A350
TECHNICAL TRAINING MANUAL
MAINTENANCE COURSE - T1+T2 - RR Trent XWB
Information Systems

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INFORMATION SYSTEMS

V1813401 - V01T0M0

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

Onboard Information System Philosophy

The function of the Onboard Information System (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).

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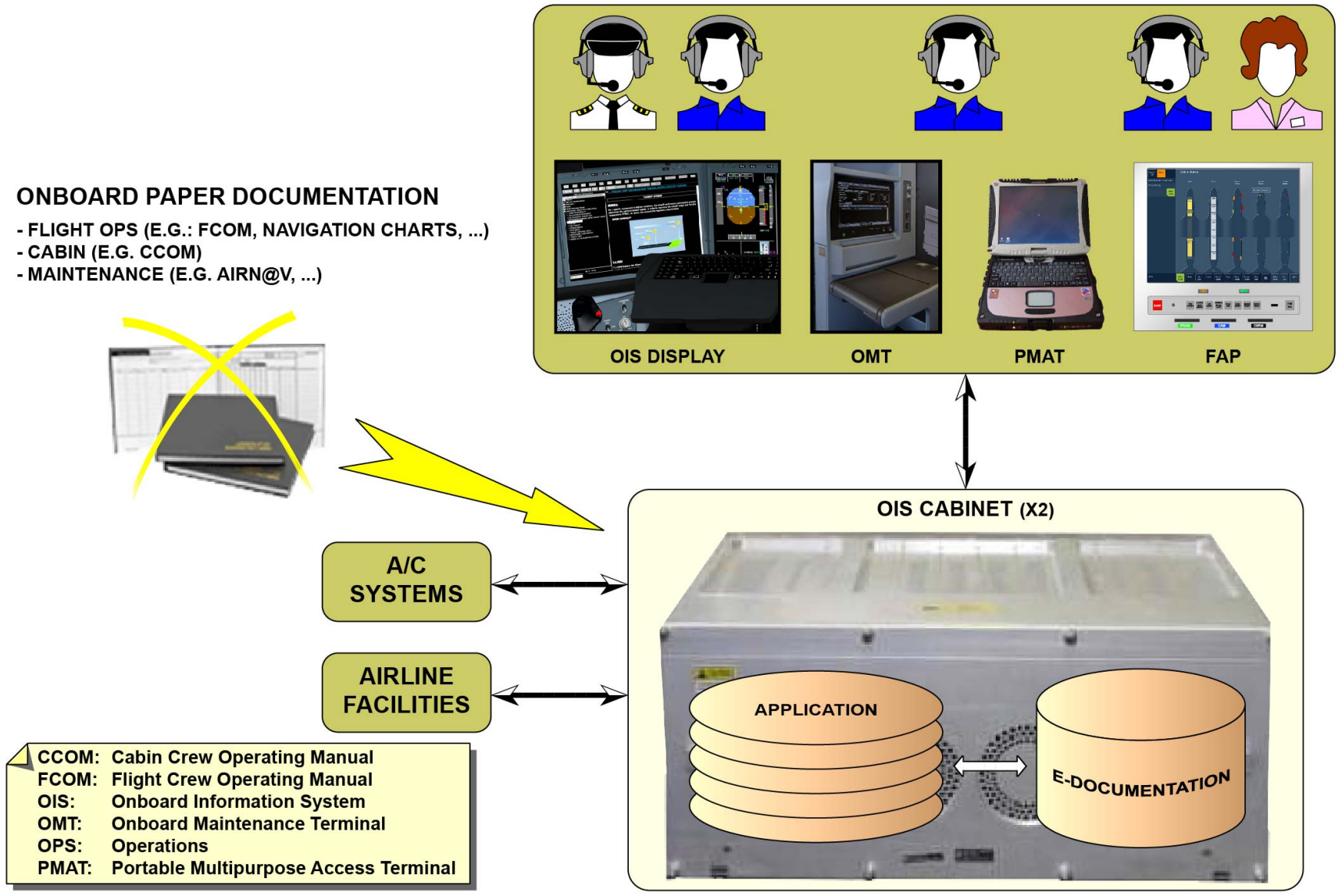

ONBOARD INFORMATION SYSTEM PHILOSOPHY

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Resources

The OIS applications and related database (electronic documentation) are hosted in the 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 A/C systems through two dedicated firewalls, the Secure Communication Interfaces (SCIs), which give protection to the A/C systems from non-secure data (virus, ...).
- The OSFC and ASFC through a dedicated firewall, the Smart Diode Module (SDM), which gives protection to the ASFC integrity.
- The EFB laptops and OSFC.

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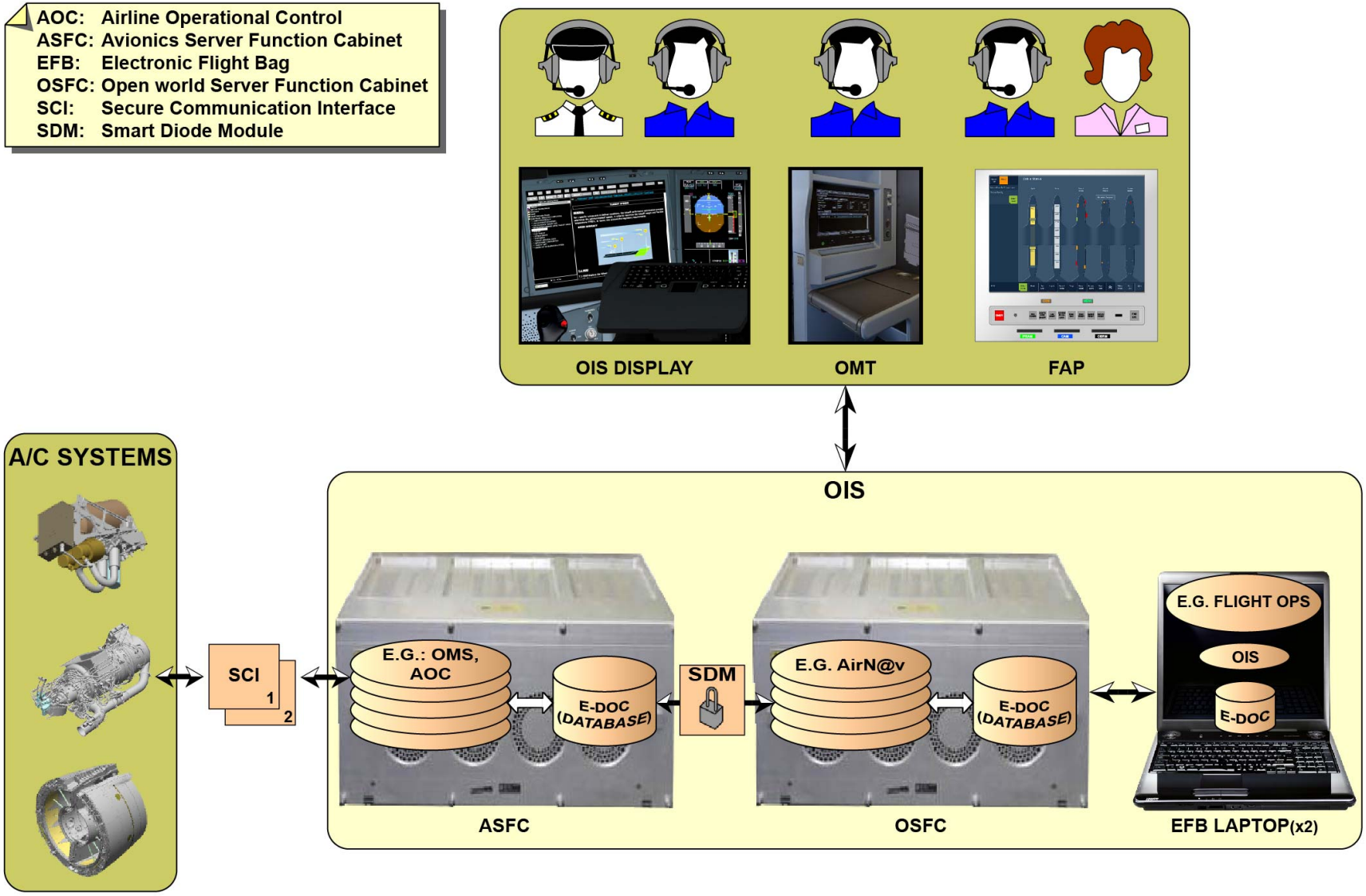

OIS RESOURCES

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Human-Machine Interfaces

The equipment given below makes the interface with the OIS in the cockpit:
- Two outer OIS Display Units (DU) on the main instrument panel: They are used by the flight and maintenance crew to get respectively access to the flight operations and maintenance applications or documentation.
- The CAPT and F/O keyboards on the sliding table and the KCCUs. They are used by the flight crew to navigate or make modifications on the OIS applications.
- The Onboard Maintenance Terminal (OMT), installed near the 3rd Occupant seat. It lets the maintenance crew interact with the maintenance applications or documentation.
- The FAPs installed in the cabin. They are used by the cabin crew to consult the cabin crew applications or documentation. The mechanics can also consult the FAPs as access to monitor the data related to some cabin systems.

Note that the EFB laptops are used by the flight crew to get access to the flight crew related functions. They are stowed in docking stations in the cockpit, behind each flight crew.

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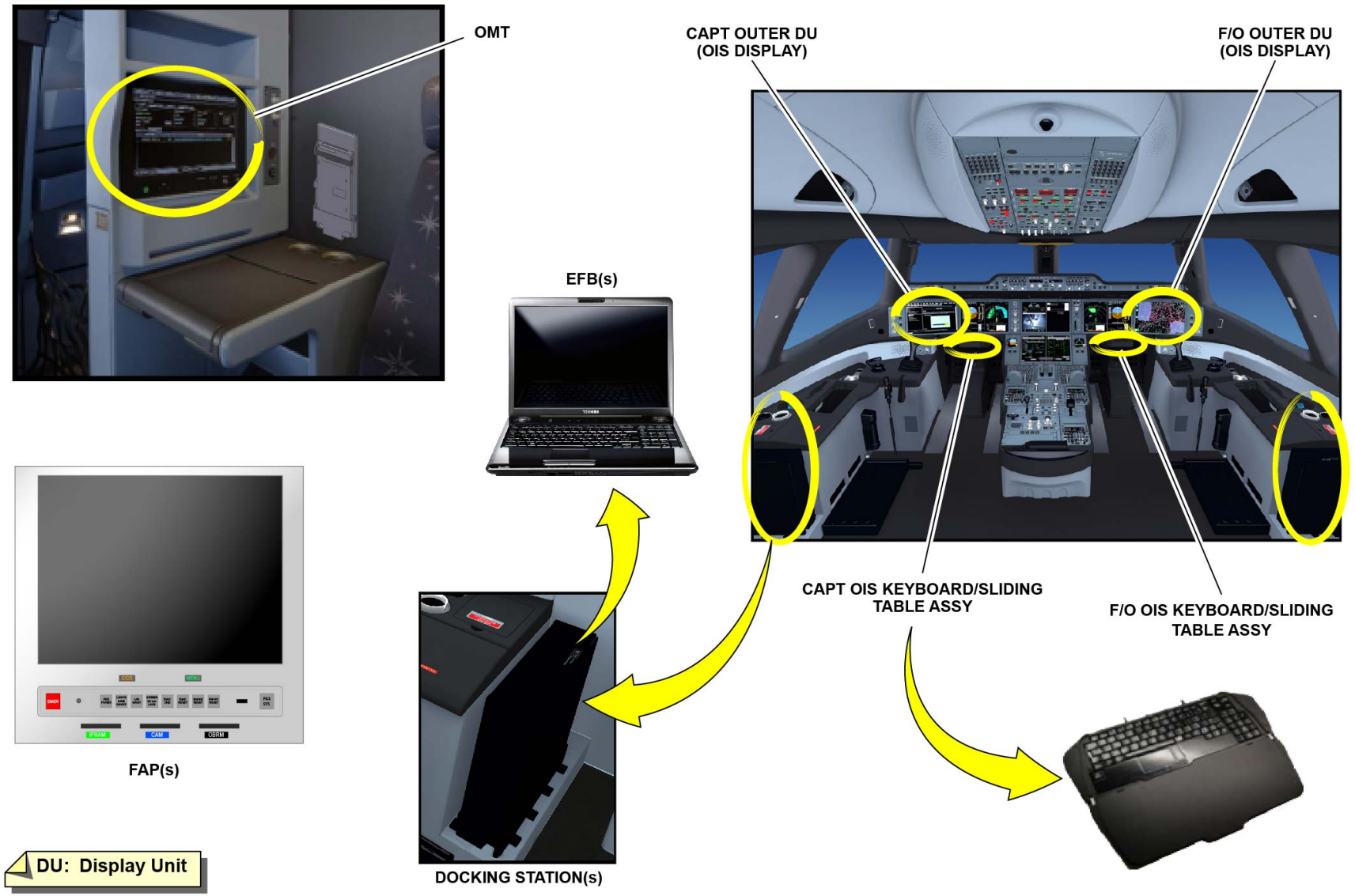


OIS HUMAN-MACHINE INTERFACES

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Architecture

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, related to the A/C systems (e.g.: fuel, L/G, ...)
- The ASFC, whose function is to host the applications that follow:
- Airline Operational Control (AOC) (e.g. communication with maintenance control center)
- ACD maintenance
- ACD communication (e.g. transmission of maintenance data to the maintenance control center).

The two ACD parts are connected to each other through two SCIs to prevent A/C systems from unauthorized access and data entry.
The AISD parts are:
- The OSFC, whose function is to host:
- The flight Operations (OPS) (e.g. electronic logbook)
- The cabin (e.g. cabin logbook)
- The maintenance and communication applications (high-speed data exchange with the ground).
- The data between the ASFC and the OSFC, which are transmitted through a firewall.
- Two hardwired docking stations where the flight crew can connect their EFB laptops. They are installed in the cockpit.

When they are connected, the EFB laptops let the flight crew get access through the OIS displays to:
- The flight OPS (Electronic Flight Folder (EFF), Flight Crew Operating Manual (FCOM), ...)
- The EFB maintenance or administration data.

Some HMIs are used by the flight crew, the maintenance personnel and the cabin crew:
- Flight crew HMIs

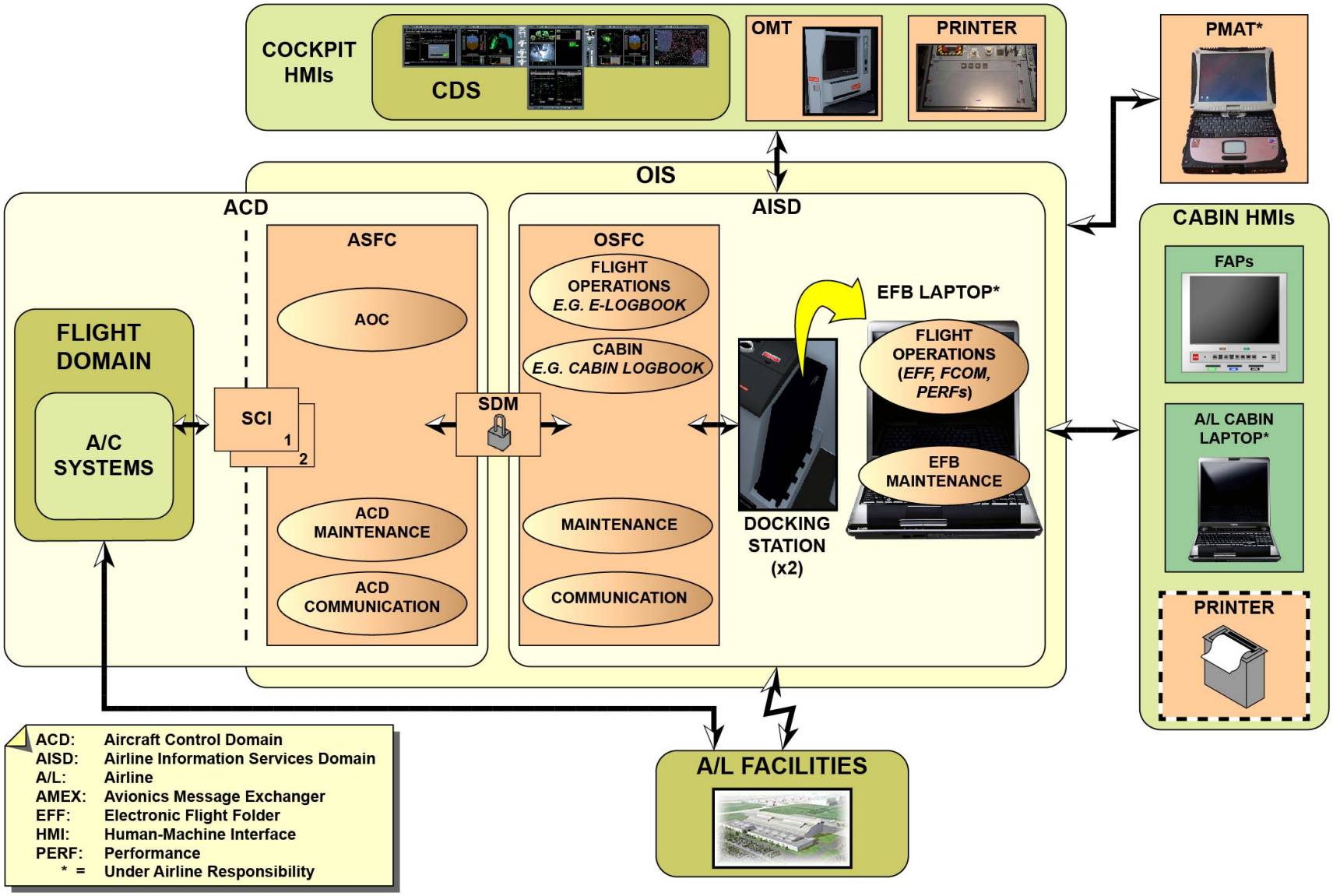
The flight crew can get access to the flight operation applications through:
- The OIS displays
- The EFB laptops.
- Maintenance personnel HMIs

The maintenance personnel can get access to the maintenance applications in the cockpit:
- On the OMT, as a primary HMI
- Through the OIS display.

They can also use the cockpit printer to print technical documents.
In the cabin, the maintenance personnel can get access to the cabin specific maintenance-applications on the FAPs.
The maintenance personnel can also get access to the OIS through an optional Portable Multipurpose Access Terminal (PMAT). The PMAT can be connected to the OIS from the cockpit or through some access points.
- Cabin crew HMIs

The cabin crew can get access to the cabin applications:
- On the FAPs
- Through the optional airline-cabin laptop.

The IFE printer installed in the cabin is used to print cabin and maintenance data (optional).



OIS ARCHITECTURE

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ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Applications

ASFC applications

The ASFC is used as a server. It can compute, host applications and do the network communications.
The ASFC hosts four types of applications:
- Flight operation application: AOC application
The primary function of the AOC application is to give data link services to the flight crew.
- Communication application: ACD application
The ACD communication manager has air-ground routing functions for AOC messages and ACD maintenance data.
- Basic services applications (printing, data import, data/files export, ...)
- ACD maintenance applications.
The maintenance applications are:
- The Power Distribution Monitoring and Maintenance Function (PDMMF), which gives contactors and C/B devices, remote control and status monitoring on the CDS (C/B page) or on the OMT/OIS displays.
- The CMS-ACD, which has the ACD maintenance functions (fault messages or warning reports, tests, ...).
- The DLCS-ACD, which uploads the software and do the configuration report.
- The ACMS, which monitors and records the in depth A/C parameters.
- The Software Pin Programming (SPP), which shows the A/C system configurations (option activated, ...).

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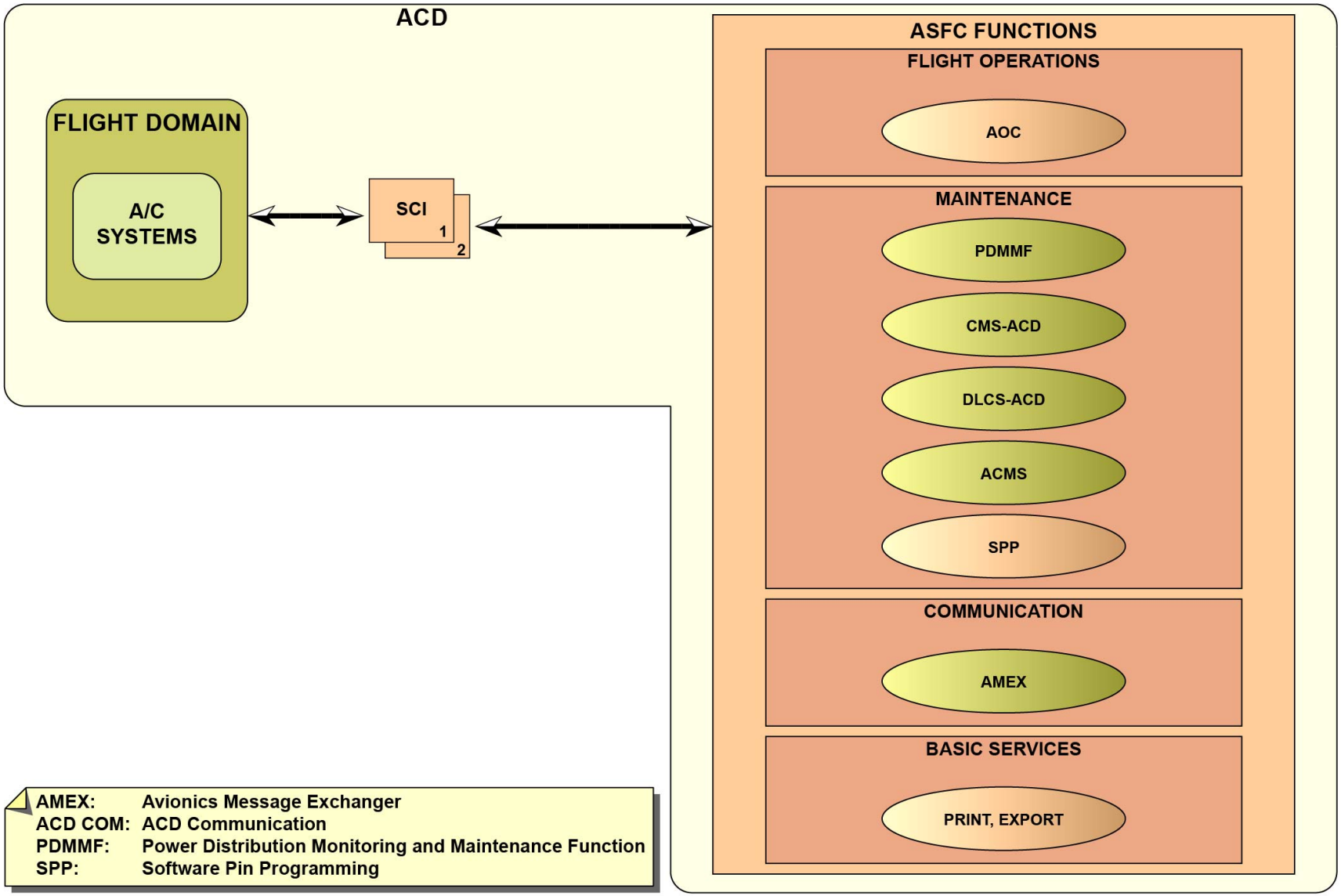

OIS APPLICATIONS - ASFC APPLICATIONS

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ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Applications (continued)

OSFC applications

The OSFC is also used as a server, like the ASFC.
The OSFC hosts four types of applications:
- Flight operation applications
- Cabin applications
- Basic function applications
- Maintenance applications.

The flight operation applications are:
- Flight-operation HMI manager

The flight-operation HMI manager shows the pilot session on the A350 A/C. It is a HMI menu which gives an overview of all the available flight-operation functions (these functions include applications hosted on the EFB if given by the EFB).
- Technical logbook (Optional).

The technical logbook is used during all the A/C life to record all the information and actions related to each flight, with the same current process used by the airlines with the paper logbook.
The cabin applications are:
- Cabin Crew Mailing (CCMail)

The cabin crew mail lets the cabin crew exchange mails with the ground facilities.
- Cabin Documentation Display (CaDoc)

The CaDoc function gives access to the Cabin Crew Operating Manual (CCOM) and other cabin documentation.
- The Digital Cabin Logbook (DCL) (Optional).

The DCL is an electronic logbook interface for the maintenance cabin crew onboard the A/C.
The basic functions are:
- Local Maintenance Function (LMF)

The LMF centralizes the fault messages and manages the tests for the OSFC cabinet and AISD application BITEs.
- Simple Data Loader (SDL)

The SDL uploads the software and database to the OSFC cabinet.
- OSFC Internet-protocol Communication (COM) manager

The OSFC Internet-protocol COM manager gives routing functions for the OSFC data to the Internet-protocol COM systems.
- Wireless LAN (Local Area Network) Manager (WLM)

The WLM manages the Wireless Airport Communication System (WACS).
- Cabin WLM

The cabin WLM manages the wireless communication systems in the cabin.
- Basic services (printing, data import, data/files export, ...).

