A350
TECHNICAL TRAINING MANUAL
MAINTENANCE COURSE - T1+T2 - RR Trent XWB
ELECTRO-AVIONICS SYSTEMS Level 1

This document must be used for training purposes only

Under no circumstances should this document be used as a reference

It will not be updated.

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ELECTRO-AVIONICS SYSTEMS LEVEL 1

V2414251 - V00T0MM0

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02 - ELECTRO-AVIONICS SYSTEMS Level 1

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

Overview

The function of the electrical power system is to give AC and DC
electrical power and supply it to the users.
The general training for this system includes:
- The AC generation
- The DC generation
- The AC electrical-load distribution
- The primary and secondary power distribution
- The Electrical Structure Network (ESN).

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AC
GENERATION

DC
GENERATION

ELECTRICAL POWER

ELECTRICAL
STRUCTURE
NETWORK

PRIMARY AND
SECONDARY POWER
DISTRIBUTION

AC ELECTRICAL
LOAD
DISTRIBUTION

OVERVIEW

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

AC Generation - Presentation

Function/Description

The AC generation system includes:
- The AC main generation
- The AC emergency generation.
The AC main generation includes:
- The Ground Power Units (GPUs) that supply the AC network with 115VAC on the ground only, through the external power receptacles
- The Variable Frequency Generators (VFGs) that supply the AC network with 230VAC
- The Auxiliary Power Unit (APU) starter/generator that supply the AC network with 230VAC.
The AC emergency generation includes:
- The static inverter that supplies the AC inverter busbar with 115VAC, when emergency battery 1 is available at a minimum.
- The AC generator of the Ram Air Turbine (RAT) module that supplies the AC emergency network with 230VAC (when the RAT is fully extended).

Location

- Four VFGs are installed on the engines (two on each engine).
- Two external power receptacles are installed on the lowest section of the forward fuselage.
- The RAT module is installed on the right side of the aft belly fairing.
- One static inverter is installed on the left side of the avionics compartment.

Interface

The AC network receives 230VAC electrical power supply from the APU starter/generator.

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115VAC
AC MAIN NETWORK

GPU

VOLTAGE

115VAC
AC MAIN GENERATION

2 EXTERNAL POWER RECEPTACLES

STATIC INVERTER

115VAC
INVERTER NETWORK

115VAC
INVERTER GENERATION

APU: Auxilliary Power Unit
GPU: Ground Power Unit
RAT: Ram Air Turbine
VFG: Variable Frequency Generator

4 VFGs

230VAC
AC MAIN NETWORK

230VAC
AC MAIN GENERATION

APU STARTER/GENERATOR

RAT MODULE

230VAC
AC EMERGENCY NETWORK

230VAC
AC EMERGENCY GENERATION

AC GENERATION - PRESENTATION - FUNCTION/DESCRIPTION ... INTERFACE

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

DC Generation - Presentation

Function/Description

The DC generation system includes:
- The DC main generation
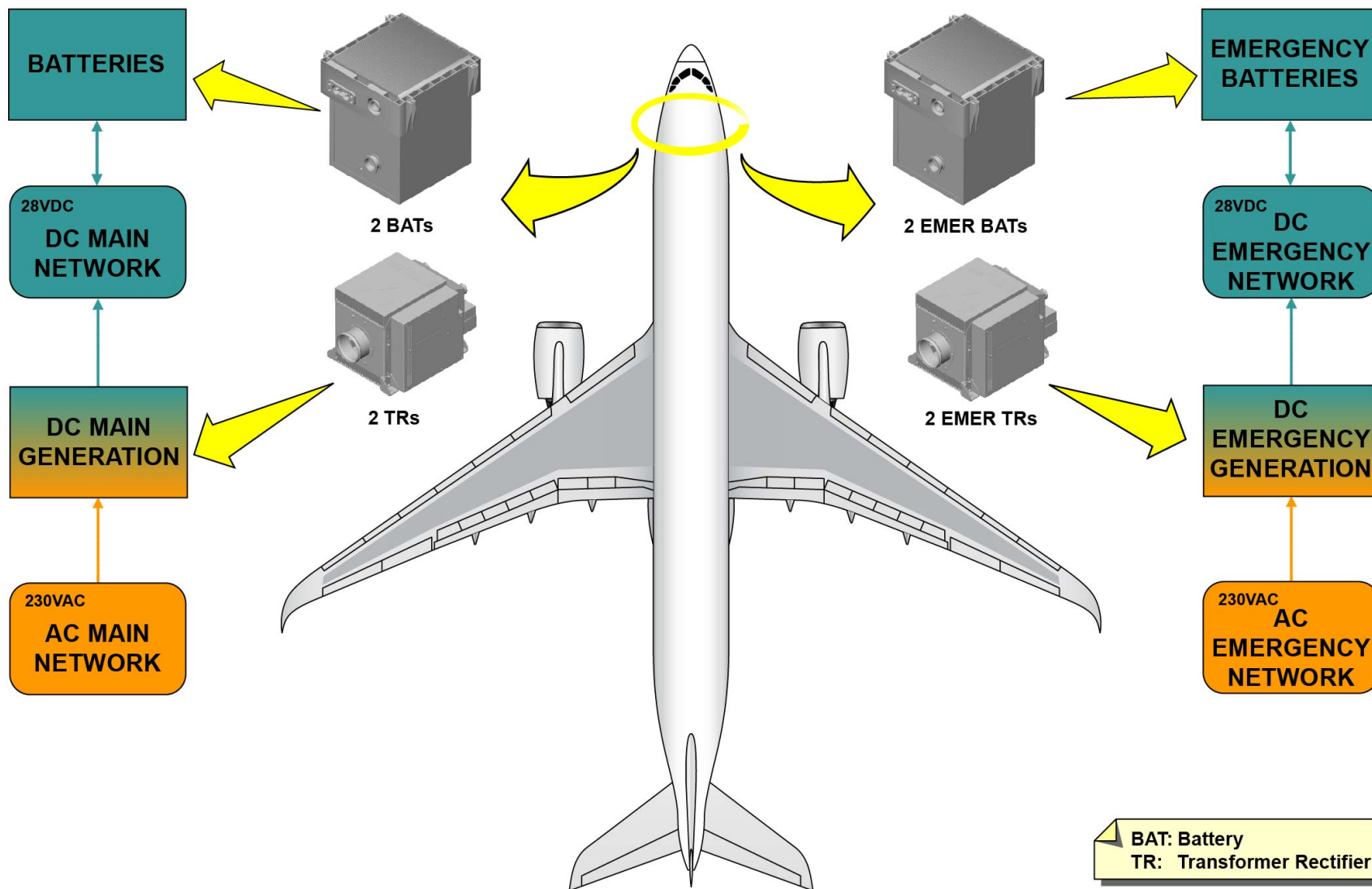- The DC emergency generation.
The DC main generation includes:
- Two Transformer Rectifiers (TRs) that change the 230VAC from the AC main network into 28VDC to supply the DC main network.
- Two batteries that supply the DC main network on the ground for maintenance.
The DC emergency generation includes:
- Two emergency TRs that change the 230VAC from the AC emergency network into 28VDC to supply the DC emergency network.
- Two emergency batteries that supply the DC emergency network during the extension of the RAT module.

Location

All the TRs and batteries are installed in the avionics compartment.

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DC GENERATION - PRESENTATION - FUNCTION/DESCRIPTION & LOCATION

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

AC Electrical-Load Distribution - Presentation

Function/Description

The AC electrical-load distribution includes Auto Transformer Units (ATUs):
The ATUs change:
- 230VAC into 115VAC when the VFGs supply the AC main network
- 115VAC into 230VAC when the GPUs supply the AC main network
through the external power receptacles.
The emergency ATUs change:
- 230VAC into 115VAC when the AC generator of the RAT module
supplies the AC emergency network.

Location

All the ATUs are installed in the avionics compartment:
- Four ATUs for the AC main network
- Two emergency ATUs for the AC emergency network.
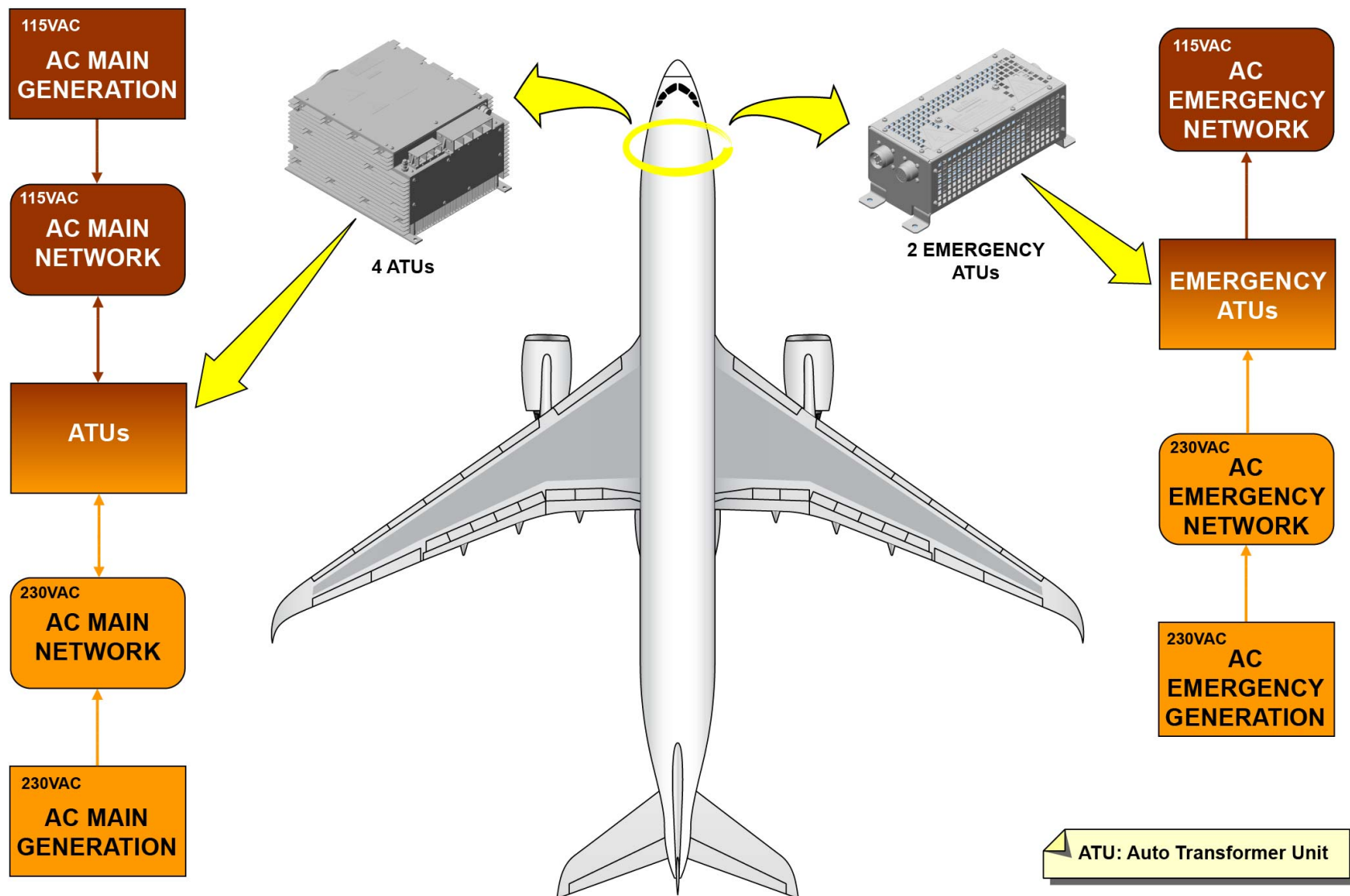
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115VAC
AC MAIN GENERATION

115VAC
AC MAIN NETWORK

ATUs

230VAC
AC MAIN NETWORK

230VAC
AC MAIN GENERATION

4 ATUs

2 EMERGENCY ATUs

115VAC
AC EMERGENCY NETWORK

EMERGENCY ATUs

230VAC
AC EMERGENCY NETWORK

230VAC
AC EMERGENCY GENERATION

ATU: Auto Transformer Unit

AC ELECTRICAL-LOAD DISTRIBUTION - PRESENTATION - FUNCTION/DESCRIPTION & LOCATION

ELECTRICAL POWER SYSTEM PRESENTATION (1)

Electrical Power Generation and Distribution - Presentation

Function/Description

Electrical power generation

In normal conditions:

- In flight or on the ground, four VFGs (two on each engine) supply the AC main network. On the ground, two GPUs supply the AC main network through two external power receptacles.
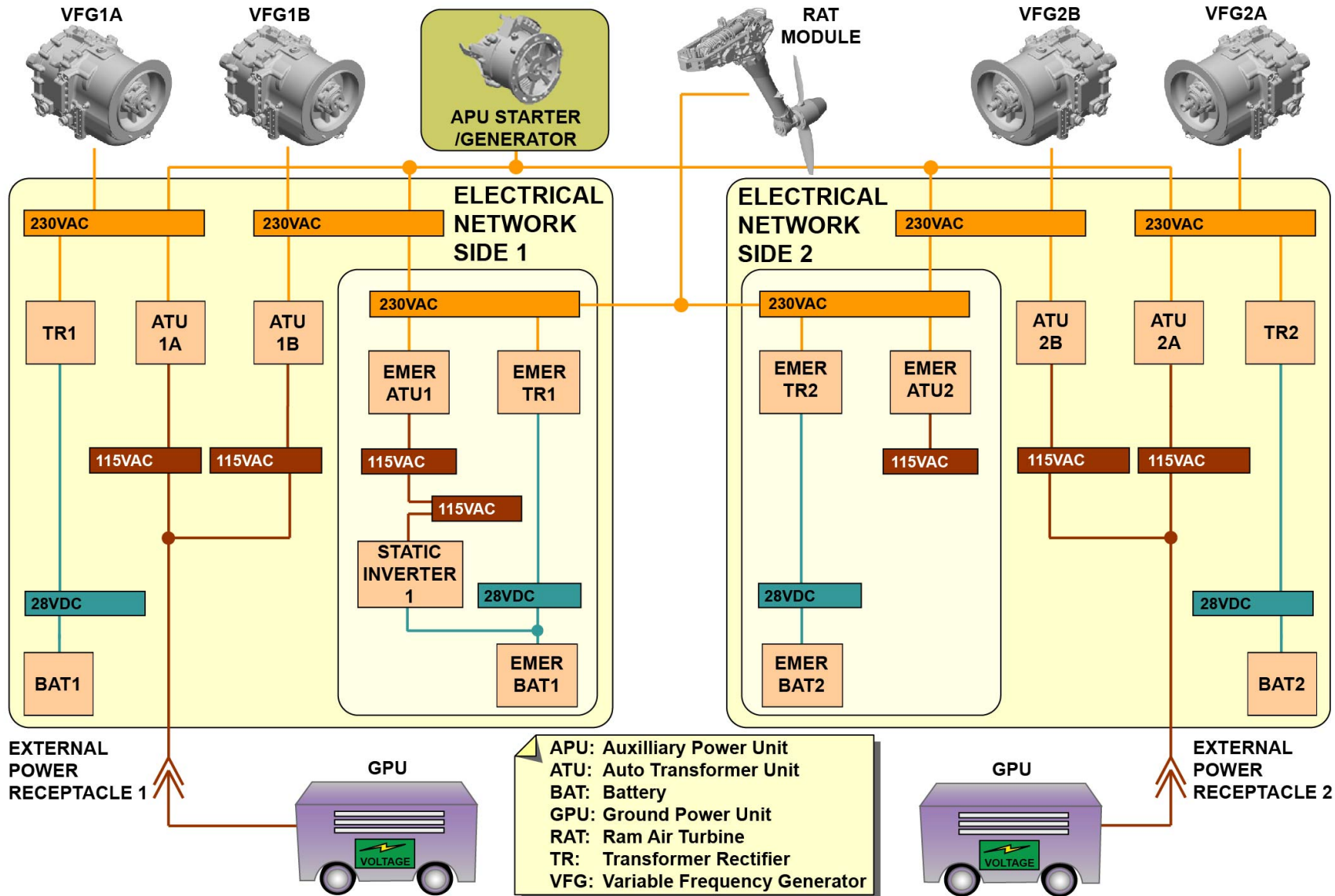
- In flight and on the ground, two TRs or two batteries supply the DC main network.

In emergency conditions:

- One static inverter, that changes the DC power into AC power, supplies a part of the AC emergency network when only the emergency batteries are available.

- One generator, in the RAT module, supplies the AC emergency network.

- Two emergency TRs or two emergency batteries supply the DC emergency network.

Electrical power distribution

1_ Four ATUs, that change 230VAC into 115VAC or 115VAC into 230VAC, supply the AC main network.

2_ Two emergency ATUs, that change 230VAC into 115VAC, supply the AC emergency network.

ELECTRICAL POWER GENERATION AND DISTRIBUTION - PRESENTATION - FUNCTION/DESCRIPTION

Legend:
- **APU:** Auxilliary Power Unit
- **ATU:** Auto Transformer Unit
- **BAT:** Battery
- **GPU:** Ground Power Unit
- **RAT:** Ram Air Turbine
- **TR:** Transformer Rectifier
- **VFG:** Variable Frequency Generator

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

Primary and Secondary Power Distribution - Presentation

Function/Description

The primary and secondary power-distribution system controls and manages the power sources to supply the electrical network.
The primary and secondary power-distribution system includes:
- The Electrical Power Distribution Center (EPDC) interface
- The Circuit Breaker Panel (CBP) interface
- The cabin and cargo power distribution.
There are two EPDCs (side 1 and side 2) for segregation of the aircraft distribution system. The basic functions of the EPDCs are:
- Connection or disconnection of the AC, DC or emergency power sources
- Reconfiguration of the electrical network
- Protection of the electrical network (short circuit, etc.).
Each EPDC has three sub-systems:
- The primary power distribution
- The secondary power distribution
- The emergency distribution.
The primary power distribution supplies 230VAC, 115VAC and 28VDC to the technical loads and to the non-technical loads of more than 15A.
The secondary power distribution supplies 115VAC and 28VDC to the technical loads of less than or equal to 15A.
The emergency distribution supplies 230VAC, 115VAC and 28VDC to the emergency loads.
There are two CBPs (side 1 and side 2) for segregation of the aircraft distribution system. The basic functions of the CBPs are:
- The secondary power distribution
- The emergency distribution.
The secondary power distribution supplies 115VAC to the technical loads of less than or equal to 15A.
The emergency distribution supplies 28VDC to the emergency loads.

The cabin and cargo power distribution is supplied by the Secondary Power Distribution Boxes (SPDBs). The EPDCs supply 115VAC and 28VDC to the SPDBs through the primary power-distribution system. Each SPDB supplies the cabin and cargo loads of less than or equal to 15A.

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AIRBUS

ELECTRICAL POWER GENERATION

PRIMARY AND SECONDARY POWER DISTRIBUTION SIDE 1

PRIMARY AND SECONDARY POWER DISTRIBUTION SIDE 2

EPDC1 AND CBP1

| EMERGENCY DISTRIBUTION | PRIMARY DISTRIBUTION | SECONDARY DISTRIBUTION |

SPDBs 1 ... 6

EPDC2 AND CBP2

| EMERGENCY DISTRIBUTION | PRIMARY DISTRIBUTION | SECONDARY DISTRIBUTION |

SPDBs 1 ... 6

| EMERGENCY LOADS | CABIN & CARGO LOADS <= 15 A | TECHNICAL LOADS > 15 A | TECHNICAL LOADS <= 15 A |

AIRCRAFT ELECTRICAL LOADS SIDE 1

| EMERGENCY LOADS | TECHNICAL LOADS > 15 A | CABIN & CARGO LOADS <= 15 A | TECHNICAL LOADS <= 15 A |

AIRCRAFT ELECTRICAL LOADS SIDE 2

CBP: Circuit Breaker Panel
EPDC: Electrical Power Distribution Center
SPDB: Secondary Power Distribution Box

PRIMARY AND SECONDARY POWER DISTRIBUTION - PRESENTATION - FUNCTION/DESCRIPTION

ELECTRICAL POWER SYSTEM PRESENTATION (1)

Primary and Secondary Power Distribution - Presentation (continued)

Location

- Two EPDCs are installed in the avionics compartment.
- Two CBPs are installed in the avionics compartment.
- Eight SPDBs are installed in the cabin and four SPDBs are installed in the cargo compartments (two in the forward cargo compartment and two in the aft cargo compartment).
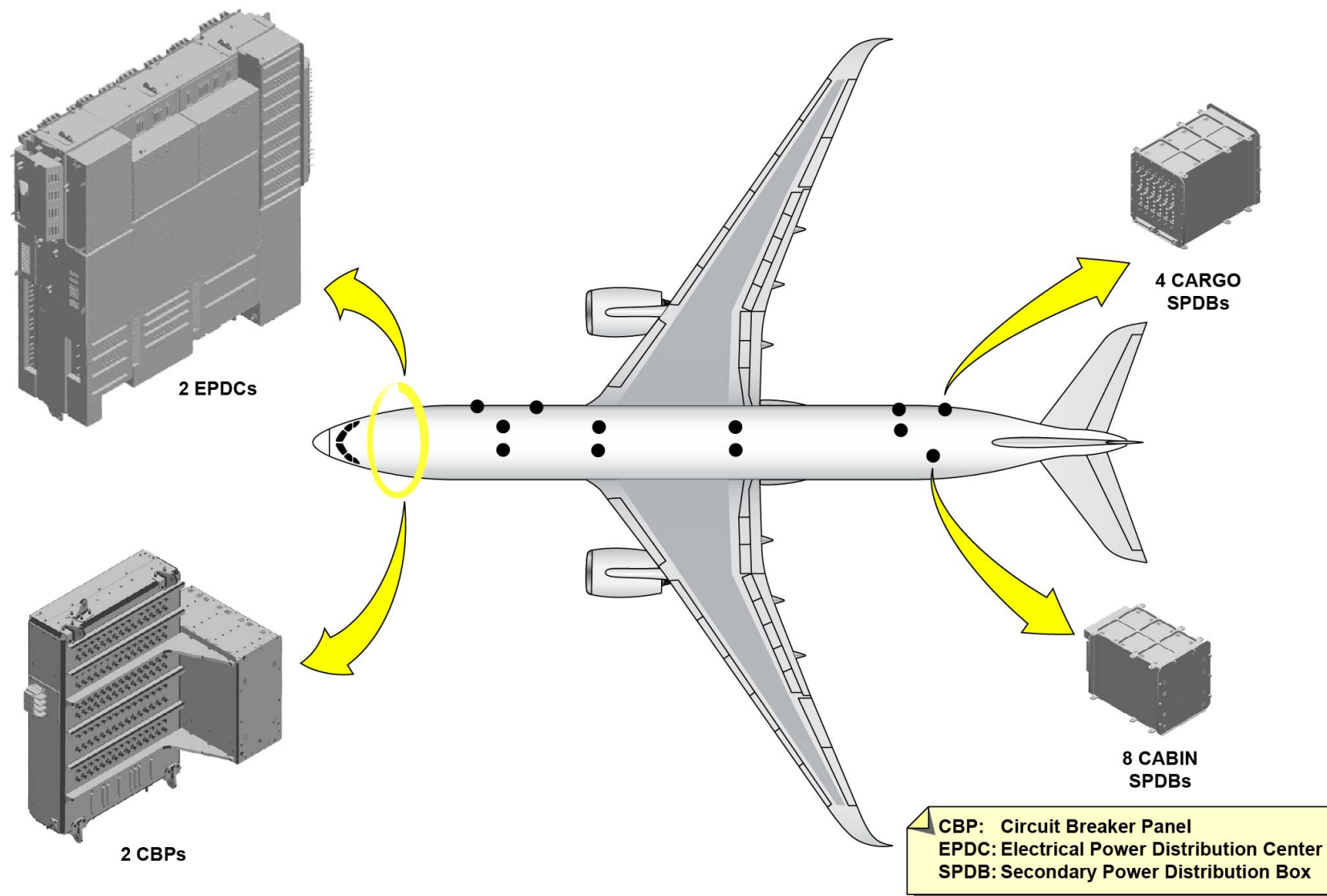
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ELECTRICAL POWER SYSTEM PRESENTATION (1)

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2 EPDCs

2 CBPs

4 CARGO SPDBs

8 CABIN SPDBs

CBP: Circuit Breaker Panel
EPDC: Electrical Power Distribution Center
SPDB: Secondary Power Distribution Box

PRIMARY AND SECONDARY POWER DISTRIBUTION - PRESENTATION - LOCATION

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

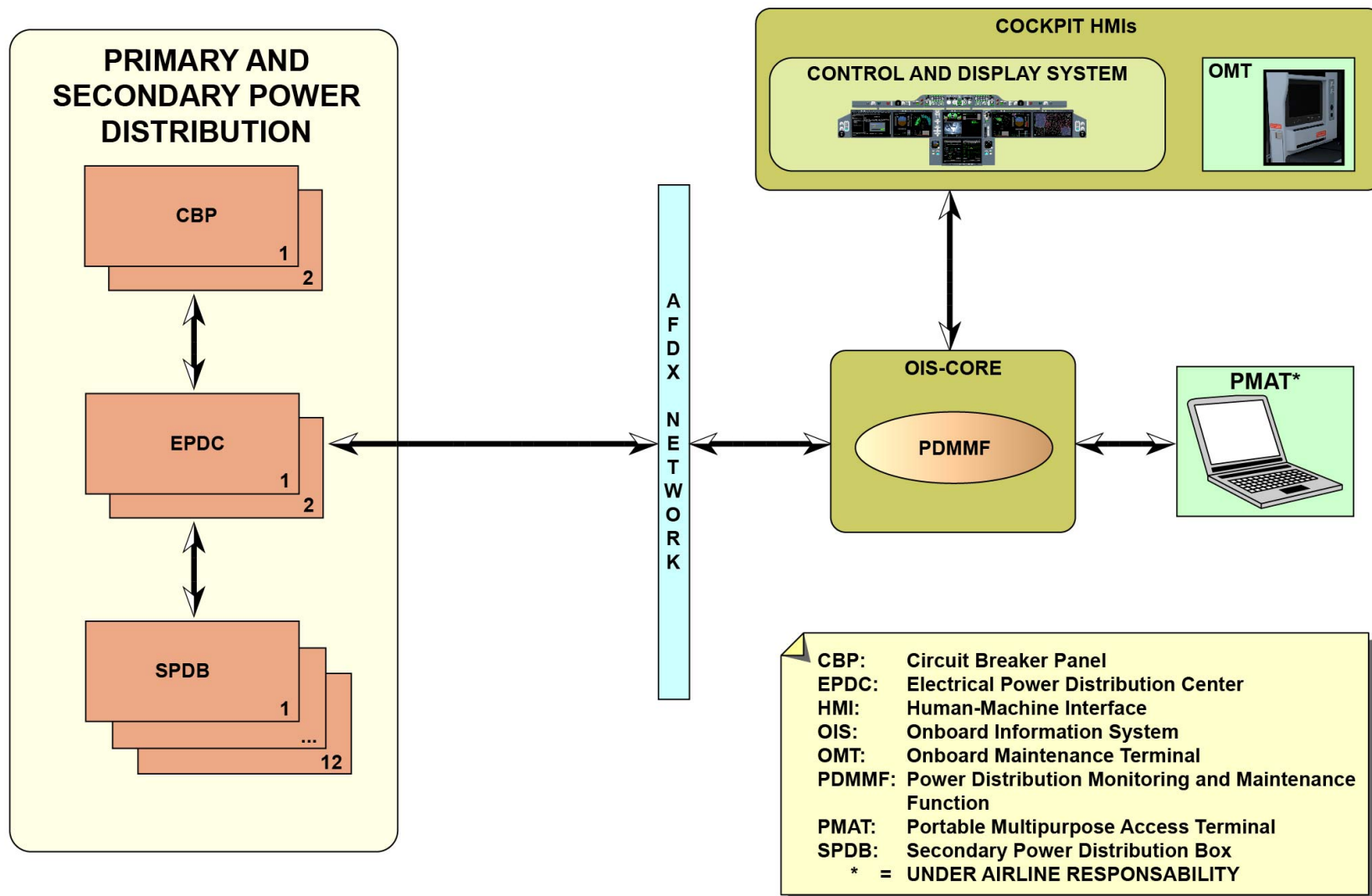**Primary and Secondary Power Distribution - Presentation (continued)**

Interface

The primary and secondary power-distribution system has an interface with the Avionics Full Duplex Switched Ethernet (AFDX) network for communication with the Power Distribution Monitoring and Maintenance Function (PDMMF).
The PDMMF is hosted on the core Onboard Information System (OIS). It includes the monitoring and maintenance functions related to the protection devices in the CBPs, the SPDBs and the EPDCs.
The PDMMF has an interface with some Human-Machine Interfaces (HMIs), the Control and Display System (CDS), the Onboard Maintenance Terminal (OMT), the Portable Multipurpose Access Terminal (PMAT).

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PRIMARY AND SECONDARY POWER DISTRIBUTION - PRESENTATION - INTERFACE

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

Electrical Structure Network (ESN) - Presentation

Function/Description

Because the fuselage is made of Carbon Fiber Reinforced Plastic (CFRP), an ESN is installed in the pressurized fuselage and have the functions that follow:
- Common ground reference
- Grounding/bonding
- Current return path
- Lightning strike protection
- Static electricity discharging.
The ESN is a high-conductivity network installed in the pressurized fuselage and made of metal parts:
- Primary structure components (for example, metal frames, metal crossbeams, seat tracks)
- Secondary structure components (for example, cabin center attachments, L-brackets, avionics rack chassis)
- Standard parts (for example, raceways, ESN cables, electrical junctions).

Location

The ESN components are installed in the pressurized fuselage.

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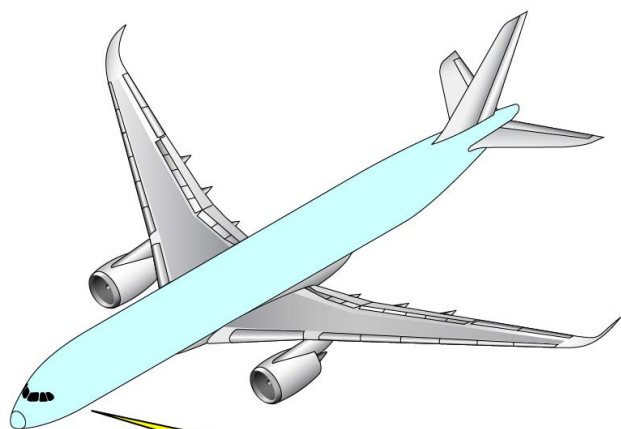
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Electrical Structure Network (ESN):

- Common Ground Reference
- Grounding/Bonding
- Current Return Path
- Lightning Strike Protection
- Static Electricity Discharging

PRIMARY STRUCTURE
SECONDARY STRUCTURE
STANDARD PARTS
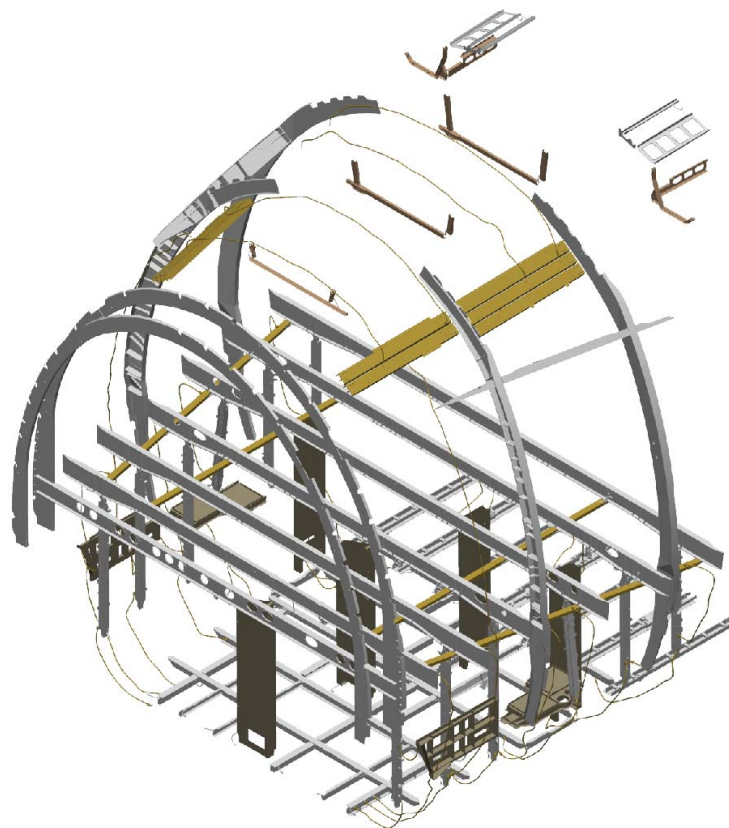
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ELECTRICAL STRUCTURE NETWORK (ESN) - PRESENTATION - FUNCTION/DESCRIPTION & LOCATION

ELECTRICAL POWER SYSTEM PRESENTATION (1)

Control and Indicating - Presentation

The controls and indications of the electrical power system are on the
overhead panel on:
- The ELEC section of Integrated Control Panel (ICP) 225VM
- The EMER ELEC PWR section of ICP 215VM.
The status of the electrical power system is shown on the ECAM display,
on the System Display (SD).
On the SD, the pages that follow give data about the electrical power
system:
- ELEC AC page
- ELEC DC page
- C/B page.
On the ground, the CDS and/or OMT and/or PMAT give access to the
PDMMF page for the functions that follow:
- Monitoring of all the circuit breakers, Remote Control Circuit Breakers
(RCCBs) and Solid State Power Controllers (SSPCs)
- Control of the RCCBs and SSPCs of the main network for maintenance.
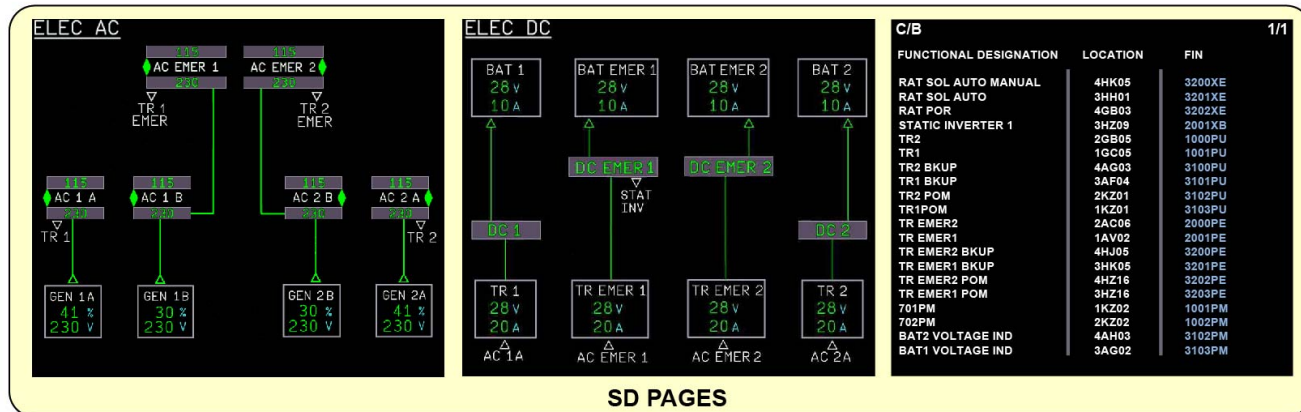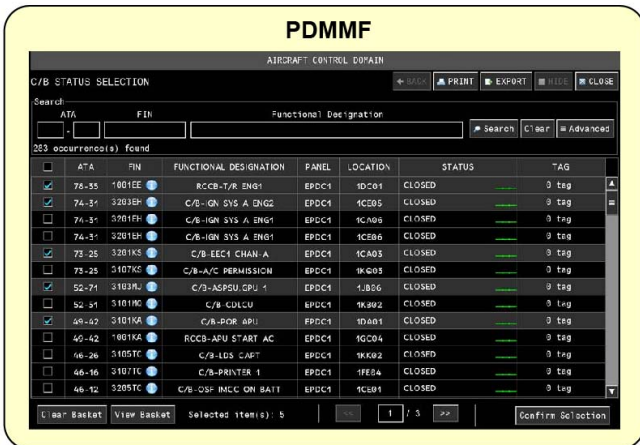
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CONTROL AND INDICATING - PRESENTATION

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ELECTRICAL POWER SYSTEM PRESENTATION (1)

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

Overview

The function of the IMA is to give shared resources for avionics applications and data processing and transmission through a common communication network.
Some Line Replaceable Units (LRUs) are directly connected to the communication network and some LRUs are connected to the network through modules.
The general familiarization training for these systems is about:
- Communication network
- CPIOMs
- CRDCs.

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COMMUNICATION
NETWORK

INTEGRATED
MODULAR
AVIONICS

CORE PROCESSING
INPUT/OUTPUT MODULE

COMMON REMOTE
DATA CONCENTRATOR

OVERVIEW

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

Communication Network - Presentation

Function/Description

The communication network, also known as the AFDX network, is
used for communication between AFDX network users.
For redundancy, the AFDX network has two networks:
- Network A
- Network B.
The AFDX network uses the AFDX technology.
This technology includes:
- AFDX switches
- AFDX cables (quad cables).

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NETWORK A

AFDX SWITCH

NETWORK B

AFDX NETWORK USER

AFDX NETWORK USER

AFDX NETWORK USER

AFDX NETWORK USER

AFDX NETWORK USER

AFDX NETWORK USER

AFDX SWITCH

AFDX SWITCH

AFDX SWITCH

AFDX SWITCH

AFDX NETWORK

AFDX CABLE / QUAD CABLE

AFDX: Avionics Full Duplex Switched Ethernet

COMMUNICATION NETWORK - PRESENTATION - FUNCTION/DESCRIPTION

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION
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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

Communication Network - Presentation (continued)

Location

All the AFDX switches are installed in the avionics compartment.

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AVIONICS
COMPARTMENT
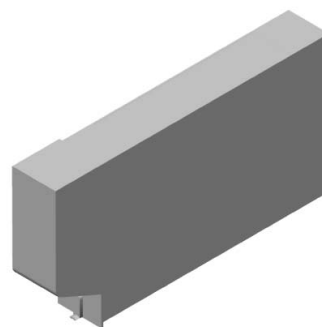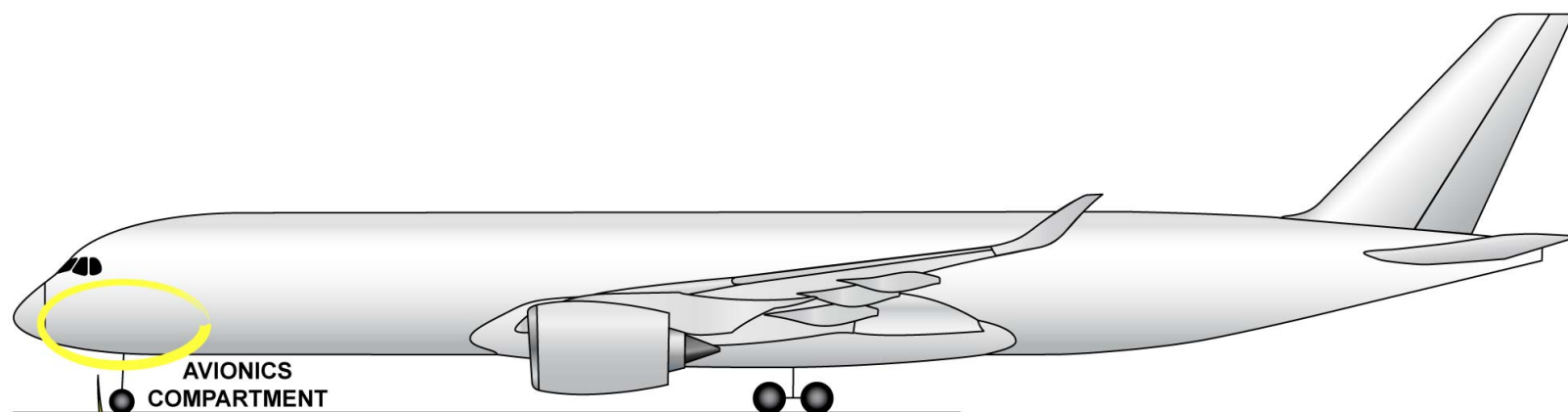
AFDX SWITCH

AFDX: Avionics Full Duplex Switched Ethernet

COMMUNICATION NETWORK - PRESENTATION - LOCATION

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

CPIOMs - Presentation

Function/Description

The CPIOMs have these functions:
- They host avionics applications and process data to do the avionics functions. Each CPIOM hosts many applications.
- They convert and transmit data between the AFDX network and LRUs that do not have the AFDX technology.
There are two types of CPIOM:
- CPIOM-J
- CPIOM-H.

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AVIONICS
APPLICATIONS

CPIOM

PROCESSING
RESOURCE

CPIOM-x

CPIOM-x

AFDX

AFDX

LRUs

NON-AFDX

I/O CONVERTING
RESOURCE

AFDX

AFDX NETWORK

CPIOM-x

2 TYPES: J and H

AFDX: Avionics Full Duplex Switched Ethernet
CPIOM: Core Processing Input/Output Module
I/O: Input/Output
LRU: Line Replaceable Unit

CPIOMS - PRESENTATION - FUNCTION/DESCRIPTION

INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

CPIOMs - Presentation (continued)

Location

The CPIOMs are installed in the avionics compartment.

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AVIONICS
COMPARTMENT
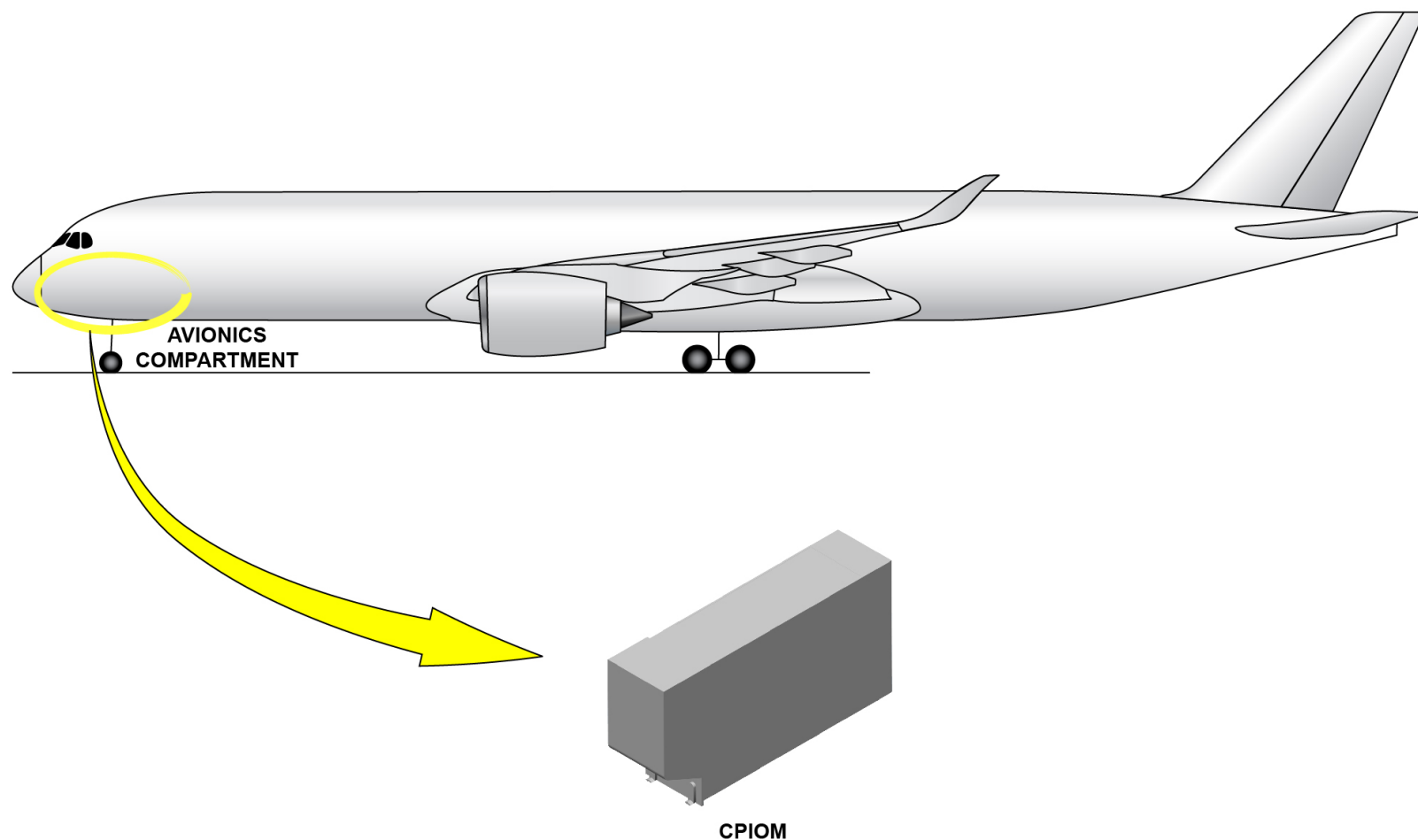
CPIOM

CPIOM: Core Processing Input/Output Module

CPIOMS - PRESENTATION - LOCATION

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

CRDCs - Presentation

Function/Description

The CRDCs have these functions:
- They collect, convert and exchange data between the AFDX network and LRUs that do not have the AFDX technology and that are mostly installed out of the avionics compartment.
There are two types of CRDC:
- CRDC-A
- CRDC-B.

