

Reference to Figure 37 Fire Protection System Overview

ATA 26 FIRE PROTECTION

26-00 FIRE PROTECTION GENERAL

SYSTEM DESCRIPTION

FIRE PROTECTION GENERAL

There are two types of fire protection:

- the active fire protection, which enables to detect the start of a fire or smoke, localized and neutralized quickly,
- the passive fire protection which is obtained through design precautions at each aircraft compartment level.

ACTIVE FIRE PROTECTION

The various purposes of the active fire protection system are:

- to detect and extinguish any fire in each engine nacelle and in the Auxiliary Power Unit (APU) compartment,
- to protect the engine pylon against any torching flame from the combustion chamber,
- to detect smoke in the avionics compartment,
- to detect smoke and to extinguish fire in lavatories,
- to detect any leakage from hot air ducts,
- to extinguish fire in passenger/crew compartments and other accessible areas in flight,
- to detect smoke and extinguish fire in cargo compartments.

FIRE AND OVERHEAT DETECTION

Engine

When the engine Fire Detection Unit (FDU) confirms a fire or an overheat:

- it triggers warnings on the ENG/APU FIRE panel (20VU) & on the ENG MASTER control panel (115VU),
- the MASTER WARN light comes on,
- a warning comes into view on the upper ECAM DU.
- the aural warning sounds.

Auxiliary Power Unit (APU)

When the engine FDU confirms a fire or an overheat:

- it triggers a warning on the ENG/APU FIRE panel (20VU),
- the MASTER WARN light comes on,
- a warning comes into view on the upper ECAM DU.
- the aural warning sounds.
- on ground the FIRE warning light comes on on the external power panel (108VU) and the MECH Horn sounds.

SMOKE DETECTION

Avionics Compartment

When the smoke detector confirms a smoke detection:

- it triggers warning on the VENTILATION control panel (22VU) & the EMER ELEC PWR control panel (21VU),
- the MASTER CAUT light comes on,
- a warning comes into view on the upper ECAM DU.
- the aural warning sounds.

Lavatories

When the SDCU (Classic) or SDF (Enhanced) confirms a smoke detection:

- the MASTER WARN light comes on,
- a warning comes into view on the upper ECAM DU.
- the aural warning sounds

Cargo Compartment

When the SDCU (Classic) or SDF (Enhanced) confirms a smoke detection:

- it triggers a warning on the CARGO SMOKE control panel (22VU)
- the MASTER WARN light comes on,
- a warning comes into view on the upper ECAM DU.
- the aural warning sounds.

EXTINGUISHING

Engine

The two fire extinguisher bottles are controlled from the cockpit.

Auxiliary Power Unit (APU)

For the APU, the fire extinguishing agent is contained in one fire extinguisher bottle. Only on ground the APU is extinguished automatically

Lavatories

The lavatories must be extinguished manually with portable fire extinguishers located at the attendant stations. If a fire starts in the waste container, it is extinguished by a small extinguisher bottle which is self-actuated.

Cargo Compartment

For the cargo compartment normally only one bottle is installed. A two bottle system is used for ETOPS configuration. The fire extinguisher bottle is controlled from the cockpit.