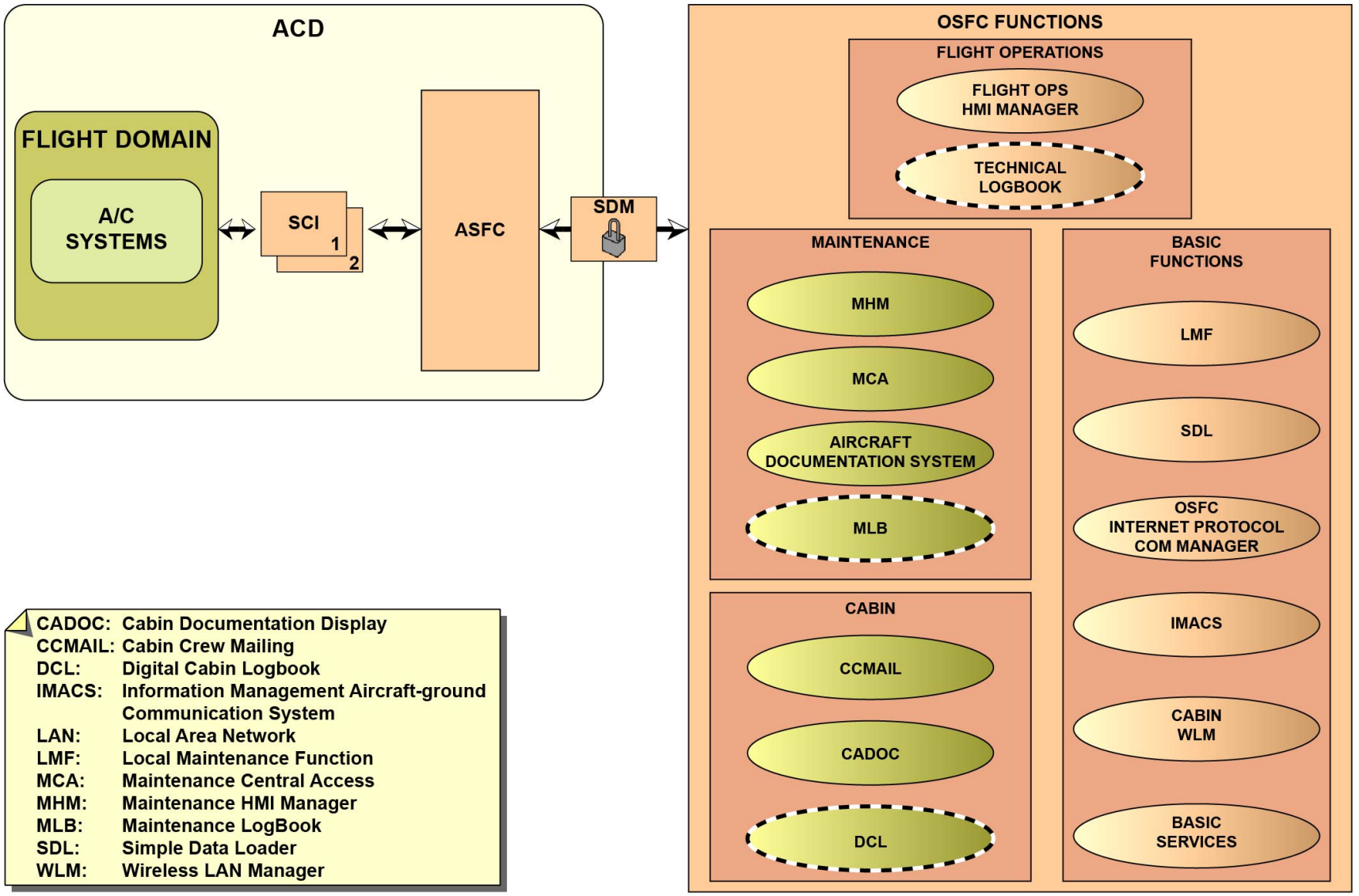
The maintenance applications are:
- Maintenance HMI Manager (MHM)

The MHM centralizes the access to the AISD and ACD maintenance applications onboard the A/C. It is used for the navigation between the applications of the maintenance workflow (through hyperlinks and navigation path).
- Maintenance Central Access (MCA)

The MCA function computes and shows maintenance data (Post Flight Report (PFR)) from the CMS-ACD and Open world Server Function (OSF)-LMF.
- A/C documentation system

The A/C documentation system function is to give access and to show technical data documentation related to the maintenance package (as: troubleshooting procedures, maintenance procedures, schematics and wiring, FIN, P/N, C/B, zone, panel, ...). It also gives access to and shows the Minimum Equipment List (MEL) or Configuration Deviation List (CDL) procedures.
- Maintenance electronic logbook (Optional).

The maintenance electronic logbook is an interface for the maintenance crew onboard the A/C.



OIS APPLICATIONS - OSFC APPLICATIONS

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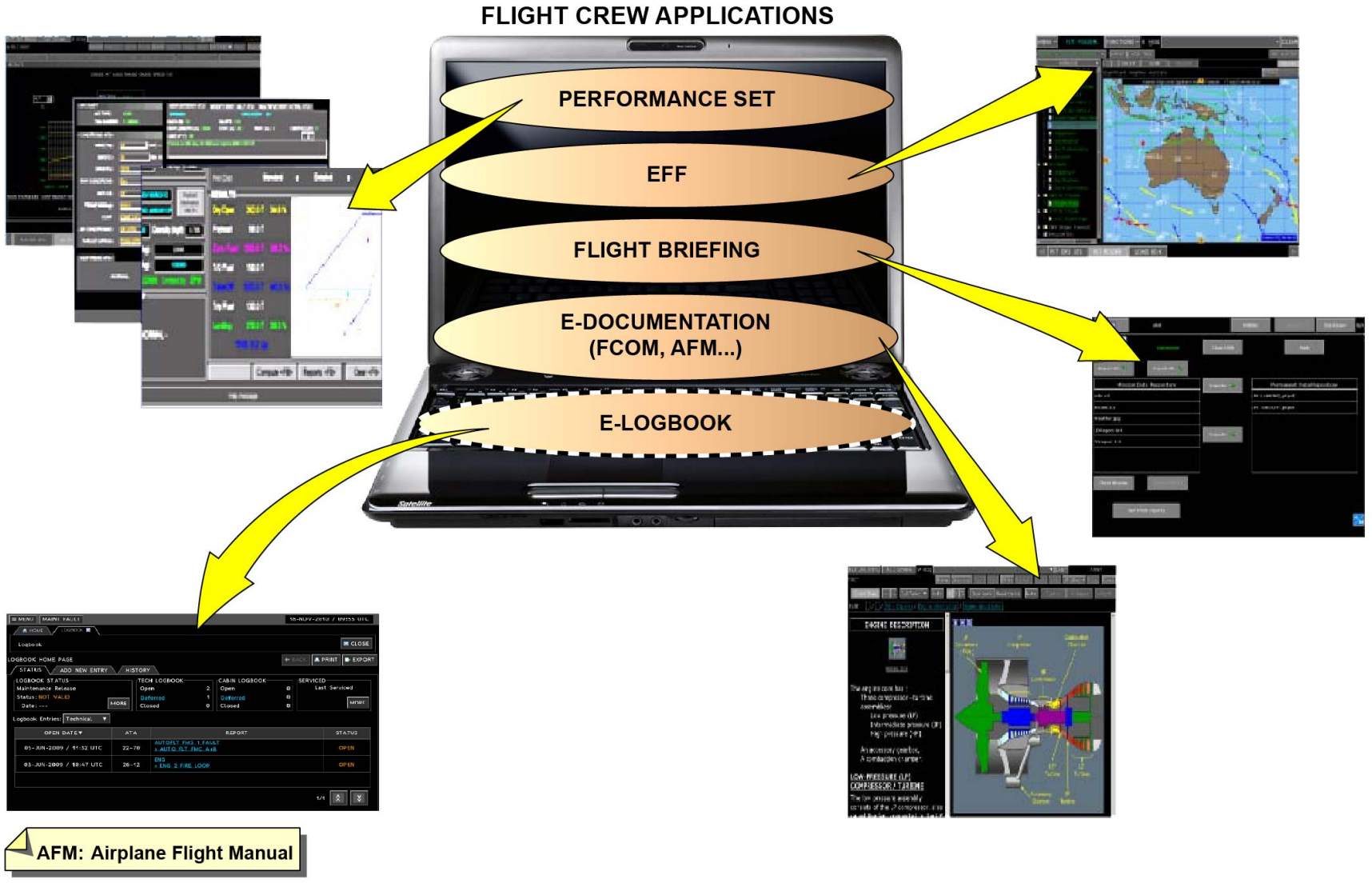
ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Applications (continued)

EFB applications

The two EFB laptops give access to the flight crew applications that follow:

- Performance set application
- EFF application
- Flight briefing application
- Electronic documentation
- Technical electronic logbook (optional).



OIS APPLICATIONS - EFB APPLICATIONS

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

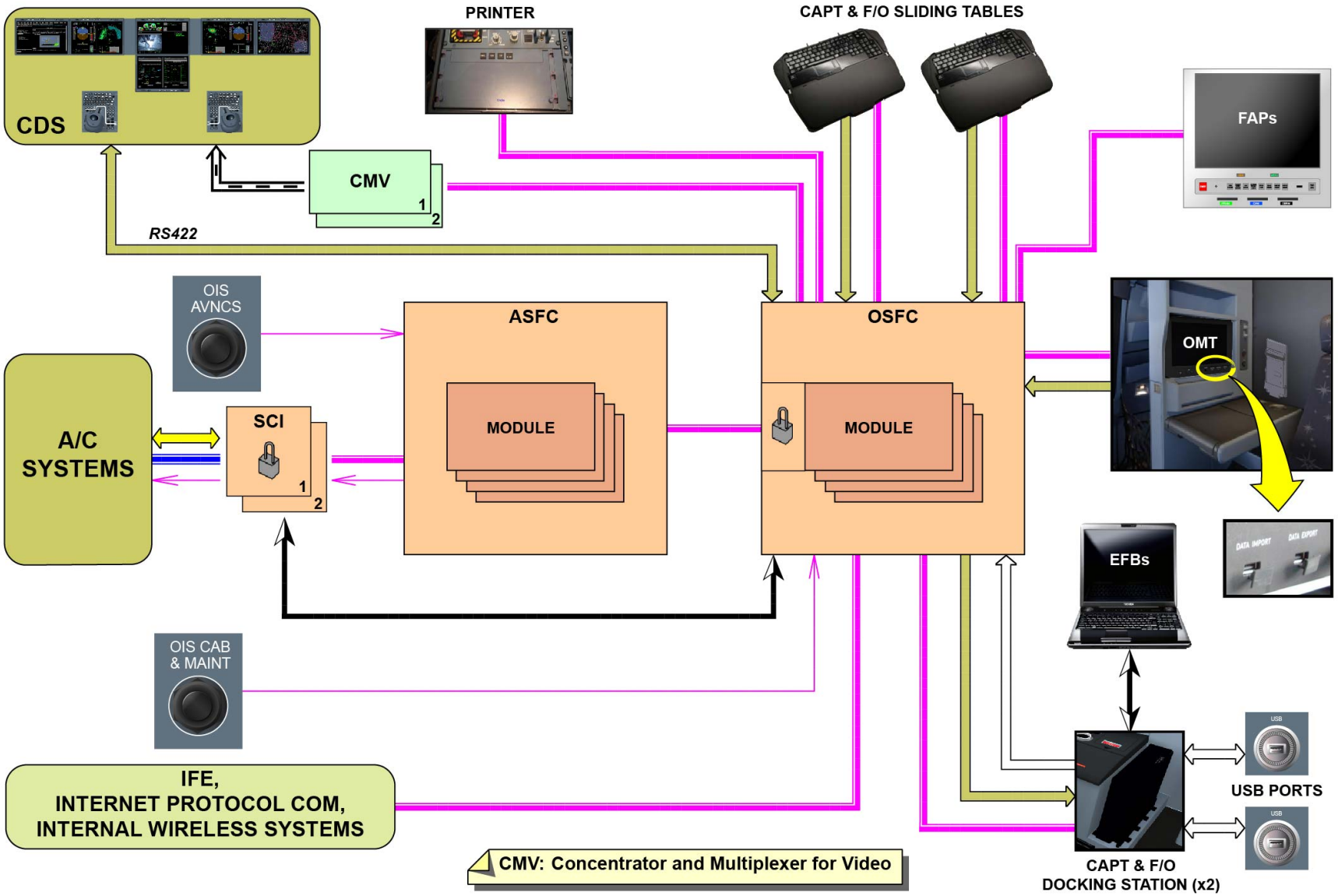
OIS Detailed Architecture

The OIS includes:
- Two SCIs for the firewall and gateway functions between avionics systems and the ASFC and OSFC cabinets (to give protection to avionics systems from malicious data attacks).
- The ASFC, which has the functions that follow:
- The network and cabinet management function:
- Management of internal and external communications of the ASFC applications
- Data storage access.
- The hosting and server function, which:
- Gives storage capacity with server functions
- Manages the processing and segregation of the resources for the hosted applications.
- The graphical generation function, which generates graphical images that must be sent to the OSFC.
- The OSFC, which has the functions that follow:
- The secure-network management function, which controls and manages the OSFC interfaces (PMAT, EFB class II, ...)
- The hosting and server function, which:
- Gives storage capacity with server functions
- Manages the processing and segregation of the resources for the hosted applications.
- The inter-domain security management function, which:
- Gives dataflow advanced filtering
- Manages the ACD and AISD inter-domain communications.
- The display management function, which gives an interface with:
- The CDS and OMT displays
- The KCCUs and keyboards control means.
- The communication management function, which has a routing function for the data that go out of the OSFC.
- Two docking stations used to rack EFB class II (under airline responsibility)
- Two USB ports in the cockpit for the data import/export, mainly for the flight crew
- Two sliding-tablet keyboard-pointing devices
- One cockpit printer
- One OMT, with:
- A maintenance keyboard-pointing device
- A USB interface for the data import/export functions
- An Ethernet plug.

The interface between the avionics system and the OIS is done with two SCIs through AFDX, ARINC 429 or discrete links.
Many system data are exchanged between the ASFC and the OSFC through SCIs mainly for:
- Data transmission to ground airline facilities
- A/C system BITEs
- Software uploading
- A/C flight/ground condition
- Data collection/centralization
- Etc.

Note that the ASFC is connected to the SCIs only through Ethernet and discrete links.
The OSFC is connected to the SCIs through Ethernet, ARINC 429 and discrete links to send the flight OPS-OIS ECAM notification (logbook and EFB events). It also receives CDS allocation information, date, time and flight/ground conditions.
The two cabinets are connected through Ethernet links (with restricted communication because of the firewall function).
Also, the OSFC can exchange data with the CDS for control orders and with the Concentrator and Multiplexer for Video (CMV) system for video display on the CDS through optical fiber.
Finally, the ASFC and OSFC can exchange data with the IFE, cabin wireless system and the ground through Internet-protocol COM systems.

Reset:
The system is interfaced with two reset P/BSWs.
When the OIS AVNCS P/BSW is pulled and then pushed, the ASFC behaves in the same way as if the power is lost and it starts again.
When the OIS CAB & MAINT P/BSW is pulled and then pushed, the OSFC does a soft shutdown of all the software components in operation and then they start again.
If the P/BSW is kept in the reset position, the cabinets can not start again.



OIS DETAILED ARCHITECTURE

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ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Module Concept

ASFC modules

The ASFC hosts applications that interact with the avionics system.
There is one ASFC on the OIS platform.
It includes:
- The Information Management Common Chassis (IMCC) housing (avionics bay)
- The modules in the IMCC for computation functions and applications in operation.

The ASFC includes the modules that follow:
- Two Intelligent Power Supply Modules (IPSMs)

They manage and energize the other modules in the cabinet, one at a time (hot plug capability). One IPSM module is the master, the other one is in standby.
- Four Avionics Bare Processing Modules (ABPMs)

They operate hosted applications and have hosting and server functions for the applications (multi-core processing technology, with a maximum of 2 GBytes Random Access Memory (RAM) per module).
The ABPMs operate in pairs:
- ABPM 1 and ABPM 3 are redundant (they host the same applications)
- ABPM 2 and ABPM 4 are also redundant.

If there is a failure of one module, the other ABPMs absorb the load of the unserviceable one. There is no loss of data. The unserviceable module is replaced and then the new one is initialized without the mechanics intervention.
- Two System Management Modules (SMMs)

They manage the ASFC Ethernet network and data storage. They do the network and cabinet management function. An SMM is selected at the start-up and manages its network, the other network becomes inactive.
If there is a failure in the selected SMM, the inactive network that the other SMM manages, becomes active.
- Two Avionics Video Modules (AVMs)

They give video capability for some hosted applications, they have graphical generation function. They have an interface with the display management function hosted in the OSFC.
- Four Avionics Data Storage Modules (ADSMs)

They have data storage functions for the hosted applications. They are part of the hosting and server function. The access to the data stored in the ADSM is managed by the SMM.
All the ADSMs operate in parallel. If there is a failure, there will be no loss of data. The unserviceable module is replaced and the new one is automatically repaired.

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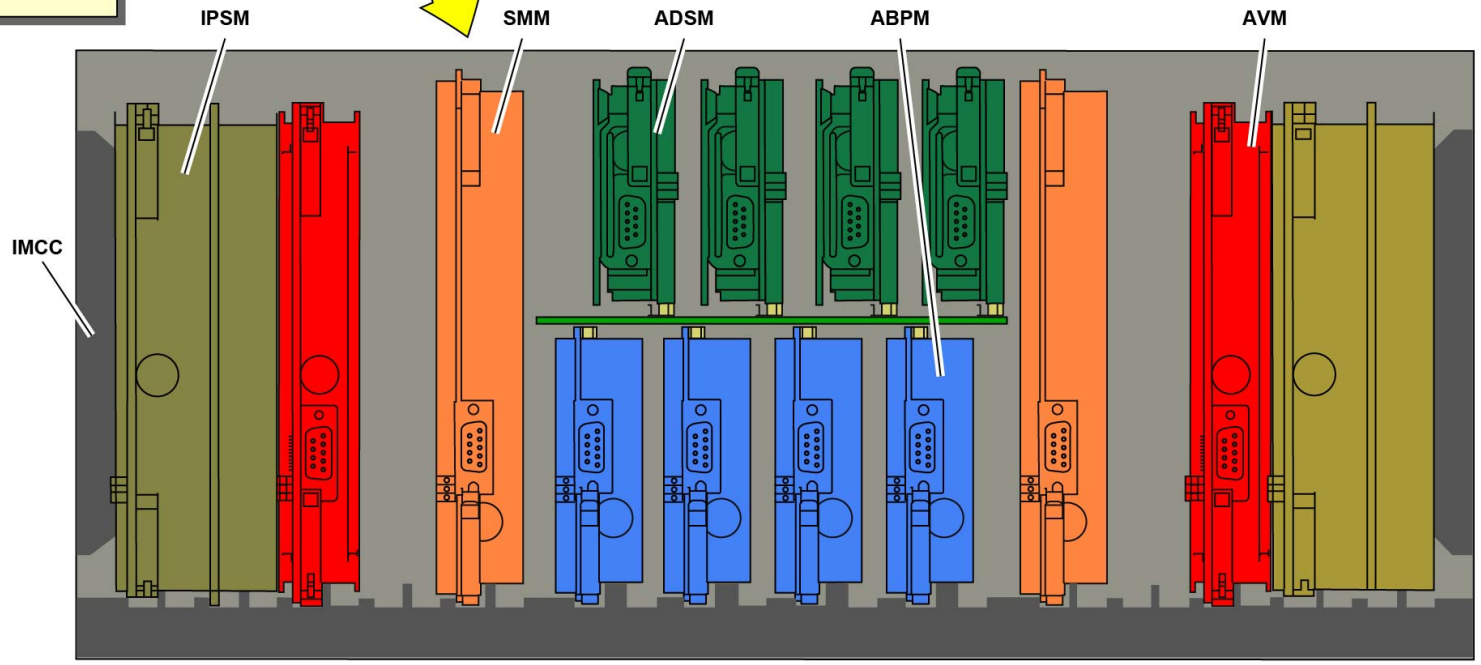
ASFC

ASFC = IMCC+MODULES

ABPM: Avionics Bare Processing Module
ADSM: Avionics Data Storage Module
AVM: Avionics Video Module
IMCC: Information Management Common Cabinet
IPSM: Intelligent Power Supply Module
SMM: System Management Module



OIS MODULE CONCEPT - ASFC MODULES

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Module Concept (continued)

OSFC modules

The OSFC hosts the AISD applications and has an interface with:
- The HMIs, EFBs (through docking stations)
- The IFE and Internet-protocol communication systems.

There is one OSFC on the OIS platform. It includes:
- The IMCC housing (avionics bay) (same design for the ASFC IMCC and the OSFC IMCC)
- The modules in the IMCC, for computation functions and applications in operation.

The OSFC includes the modules that follow:
- Two IPSMs

They manage and energize the other modules in the cabinet, one at a time (hot plug capability). One IPSM module is the master, the other one is in standby.
- Two Versatile Graphical Modules (VGMs)

They give video capability for some hosted applications and video routing for the Avionics Server Function (ASF) and EFB. They have the display management function. The VGMs are the interfaces between the CDS and OMT displays and the KCCUs and keyboards control means. They are used for the inter-domain switching.
- One Smart Diode Module (SDM)

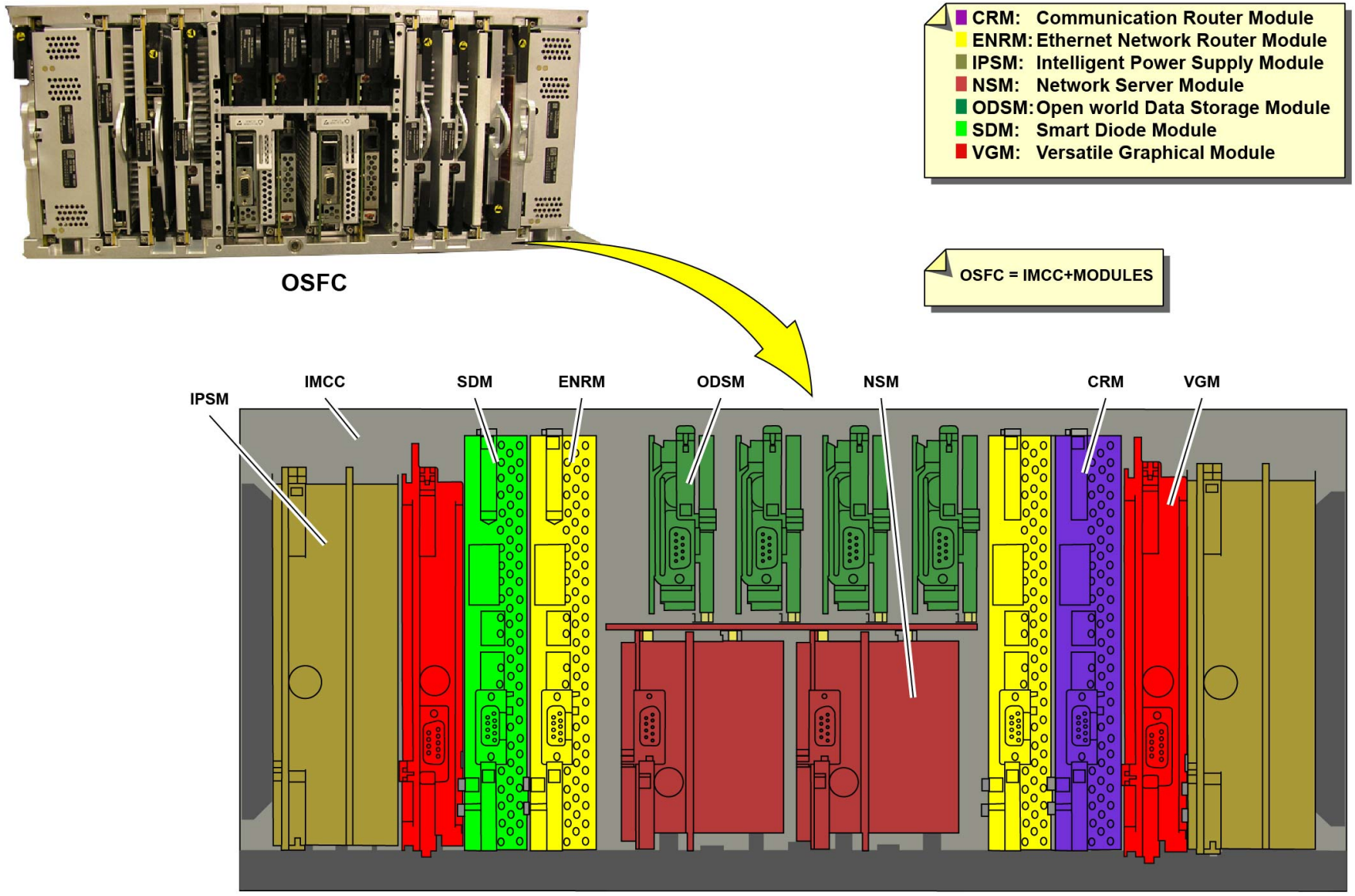
It secures communications between avionics and AISD domains and has an inter-domain security management-function.
- Two Network Server Modules (NSMs)

They give hosting and server capabilities for applications. They give computing resources (with a maximum of 4 GBytes RAM). They manage the disk access (redundant array of independent disk technology) and allocate tasks and resources to each function.
- Two Ethernet Network Router Modules (ENRMs)

They manage the Ethernet network, and have a network and cabinet management function. An ENRM is selected at the start-up and manages the network, the other one is inactive. If there is a failure, the inactive ENRM becomes active. Then, all the systems connected are switched by an Ethernet switching relay hosted in the cabinet.
- One Communication Router Module (CRM)

It has the communication-management function capability. It is also the interface for the Internet-protocol communication systems. It does the segregation for the Passenger (PAX) related data-flows. It is based on the same hardware as the ENRM.
- Four Open world Data Storage Modules (ODSMs)

They give data storage capabilities for the hosted applications. They are part of the hosting and server function. They are used for the mass storage for applications (200 GBytes of storage capacity and common design for ASFC and OSFC). All ODSMs operate in parallel. If there is a failure, there will be no loss of data. The unserviceable disk is replaced and the new one is automatically repaired.