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CRDCS - PRESENTATION - FUNCTION/DESCRIPTION

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

CRDCs - Presentation (continued)

Location

The CRDCs are installed in pressurized areas:
- Most of them are installed in the areas below the cabin floor.
- Some of them are installed in the avionics compartment.

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION
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AVIONICS
COMPARTMENT
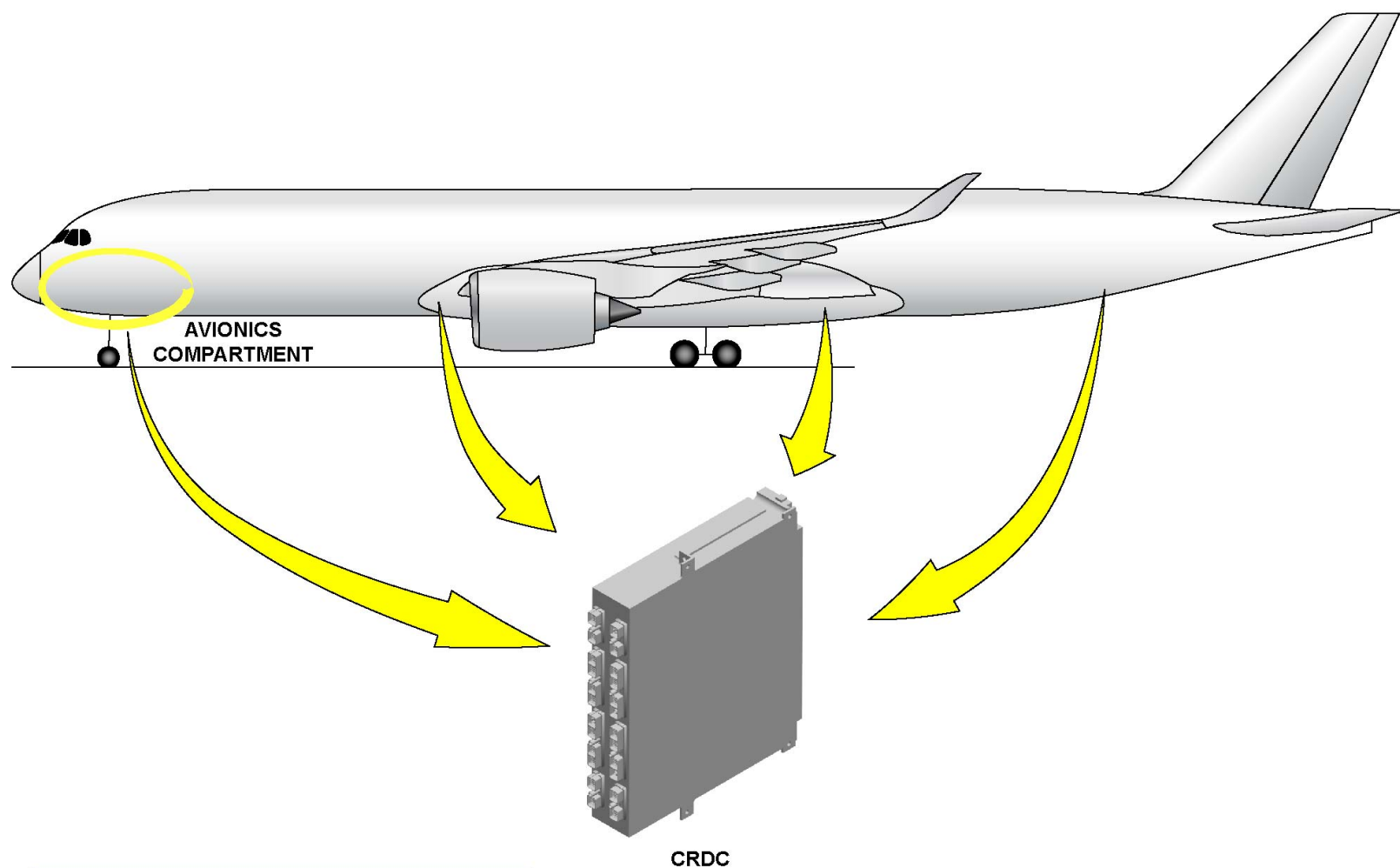
CRDC

CRDC: Common Remote Data Concentrator

CRDCS - PRESENTATION - LOCATION

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

Interface - Presentation

The LRUs with the AFDX capability are directly connected to the AFDX network.
The LRUs without the AFDX capability are connected to the AFDX network through CPIOMs or CRDCs (e.g. computers, sensors etc.).

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AIRBUS

IMA

LRUs
WITH NO AFDX CAPABILITY

NON-AFDX

CRDCs

CPIOMs

AFDX

AFDX

LRUs
WITH AFDX CAPABILITY

AFDX

AFDX NETWORK

AFDX: Avionics Full Duplex Switched Ethernet
CPIOM: Core Processing Input/Output Module
CRDC: Common Remote Data Concentrator
IMA: Integrated Modular Avionics
LRU: Line Replaceable Unit

INTERFACE - PRESENTATION

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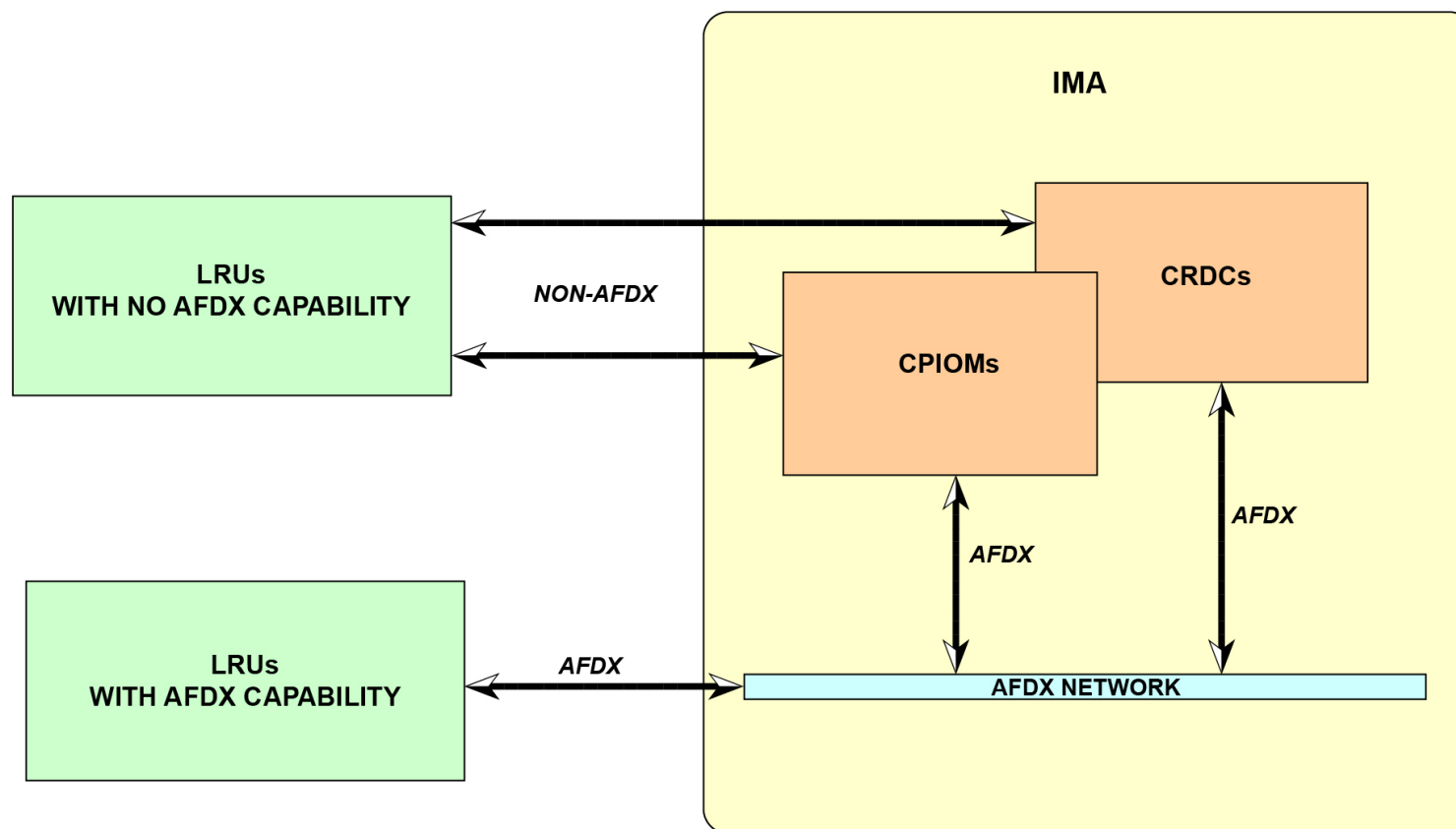02 - ELECTRO-AVIONICS SYSTEMS Level 1   (1)   Page 37

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION (1)

Maintenance

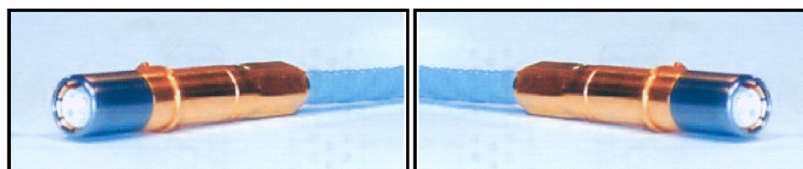### Tools

You must use a specific tester to do a check of the quad cables.

Maintenance Practices

Refer to the AirN@v/Line Electrical Standard Practices to do a check
and repair the quad cables.

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INTEGRATED MODULAR AVIONICS SYSTEM PRESENTATION
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USE AN APPROVED TESTER

AFDX: Avionics Full Duplex Switched Ethernet

REFER TO AirN@v LINE ELECTRICAL STANDARD PRACTICES FOR AFDX CABLE CHECK AND REPAIR

MAINTENANCE - TOOLS & MAINTENANCE PRACTICES

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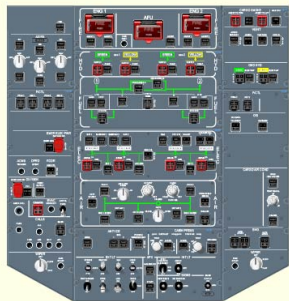# INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Overview

The functions of the indicating/recording systems are:
- To ensure indicating and control interfaces with aircraft systems to show
flight parameters
- To monitor and control most of the aircraft systems
- To record flight parameters for a full investigation.
The general familiarization training for these systems focuses on:
- ICPs
- Tailstrike indication system
- Recorders
- FWS
- Display systems.

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INDICATING/RECORDING SYSTEMS

INTEGRATED CONTROL PANELS
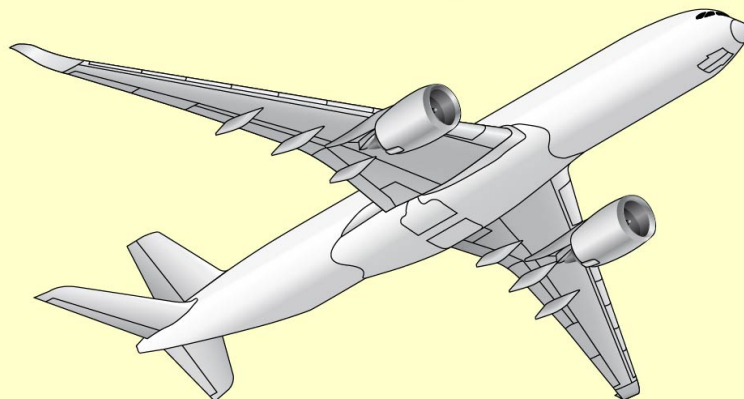
TAILSTRIKE INDICATION SYSTEM

DISPLAY SYSTEMS

FLIGHT WARNING SYSTEM

411 VU

412 VU

MASTER WARN

MASTER WARN

MASTER CAUT

MASTER CAUT

RECORDERS

OVERVIEW

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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V2414251 - V00T0MM0 - VM31P1LEVEL0101
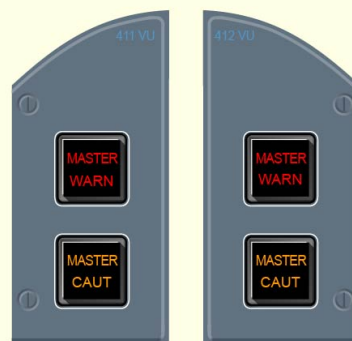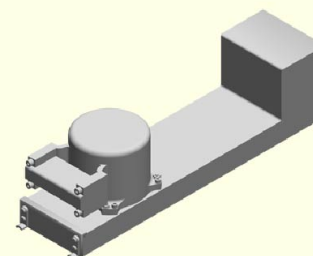
INDICATING/RECORDING SYSTEMS PRESENTATION (1)

ICPs - Presentation

Function/Description

The functions of the ICPs are:
- To show local warnings and system status and
- To control some aircraft systems.
The ICPs use discrete/analog signals and digital communication buses
to exchange data with aircraft systems.

Location

All the ICPs are installed in the cockpit. Most of them are on the
overhead panel.

Interface

The ICPs have interfaces with the aircraft systems through:
- Discrete/analog buses
- Digital connections, directly or through the Common Remote Data
Concentrators (CRDCs) and Avionics Full Duplex Switched Ethernet
(AFDX) network.
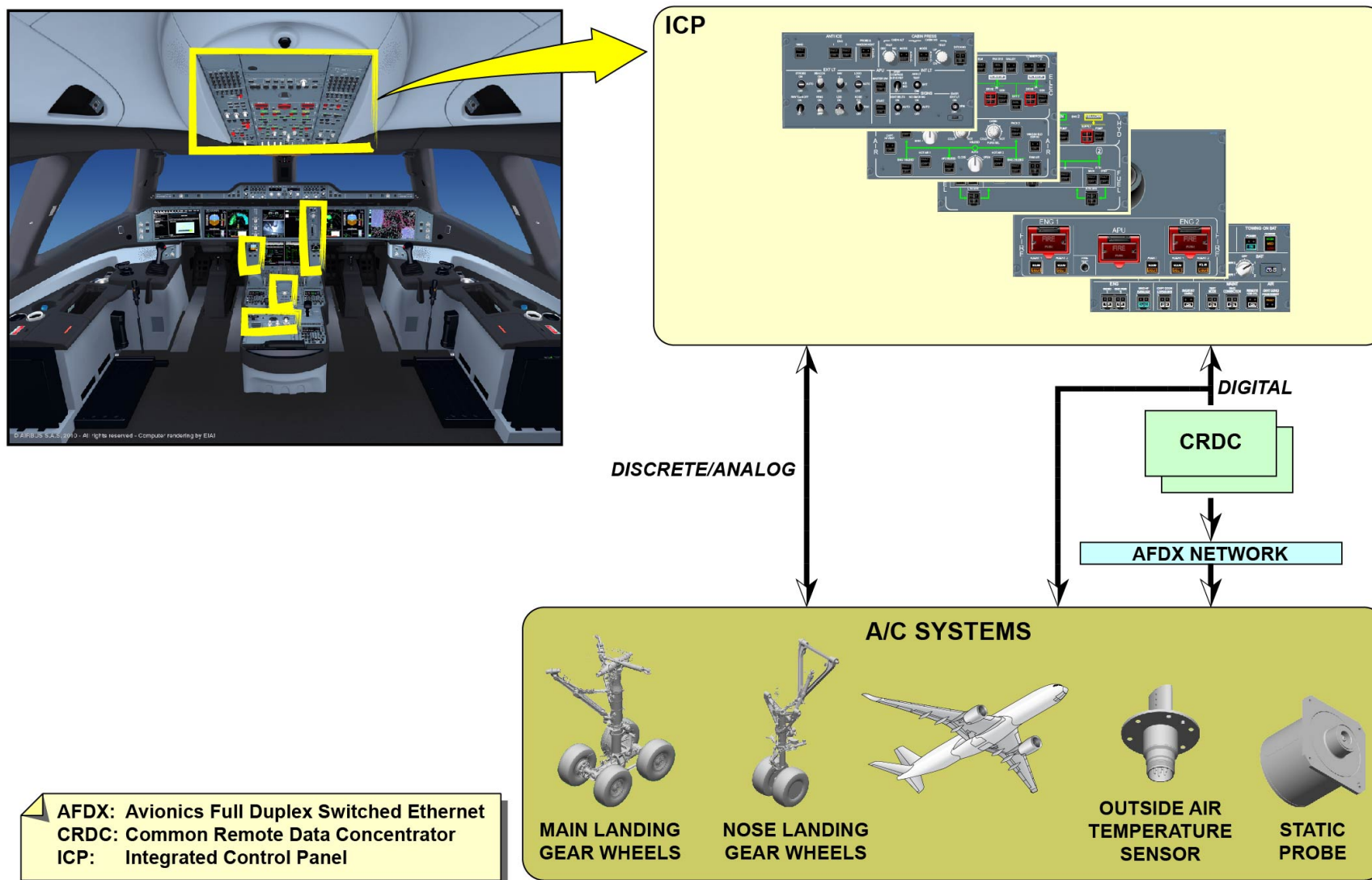
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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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ICP

DIGITAL

CRDC

DISCRETE/ANALOG

AFDX NETWORK

A/C SYSTEMS

△ AFDX: Avionics Full Duplex Switched Ethernet
CRDC: Common Remote Data Concentrator
ICP: Integrated Control Panel

MAIN LANDING
GEAR WHEELS

NOSE LANDING
GEAR WHEELS

OUTSIDE AIR
TEMPERATURE
SENSOR

STATIC
PROBE

ICPS - PRESENTATION - FUNCTION/DESCRIPTION ... INTERFACE

INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Tailstrike Indication System - Presentation

Function/Description

The function of the tailstrike indication system is to detect tailstrike events and to send data to the FWS for warning generation. When a tailstrike indication event is detected, the LAND ANSA (Landing At Nearest Suitable Airport) warning is shown and a maintenance operation will be necessary on the ground.
The tailstrike indication sensor is the only component of the system. It is an electrical circuit with wires that break easily if there is contact with the ground. The sensor then transmits the tailstrike detection data to the FWS (hosted in Core Processing Input/Output Modules (CPIOMs)) through the AFDX network.

Location

The tailstrike indication sensor is installed at the bottom of the rear fuselage.

Control and Indicating

When the FWS receives the tailstrike detection data, it generates a tailstrike warning and sends it to the CDS through the AFDX network.
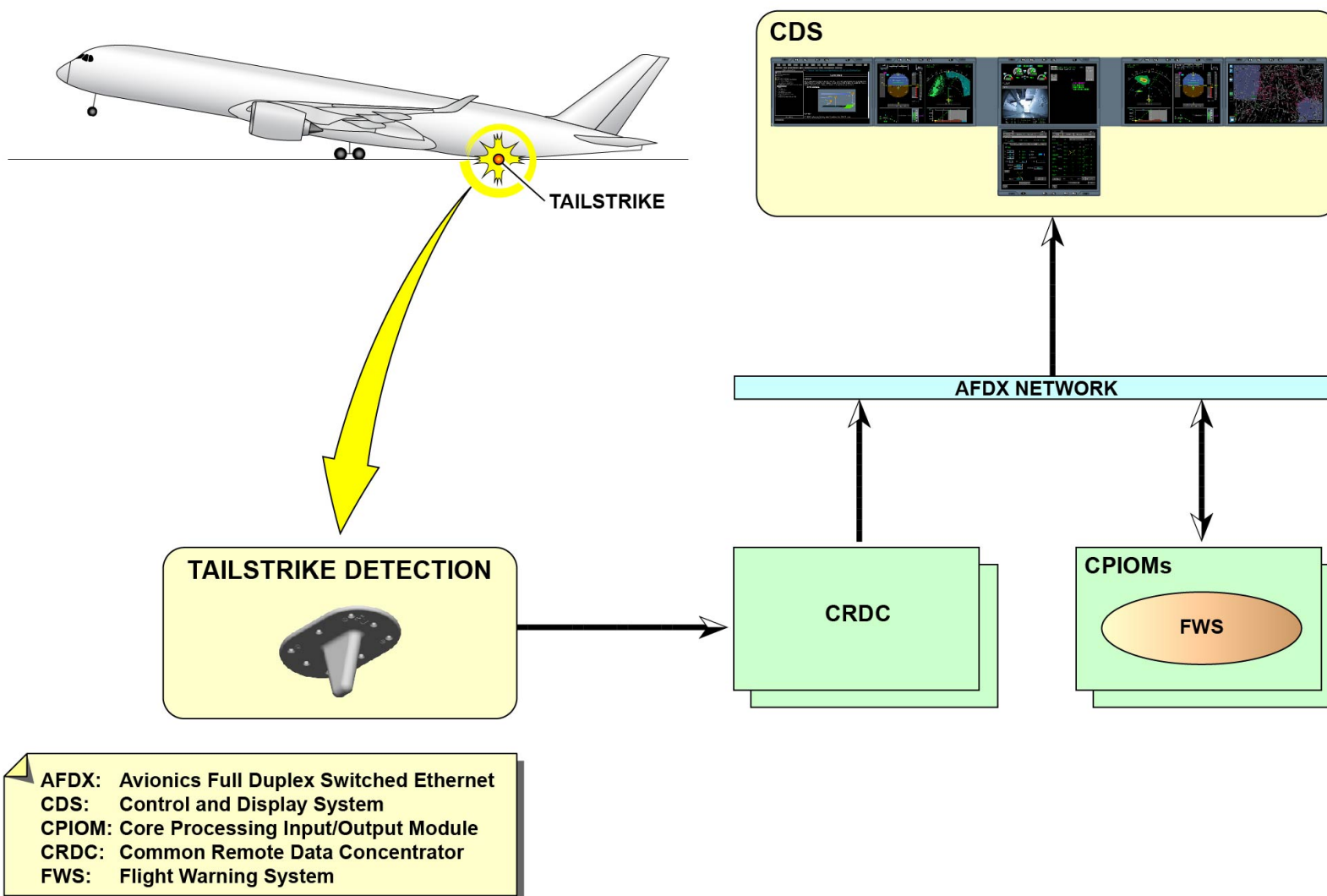
V2414251 - V00T0MM0 - VM31P1LEVEL0101

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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AFDX: Avionics Full Duplex Switched Ethernet
CDS: Control and Display System
CPIOM: Core Processing Input/Output Module
CRDC: Common Remote Data Concentrator
FWS: Flight Warning System

TAILSTRIKE INDICATION SYSTEM - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Recorders - Presentation

Function/Description

The function of the recorders is to record and store mandatory flight
parameters related to the last 25 hours of aircraft operation.
The recorders include:
- A Centralized Data Acquisition Unit (CDAU)
- A flight-data interface-function application, and
- A crash-resistant Solid State Flight Data Recorder (SSFDR).
The CDAU hosts the flight-data interface-function application that
receives the data from the aircraft systems. The flight-data
interface-function application changes the format of the flight
parameters into a recordable format and sends them to the SSFDR for
recording.

Location

The SSFDR is installed in the aft-cabin underfloor compartment of
the aircraft.
The CDAU is installed in the avionics compartment.

Interface

The CDAU has interfaces with the aircraft systems through the AFDX
network and through other types of connections which are used as
backup connections.
The SSFDR is connected to the CDAU.

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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CDAU

FLIGHT DATA INTERFACE FUNCTION

A/C SYSTEMS

BACKUP

CDAU

MANDATORY FLIGHT PARAMETERS

SSFDR

(LAST 25 HOURS)

FLIGHT DATA RECORDING
AND CENTRALIZED DATA ACQUISITION

INVESTIGATIONS

A/C SYSTEMS

AVIONICS COMPARTMENT

AFT-CABIN UNDER-FLOOR COMPARTMENT

AIRWORTHINESS AUTHORITIES

AFDX: Avionics Full Duplex Switched Ethernet
CDAU: Centralized Data Acquisition Unit
SSFDR: Solid State Flight Data Recorder

RECORDERS - PRESENTATION - FUNCTION/DESCRIPTION ... INTERFACE

MAINTENANCE COURSE - T1+T2 - RR Trent XWB
02 - ELECTRO-AVIONICS SYSTEMS Level 1

INDICATING/RECORDING SYSTEMS PRESENTATION (1)
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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Recorders - Presentation (continued)

Control and Indicating

The SSFDR controls (two pushbutton switches) are on the overhead panel.

The RCDR/GND CTL pushbutton switch is used to supply electrical power to the SSFDR on the ground for test and maintenance operations.

The DFDR/EVENT pushbutton switch lets the flight crew put a mark on a specified event in the SSFDR.

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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RECORDERS - PRESENTATION - CONTROL AND INDICATING

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Flight Warning System (FWS) - Presentation

Function/Description

The FWS is a central system that gives operational aid to the flight crew in normal and abnormal aircraft system operations.
When there is an aircraft system fault or a dangerous aircraft configuration, the function of the FWS is to generate aural and visual warnings through cockpit peripherals.
The FWS has two identical FWS applications hosted in the two CPIOMs. It receives data from most aircraft systems.

Interface

The FWS has interfaces with:
- The ECAM control panel
- The visual attention getters (lights of the MASTER WARN and MASTER CAUT pushbutton switches)
- The CDS
- The aircraft systems through the AFDX network and other types of connections for system monitoring. Most of these connections are backup connections.
- The audio management system for the aural warnings.

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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FLIGHT WARNING SYSTEM:
- CENTRAL ALERTING SYSTEM
- ASSISTANCE IN NORMAL
  AND ABNORMAL SITUATIONS
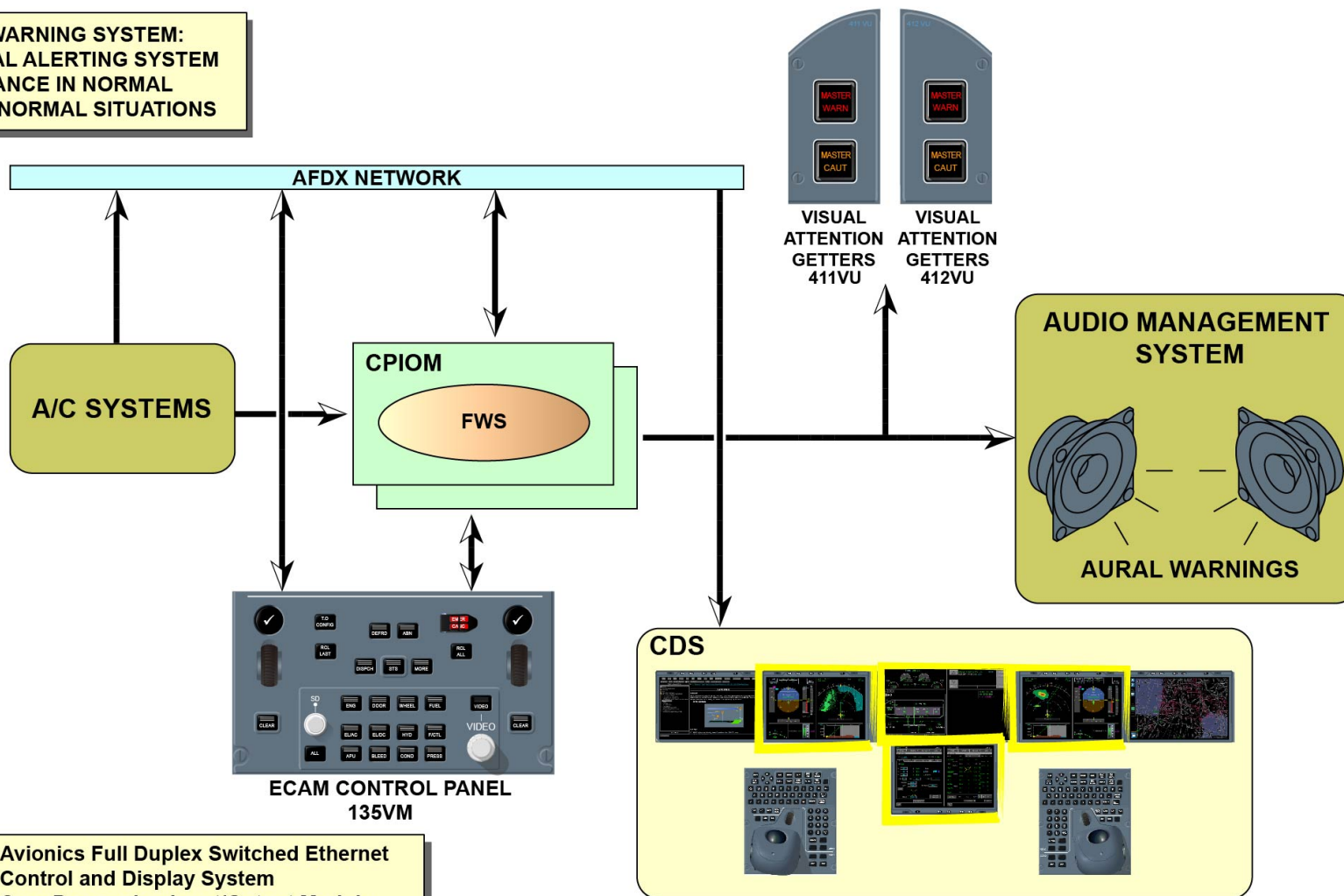
AFDX NETWORK

VISUAL
ATTENTION
GETTERS
411VU

VISUAL
ATTENTION
GETTERS
412VU

MASTER WARN
MASTER CAUT

MASTER WARN
MASTER CAUT

AUDIO MANAGEMENT
SYSTEM

AURAL WARNINGS

A/C SYSTEMS

CPIOM

FWS

CDS

ECAM CONTROL PANEL
135VM

AFDX: Avionics Full Duplex Switched Ethernet
CDS: Control and Display System
CPIOM: Core Processing Input/Output Module
ECAM: Electronic Centralized Aircraft Monitoring
FWS: Flight Warning System

FLIGHT WARNING SYSTEM (FWS) - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Flight Warning System (FWS) - Presentation (continued)

Control and Indicating

The ECAM control panel is used to:
- Manage ECAM warning procedures
- Manage the display of system pages on the System Display (SD)
- Call and manage the abnormal procedures.
The KCCU is used to:
- Call and manage the normal checklists.
The FWS sends:
- Aural warnings to the cockpit loudspeakers
- Visual warnings through visual attention getters
- Warning messages for display on the CDS Display Units (DUs).

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CDS

CAPT VISUAL
ATTENTION GETTERS
411VU

F/O VISUAL
ATTENTION GETTERS
412VU

LOUDSPEAKER

LOUDSPEAKER

CDS: Control and Display System

ECAM CONTROL PANEL
135VM

FLIGHT WARNING SYSTEM (FWS) - PRESENTATION - CONTROL AND INDICATING

V2414251 - V00T0MM0 - VM31P1LEVEL0101

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Display Systems - Presentation

Function/Description

The display systems include:
- The CDS
- The Concentrator and Multiplexer for Video (CMV)
- The Head-Up Display (HUD) (optional).
CDS
The CDS receives aircraft system data through the AFDX network.
These data are shown on six interchangeable DUs.
The six DUs have a large Liquid Crystal Display (LCD) divided into
two windows, except for the Onboard Information System (OIS).
These DUs can show video images.
CMV
The function of the CMV lets the flight crew see the video images on
the DUs.
The two CMVs receive video signals from different sources in
different formats. They then change the video signals to adapt them
to the CDS format.
HUD (optional)
The HUD function gives the flight crew navigation, guidance and
flight data. It helps to improve the manual flight-path control and
situational awareness especially in low visibility conditions.

Interface

The CDS has interfaces with:
- The AFDX network for aircraft data reception
- The CMVs for video signal acquisition
- The Electronic Flight Instrument System (EFIS) control panels for
display mode selection.
The CMVs receive video data from:
- The Cabin Video Monitoring System (CVMS) (optional)
- The Cockpit Door Surveillance System (CDSS) (optional)

- The External and Taxiing Aid Camera System (ETACS) (optional)
- The OIS.

AFDX:	Avionics Full Duplex Switched Ethernet	**ED:**	Engine Display
ATC:	Air Traffic Control	**EFIS:**	Electronic Flight Instrument System
CDS:	Control and Display System	**ETACS:**	External and Taxiing Aid Camera System
CDSS:	Cockpit Door Surveillance System	**HUD:**	Head-Up Display
CMV:	Concentrator and Multiplexer for Video	**MFD:**	MultiFunction Display
CVMS:	Cabin Video Monitoring System	**ND:**	Navigation Display

OIS:	Onboard Information System
PFD:	Primary Flight Display
SD:	System Display
VD:	Vertical Display
WD:	Warning Display

DISPLAY SYSTEMS - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Display Systems - Presentation (continued)

Location

There are two CMVs installed in the avionics compartment.

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AVIONICS
COMPARTMENT

2 CMVs
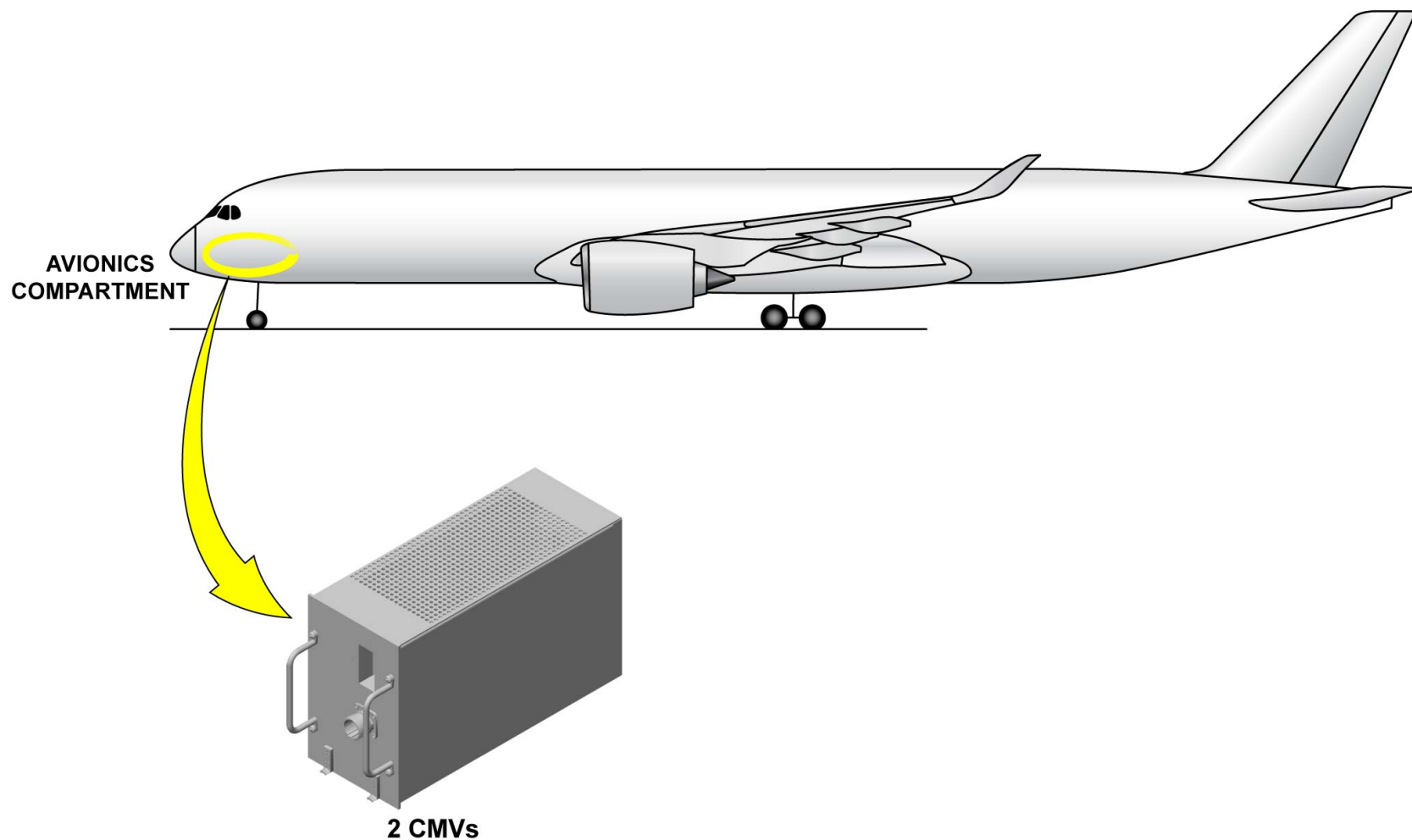
CMV : Concentrator and Multiplexer for Video

DISPLAY SYSTEMS - PRESENTATION - LOCATION

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MAINTENANCE COURSE - T1+T2 - RR Trent XWB   INDICATING/RECORDING SYSTEMS PRESENTATION (1)   Jul 10, 2014
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INDICATING/RECORDING SYSTEMS PRESENTATION (1)

Display Systems - Presentation (continued)

Control and Indicating

CDS

The controls in the cockpit are:

- The CAPT and F/O EFIS control panels to select the display mode

- The CHRONO pushbutton switches, which are on the CAPT and F/O glareshield panels, to give a chronometer indication on the Navigation Display (ND)

- The DU MASTER BRT knob on panel 115VM to do a CDS reconfiguration

- The display configuration pushbutton-switches to do a CDS reconfiguration:

- CAPT (F/O) OIS ON CENTER pushbutton switch, on panel 301VM (302VM)

- DISPLAY CYCLE pushbutton switch, on panel 301VM (302VM)

- OIS/VIEW OFFSIDE pushbutton switch, on panel 313VU (314VU).

- The two KCCUs, which are on the center pedestal, to control the DUs

- The ECAM control panel:

- To manage and show the warnings, cautions, normal checklists and abnormal procedures on the warning display window.

- To select the aircraft system synoptics and status pages on the system display window.

- The pushbutton switches on each DU to start/stop and adjust the brightness and contrast of the DU.

CMV

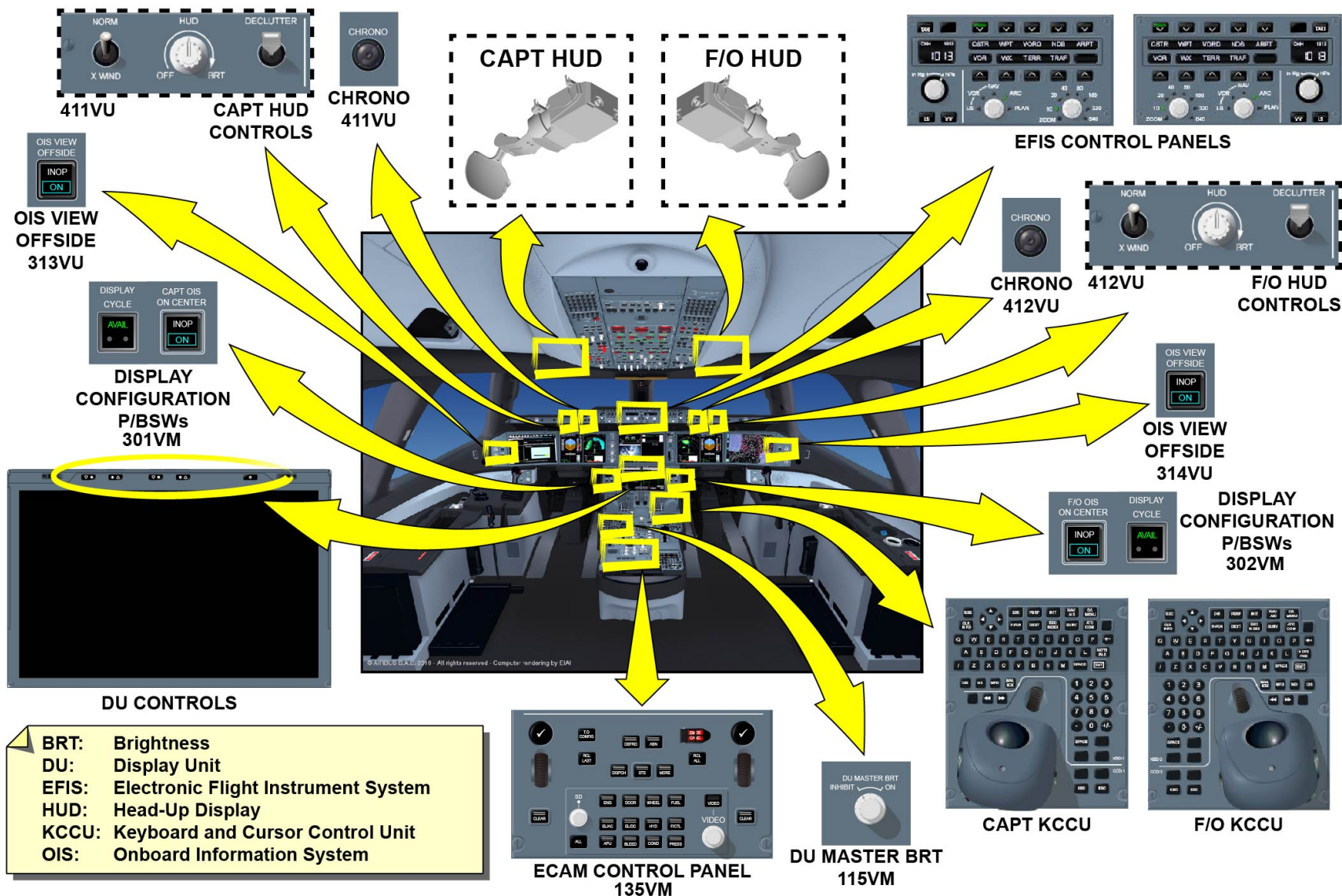All the video images that the CMV receives from video source systems (CDSS, CVMS) or external video system) are shown on the DUs through a selection from the EFIS control panels and from the ECAM control panel.

HUD (optional)

The HUD data are shown on a transparent image superimposed on the real outside view.

The HUD controls are installed on glareshield panels 411VU and 412VU.