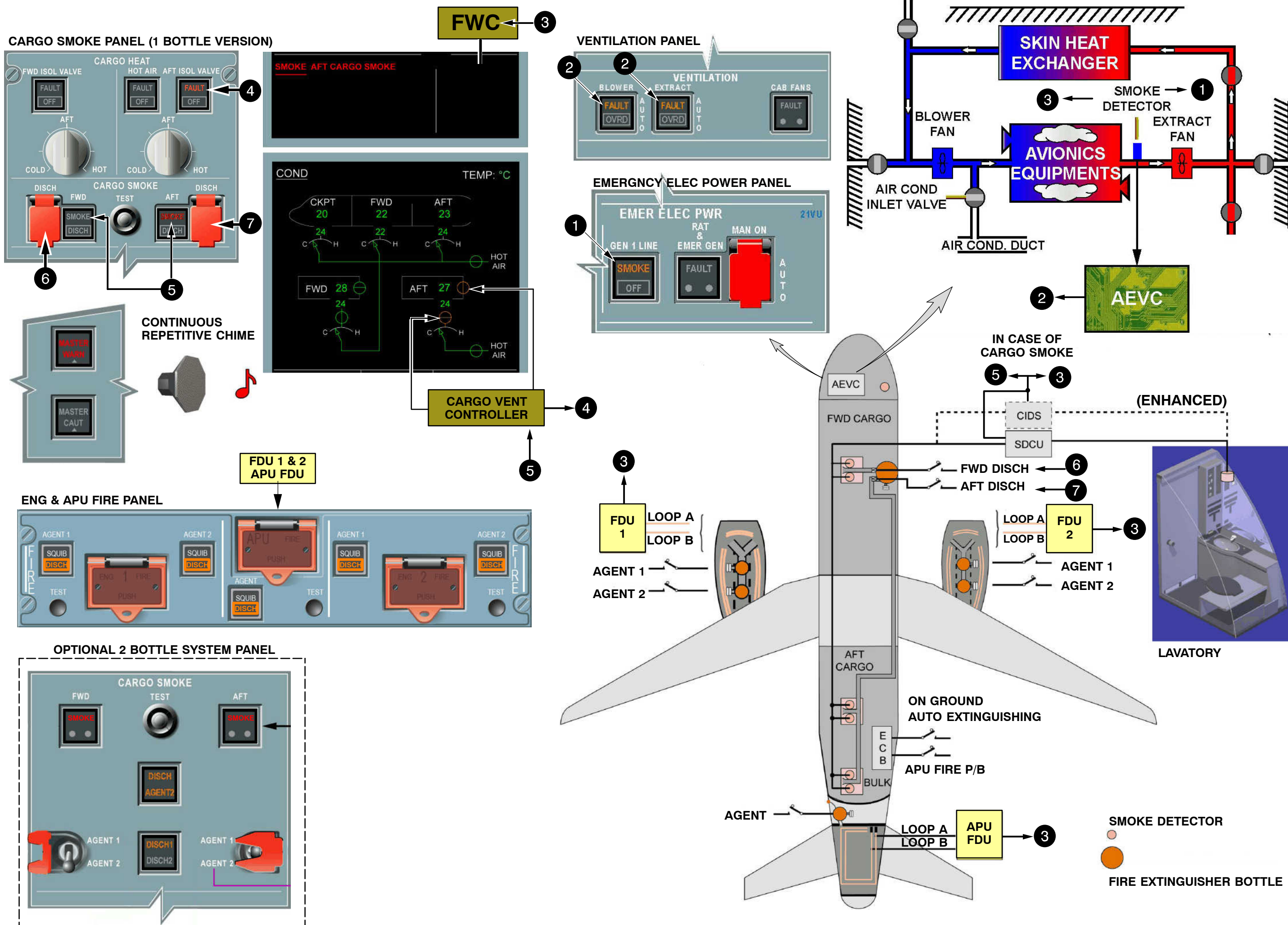


Figure 37 Fire Protection System Overview

Reference to Figure 38 ENG Fire & OVHT Detection Schematic

26-12 ENGINE FIRE AND OVHT DETECTION

SYSTEM DESCRIPTION

The fire detection system is of the electro-pneumatic type. On each engine there are two continuous loops for the fire detection. The loops are connected in parallel to a FDU (**F**ire **D**etection **U**nit). The connection is made through an AND logic to avoid spurious FIRE warnings. In case of failure of one loop, the AND logic becomes an OR logic.

The aircraft can be released in this configuration.

The fire detection loops are monitored by the FDU.

The monitoring device indicates the loss of a fire detection loop to the crew members (Flight Warning System).

For one engine, each loop:

- comprises three fire detectors connected in parallel. The detectors are installed in the nacelle and pylon fire zones.
- is connected to a separate channel of the FDU
- is connected through the related channel, to four of the eight lamps in a red warning light common to the two loops. This warning light is integral with the ENG/FIRE pushbutton switch located on the ENG/FIRE control panel (20VU).
The fire detection system can be tested using the TEST pushbuttons on the ENG/APU fire control panel (20VU).



Figure 38 ENG Fire & OVHT Detection Schematic

Reference to Figure 39 APU Fire Extinguishing Schematic

26–22 APU FIRE EXTINGUISHING

SYSTEM OPERATION

1 AUTO EXTINGUISHING CIRCUIT

When the aircraft is on ground and electrical power on the network, relay coils from the AUTO PUSH RLY and AUTO TIME DELAY PUSH RLY are supplied with 28V DC from the BAT BUS (301PP) via a FLIGHT/GROUND RLY.