OIS MODULE CONCEPT - OSFC MODULES

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Module Concept (continued)

Module LED status

The power supply status of the ASFC and OSFC modules is shown on the modules themselves, with the two LEDs installed on the lower part of each blade. The LEDs can have different status related to the power supply configurations that follow:
- Two LEDs off: the module is not power supplied
- Top LED green, bottom LED off: the module operates correctly
- Top LED off, bottom LED flashes amber: the module starts or a critical operation or a securing process is in progress
- Top LED flashes green, bottom LED flashes amber: the module is in irrelevant state
- Top LED off: the module is unserviceable.

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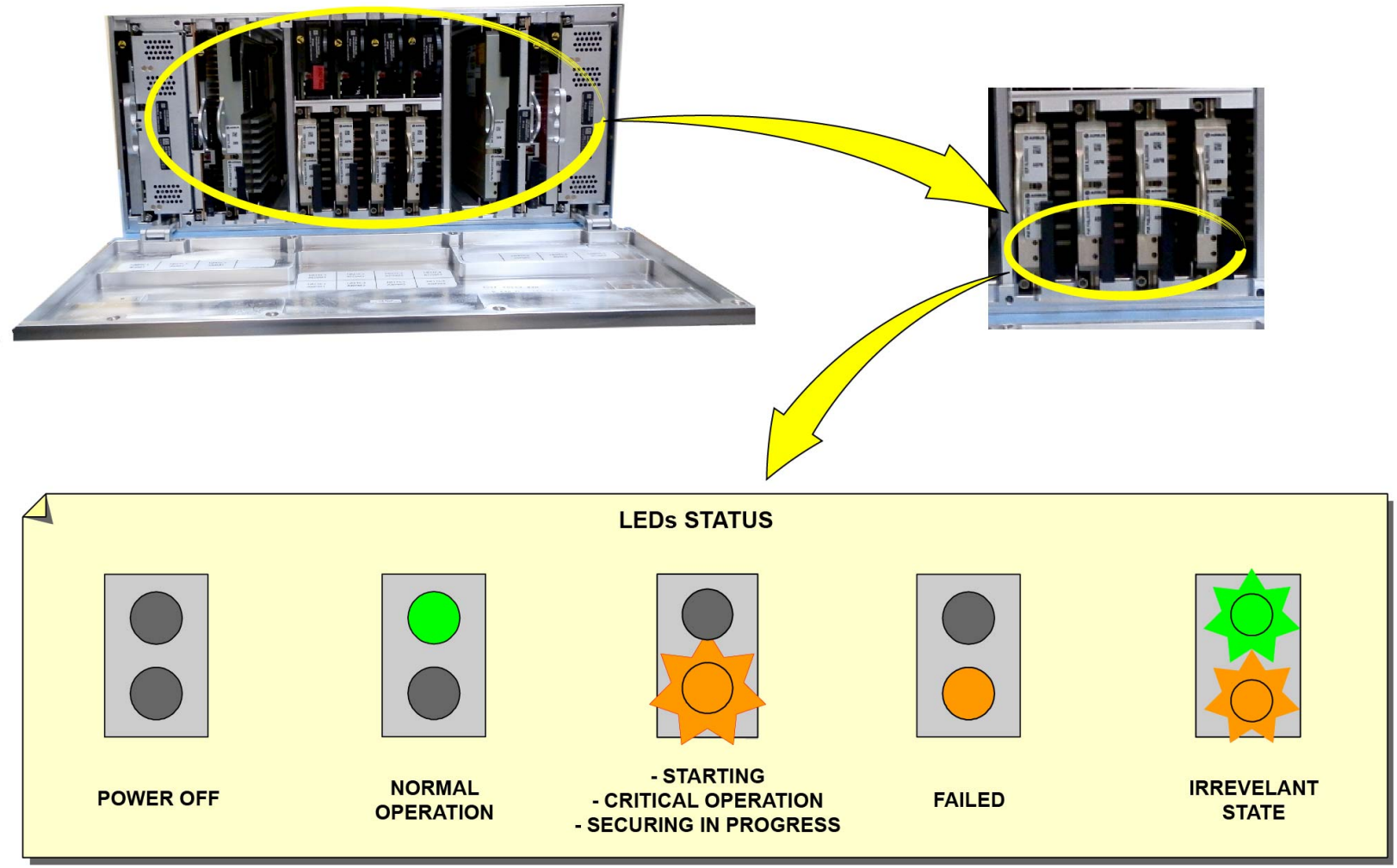


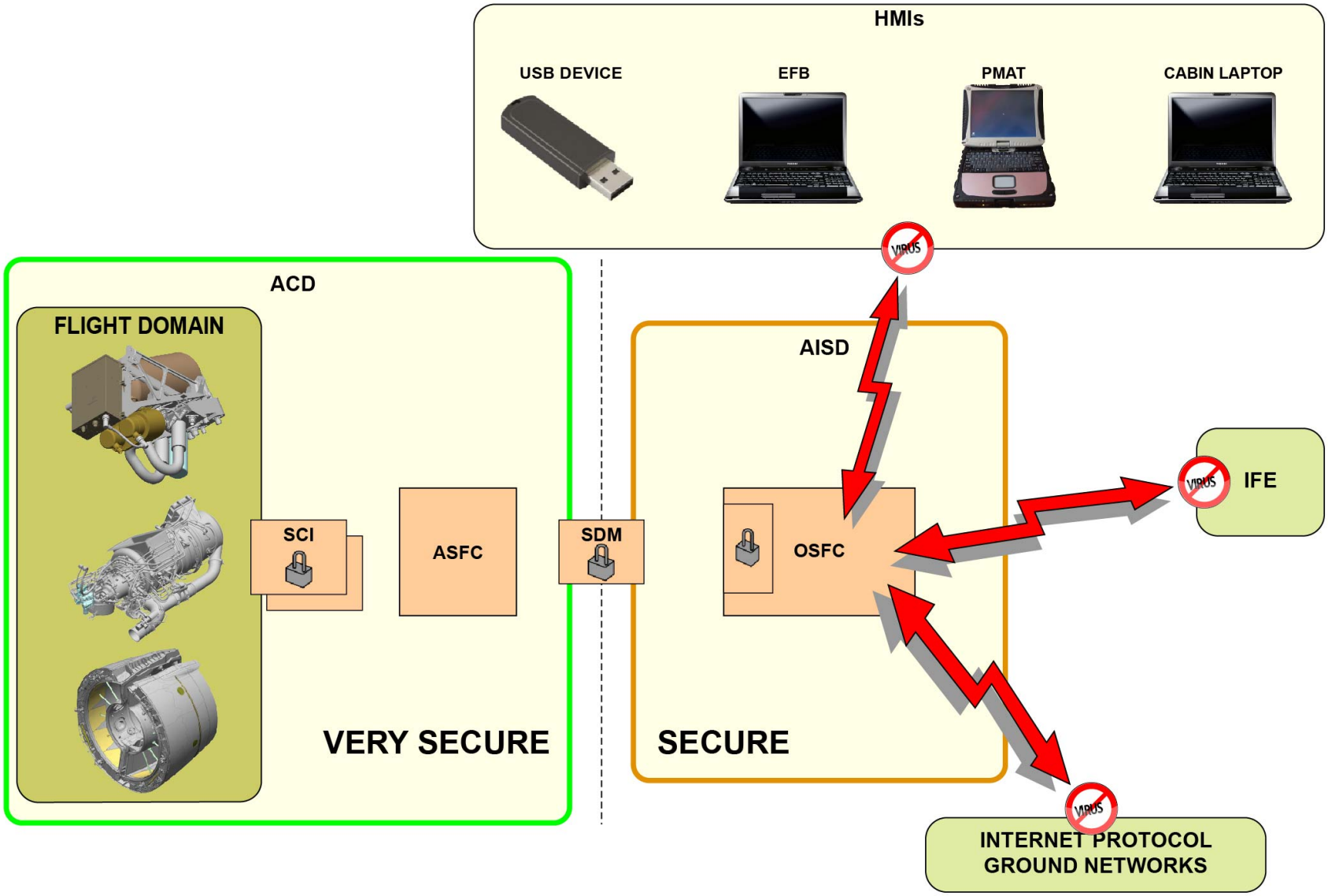
OIS MODULE CONCEPT - MODULE LED STATUS

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Security Aspects

OIS security-functions allocation

There are different levels of protection onboard the A/C.
The ACD is a very secure domain. It includes:
- The flight domain, which has the airworthiness systems and is the most secure part of the A/C.
The flight domain has protection given by the two SCIs (firewalls) from the intrusion of possible malicious-data that come from the ASFC.
- The ASFC, which has protection given by the SDM (part of the OSFC) from the AISD possible malicious data.
The AISD is a secure domain. It includes:
- The OSFC (and the EFB docking stations), which has protection given by its internal modules (SDM, CRM, ENRM, ...) from the intrusion of possible malicious-data, that come from:
- The HMIs (EFBs, PMAT, cabin laptop)
- The IFE
- The Internet-protocol ground networks.
The OSFC includes the protections that follow:
- The firewall and data authentication mechanisms for the mobile EFBs, and PMATs
- The decryption function for the data that come from the airline ground network
- The field loadable software authentication
- The backlink function, which is used to complement the hyperlink messages to support the inter-domain navigation between the ASFC and the OSFC.



OIS SECURITY ASPECTS - OIS SECURITY-FUNCTIONS ALLOCATION

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

OIS Security Aspects (continued)

OIS-security specific functions

The specific functions are managed through the OIS control panel on the overhead panel. They are mainly used by the pilot to react if a data security event is detected.
The CAB DATA TO OIS P/BSW stops the communication from the IFE and Cabin Wireless LAN Unit (CWLU).
The OIS DATA TO AVNCS P/BSW stops the communication from the AISD to the ACD IS.
The GATELINK P/BSW stops the wireless communication with Internet-protocol ground network.

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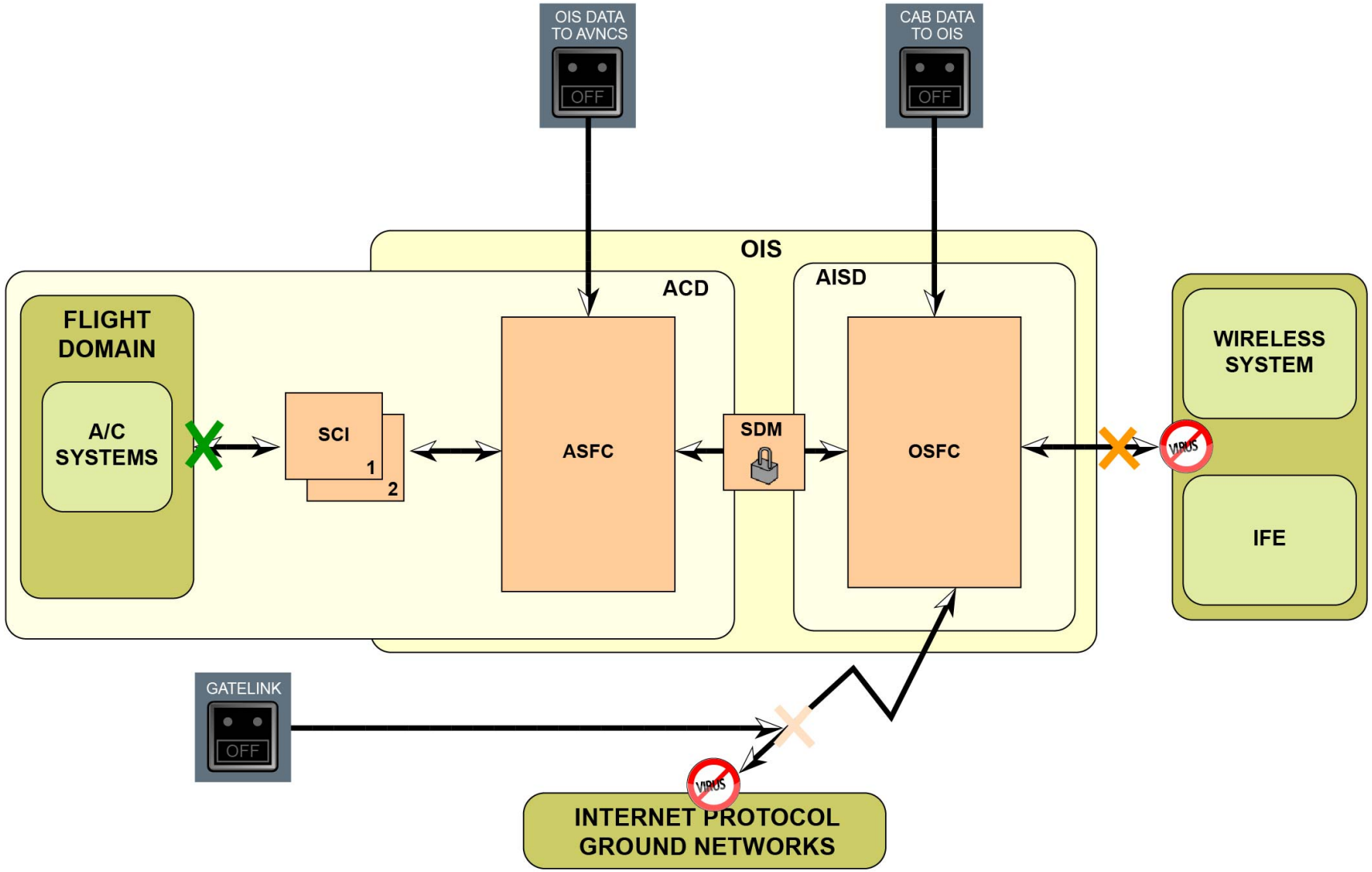


OIS SECURITY ASPECTS - OIS-SECURITY SPECIFIC FUNCTIONS

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

Video Generation Architecture

There are three sources of video in the OIS:
- The ASFC
- The OSFC
- The EFBs.

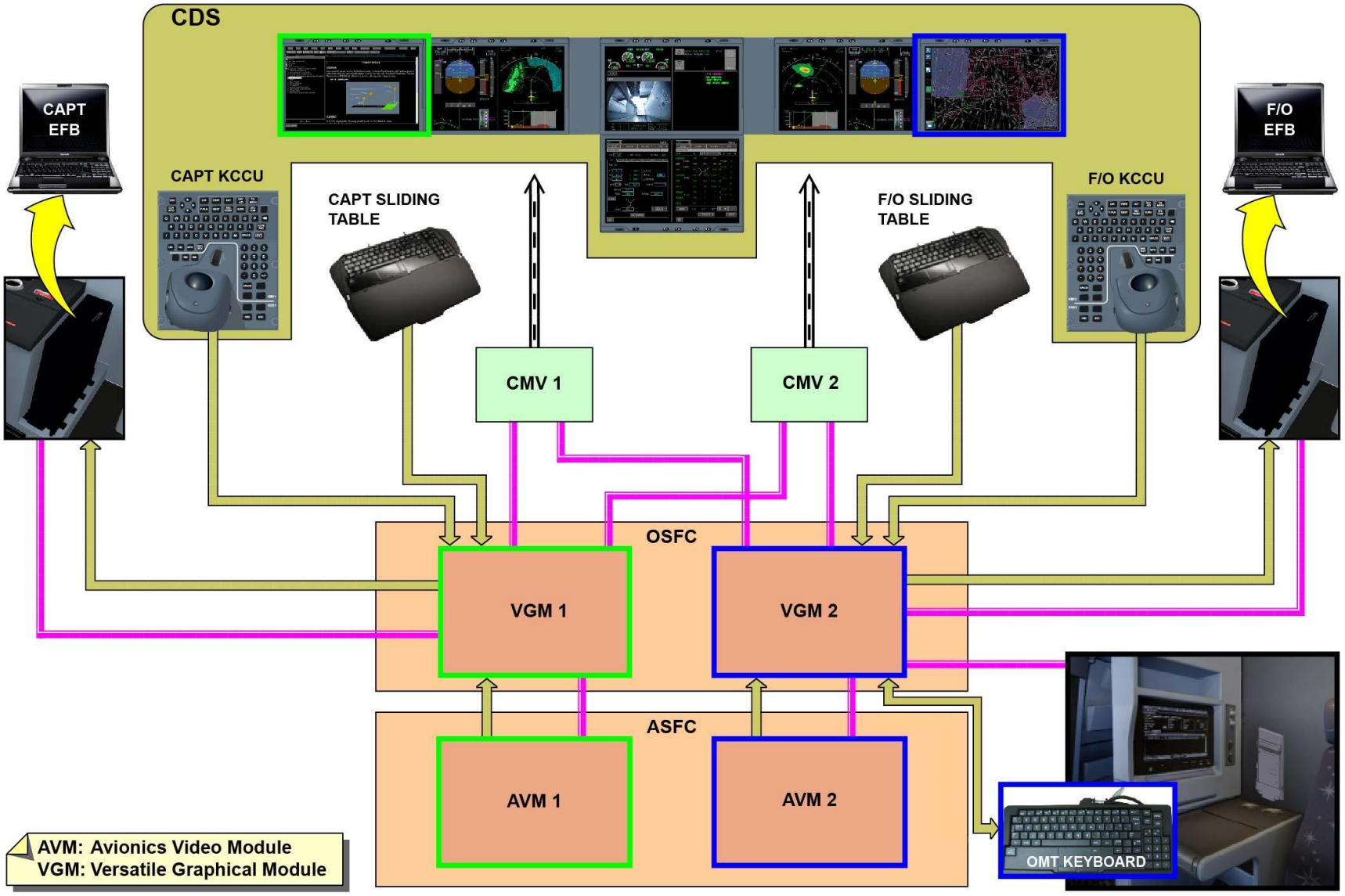
The ASFC has two AVMs. Each AVM generates two video images:
- The AVM 1 sends the video data to the CAPT CDS side through the VGM 1 (OSFC) and has a spare video output.
- The AVM 2 sends the video data to the F/O CDS side and to the OMT through the VGM 2 (OSFC).

If there is a failure of one AVM, the video is lost on the related terminals and there is no reconfiguration on the other AVM.

The OSFC has two VGMs. Each VGM gives two video images:
- The VGM 1 sends video data to the CAPT CDS side and has a spare video input.
- The VGM 2 sends video data to the F/O CDS side and to the OMT.

The connections between the VGMs and CDS for the video data transmission are done through the CMVs. Each VGM video output to the CDS is doubled to support the connection to the two CMVs (this characteristic is necessary for ensure the view offside capability).

If there is a failure of one VGM:
- The video is lost on the related terminals
- There is no reconfiguration on the other VGM.



VIDEO GENERATION ARCHITECTURE

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

Inter-Domain Navigation

At the start-up, the OIS launches the default menu related to the terminal types.
The flight-operation HMI manager is launched:
- On the left-outer CDS display for the CAPT
- On the right-outer CDS display for the F/O.

By default, the pilots can only use the sliding-tablets keyboard/pointing devices to navigate on the OIS displays (or the KCCU, if the KCCU OIS button is selected). Each pilot controls the allocation of his KCCU to his OIS display).
When the menus are available, the users can navigate through the applications whatever their hosting platform, only with the navigation and selection means on the OIS display.
This characteristic is given by the inter-domain navigation function. To do this function, the pilots also use a physical switch that connects to the EFB or to the OIS core system (ASFC/OSFC applications) in relation to the EFB software functions.
If there is loss of the flight-operation HMI manager function, the switching from the EFB to OIS core applications (ASFC/OSFC applications) and vice versa is only possible with the OIS AVNCS/EFB toggle SW of the OIS inter-domain navigation.

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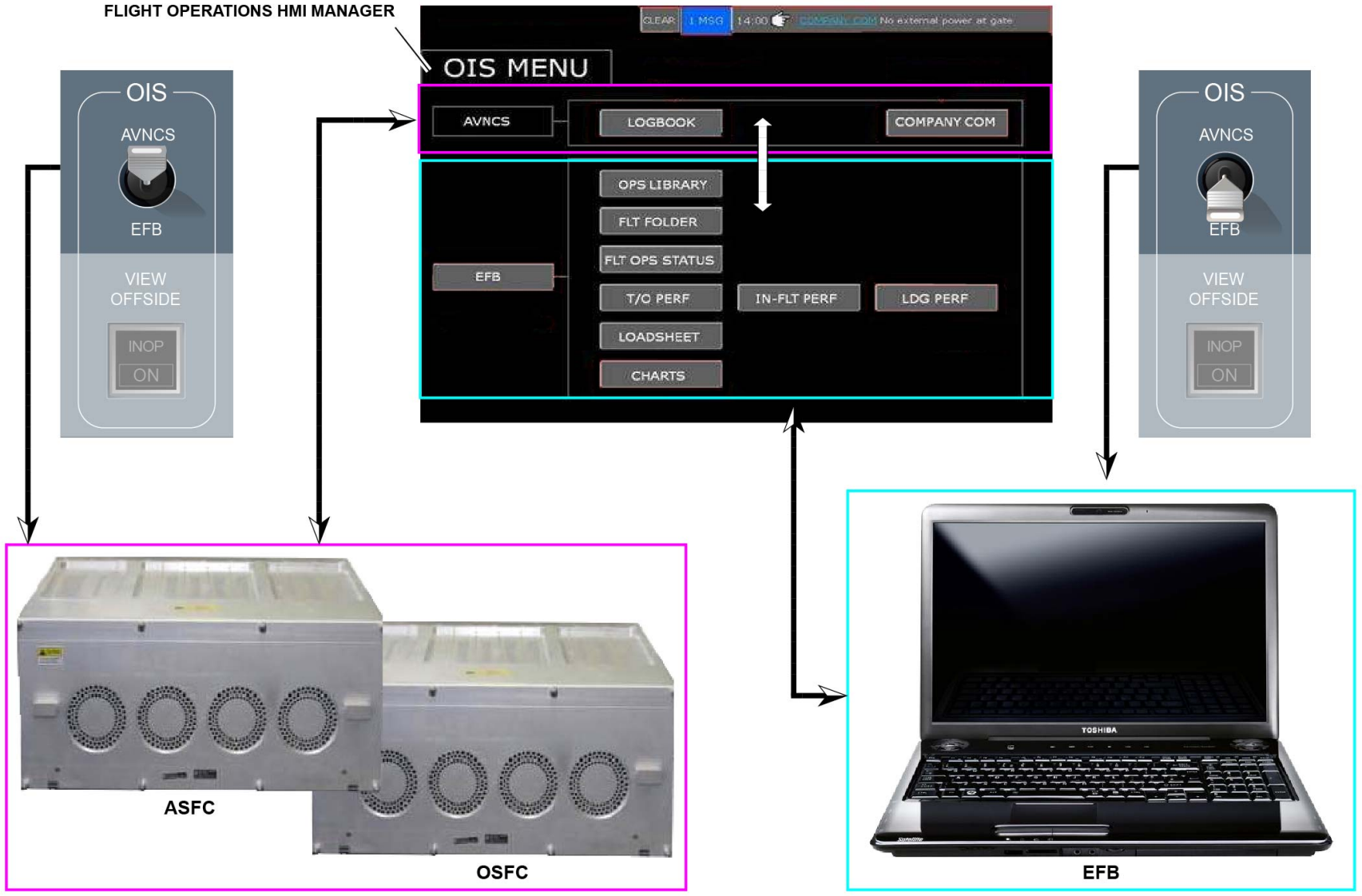

INTER-DOMAIN NAVIGATION

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

Onboard Maintenance Terminal

OMT description

The OMT lets the mechanics get access to the OMS functions.
It has a display, and includes:
- One USB plug for the uploading of the avionics-field loadable software to the ACD and AISD
- One USB plug to export data
- One connector for the OMT keyboard
- One Ethernet plug for the PMAT initialization
- The OMT keyboard unit.