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411VU

CAPT HUD
CONTROLS

CHRONO
411VU

CAPT HUD

F/O HUD

EFIS CONTROL PANELS

OIS VIEW
OFFSIDE
313VU

CHRONO
412VU

412VU

F/O HUD
CONTROLS

DISPLAY
CONFIGURATION
P/BSWs
301VM

OIS VIEW
OFFSIDE
314VU

DISPLAY
CONFIGURATION
P/BSWs
302VM

DU CONTROLS

BRT: Brightness
DU: Display Unit
EFIS: Electronic Flight Instrument System
HUD: Head-Up Display
KCCU: Keyboard and Cursor Control Unit
OIS: Onboard Information System

ECAM CONTROL PANEL
135VM

DU MASTER BRT
115VM

CAPT KCCU

F/O KCCU

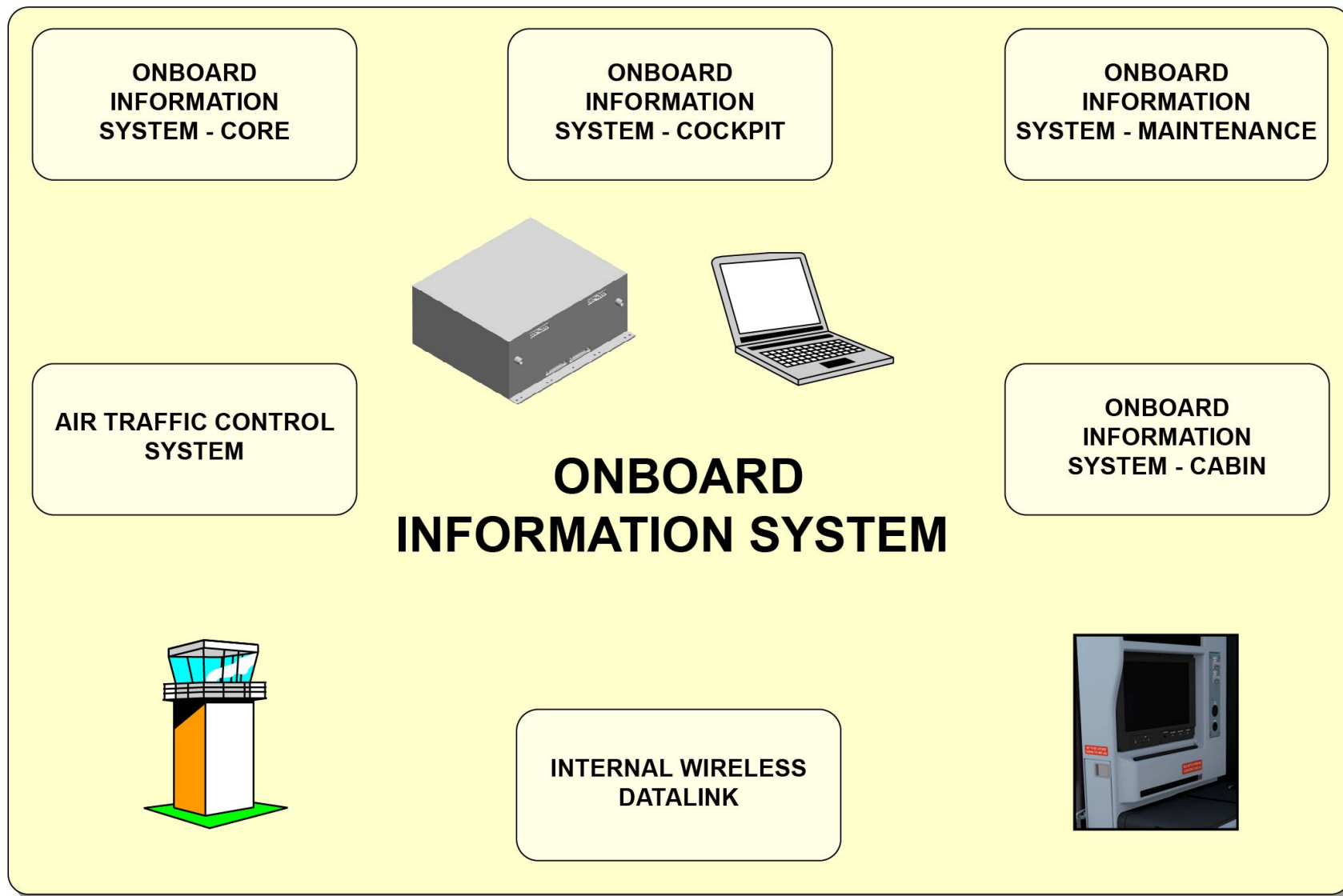DISPLAY SYSTEMS - PRESENTATION - CONTROL AND INDICATING

INFORMATION SYSTEMS PRESENTATION (1)

Overview

The function of the Onboard Information System (OIS) is to give network infrastructure and to host flight operations, maintenance and cabin applications.
General familiarization training for this system focuses on:
- OIS - Core
- OIS - Cockpit
- OIS - Maintenance
- OIS - Cabin
- Internal Wireless Datalink
- Air Traffic Control (ATC) System.

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INFORMATION SYSTEMS PRESENTATION (1)

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ONBOARD INFORMATION SYSTEM - CORE	ONBOARD INFORMATION SYSTEM - COCKPIT	ONBOARD INFORMATION SYSTEM - MAINTENANCE
AIR TRAFFIC CONTROL SYSTEM	**ONBOARD INFORMATION SYSTEM**	ONBOARD INFORMATION SYSTEM - CABIN
	INTERNAL WIRELESS DATALINK	

OVERVIEW

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INFORMATION SYSTEMS PRESENTATION (1)

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INFORMATION SYSTEMS PRESENTATION (1)

Onboard Information System (OIS) - Core - Presentation

Function/Description

The function of the OIS is to replace the onboard paper documentation with electronic documentation and applications to control the flight, cabin and maintenance operations.

All the applications and electronic documentation are hosted in two OIS cabinets. They are available from some displays through Human-Machine Interfaces (HMIs).

The OIS applications and their related database (electronic documentation) are hosted in the items of equipment that follow:
- The Avionics Server Function Cabinet (ASFC)
- The Open world Server Function Cabinet (OSFC)
- Two Electronic Flight Bag (EFB) laptops (Commercial Off-The-Shelf (COTS) laptops).

For the connections, data exchanges are possible between:
- The ASFC and the aircraft systems through two firewalls, the Secure Communication Interfaces (SCIs), which give protection to the aircraft systems from non-secure data (virus, etc.).
- The OSFC and the ASFC through a firewall, the Smart Diode Module (SDM), which gives protection to the ASFC integrity.
- The EFB laptops and the OSFC.

The core OIS is divided into two domains:
- The Aircraft Control Domain (ACD)
- The Airline Information Services Domain (AISD).

Each domain has two parts.

The ACD parts are:
- The flight domain (not included in the OIS) related to the aircraft systems
- The ASFC that hosts a set of applications and databases.

The two ACD parts are connected to each other through two Secure Communication Interfaces (SCIs), to prevent unauthorized access and data entry into aircraft systems.

The AISD parts are:
- The OSFC that hosts a set of applications and databases. Data between the ASFC and the OSFC is transmitted through the Smart Diode Module (SDM) which is used to transmit the applicable data.
- The EFB which contains the EFB laptops and associated applications/databases.

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INFORMATION SYSTEMS PRESENTATION (1)

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OIS DISPLAY   OMT   PMAT   FAP

ONBOARD PAPER DOCUMENTATION

- FLIGHT OPS (E.G.: FCOM, NAVIGATION CHARTS, ...)
- CABIN (E.G. CCOM)
- MAINTENANCE (E.G. AIRN@V, ...)

AIRCRAFT SYSTEMS

AIRLINE GROUND CENTER

OIS CABINET (X2)

APPLICATION

E-DOCUMENTATION

CCOM: Cabin Crew Operating Manual
FAP: Flight Attendant Panel
FCOM: Flight Crew Operating Manual
OIS: Onboard Information System
OMT: Onboard Maintenance Terminal
OPS: Operations
PMAT: Portable Multipurpose Access Terminal
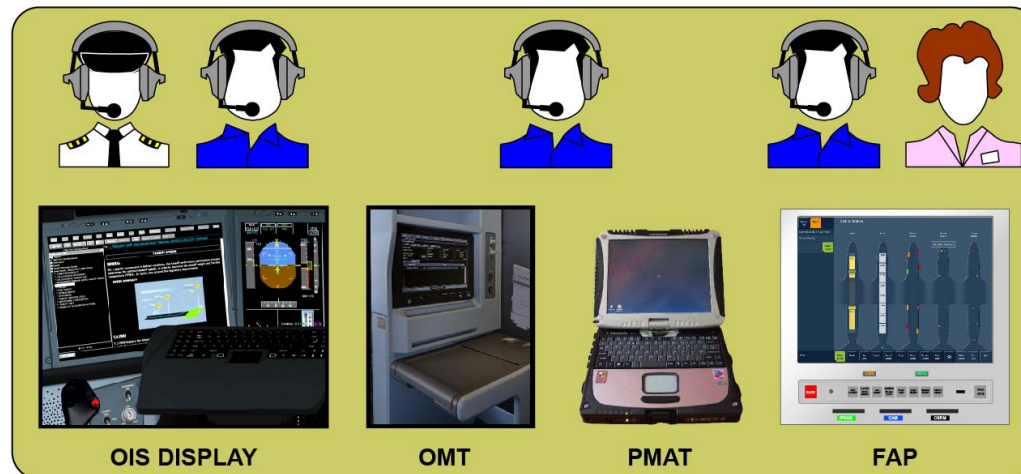
ONBOARD INFORMATION SYSTEM (OIS) - CORE - PRESENTATION - FUNCTION/DESCRIPTION
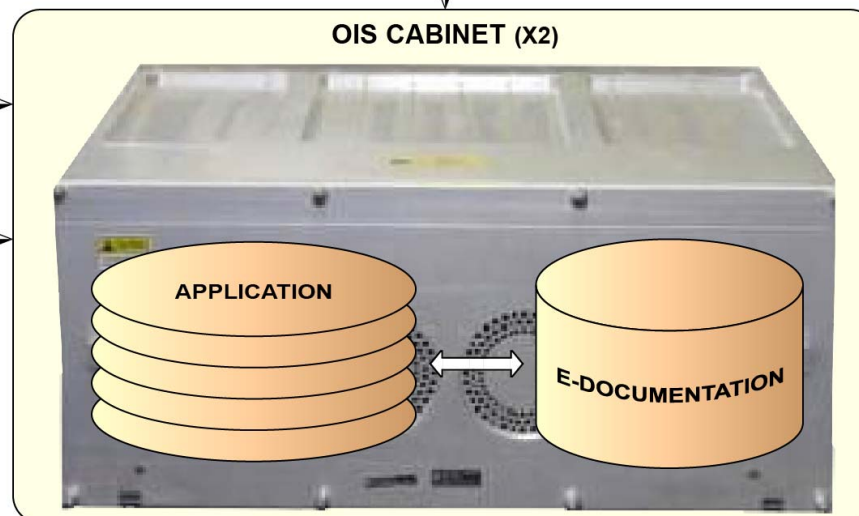
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AOC: Airline Operational Control
ASFC: Avionics Server Function Cabinet
EFB: Electronic Flight Bag
FAP: Flight Attendant Panel
OMS: Onboard Maintenance System
OMT: Onboard Maintenance Terminal
OPS: Operations
OSFC: Open world Server Function Cabinet
SCI: Secure Communication Interface
SDM: Smart Diode Module

OIS DISPLAY   **OMT**   **FAP**

ONBOARD INFORMATION SYSTEM

AIRCRAFT CONTROL DOMAIN   **AIRLINE INFORMATION SERVICE DOMAIN**

AIRCRAFT SYSTEMS

SCI 1 2

E.G.: OMS, AOC

E-DOC (DATABASE)

SDM

E.G. AirN@v

E-DOC (DATABASE)

E.G. FLIGHT OPS

OIS

E-DOC

ASFC   **OSFC**   **EFB LAPTOP**(x2)

ONBOARD INFORMATION SYSTEM (OIS) - CORE - PRESENTATION - FUNCTION/DESCRIPTION

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INFORMATION SYSTEMS PRESENTATION (1)

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INFORMATION SYSTEMS PRESENTATION (1)

Onboard Information System (OIS) - Core - Presentation (continued)

Interface

The core OIS has interfaces with:
- The airline ground centers
- The cabin Human-Machine Interfaces (HMIs) such as the Flight Attendant Panels (FAPs), airline cabin laptops and cabin printer (optional). These HMIs are used for display of some avionics data and for passenger air/ground communications.

Onboard Information System (OIS) - Cockpit - Presentation

Function/Description

The cockpit OIS gives access to flight operations applications for the flight crew. These flight operations applications are hosted in the two cabinets (ASFC and OSFC) and in the EFB laptops.

Onboard Information System (OIS) - Maintenance - Presentation

Function/Description

The maintenance OIS gives access to maintenance applications for the maintenance personnel. These maintenance applications are hosted in the two cabinets (ASFC and OSFC).

Onboard Information System (OIS) - Cabin - Presentation

Function/Description

The cabin OIS gives access to cabin applications for the cabin crew. These cabin applications are hosted in the OSFC.

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INFORMATION SYSTEMS PRESENTATION (1)

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COCKPIT HMIs
- CONTROL AND DISPLAY SYSTEM
- OMT
- PRINTER

PMAT*

ONBOARD INFORMATION SYSTEM

AIRCRAFT CONTROL DOMAIN

FLIGHT DOMAIN
- AIRCRAFT SYSTEMS

SCI 1 2

AIRLINE INFORMATION SERVICES DOMAIN

ASFC
- FLIGHT OPERATIONS
- ACD MAINTENANCE
- COMMUNICATION

SDM

OSFC
- FLIGHT OPERATIONS
- CABIN
- OSFC MAINTENANCE
- COMMUNICATION

EFB LAPTOP*
- FLIGHT OPERATIONS
- EFB MAINTENANCE

CABIN HMIs
- FAPs
- A/L CABIN LAPTOP*
- PRINTER

AIRLINE GROUND CENTER

A/L:	Airline	OMT:	Onboard Maintenance Terminal
ACD:	Aircraft Control Domain	OSFC:	Open world Server Function Cabinet
ASFC:	Avionics Server Function Cabinet	PMAT:	Portable Multipurpose Access Terminal
EFB:	Electronic Flight Bag	SCI:	Secure Communication Interface
FAP:	Flight Attendant Panel	SDM:	Smart Diode Module
HMI:	Human-Machine Interface	* =	UNDER AIRLINE RESPONSIBILITY

ONBOARD INFORMATION SYSTEM (OIS) - CORE - PRESENTATION ... ONBOARD INFORMATION SYSTEM (OIS) - CABIN - PRESENTATION

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INFORMATION SYSTEMS PRESENTATION (1)

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INFORMATION SYSTEMS PRESENTATION (1)

Onboard Information System (OIS) - Cockpit - Presentation

Control and Indicating

The flight crew gets access to the flight operations applications through:
- The Control and Display System (CDS)
- The EFB laptops
- The CAPT and F/O keyboards on the sliding table and the Keyboard and Cursor Control Units (KCCUs). The flight crew uses them for navigation or modifications on the OIS applications.

Onboard Information System (OIS) - Maintenance - Presentation

Control and Indicating

In the cockpit, the maintenance personnel can get access to the maintenance applications:
- On the Onboard Maintenance Terminal (OMT) installed near the Third Occupant seat.
- Through the CDS, if necessary.
In the cabin, the maintenance personnel can get access to the maintenance applications:
- On the FAPs, which are touchscreens
- On the airline cabin laptops.
Access in the cabin and out of the cockpit is also possible through a Portable Multipurpose Access Terminal (PMAT), which can be connected to the aircraft network through one of the Ethernet connectors installed in different areas in and out of the aircraft.
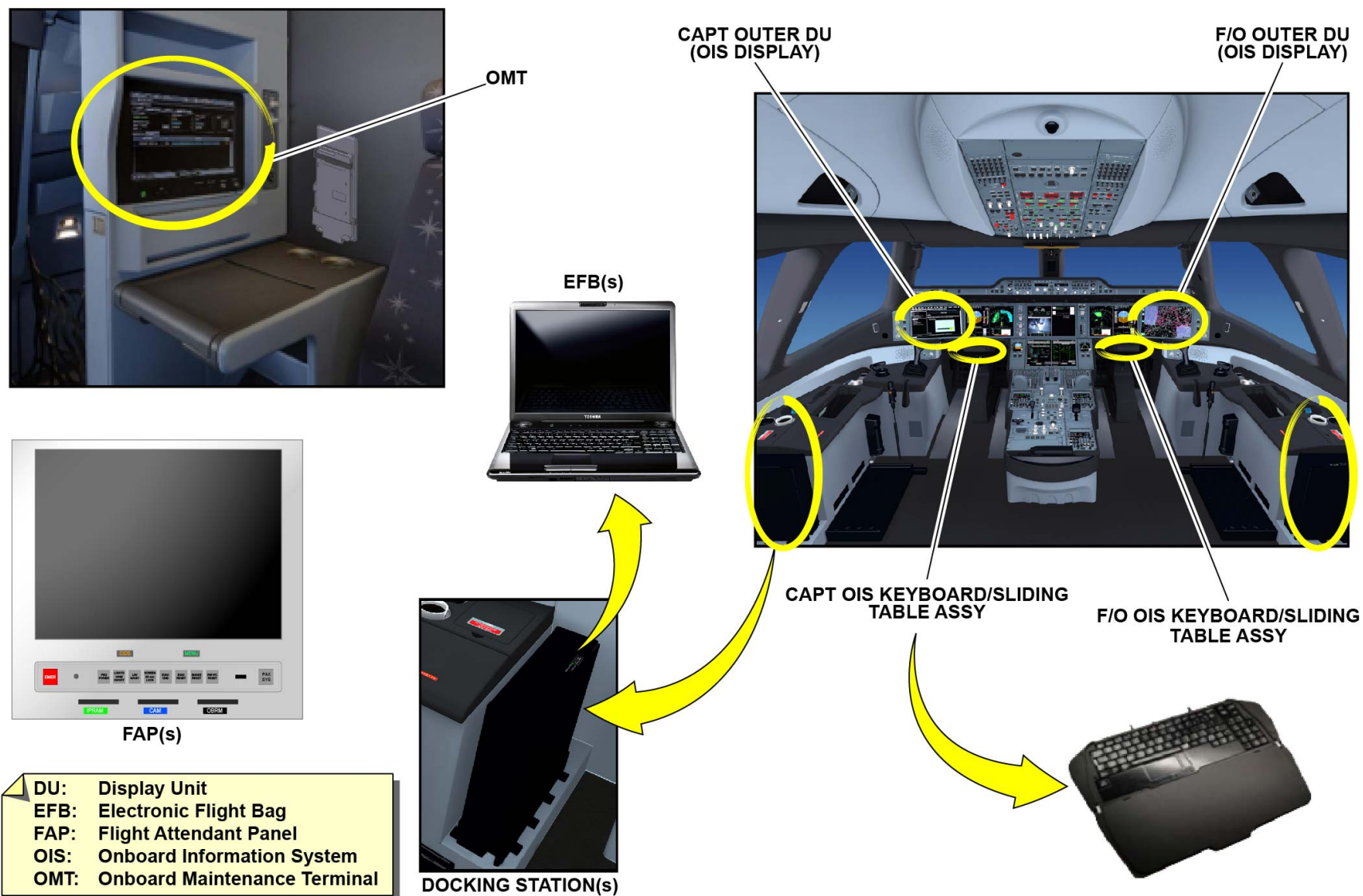
Onboard Information System (OIS) - Cabin - Presentation

Control and Indicating

The cabin crew can get access to the cabin applications:

- On the FAPs, which are touchscreens
- On the airline cabin laptops, through the internal wireless cabin network.
A printer can be installed in the cabin to print cabin and maintenance data (optional).

OMT

CAPT OUTER DU
(OIS DISPLAY)

F/O OUTER DU
(OIS DISPLAY)

EFB(s)

FAP(s)

CAPT OIS KEYBOARD/SLIDING
TABLE ASSY

F/O OIS KEYBOARD/SLIDING
TABLE ASSY

DOCKING STATION(s)

DU: Display Unit
EFB: Electronic Flight Bag
FAP: Flight Attendant Panel
OIS: Onboard Information System
OMT: Onboard Maintenance Terminal

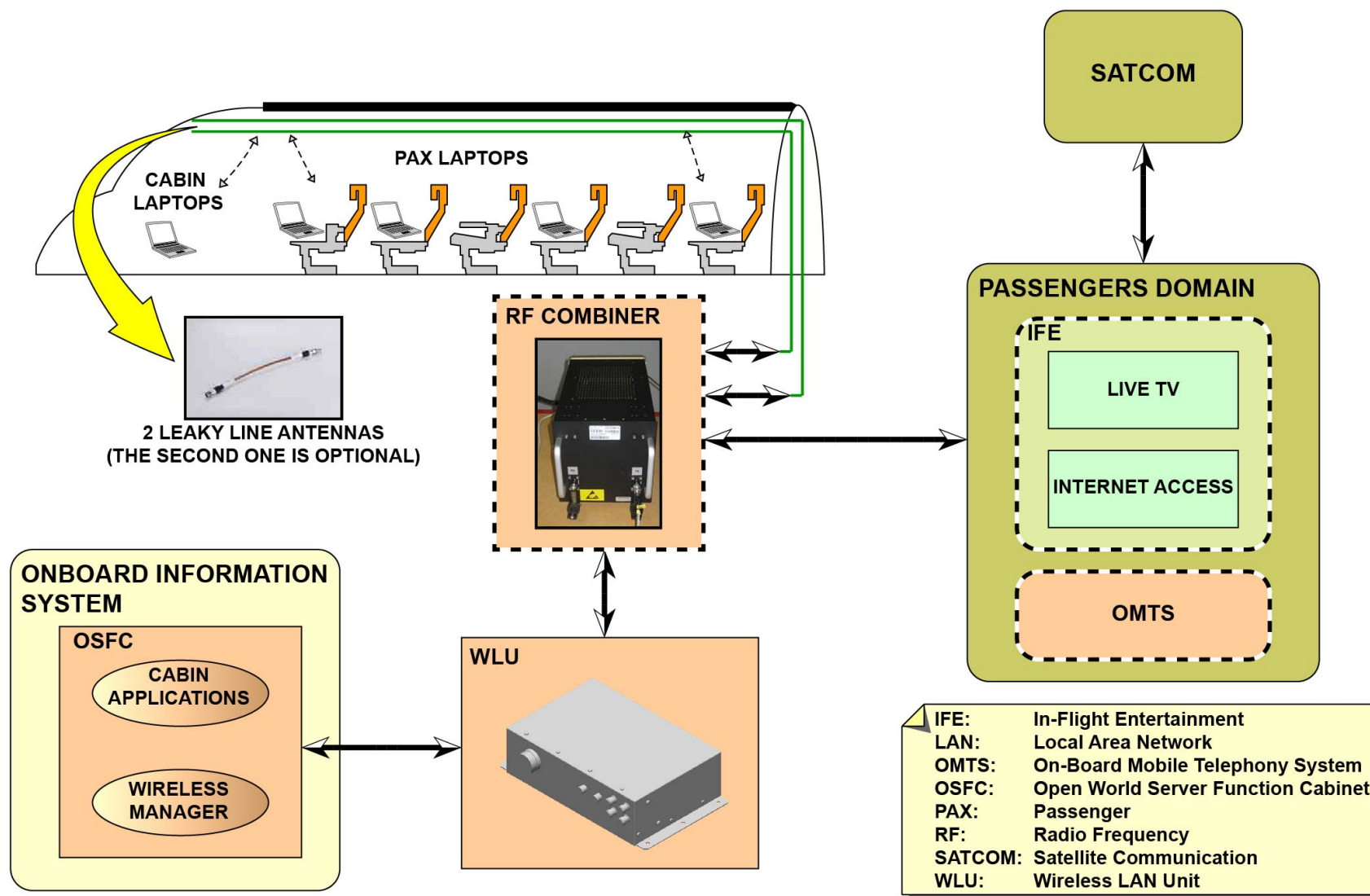ONBOARD INFORMATION SYSTEM (OIS) - COCKPIT - PRESENTATION ... ONBOARD INFORMATION SYSTEM (OIS) - CABIN -
PRESENTATION

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INFORMATION SYSTEMS PRESENTATION (1)

Internal Wireless Datalink - Presentation

Function/Description

The internal wireless datalink system gives the resources necessary for wireless connections in the cabin. The wireless system lets the cabin crew get access to the Cabin Operations Applications System (COAS) through Portable Electronic Devices (PEDs) or through airline-owned mobile devices. The system components (RF combiner (optional), Wireless LAN Unit (WLU) and leaky line antennas (one is optional)) supply the wireless connection for passenger applications (On-bord Mobile Telephony System (OMTS), In-Flight Entertainment (IFE) system).

SATCOM

PAX LAPTOPS

CABIN LAPTOPS

2 LEAKY LINE ANTENNAS (THE SECOND ONE IS OPTIONAL)

RF COMBINER

PASSENGERS DOMAIN

IFE

LIVE TV

INTERNET ACCESS

OMTS

ONBOARD INFORMATION SYSTEM

OSFC

CABIN APPLICATIONS

WIRELESS MANAGER

WLU

IFE:	In-Flight Entertainment
LAN:	Local Area Network
OMTS:	On-Board Mobile Telephony System
OSFC:	Open World Server Function Cabinet
PAX:	Passenger
RF:	Radio Frequency
SATCOM:	Satellite Communication
WLU:	Wireless LAN Unit

INTERNAL WIRELESS DATALINK - PRESENTATION - FUNCTION/DESCRIPTION

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INFORMATION SYSTEMS PRESENTATION (1)

Air Traffic Control (ATC) System - Presentation

Function/Description

The ATC system is a datalink application.
The functions of this application are as follows:
- It lets the pilot and the air traffic controller communicate through the Controller-Pilot DataLink Communication (CPDLC) application.
- It lets the pilot request and receive Flight Information Services (FIS) from ground FIS systems.
- It sends automatic reports of the aircraft position to give aircraft surveillance data to the ATC ground station (no pilot action is necessary).
The ATC system has:
- An ATC datalink application hosted in a Core Processing Input/Output Module (CPIOM)
- ATC HMIs.

Interface

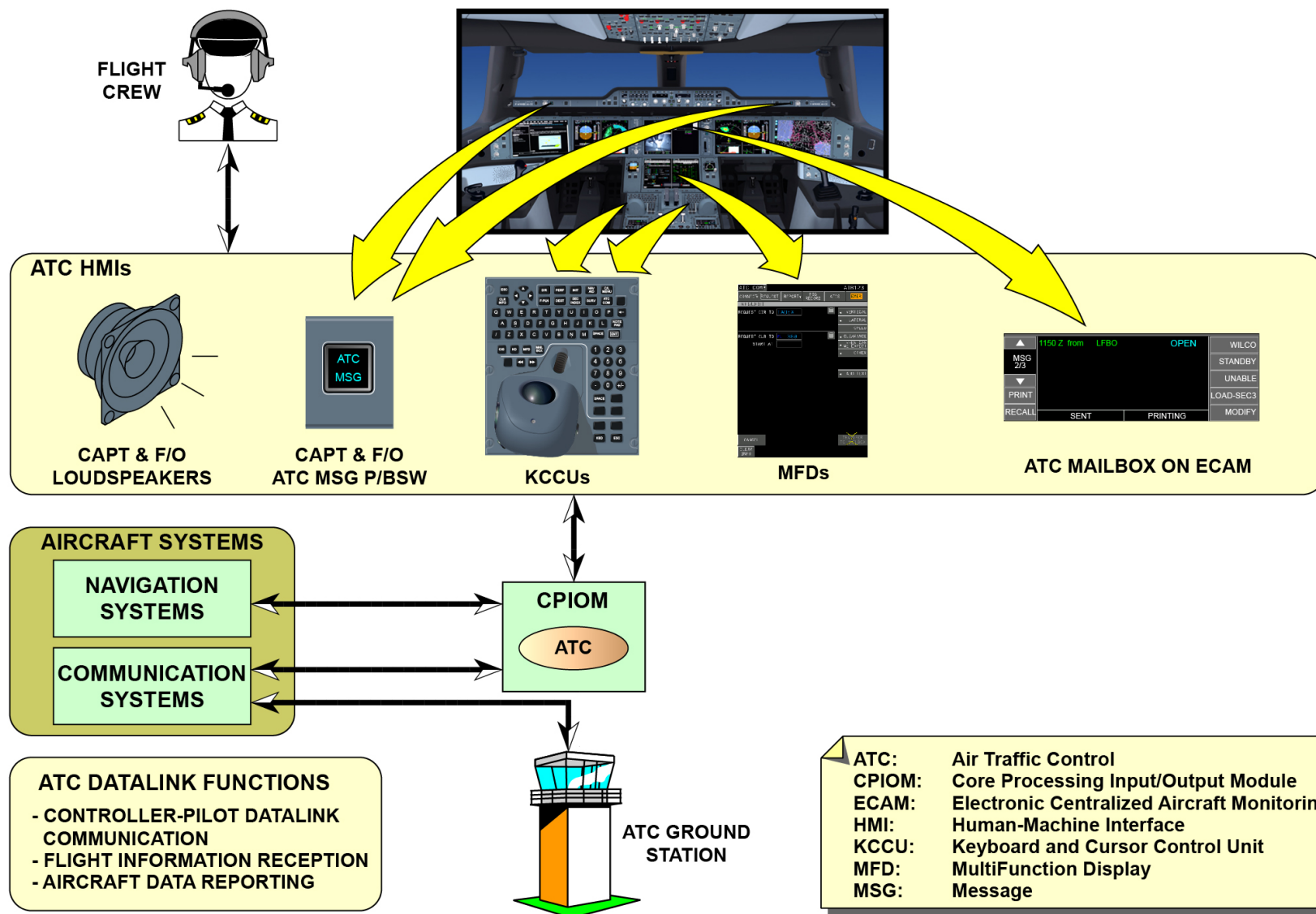The ATC system has interfaces with the aircraft systems that follow:
- Navigation systems: Air Data/Inertial Reference System (ADIRS), Flight Management System (FMS), Aircraft Environment Surveillance System (AESS) etc., for surveillance of the aircraft position and heading by the ATC ground station
- Communication systems for communication with the ATC ground station.

Control and Indicating

The Captain and First Officer ATC MSG pushbutton switches and loudspeakers alert the crew each time a message is received.
The flight crew can get access to the ATC application through the KCCUs:
- On the MultiFunction Display (MFD)
- On the Electronic Centralized Aircraft Monitoring (ECAM) display.

FLIGHT CREW

ATC HMIs

CAPT & F/O
LOUDSPEAKERS

CAPT & F/O
ATC MSG P/BSW

**ATC
MSG**

KCCUs

MFDs

ATC MAILBOX ON ECAM

1150 Z from   LFBO   OPEN   WILCO
MSG   STANDBY
2/3   UNABLE
PRINT   LOAD-SEC3
RECALL   SENT   PRINTING   MODIFY

AIRCRAFT SYSTEMS

NAVIGATION
SYSTEMS

COMMUNICATION
SYSTEMS

CPIOM

ATC

ATC DATALINK FUNCTIONS

- CONTROLLER-PILOT DATALINK
  COMMUNICATION
- FLIGHT INFORMATION RECEPTION
- AIRCRAFT DATA REPORTING

ATC GROUND
STATION

ATC: Air Traffic Control
CPIOM: Core Processing Input/Output Module
ECAM: Electronic Centralized Aircraft Monitoring
HMI: Human-Machine Interface
KCCU: Keyboard and Cursor Control Unit
MFD: MultiFunction Display
MSG: Message

AIR TRAFFIC CONTROL (ATC) SYSTEM - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

MAINTENANCE COURSE - T1+T2 - RR Trent XWB   INFORMATION SYSTEMS PRESENTATION (1)   Jul 10, 2014
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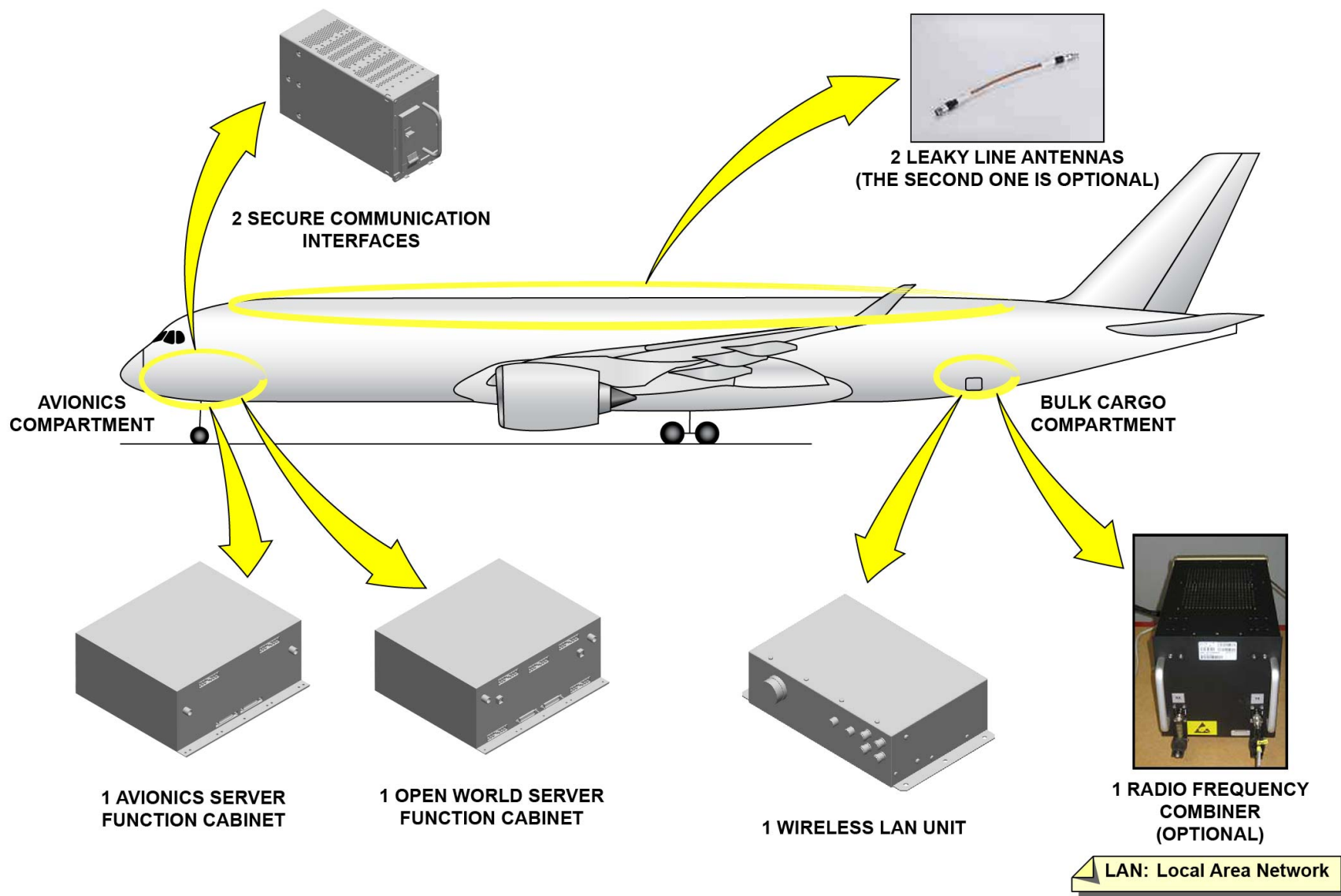V2414251 - V00T0MM0 - VM46P1LEVEL0101

INFORMATION SYSTEMS PRESENTATION (1)

Location - Presentation

The ASFC, the OSFC and the two SCIs are installed in the avionics
compartment.
The leaky line antennas are installed in the cabin ceiling.
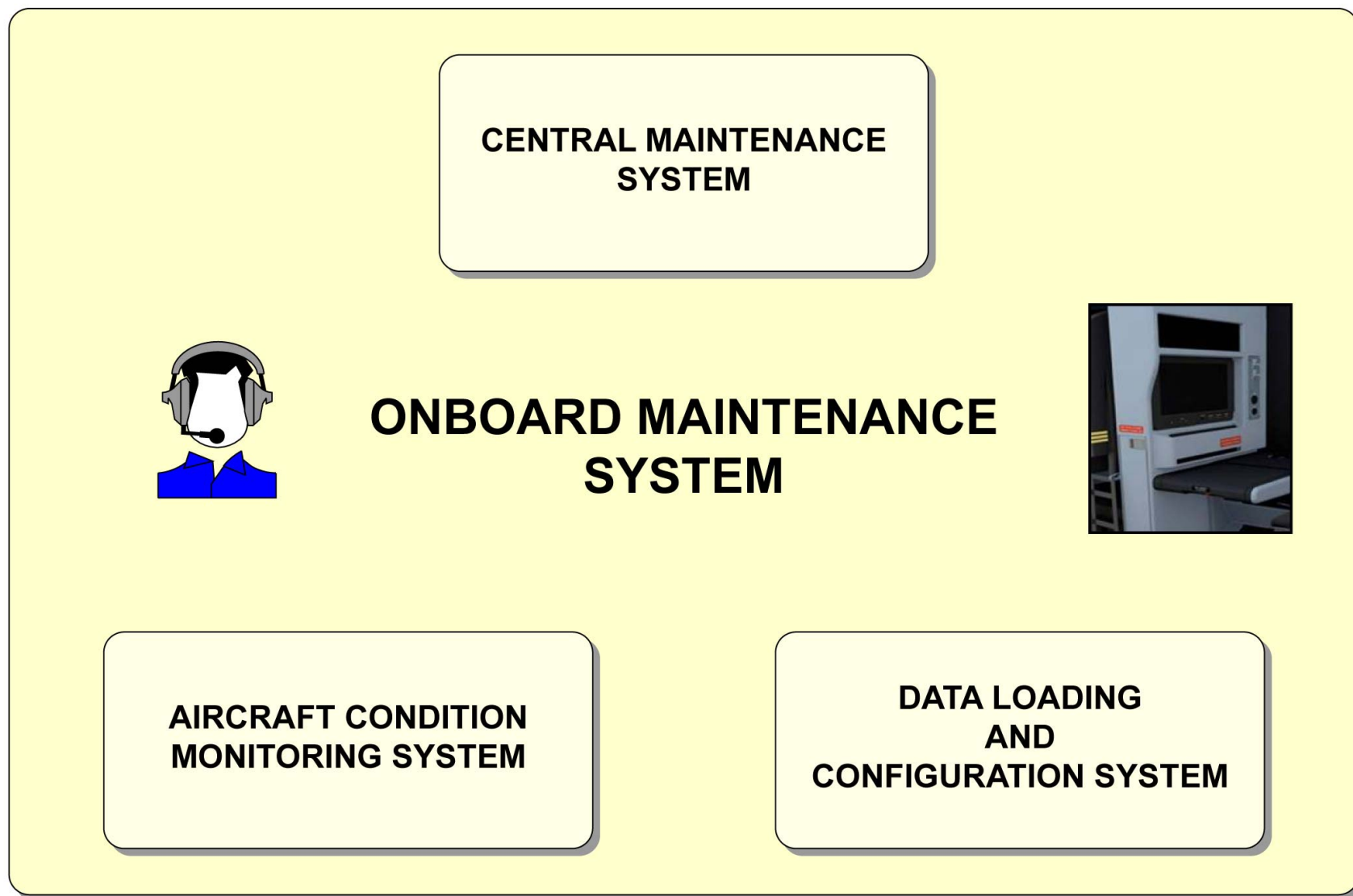The WLU and the RF combiner are installed in the bulk cargo
compartment.

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2 SECURE COMMUNICATION INTERFACES

2 LEAKY LINE ANTENNAS (THE SECOND ONE IS OPTIONAL)

AVIONICS COMPARTMENT

BULK CARGO COMPARTMENT

1 AVIONICS SERVER FUNCTION CABINET

1 OPEN WORLD SERVER FUNCTION CABINET

1 WIRELESS LAN UNIT

1 RADIO FREQUENCY COMBINER (OPTIONAL)

LAN: Local Area Network

LOCATION - PRESENTATION

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INFORMATION SYSTEMS PRESENTATION (1)

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

Overview

The function of the Onboard Maintenance System (OMS) is to give the
onboard tools necessary for aircraft maintenance.
General familiarization training for this system focuses on:
- Central Maintenance System (CMS)
- Data Loading and Configuration System (DLCS)
- Aircraft Condition Monitoring System (ACMS).

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CENTRAL MAINTENANCE SYSTEM

ONBOARD MAINTENANCE SYSTEM

AIRCRAFT CONDITION MONITORING SYSTEM

DATA LOADING AND CONFIGURATION SYSTEM

OVERVIEW

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

Central Maintenance System (CMS) - Presentation

Function/Description

The CMS includes two different functions:
One is hosted in the Avionics Server Function Cabinet (ASFC) part
of the Aircraft Control Domain (ACD) for ACD maintenance.
This function is used for:
- Fault centralization for ACD maintenance data
- Report generation (Post Flight Report (PFR), Active Electronic
Centralized Aircraft Monitoring (ECAM) Alerts, etc.)
- Test management (System Report/Test & Scanning).
The other is hosted in the Open world Server Function Cabinet (OSFC)
part of the Airline Information Services Domain (AISD) for global
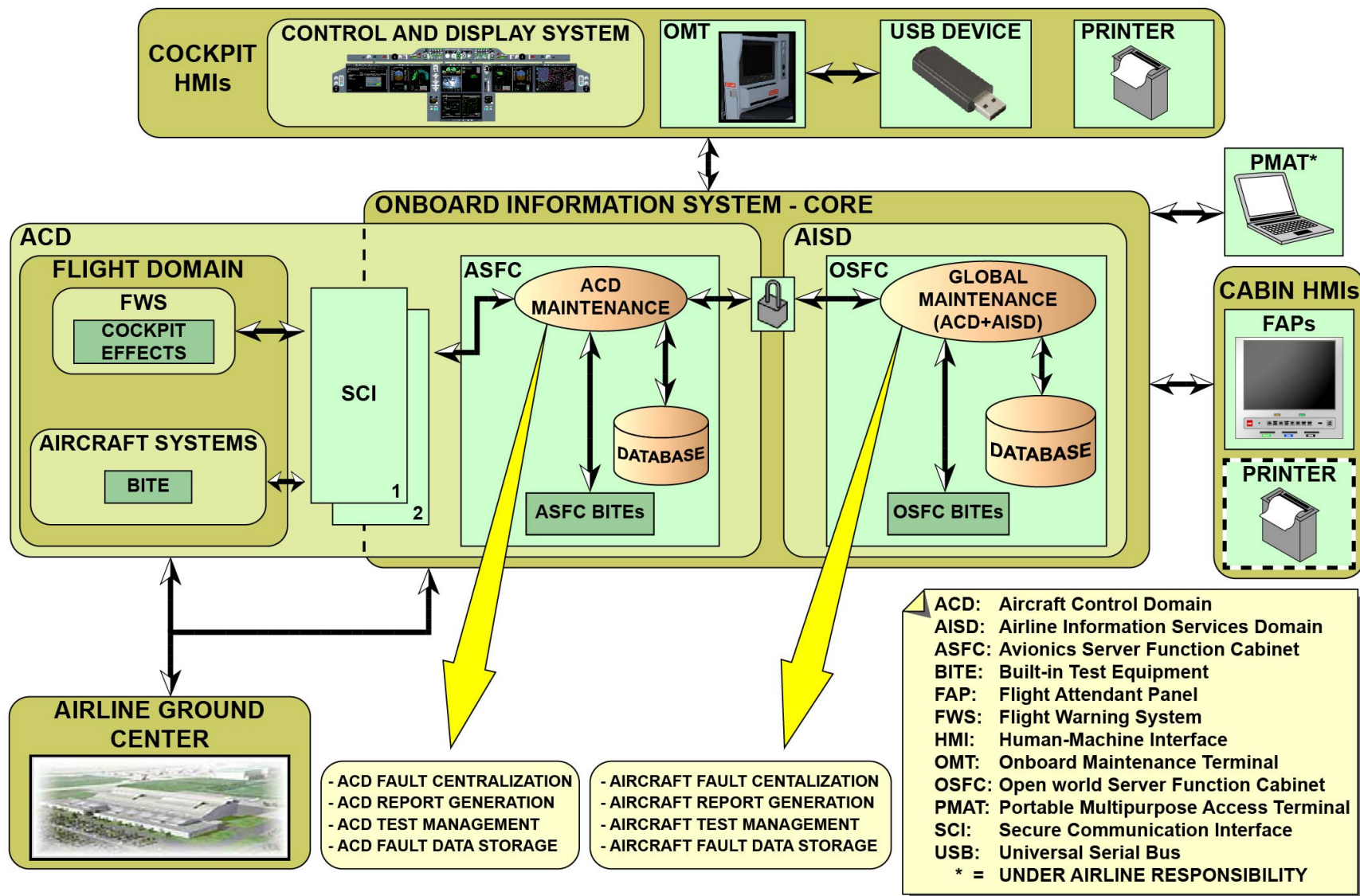maintenance (ACD and AISD).
This function is used for:
- Fault centralization for ACD and AISD maintenance data
- Report generation (Effect Detail, etc.)
- Test management for the acquisition of the AISD BITE.