2 AUTO EXTINGUISHING CIRCUIT / FIRE DETECTED

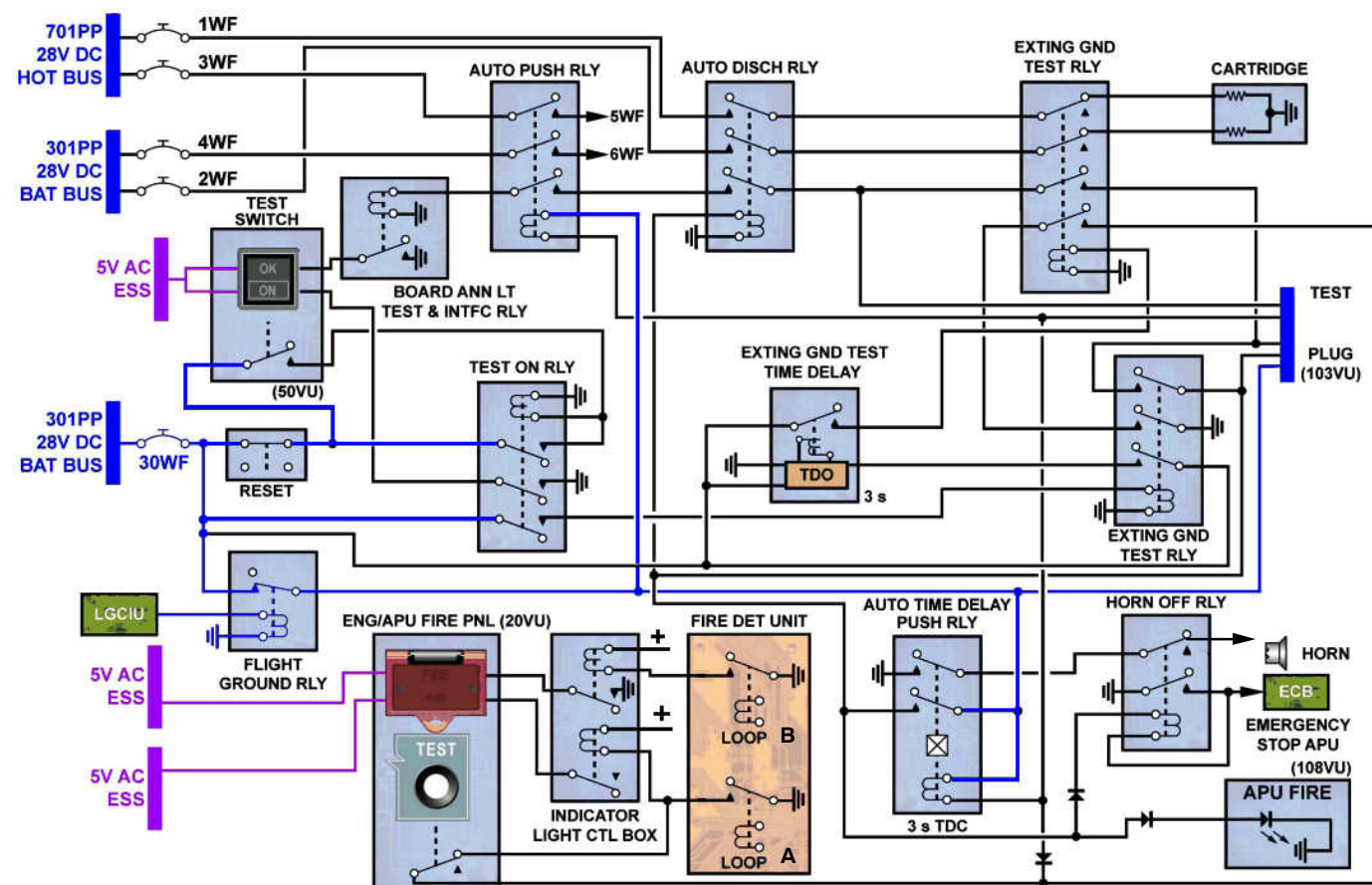
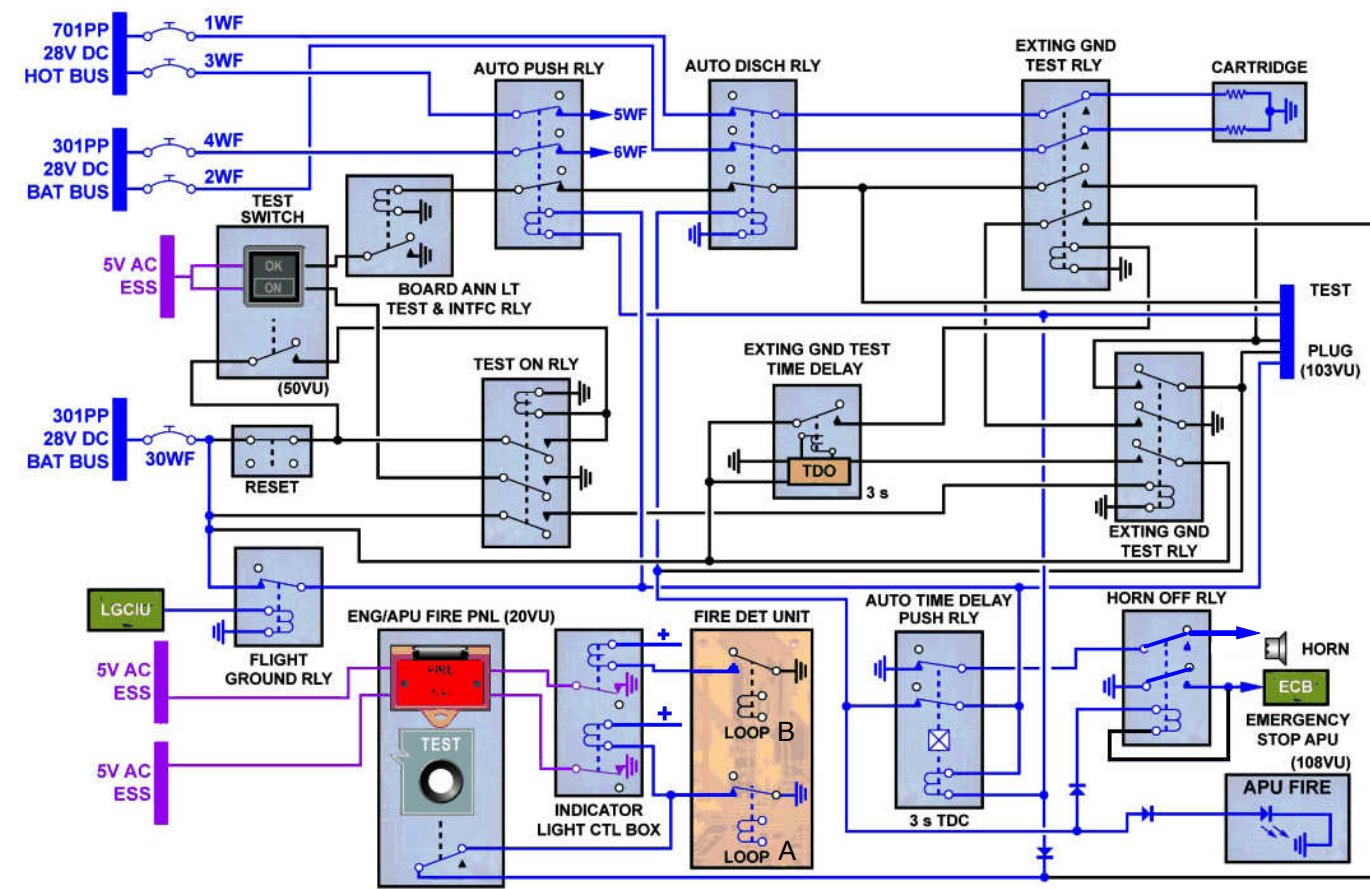
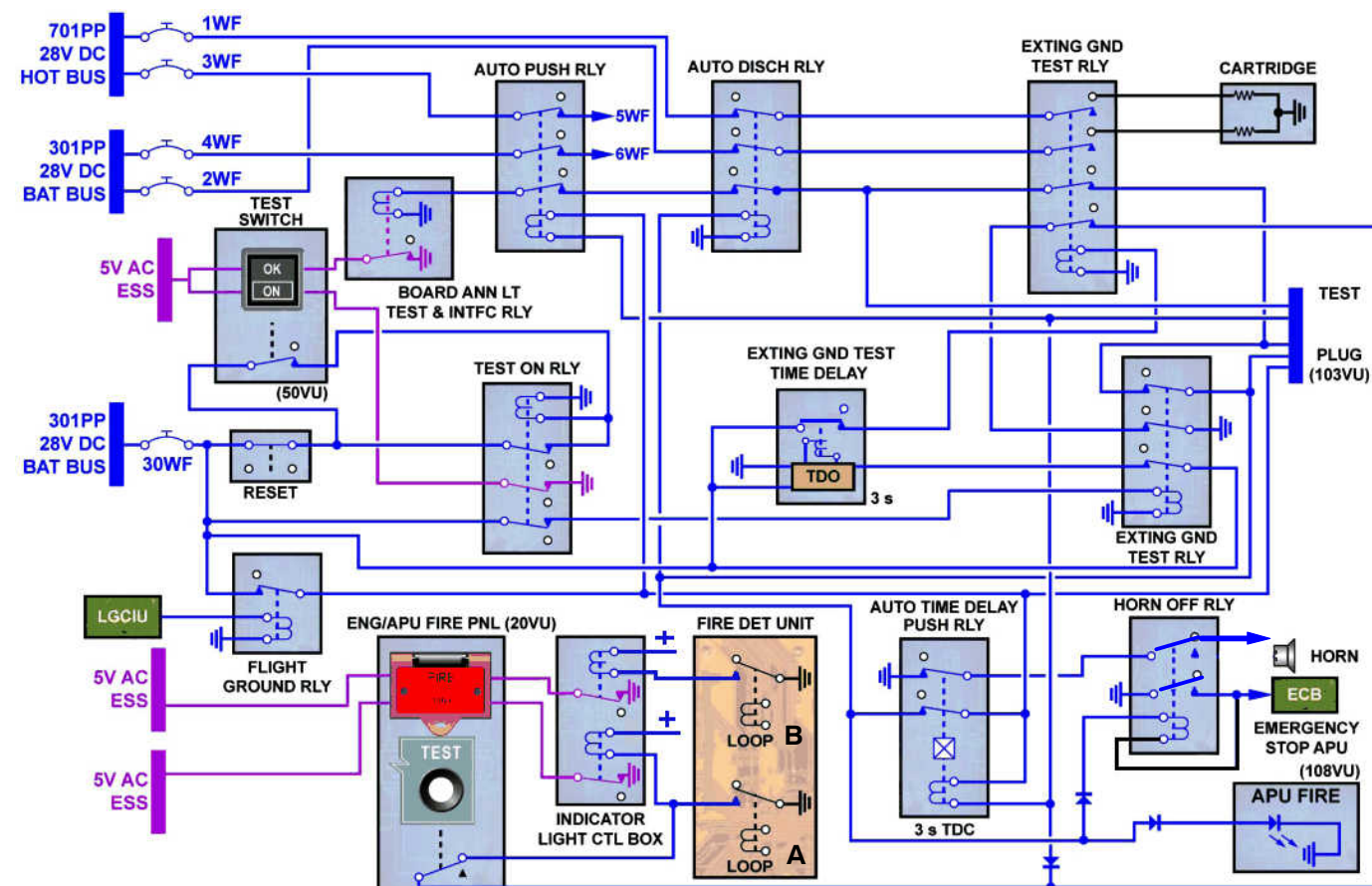
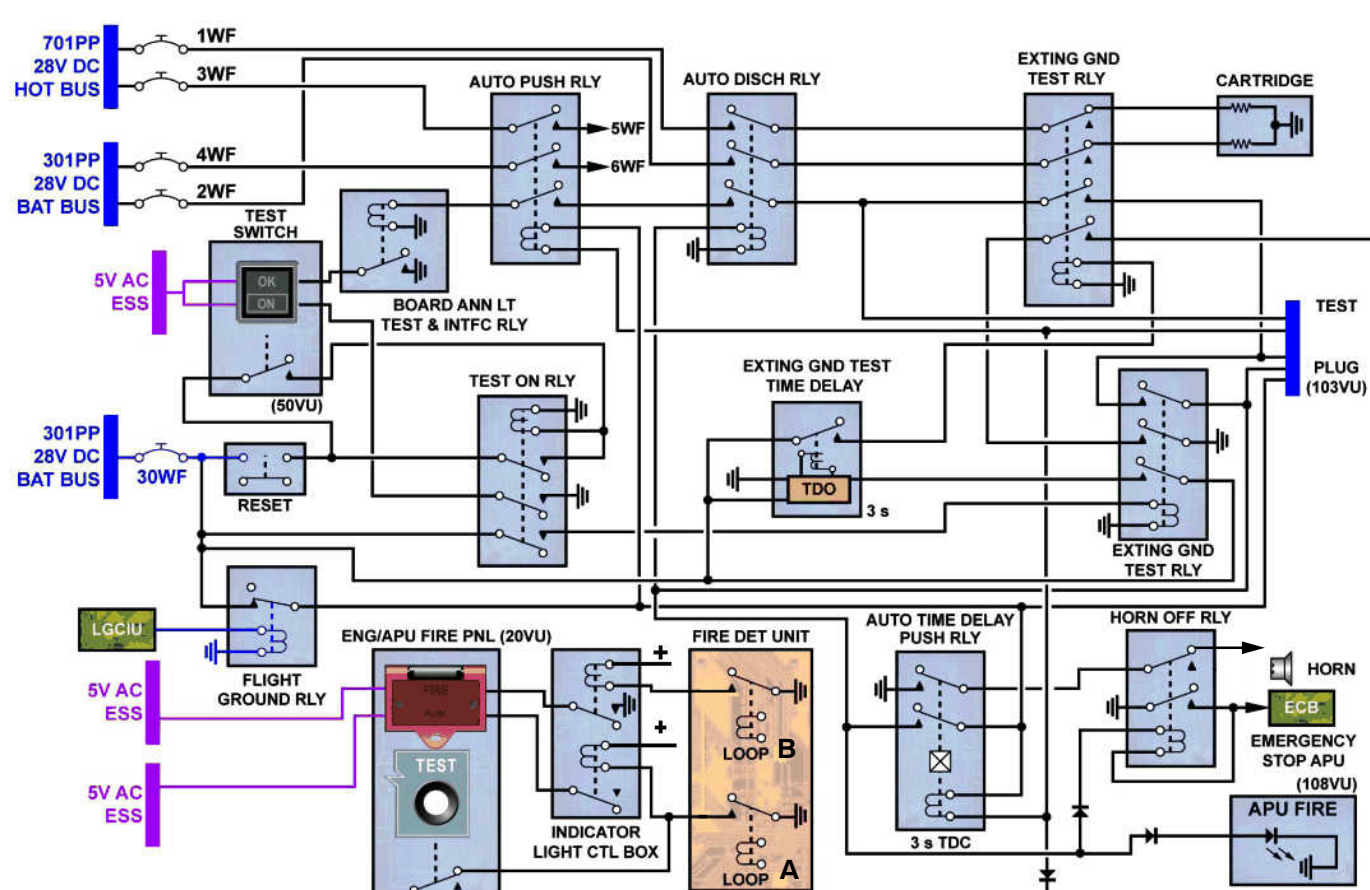
If there is a fire detected on ground by the fire detection system of the APU, the auto extinguishing system is initiated by the channel A (LOOP A) of the APU FIRE DET UNIT (APU FDU) via a ground signal. The APU shutdown circuit is energized via the AUTO PUSH RLY. The extinguishing circuit is energized by the AUTO DISCH RLY via the AUTO TIME DELAY PUSH RLY (with 3sec delay).