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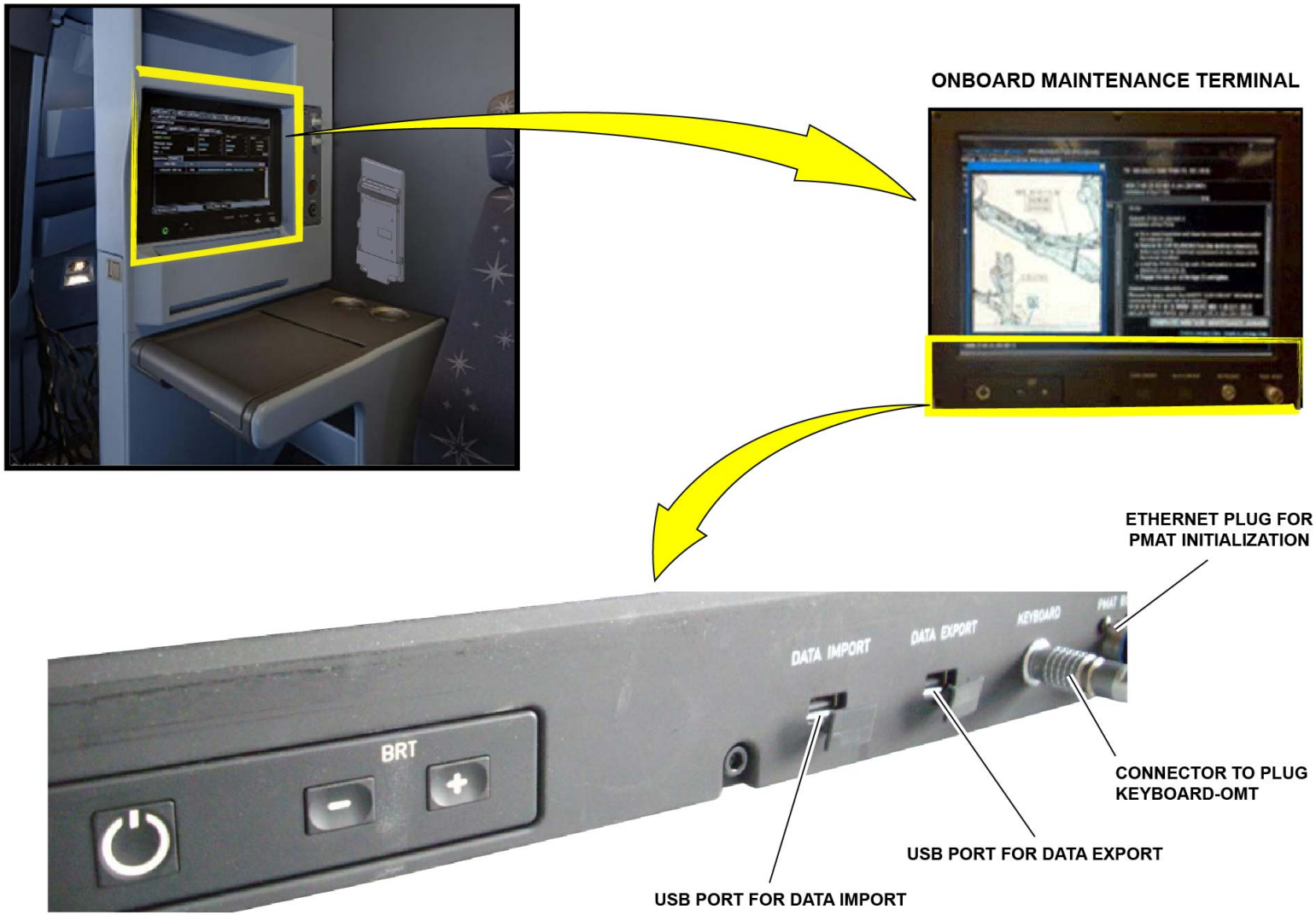


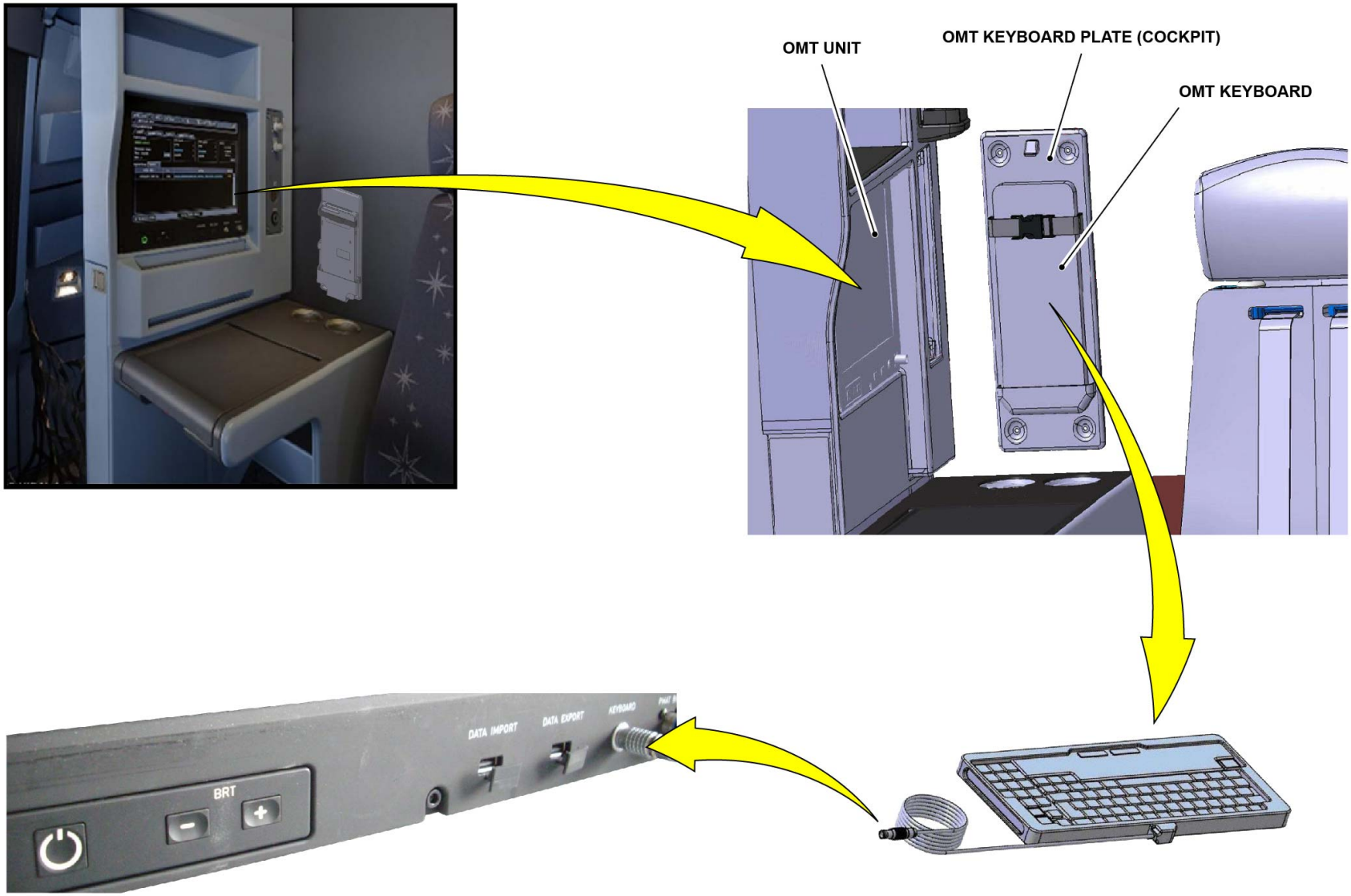
ONBOARD MAINTENANCE TERMINAL - OMT DESCRIPTION

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

Onboard Maintenance Terminal (continued)

OMT keyboard stowage

The OMT keyboard is stowed on the right hand side wall on a dedicated plate, just near the 3rd Occupant seat.
The OMT keyboard is fitted with a cable that must be connected to the OMT.



ONBOARD MAINTENANCE TERMINAL - OMT KEYBOARD STOWAGE

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

PMAT

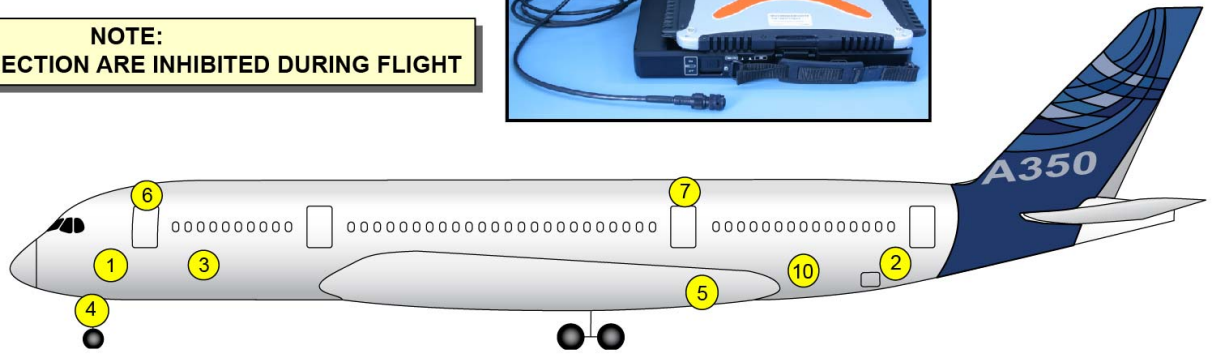
The maintenance crew use the PMAT for connection to the OIS :
- To get access to the maintenance applications
- To do the maintenance operations on the A/C systems.

The PMAT can be connected to internal and external Ethernet connections strategically located through the A/C.
The PMAT is used to show and consult the ASFC and OSFC applications with a very small number of restrictions (e.g. no possibility to start tests with cautions). All the PMAT plugs are inhibited during the flight.
The connection between the OIS network and the PMAT plugs is done when the COM GND CONNECTION P/BSW is set to ON.
Note that the PMAT is a Ground Support Equipment (GSE) tool under airline responsibility (it is not an A/C component).

V1813401 - V01T0M0 - VM46D1OIS003001

PMAT IS NOT PART OF A/C DEFINITION
PMAT IS A GROUND SUPPORT EQUIPMENT

NOTE:
ALL PMAT CONNECTION ARE INHIBITED DURING FLIGHT



PMAT NETWORK PORT LOCATION

1	AVIONIC RACK
2	REAR EBAY
3	FWD LDCC
4	STEERING DISCONNECT PANEL
5	REFUEL PANEL
6	CABIN 1 - DOOR 1
7	CABIN 2 - DOOR 3
10	AFT LDCC

MAINTENANCE PANEL

PMAT CONNECTIONS

GROUND
POWER PANEL

STEERING
DISCONNECT PANEL

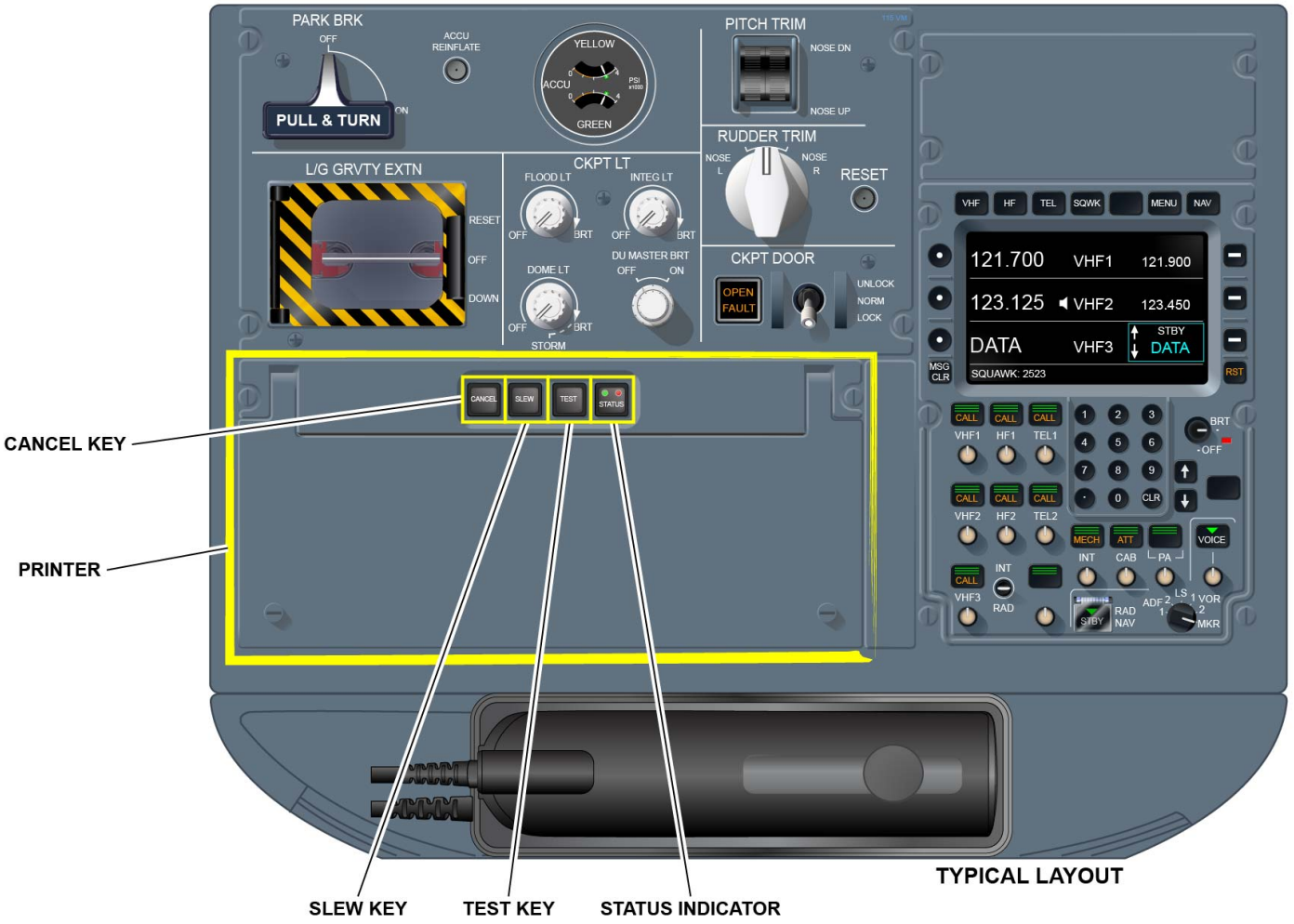
COM GND CONNECTION P/BSW HAS TO BE ACTIVATED AND ONLY ONE CONNECTION IS USED AT A TIME
NO POWER SUPPLY CONNECTION ARE AVAILABLE IN THE NOSE LANDING GEAR BAY AT A TIME

PMAT

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

Cockpit Printer

The cockpit printer is a black and white thermal printer, connected to the OIS network.
The primary function of the printer is to let the pilots and mechanics print the documents.
The paper filling is made through the visible top face, without the removal of the printer equipment.

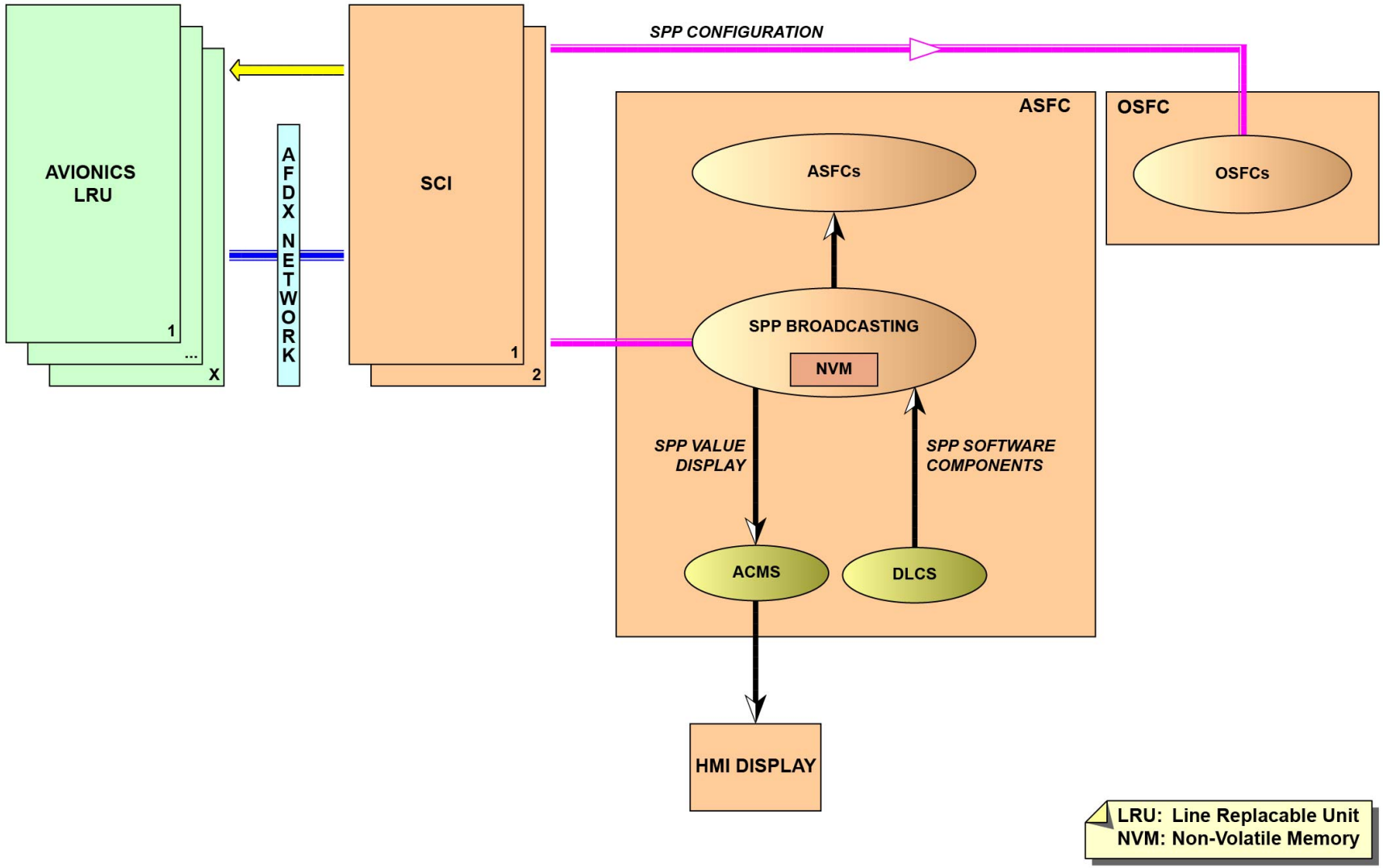


COCKPIT PRINTER

ONBOARD INFORMATION SYSTEM (OIS) DESCRIPTION (2/3)

Software Pin Programming

The A350 SPP function supports the Hardware Pin Programming (HPP) systems for which the consequence of an erroneous data is critical. It still remains hard pin programmable (e.g. Flight Management (FM)).
An SPP is a file included in the field loadable software/load stored in a non-volatile memory in the ASFC.
The SPP gives many different configurations to a system. The pin program gives the status of the activation of options and configurations.
Pin programmed data values do not change until a new configuration is installed. The subscribers can read the value of this data to identify the configuration of the function that they will use.
This SPP configuration is made of many SPP files, which are uploaded to the SPP application through the DLCS.
The primary function of the SPP broadcast application is to broadcast the SPP configuration to all possible OIS platform subscribers connected to the SCIs, which include the ASFC and OSFC applications. These subscribers send the SPP data back for information.
Note that it is possible to consult the hard and the soft pin status from the OMS.



SOFTWARE PIN PROGRAMMING

V1813401 - V01T0M0 - VM46D1OIS003001

ELECTRONIC FLIGHT BAG (EFB) DESCRIPTION (2)

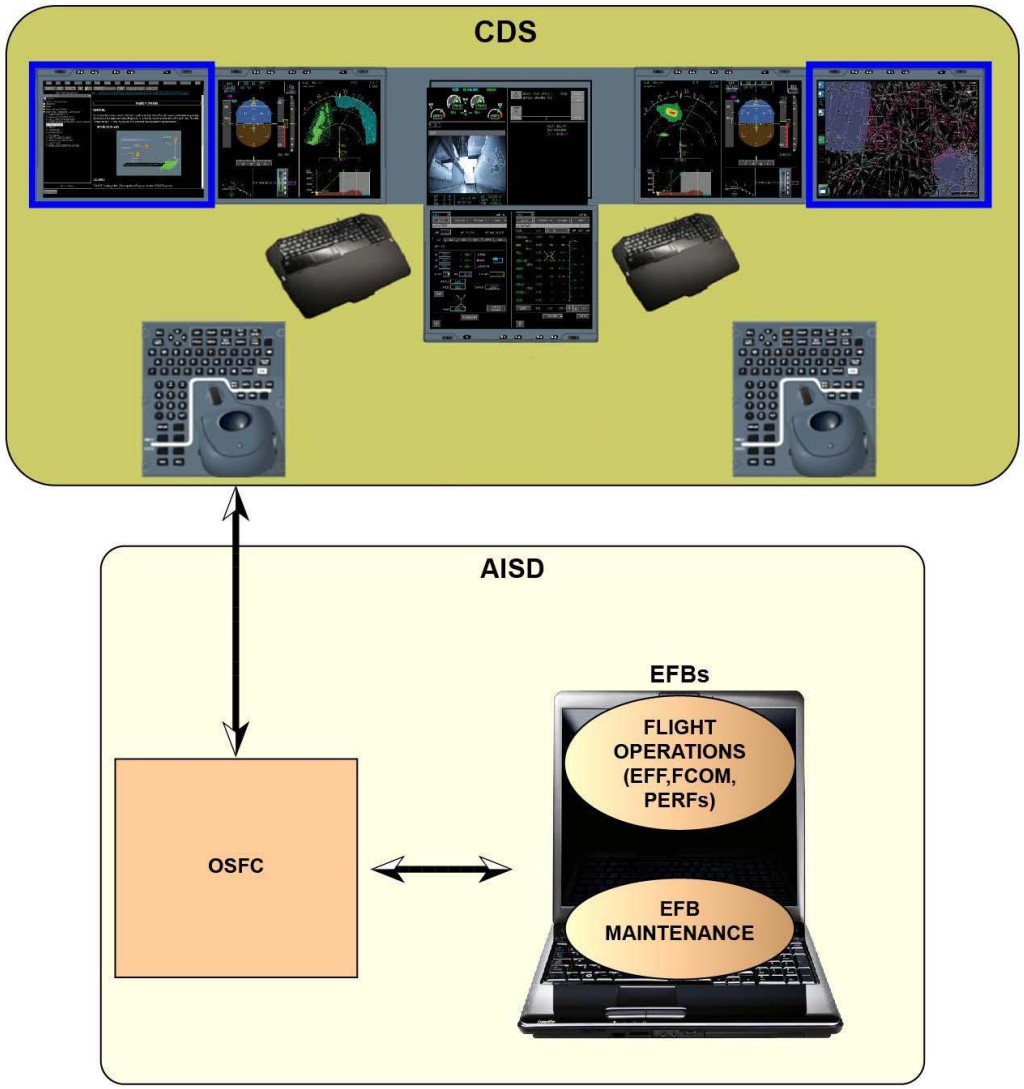
Electronic Flight Bag and Docking Station Presentation

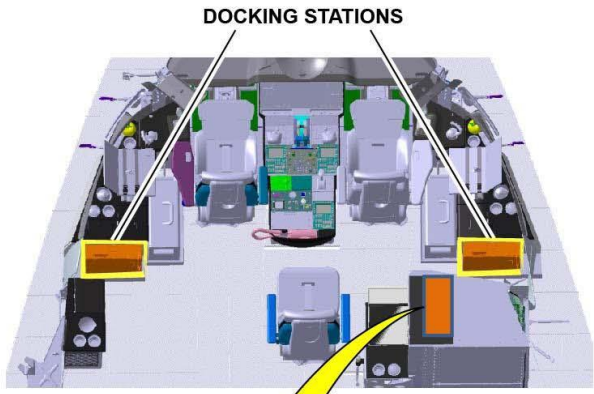
The A350 cockpit has two Laptop Docking Stations (LDSs):
- One for the CAPT
- One for the F/O.

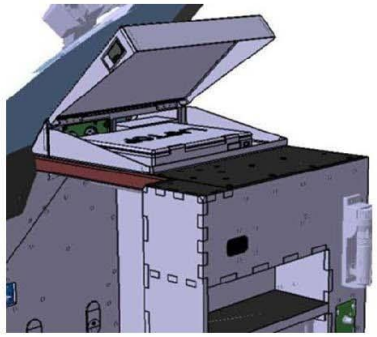
Note that a third optional Electronic Flight Bag (EFB) laptop can be stowed in the cockpit above the Onboard Maintenance Terminal (OMT).
The LDS functions are:
- To dock an EFB laptop
- To give physical interfaces to the Open world Server Function Cabinet (OSFC) applications to support the EFB class II operations as part of the Airline Information Services Domain (AISD) applications (flight operations).

The EFB laptop is a class II laptop. It can be connected and disconnected to/from the A/C network.
When the EFB is connected to the docking station, the flight crew can show the EFB image on the Onboard Information System (OIS) displays and control it from the CDS controls. The maintenance applications are also hosted in the EFB for the laptop monitoring and software loading.