Interface

The CMS has interfaces with:
- All the aircraft systems that have a BITE, and ASFC and OSFC
BITEs
- Applications hosted in the ASFC and OSFC (DLCS, Information
Management Aircraft-ground Communication System (IMACS),
ACMS, etc.)
- The airline ground center to transmit maintenance data
- Databases hosted in the ASFC and OSFC
- The Flight Warning System (FWS), which sends cockpit effects
- Some Human-Machine Interfaces (HMIs) (Control and Display
System (CDS), Onboard Maintenance Terminal (OMT), Portable
Multipurpose Access Terminal (PMAT), Universal Serial Bus (USB)
mass-storage device, etc.).

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COCKPIT HMIs

CONTROL AND DISPLAY SYSTEM

OMT

USB DEVICE

PRINTER

PMAT*

ONBOARD INFORMATION SYSTEM - CORE

ACD

FLIGHT DOMAIN

FWS

COCKPIT EFFECTS

AIRCRAFT SYSTEMS

BITE

SCI

1

2

ASFC

ACD MAINTENANCE

DATABASE

ASFC BITEs

AISD

OSFC

GLOBAL MAINTENANCE (ACD+AISD)

DATABASE

OSFC BITEs

CABIN HMIs

FAPs

PRINTER

AIRLINE GROUND CENTER

- ACD FAULT CENTRALIZATION
- ACD REPORT GENERATION
- ACD TEST MANAGEMENT
- ACD FAULT DATA STORAGE

- AIRCRAFT FAULT CENTALIZATION
- AIRCRAFT REPORT GENERATION
- AIRCRAFT TEST MANAGEMENT
- AIRCRAFT FAULT DATA STORAGE

ACD: Aircraft Control Domain
AISD: Airline Information Services Domain
ASFC: Avionics Server Function Cabinet
BITE: Built-in Test Equipment
FAP: Flight Attendant Panel
FWS: Flight Warning System
HMI: Human-Machine Interface
OMT: Onboard Maintenance Terminal
OSFC: Open world Server Function Cabinet
PMAT: Portable Multipurpose Access Terminal
SCI: Secure Communication Interface
USB: Universal Serial Bus
  * = UNDER AIRLINE RESPONSIBILITY

CENTRAL MAINTENANCE SYSTEM (CMS) - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

Data Loading and Configuration System (DLCS) - Presentation

Function/Description

The DLCS includes two different functions:

One is hosted in the ASFC part of ACD for the ACD data loading.

This function is used for:

- Software uploading
- File/report downloading
- Software configuration management.

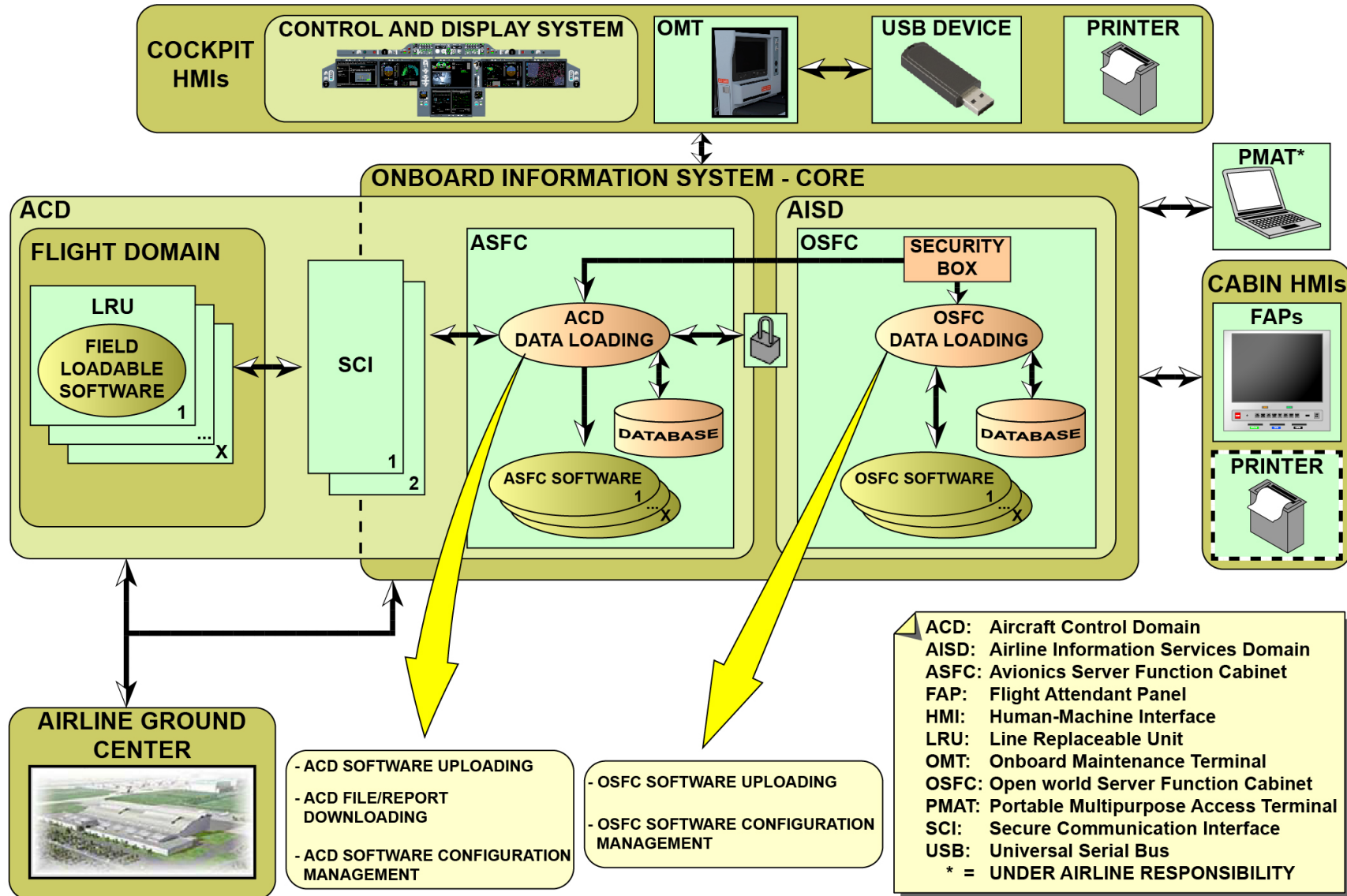The other is hosted in the OSFC part of the AISD for OSFC data loading.

This function is used for:

- Software uploading
- Software configuration management.

Interface

The DLCS has interface with:

- All the aircraft systems that host field loadable software, and the ASFC and OSFC
- The security box in the OSFC, which identifies the applicable software to upload
- The airline ground center to transmit maintenance data and upload software
- Databases hosted in the ASFC and OSFC
- Some HMIs (CDS, OMT, PMAT, USB mass-storage device, etc.).

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

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COCKPIT HMIs

CONTROL AND DISPLAY SYSTEM | **OMT** | **USB DEVICE** | **PRINTER**

PMAT*

ONBOARD INFORMATION SYSTEM - CORE

ACD

FLIGHT DOMAIN

LRU

FIELD LOADABLE SOFTWARE
1
... X

SCI
1
2

AISD

ASFC

ACD DATA LOADING

DATABASE

ASFC SOFTWARE
1
... X

OSFC

SECURITY BOX

OSFC DATA LOADING

DATABASE

OSFC SOFTWARE
1
... X

CABIN HMIs

FAPs

PRINTER

AIRLINE GROUND CENTER

- ACD SOFTWARE UPLOADING

- ACD FILE/REPORT DOWNLOADING

- ACD SOFTWARE CONFIGURATION MANAGEMENT

- OSFC SOFTWARE UPLOADING

- OSFC SOFTWARE CONFIGURATION MANAGEMENT

ACD: Aircraft Control Domain
AISD: Airline Information Services Domain
ASFC: Avionics Server Function Cabinet
FAP: Flight Attendant Panel
HMI: Human-Machine Interface
LRU: Line Replaceable Unit
OMT: Onboard Maintenance Terminal
OSFC: Open world Server Function Cabinet
PMAT: Portable Multipurpose Access Terminal
SCI: Secure Communication Interface
USB: Universal Serial Bus
 * = UNDER AIRLINE RESPONSIBILITY

DATA LOADING AND CONFIGURATION SYSTEM (DLCS) - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

Aircraft Condition Monitoring System (ACMS) - Presentation

Function/Description

The ACMS includes:
- The Centralized Data Acquisition Unit (CDAU)
- The ACMS application, hosted in the ASFC.
For the ACMS, the CDAU:
- Monitors the aircraft system parameters in real-time
- Records part of these parameters
- Sends automatic or requested reports to the ACMS application.
The ACMS application:
- Stores the parameters sent by the CDAU
- Manages the ACMS data output
- Manages the ACMS HMIs.

Interface

The ACMS has interfaces with the airline ground center for parameter acquisition.
The operator can send these parameters directly to the airline ground tools through the aircraft communication systems, or can download them into a standard USB device.
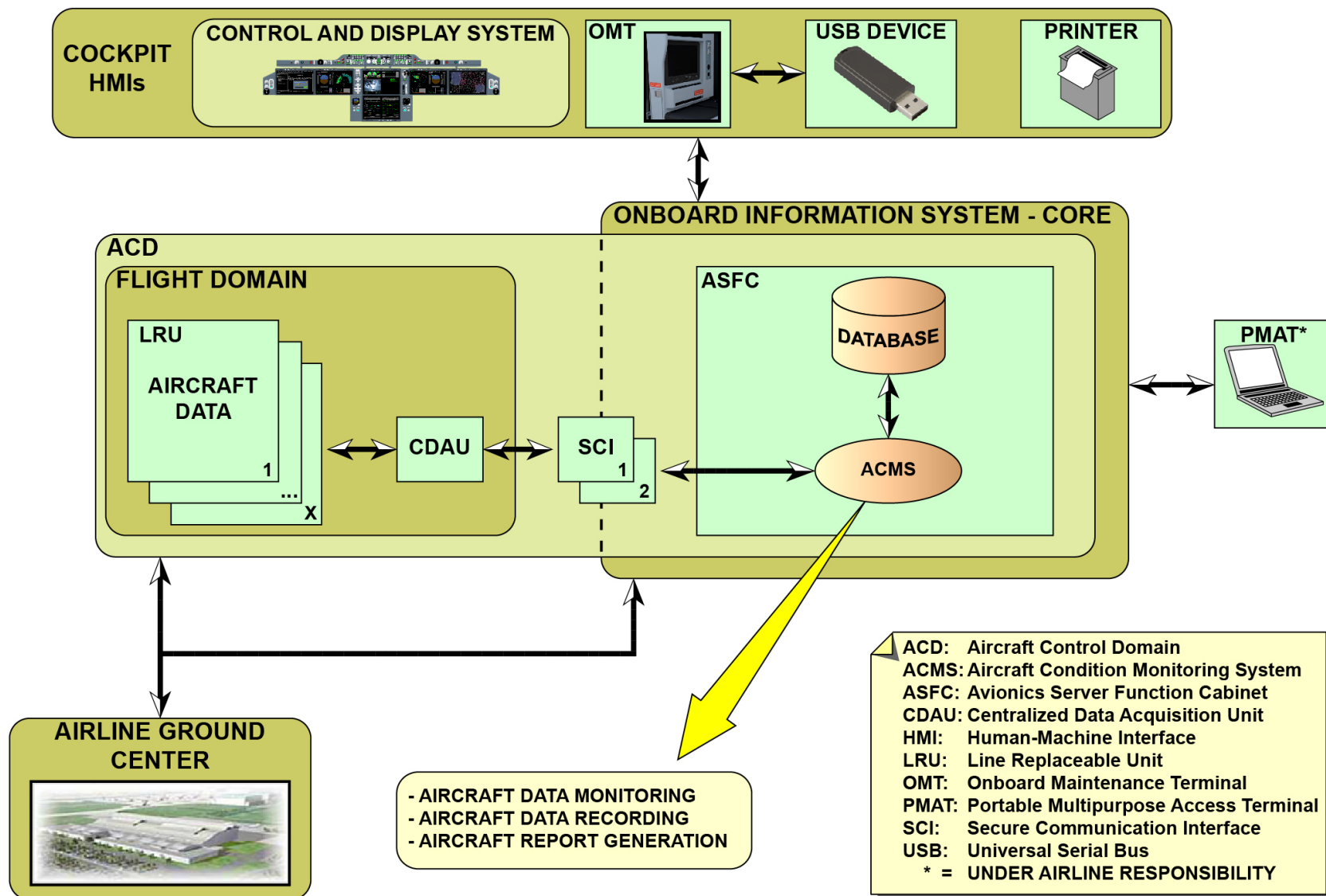
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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

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Abbreviation	Meaning
ACD:	Aircraft Control Domain
ACMS:	Aircraft Condition Monitoring System
ASFC:	Avionics Server Function Cabinet
CDAU:	Centralized Data Acquisition Unit
HMI:	Human-Machine Interface
LRU:	Line Replaceable Unit
OMT:	Onboard Maintenance Terminal
PMAT:	Portable Multipurpose Access Terminal
SCI:	Secure Communication Interface
USB:	Universal Serial Bus
* =	UNDER AIRLINE RESPONSIBILITY

AIRCRAFT CONDITION MONITORING SYSTEM (ACMS) - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

Control and Indicating - Presentation

The operator can use and control the CMS, DLCS and ACMS through
HMIs.
To get access to the Onboard Information System (OIS) displays, the
operator can use:
- The OMT
- The CDS
- A PMAT connected in and out of the aircraft.
The operator can export or print the maintenance reports for the CMS
and ACMS functions with:
- The USB mass-storage device or Internet protocol to export the reports
- The cockpit printer to print the reports.

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CONTROL AND INDICATING - PRESENTATION

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

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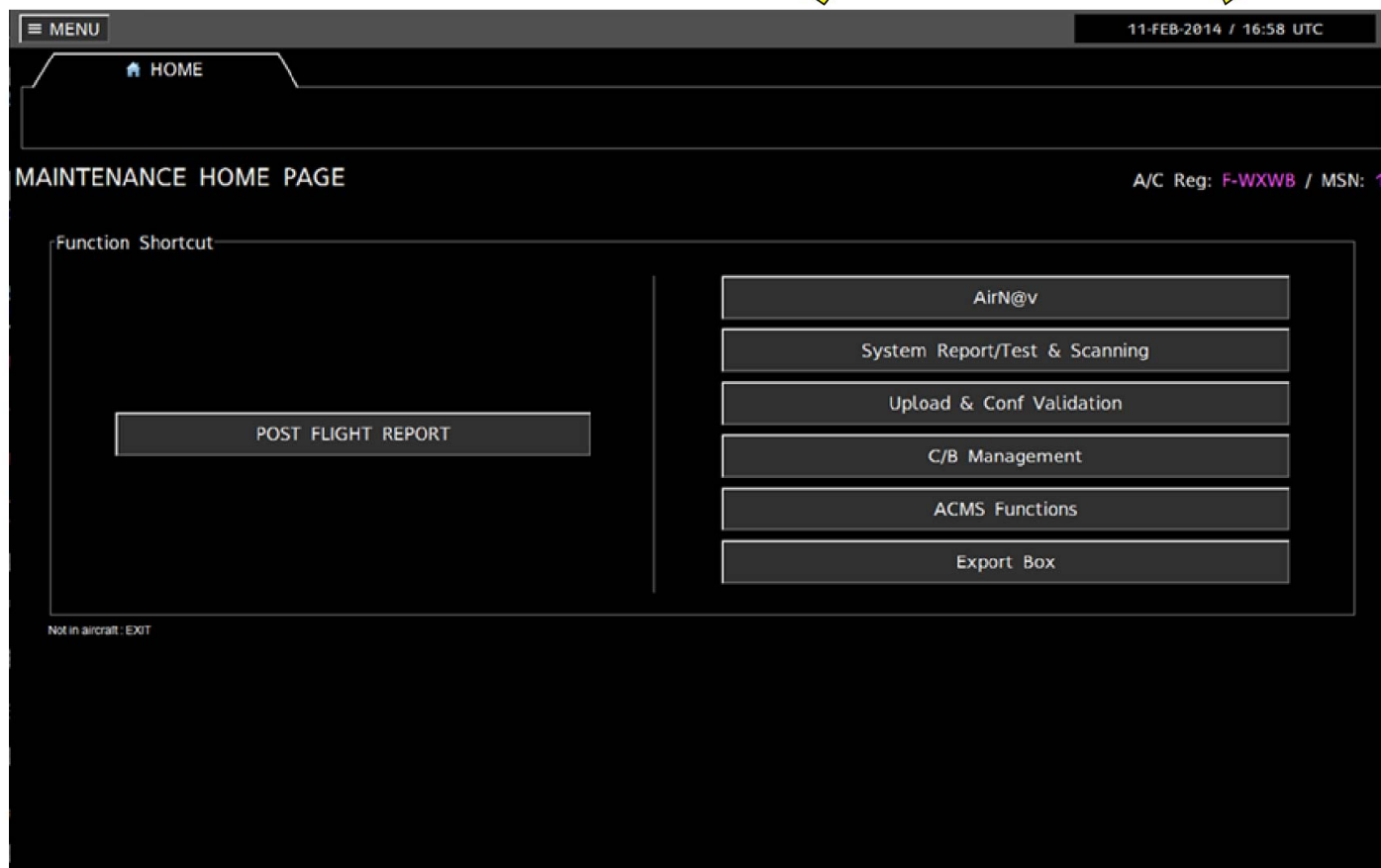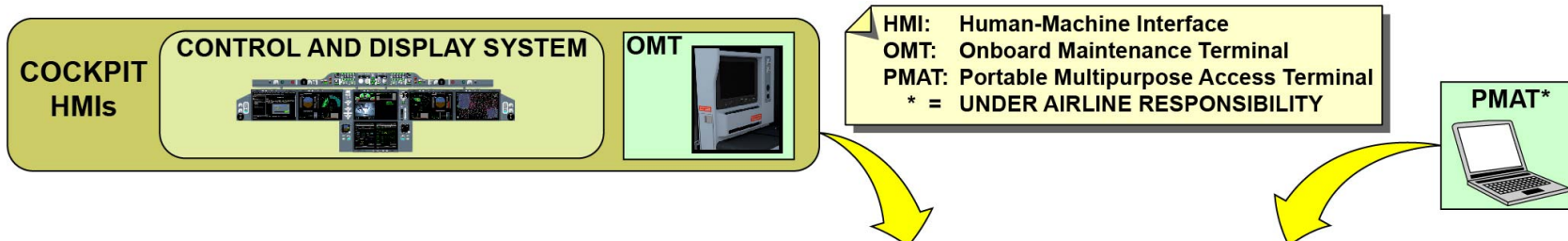
ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

Safety Precaution - Maintenance

WARNING: BE CAREFUL WHEN YOU START AN INTERACTIVE
TEST FROM THE CMS. IT CAN HAVE AN EFFECT ON
OTHER AIRCRAFT SYSTEMS SUCH AS THE FLIGHT
CONTROLS, THE RADAR, ETC. THIS CAN CAUSE
INJURY TO PERSONS AND/OR DAMAGE TO
EQUIPMENT.

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ONBOARD MAINTENANCE SYSTEM

OBEY THE MAINTENANCE SAFETY PROCEDURES

WARNING

CAUTION

AirN@v

ONBOARD MAINTENANCE TERMINAL

FLIGHT CONTROL SURFACE MOVEMENTS:

ENERGIZED COMPONENTS:
- ELECTRICAL
- HYDRAULIC

REMOVE SAFETY OR PROTECTIVE COVERS ON SYSTEMS WHEN NEEDED BEFORE YOU LAUNCH TESTS

SAFETY PRECAUTION - MAINTENANCE

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ONBOARD MAINTENANCE SYSTEM PRESENTATION (1)

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NAVIGATION SYSTEM PRESENTATION (1)

Overview

The function of the navigation system is to give flight crew the data
necessary for a safe and optimized routing of the aircraft.
The general familiarization training for this system is about:
- Air Data/Inertial Reference System (ADIRS)
- Standby navigation systems
- Multi-Mode Receiver (MMR)
- Onboard Airport Navigation System (OANS)
- Radio Altimeter (RA)
- Distance Measuring Equipment (DME)
- Automatic Direction Finder (ADF)
- VHF Omnidirectional Range (VOR)/marker
- Aircraft Environment Surveillance System (AESS).

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NAVIGATION

AIR DATA/INERTIAL REFERENCE SYSTEM
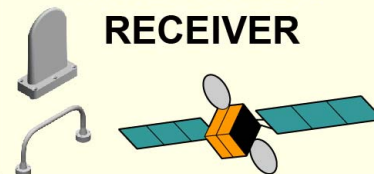
AIRCRAFT ENVIRONMENT SURVEILLANCE SYSTEM

VHF OMNIDIRECTIONAL RANGE/MARKER (RADIO) BEACON

AUTOMATIC DIRECTION FINDER

STANDBY NAVIGATION SYSTEMS

MULTI-MODE RECEIVER

ONBOARD AIRPORT NAVIGATION SYSTEM
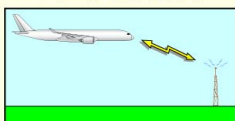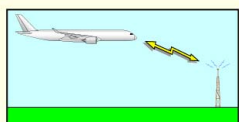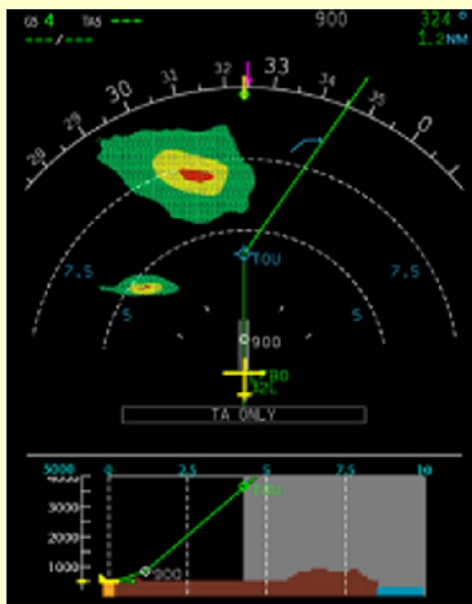
RADIO ALTIMETER
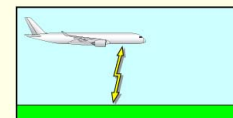
DISTANCE MEASURING EQUIPMENT
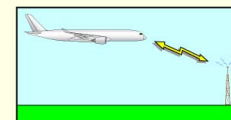
OVERVIEW

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NAVIGATION SYSTEM PRESENTATION (1)

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NAVIGATION SYSTEM PRESENTATION (1)

Air Data/Inertial Reference System (ADIRS) - Presentation

Function/Description

The ADIRS is an autonomous navigation system, independent of ground navigation aids.
The function of the ADIRS is to give Air Data Reference (ADR), Inertial Reference (IR) data and Universal Time Coordinated (UTC) time reference to many aircraft systems (Control and Display System (CDS), Flight Management System (FMS) etc.).

NOTE: Each Air Data/Inertial Reference Unit (ADIRU) also has the heating function of its related probes.

The ADIRS has three independent channels, one for each ADIRU.
Each ADIRU receives air data from its related probes and sensors.
Each ADIRU has two parts (one ADR part and one IR part):
- The ADR part receives the air data from the different sensors and probes.
- The IR part computes the inertial data given by internal accelerometers and gyrometers.
The ADIRS receives Global Positioning System (GPS) data from the MMRs. In normal operation, the IR part is automatically aligned with the GPS position. It is also possible to align the IR manually through the Keyboard and Cursor Control Unit (KCCU) (the KCCU gives access to the FMS menu on the MultiFunction Display (MFD) to do the IR alignment).
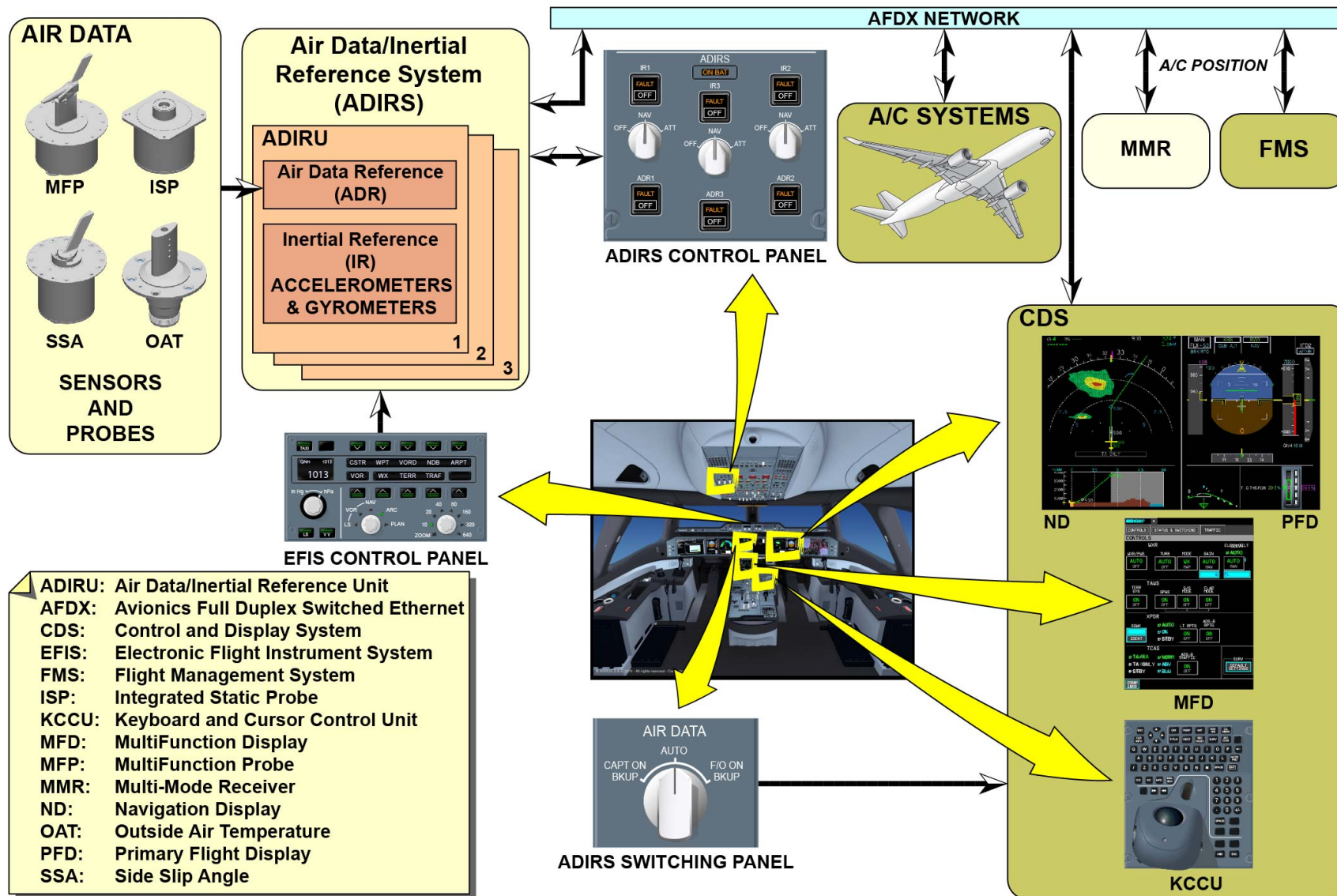
Interface

The ADIRS has interfaces with the CDS to show the air and inertial data on the CDS display units (Primary Flight Display (PFD), Navigation Display (ND) and MFD).

Control and Indicating

The air and inertial data are shown on the CDS display units (PFD, ND and MFD).
The ADIRS controls are done from:
- The ADIRS control panel, installed on the overhead panel, to start and stop the ADIRUs and to tell that there is an ADR/IR fault.
- The ADIRS switching panel, installed on the main instrument panel, to manually change the source of the data for the CDS displays.
- The CAPT and F/O Electronic Flight Instrument System (EFIS) control panels, installed on the glareshield.
- The KCCUs, installed on the center pedestal, to get access to the MFD menu for the IR alignment.

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NAVIGATION SYSTEM PRESENTATION (1)

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AFDX NETWORK

A/C POSITION

AIR DATA

MFP   ISP

SSA   OAT

**SENSORS
AND
PROBES**

Air Data/Inertial Reference System (ADIRS)

ADIRU

Air Data Reference (ADR)

**Inertial Reference (IR)
ACCELEROMETERS
& GYROMETERS**

1 2 3

ADIRS CONTROL PANEL

ADIRS
ON BAT
IR1 FAULT OFF
IR2 FAULT OFF
IR3 FAULT OFF
NAV ATT OFF
NAV ATT OFF
NAV ATT OFF
ADR1 FAULT OFF
ADR2 FAULT OFF
ADR3 FAULT OFF

A/C SYSTEMS

MMR   **FMS**

CDS

ND   PFD

MFD

KCCU

EFIS CONTROL PANEL

TAXI CSTR WPT VORD NDB ARPT
QNH 1013
VOR WX TERR TRAF
In Hg hPa
VOR
LS
NAV
ARC
PLAN
ZOOM
LS VV

AIR DATA

AUTO
CAPT ON BKUP   F/O ON BKUP

ADIRS SWITCHING PANEL

ADIRU:	Air Data/Inertial Reference Unit
AFDX:	Avionics Full Duplex Switched Ethernet
CDS:	Control and Display System
EFIS:	Electronic Flight Instrument System
FMS:	Flight Management System
ISP:	Integrated Static Probe
KCCU:	Keyboard and Cursor Control Unit
MFD:	MultiFunction Display
MFP:	MultiFunction Probe
MMR:	Multi-Mode Receiver
ND:	Navigation Display
OAT:	Outside Air Temperature
PFD:	Primary Flight Display
SSA:	Side Slip Angle

AIR DATA/INERTIAL REFERENCE SYSTEM (ADIRS) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

NAVIGATION SYSTEM PRESENTATION (1)

Air Data/Inertial Reference System (ADIRS) - Presentation (continued)

Location

The ADIRS has:
- Three ADIRUs installed in the avionics compartment
- Three MultiFunction Probes (MFPs) installed on the left and right sides of the forward fuselage
- Six Integrated Static Probes (ISPs) installed on the left and right sides of the forward fuselage
- Three Side Slip Angle (SSA) probes installed on the forward fuselage
- Two Outside Air Temperature (OAT) sensors installed on the nose landing gear.

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3 MFPs

6 ISPs

3 SSA PROBES

**SET OF PROBES
ON THE FWD FUSELAGE**

**AVIONICS
COMPARTMENT**

3 IDENTICAL ADIRUs

**2 OAT SENSORS
ON THE NOSE LANDING GEAR**

ADIRU: Air Data/Inertial Reference Unit
ISP: Integrated Static Probe
MFP: MultiFunction Probe
OAT: Outside Air Temperature
SSA: Side Slip Angle

AIR DATA/INERTIAL REFERENCE SYSTEM (ADIRS) - PRESENTATION - LOCATION

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NAVIGATION SYSTEM PRESENTATION (1)

Standby Navigation Systems - Presentation

Function/Description

The standby navigation systems are autonomous backup systems that can be used by the crew when there is loss of the ADIRS or loss of the CDS. In normal operation, the standby navigation systems are used to make sure that the ADIRS data is correct. In abnormal condition, the standby navigation systems supply backup navigation data.

The standby navigation systems have:
- One standby compass that gives the aircraft magnetic-heading indication.
- Two independent Integrated Standby Instrument System (ISIS) indicators (the second indicator is optional).

The function of the ISIS indicators is to compute and show air data parameters, flight plan and navigation data.

The ISIS indicators receive air data through pressure lines from:
- One standby pitot probe
- Two standby static probes.

Location

The standby compass is installed in the cockpit, in the middle top of the windshield.

The two ISIS indicators are installed in the cockpit, on the main instrument panel.

The standby pitot probe is installed on the left side of the forward fuselage.

The two standby static probes are installed on the left and right sides of the forward fuselage, on the nose section.

Control and Indicating

In single configuration (only one ISIS indicator is installed), the ISIS indicator is in standby flight-display mode. The data shown in this mode are flight data and basic navigation data.

In dual configuration (two ISIS indicators are installed):
- One ISIS indicator is in standby flight-display mode.
- The other ISIS indicator is in standby navigation-display mode. The data shown in this mode are aircraft position, heading and the main navigation parameters.
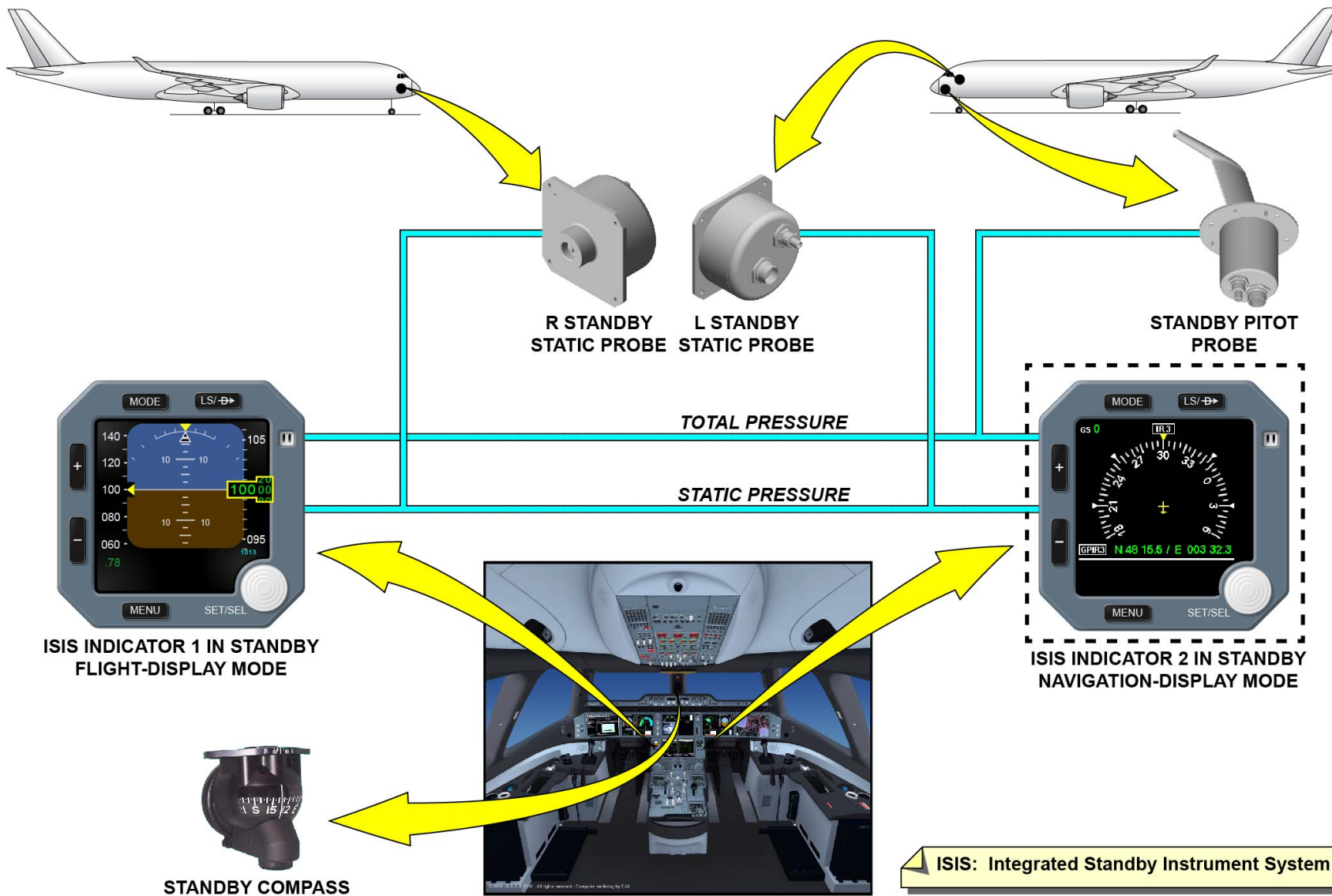
R STANDBY STATIC PROBE   **L STANDBY STATIC PROBE**

STANDBY PITOT PROBE

TOTAL PRESSURE

STATIC PRESSURE

ISIS INDICATOR 1 IN STANDBY FLIGHT-DISPLAY MODE

ISIS INDICATOR 2 IN STANDBY NAVIGATION-DISPLAY MODE

STANDBY COMPASS

ISIS: Integrated Standby Instrument System

STANDBY NAVIGATION SYSTEMS - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

NAVIGATION SYSTEM PRESENTATION (1)

Multi-Mode Receiver (MMR) - Presentation

Function/Description

The MMR is a radio navigation aid.
The MMR function is to:
- Compute lateral and vertical deviations for precision approach and landing through a landing function (e.g. Instrument Landing System (ILS) function)
- Compute aircraft position, velocity and time from different satellite navigation solutions.

Interface

The MMR has interfaces with:
- The communication systems for the backup tuning (through the Radio and Audio Management Panels (RMPs)) and for audio identification of the ground station (through the loudspeakers and the boomsets)
- The FMS
- The ADIRS for alignment of the IR with the GPS position
- The Automatic Flight System (AFS)/PRIMary Computer (PRIM) for guidance deviation orders in Autopilot (AP) mode.

Control and Indicating

The MMR sends navigation data to the CDS for display on the PFD and the ND.
The MMR controls are done from:
- The EFIS control panels to select the Landing System (LS) mode
- The MFD to get access to the GPS and ILS pages through the KCCU
- The RMPs to manually set the two MMRs to the backup mode.

AFDX NETWORK

ALIGNMENT

MMR

LANDING FUNCTION
(e.g. ILS)

SATELLITE NAVIGATION
SOLUTIONS
(e.g. GPS, Galileo)

1
2

**COMMUNICATION
SYSTEMS**

RMP

**EFIS
CONTROL PANEL**

ADIRS

AFS/PRIM

FMS

CDS

ND   PFD

MFD

KCCU

MMR ANTENNAS

ADIRS: Air Data/Inertial Reference System
AFDX: Avionics Full Duplex Switched Ethernet
AFS: Automatic Flight System
CDS: Control and Display System
EFIS: Electronic Flight Instrument System
FMS: Flight Management System
GPS: Global Positioning System
ILS: Instrument Landing System
KCCU: Keyboard and Cursor Control Unit
MFD: MultiFunction Display
MMR: Multi-Mode Receiver
ND: Navigation Display
PFD: Primary Flight Display
PRIM: PRIMary Computer
RMP: Radio and Audio Management Panel

MULTI-MODE RECEIVER (MMR) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

NAVIGATION SYSTEM PRESENTATION (1)

Multi-Mode Receiver (MMR) - Presentation (continued)

Location

The MMR system has:
- Two MMRs installed in the avionics compartment.
- Two Global Navigation Satellite System (GNSS) antennas installed
at the top of the fuselage, in the aircraft longitudinal axis
- One Digital Global Positioning System (DGPS) Localizer (LOC)
antenna installed in the radome
- One glide capture antenna installed in the radome.

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2 GNSS ANTENNAS

TOP FUSELAGE

RADOME

AVIONICS COMPARTMENT

1 GLIDE CAPTURE ANTENNA

1 DGPS LOC ANTENNA

2 MMRs

DGPS: Digital Global Positioning System
GNSS: Global Navigation Satellite System
LOC: Localizer
MMR: Multi-Mode Receiver
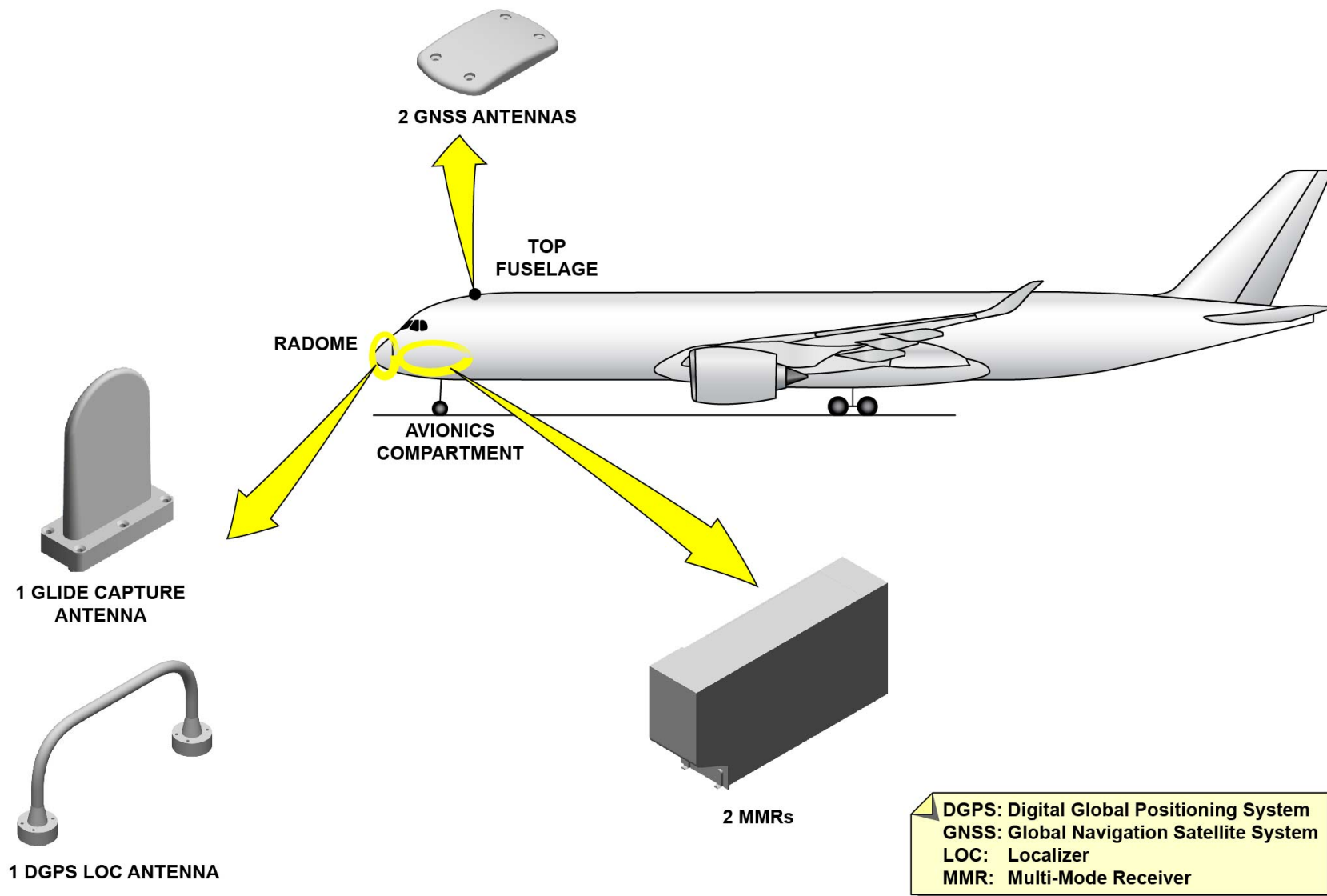
MULTI-MODE RECEIVER (MMR) - PRESENTATION - LOCATION

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NAVIGATION SYSTEM PRESENTATION (1)

Onboard Airport Navigation System (OANS) - Presentation

Function/Description

The OANS gives data about the airport to the flight crew when the aircraft is on the ground.

The functions of the OANS are:
- To help the pilot navigate in complex airports
- To prevent dangerous situations such as runway incursion or take-off from an incorrect runway (important safety function).

The OANS has OANS software and an airport database uploaded in the six CDS display units.

In normal operation, the OANS data is shown on the ND. The OANS image shows the aircraft position on an airport moving map given by the airport database.

The OANS also sends data to the brake system for the Brake To Vacate (BTV) function.

Interface

The OANS has interfaces with:
- The CDS to show the aircraft and airport data on the airport moving map
- The ADIRS, the MMR and the FMS to have aircraft data (e.g. aircraft position, aircraft speed, selected runway)
- The Flight Warning System (FWS) to give aural alerts through the communication systems (loudspeakers and boomsets)
- The brake system for the BTV function (e.g. runway length).

Control and Indicating

The ND shows the aircraft position on an airport moving map.

The OANS controls are done from:
- The EFIS control panels to get the OANS image
- The KCCUs to directly control the OANS image and to enter data.

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AFDX NETWORK

OANS

CDS DISPLAY UNIT

OANS SOFTWARE

DATABASE

1

...