3 AUTO EXTINGUISHING CIRCUIT/TEST PUSHBUTTON

By pressing the TEST SWITCH on the maintenance panel (50VU) momentarily the auto extinguishing system is initiated by a self holding relay circuit via TEST ON RLY and two EXTING GND TEST RLYs. The firing of the cartridge is inhibited by one EXTING GND TEST RLY, but the APU shutdown circuit (via AUTO PUSH RLY) is activated. Therefore it is important to do the test with APU stopped.

4 AUTO EXTINGUISHING CIRCUIT / RESET PUSHBUTTON

By pressing the RESET pushbutton on maintenance panel (50VU) momentarily all relays of the auto extinguishing system are de-energized. The red APU FIRE light on external power control panel (108VU) will be extinguished. The warning horn in nose wheel well will be silenced.

**1 AUTO EXTINGUISHING CIRCUIT****2 AUTO EXTINGUISHING CIRCUIT/FIRE DETECTED****3 AUTO EXTINGUISHING CIRCUIT/TEST PUSHBUTTON****4 AUTO EXTINGUISHING CIRCUIT/RESET PUSHBUTTON**

Reference to Figure 40 Cargo/LAV Smoke Detection System (Non Enhanced Technology)

26–16 CARGO COMPARTMENT SMOKE DETECTION

SYSTEM DESCRIPTION
(NON-ENHANCED TECHNOLOGY)

General

The cargo–compartment smoke–detection system gives a visual and aural warning in the cockpit, if smoke or fire is in the compartment. It is a dual loop system to prevent incorrect warnings.

Smoke detectors are installed in the FWD and in the AFT compartment, whereas always two are combined with an AND–logic.

The system Includes:

- the smoke detectors,
- the smoke annunciator lights and a TEST pushbutton switch,

Smoke Detection Control Unit (SDCU).

Indications are shown on the Electronic Centralized Aircraft Monitoring (ECAM) upper display unit.

Normal Operation

Smoke detected in the cargo compartment will cause:

- the related SMOKE warning light to come on,
- the red light in the MASTER WARNING pushbutton switch to flash,
- the aural repetitive chime to sound,
- the ECAM upper display unit to show the messages:
 - SMOKE FWD/AFT CARGO SMOKE
 - ISOL VALVE (of affected compartment) ... OFF (if not automatically closed)
 - AGENT ... DISCH .

In the case of a smoke warning the isolation valves of the cargo–compartment ventilation system close automatically. They remain closed, independent of the smoke warning signals.

Operation with one Faulty Smoke Detector

When only one detector sends an alarm, the SDCU checks the second detector automatically. If this test shows a normal function of the second detector, the result is no indication in the cockpit. The alarm of the detector is a false warning.

If this test shows an abnormal function of the second detector, the warning signals come on. The alarm of the first detector is the correct warning.

26–17 LAVATORY SMOKE DETECTION

SYSTEM DESCRIPTION
(NON-ENHANCED TECHNOLOGY)

General

The lavatory smoke detectors are installed in a loop system, together with the cargo–compartment smoke detectors. If smoke is detected, the system gives a visual and aural warning to the flight crew.

This system is made–up of:

- one smoke detector for each lavatory,
- the Smoke Detection Control Unit (SDCU).

Normal Operation

Smoke or fire in one of the lavatories causes a detector to signal the SDCU. The SDCU sends signals to the Centralized Intercommunication Data System (CIDS) and the Flight Warning Computer (FWC).