V1813401 - V01T0M0 - VM46D2EFBC22301







3RD EFB LAPTOP (OPTION)

AISD:	Airline Information Services Domain
EFB:	Electronic Flight Bag
EFF:	Electronic Flight Folder
FCOM:	Flight Crew Operating Manual
OSFC:	Open world Server Function Cabinet
PERF:	Performance

ELECTRONIC FLIGHT BAG AND DOCKING STATION PRESENTATION

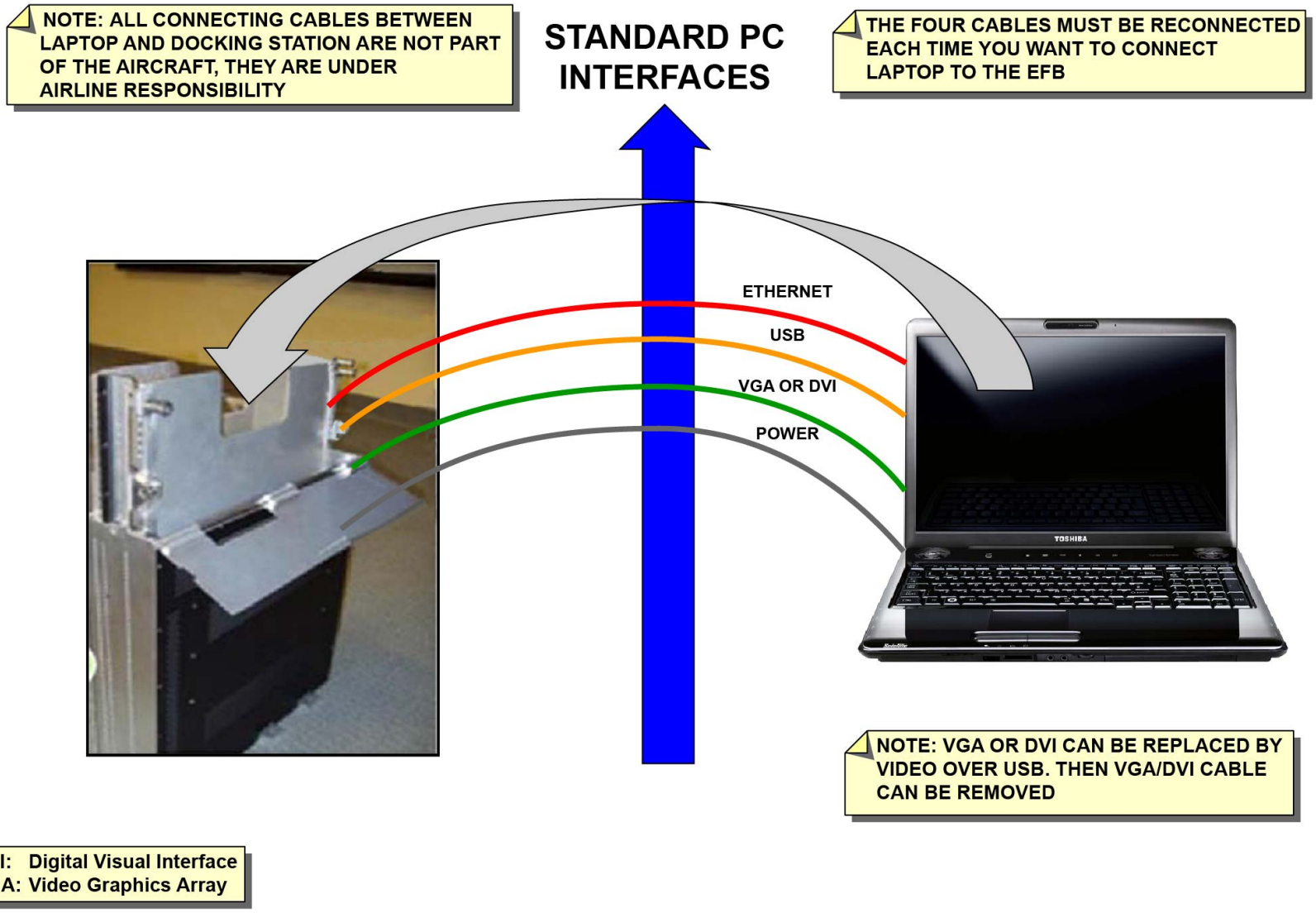
ELECTRONIC FLIGHT BAG (EFB) DESCRIPTION (2)

EFB Connection to Docking Station

The EFB laptop is connected to and stowed in its related docking station.
The docking station makes the interface between the laptop and the A/C network.
The necessary connecting cables are:
- An Ethernet cable
- A USB cable
- A VGA or DVI cable if video over USB is not used
- A power supply cable (28 VDC).

Note that all the connecting cables between the laptop and the docking station are not part of the A/C, but they are under airline responsibility. They must be connected/disconnected again each time the laptop is connected or disconnected to or from the docking station.

V1813401 - V01T0M0 - VM46D2EFBC22301



EFB CONNECTION TO DOCKING STATION

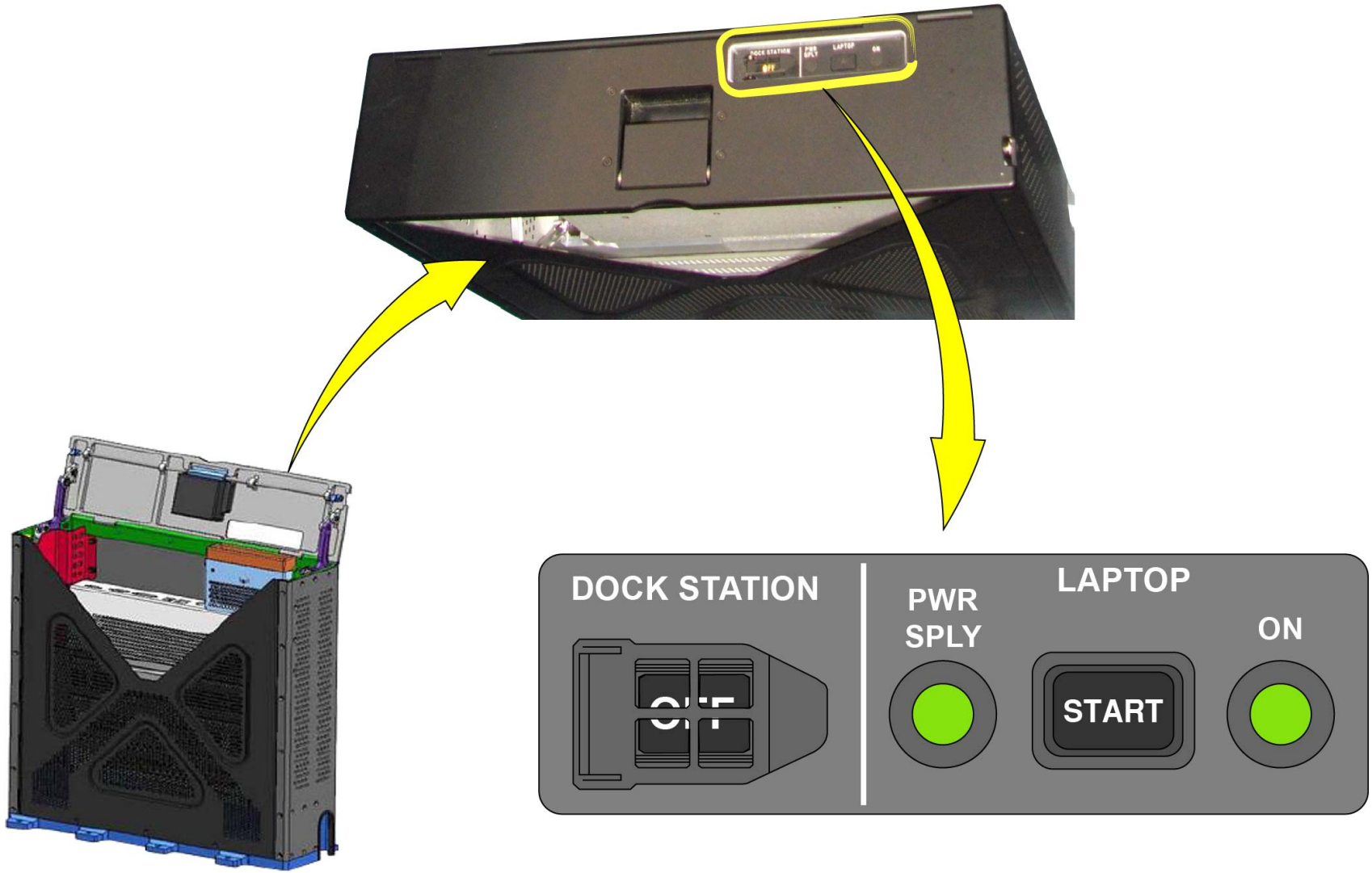
V1813401 - V01T0M0 - VM46D2EFBC22301

ELECTRONIC FLIGHT BAG (EFB) DESCRIPTION (2)

Docking Station Presentation

The function of a docking station is:
- To dock and stow the EFB
- To transmit the video and USB signals from the EFB to the CDS (OIS displays)
- To change ARINC 429 and discrete inputs into Ethernet signals
- To manage the view offside function
- To energize its related laptop.

The docking station also includes a control panel that gives to the crew the capability to manage the start-up or power-off of the docking station and the start-up of the EFB laptop.

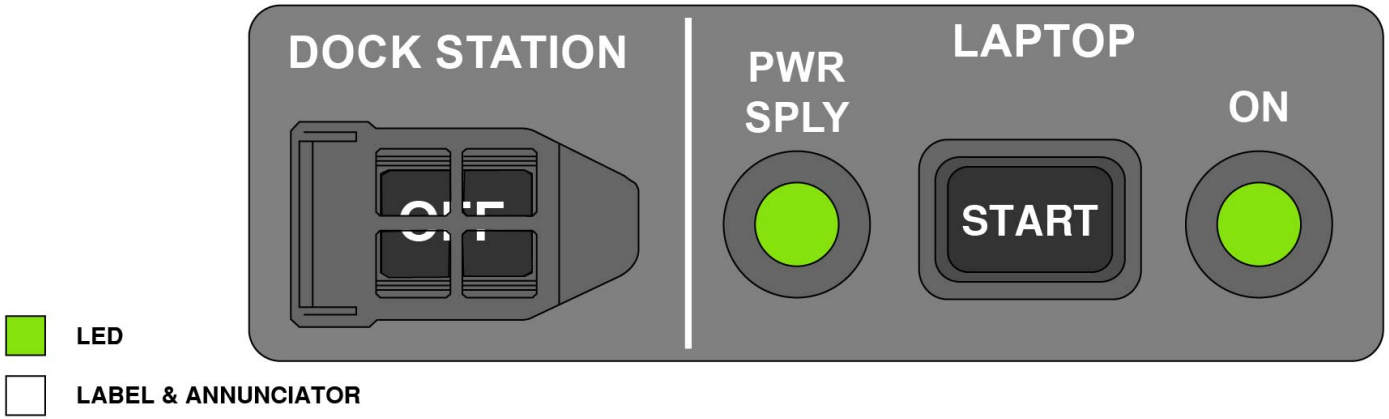


DOCKING STATION PRESENTATION

ELECTRONIC FLIGHT BAG (EFB) DESCRIPTION (2)

Docking-Station Control Panel

The label backlights (DOCK STATION, LAPTOP, ...) turn on when the laptop docking station receives power supply from the A/C.
The docking-station control panel includes:
- Two P/BSW with their related legends:
- A DOCK STATION/OFF P/BSW. When the OFF legend is on, the docking station is off (not operation).
When the DOCK STATION/OFF P/BSW is pushed, the docking station starts.
- The LAPTOP/START P/BSW. When the START legend is on, the laptop is off (the laptop starts when the docking station is on).
When the LAPTOP/START P/BSW is pushed, the laptop starts (LAPTOP/ON on).
- Two status LEDs:
- The PWR SPLY LED, which turns on when the laptop is energized by the docking station (the laptop starts when the docking station is on).
- The ON LED, which turns on when the laptop is on (the ON LED can be on even if the docking station is off, if the laptop is energized by its battery).



LABEL LIGHTING LOGICS

THE LAPTOP DOCKING STATION RECEIVES THE A/C 28VDC POWER SUPPLY FROM A/C

ANNUNCIATOR LIGHTING LOGICS

OFF BUTTON IS ON: DOCKING STATION IS OFF --> PUSH THE **OFF** BUTTON TO START THE DOCKING STATION

START BUTTON IS ON: LAPTOP IS OFF --> PUSH THE **START** BUTTON TO START THE LAPTOP

LED LIGHTING LOGICS

PWR SPLY: LAPTOP POWER SUPPLIED BY THE DOCKING STATION

ON: LAPTOP IS OPERATING

DOCKING-STATION CONTROL PANEL

ELECTRONIC FLIGHT BAG (EFB) DESCRIPTION (2)

Laptop Start Configuration

There are two different configurations to start an EFB laptop:
- The pilot attached configuration (the process is the same as the one used for the first installation in the docking station)
- Start the docking station: to do this, push the DOCK STATION/OFF P/BSW.
- Start the laptop: to do this, push the power on P/BSW of the laptop.
Note: the laptop must be started before the connection to the docking station for correct recognition by the docking station.
- Connect the connecting cables that follow between the laptop and the docking station:
- Video cable
- USB cable
- Ethernet cable
- Power supply cable.
- Stow the laptop in the docking station.
- The A/C attached configuration
Note: in this configuration, the laptop is already stowed in the docking station and the cables between the laptop and the docking station are already connected.
- Start the docking station: to do this, push the DOCK STATION/OFF P/BSW.
- Start the laptop from the docking-station control panel: to do this, push the LAPTOP/START P/BSW.

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LAPTOP START CONFIGURATIONS

PILOT ATTACHED CONFIGURATION

1/ START THE DOCKING STATION

→ *PUSH THE **DOCK STATION** P/BSW*

2/ START THE LAPTOP

→ *ON THE LAPTOP, PUSH THE LAPTOP **PWR ON** P/BSW*

3/ CONNECT CABLES BETWEEN THE LAPTOP AND THE DOCKING STATION

→ *VIDEO CABLE (IF APPLICABLE)*
→ *USB CABLE*
→ *ETHERNET CABLE*
→ *POWER SUPPLY CABLE*

A/C ATTACHED CONFIGURATION

NOTE: IN THIS CONFIGURATION THE LAPTOP IS ALREADY STOWED IN THE DOCKING STATION SINCE IT IS ATTACHED TO THE AIRCRAFT SO THAT CABLES ARE ALREADY CONNECTED

1/ START THE DOCKING STATION

→ *PUSH THE **DOCK STATION** P/BSW*

2/ START THE LAPTOP (FROM THE DOCKING STATION)

→ *PUSH THE LAPTOP **START** P/BSW ON THE DOCKING STATION*

LAPTOP START CONFIGURATION

V1813401 - V01T0M0 - VM46D2EFBC22301

E-LOGBOOK DESCRIPTION (2/3)

Electronic Logbook Philosophy

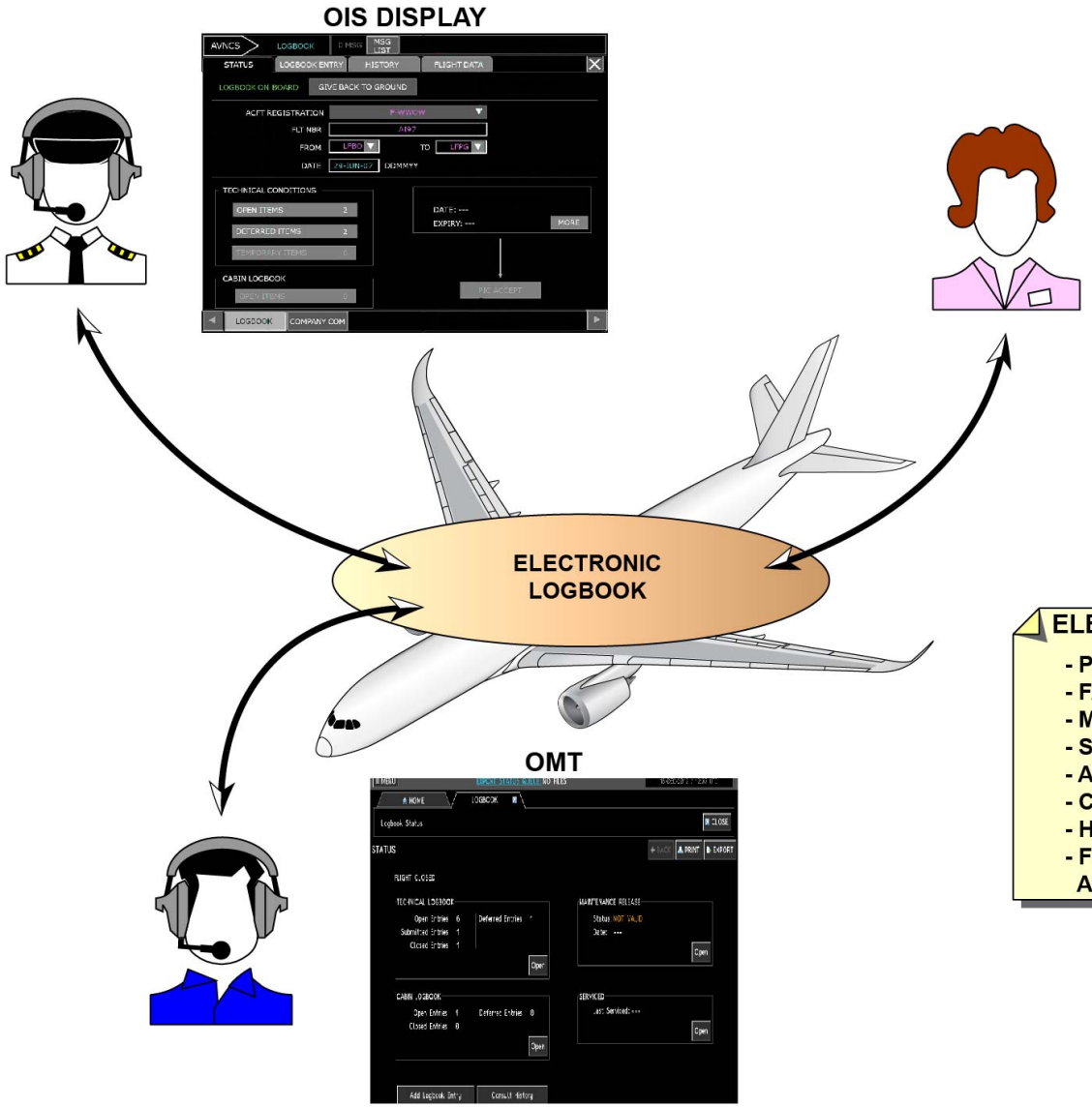
The electronic logbook is an optional onboard application, which can replace the A/C paper logbook. Thanks to digital links, it has much more functions with:
- The A/C systems
- The ground database and digital documentation
- The customization and computation capabilities.

The functions of the electronic logbook are:
- To make the fault report better with the standardization tool used by the pilots and the maintenance and cabin crews.
- To make the troubleshooting efficiency better (standard fault related to the BITE test and Flight Deck Effect (FDE) with a direct link to the applicable documentation like the Trouble Shooting Manual (TSM) and the Minimum Equipment List (MEL)).
- To supply the airline operations with the real time information for the anticipation and scheduling of the dispatch activities.

The electronic logbook functions are dedicated to:
- The flight crew, for all the faults and reports about the flight leg events
- The cabin crew, for all the faults and reports about the cabin events
- The maintenance crew during the maintenance phases.

The electronic logbook does :
- The flight data reports (ie: pre-flight and post-flight reports)
- The pilot, cabin and maintenance crew fault-reports
- The maintenance action report
- The servicing action report
- The A/C maintenance release-report
- The check of the A/C status
- The consultation of the history report, from data logged in the past
- The follow-up of deferred maintenance actions.

V1813401 - V01T0M0 - VM46D3ELOGB3001



ELECTRONIC LOGBOOK FUNCTIONS

- PRE-FLIGHT AND POST-FLIGHT REPORTS
- FAULT REPORT
- MAINTENANCE ACTION REPORT
- SERVICING ACTION REPORT
- AIRCRAFT MAINTENANCE RELEASE-REPORT
- CHECK AIRCRAFT STATUS
- HISTORY REPORT
- FOLLOW-UP OF DEFERRED MAINTENANCE ACTIONS

OIS: Onboard Information System
OMT: Onboard Maintenance Terminal

ELECTRONIC LOGBOOK PHILOSOPHY

E-LOGBOOK DESCRIPTION (2/3)

Electronic Logbook Architecture

The onboard electronic logbook has two applications:
- The Technical and Maintenance LogBook (TMLB) application
- The Digital Cabin Logbook (DCL) application.

The TMLB equipment includes these sub-applications:
- The TMLB application server
- The technical logbook application for the flight crew
- The Maintenance LogBook (MLB) application for the maintenance crew.

The technical logbook application sends commands to the TMLB application server from the flight crew actions and generates the logbook Human-Machine Interface (HMI) dedicated to the flight crew.
The access is possible from the CAPT and F/O interfaces that follow:
- The CAPT and F/O keyboards and KCCUs
- The CAPT and F/O OIS displays.

The MLB application for the maintenance crew is accessible from the maintenance terminal (Onboard Maintenance Terminal (OMT) or Portable Multipurpose Access Terminal (PMAT)). The MLB sends commands to the TMLB application server from the maintenance crew actions and generates the logbook HMI for the maintenance crew.
The TMLB application server manages all the functions of the TMLB applications and records them.
The TMLB application server exchanges data with the DCL application server and the ground logbook application.
The cabin logbook includes the applications that follow:
- The DCL application server
- The DCL application.

The DCL application starts the DCL software. It sends commands to the DCL application from the cabin crew actions and generates the logbook HMI for the cabin crew. The access to the DCL application for the cabin crew is possible from the cabin crew terminal (FAPs). The DCL application server manages all the functions of the DCL application and records them.
The DCL application server exchanges data with the TMLB and the ground logbook application.
The TMLB application has interfaces with the avionics systems that follow:
- The CMS

The electronic logbook receives the tracking data from CMS (The tracking data are actions done by the maintenance crew and automatically reported to the system, e.g. BITE tests). These data are automatically recorded in the maintenance action reports.
The electronic logbook receives the FDE (ECAM warnings) and the dispatch messages from the CMS to give the standardized fault.
- The DLCS

The electronic logbook receives the tracking data (LRU replacement, data loading operations) from the DLCS. These data are automatically recorded in the maintenance action reports.
- The Airline Operational Control (AOC)

The electronic logbook receives parameters from the AOC. These parameters are used to automatically pre-record and compute the flight hours.
- The Simple Data Loader (SDL)

The electronic logbook receives the tracking data (data loading operations) from the SDL. These data are automatically recorded in the maintenance action reports.
- The Maintenance Central Access (MCA)

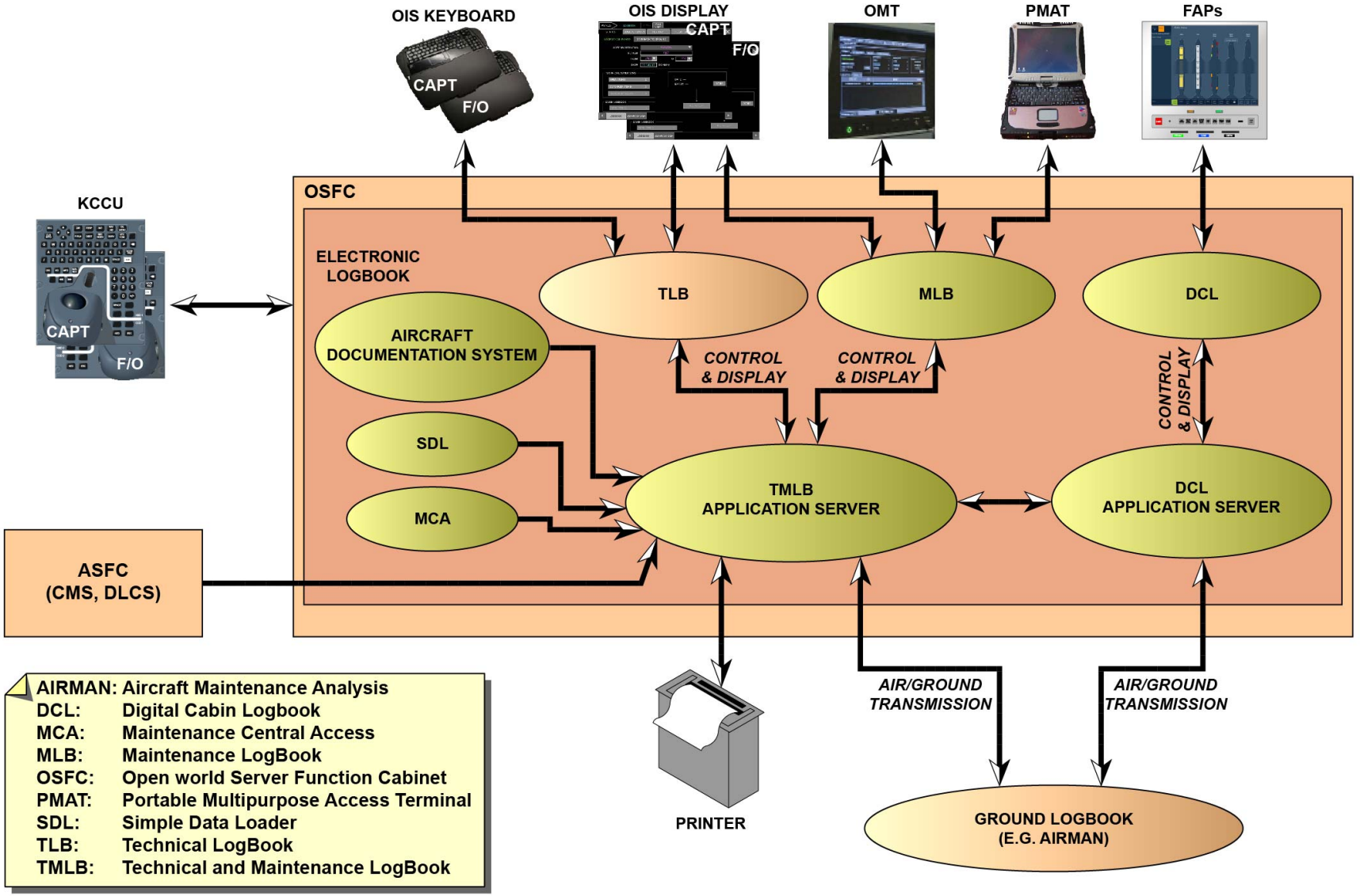
The electronic logbook sends to the MCA the faults occurred during the last flight or updated during the maintenance phase (the MCA puts these faults together with the CMS correlation data (the CMS sends these data/fault to the MCA from the Aircraft Control Domain (ACD))).
- The A/C documentation system

The electronic logbook receives the tracking data (related to maintenance and troubleshooting procedures, MEL and Configuration Deviation List

(CDL) item condition) from the A/C documentation system. This system must be used to automatically record these tracking data in the maintenance action reports. The maintenance crew can use or not these tracking data. The tracking function helps them to decrease the workload.