6

A/C SPEED

A/C POSITION

SELECTED RUNWAY

RUNWAY LENGTH

MMR

ADIRS

FMS

Brake To Vacate (BTV) FUNCTION

FWS

ND

KCCU

EFIS CONTROL PANEL

ADIRS: Air Data/Inertial Reference System
AFDX: Avionics Full Duplex Switched Ethernet
CDS: Control and Display System
EFIS: Electronic Flight Instrument System
FMS: Flight Management System
FWS: Flight Warning System
KCCU: Keyboard and Cursor Control Unit
MMR: Multi-Mode Receiver
ND: Navigation Display
OANS: Onboard Airport Navigation System

ONBOARD AIRPORT NAVIGATION SYSTEM (OANS) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

NAVIGATION SYSTEM PRESENTATION (1)

Radio Altimeter (RA) - Presentation

Function/Description

The RA is an independent system that gives the aircraft radio height. The RA system has three transceivers and six antennas. Each transceiver is connected to one transmission antenna and to one reception antenna.
The RA transceivers are digital transceivers. They transmit and receive a radio frequency signal through the antennas to measure the vertical distance between the aircraft and the ground.

Interface

The RA has interfaces with:
- The CDS to show the aircraft radio height on the PFD
- The FWS to generate automatic call-out announcements through the communication systems (through the loudspeakers and the boomsets)
- The aircraft systems which uses the aircraft radio-height information.

Control and Indicating

The aircraft radio height is shown on the PFD.
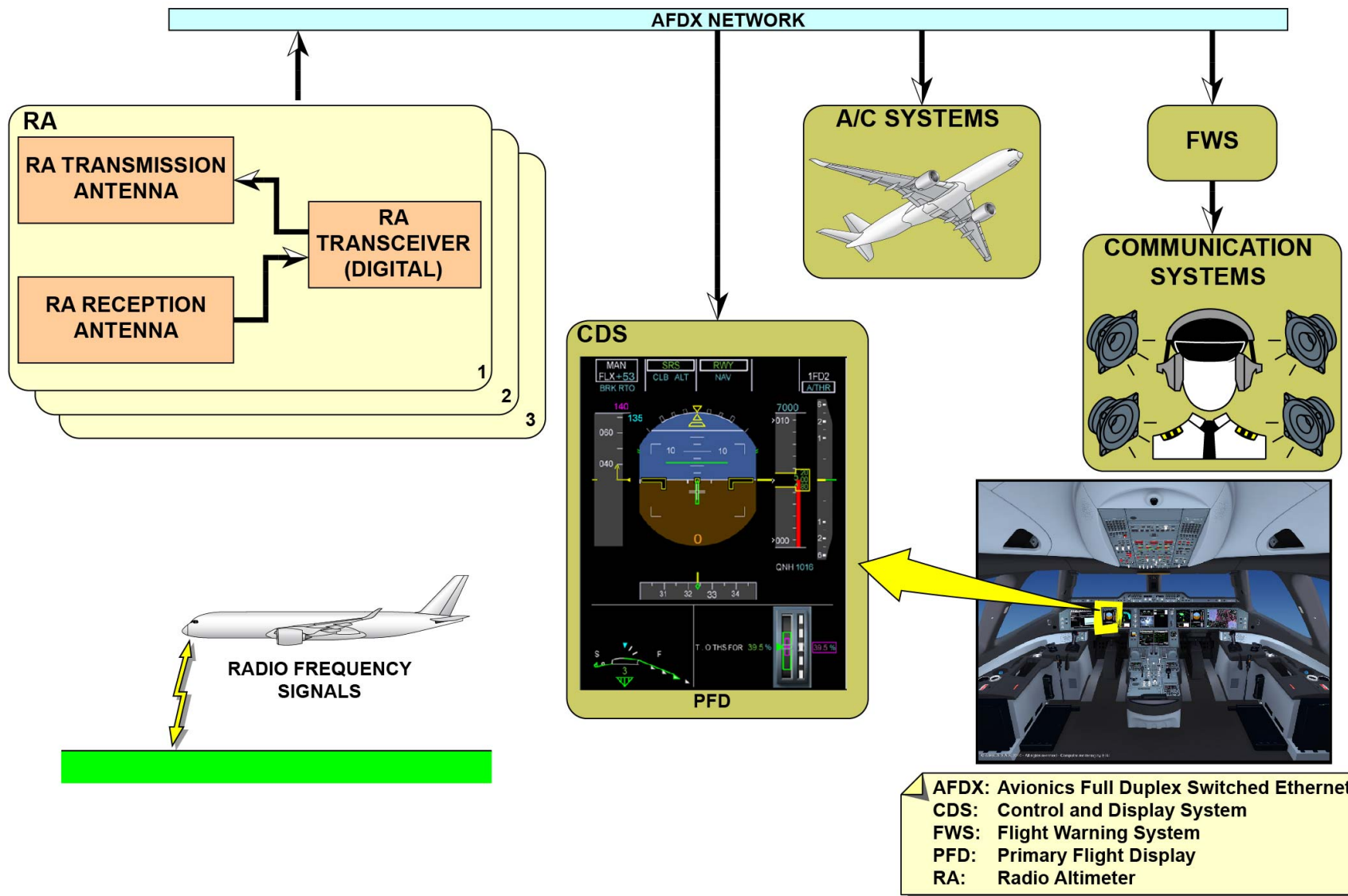
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RADIO ALTIMETER (RA) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

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NAVIGATION SYSTEM PRESENTATION (1)

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NAVIGATION SYSTEM PRESENTATION (1)

Radio Altimeter (RA) - Presentation (continued)

Location

RA transceiver 1 is installed in the avionics compartment.
RA transceivers 2 and 3 are installed in the forward cargo compartment.
The six RA antennas are installed at the bottom of the forward fuselage.

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NAVIGATION SYSTEM PRESENTATION (1)

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AVIONICS COMPARTMENT

FWD CARGO COMPARTMENT

1 RA TRANSCEIVER

3 RA TRANSMISSION ANTENNAS AND 3 RA RECEPTION ANTENNAS

2 RA TRANSCEIVERS
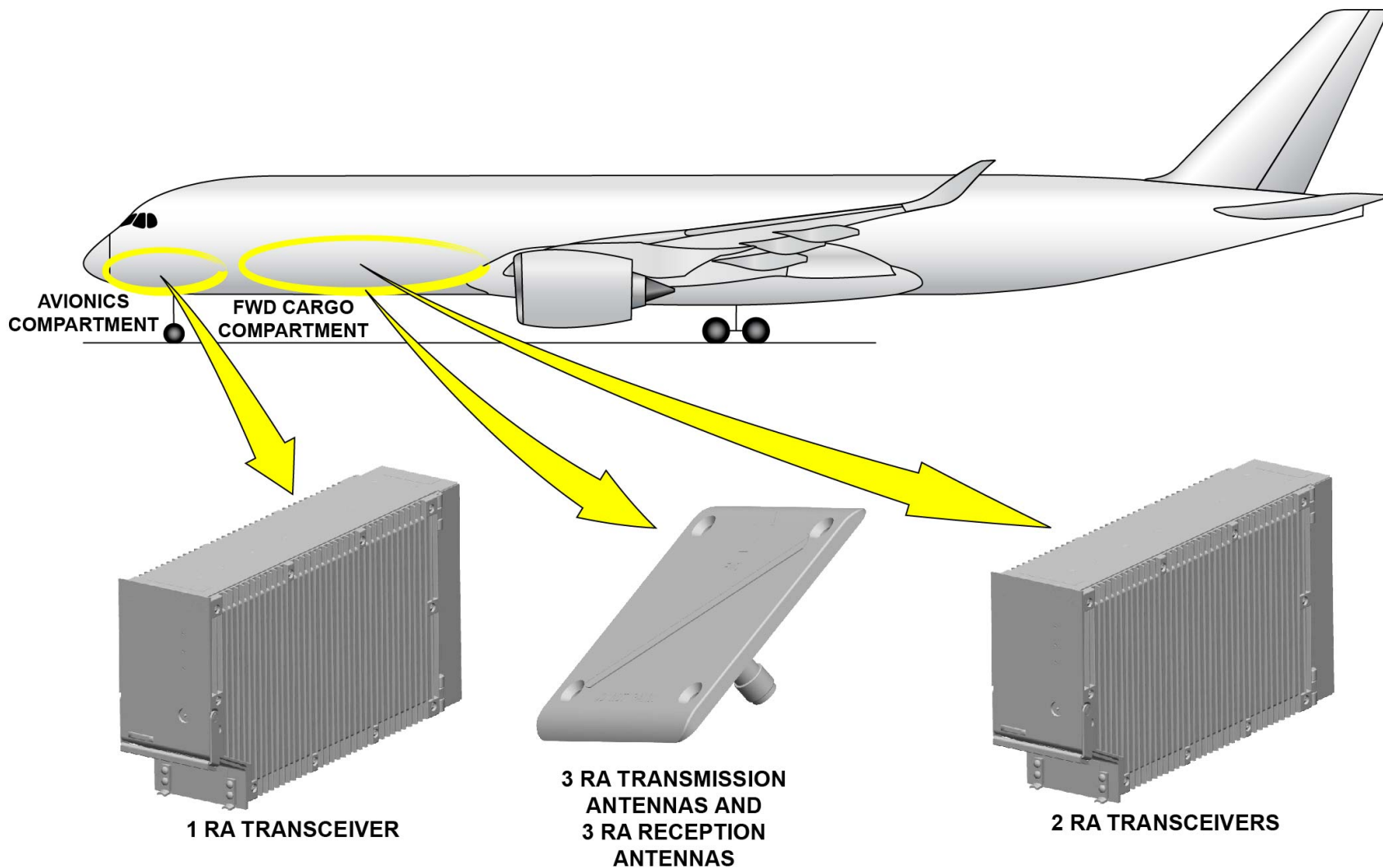
RA: Radio Altimeter

RADIO ALTIMETER (RA) - PRESENTATION - LOCATION

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NAVIGATION SYSTEM PRESENTATION (1)

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NAVIGATION SYSTEM PRESENTATION (1)

Distance Measuring Equipment (DME) - Presentation

Function/Description

The DME system is a radio navigation aid which operates with the ground stations.
The function of the DME is to give:
- The slant distance between the aircraft and the selected ground station
- The audio signal for the identification of the selected DME ground station.
The DME has two interrogators and two antennas (the second interrogator is optional). Each interrogator is connected to its related antenna.
The DME interrogator measures the transmission time of the signal (between the antenna and the ground station) to calculate the distance between the aircraft and the selected ground station.

Interface

The DME has interfaces with:
- The FMS for automatic tuning
- The CDS to show the DME data
- The communication systems for backup tuning (through the RMPs) and for audio identification of the ground station (through the loudspeakers and the boomsets).

Control and Indicating

The DME sends navigation data to the CDS for display on the ND. In normal operation, the DME is automatically tuned by the FMS. The flight crew can manually tune the frequency of the VOR or ILS DME collocated station through:
- The KCCUs to get access to the "POSITION/NAVAIDS" page on the MFD
- The RMPs for backup tuning.

The EFIS control panels are used to select the display mode on the ND.

Automatic Direction Finder (ADF) - Presentation

Function/Description

The ADF system is a radio navigation aid which operates with the ground stations.
The function of the ADF is to give:
- The relative bearing between the aircraft axis and the direction of the selected ADF ground station
- The audio signal for identification of the selected ground station.
The full ADF system has two receivers and two antennas. Each receiver is connected to its related antenna.
The ADF system is optional. It can be installed in single configuration (one receiver and one antenna) or in dual configuration (two receivers and two antennas).

Interface

The ADF has interfaces with:
- The FMS for automatic tuning
- The CDS to show the ADF data
- The communication systems for backup tuning (through the RMPs) and for audio identification of the ground station (through the loudspeakers and the boomsets).

Control and Indicating

The ADF sends navigation data to the CDS for display on the ND. In normal operation, the ADF is automatically tuned by the FMS. The flight crew can tune the ADF manually through:
- The KCCUs to get access to the "POSITION/NAVAIDS" page on the MFD
- The RMPs for backup tuning.

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NAVIGATION SYSTEM PRESENTATION (1)

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The EFIS control panels are used to select the display mode on the ND.

VOR/Marker - Presentation

Function/Description

The VOR/marker system is a radio navigation aid which operates with ground stations. It uses the signals that come from an omnidirectional ground station to calculate bearing data.
The VOR/marker system has two receivers (the VOR2 receiver is optional), a VOR antenna (common to the two receivers) and a marker antenna for the VOR1 receiver.
The marker function is only activated in the VOR1/marker receiver which is connected to the marker antenna.
The function of the VOR receiver is to give:
- The aircraft magnetic bearing related to the selected VOR ground station
- The audio and digital identification of the selected ground station.
The function of the marker is to give an aural and visual alerts when the aircraft flies above the ground marker beacons during the approach phase.

Interface

The VOR/marker has interfaces with:
- The FMS for automatic tuning
- The CDS to show the VOR data
- The communication systems for backup tuning (through the RMPs) and for audio identification of the ground station (through the loudspeakers and the boomsets).
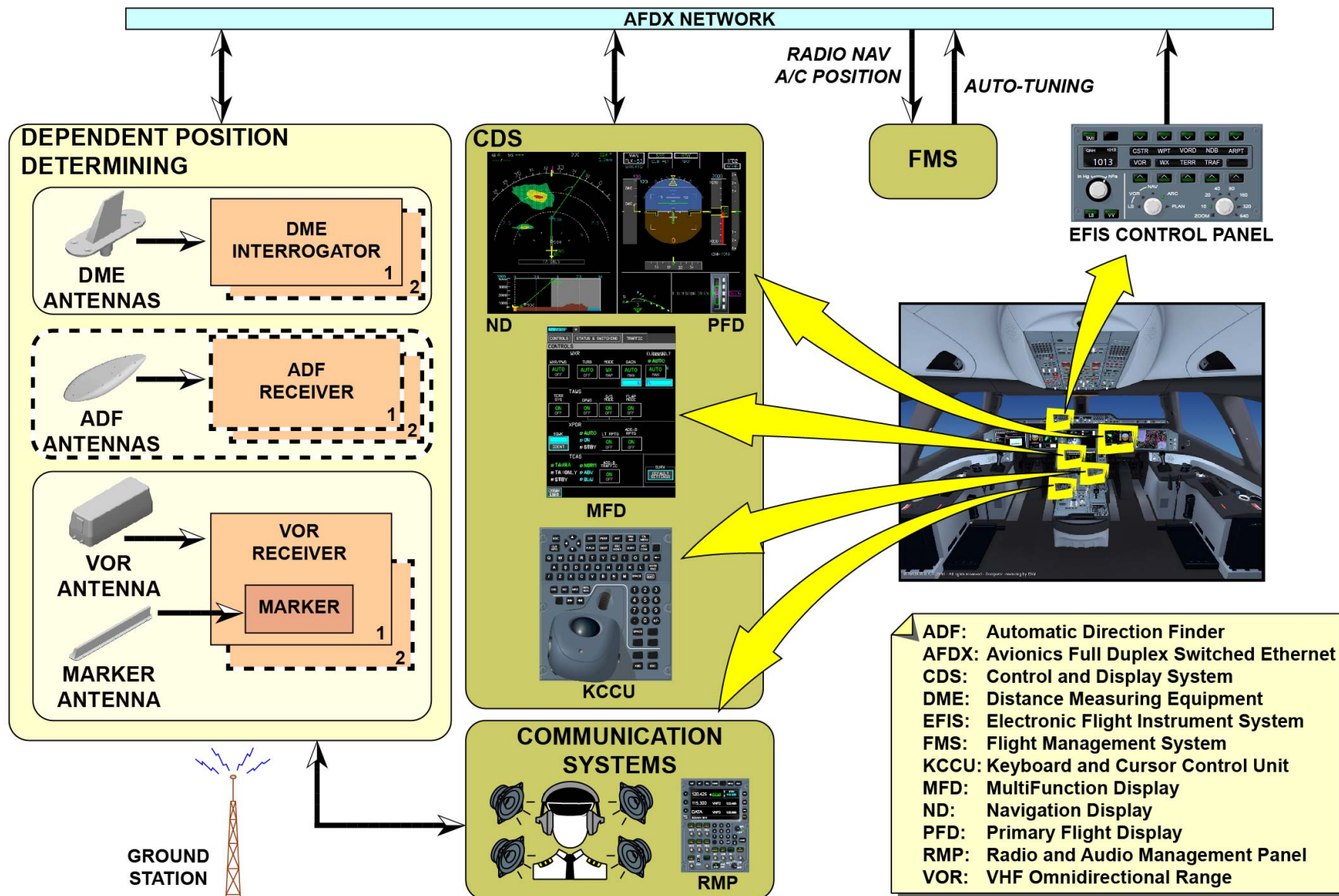
Control and Indicating

The VOR/marker sends navigation data to the CDS for display on the PFD and ND.
In normal operation, the VOR receiver is automatically tuned by the FMS.

The flight crew can tune the VOR receivers manually through:
- The KCCUs to get access to the "POSITION/NAVAIDS" page on the MFD
- The RMPs for the backup tuning.
The EFIS control panels are used to select the display mode on the ND.

AFDX NETWORK

RADIO NAV A/C POSITION

AUTO-TUNING

FMS

EFIS CONTROL PANEL

DEPENDENT POSITION DETERMINING

DME ANTENNAS → **DME INTERROGATOR** 1 2

ADF ANTENNAS → **ADF RECEIVER** 1 2

VOR ANTENNA → **VOR RECEIVER** / **MARKER** 1 2

MARKER ANTENNA

CDS

ND   PFD

MFD

KCCU

GROUND STATION

COMMUNICATION SYSTEMS

RMP

ADF:	**Automatic Direction Finder**
AFDX:	**Avionics Full Duplex Switched Ethernet**
CDS:	**Control and Display System**
DME:	**Distance Measuring Equipment**
EFIS:	**Electronic Flight Instrument System**
FMS:	**Flight Management System**
KCCU:	**Keyboard and Cursor Control Unit**
MFD:	**MultiFunction Display**
ND:	**Navigation Display**
PFD:	**Primary Flight Display**
RMP:	**Radio and Audio Management Panel**
VOR:	**VHF Omnidirectional Range**

DISTANCE MEASURING EQUIPMENT (DME) - PRESENTATION ... VOR/MARKER - PRESENTATION

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NAVIGATION SYSTEM PRESENTATION (1)

Distance Measuring Equipment (DME) - Presentation

Location

The two DME interrogators are installed in the avionics compartment.
The two DME antennas are installed at the bottom of the center fuselage.

Automatic Direction Finder (ADF) - Presentation

Location

The ADF receivers are installed in the avionics compartment.
The ADF system antennas are installed at the top of the center fuselage.

VOR/Marker - Presentation

Location

The two VOR receivers are installed in the avionics compartment.
The VOR antenna is installed at the top of the vertical stabilizer and is used by the two VOR receivers.
The marker antenna is installed at the bottom of the center fuselage.

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NAVIGATION SYSTEM PRESENTATION (1)

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2 ADF RECEIVERS

2 ADF ANTENNAS

1 VOR ANTENNA

VERTICAL
STABILIZER

TOP
FUSELAGE

AVIONICS
COMPARTMENT

BOTTOM
FUSELAGE

1 MARKER ANTENNA

2 DME INTERROGATORS

2 VOR/MARKER RECEIVERS

2 DME ANTENNAS

ADF: Automatic Direction Finder
DME: Distance Measuring Equipment
VOR: VHF Omnidirectional Range
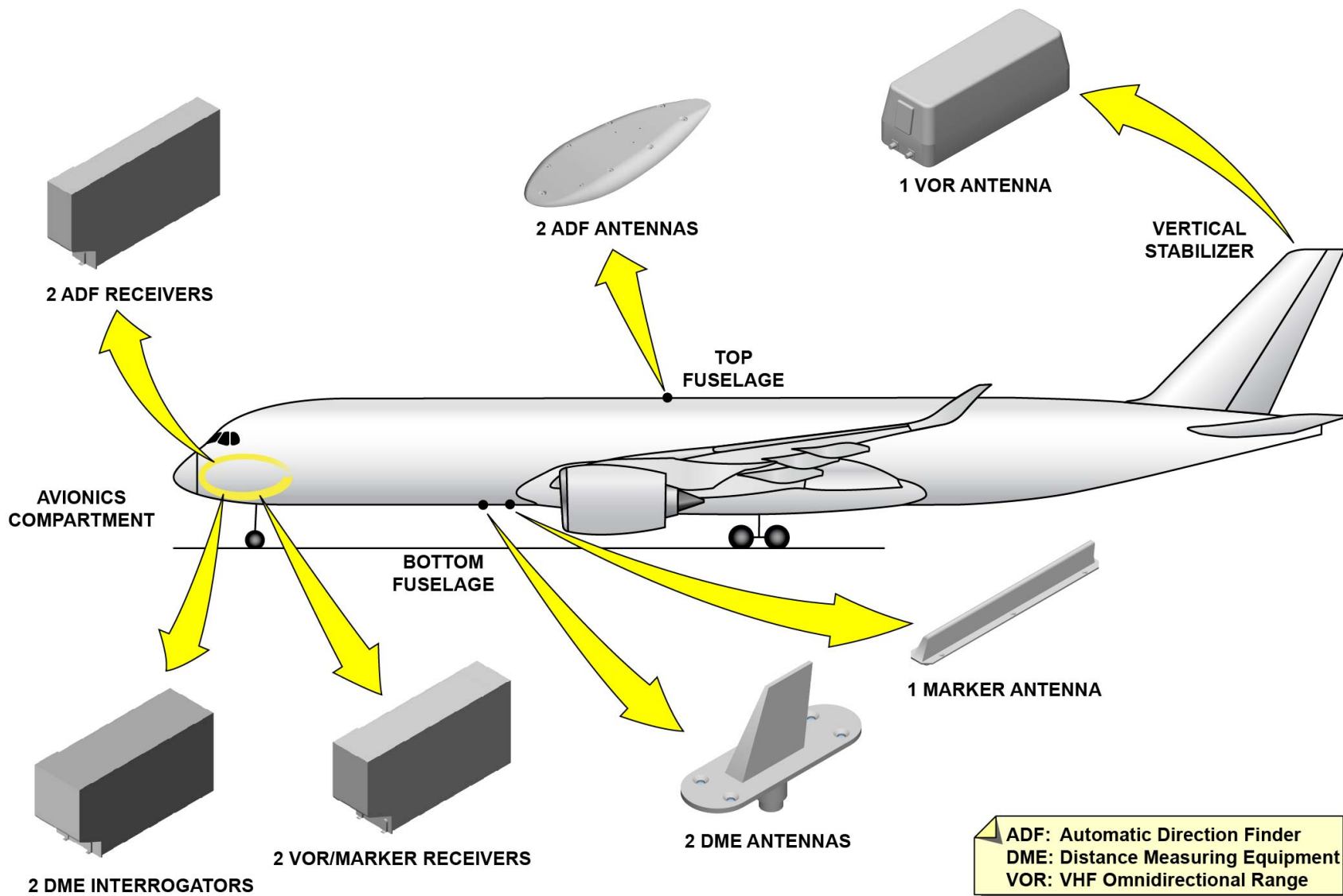
DISTANCE MEASURING EQUIPMENT (DME) - PRESENTATION ... VOR/MARKER - PRESENTATION

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NAVIGATION SYSTEM PRESENTATION (1)

Aircraft Environment Surveillance System (AESS) - Presentation

Function/Description

The AESS has these subsystems:
- Weather Radar (WXR) and Predictive WindShear (PWS)
- Traffic Alert and Collision Avoidance System (TCAS)
- Terrain Awareness and Warning System (TAWS)
- Transponder (XPDR) function for air traffic surveillance by the Air Traffic Control (ATC) ground station.

The function of the AESS is to:
- Give aircraft environment data to the flight crew for display on the CDS. It detects possible external dangerous elements that can have an effect on aircraft flight path or safety (weather conditions, windshear events, turbulence areas, aircraft or terrain proximity)
- Alert the flight crew if there is imminent danger and give an escape maneuver when necessary
- Give automatic reactions through the Autopilot (AP) (only with the TCAS).

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NAVIGATION SYSTEM PRESENTATION (1)

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AFDX NETWORK

AESS

XPDR

TCAS

TAWS

WXR/PWS

CDS

FWS

PRIM

AP/TCAS MODE

CREW ALERT

MANUAL REACTION

AUTOMATIC REACTION

AESS: Aircraft Environment Surveillance System
AFDX: Avionics Full Duplex Switched Ethernet
AP: Autopilot
CDS: Control and Display System
FWS: Flight Warning System
PRIM: PRIMary Computer
PWS: Predictive WindShear
TAWS: Terrain Awareness and Warning System
TCAS: Traffic Alert and Collision Avoidance System
WXR: Weather Radar
XPDR: Transponder

AIRCRAFT ENVIRONMENT SURVEILLANCE SYSTEM (AESS) - PRESENTATION - FUNCTION/DESCRIPTION

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NAVIGATION SYSTEM PRESENTATION (1)

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NAVIGATION SYSTEM PRESENTATION (1)

**Aircraft Environment Surveillance System (AESS) -
Presentation (continued)**

Location

The AESS has:
- Two Aircraft Environment Surveillance Units (AESUs) installed in
the avionics compartment
- One WXR antenna assembly (plate and drive unit) installed in the
radome
- Two Radar Transceiver Units (RTUs) installed in the radome. The
two RTUs are directly connected to the WXR antenna drive-unit.
- One AESS control panel installed in the cockpit, on the center
pedestal
- Four combined mode S/TCAS antennas. Two antennas are installed
at the top of the fuselage and two antennas are installed at the bottom
of the fuselage.

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2 RTUs

2 MODE S/TCAS ANTENNAS

1 WEATHER RADAR ANTENNA

TOP FUSELAGE

RADOME

AVIONICS COMPARTMENT

BOTTOM FUSELAGE

2 MODE S/TCAS ANTENNAS

2 AESUs

AESU: Aircraft Environment Surveillance Unit
RTU: Radar Transceiver Unit
TCAS: Traffic Alert and Collision Avoidance System

AIRCRAFT ENVIRONMENT SURVEILLANCE SYSTEM (AESS) - PRESENTATION - LOCATION

V2414251 - V00T0MM0 - VM34P1LEVEL0101

NAVIGATION SYSTEM PRESENTATION (1)

AESS - Weather Radar and Predictive WindShear (WXR/PWS)
- Presentation

Function/Description

The function of the WXR/PWS is to:
- Detect atmospheric disturbances and turbulence areas to prevent
passenger injury or aircraft damage and to make passengers and crews
feel more comfortable
- Detect risks of windshear events along the aircraft trajectory
- Give a ground mapping.
The WXR/PWS operates through the AESUs, the RTUs and the WXR
antenna.

Interface

The WXR/PWS has interfaces with:
- The CDS to show the WXR and PWS data
- The FWS to give alerts and priority management (then the aural
alerts are sent to the communication systems)
- The communication systems for aural alerts through the loudspeakers
and the boomsets.

Control and Indicating

The WXR/PWS sends data to the CDS to show the radar image and
the related WXR/PWS warnings and data on the ND.
The WXR/PWS controls are done from:
- The AESS control panel (WXR/PWS mode and activation of the
function in AESU1 or AESU2)
- The EFIS control panels to select the display mode of the ND to
show the radar image
- The KCCUs to get access to the surveillance pages on the MFD
(WXR/PWS status and mode).

AFDX NETWORK

A/C SYSTEMS

FWS

EFIS CONTROL PANEL

CDS

AESU

WXR/PWS

1

2

COMMUNICATION SYSTEMS

ND　**PFD**

MFD　**KCCU**

AESS CONTROL PANEL

GROUND MAPPING

WEATHER RADAR ANTENNA

WEATHER WINDSHEAR TURBULENCE DETECTION

AESS: Aircraft Environment Surveillance System
AESU: Aircraft Environment Surveillance Unit
AFDX: Avionics Full Duplex Switched Ethernet
CDS: Control and Display System
EFIS: Electronic Flight Instrument System
FWS: Flight Warning System
KCCU: Keyboard and Cursor Control Unit
MFD: MultiFunction Display
ND: Navigation Display
PFD: Primary Flight Display
PWS: Predictive WindShear
WXR: Weather Radar

AESS - WEATHER RADAR AND PREDICTIVE WINDSHEAR (WXR/PWS) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

V2414251 - V00T0MM0 - VM34P1LEVEL0101

NAVIGATION SYSTEM PRESENTATION (1)

AESS - Traffic Alert and Collision Avoidance System (TCAS) - Presentation

Function/Description

The function of the TCAS is to:
- Give an active surveillance of the air traffic to prevent aircraft collision
- Give the flight crew air traffic display and advisories (escape maneuver) to cause a safety vertical separation, if there is a risk of collision.
The TCAS transmits Radio Frequency (RF) interrogation signals to the intruder aircraft and uses its reply to make an analysis of its trajectory and the risk of collision.
The TCAS operates through the AESUs and four mode S/TCAS antennas.

Interface

The TCAS function has interfaces with:
- The CDS to show the TCAS data
- The PRIM for escape maneuvers (AP/TCAS mode)
- The FWS to give alerts and priority management (then the aural alerts are sent to the communication systems)
- The communication systems for aural alerts through the loudspeakers and the boomsets.

Control and Indicating

The TCAS sends data to the CDS to show the air traffic and the related TCAS warnings and data on the PFD and ND.
The TCAS controls are done from:
- The AESS control panel (TCAS mode and activation of the function in AESU1 or AESU2)
- The EFIS control panels to select the display mode of the ND to show the TCAS data

- The KCCUs to get access to the surveillance pages on the MFD (TCAS status and mode).

AESS CONTROL PANEL

MODE S/TCAS ANTENNAS

EFIS CONTROL PANEL

CDS

ND · PFD · MFD · KCCU

RANGE · RELATIVE ALTITUDE

AESS: Aircraft Environment Surveillance System
AFDX: Avionics Full Duplex Switched Ethernet
AP: Autopilot
CDS: Control and Display System
EFIS: Electronic Flight Instrument System
FWS: Flight Warning System
KCCU: Keyboard and Cursor Control Unit
MFD: MultiFunction Display
ND: Navigation Display
PFD: Primary Flight Display
PRIM: PRIMary Computer

AESS - TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

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NAVIGATION SYSTEM PRESENTATION (1)

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NAVIGATION SYSTEM PRESENTATION (1)

AESS - Terrain Awareness and Warning System (TAWS) - Presentation

Function/Description

The function of the TAWS is to:
- Prevent aircraft collision with the terrain
- Show an image of the terrain
- Detect dangerous A/C configurations related to the terrain when it compares the current aircraft altitude and position with the terrain database
- Give an aural and visual warnings to alert the flight crew when the aircraft is in dangerous conditions.
The TAWS operates in the two AESUs with internal terrain databases.

Interface

The TAWS has interfaces with:
- The ADIRS for the aircraft flight path
- The RA for the aircraft radio height
- The FMS for the aircraft position
- The CDS to show the TAWS data
- The FWS to give alerts and priority management (then the aural alerts are sent to the communication systems)
- The communication systems for aural alerts through the loudspeakers and the boomsets
- Some A/C systems (Landing Gear Extension and Retraction System (LGERS), Slat Flap Control Computer (SFCC), MMR, etc.).

Control and Indicating

The TAWS sends data to the CDS to show the terrain image and the related TAWS warnings and data on the ND.
The TAWS controls are done from:
- The AESS control panel (TAWS mode and activation of the function in AESU1 or AESU2)

- The EFIS control panels to select the display mode of the ND to show the terrain image
- The KCCUs to get access to the surveillance pages on the MFD (TAWS status and mode).

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NAVIGATION SYSTEM PRESENTATION (1)

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AFDX NETWORK

ADIRS | Radio Altimeter (RA) | FWS | FMS | A/C SYSTEMS | CDS

Aircraft Environment Surveillance Unit (AESU)

TAWS

TERRAIN DATABASE

COMMUNICATION SYSTEMS

EFIS CONTROL PANEL

PFD   ND

MFD   KCCU

AESS CONTROL PANEL

TAWS

ADIRS: Air Data/Inertial Reference System
AFDX: Avionics Full Duplex Switched Ethernet
AESS: Aircraft Environment Surveillance System
CDS: Control and Display System
EFIS: Electronic Flight Instrument System
FMS: Flight Management System
FWS: Flight Warning System
KCCU: Keyboard and Cursor Control Unit
MFD: MultiFunction Display
ND: Navigation Display
PFD: Primary Flight Display
TAWS: Terrain Awareness and Warning System

AESS - TERRAIN AWARENESS AND WARNING SYSTEM (TAWS) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

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NAVIGATION SYSTEM PRESENTATION (1)

AESS - Transponder (XPDR) - Presentation

Function/Description

The function of the XPDR is to reply to interrogations for identification and altitude reporting through the mode S/TCAS antennas.
It automatically replies to interrogations from:
- ATC ground station for air traffic surveillance
- TCAS-equipped aircraft to give traffic alerts and prevent collision.
The XPDR operates in the two AESUs and through the four mode S/TCAS antennas.

Interface

The XPDR has interfaces with:
- The CDS/MFD to show the XPDR data and to change the XPDR code (e.g. SQWAK code)
- The communication systems to change the XPDR code through the RMPs.

Control and Indicating

The XPDR controls are done from:
- The AESS control panel (activation of the function in AESU1 or AESU2)
- The KCCUs, to get access to the surveillance pages on the MFD (XPDR status and mode, XPDR code)
- The RMPs, to change the XPDR code.

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NAVIGATION SYSTEM PRESENTATION (1)

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AFDX NETWORK

AESU

XPDR

1
2

XPDR CODE

COMMUNICATION SYSTEMS

RMP

AESS CONTROL PANEL

CDS

MFD

KCCU

MODE S/TCAS ANTENNAS

ATC GROUND STATION

AESS: Aircraft Environment Surveillance System
AESU: Aircraft Environment Surveillance Unit
AFDX: Avionics Full Duplex Switched Ethernet
ATC: Air Traffic Control
CDS: Control and Display System
KCCU: Keyboard and Cursor Control Unit
MFD: MultiFunction Display
RMP: Radio and Audio Management Panel
TCAS: Traffic Alert and Collision Avoidance System
XPDR: Transponder

AESS - TRANSPONDER (XPDR) - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

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AUTO FLIGHT SYSTEM PRESENTATION (1)

Overview

The functions of the Automatic Flight System (AFS) are:
- To increase the flight safety
- To reduce the crew workload
- To optimize the fuel consumption.
General familiarization training for this system focuses on:
- Flight Guidance functions (FG)
- Autopilot/Flight Director (AP/FD)
- Autothrust (A/THR).
- Flight Envelope (FE)
- Flight Management (FM).

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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FLIGHT GUIDANCE

AUTOPILOT/ FLIGHT DIRECTOR

AUTOTHRUST

AUTO FLIGHT SYSTEM

FLIGHT MANAGEMENT

FLIGHT ENVELOPE

OVERVIEW

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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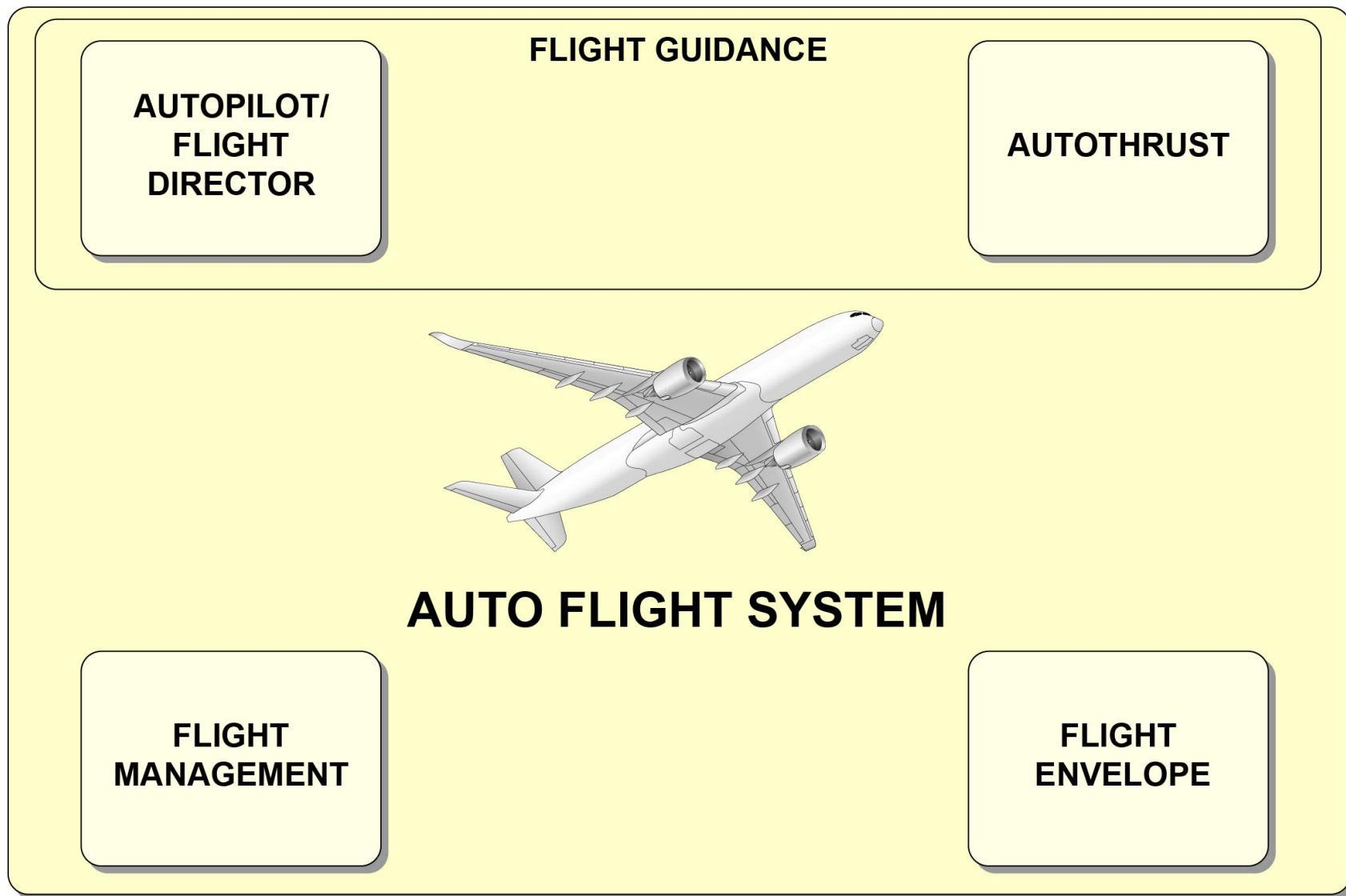
AUTO FLIGHT SYSTEM PRESENTATION (1)

Flight Guidance - Autopilot/Flight Director (AP/FD) - Presentation

Function/Description

The aircraft attitude can be controlled either manually or automatically:
- In manual mode, the pilots use the Side Stick Units (SSUs) to send guidance orders to the flight controls system which will apply corresponding deflection on movable surfaces. In addition, in manual mode, the pilots use the throttle control levers to adjust the thrust.
- In automatic mode, the guidance orders are sent automatically by the AP/FD function part of the AFS to the flight controls system.
The AP/FD includes Autopilot (AP) functions and Flight Director (FD) functions.
The AP functions give orders to:
- The actuators of the flight control surfaces to control the attitude of the aircraft on the three axes (pitch, roll and yaw)
- The Nose Wheel Steering (NWS) system for small adjustments during automatic landing
- The Brake Control System (BCS) for the Brake to Vacate (BTV) function.
The FD functions give guidance information to the flight crew for manual control of the aircraft and for AP monitoring.
The AP/FD receives orders from the Aircraft Environment Surveillance System (AESS) for the Traffic Alert and Collision Avoidance System (TCAS) function. These orders are used for the automatic guidance of the aircraft or are given to the flight crew as FD guidance data for manual control of the aircraft.
The general architecture of the AP/FD includes three PRIMary Computers (PRIMs) and the AFS applications in the Core Processing Input/Output Modules (CPIOMs).
The AP/FD functions are hosted in each PRIM.

Interface

For the AP/FD functions, the PRIMs have interfaces as follows:
The PRIMs receive inputs from:
- The rudder pedals
- The SSUs
- The FCU and FCU backup
- The navigation systems.
The PRIMs send data or orders to the actuators of the flight control surfaces through the AFDX network, and communicate with:
- The NWS system
- The BCS function
- The engines
- The Control and Display System (CDS)
- The FWS for the generation of warnings and messages
- The AESS for TCAS function.

Flight Guidance - Autothrust (A/THR) - Presentation

Function/Description

The engine thrust can be controlled either manually or automatically:
- In manual mode, the pilots use the throttle control levers to send guidance (thrust) orders to the Propulsion Control System (PCS).
- In automatic mode, the thrust orders are sent automatically by the A/THR function part of the AFS to the PCS.
The function of the A/THR is to automatically control the engine thrust.

Interface

The A/THR functions are hosted in each PRIM. For these functions, the PRIMs:
- Communicate with the FCU, the engines and the CDS

- Receive input from the thrust control levers and the instinctive-disconnect pushbutton-switches on the throttle control levers.

The AFS applications, which are hosted in the CPIOMs:
- Give FCU backup, through the AFDX network, used when the FCU is not available but not only
- Send data to the FWS, through the AFDX network, for the generation of warnings and messages.

Flight Envelope (FE) - Presentation

Function/Description

The FE functions monitor the parameters related to the aircraft flight envelope. The primary function of the FE is to detect abnormal flight conditions.
The general architecture of the FE includes three PRIMs.
The FE functions are hosted in each PRIM. For these functions, the PRIMs communicate, through the AFDX network, with the FE functions hosted in the other PRIMs and the AFS applications in the CPIOMs.

Interface

For the FE functions, the PRIMs have an interface with the CDS through the AFDX network.

Flight Management (FM) - Presentation

Function/Description

The primary functions of the FM are to:
- Calculate the aircraft position (navigation function)
- Give orders for flight control and thrust control (guidance function).
The general architecture of the FM includes three Flight Management Computers (FMCs).

Interface

Each FMC has interfaces with:

- The CDS through the AFDX network
- The navigation systems
- The other FMCs
- The FG and FE functions
- The AFS applications
- The Aircraft Environment Surveillance System (AESS).

AUTO FLIGHT SYSTEM

FLIGHT CONTROL UNIT
AFS CONTROL PANEL

MFD

FLIGHT ENVELOPE

FLIGHT GUIDANCE

FLIGHT MANAGEMENT

KCCU

SHORT TERM

LONG TERM

AUTO CTL

AUTO CTL

MANUAL CTL

SIDE STICK UNIT

RUDDER PEDALS

FLIGHT CONTROL SYSTEM

PROPULSION CONTROL SYSTEM

MANUAL CTL

THROTTLE CONTROL LEVERS

AFS: Automatic Flight System
CTL: Control
KCCU: Keyboard and Cursor Control Unit
MFD: MultiFunction Display

FLIGHT GUIDANCE - AUTOPILOT/FLIGHT DIRECTOR (AP/FD) - PRESENTATION ... FLIGHT MANAGEMENT (FM) - PRESENTATION

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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AFDX:	Avionics Full Duplex Switched Ethernet
AESS:	Aircraft Environment Surveillance System
AFS:	Automatic Flight System
CDS:	Control and Display System
CPIOM:	Core Processing Input/Output Module
FCU:	Flight Control Unit
FG:	Flight Guidance
FMC:	Flight Management Computer
FMS:	Flight Management System
FWS:	Flight Warning System
NWS:	Nose Wheel Steering
PRIM:	PRIMary Computer
TCAS:	Traffic Alert and Collision Avoidance System

FLIGHT GUIDANCE - AUTOPILOT/FLIGHT DIRECTOR (AP/FD) - PRESENTATION ... FLIGHT MANAGEMENT (FM) - PRESENTATION

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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AUTO FLIGHT SYSTEM PRESENTATION (1)

Location - Presentation

The three FMCs are installed in the avionics compartment.
For the PRIMs, refer to paragraph location of the description 270000.