The FWC gives indications on:

- the ECAM upper display unit (EWD),

The CIDS gives indications on:

- the related lavatory light,
- the FWD attendant panel (FAP),
- the area call panel (ACP),
- the attendant indication panel (AIP),
- the programming & test panel (PTP).

Failure Condition

The SDCU continuously monitors all components of the system. When the SDCU detects a failure on any smoke detector, the faulty detector is automatically isolated in the bus system. The failure information is sent to the CIDS, FWC and CFDIU.

The CIDS director signals the fault message to the Programming and Test Panel (PTP) in the cabin.

The FWC initiates a fault indication on the ECAM upper display unit.

If one of the two SDCU channels fail, an automatic fault–indication is displayed on the ECAM upper display unit.

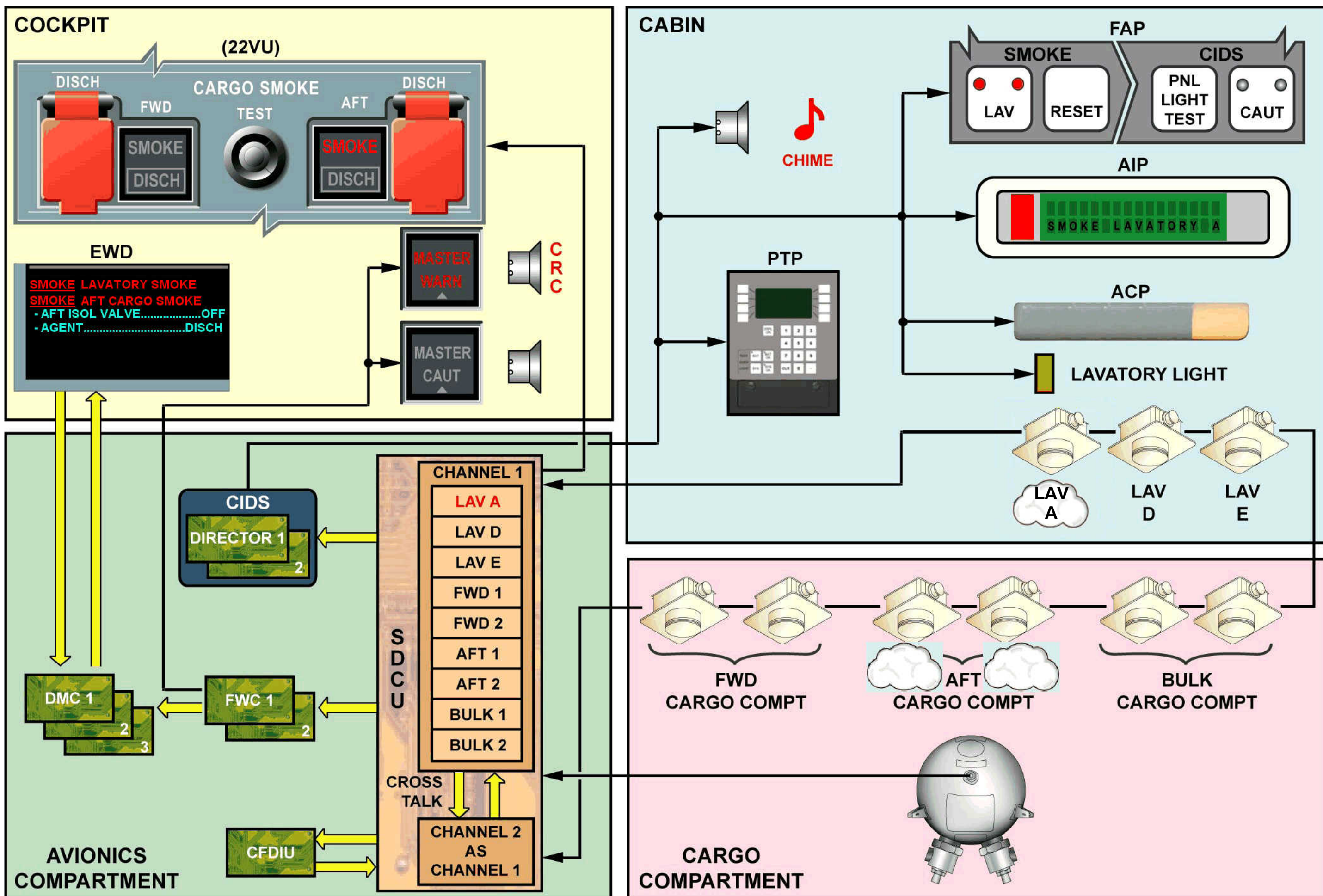


Figure 40 Cargo/LAV Smoke Detection System (Non Enhanced Technology)

Reference to Figure 41 Cargo/LAV Smoke Detection System (Enhanced Technology)

26–16 CARGO COMPTM. SMOKE DETECTION

SYSTEM DESCRIPTION
(ENHANCED TECHNOLOGY)

General

The cargo-compartment smoke-detection system is installed in the cargo compartment. It gives visual and aural warnings in the cockpit, if smoke or fire is in the cargo compartment.

Smoke detectors are installed in the FWD and in the AFT compartment, whereas always two are combined with an AND-logic.

The system includes:

- the smoke detectors,
- the smoke annunciator lights and a TEST pushbutton switch,

the Smoke Detection Function of the Cabin Intercommunication Data System (CIDS-SDF)

If smoke in the cargo compartment is detected by the system, indications will be given on the ECAM upper display unit and via smoke warning lights on the overhead panel.

