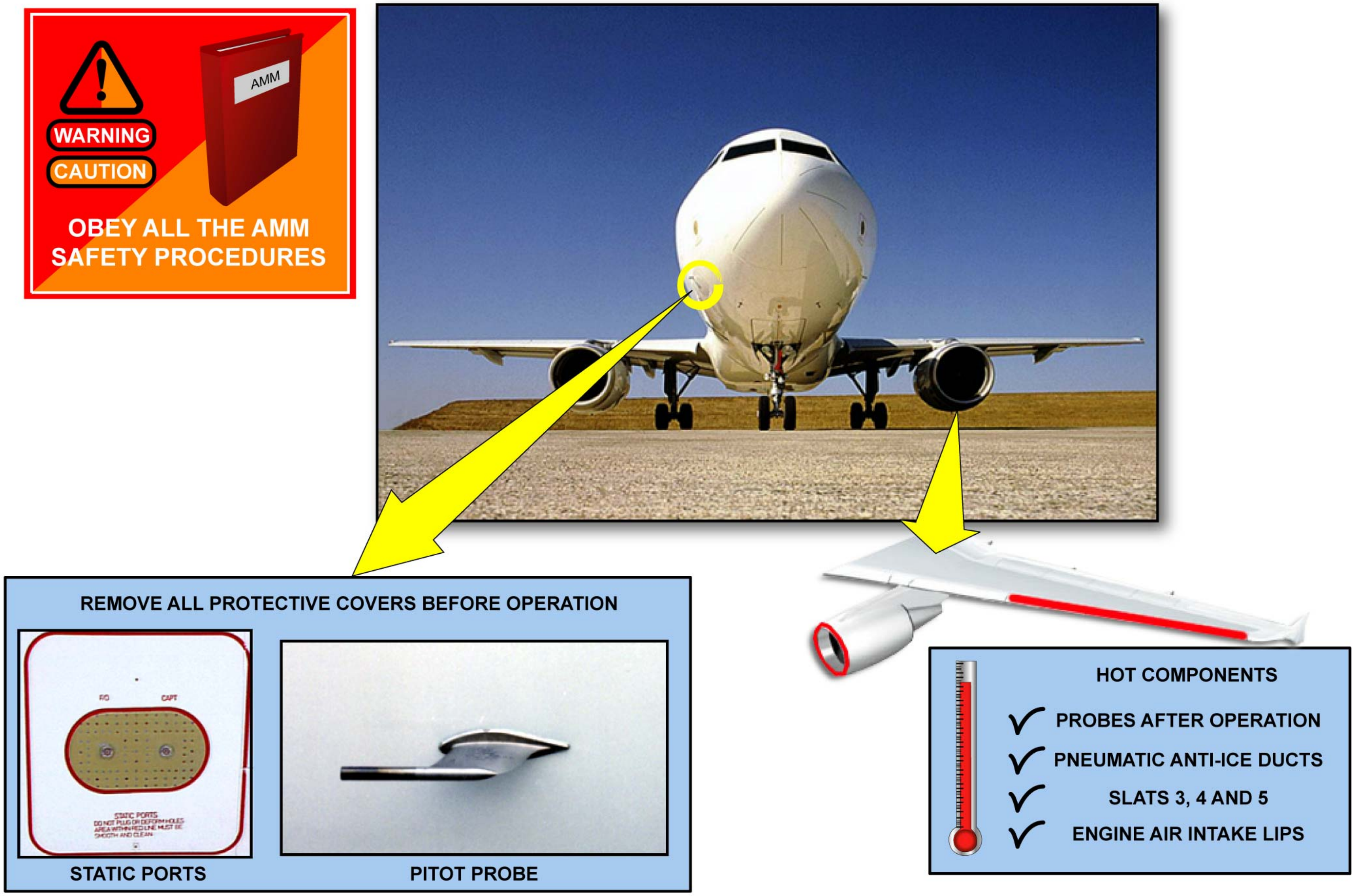
MAINTENANCE/TEST FACILITIES

30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

SAFETY PRECAUTIONS

When you work on the ice and rain protection system, make sure that you obey all Aircraft Manual Maintenance (AMM) safety procedures. This will prevent injury to persons and/or damage to the aircraft. Here is an overview of the main safety precautions related to the ice and rain protection system.
Remove the protective covers from the probes before activating the probe ice protection system.
Do not touch the probes during or immediately after operation. The probes are hot and can burn you.
Do not touch the anti-ice ducts, slats 3, 4 and 5 and engine air intake lips until they are cool. Those items stay hot for some time after the engine shuts down.