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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AVIONICS COMPARTMENT

3 FMCs
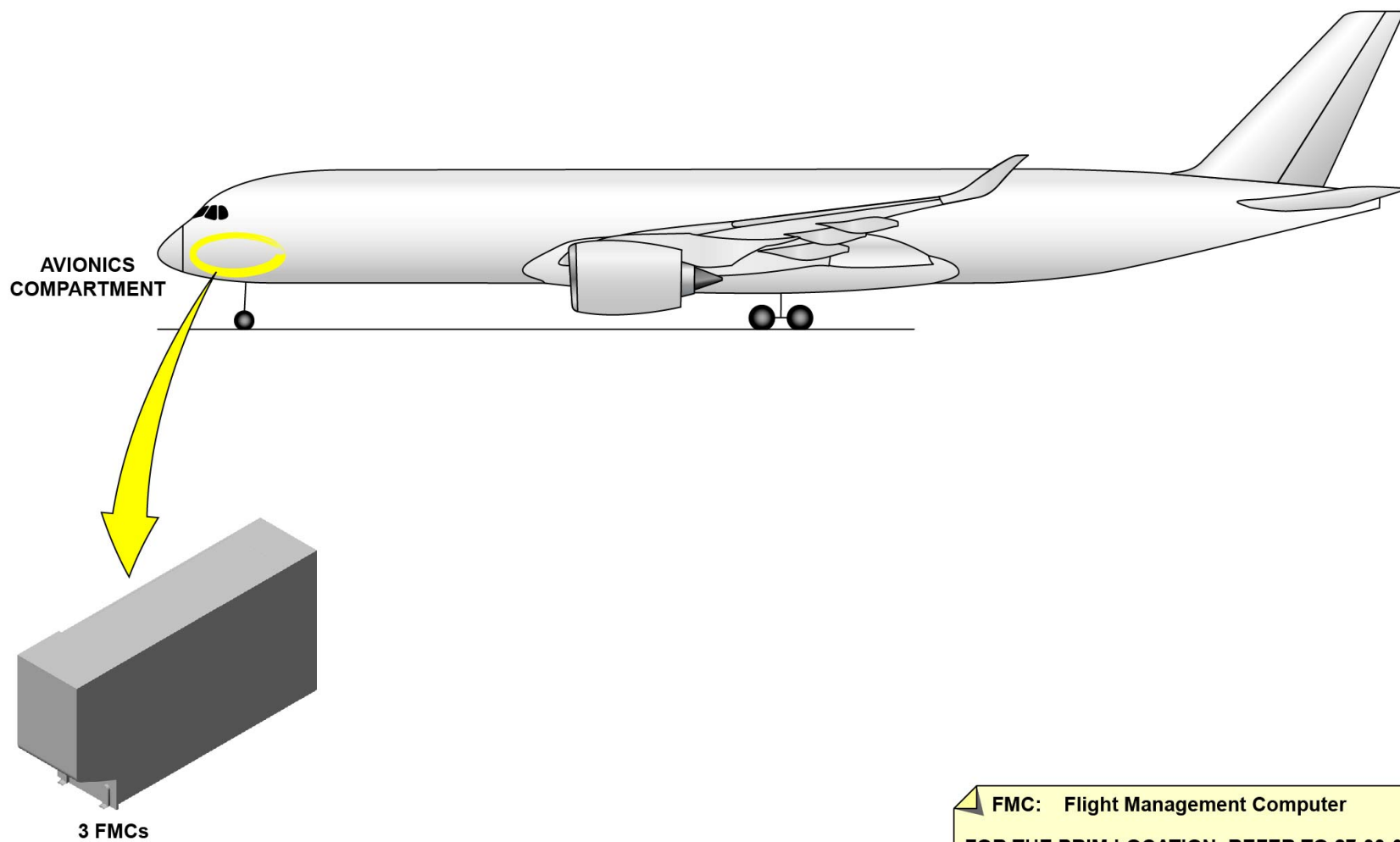
FMC: Flight Management Computer

FOR THE PRIM LOCATION, REFER TO 27-00-00

LOCATION - PRESENTATION

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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AUTO FLIGHT SYSTEM PRESENTATION (1)

Control and Indicating - Presentation

Control

The controls of the AFS are as follows:
- FCU and FCU backup (the FCU is the primary interface with the flight crew for the selection of the AP/FD and A/THR modes)
- CDS (two MultiFunction Displays (MFDs))
- Keyboard and Cursor Control Units (KCCUs)
- SSUs, each one with an AP instinctive-disconnect pushbutton-switch
- Rudder pedals
- Throttle control levers, each one with an A/THR instinctive-disconnect pushbutton-switch
- Three PRIM pushbutton-switches and one FCU switch on the cockpit overhead panel
- FMS selector switch on the main instrument panel.

Indicating

The indicating of the AFS is as follows:
- The FCU and the FCU backup page on the MFD show the AP/FD and A/THR engagement statuses
- The MFDs and SD are used to show FM data
- The PFDs and NDs show navigation and guidance indications.

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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CKPT EQPT POWER SUPPLY
CCD1 KBD1 FCU

231VM **FCU SWITCH**

AFS **FCU**

FMS SELECTOR SWITCH

FMS
BOTH ON 2 NORM BOTH ON 1

311VU

INSTINCTIVE DISCONNECT P/BSW

SIDE STICK UNIT

F/CTL
PRIM 1 SEC 1 PRIM 3 SEC 3

211VM **PRIM P/BSWs**

F/CTL
PRIM 2 SEC 2

212VM

RUDDER PEDALS

INSTINCTIVE DISCONNECT P/BSW

THROTTLE CONTROL LEVERS

CDS

PFD **ND**

SD

MFD FMS **MFD FCU BACKUP**

KCCU

AFS:	Automatic Flight System
CDS:	Control and Display System
FCU:	Flight Control Unit
FMS:	Flight Management System
KCCU:	Keyboard and Cursor Control Unit
MFD:	MultiFunction Display
ND:	Navigation Display
PFD:	Primary Flight Display
PRIM:	PRIMary Computer
SD:	System Display

CONTROL AND INDICATING - PRESENTATION - CONTROL & INDICATING

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AUTO FLIGHT SYSTEM PRESENTATION (1)

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COMMUNICATIONS SYSTEM PRESENTATION (1)

Overview

The functions of the communications system are:
- To give communication means
- To monitor audio and video.

The general familiarization training for these systems includes:
- External transmission systems for voice and data communications
- Audio integrating and voice command systems
- Cockpit Voice Recorder (CVR)
- Static discharger
- External video system.
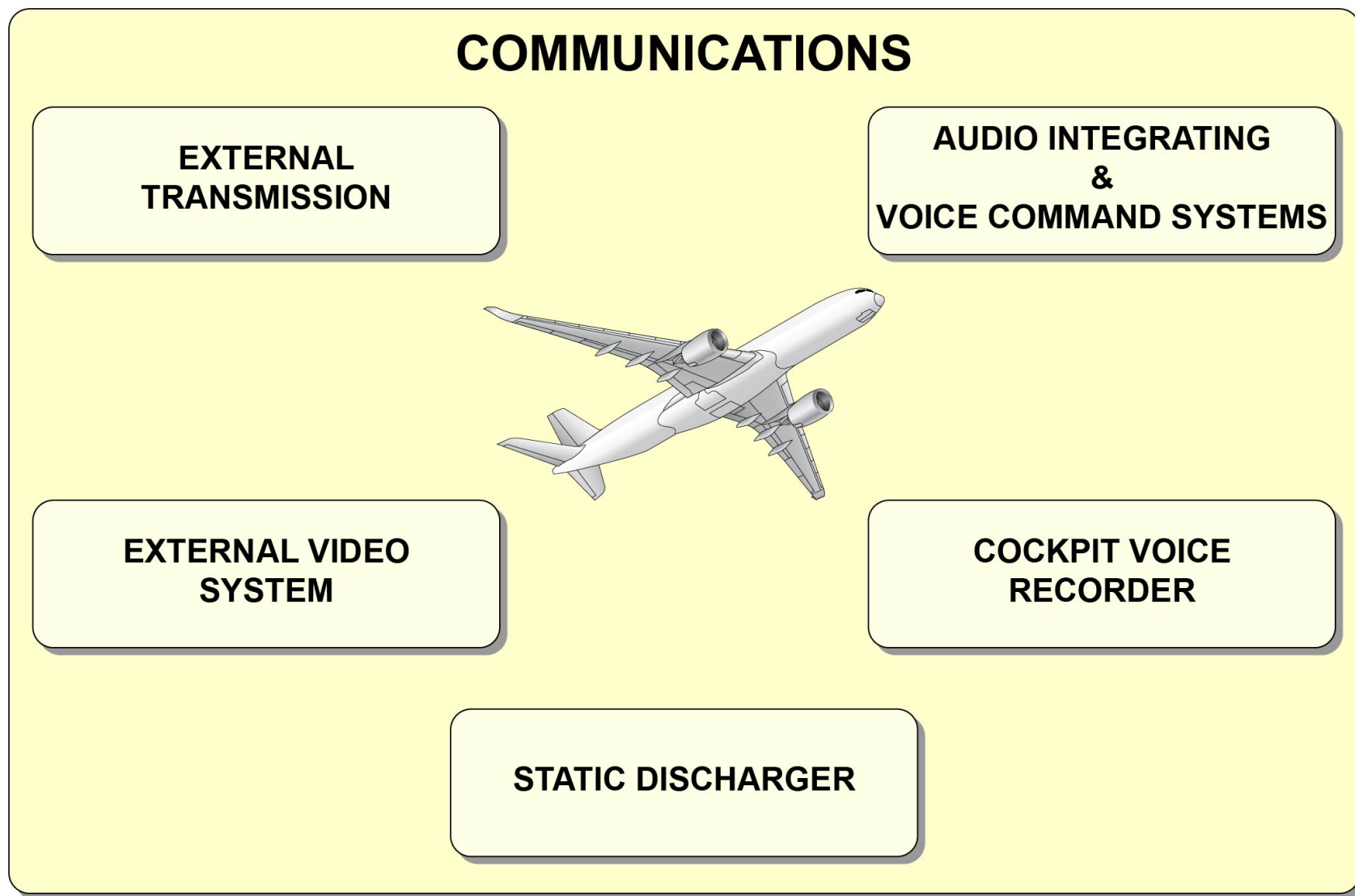
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COMMUNICATIONS SYSTEM PRESENTATION (1)

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COMMUNICATIONS

EXTERNAL TRANSMISSION

AUDIO INTEGRATING & VOICE COMMAND SYSTEMS

EXTERNAL VIDEO SYSTEM

COCKPIT VOICE RECORDER

STATIC DISCHARGER

OVERVIEW

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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COMMUNICATIONS SYSTEM PRESENTATION (1)

External Transmission - Presentation

Function/Description

The function of the external transmission system is to make voice and data communications possible between the aircraft and these ground stations:
- Air Traffic Control (ATC) centers
- Airline Operational Control (AOC) centers.
The external transmission system includes:
- The High Frequency (HF) system
- The Very High Frequency (VHF) system.
The HF system includes:
- Two identical High Frequency Data Radio (HFDR) transceivers (the second one is optional)
- Two identical HFDR couplers (the second one is optional)
- One common HFDR antenna.
The HF system is used for long-range communications between different aircraft and between the aircraft and ground stations (ATC and/or AOC centers) in voice and/or data simplex modes.
The VHF system includes:
- Two Multiple VHF Data Radio (MVDR) transceivers
- Three VHF Data Radio (VDR) antennas.
MVDR transceiver 1 is connected to two VDR antennas. MVDR transceiver 2 is connected to one VDR antenna.
The VHF system is used for short-range (line of sight) communications between different aircraft and between the aircraft and ground stations (ATC and/or AOC centers) in voice and/or data simplex modes.

EXTERNAL TRANSMISSION - PRESENTATION - FUNCTION/DESCRIPTION

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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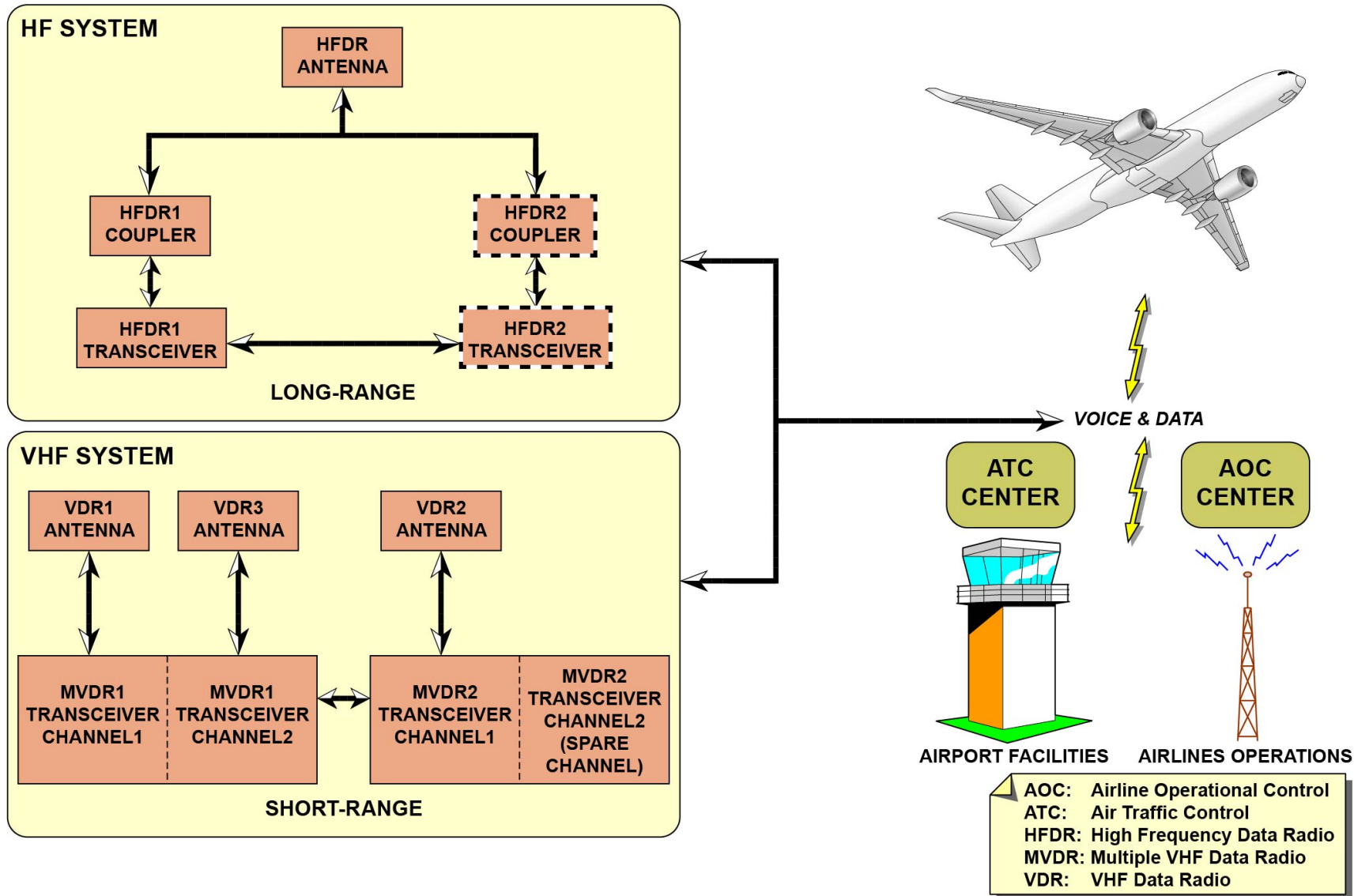
COMMUNICATIONS SYSTEM PRESENTATION (1)

External Transmission - Presentation (continued)

Location

The HF system has:
- Two HFDR transceivers in the avionics compartment (the second
one is optional)
- Two HFDR couplers in a pressurized area near the vertical stabilizer
(the second one is optional)
- One antenna on the forward section of the vertical stabilizer.
The VHF system has:
- Two MVDR transceivers in the avionics compartment
- One antenna on the forward top section of the aircraft fuselage
- One antenna on the forward bottom section of the aircraft fuselage
- One antenna on the aft top section of the aircraft fuselage.
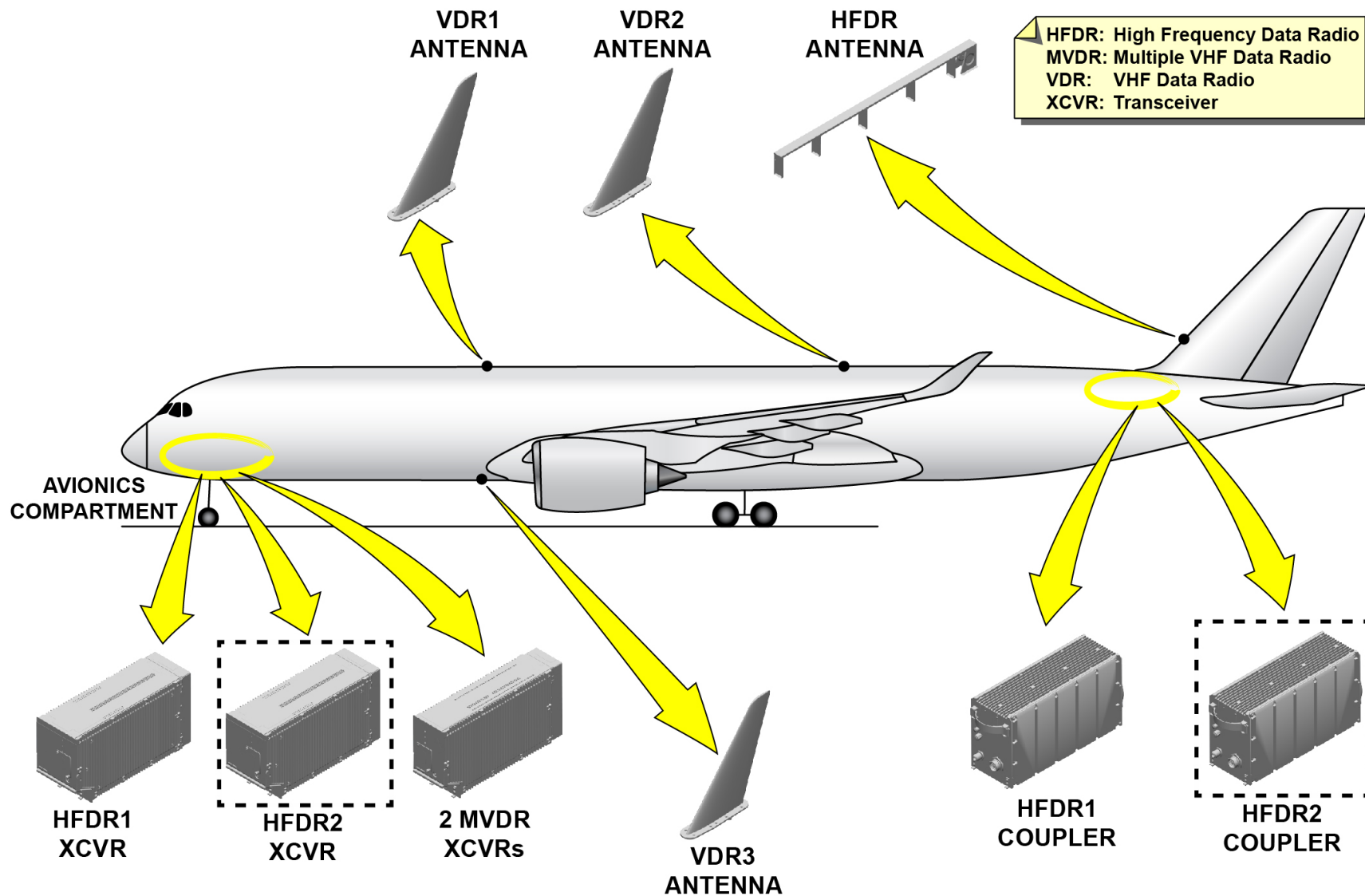
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COMMUNICATIONS SYSTEM PRESENTATION (1)

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VDR1 ANTENNA

VDR2 ANTENNA

HFDR ANTENNA

HFDR:	High Frequency Data Radio
MVDR:	Multiple VHF Data Radio
VDR:	VHF Data Radio
XCVR:	Transceiver

AVIONICS COMPARTMENT

HFDR1 XCVR

HFDR2 XCVR

2 MVDR XCVRs

VDR3 ANTENNA

HFDR1 COUPLER

HFDR2 COUPLER

EXTERNAL TRANSMISSION - PRESENTATION - LOCATION

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COMMUNICATIONS SYSTEM PRESENTATION (1)

External Transmission - Presentation (continued)

Control and Indicating

For the HF system:

The controls are as follows:

- Three Radio and Audio Management Panels (RMPs) installed in the cockpit, on the center pedestal
- A Push-To-Talk (PTT) switch on the three hand microphones
- A PTT switch on the Captain (CAPT) side-stick unit and one on the First Officer (F/O) side-stick unit
- Two PTT switches on the glareshield (optional): one for the CAPT and one for the F/O.

The indicating is as follows:

- The three RMPs show the status of the frequencies and the communication modes (VOICE/DATA).
- The Control and Display System (CDS) shows the Electronic Centralized Aircraft Monitoring (ECAM) memos and alerts.
- The audio signals are sent to the CAPT and F/O through the boomsets, headsets and four loudspeakers.

For the VHF system:

The controls are as follows:

- Three RMPs: they are used to select and tune a frequency channel, to switch voice and data, and to show the VHF function communication status.
- A PTT switch on the three hand microphones
- A PTT switch on the CAPT side-stick unit and one on the F/O side-stick unit
- Two PTT switches on the glareshield (optional): one for the CAPT and one for the F/O.

The indicating is as follows:

- The three RMPs show the status of the frequencies and the communication modes (VOICE/DATA).
- The CDS shows the ECAM memos and alerts.
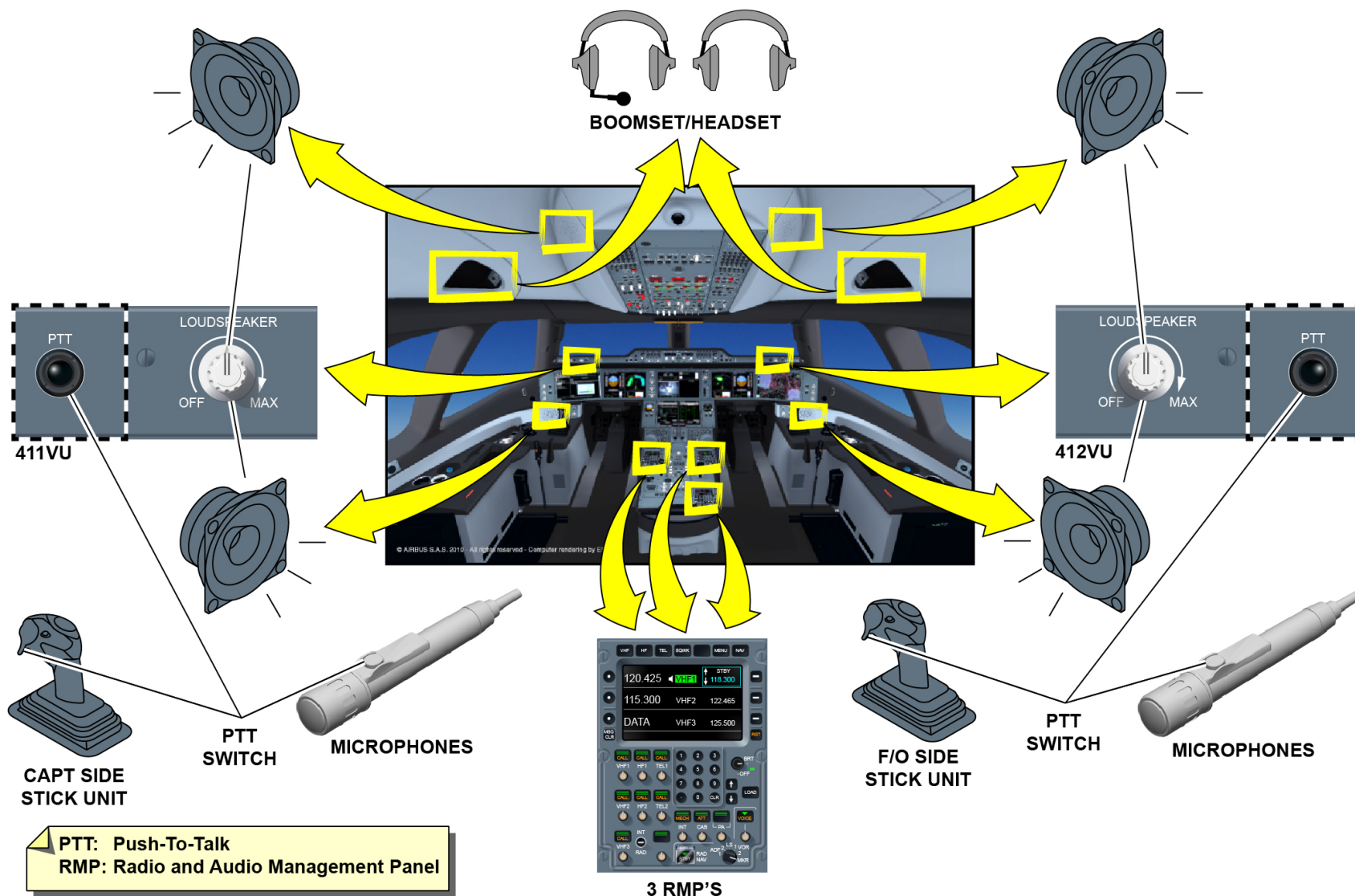
- The audio signals are sent to the CAPT and F/O through the boomsets, headsets and four loudspeakers.

BOOMSET/HEADSET

411VU

LOUDSPEAKER

OFF — MAX

PTT

412VU

LOUDSPEAKER

OFF — MAX

PTT

CAPT SIDE STICK UNIT

PTT SWITCH

MICROPHONES

F/O SIDE STICK UNIT

PTT SWITCH

MICROPHONES

3 RMP'S

PTT: Push-To-Talk
RMP: Radio and Audio Management Panel

EXTERNAL TRANSMISSION - PRESENTATION - CONTROL AND INDICATING

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COMMUNICATIONS SYSTEM PRESENTATION (1)
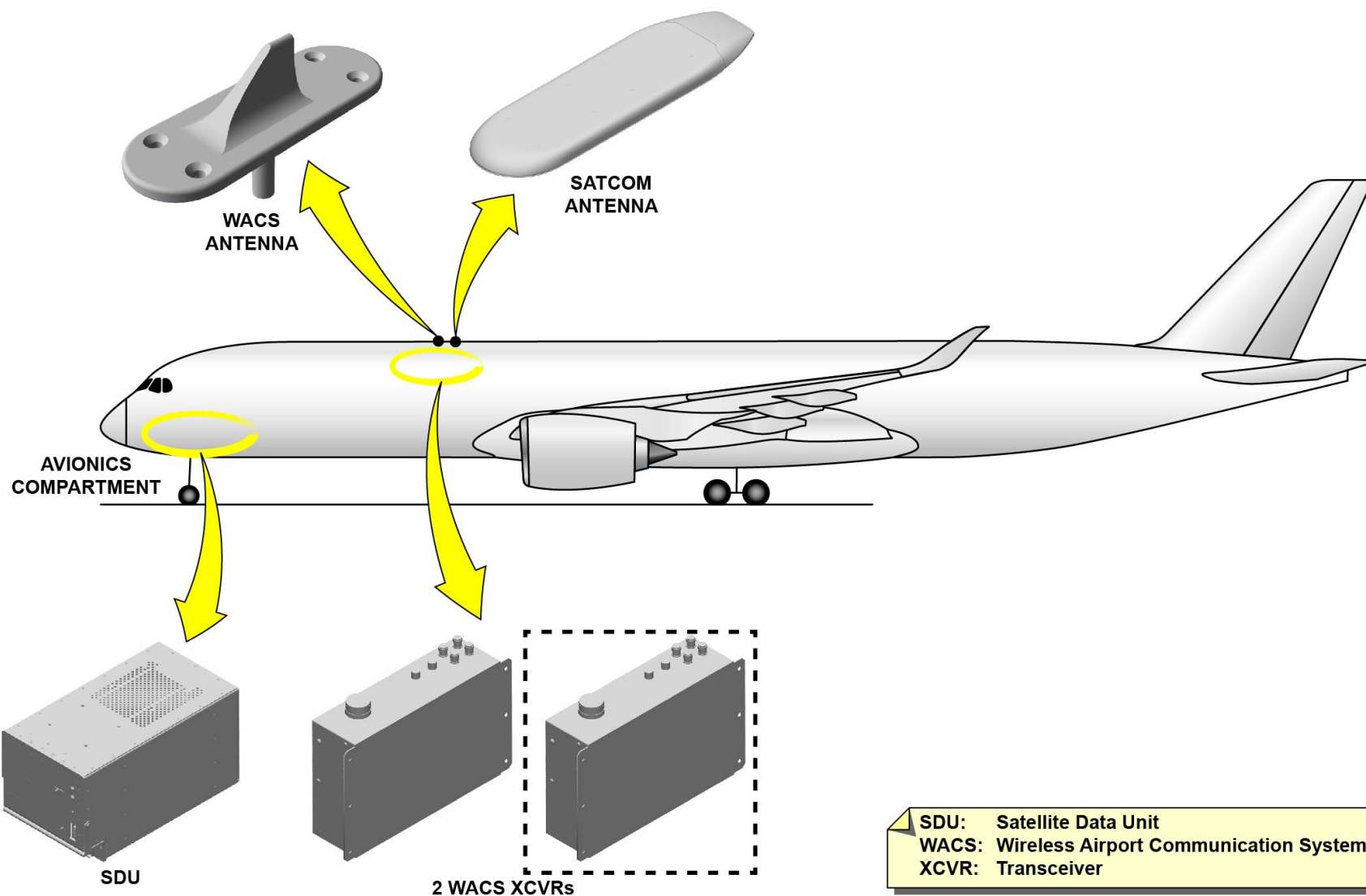
External Transmission - Presentation

Function/Description

The function of the external transmission system is to give worldwide
onboard-communication services necessary to different applications:
- ATC
- Flight Management System (FMS)
- Onboard Information System (OIS) applications (Onboard
Maintenance System (OMS), AOC).
The external transmission system includes:
- The Avionics Communication Router (ACR) application
- The Wireless Airport Communication System (WACS)
- The SATellite COMmunication (SATCOM) system.
The function of the ACR application is to give worldwide
air-to-ground data communication services to airborne applications
through the VHF, HF and SATCOM systems.
The ACR application is hosted in a Core Processing Input/Output
Module (CPIOM).
The WACS is used to transmit and receive data for airline use when
the aircraft is at the airport gate. It has two transceivers (one of them
is optional) and their related antenna.
The SATCOM system is used for voice and data communications
(cockpit voice, cockpit data, passenger high speed services) between
the aircraft and the ground stations through satellites.
The SATCOM is connected to the ACR application.

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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| FMS | ATC |

AFDX NETWORK

CPIOM

ACR

SCI

OIS
(AOC, OMS)

| HF | VHF | SATCOM |

WACS

ATC
CENTER

AOC
CENTER
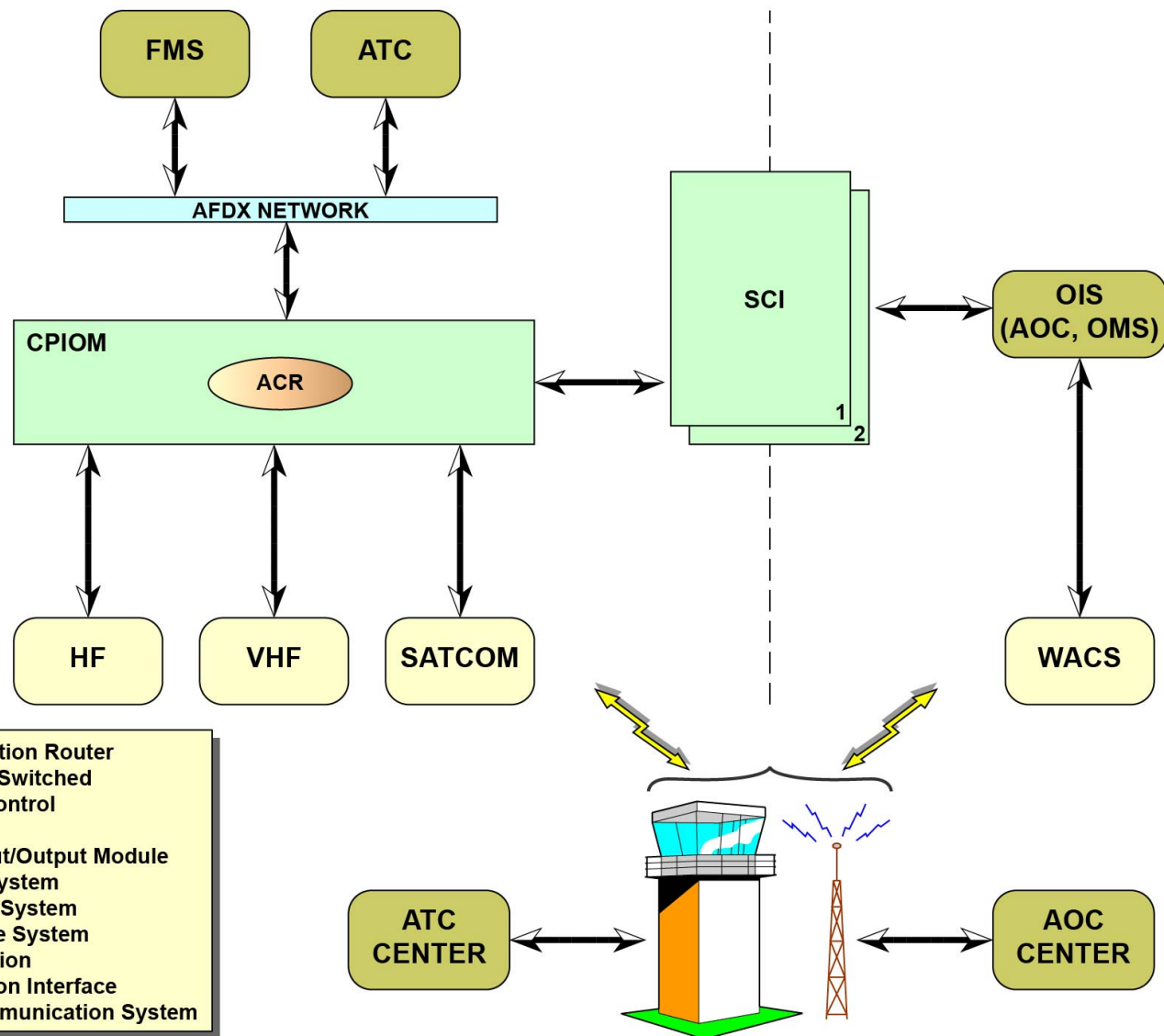
ACR: Avionics Communication Router
AFDX: Avionics Full Duplex Switched
AOC: Airline Operational Control
ATC: Air Traffic Control
CPIOM: Core Processing Input/Output Module
FMS: Flight Management System
OIS: Onboard Information System
OMS: Onboard Maintenance System
SATCOM: Satellite Communication
SCI: Secure Communication Interface
WACS: Wireless Airport Communication System

EXTERNAL TRANSMISSION - PRESENTATION - FUNCTION/DESCRIPTION

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COMMUNICATIONS SYSTEM PRESENTATION (1)

External Transmission - Presentation (continued)

Location

The WACS antenna is installed on the top fuselage.
The WACS transceivers are installed in the aircraft near their antennas.
The SATCOM antenna is installed on the top fuselage.
The Satellite Data Unit (SDU) is installed in the avionics compartment.

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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WACS
ANTENNA

SATCOM
ANTENNA

AVIONICS
COMPARTMENT

SDU

2 WACS XCVRs

SDU:	Satellite Data Unit
WACS:	Wireless Airport Communication System
XCVR:	Transceiver

EXTERNAL TRANSMISSION - PRESENTATION - LOCATION

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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COMMUNICATIONS SYSTEM PRESENTATION (1)

External Transmission - Presentation (continued)

Control and Indicating

The control and indicating of the ACR and SATCOM are made through the RMPs.
The GATELINK pushbutton switch on the OIS control panel is used to stop the transmission of WACS data between the aircraft and the ground.
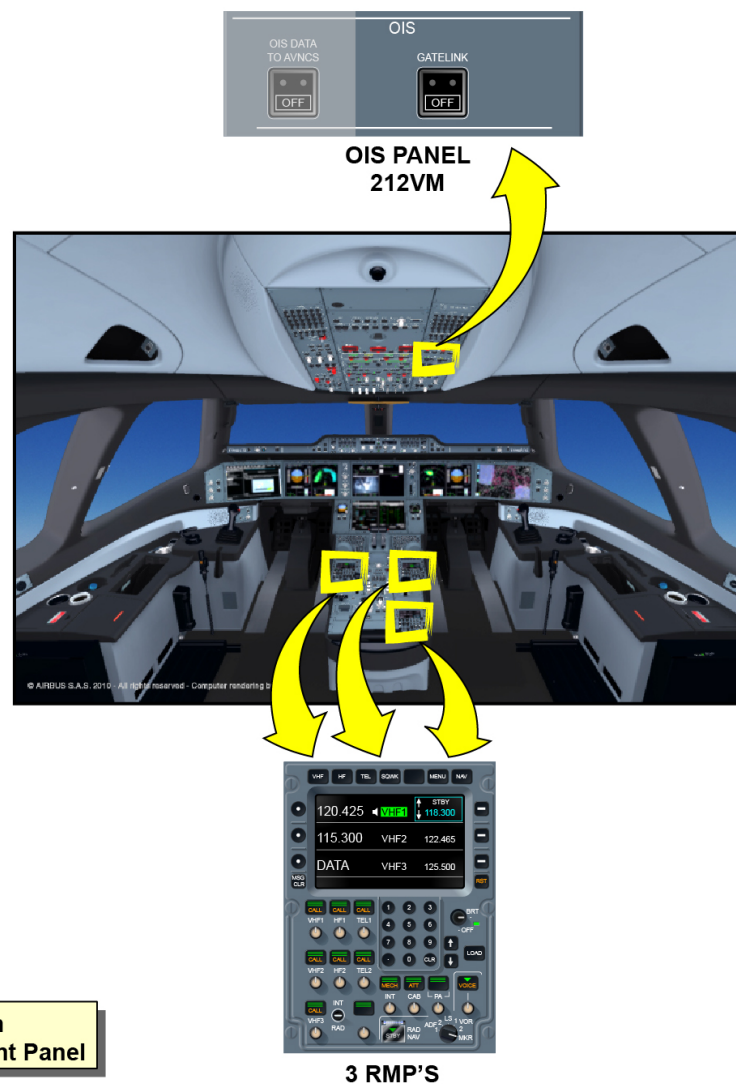
V2414251 - V00T0MM0 - VM23P1LEVEL0101

MAINTENANCE COURSE - T1+T2 - RR Trent XWB
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COMMUNICATIONS SYSTEM PRESENTATION (1)

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OIS PANEL
212VM

3 RMP'S

OIS: Onboard Information System
RMP: Radio and Audio Management Panel

EXTERNAL TRANSMISSION - PRESENTATION - CONTROL AND INDICATING

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COMMUNICATIONS SYSTEM PRESENTATION (1)

Audio Integrating and Voice Command Systems - Presentation

Function/Description

The function of the audio integrating and voice command systems is to let the cockpit crew control:
- The voice communications in the aircraft and with other aircraft
- The voice/data communications with the ground stations.

The audio integrating and voice command systems include:
- The Audio Management System (AMS) which has two Audio Management Units (AMUs)
- The radio management system which has three RMPs
- Audio peripheral equipment in the cockpit:
- PTT switches (on the glareshield (optional), side stick unit and hand microphones)
- Loudspeakers
- Oxygen mask microphones
- Boomsets
- Hand microphones
- Headsets.
- Audio Control Panel (ACP) 4 (optional).

The function of the AMS is to connect the radio communication systems (HF, VHF and SATCOM) to the RMPs and audio peripherals for data and audio transmission.

In the AMS, the AMUs are connected to each other and to:
- The RMPs
- The audio peripheral equipment
- The radio communication systems (HF, VHF and SATCOM).

The RMP function is to let the cockpit crew control the tuning, display and/or dialling of:
- The radio communication systems (HF, VHF and SATCOM)
- The data mode control of the radio communication means and of the ACR.

Each RMP is connected to the other RMPs and to:

- The HF system
- The VHF system
- The ACR system
- The SATCOM system.