- Functional interfaces with the ground

The electronic logbook can send its reports to the ground logbook application for the legal repository (through the communication means or exportable media in relation to the electronic logbook configuration).



ELECTRONIC LOGBOOK ARCHITECTURE

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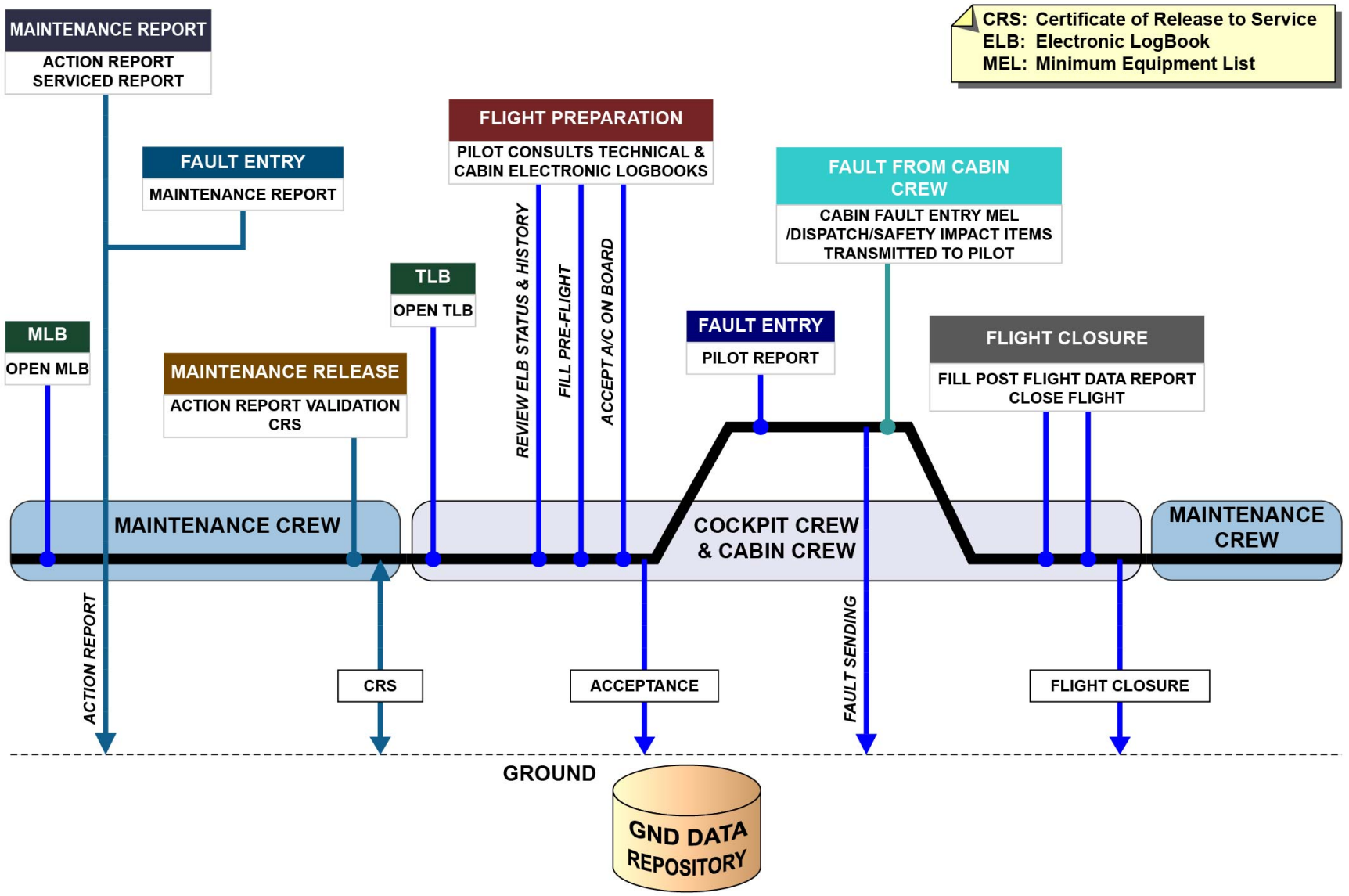
E-LOGBOOK DESCRIPTION (2/3)

Electronic Logbook Use Case

Typical use of the electronic logbook during the phases that follow:
- Maintenance phase
- At the end of the previous flight, after the release of the A/C by the flight crew, the maintenance crew opens the maintenance logbook to start the maintenance phase.
- The maintenance crew:
- Consults the maintenance logbook
- Does the related corrective-maintenance actions (if applicable)
- Records all maintenance actions in the maintenance logbook action report and/or serviced report to answer the flight crew entries.
Note that the maintenance action report is also sent to the ground through communication systems for synchronization with the ground data repository.
- The maintenance crew can also enter the faults if applicable (maintenance reports).
- When all the maintenance actions are closed, the maintenance crew validates all reported actions, fills in and signs the Certificate of Release to Service (CRS).
Note that the CRS is also sent to the ground through the communication systems or the synchronization with the ground data repository.
- The flight leg phase
- Before a new flight leg is started, the flight crew must first:
- Open the technical logbook
- Examines the logbook status (recorded/deferred actions, MEL status, ...)
- Fill in the pre-flight menu
- Accept the A/C from all the logbook information.
Note that the A/C acceptance is also sent to the ground through the communication systems for the synchronization with the ground data repository.
- During all the flight, the flight crew can enter possible faults. The cabin crew can also enter possible faults with the DCL.
Note that if there is a fault entry, the cabin crew has the possibility to transmit the fault with a MEL/dispatch/safety impact to the technical logbook (flight crew side). Then the flight crew can validate or not the cabin crew entry.
- At the end of the flight, the flight crew must close the flight through the logbook. The flight closure is also sent to the ground through the communication systems for the synchronization with the ground data repository.
Then, the maintenance crew takes over and starts again the above process explained.
Note: the synchronization between the electronic logbook and the ground repository makes possible to keep a copy of the logbook data on the ground as a legal repository. This is the same philosophy as the one used by the classic paper logbook.



ELECTRONIC LOGBOOK USE CASE

V1813401 - V01T0M0 - VM46D3ELOGB3001

INTERNAL WIRELESS SYSTEM DESCRIPTION (2/3)

Internal Wireless Presentation

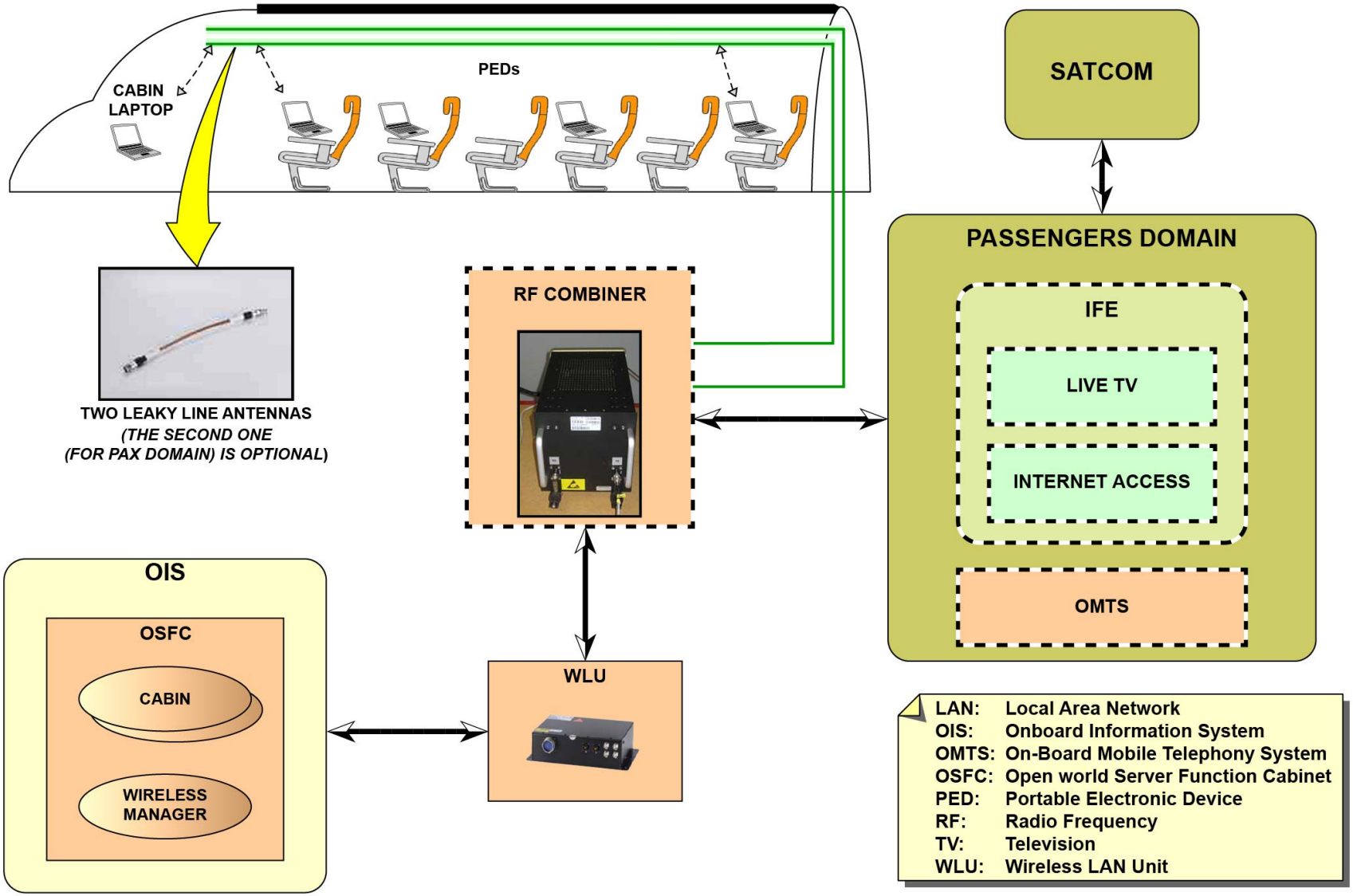
A wireless system has two architectures:
- The basic architecture
- The optional architecture.

The standard wireless-system architecture gives a wireless access to the cabin crew through the Wireless Local Area Network (LAN) Unit (WLU).
It includes:
- The WLU
- One leaky line antenna
- A wireless manager hosted in the Open world Server Function Cabinet (OSFC).

As an option, it can also give a wireless connectivity to the passengers for:
- The IFE system (live TV and Internet access)
- On-Board Mobile Telephony System (OMTS).

In this configuration, the full wireless-system architecture includes:
- An additional leaky line antenna
- An additional Radio Frequency (RF) combiner.

V1813401 - V01T0M0 - VM46D4INTWS3001



INTERNAL WIRELESS PRESENTATION

INTERNAL WIRELESS SYSTEM DESCRIPTION (2/3)

Internal Wireless Detailed Architecture and Components

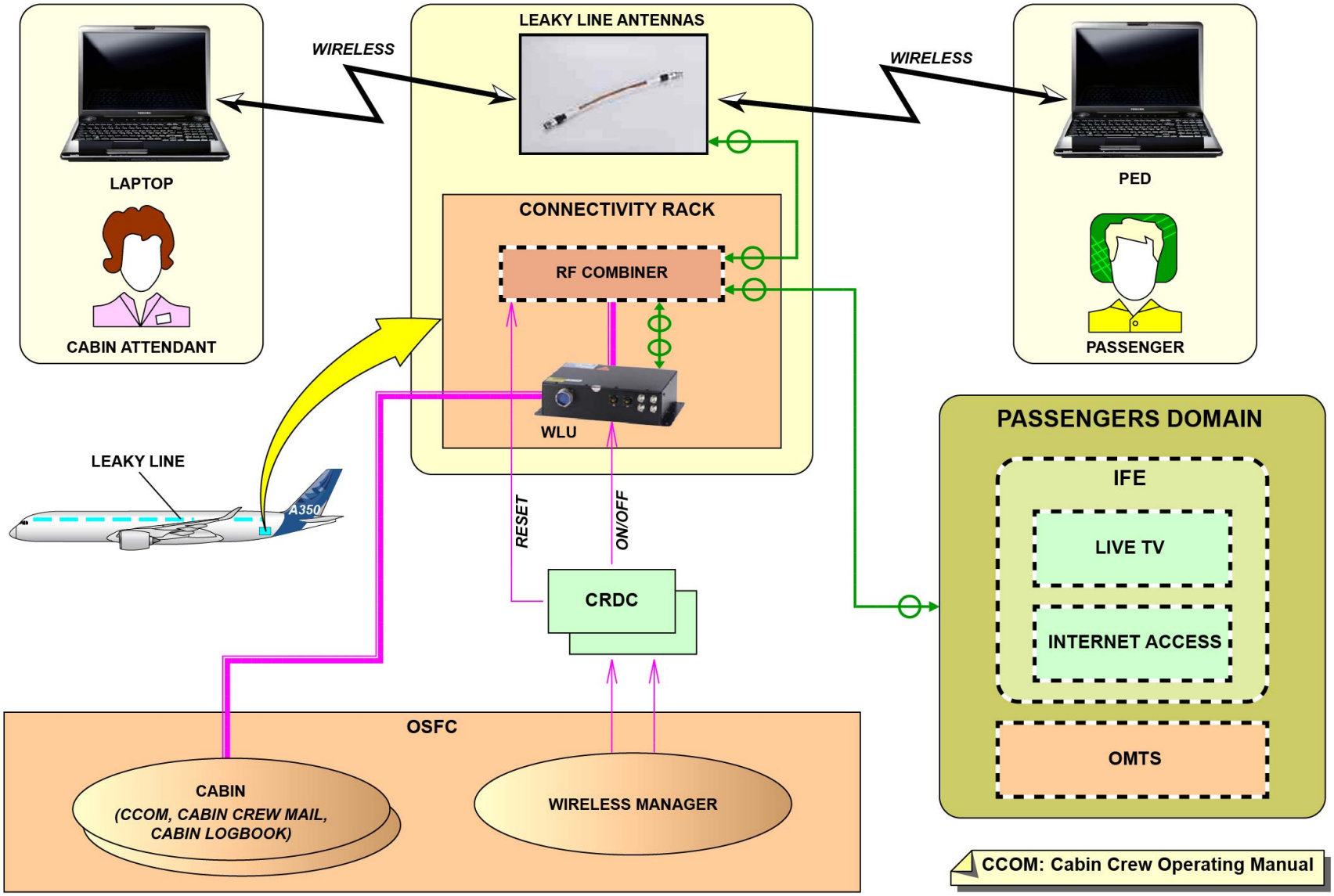
The wireless system gives to the cabin crew the wireless access to:
- The cabin applications (Cabin Crew Operating Manual (CCOM), cabin crew mail, cabin logbook), as a standard option
- The passengers (full option).

The WLU is used as a wireless access point to the cabin and makes the interface with the wireless devices used by the cabin crew members.
The wireless manager, hosted in the OSFC, is an application that controls and monitors the WLU and RF combiner.
In the standard architecture, the WLU is directly connected to the leaky line antenna through a coaxial cable.
In the full architecture, the WLU first receives the HF signal from the RF combiner and changes it into an Ethernet signal and vice versa.
The leaky line antennas constantly transmit the RF signals to the cabin (spectrum from 400 MHz to 6 GHz). The primary function of the leaky line antenna is to supply the signals from some of the RF systems to the cabin, (e.g.: Wi-Fi, Global System for Mobile Communication (GSM)/General Packet Radio Service (GPRS), Bluetooth) as an alternative to some conventional antennas for each RF system and frequency range.
In the standard architecture:
- Only one leaky line antenna is directly connected to the WLU.

In the full architecture:
- The second optional leaky-line antenna is used
- A RF combiner is necessary.

The RF combiner is an optional unit used only in a wireless-system full architecture.
The primary function of the RF combiner is:
- To combine or divide the signals from/to some systems (IFE and OMTS)
- To supply or receive the signals to/from the cabin portable devices through the leaky line antenna.

The wireless manager is a software hosted in the OSFC. It controls and monitors the WLU and the RF combiner through two CRDCs.
The wireless manager uses an Human-Machine Interface (HMI) for the controlling and monitoring means. It gives a solution for the necessary wireless data access to the cabin-operation applications systems.
Through the wireless manager, the wireless system manages:
- The enabling and disabling of the wireless function
- The reset of the WLUs and of the RF combiner
- The monitoring function (BITE concentration for the WLU and RF combiner).



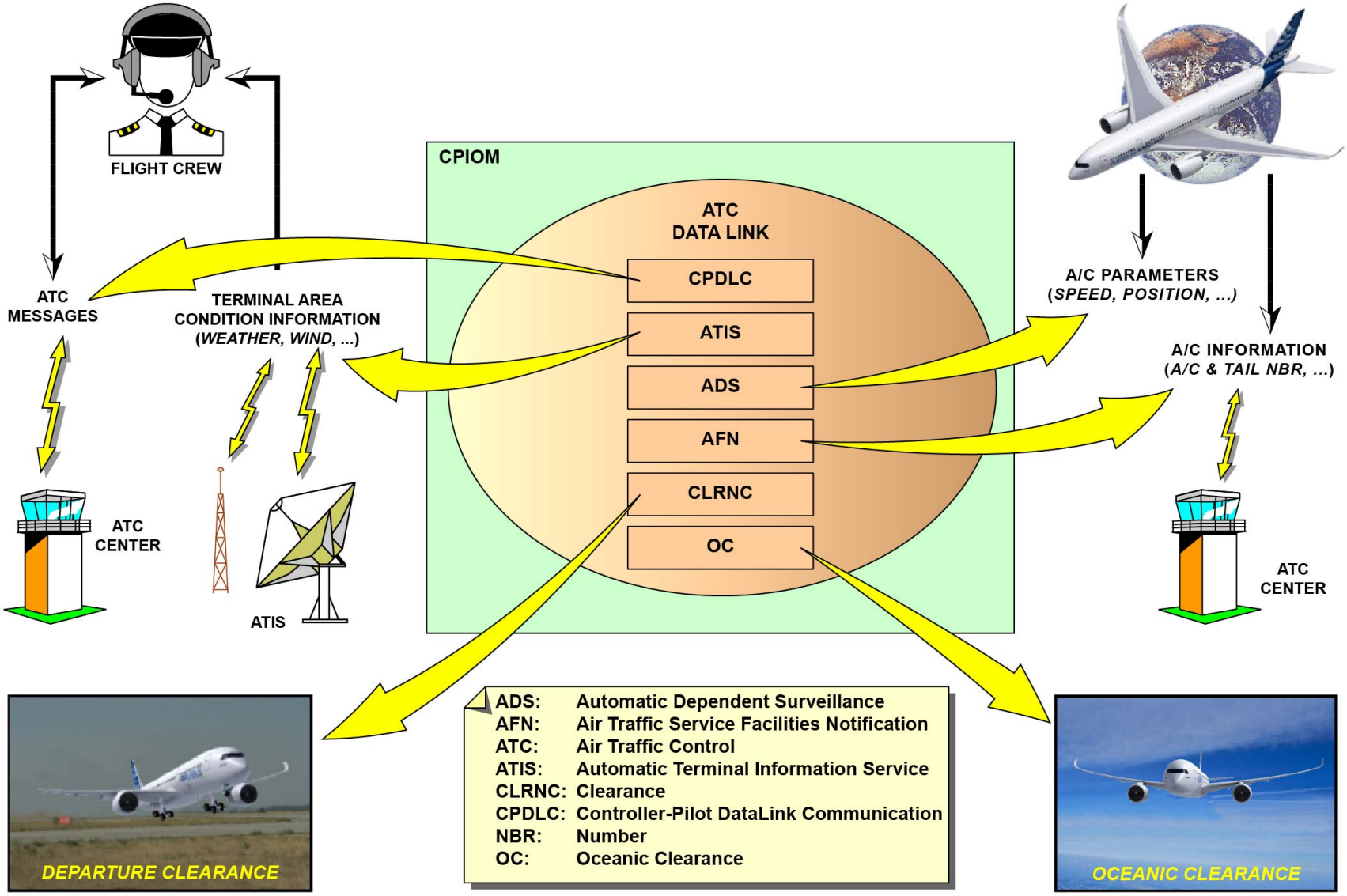
INTERNAL WIRELESS DETAILED ARCHITECTURE AND COMPONENTS

AIR TRAFFIC CONTROL (ATC) SYSTEM DESCRIPTION (3)

Air Traffic Control Presentation

The Air Traffic Control (ATC) system gives the cabin crew the capability to exchange the ATC data link messages with the ground ATC systems and controllers.
The ATC system operates through an ATC data link application hosted in a CPIOM.
The ATC data link application is a group of some oceanic and continental airspace functions, which are:
- The Controller-Pilot DataLink Communications (CPDLC)
- The Automatic Terminal Information Service (ATIS)
- Automatic Dependent Surveillance (ADS)
- Air traffic service Facilities Notification (AFN)
- Clearance (CLRNC)
- Oceanic Clearance (OC).

The CPDLC function lets a dialogue between the flight crew and the ATC through uplink and downlink messages.
A pre-defined set of messages and/or free text can also be sent or received from/to the pilot or the controller.
The ATIS function is used by the flight crew to request and get information about the terminal area conditions, such as the runway, the approach procedure, the meteorological parameters (weather, wind, visibility, clouds, runway surface conditions, ...).
The ADS function automatically gives the surveillance data reports for the transmissions to the ATC centers.
The AFN function is used for the initial data link connections between the A/C and the ATC centers.
This function sends the information about the A/C: aircraft and tail number, ...
The departure CLRNC function lets the flight crew request and get departure clearances.
The OC function lets the flight crew request and get oceanic clearances.



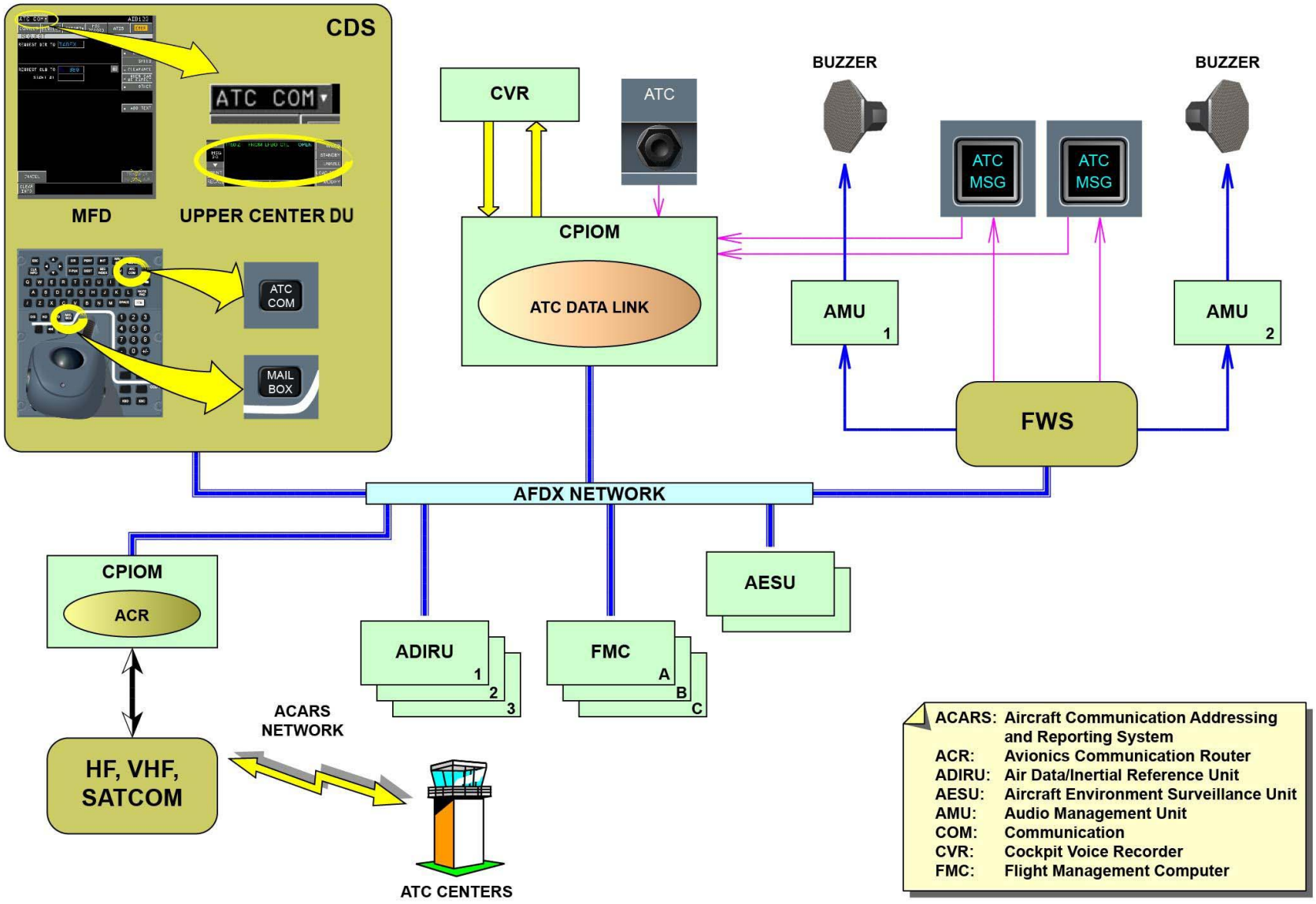
AIR TRAFFIC CONTROL PRESENTATION

V1813401 - V01T0M0 - VM46D5ATC003001

AIR TRAFFIC CONTROL (ATC) SYSTEM DESCRIPTION (3)

ATC Architecture

The ATC system operates through an ATC data link application hosted in a CPIOM.
This application collects or exchanges data with:
- The A/C systems (A/C parameters)
- The printer (e.g. ATIS data printing)
- The ATC centers through the Avionics Communication Router (ACR) hosted in a CPIOM and the communication systems
- The flight crew through different Human-Machine Interfaces (HMIs).
The HMI interfaces and attention getters are:
- The CAPT and F/O ATC MSG P/BSW and the loudspeakers (buzzer) which indicate the arrival of an ATC message
- The CAPT and F/O KCCUs which are used to enter or manage the messages
- An ATC COM page shown on MFDs 1 and 2. This page gives the ATC system information
- An ATC mailbox shown on the SD. This mailbox shows the ATC system messages exchanged between the flight crew and the ATC centers.
The KCCU includes a MAIL BOX key to move the cursor from the MFD to the ATC mailbox and vice versa.
The ATC data link application has interfaces with the next different A/C systems:
- The ACR, which lets the ATC data link application use the worldwide air or ground data communications, through the Aircraft Communication Addressing and Reporting System (ACARS) network and the communication systems that follow:
- High Frequency Data Radio (HFDR)
- VHF Data Radio (VDR)
- SATCOM.
- Three Air Data/Inertial Reference Units (ADIRUs), which give the ATC data link application with the GPS data and time, and air data and inertial reference parameters (speed, position, heading, altitude, ...).
- Three Flight Management Computers (FMCs), which use the ATC data link application to request and receive the route clearance and reports from the ATC centers.
- Two Aircraft Environment Surveillance Units (AESUs), which give the ATC data link application with the Traffic and Collision Alert Avoidance System (TCAS) status (TCAS operational or not).
Note: the TCAS status is used by the ATC controllers on ground, to determine the clearance for flight level appropriately.
- The Cockpit Voice Recorder (CVR), which records ATC written messages, and gives the CVR status (recording failure, ready to record) to the ATC data link application.
- The FWS, which manages through the Audio Management Units (AMUs) the two visual annunciators of the ATC MSG P/BSW and an aural attention-getter ring tone on the loudspeakers.
An ATC P/BSW on the RESET panel lets the crew do a manual reset of the ATC data link application.