SAFETY PRECAUTIONS

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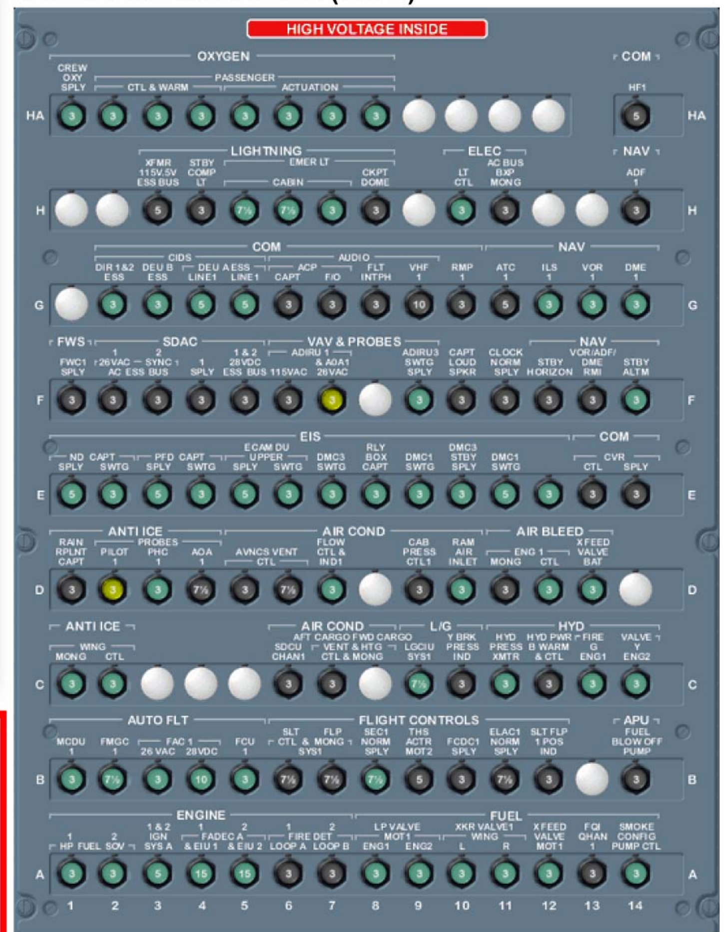
30 ICE AND RAIN PROT SYSTEMS PRESENTATION (1)

SAFETY PRECAUTIONS (continued)

WARNINGS ABOUT FAIL SAFE HEATING

The probe heat system is a fail-safe system in order to keep the probes and static ports de-iced (in flight) in case of a PHC failure.
The window heat system is designed in order to keep the windows defogged (in flight) in case of a WHC failure.
If the PHC or WHC power Circuit Breakers (C/Bs) are pulled, the probe or window heat will come on. Pulling the EIU C/B will have the same result. The EIU controls the "engine running" signal for automatic operation. If any of these C/Bs are pulled, all of the heater C/Bs must also be pulled.

OVERHEAD C/B PANEL (49VU)



WARNING

PULLING THE PROBE HEAT COMPUTER (PHC), THE LANDING GEAR CONTROL AND INTERFACE UNIT (LGCIU) OR THE ENGINE INTERFACE UNIT (EIU) POWER SUPPLY CIRCUIT BREAKERS CAUSES UNWANTED HEATING OF THE PROBES & STATIC PORTS AND / OR THE WINDOWS.
THIS CAN CAUSE INJURY AND BURNS.