Interface

The AMUs have interfaces with:
- The CVR
- The radio navigation systems
- The Aircraft Environment Surveillance System (AESS)
- The Flight Warning System (FWS).
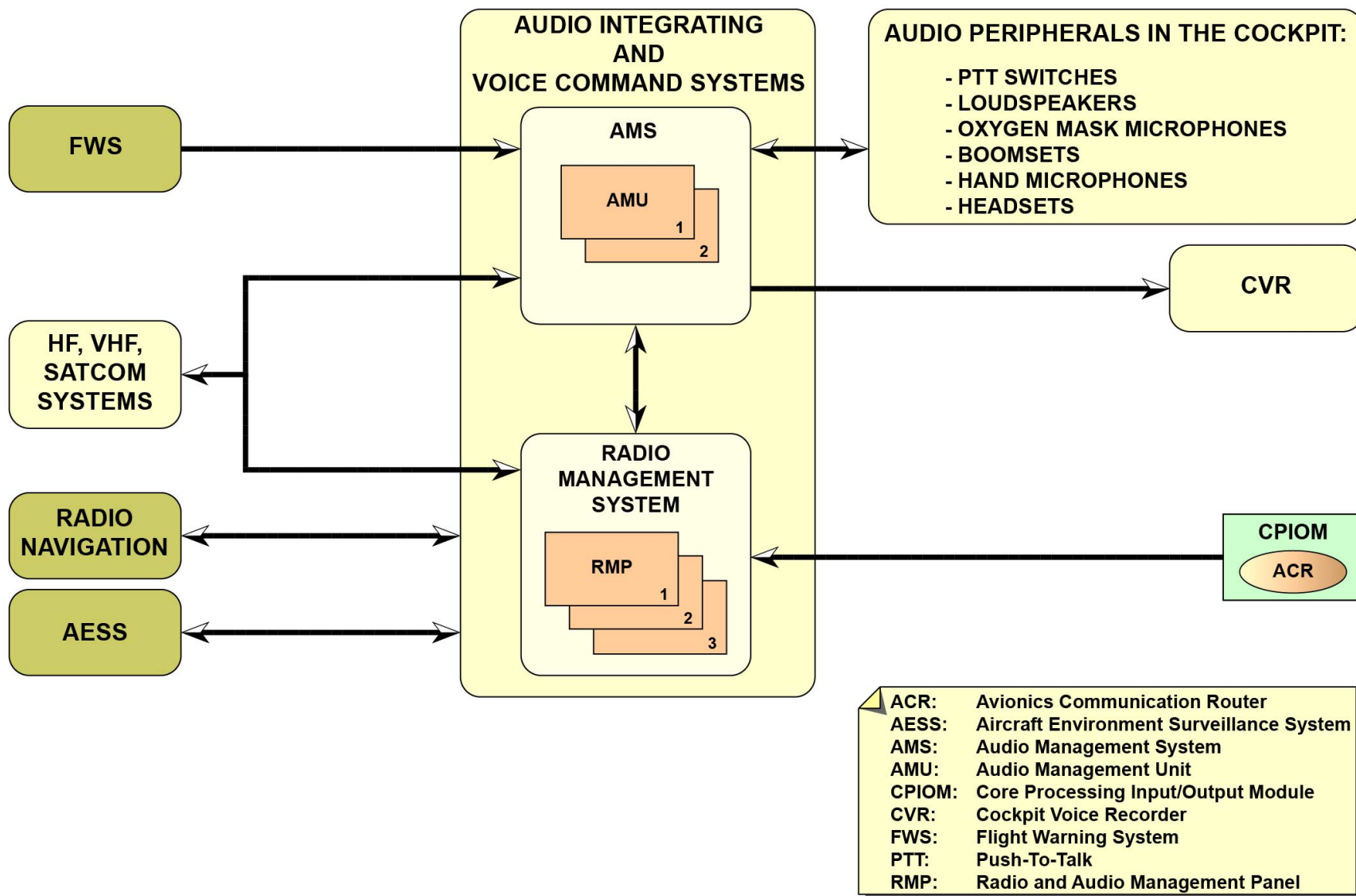
AUDIO INTEGRATING AND VOICE COMMAND SYSTEMS - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

COMMUNICATIONS SYSTEM PRESENTATION (1)

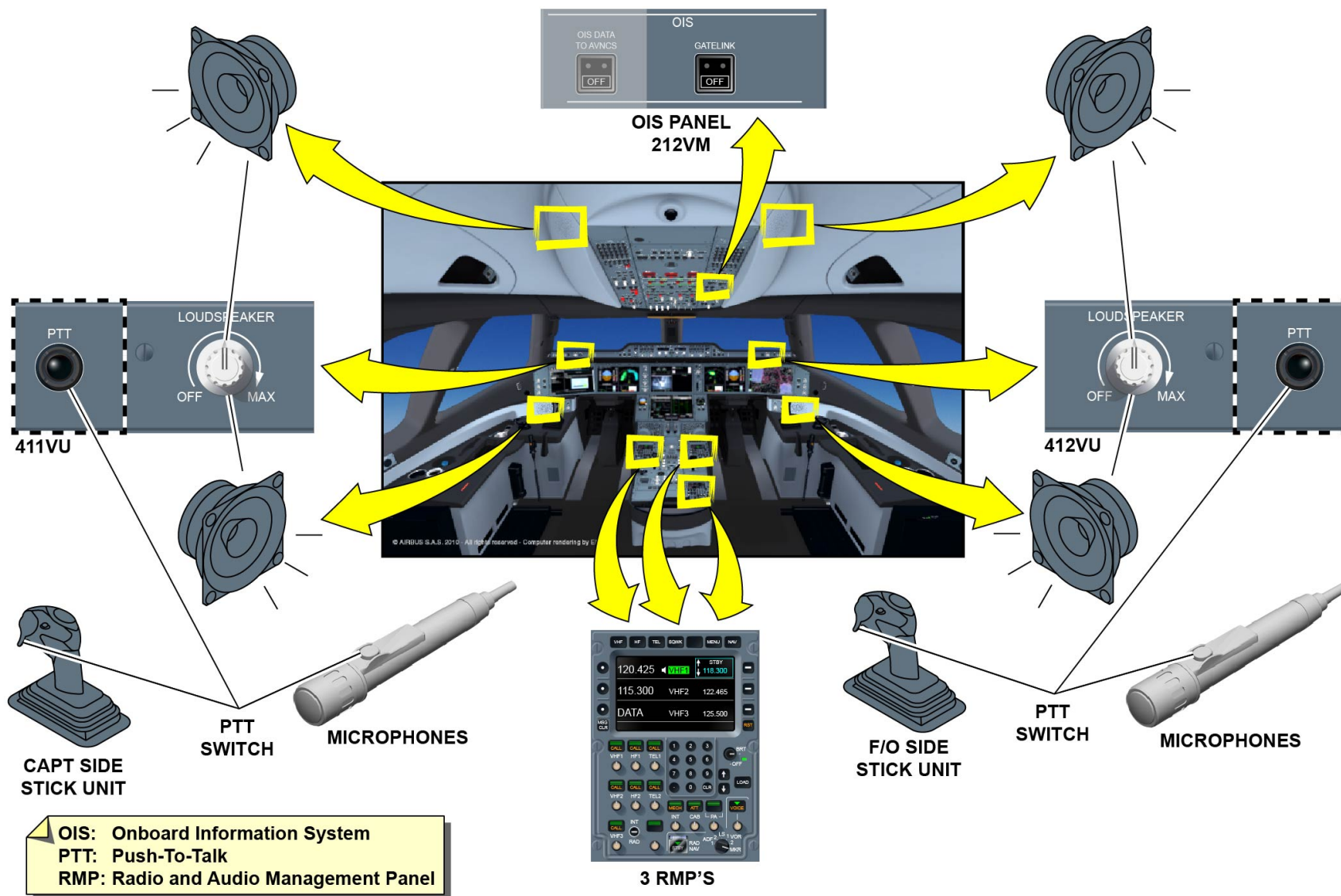## Audio Integrating and Voice Command Systems - Presentation (continued)

Location

The two AMUs are installed in the avionics compartment.
The three RMPs are installed in the cockpit, on the center pedestal.
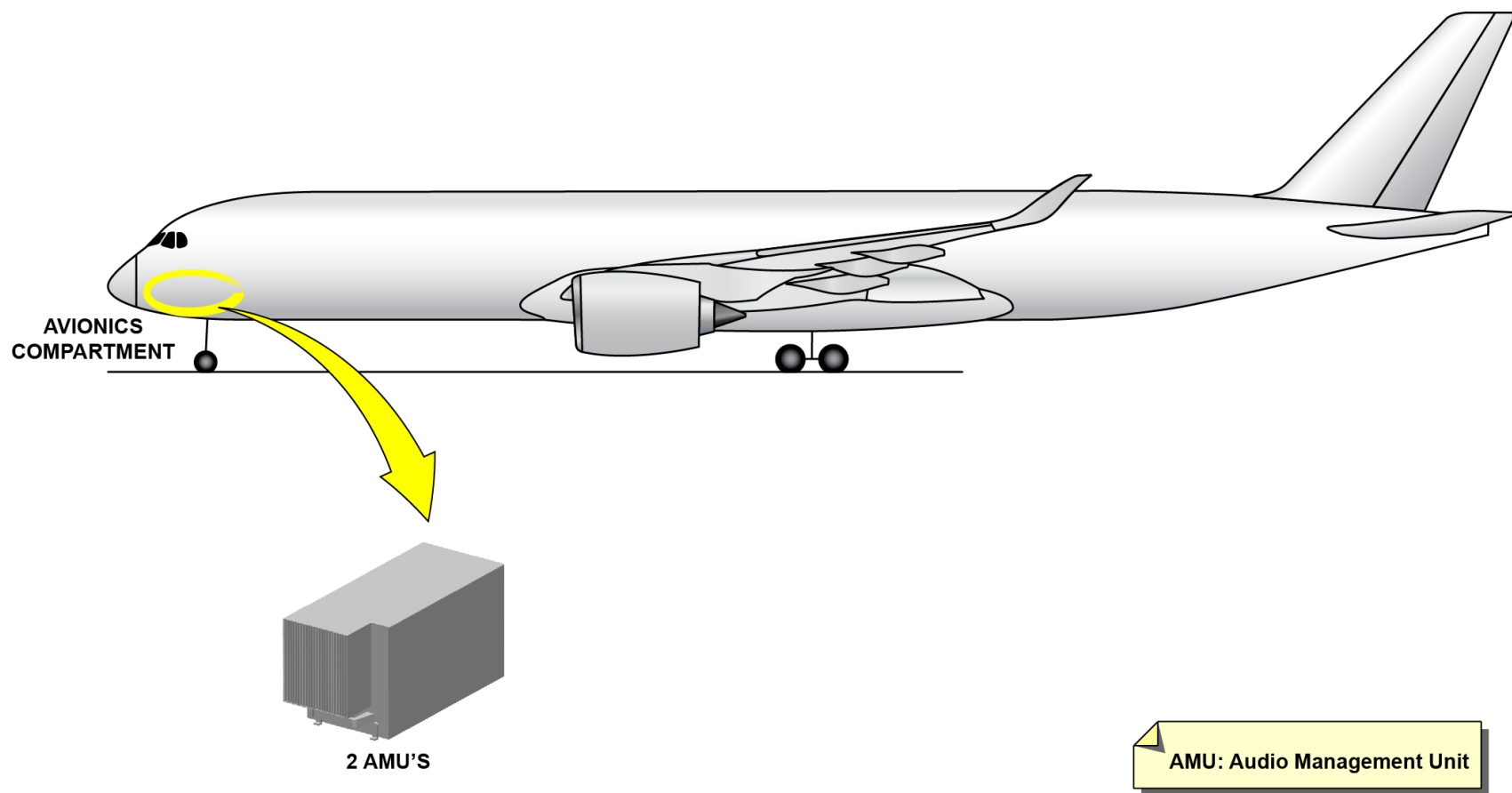
AVIONICS
COMPARTMENT

2 AMU'S

AMU: Audio Management Unit

AUDIO INTEGRATING AND VOICE COMMAND SYSTEMS - PRESENTATION - LOCATION

V2414251 - V00T0MM0 - VM23P1LEVEL0101

COMMUNICATIONS SYSTEM PRESENTATION (1)

Audio Integrating and Voice Command Systems - Presentation (continued)

Control and Indicating

The RMPs control the AMUs.
The AMS send data to the RMPs and audio signals to the audio peripherals.
The PTT switches activate the transmission mode.
The loudspeaker potentiometers adjust the volume of the loudspeakers.

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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Page 152

OIS PANEL
212VM

411VU

412VU

CAPT SIDE
STICK UNIT

PTT
SWITCH

MICROPHONES

F/O SIDE
STICK UNIT

PTT
SWITCH

MICROPHONES

3 RMP'S

OIS: Onboard Information System
PTT: Push-To-Talk
RMP: Radio and Audio Management Panel

AUDIO INTEGRATING AND VOICE COMMAND SYSTEMS - PRESENTATION - CONTROL AND INDICATING

V2414251 - V00T0MM0 - VM23P1LEVEL0101

COMMUNICATIONS SYSTEM PRESENTATION (1)

Cockpit Voice Recorder - Presentation

Function/Description

The CVR system records the conversations and audio communications of the cockpit crew, and datalink communications, in flight and on the ground.
After an aircraft accident or incident, the airworthiness authorities use the recorded data for investigation.
The CVR system includes:
- A cockpit area microphone which is connected to the CVR Control Unit (CU)
- A CVR CU which is connected to the Solid State Cockpit Voice Recorder (SSCVR)
- An SSCVR.

Location

The cockpit area microphone and the CVR CU are installed in the cockpit.
The SSCVR is installed in the aft-cabin underfloor compartment of the aircraft.

Interface

The CVR system has an interface with:
- The ATC application hosted in a CPIOM for datalink message recording
- The Centralized Data Acquisition Unit (CDAU) to give the time of the recorded data
- The audio integrating and voice command systems.

Control and Indicating

The CVR CU is used for the control of the CVR system.

CVR SYSTEM

COCKPIT AREA MICROPHONE

CVR

TEST   ERASE

B O O M S E T

CVR CU 232VM

SSCVR

AIRWORTHINESS AUTHORITIES

AUDIO INTEGRATING AND VOICE COMMAND SYSTEMS

CDAU *TIME*

CPIOM

ATC

ATC: Air Traffic Control
CDAU: Centralized Data Acquisition Unit
CPIOM: Core Processing Input/Output Module
CVR: Cockpit Voice Recorder
CU: Control Unit
SSCVR: Solid State Cockpit Voice Recorder
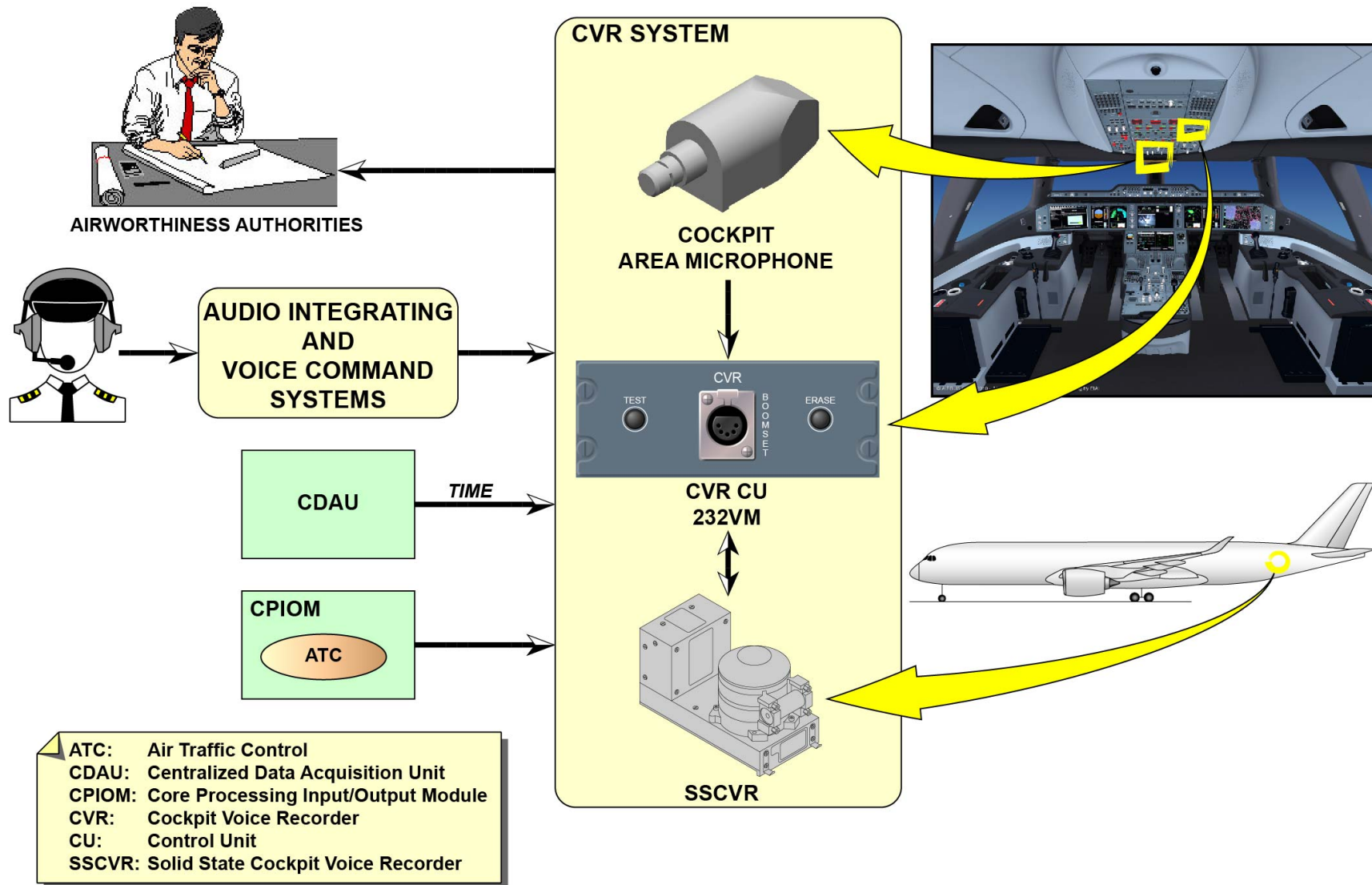
COCKPIT VOICE RECORDER - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

COMMUNICATIONS SYSTEM PRESENTATION (1)

Static Discharger - Presentation

Function/Description

During flight, the aircraft becomes electrostatically charged. Random electricity discharges can cause interference in the communication and navigation systems. The function of the static dischargers is to release the static electricity charge into the atmosphere through a controlled resistance path and thus decrease the interferences in the communication and navigation systems.

Location

Two types of static discharger are installed:
- One with a straight mounting, at the trailing edges
- One with a 30-degree angle, at the tips.

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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EXTERNAL AILERONS
AND WINGLETS

VERTICAL STABILIZER
AND RUDDER

STRAIGHT MOUNTED
STATIC DISCHARGER ON
THE TRAILING EDGE

30-DEGREE ANGLE MOUNTED
STATIC DISCHARGER ON
THE TIP

HORIZONTAL STABILIZERS
AND ELEVATORS

STATIC DISCHARGER - PRESENTATION - FUNCTION/DESCRIPTION & LOCATION

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COMMUNICATIONS SYSTEM PRESENTATION (1)

External Video System - Presentation

Function/Description

The external video system is optional for A350-800/900. For
A350-1000, only the landscape camera is optional.
The function of the external video system is to give a visual monitoring
of the aircraft on the ground during maneuvers (runways, taxiways).
The external video system includes:
- Two Taxiing Aid Cameras (TACs)
- A landscape camera.

Location

A TAC is installed on the lowest part of the forward fuselage.
A TAC is installed on the top of the vertical stabilizer.
The landscape camera is installed on the lowest part of the forward
fuselage.

Interface

The external video system has an interface with the two Concentrators
and Multiplexers for Video (CMVs).

Control and Indicating

The Electronic Flight Instrument System (EFIS) and ECAM control
panels are used to control the external video system.
The CDS shows the video images from the external video system
through the two CMVs:
- On CDS for TACs only
- On passenger seats.

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COMMUNICATIONS SYSTEM PRESENTATION (1)

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IFE

CDS

EFIS CONTROL PANELS

ECAM CONTROL PANEL

CIDS

CMV
1
2

VERTICAL STABILIZER TAC

BELLY TAC

LANDSCAPE CAMERA

CDS

ECAM:	**Electronic Centralized Aircraft Monitoring**
EFIS:	**Electronic Flight Instrument System**
CDS:	**Control and Display System**
CIDS:	**Cabin Intercommunication Data System**
CMV:	**Concentrator and Multiplexer for Video**
IFE:	**In-Flight Entertainment**
TAC:	**Taxiing Aid Camera**

EXTERNAL VIDEO SYSTEM - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING

CABIN SYSTEMS PRESENTATION (1)

Overview

The cabin system gives the cabin crew an interface to the cabin core
system and the cabin monitoring system. It also lets the passengers use
the entertainment system.
General familiarization training for this system focuses on:
- Cabin core system
- In-Flight Entertainment (IFE) system
- Cabin monitoring system.
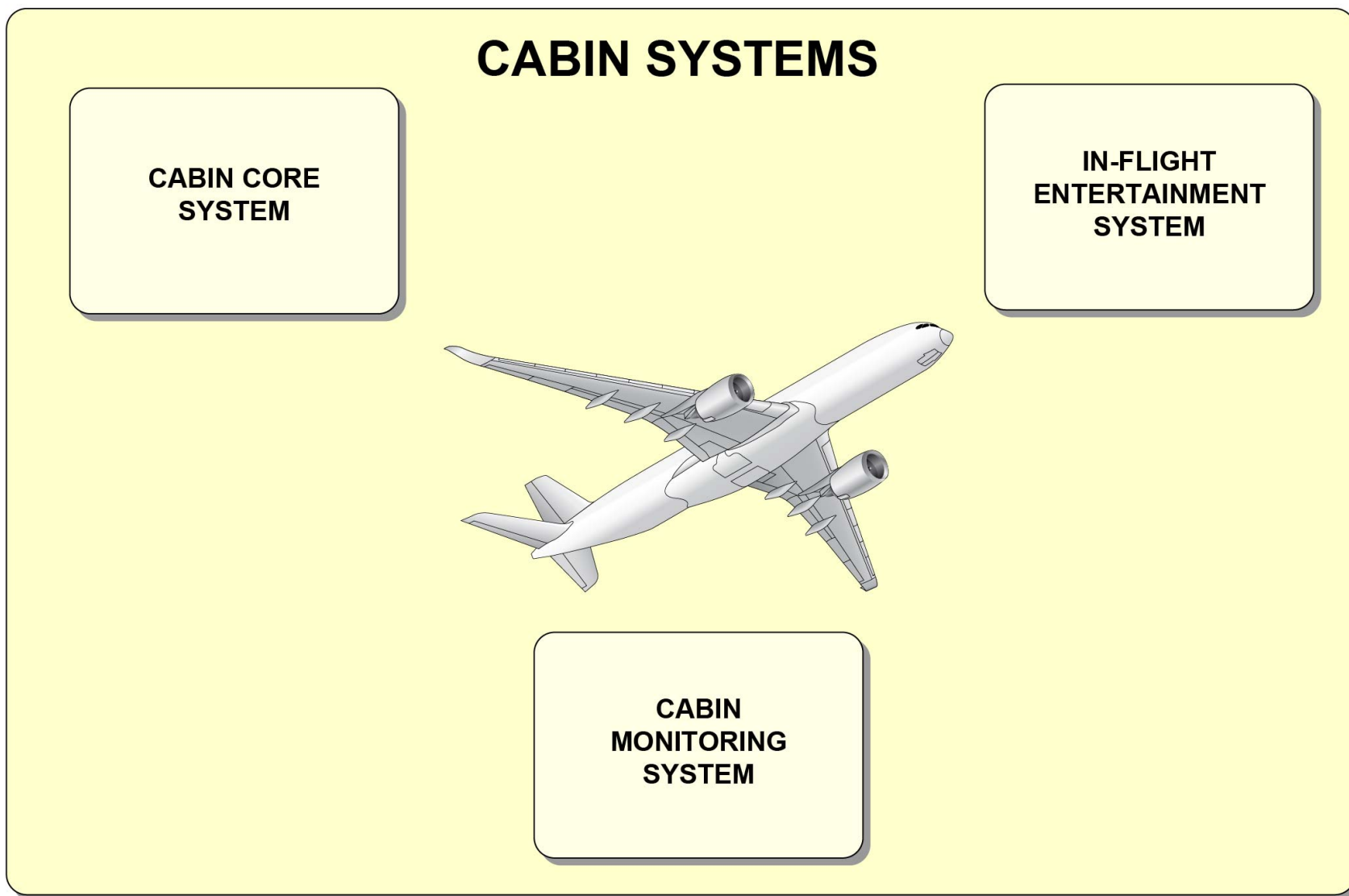
V2414251 - V00T0MM0 - VM44P1LEVEL0101

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CABIN SYSTEMS PRESENTATION (1)

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CABIN SYSTEMS

CABIN CORE SYSTEM

IN-FLIGHT ENTERTAINMENT SYSTEM

CABIN MONITORING SYSTEM

OVERVIEW

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CABIN SYSTEMS PRESENTATION (1)

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CABIN SYSTEMS PRESENTATION (1)

Cabin Core System - Presentation

Function/Description

The Cabin Intercommunication Data System (CIDS) is the cabin core system.

It has an easy interface with some cabin support systems for the cabin crew, the passengers, the maintenance personnel and the cockpit crew.
The components of the CIDS are:
- Two CIDS directors
- Flight Attendant Panels (FAPs), Attendant Indication Panels (AIPs), Area Call Panels (ACPs) and Additional Attendant Panels (AAPs) for controls and indicating
- Communication devices such as handsets and loudspeakers.
The CIDS has some communication functions:
- Passenger services (call, reading lights, etc.)
- Passenger Address (PA)
- Cabin interphone
- Service interphone
- Cabin systems control and monitoring (lights, temperature, water, waste, boarding music, etc.).
The PA lets the crew do the announcements to the passengers from the cockpit or from a cabin crew station. These announcements start from the cockpit with a handset or acoustic devices and from the cabin with the cabin-crew station handsets. They are then transmitted to the passengers through the passengers headset (through IFE) and through all cabin loudspeakers. The Prerecorded Announcement and Music (PRAM) function supplies prerecorded voice information and also prerecorded music.
The cabin interphone system lets the crew start calls between all cabin crew stations or between the cockpit and the cabin crew stations. In the cockpit, the crew can use the cockpit handset or the acoustic devices. In the cabin, the crew can use the cabin-crew station handsets.

The service interphone system is available only on the ground. The maintenance personnel speak with the flight/cabin crew through the boomset connected to the interphone jacks.
The CIDS has some control and indicating functions related, for example, to cabin lighting, temperature, potable and waste tank level. The CIDS also lets the passengers control their seat lights or call the cabin crew.

Interface

The CIDS directors have interfaces with:
- The Control and Display System (CDS)
- The CDS through the Onboard Information System (OIS)
- The aircraft systems and cabin support systems
- The aircraft systems and cabin support systems through the OIS
- The cockpit acoustic equipment.
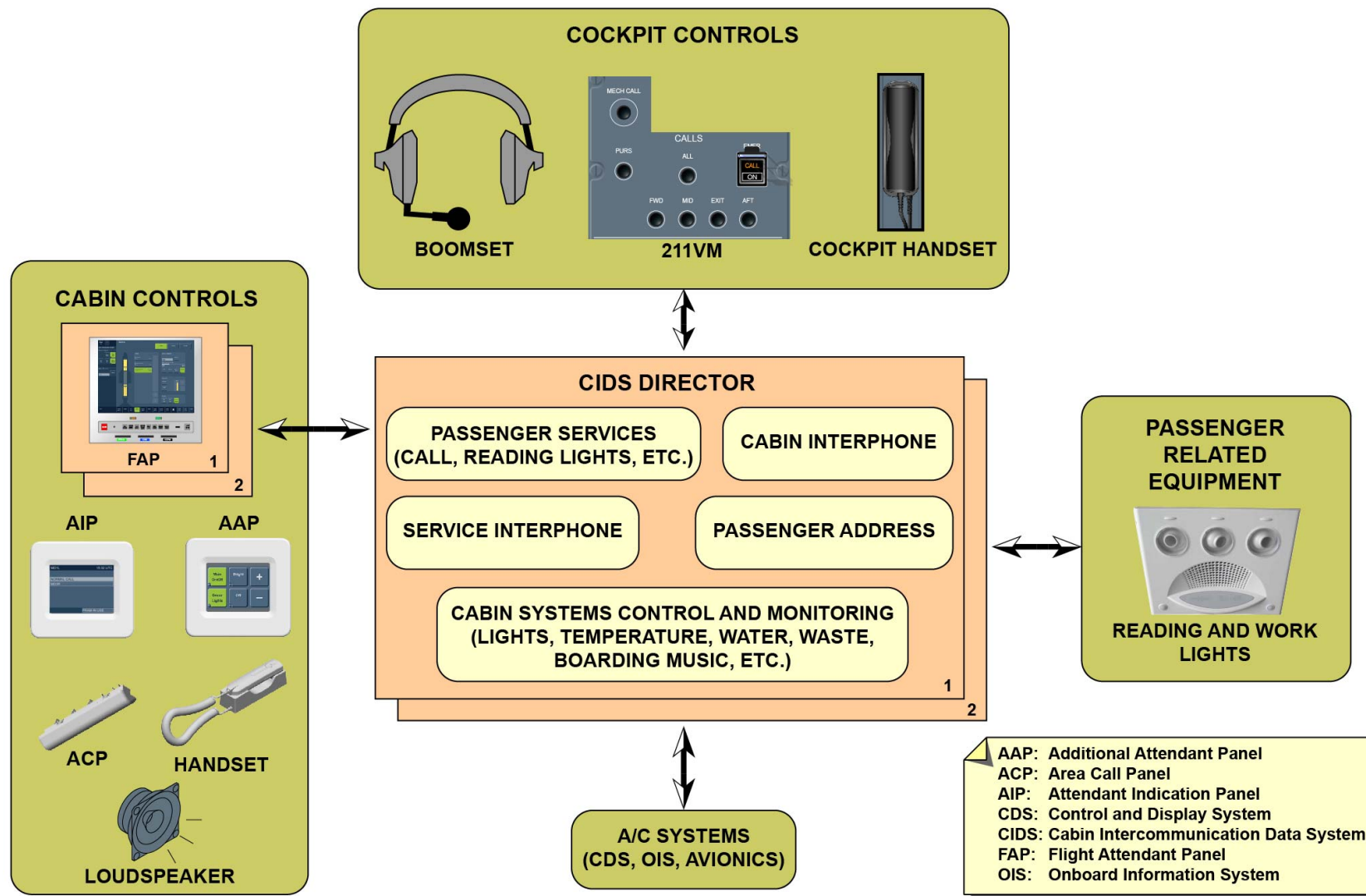
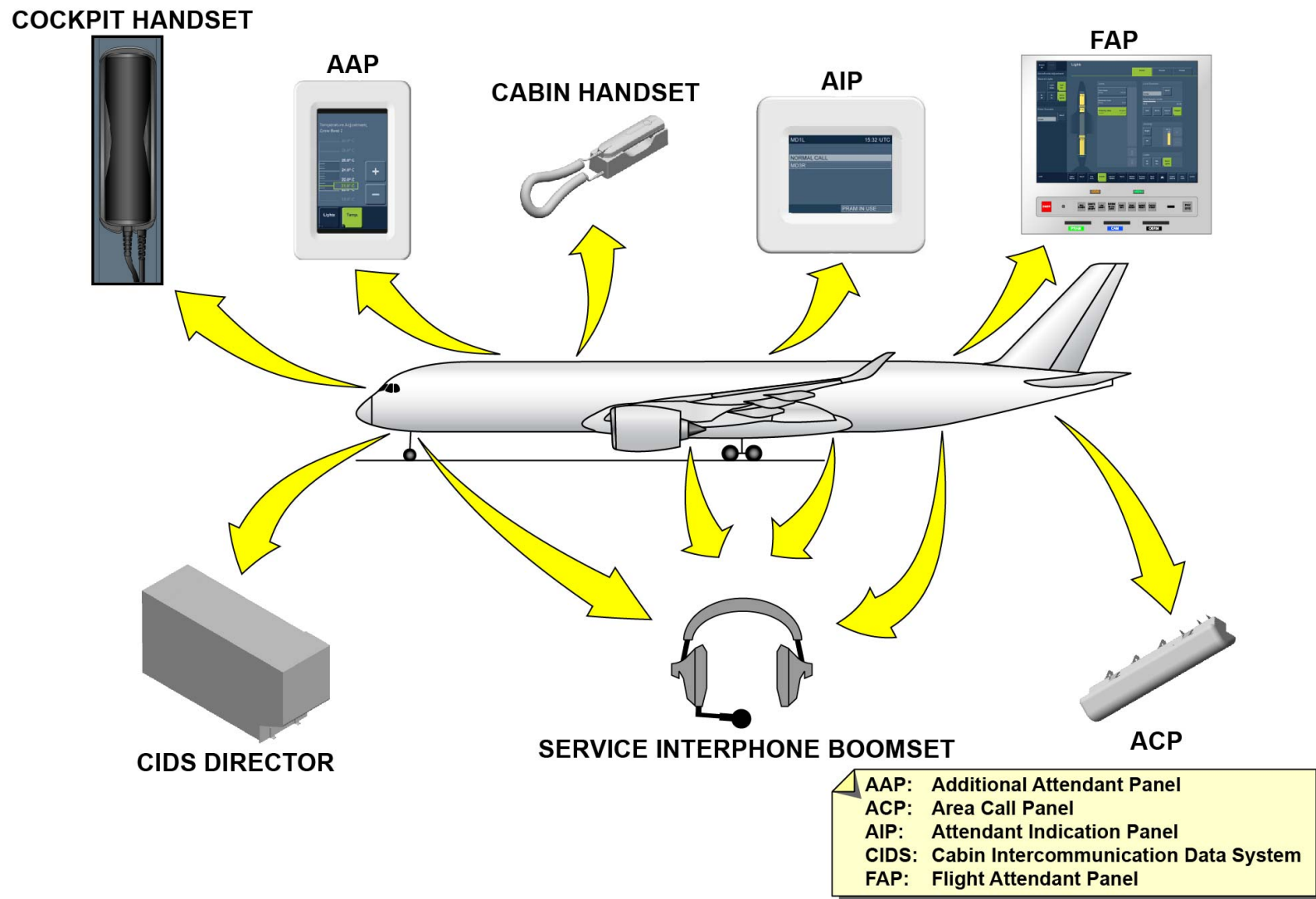CABIN CORE SYSTEM - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

CABIN SYSTEMS PRESENTATION (1)

Cabin Core System - Presentation (continued)

Location

There is one special handset in the cockpit and some handsets in the cabin. The FAPs are in the cabin. The CIDS directors are in the avionics compartment. There are many service interphone connections installed inside and outside the aircraft.
The AIPs, ACPs and AAPs are also in the cabin.

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CABIN SYSTEMS PRESENTATION (1)

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COCKPIT HANDSET

AAP

CABIN HANDSET

AIP

FAP

CIDS DIRECTOR

SERVICE INTERPHONE BOOMSET

ACP

AAP:	**Additional Attendant Panel**
ACP:	**Area Call Panel**
AIP:	**Attendant Indication Panel**
CIDS:	**Cabin Intercommunication Data System**
FAP:	**Flight Attendant Panel**

CABIN CORE SYSTEM - PRESENTATION - LOCATION

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CABIN SYSTEMS PRESENTATION (1)

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CABIN SYSTEMS PRESENTATION (1)

Cabin Core System - Presentation (continued)

Control and Indicating

The controls for the CIDS are:
- In the cockpit, on the overhead panel and on the center pedestal
- In the cabin, on the FAPs, AAP and AIP.
The FAPs are also indicators.
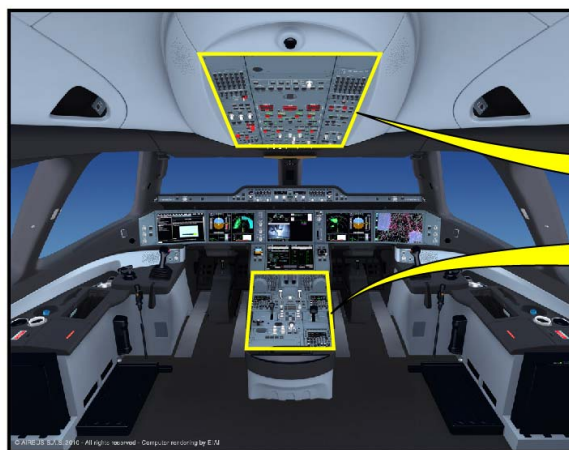
COCKPIT CONTROLS

OVERHEAD PANEL   **CENTER PEDESTAL PANEL**
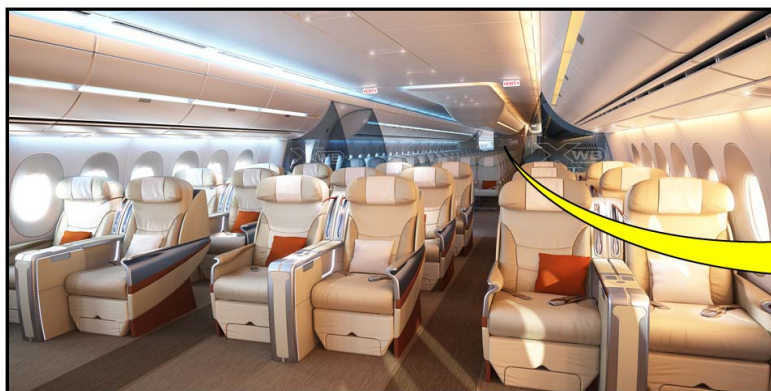
CABIN CONTROLS

FAP   **AAP**   **AIP**

AAP: Additional Attendant Panel
AIP: Attendant Indication Panel
FAP: Flight Attendant Panel

CABIN CORE SYSTEM - PRESENTATION - CONTROL AND INDICATING

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CABIN SYSTEMS PRESENTATION (1)

IFE System - Presentation

Function/Description

The IFE system supplies the passengers with audio, video, data and interactive functions. The interactive functions are games, gambling, on-board shopping and internet services. The IFE system also gives passengers access to the telephone and data networks through an optional satellite communication link.
The IFE system contains the In-Flight Entertainment Center (IFEC), the cabin distribution network and the passenger in-seat equipment.
The IFE control panel is in the Remote Control Center (RCC).
The IFEC has connections with:
- The RCC
- The FAPs
- The cabin distribution network
- The passenger in-seat equipment, the wall-mounted displays and the Wireless Access Points (WAPs) through the cabin distribution network.

Interface

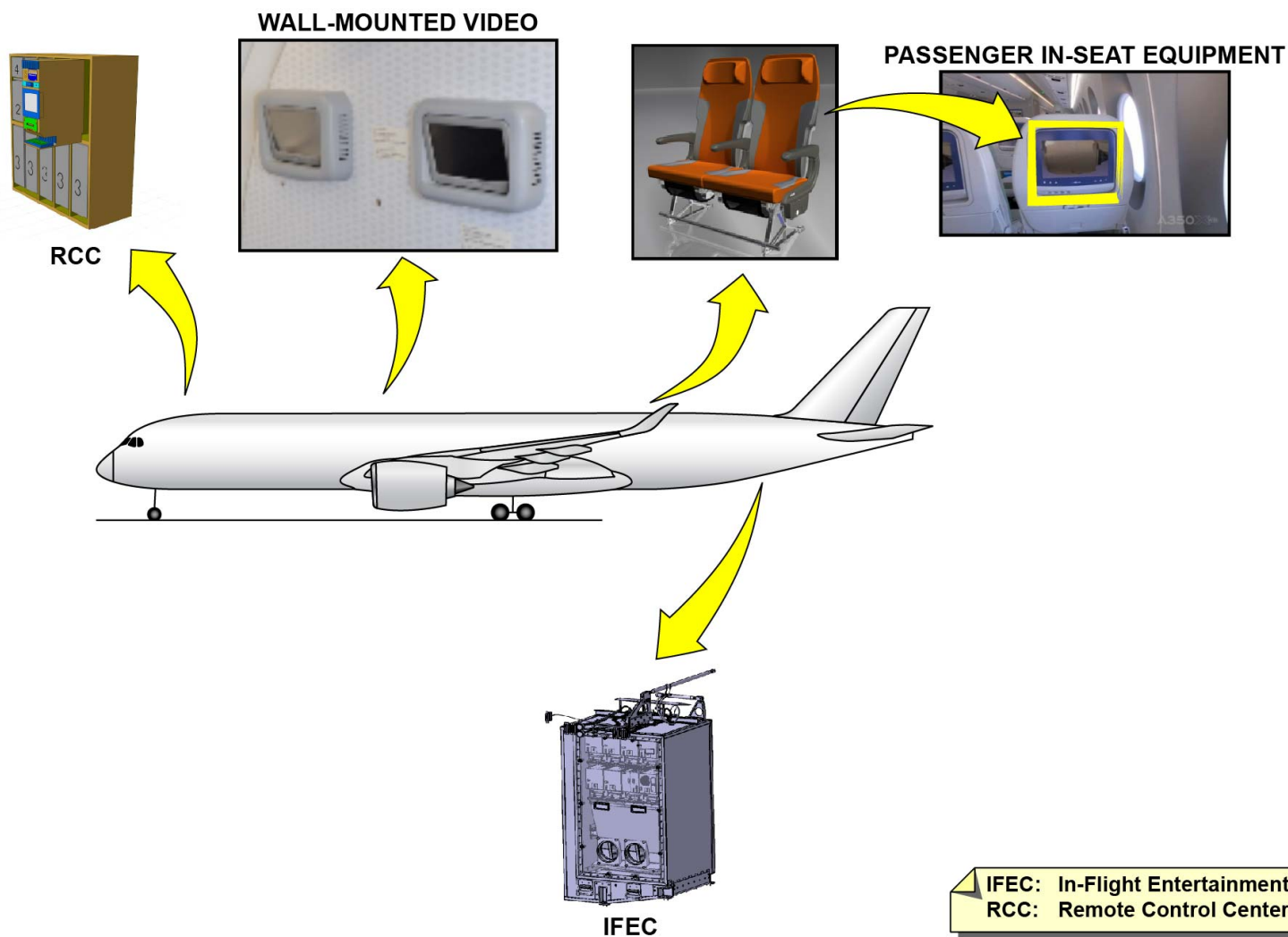The IFE system has interfaces to other aircraft systems through the OIS.

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CABIN SYSTEMS PRESENTATION (1)

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IFE SYSTEM - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

CIDS: Cabin Intercommunication Data System
FAP: Flight Attendant Panel
IFE: In-Flight Entertainment
IFEC: In-Flight Entertainment Center
OIS: Onboard Information System
PCU: Passenger Control Unit
PED: Portable Electronic Device
RCC: Remote Control Center
SATCOM: Satellite Communication
SDU: Seat Display Unit
WAP: Wireless Access Point

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CABIN SYSTEMS PRESENTATION (1)

IFE System - Presentation (continued)

Location

The RCC is installed at the attendant station at door 1 area. The wall-mounted video displays and the passenger in-seat equipment are in the cabin. The IFEC is installed in the aft of the bulk cargo compartment.
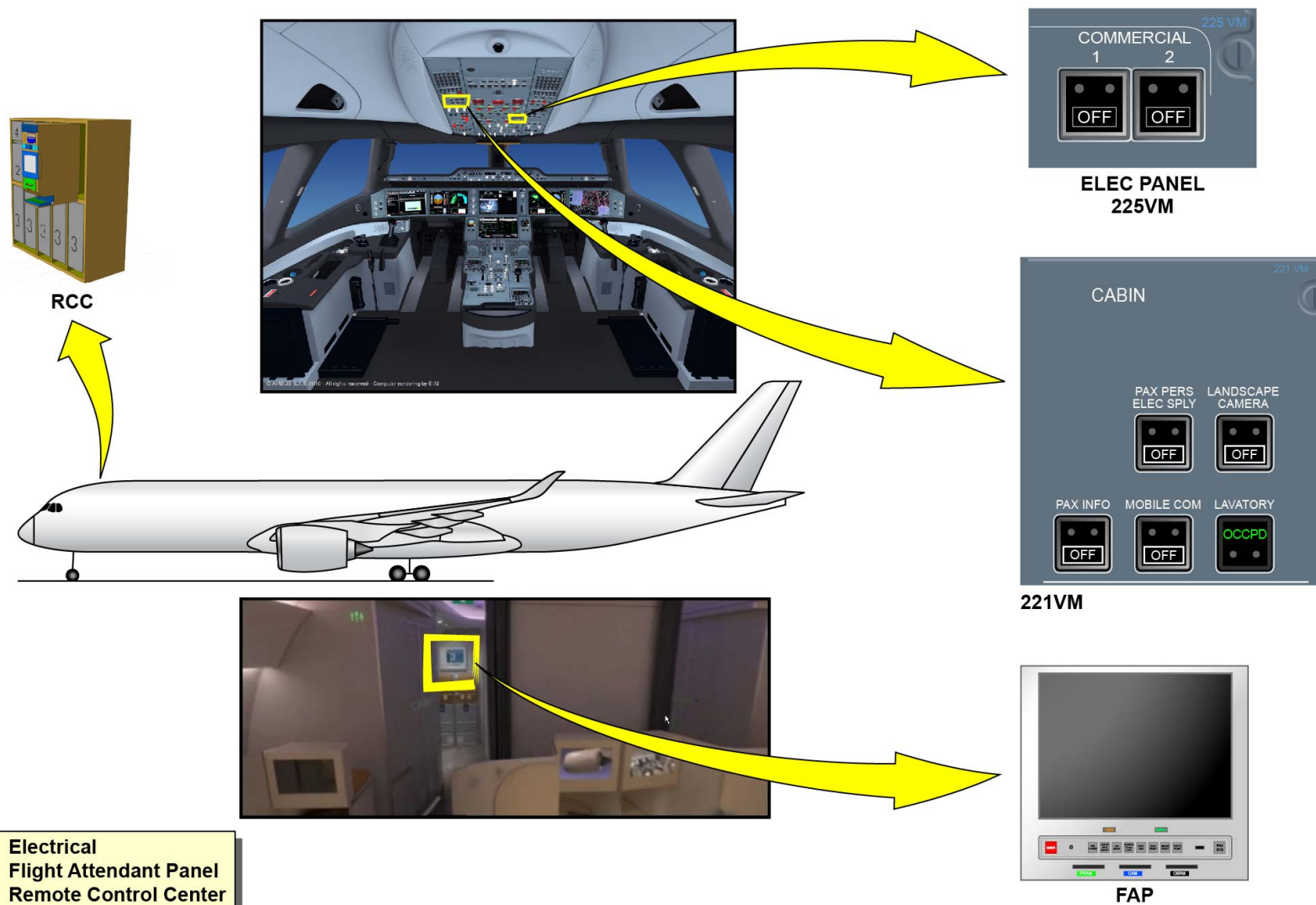
V2414251 - V00T0MM0 - VM44P1LEVEL0101

WALL-MOUNTED VIDEO

PASSENGER IN-SEAT EQUIPMENT

RCC

IFEC

IFEC:	In-Flight Entertainment Center
RCC:	Remote Control Center

IFE SYSTEM - PRESENTATION - LOCATION

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CABIN SYSTEMS PRESENTATION (1)

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CABIN SYSTEMS PRESENTATION (1)

IFE System - Presentation (continued)

Control and Indicating

The flight crew and the cabin crew have access to the controls of the
IFE system in the cockpit, on the FAPs, and through the RCC.

RCC

COMMERCIAL
1 2
OFF OFF

**ELEC PANEL
225VM**

CABIN

PAX PERS
ELEC SPLY LANDSCAPE
CAMERA
OFF OFF

PAX INFO MOBILE COM LAVATORY
OFF OFF OCCPD

221VM

FAP

ELEC: Electrical
FAP: Flight Attendant Panel
RCC: Remote Control Center

IFE SYSTEM - PRESENTATION - CONTROL AND INDICATING

CABIN SYSTEMS PRESENTATION (1)

Cabin Monitoring System - Presentation

Function/Description

The cabin monitoring system has these optional subsystems:
- Cabin Video Monitoring System (CVMS)
- Cockpit Door Surveillance System (CDSS).
CVMS
The CVMS helps the flight and cabin crew monitor some areas of the cabin. The FAP in the cabin and the CDS in the cockpit show the data. There is a connection between each Area Distribution Unit (ADU) and a maximum of 16 camera/microphone assemblies.
CDSS
The CDSS helps the flight crew to identify a person who is in front of the cockpit door. A maximum of four infrared cameras show the passenger door 1 area and the cockpit-door entrance area. The CDS shows the images from the cameras. The infrared cameras are connected to ADU 1.