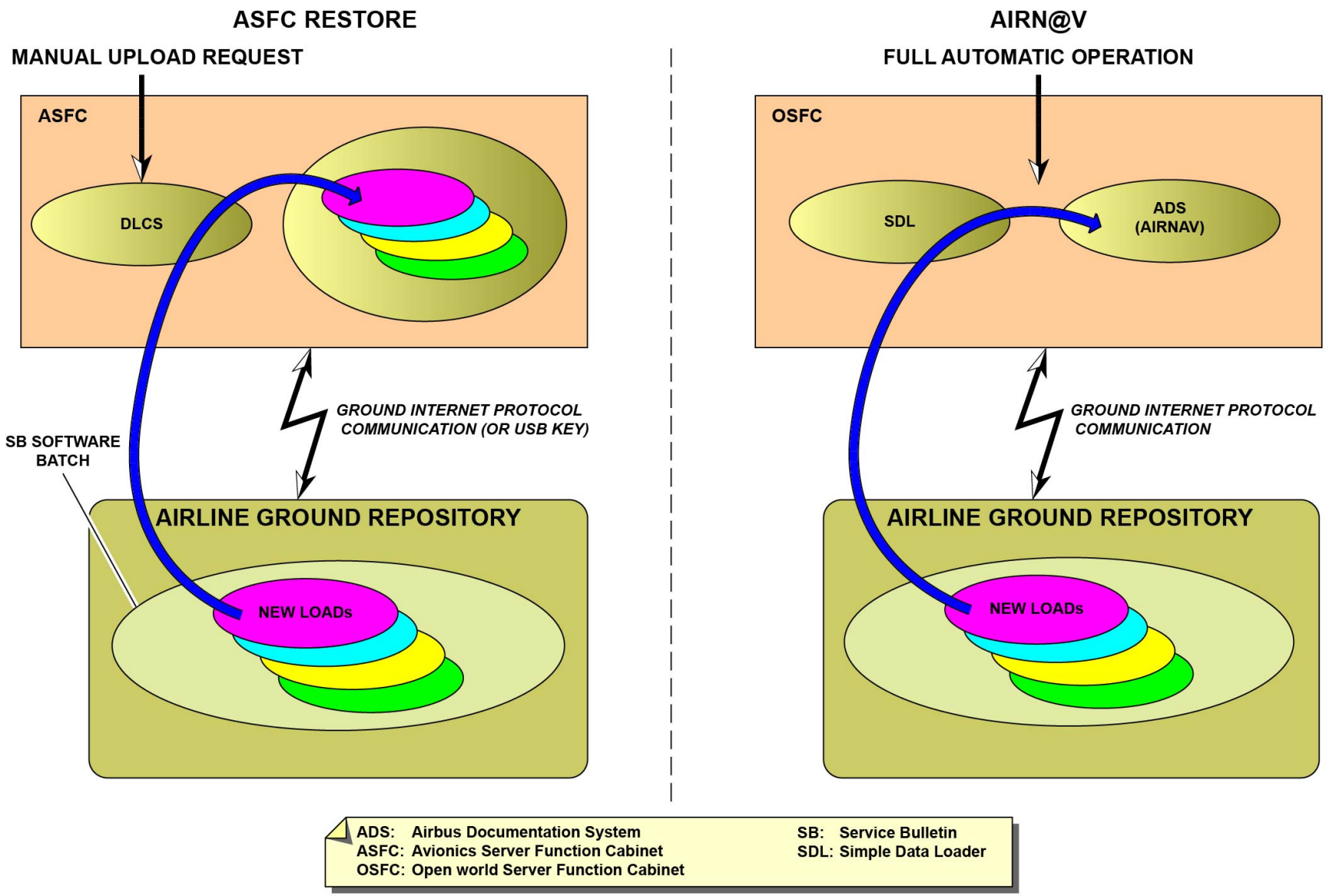


ATC ARCHITECTURE

ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

Electronic Service Bulletin (ASFC)/AirN@V Line (OSFC) Dataloading

Avionics Server Function Cabinet (ASFC) Restore.
To make the uploading procedure of the ASFC easier, an e-SB function has been developed. This function automatically receives (automatic import) all the software that must be loaded in the ASFC. Then, through the DLCS application, the mechanics validate the upload of related software batch to cause the uploading in the ASFC.
Note that this function (e-SB) is only applicable for ASFC cabinet.
AirN@V line uploading
The AirN@V line application is hosted in the Open world Server Function Cabinet (OSFC). The update of the software is a fully automatic uploading operation: when the A/C is on ground (and only on ground), the update software batch is sent from the software administration department of the airline to the A/C onboard repository. After the software authentication, the software batch is automatically uploaded in the OSFC. The entire AirN@V line operation does not need any mechanics action. The start and stop of AirN@V line uploading is fully automatic and transparent for the mechanics. The Simple Data Loader (SDL) application hosted in the OSFC does the management of the uploading procedure.



ELECTRONIC SERVICE BULLETIN (ASFC)/AIRN@V LINE (OSFC) DATALOADING

V1813401 - V01T0M0 - VM46M1OIS003001

ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

ASFC/OSFC Module Maintenance

Failed module identification

Failed module detection

The module failure indication is the same for all modules. When the system confirms a failure, the module is set to fail state by the system. The amber LED is set to a steady ON state and the computing activity of the module is stopped.

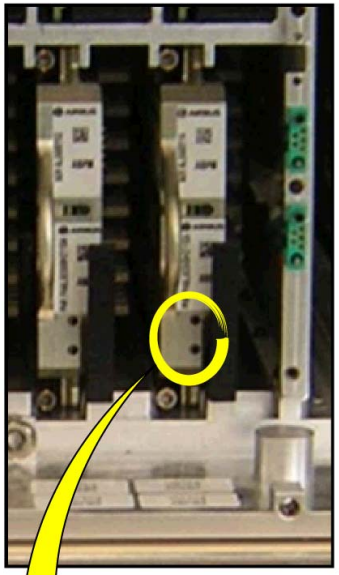
Also, a maintenance message is sent to:

- The CMS if there is an ASFC module failure
- The Local Maintenance Function (LMF) if there is an OSFC module failure.

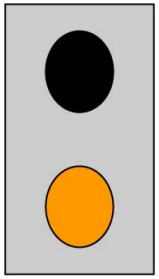
This maintenance message can be retrieved in the Post Flight Report (PFR) that permits a link to the documentation.

For all the modules to replace, the operator will start the maintenance procedures with these steps:

- From a fixed terminal (Onboard Maintenance Terminal (OMT) recommended), consult the AFI (Aircraft Fault Isolation) procedure to confirm the maintenance message:
- Through a module interactive test for the ASFC, or a system/module interactive test for the OSFC
- Through the cabinet status page that gives an indication of the module real-time status
- Go to e-bay with a new module with same Hardware Part Number (H/W P/N) as the failed one
- Open cabinet door (screwdriver is necessary) and find the failed module.



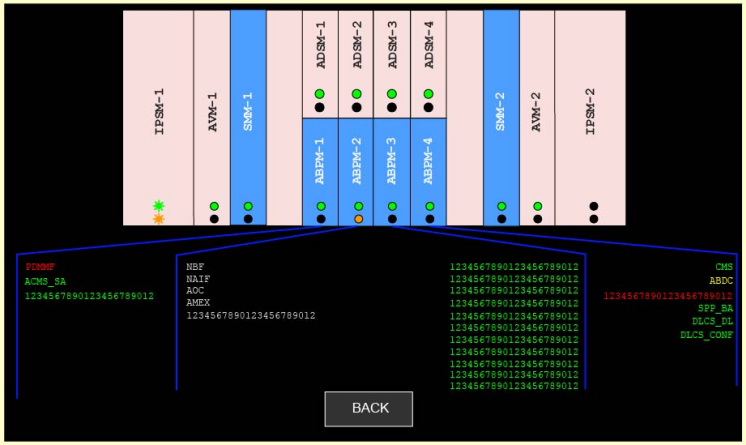
FAILED



MODULE STATUS ON THE MODULE ITSELF
(LED AMBER STATE)

OR

FROM OMT (OR OIS DISPLAY/PMAT)



ASFC MODULES STATUS

OSFC MODULES STATUS

ASFC/OSFC MODULE MAINTENANCE - FAILED MODULE IDENTIFICATION

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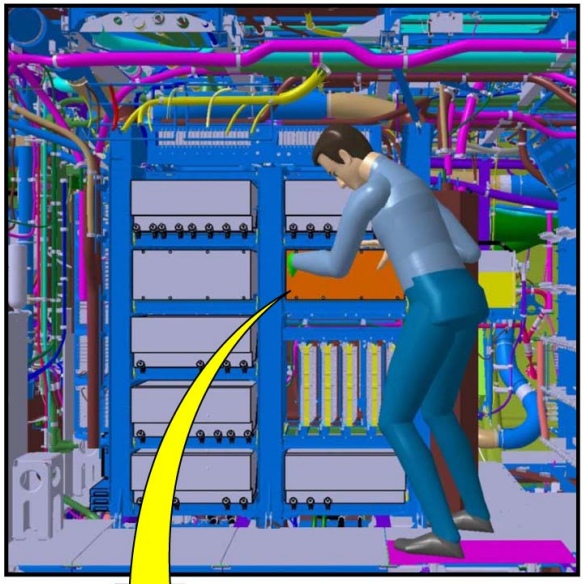
ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

ASFC/OSFC Module Maintenance (continued)

Removal/installation of the module and related tool

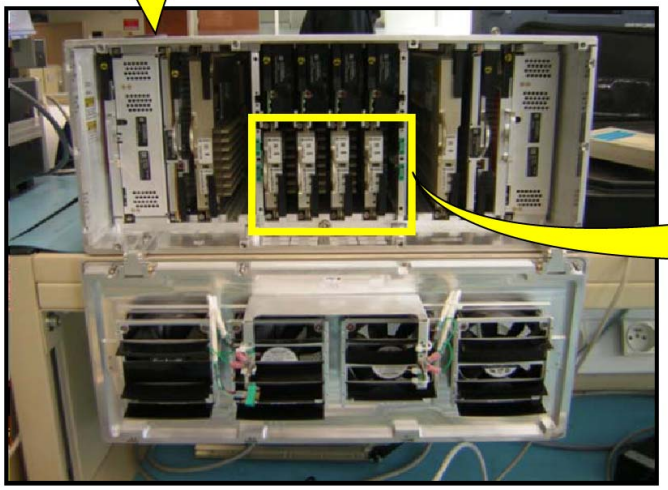
When a module is identified as failed, the removal operation can be done. Each module has installed a front P/B. Each time a module must be removed, the operator must systematically do the steps that follow:
- Loosen all the eight screws with screwdriver to open the cabinet front floor
- Identify the failed module (confirm with a visual indication the maintenance message content)
- Push on the front P/B to start a shutdown of the module. During the shutdown, the amber LED blink until the module can be safely removed. The two LEDs are off (less than 2 minutes after the shutdown starts in a nominal condition).
- Loosen the top and bottom wedge clamps until the white visual indication can be fully seen (approximately 4 mm).

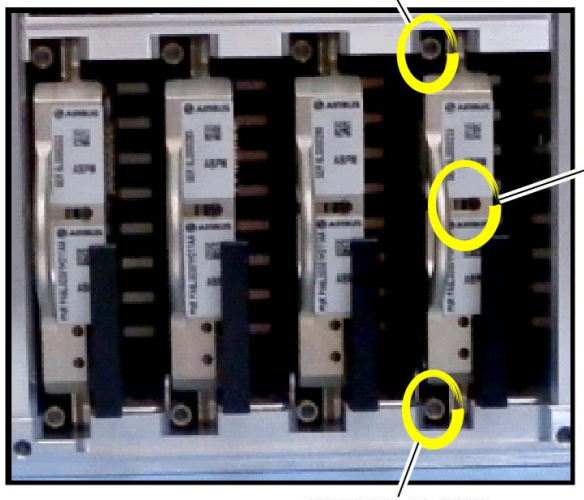
(Each module has 2 wedge clamps but not the Network Server Module (NSM) on the OSFC, which has 4 wedge clamps. Also for A/Open world Data Storage Module (A/ODSM) there is no wedge clamp).
A standard tool can be used for this operation (e.g. Bondhus reference 15205).
Note that the maintainer shall use a wrist strap connected to the ground to decrease ElectroStatic Discharge (ESD) risk during maintenance tasks. The connection can be made directly on a ground part (e.g. 1000 VU).
All different steps are covered in the maintenance procedures with related caution indication when applicable.
The installation is also covered in the maintenance procedures.



WEAR A WRIST STRAP CONNECTED TO THE GROUND TO DECREASE ELECTROSTATIC DISCHARGE RISK

CAUTION





ASFC/OSFC MODULE MAINTENANCE - REMOVAL/INSTALLATION OF THE MODULE AND RELATED TOOL

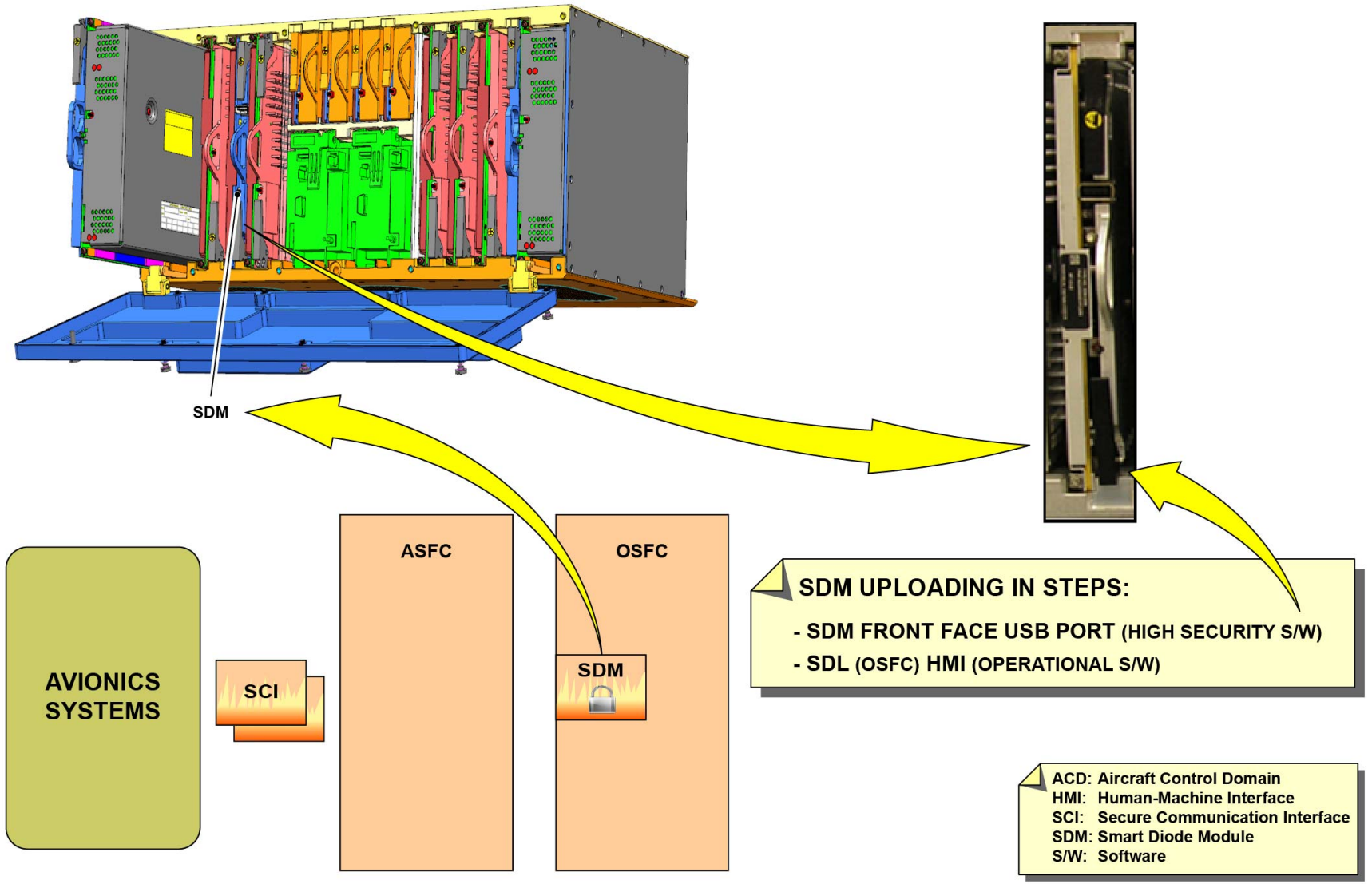
ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

ASFC/OSFC Module Maintenance (continued)

Smart Diode Module uploading specific condition

The Smart Diode Module (SDM) has many functions. The main ones are:
- To secure the ASFC (and avionics part) for possible risks coming from the OSFC (open world data)
- To authenticate the field loadable software.

These security functions are based on two different sets of software loaded inside the SDM.
The list below is non exhaustive, and given for information only:
- High security software, to load first through the SDM front face USB port
- SDM operational software to load then through SDL HMI.



ASFC/OSFC MODULE MAINTENANCE - SMART DIODE MODULE UPLOADING SPECIFIC CONDITION

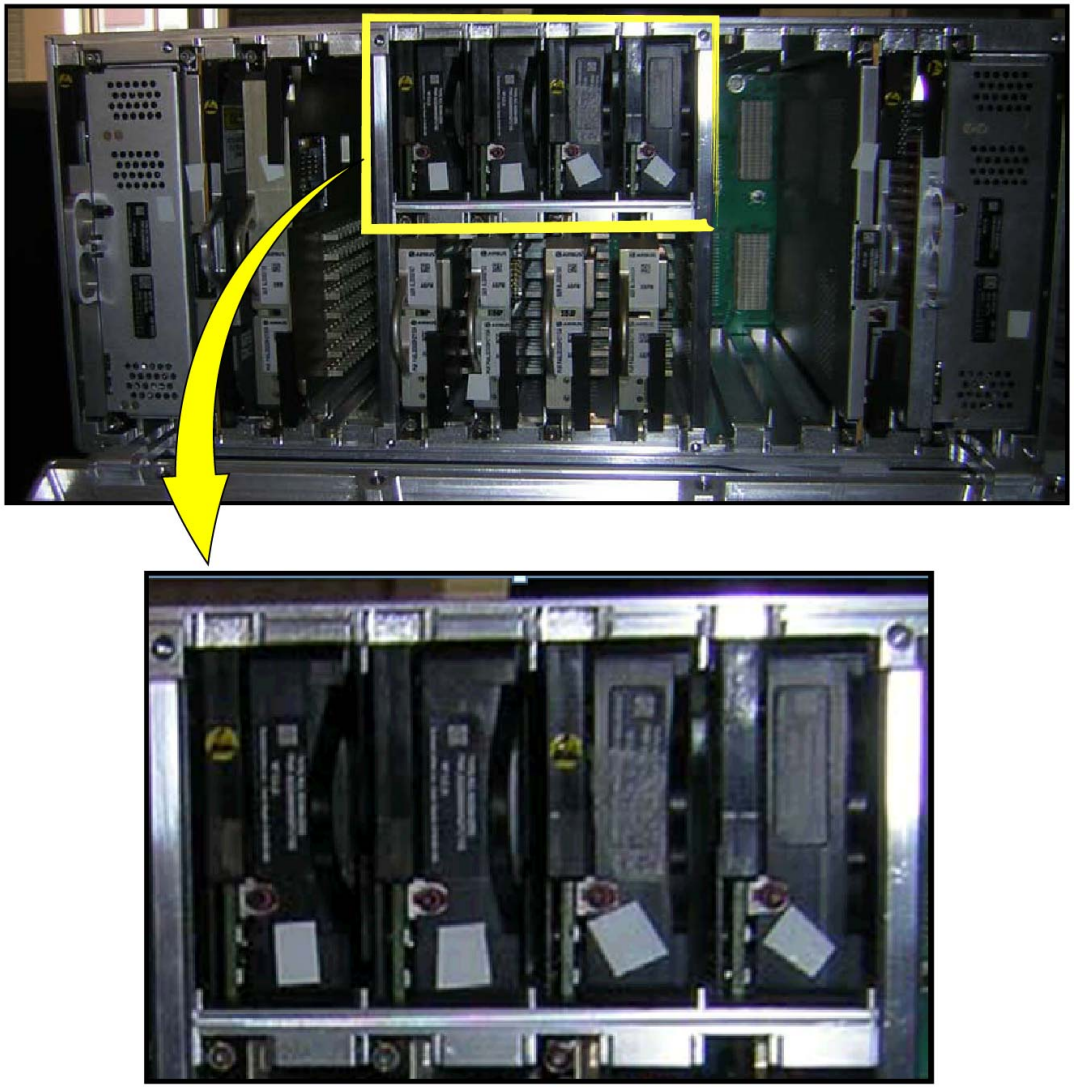
ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

ASFC/OSFC Module Maintenance (continued)

ASFC mass storage recovery

For the ASFC, when two disks (Avionics Data Storage Module (ADSM)) are out of order and if there is a hardware failure or data corruption, it is necessary to go in front of the cabinet to check the LED status (because the ASFC is not serviceable).
From this step, it is necessary to replace the failed disks and to reset the ASFC. Because of two disks are empty (it is the same condition if the four disks are empty) the ASFC switches to a specific mode called automatic dataload mode when it reboots. This mode imports the group 1 software (S/W) through the USB OMT port only. The group 1 S/W is:
- ASFC core S/W
- ASFC configuration loads
- DLCS application.

The group 1 S/W can be dataloaded on the ASFC with the import function.
When the group 1 is imported and deployed in mass storage, the ASFC is automatically reset.
From that point, DLCS HMI is serviceable and the remaining ASF software package can be imported and uploaded on the ASFC.
Note: before you install again all applications, it is recommended to first upload the CMS application to do a system test to make sure that the ASFC is fully seviceable. When the ASFC correct status is confirmed, the remaining application loads can be installed with the DLCS. This operation is approximately two hours without repository initialization.