SAFETY PRECAUTIONS - WARNINGS ABOUT FAIL SAFE HEATING

UAJ09471 - U19T4T0 - UM30PZ000000002

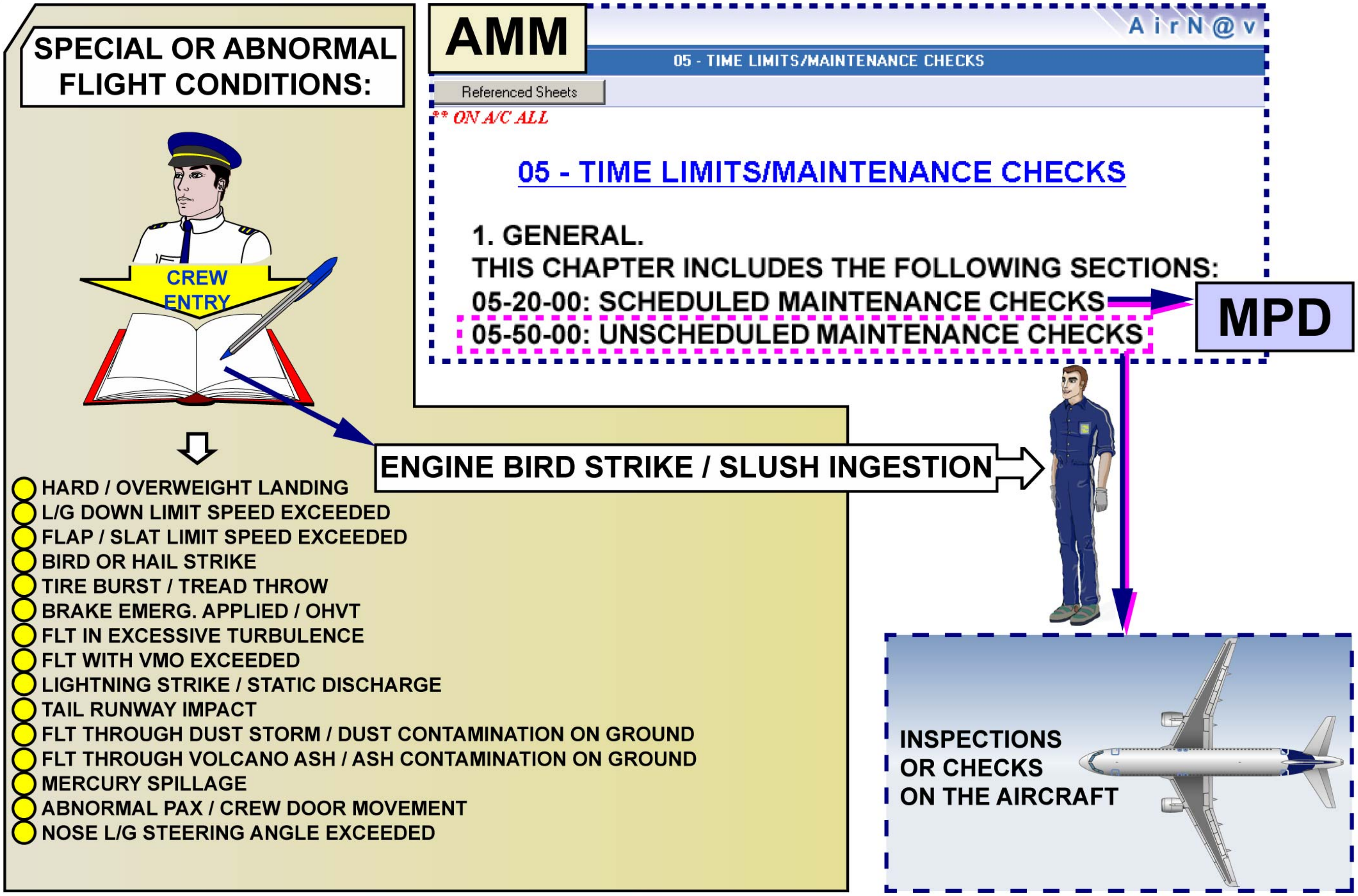
05 TIME LIMITS AND MAINTENANCE CHECKS (1)

SCHEDULED MAINTENANCE TASKS & CHECKS in MPD

This Chapter 05-20-00 "Life Limits and Maintenance Checks" is now covered in the Maintenance Planning Document (MPD).
The MPD is the repository document for all repetitive scheduled maintenance tasks declared by Airworthiness Directives (AD/CN), All Operator Telex (AOT), Inspection Service Bulletins (ISB), Service Information Letters (SIL), and Modifications (MOD/SB) and analyzed under the Maintenance Review Board (MRB).

UN-SCHEDULED MAINTENANCE in AMM Section 05-50-00

This Chapter 05-50-00 includes the maintenance checks that you must do when a flight crew report shows abnormal flight conditions.
Such maintenance actions are divided into two categories of information:
- inspections,
- checks.