Normal Operation

Smoke detected in the cargo compartment will cause:

- the related SMOKE warning light to come on,
- the red light in the MASTER WARNING pushbutton switch to flash,
- the aural repetitive chime to sound,
- the ECAM upper display unit to show the messages:
 - SMOKE FWD/AFT CARGO SMOKE
 - ISOL VALVE (of affected compartment) ... OFF (if not automatically closed)
 - AGENT ... DISCH .

In the case of a smoke warning the isolation valves of the cargo-compartment ventilation system close automatically. They remain closed, independent of the smoke warning signals.

Operation with one Faulty Smoke Detector

When only one detector sends an alarm, the CIDS-SDF checks the second detector automatically.

If this test shows a normal function of the second detector, there is no indication in the cockpit. The alarm of the first detector is a false warning.

If this test shows an abnormal function of the second detector, the warning signals come on. The alarm of the first detector is the correct warning.

26–17 LAVATORY SMOKE DETECTION

SYSTEM DESCRIPTION
(ENHANCED TECHNOLOGY)

General

A smoke detection system is installed to detect smoke and/or fire in the lavatories. The lavatory smoke detectors are connected to the related DEU B via a CAN bus (Controller Area Network).

The DEU B transmits the information to both CIDS Directors. They send the information internally to the SDF. If smoke is detected, the system gives a visual and aural warning to the flight crew.

This system is made-up of:

- one smoke detector for each lavatory,
- a DEU B,
- the CIDS director (Cabin Intercommunication Data System), containing the CIDS-SDF (CIDS Smoke Detection Function).

Smoke or fire in one of the lavatories causes a detector to signal this alarm condition to the CIDS director. This alarm condition is then forwarded to the CIDS-SDF which provides the information to the Flight Warning computer (FWC).

The FWC gives indications on:

- the ECAM upper display unit (EWD).

The CIDS gives indications on:

- the related lavatory light,
- the flight attendant panel (FAP).
- the area call panel (ACP)
- the attendant indication panel (AIP)

Failure Condition

The CIDS-SDF continuously monitors all components of the system. When the CIDS-SDF detects a failure on any smoke detector, the faulty detector is automatically isolated in the bus system.

The failure is signaled to the CIDS, FWC and CFDIU. The FWC initiates a fault indication on the ECAM upper display unit. If one of the two CIDS-SDF channels fails, a maintenance status message is shown on the upper ECAM display. If both CIDS-SDF channels fail a fault message is displayed on the ECAM upper display unit.

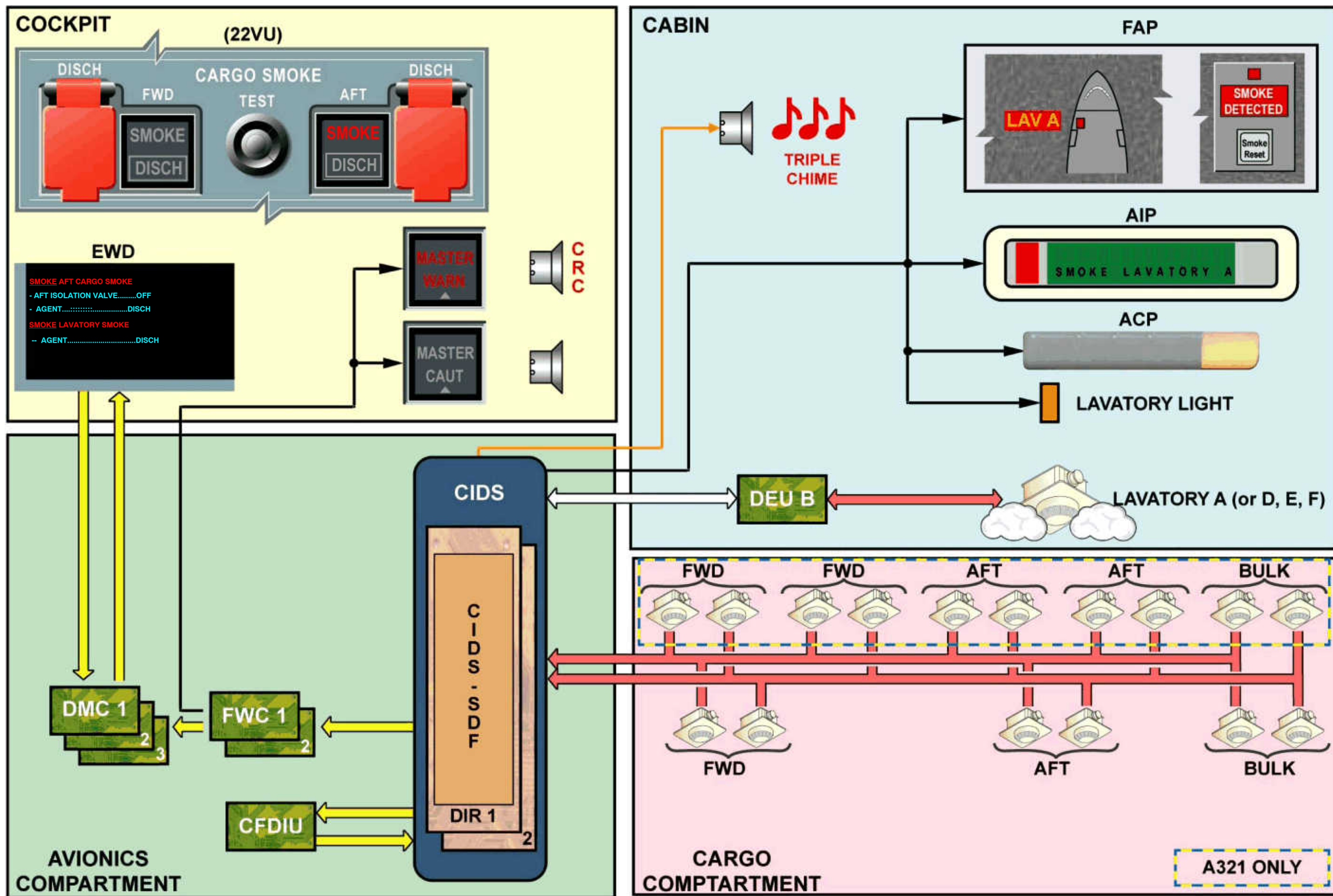


Figure 41 Cargo/LAV Smoke Detection System (Enhanced Technology)

Reference to Figure 42 AVNCS Compartment Smoke Detection Schematic

26–15 AVIONIC SMOKE

SYSTEM DESCRIPTION

Functions

The avionics-compartment smoke-detection system confirms that there is smoke in the avionics compartment.