Interface

CVMS
ADU 1 has an interface to the FAP and, through the Concentrator Multiplexer for Videos (CMVs), to the System Display (SD) of the CDS.
CDSS
ADU 1 has an interface to the CMV. The CMV has an interface to the CDS and to the Cockpit Door Locking System (CDLS) for automatic display activation.
Electronic Centralized Aircraft Monitoring (ECAM) Control Panel (ECP)
The CMVs have also an interface with the ECP for the control of the video and camera selection.

ADU: Area Distribution Unit
CDLS: Cockpit Door Locking System
CDS: Control and Display System
CDSS: Cockpit Door Surveillance System
CIDS: Cabin Intercommunication Data System
CMV: Concentrator and Multiplexer for Video
CVMS: Cabin Video Monitoring System
ECP: ECAM Control Panel
FAP: Flight Attendant Panel
MIC: Microphone
SD: System Display

CABIN MONITORING SYSTEM - PRESENTATION - FUNCTION/DESCRIPTION & INTERFACE

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CABIN SYSTEMS PRESENTATION (1)

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CABIN SYSTEMS PRESENTATION (1)

Cabin Monitoring System - Presentation (continued)

Location

CVMS
The CVMS cameras are installed in the cabin.
CDSS
The infrared CDSS cameras are installed in the cockpit entrance area.

COCKPIT DOOR SURVEILLANCE
SYSTEM CAMERA
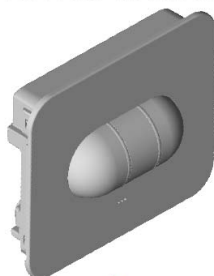
CABIN VIDEO MONITORING
SYSTEM CAMERA
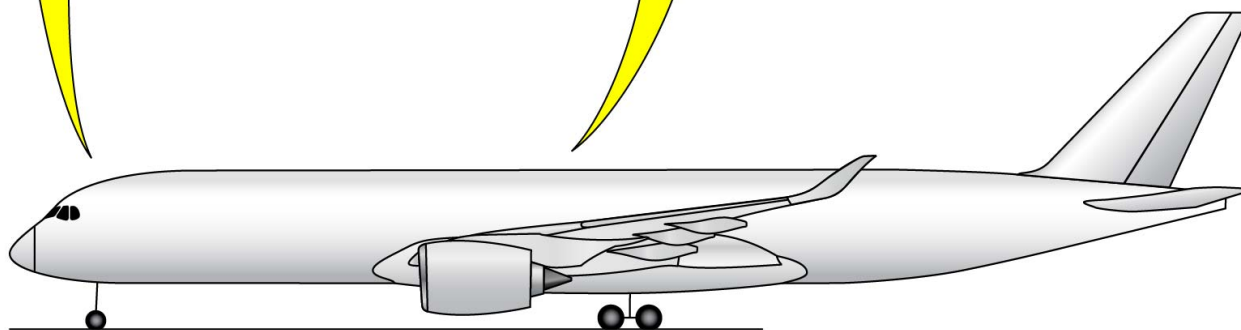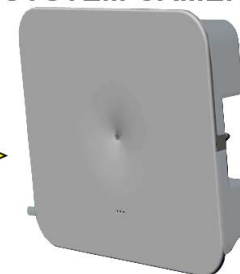
CABIN MONITORING SYSTEM - PRESENTATION - LOCATION

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CABIN SYSTEMS PRESENTATION (1)
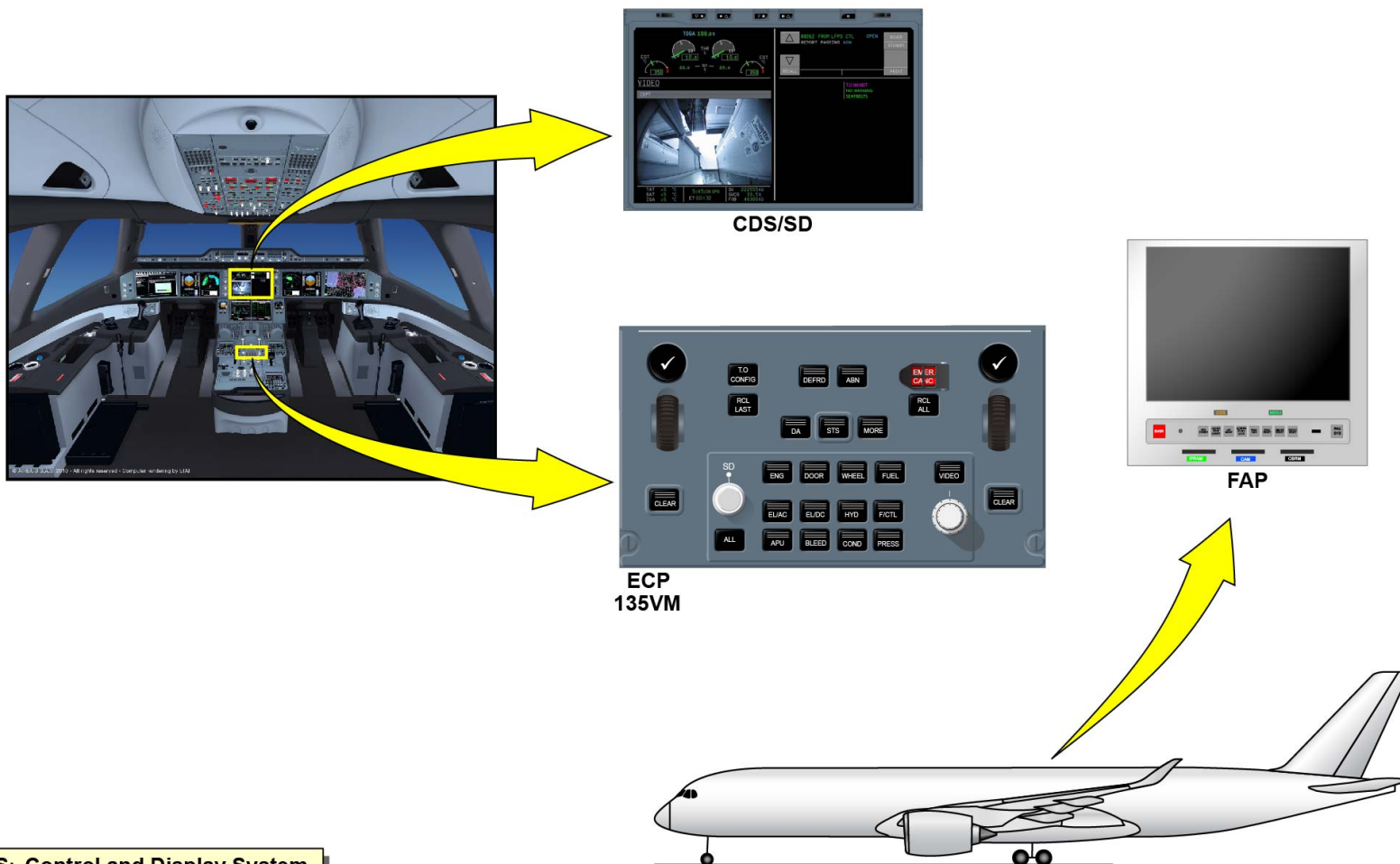
Cabin Monitoring System - Presentation (continued)

Control and Indicating

CVMS
The CVMS controls are the FAP and the ECP. The FAP in the cabin
and the SD of the CDS in the cockpit show the images.
CDSS
The ECP controls the CDSS. The CDS/SD page shows the image.

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CABIN SYSTEMS PRESENTATION (1)

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CDS/SD

**ECP
135VM**

FAP

> **CDS**: Control and Display System
> **ECP**: ECAM Control Panel
> **FAP**: Flight Attendant Panel
> **SD**: System Display

CABIN MONITORING SYSTEM - PRESENTATION - CONTROL AND INDICATING

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MAINTENANCE COURSE - T1+T2 - RR Trent XWB   CABIN SYSTEMS PRESENTATION (1)   Jul 10, 2014
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LIGHTS SYSTEM PRESENTATION (1)

Overview

The lighting system gives internal and external illumination to the aircraft.

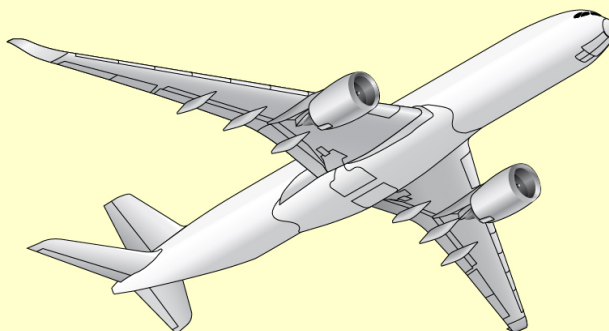General familiarization training for this system focuses on:

- Cockpit lighting
- Cabin lighting
- Cargo and service compartment lighting
- Exterior lighting
- Emergency lighting.

LIGHTS

COCKPIT LIGHTING

CABIN LIGHTING

EMERGENCY LIGHTING

EXTERIOR LIGHTING

CARGO & SERVICE COMPARTMENT LIGHTING

OVERVIEW

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LIGHTS SYSTEM PRESENTATION (1)

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LIGHTS SYSTEM PRESENTATION (1)

Cockpit Lighting - Presentation

Function/Description

The cockpit lighting includes:
- General illumination
- Annunciator light test and dimming control
- Instrument and panel integral lighting.
The general illumination system supplies sufficient light in the cockpit to let the flight crew see all panels and equipment clearly.
With the annunciator light test and dimming control it is possible to:
- Control the light intensity
- Do the test of all the annunciator lights installed in the cockpit.
The instrument and panel integral lighting controls the light intensity of the control panels.
The rotary knobs for the instrument and panel integral lighting control the light intensity of the VU panels and the Integrated Control Panels (ICPs) through the dimming control unit.

Control and Indicating

The annunciator light test and dimming control has:
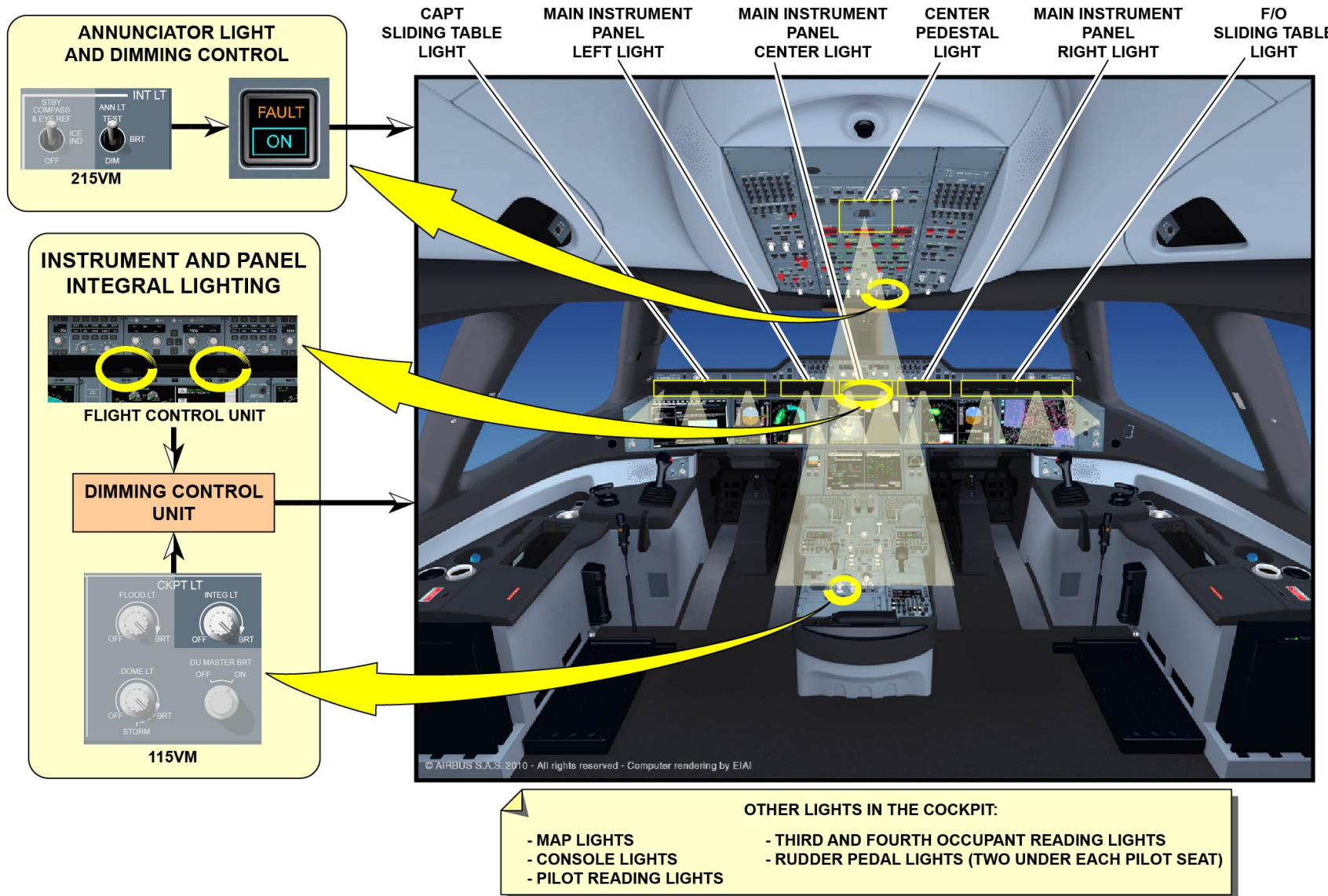- An annunciator DIM/BRT/TEST switch that is on the overhead panel.
The instrument and panel integral lighting has:
- An integral lighting knob that is on the center pedestal.
- Two glareshield rotary knobs that are on the lower part of the Flight Control Unit (FCU). One knob is for the glareshield integrated lighting and one knob is for the lighting from the rear of the FCU displays.
There are some controls in the cockpit to control these lights:
- CAPT and F/O sliding table lights
- Main instrument panel left, right and center lights
- Map lights
- Dome lights
- Pilot reading lights

- Console lights
- Third and fourth occupant lights
- Rudder pedal lights.

ANNUNCIATOR LIGHT AND DIMMING CONTROL

INT LT

STBY COMPASS & EYE REF
ICE IND
OFF

ANN LT
TEST
BRT
DIM

215VM

FAULT
ON

INSTRUMENT AND PANEL INTEGRAL LIGHTING

FLIGHT CONTROL UNIT

DIMMING CONTROL UNIT

CKPT LT

FLOOD LT
OFF — BRT

INTEG LT
OFF — BRT

DOME LT
OFF — BRT
STORM

DU MASTER BRT
OFF — ON

115VM

CAPT
SLIDING TABLE
LIGHT

MAIN INSTRUMENT
PANEL
LEFT LIGHT

MAIN INSTRUMENT
PANEL
CENTER LIGHT

CENTER
PEDESTAL
LIGHT

MAIN INSTRUMENT
PANEL
RIGHT LIGHT

F/O
SLIDING TABLE
LIGHT

OTHER LIGHTS IN THE COCKPIT:

- MAP LIGHTS
- CONSOLE LIGHTS
- PILOT READING LIGHTS
- THIRD AND FOURTH OCCUPANT READING LIGHTS
- RUDDER PEDAL LIGHTS (TWO UNDER EACH PILOT SEAT)

COCKPIT LIGHTING - PRESENTATION - FUNCTION/DESCRIPTION & CONTROL AND INDICATING

LIGHTS SYSTEM PRESENTATION (1)

Cabin Lighting - Presentation

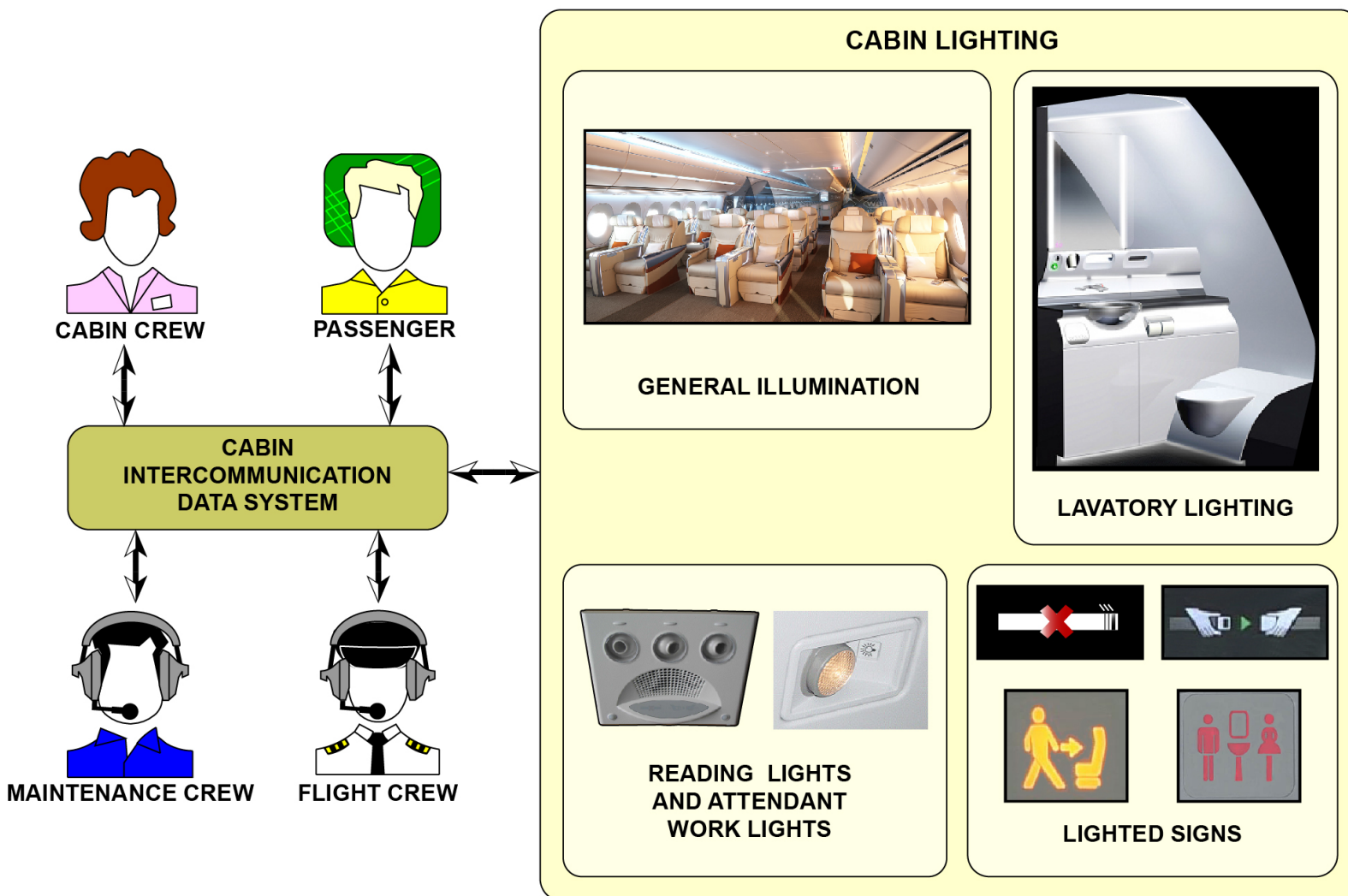### Function/Description

The cabin lighting includes:
- General illumination
- Lavatory lighting
- Lighted signs
- Reading lights and attendant work lights.
The cabin lighting system illuminates all areas of the cabin.
The cabin lighting system uses the LED technology.
The Cabin Intercommunication Data System (CIDS) controls and monitors the cabin lighting system.
There are some lights which are not controlled by the CIDS (for example galley worktop lights, stowage lights and in-seat reading lights).

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CABIN LIGHTING

GENERAL ILLUMINATION

LAVATORY LIGHTING

READING LIGHTS AND ATTENDANT WORK LIGHTS

LIGHTED SIGNS

CABIN CREW

PASSENGER

CABIN INTERCOMMUNICATION DATA SYSTEM

MAINTENANCE CREW

FLIGHT CREW

CABIN LIGHTING - PRESENTATION - FUNCTION/DESCRIPTION
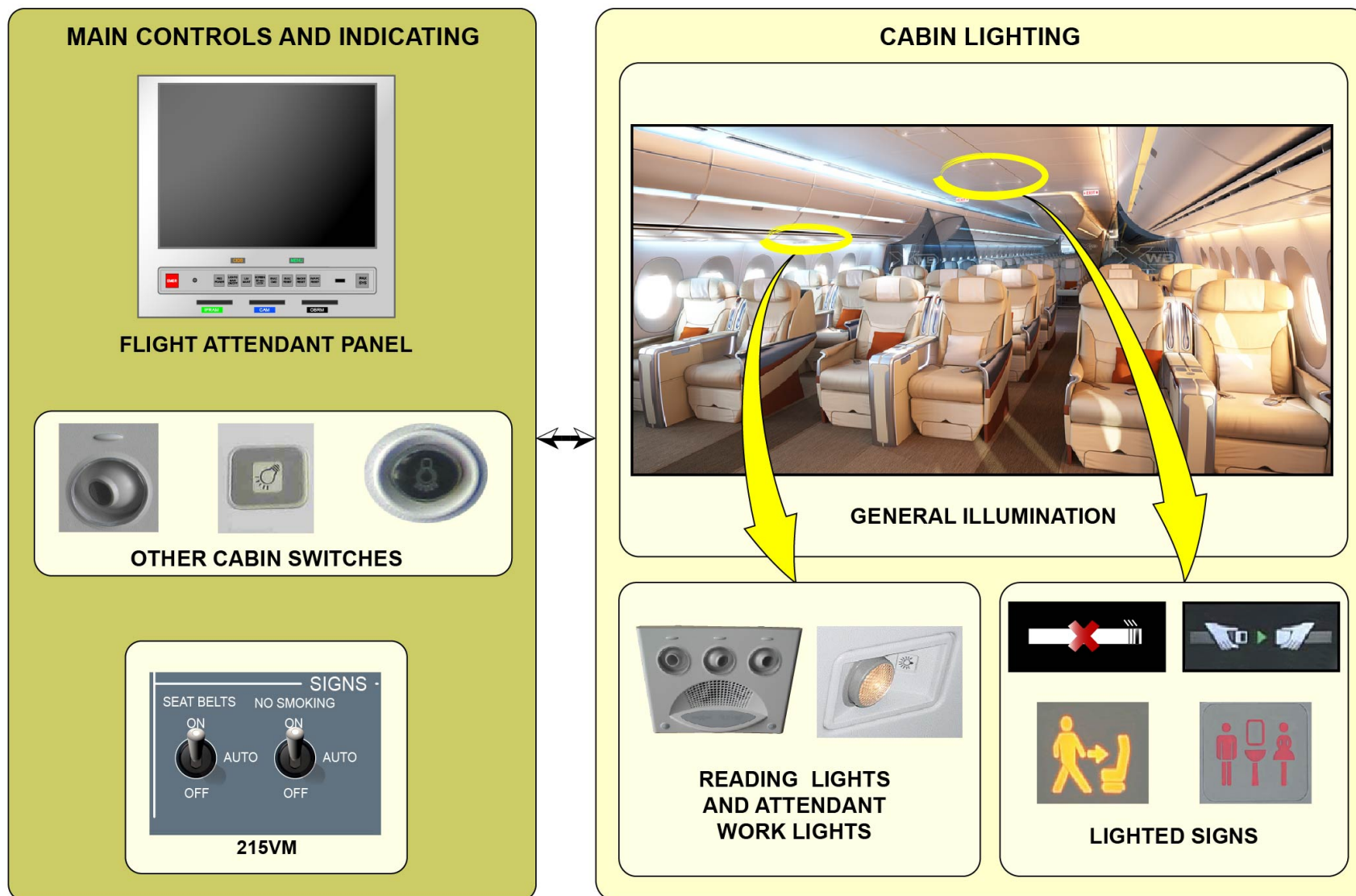
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LIGHTS SYSTEM PRESENTATION (1)

Cabin Lighting - Presentation (continued)

Control and Indicating

The Flight Attendant Panel (FAP) is the Human-Machine Interface (HMI) to control the cabin general lighting.
The pushbuttons for the passenger reading lights are above each passenger seat. The pushbuttons for the attendant work lights are in the back of the single cabin attendant seat.
The flight crew can control the No Smoking (NS) / Fasten Seat Belt (FSB) and Return To Seat (RTS) signs from the overhead panel with the SEAT BELTS or NO SMOKING control switch.

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MAIN CONTROLS AND INDICATING

FLIGHT ATTENDANT PANEL

OTHER CABIN SWITCHES

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CABIN LIGHTING

GENERAL ILLUMINATION

READING LIGHTS AND ATTENDANT WORK LIGHTS

LIGHTED SIGNS

CABIN LIGHTING - PRESENTATION - CONTROL AND INDICATING

LIGHTS SYSTEM PRESENTATION (1)

Cargo and Service Compartment Lighting - Presentation
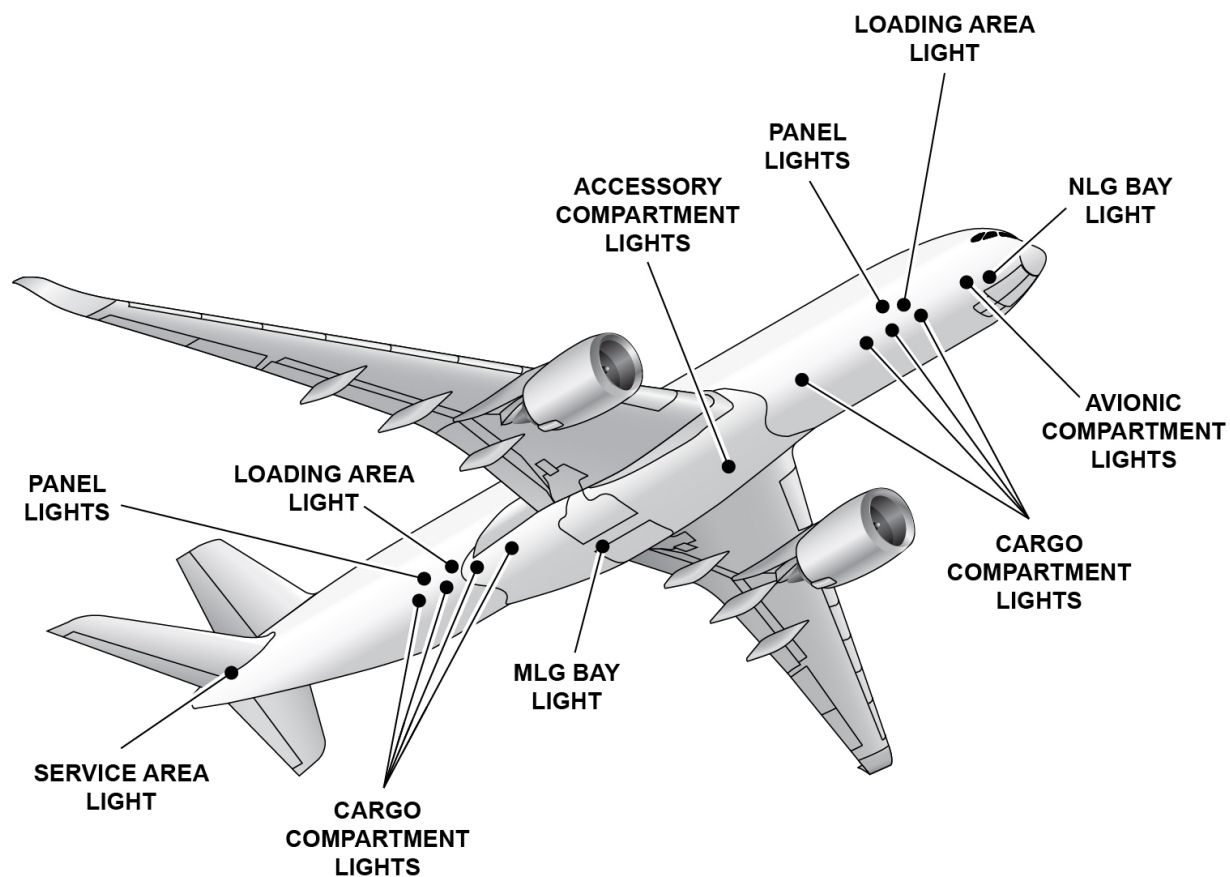
Function/Description

The cargo and service compartment lights include:
- Service area lighting
- Air conditioning duct and accessory compartment lighting
- Lower-deck cargo-compartment lighting (forward, aft and bulk cargo compartments)
- Wheel well lighting
- Maintenance area lighting
- Avionics compartment lighting.
The cargo and service compartment lights illuminate the cargo compartments, the avionics compartment, the service compartments and the maintenance areas.

Control and Indicating

Switches in different areas of the aircraft control independently the lighting for the cargo and service compartment areas.

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LOADING AREA LIGHT

PANEL LIGHTS

ACCESSORY COMPARTMENT LIGHTS

NLG BAY LIGHT

AVIONIC COMPARTMENT LIGHTS

CARGO COMPARTMENT LIGHTS

PANEL LIGHTS

LOADING AREA LIGHT

SERVICE AREA LIGHT

MLG BAY LIGHT

CARGO COMPARTMENT LIGHTS

MLG: Main Landing Gear
NLG: Nose Landing Gear

CARGO AND SERVICE COMPARTMENT LIGHTING - PRESENTATION - FUNCTION/DESCRIPTION & CONTROL AND INDICATING

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LIGHTS SYSTEM PRESENTATION (1)

Exterior Lighting - Presentation
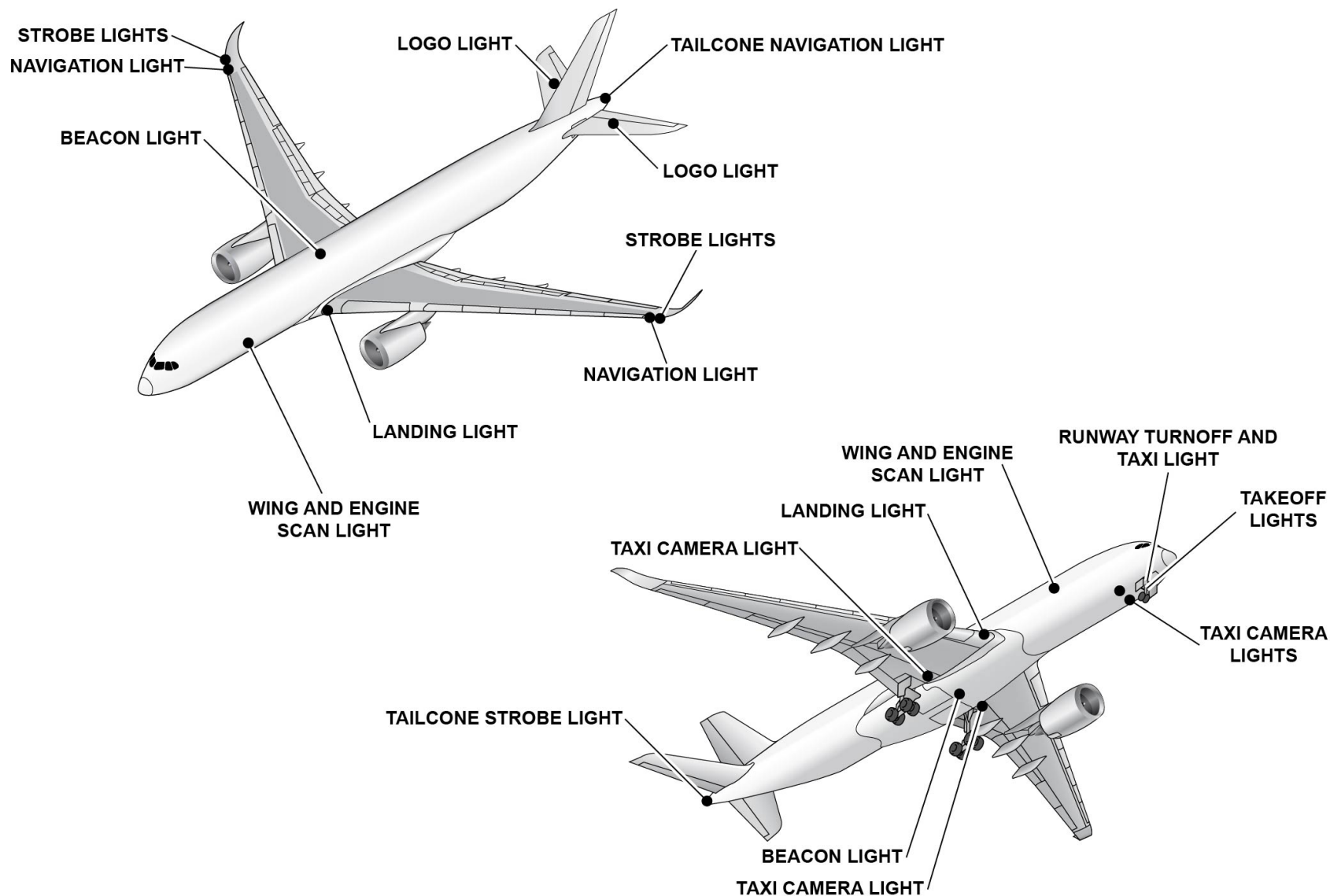
Function/Description

The exterior lighting system includes:
- Navigation lights
- Landing lights
- Taxiing and runway turnoff lights
- Taxi camera lights
- Exterior Lights Controller (ELCO)
- Takeoff lights
- Logo lights
- Anti-collision lights (beacon and strobe lights)
- Wing and engine scan lights.

The exterior lighting system illuminates the external surfaces of the aircraft and some areas of the taxiway and the runway below and in front of the aircraft.

Location

The exterior lights are along the external surfaces of the aircraft (fuselage, wings and horizontal stabilizer) to illuminate the area adjacent to the aircraft.

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STROBE LIGHTS
NAVIGATION LIGHT
BEACON LIGHT
LOGO LIGHT
TAILCONE NAVIGATION LIGHT
LOGO LIGHT
STROBE LIGHTS
NAVIGATION LIGHT
LANDING LIGHT
WING AND ENGINE SCAN LIGHT

WING AND ENGINE SCAN LIGHT
RUNWAY TURNOFF AND TAXI LIGHT
LANDING LIGHT
TAKEOFF LIGHTS
TAXI CAMERA LIGHT
TAXI CAMERA LIGHTS
TAILCONE STROBE LIGHT
BEACON LIGHT
TAXI CAMERA LIGHT

EXTERIOR LIGHTING - PRESENTATION - FUNCTION/DESCRIPTION & LOCATION

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LIGHTS SYSTEM PRESENTATION (1)

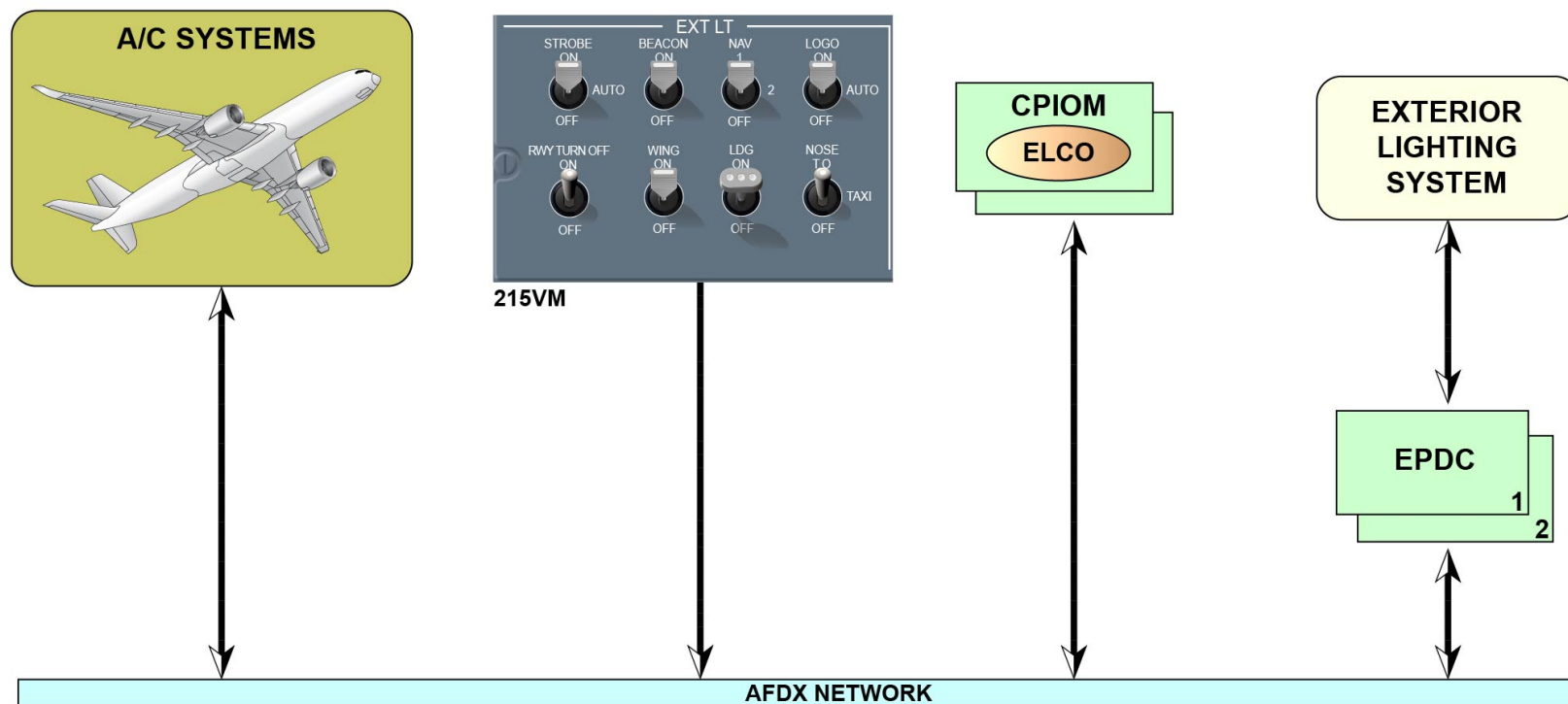**Exterior Lighting - Presentation (continued)**

Interface

The exterior lighting system has interfaces through the Avionics Full
Duplex Switched Ethernet (AFDX) network with:
- The external light panel from the cockpit
- The Electrical Power Distribution Centers (EPDCs)
- The ELCO software hosted in two Core Processing Input/Output
Modules (CPIOMs), which controls and monitors the exterior lighting
system
- The aircraft systems.

Control and Indicating

The exterior lighting system is controlled from the EXT LT section
on overhead panel.

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LIGHTS SYSTEM PRESENTATION (1)

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EXT LT

STROBE ON / AUTO / OFF
BEACON ON / OFF
NAV 1 / 2 / OFF
LOGO ON / AUTO / OFF
RWY TURN OFF ON / OFF
WING ON / OFF
LDG ON / OFF
NOSE T.O / TAXI / OFF

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A/C SYSTEMS

CPIOM
ELCO

EXTERIOR LIGHTING SYSTEM

EPDC
1
2

AFDX NETWORK

AFDX: Avionics Full Duplex Switched Ethernet
CPIOM: Core Processing Input/Output Module
ELCO: Exterior Lights Controller
EPDC: Electrical Power Distribution Center

EXTERIOR LIGHTING - PRESENTATION - INTERFACE & CONTROL AND INDICATING

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LIGHTS SYSTEM PRESENTATION (1)

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LIGHTS SYSTEM PRESENTATION (1)

Emergency Lighting - Presentation

Function/Description

If there is an emergency, the emergency lighting system illuminates the cabin and the cockpit sufficiently. It also helps to identify the emergency exit areas (doors and slides).
The integrated battery of the Emergency Power Supply Units (EPSUs) supplies electrical power to the emergency lighting units when no other electrical source is available.
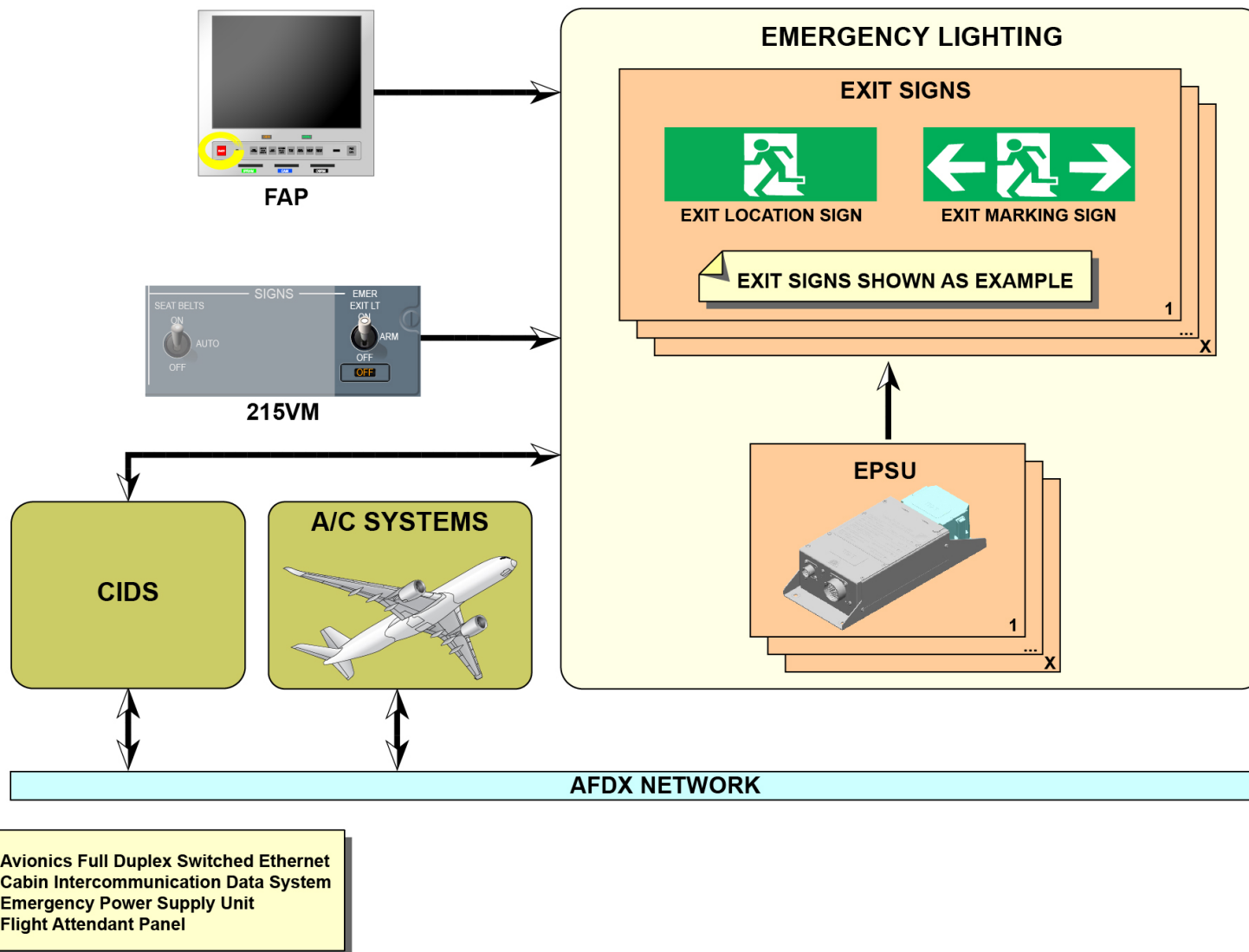
Interface

The emergency lighting system has interface with the CIDS, which receives A/C systems information through AFDX.

Control and Indicating

The flight crew can control the emergency lighting system from the emergency light panel on the overhead panel.
The cabin crew can control the emergency lighting system on the FAP, with the EMER pushbutton.

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EMERGENCY LIGHTING - PRESENTATION - FUNCTION/DESCRIPTION ... CONTROL AND INDICATING