SCHEDULED MAINTENANCE TASKS & CHECKS IN MPD & UN-SCHEDULED MAINTENANCE IN AMM SECTION 05-50-00

UAJ09471 - U19T4T0 - UM05PZ000000001

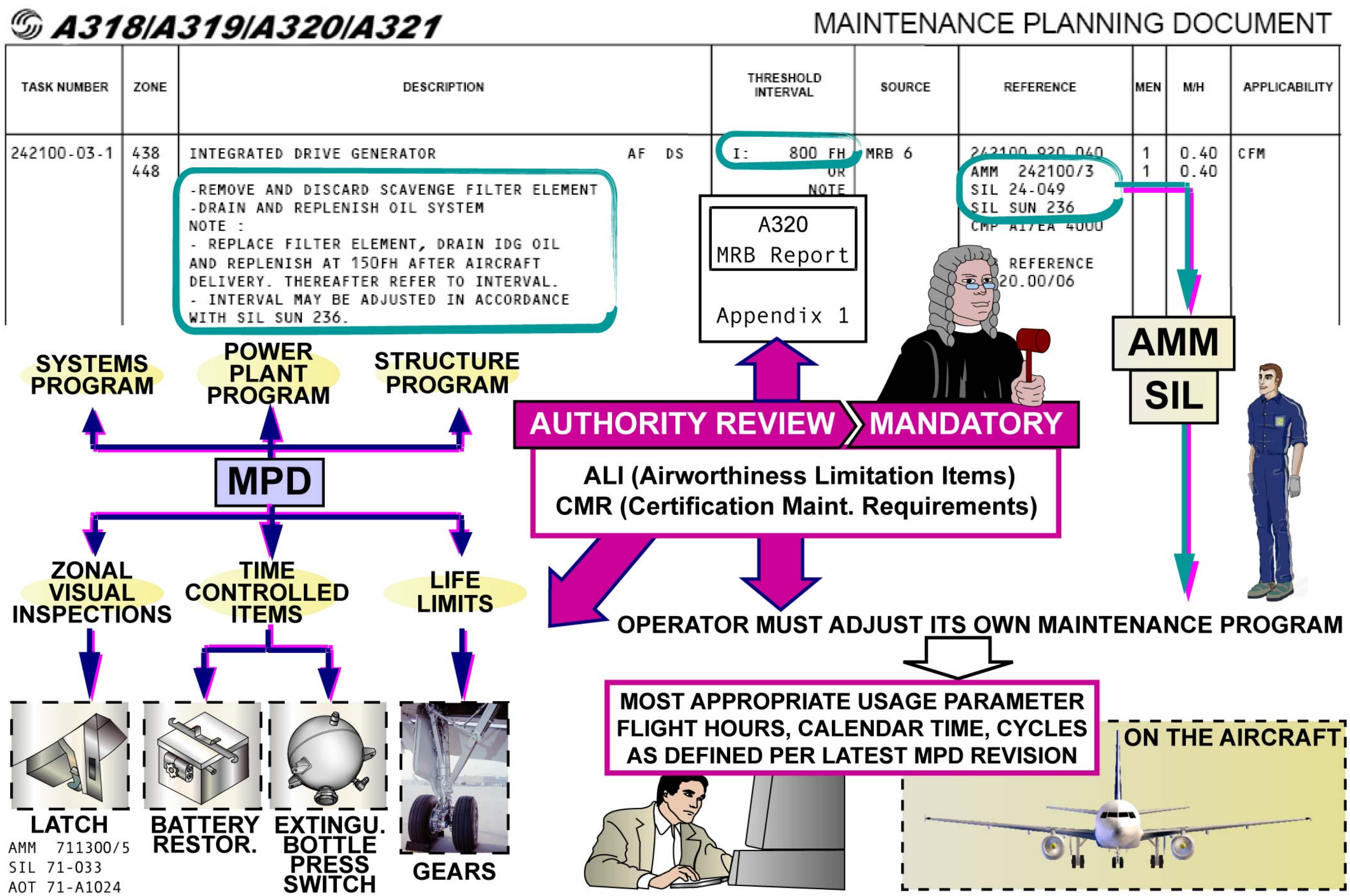
05 TIME LIMITS AND MAINTENANCE CHECKS (1)

SCHEDULED REPETITIVE REQUIREMENTS THROUGH MPD

The main objective of the MPD document is to provide maintenance planning information necessary for each operator to develop a customized maintenance program.
MPD reflects all repetitive scheduled maintenance tasks declared by AD/CN, AOT, ISB, SIL, and MOD/SB and analyzed under the MRB.
A typical scheduled repetitive task (Integrated Drive Generator (IDG) scavenge filter) is listed with the following data:
- the threshold interval, source document, cross-references to other manuals or documents (Aircraft Maintenance Manual (AMM) and SIL),
- Man Hours required to accomplish the work,
- the applicability in this Envelope document.

Note the Zonal inspection, requested by C CHECK interval, on the tension of the fan cowl latches, the AOT, AMM and SIL cross-referenced.
Some maintenance tasks have a higher ranking of requirement, when the maintenance requirement is identified as:
- "Airworthiness Limitations Item" (ALI) or "Life limit parts",
- "Certification Maintenance Requirements" (CMR).

The approved document MRB REPORT Appendix 1 lists all these airworthiness approved issues, the ALIs and CMRs.
The MPD details these airworthiness related items in the "Time controlled Items" and "Life Limits" sections.
It is the responsibility of each operator to adjust his own maintenance program in accordance with his National Authority.



SCHEDULED REPETITIVE REQUIREMENTS THROUGH MPD

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