The smoke detection system includes one smoke detector installed on the air extraction duct.

The smoke detector triggers the smoke warnings to the cockpit when the alarm threshold is reached.

When there is smoke, pneumatic and electrical procedures are started.

System Description

When the smoke concentration is above the alarm threshold, the smoke detector triggers the smoke warnings in the cockpit:

- on the EMER ELEC PWR section of the panel 21VU
- on the VENTILATION section of the OVERHEAD CTL & IND panel 22VU
- the MASTER CAUT light comes on
- the warning message is shown on the upper ECAM display unit
- The aural warning sounds (SC).

When this happens, you must push the VENTILATION/BLOWER pushbutton switch and the VENTILATION/EXTRACT pushbutton switch:

the OVRD legends come on.

This causes the blower fan (A) to stop, opens the conditioned-air inlet valve (F) and opens the skin air-outlet valve (B) not fully. All other valves close and the air goes overboard through the skin air-outlet valve. The extract fan stays energized.

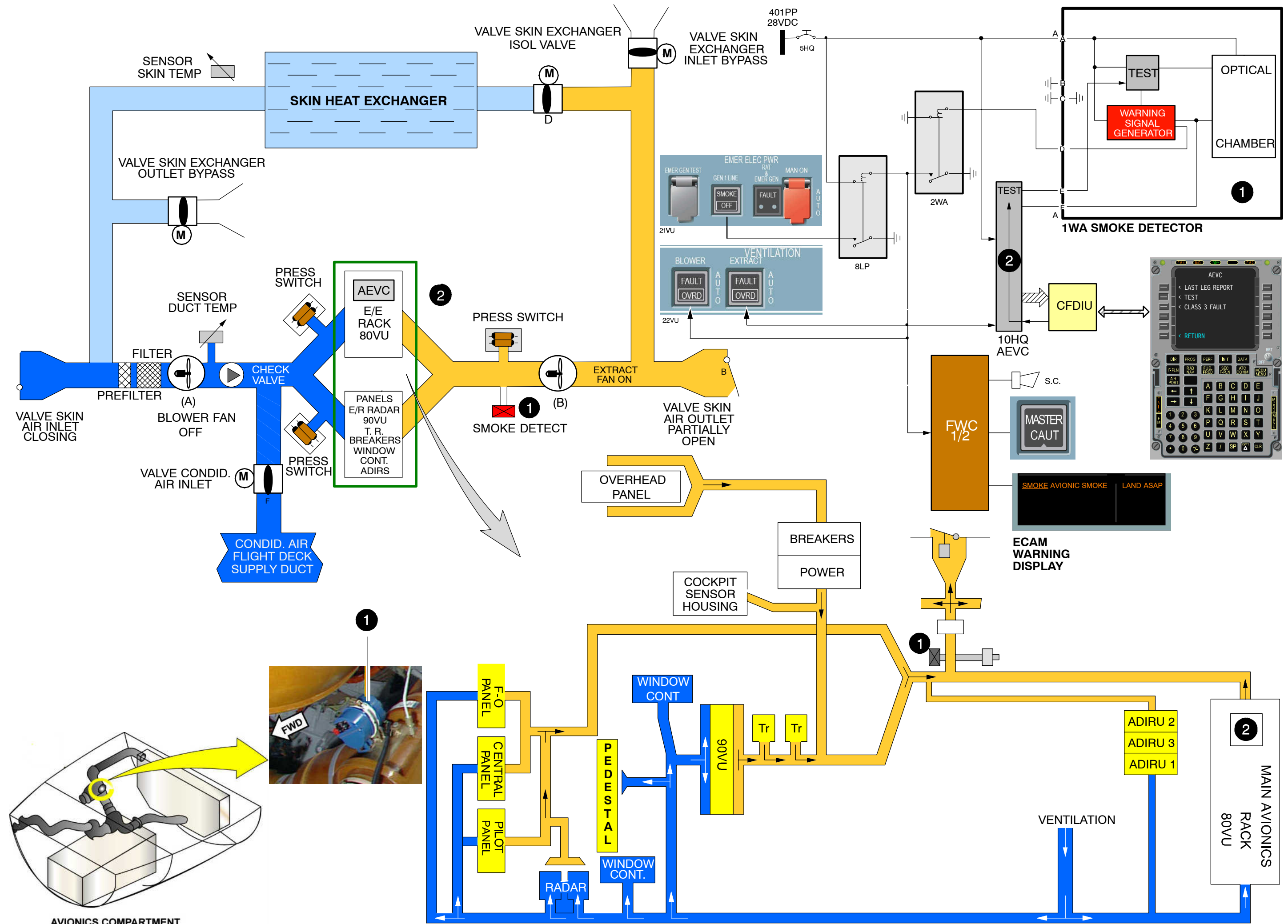


Figure 42 AVNCS Compartment Smoke Detection Schematic