ASFC ADSM MODULES (4)

ASFC MASS STORAGE RECOVERY

- AT LEAST 2 ADSM FAILED
  - → ASFC INOPERATIVE
  - → AMBER LED ON FAILED MODULES (ONLY FAULT IDENTIFICATION MEAN)
- REPLACE FAILED ADSM
  - → "AUTOMATIC DATALOADING MODE"
- IMPORT GROUP 1 ASFC LOADS FROM OMT IMPORT PLUG ONLY
- AUTOMATIC GROUP 1 LOADS INSTALL + AUTOMATIC ASFC RESET
- INSTALL CMS WITH DLCS TO TEST ASFC CORRECT STATUS
- UPLOAD ALL OTHER APPLICATIONS/ LOADS

GROUP 1 ASFC LOADS:

- ASFC CORE S/W
- ASFC CONFIGURATION LOADS
- DLCS APPLICATION

ADSM: Avionics Data Storage Module
OMT: Onboard Maintenance Terminal

ASFC/OSFC MODULE MAINTENANCE - ASFC MASS STORAGE RECOVERY

ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

ASFC/OSFC Module Maintenance (continued)

OSFC mass storage recovery

For the OSFC, the repair HMI is available on the OMT when:
- Two disks (ODSM) are out of order and there is a hardware failure or data corruption
- The four disks are empty

The actions to do are:
- To start the command repair from the HMI. This action is 20 minutes maximum.
- When the repair is finished, the import and the installation of all OSFC core S/W and configuration loads can be done.
- At the end, a reset of the OSFC is necessary from the Integrated Control Panel (ICP) P/BSW.

From that point, the OSFC menu is available and the other applications can be imported and uploaded on the OSFC.
The mass storage recovery for the OSFC is approximately 3 hours.

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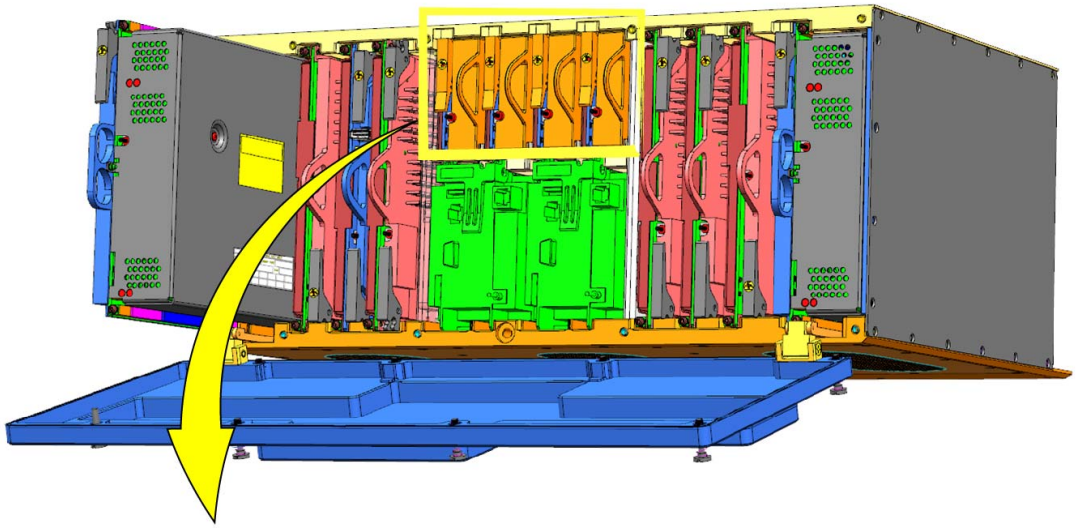

OSFC MASS STORAGE RECOVERY

- AT LEAST 2 ODSM FAILED
  - → AMBER LED ON FAILED MODULES
- OSFC REPAIR ON OMT (~20 MINS)
- IMPORT & UPLOAD GROUP 1 OSFC LOADS
- IMPORT & UPLOAD ALL OTHER OSFC APPLICATIONS/LOADS

OSFC ODSM MODULES (4)

GROUP 1 OSFC LOADS:

- OSFC CORE S/W
- OSFC CONFIGURATION LOADS

ODSM: Open world Data Storage Module

ASFC/OSFC MODULE MAINTENANCE - OSFC MASS STORAGE RECOVERY

ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

Secure Communication Interface Removal and Installation

The Secure Communication Interfaces (SCIs) are used as firewall between the avionics systems and ASFC/OSFC (a part of Onboard Information System (OIS)), to make sure that possible malicious data have not an unwanted effect on the avionics part.
The SCI 1 and 2 have not the same interfaces with avionics systems:
- The two SCIs are connected to ARINC 429 computers and the Centralized Data Acquisition Unit (CDAU)
- But only SCI 1 is connected to the AFDX network.

Because of this, if SCI 1 is removed, all communications between the OIS (ASFC/OSFC) and the AFDX network will be cut until SCI 1 is installed again.

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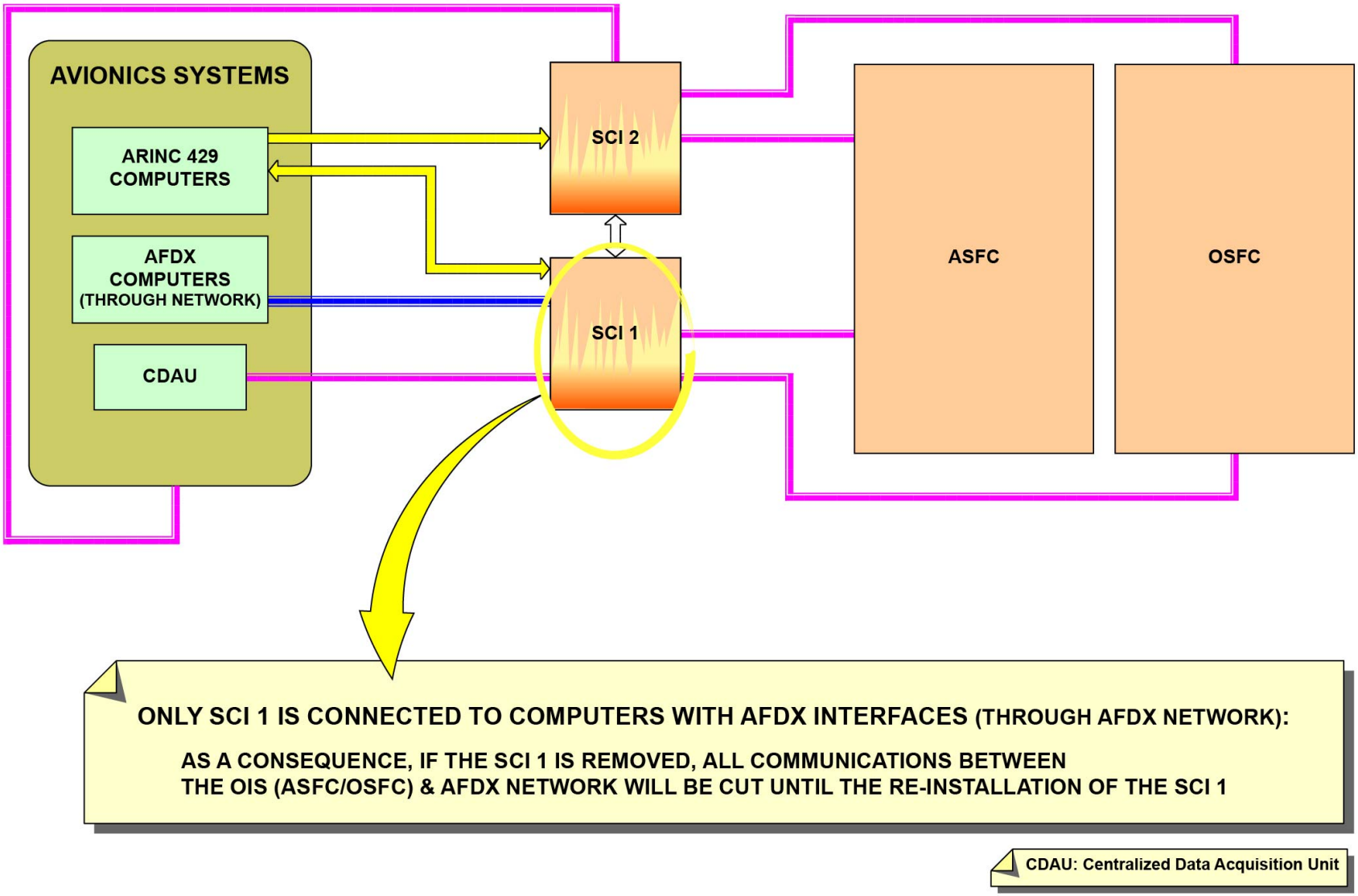

SECURE COMMUNICATION INTERFACE REMOVAL AND INSTALLATION

ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

OMT Maintenance

OMT installation

In the frame of replacement of a faulty OMT, some tips are interesting to be known:
- For OMT installation, note that the screw number 2 is symmetric to the screw number 5 to prevent incorrect installation.
- Be careful with the front glass of OMT. It is not possible to replace it independently. If there is a damage, replace OMT to get a readable OMT glass.

OMT cleaning

During the OMT cleaning:
- Make a cotton cloth moist with the cleaning agent
- Be careful to directly apply the cleaning agent to the cloth and not directly to the screen.

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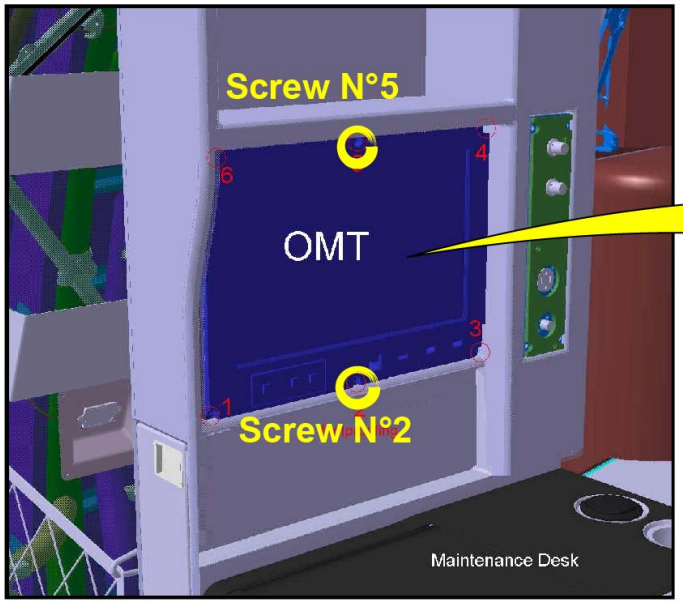
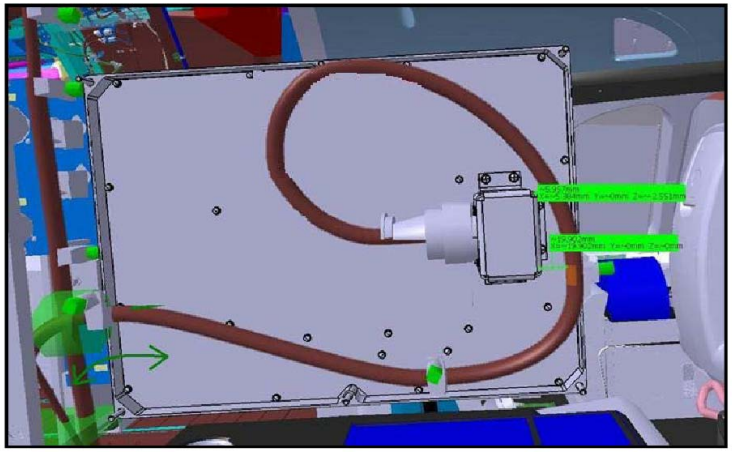


OMT INSTALLATION

-> TO PREVENT IMPROPER INSTALLATION, NOTE THAT THE SCREW N°2 IS ASYMMETRIC TO THE SCREW N°5



CAUTION

BE CAREFUL TO THE FRONT GLASS OF OMT. TO REPLACE THE GLASS, IT IS NECESSARY TO REPLACE THE ENTIRE OMT

OMT CLEANING

- USE A COTTON CLOTH MOIST WITH THE CLEANING AGENT
- BE CAREFUL TO APPLY THE CLEANING AGENT TO THE CLOTH AND NOT DIRECTLY TO THE SCREEN

OMT MAINTENANCE - OMT INSTALLATION & OMT CLEANING

ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

Electronic Flight Bag Laptop Maintenance

Monitoring page principle

When an Electronic Flight Bag (EFB) class II failure is found, even if the EFB is not an A/C component, first a related logbook entry must be created. Then, the mechanics have to troubleshoot the EFB failure to find if the root cause of the fault is an A/C or an EFB laptop related fault:

- A/C fault condition: repair A/C refer to Airbus AFI
- Laptop fault condition: reset laptop and if necessary, repair laptop refer to airline procedure.

The EFB monitoring page is an application supplied by Airbus and to be installed on each EFB laptop. This application gives a real-time status of the A/C interfaces as shown by the laptops connected to the docking stations.

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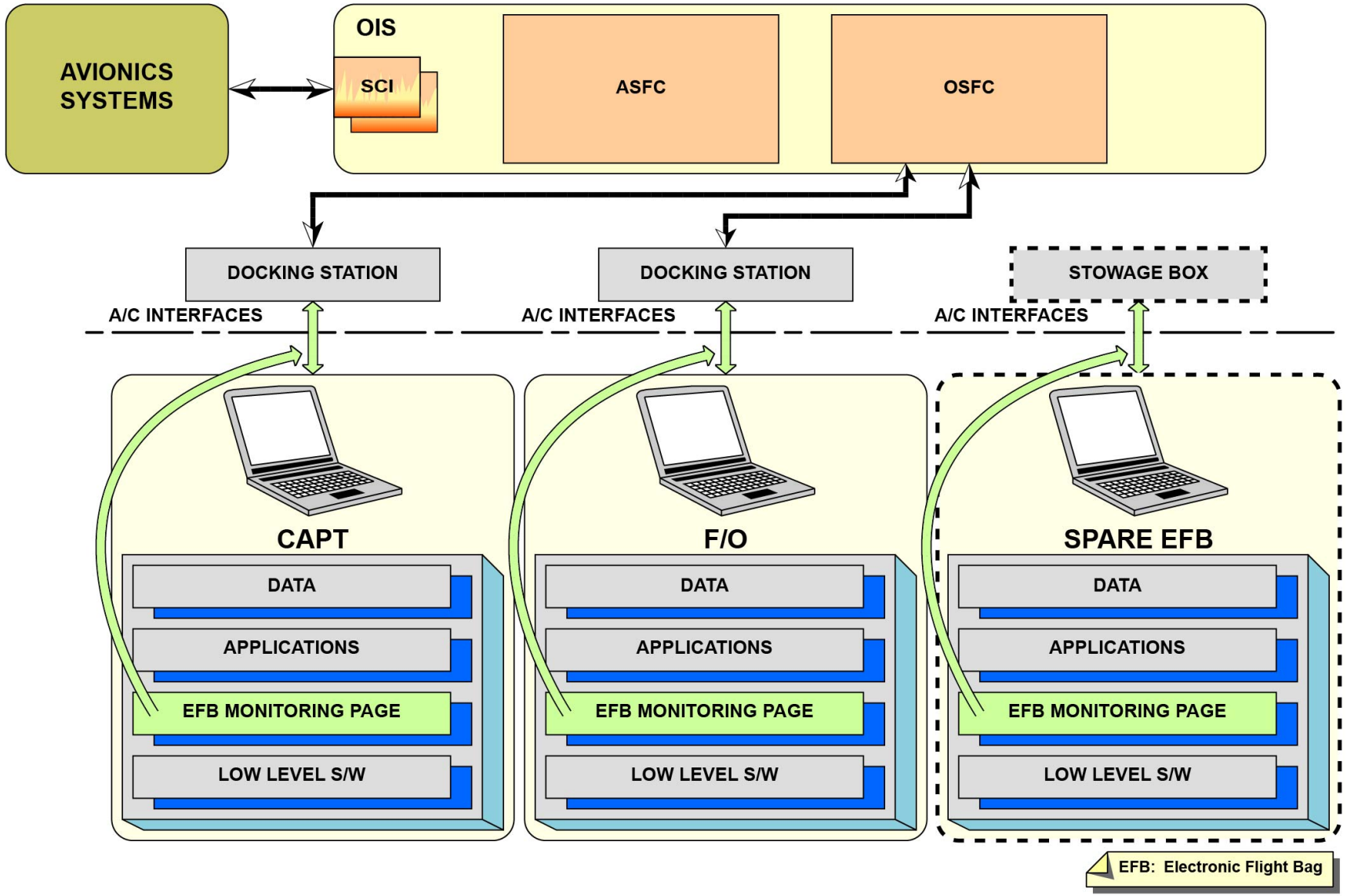


ELECTRONIC FLIGHT BAG LAPTOP MAINTENANCE - MONITORING PAGE PRINCIPLE

V1813401 - V01T0M0 - VM46M1OIS003001

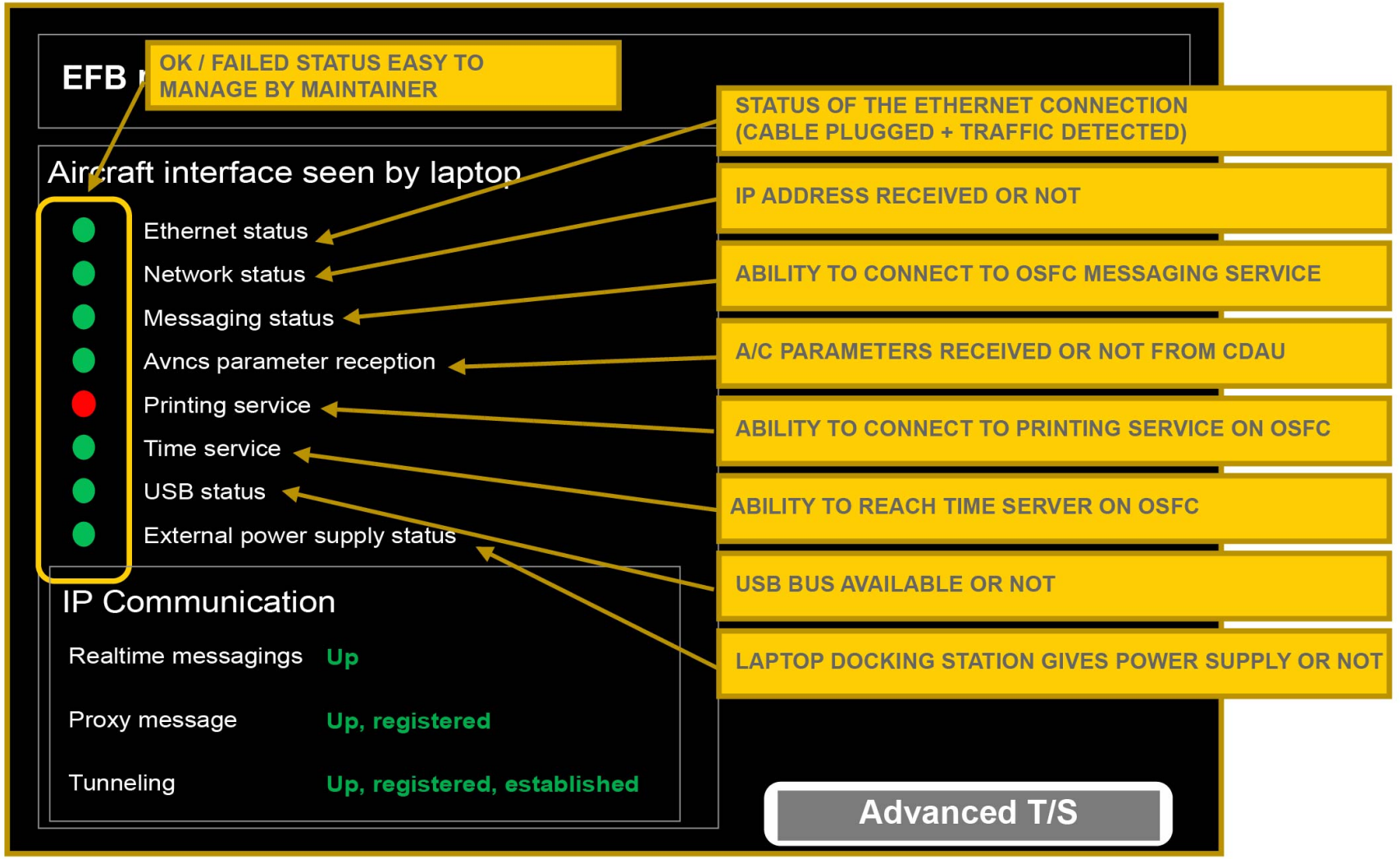
ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

Electronic Flight Bag Laptop Maintenance (continued)

Monitoring page HMI

The EFB monitoring page gives the status of the different interfaces between the A/C and the laptop shown by the laptop, like:

- Ethernet status
- Network status
- Messaging status
- Avionics parameters
- Printing service
- Time service
- USB status
- External power supply status
- IP communication messaging.



ELECTRONIC FLIGHT BAG LAPTOP MAINTENANCE - MONITORING PAGE HMI

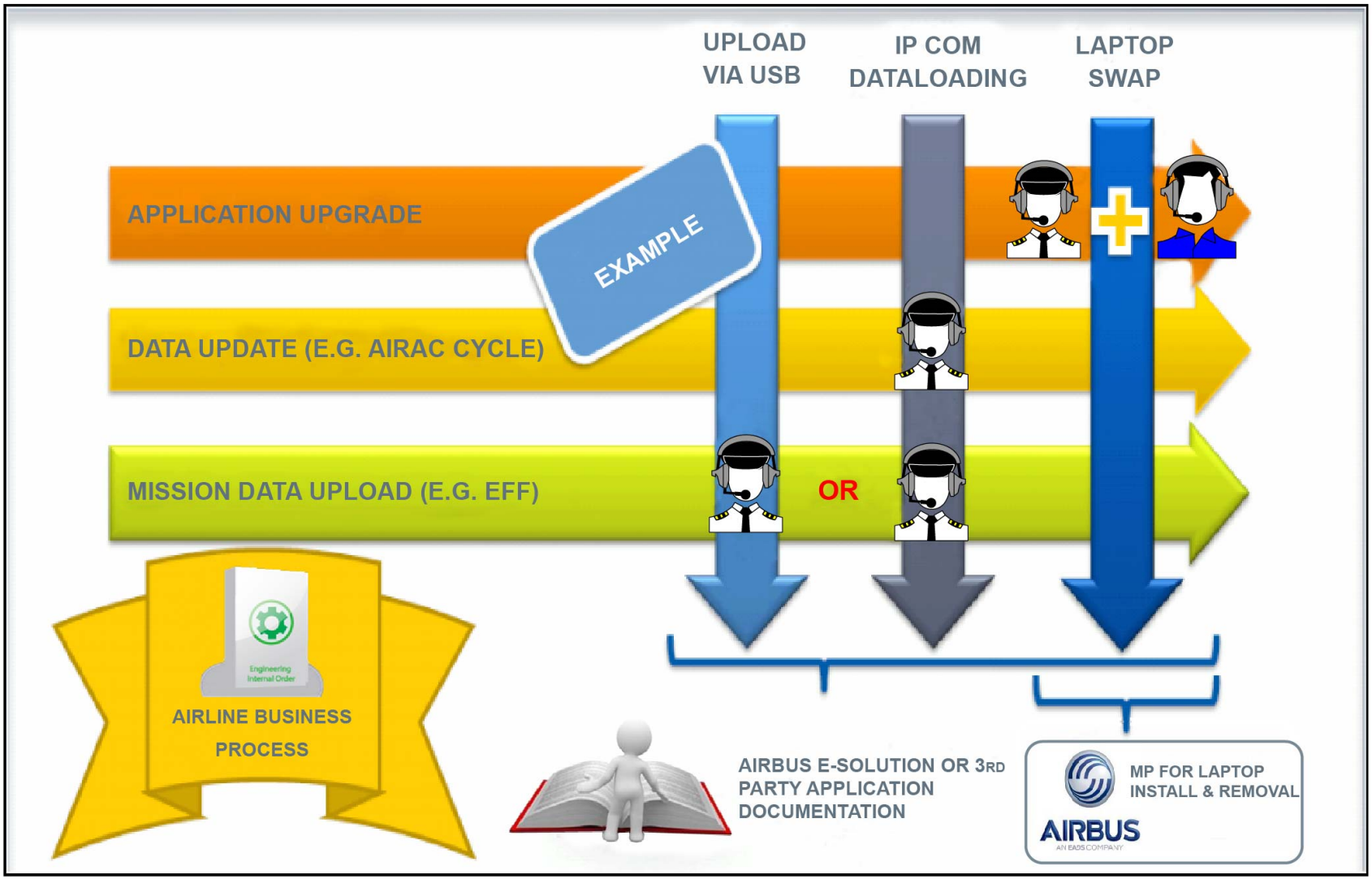
V1813401 - V01T0M0 - VM46M1OIS003001

ONBOARD INFORMATION SYSTEM (OIS) MAINTENANCE (2/3)

Electronic Flight Bag Laptop Maintenance (continued)

Example of tasks assignment

Different sets of software can be loaded in the EFB laptop, mainly flight Operations (OPS) applications. The flight crew can mainly manage uploading operations. But as an example, the mechanics can replace or swap operations of the EFB laptops.



ELECTRONIC FLIGHT BAG LAPTOP MAINTENANCE - EXAMPLE OF TASKS ASSIGNMENT

ONBOARD INFORMATION SYSTEM (OIS) CONTROL AND INDICATING (2)

OIS Main Interfaces (2)

Onboard Information System (OIS) Human Machine Interfaces:
- The Onboard Maintenance Terminal (OMT) is located near from the third occupant seat. It is fitted with one import and one export USB plugs, one Ethernet plug dedicated to the Portable Maintenance Terminal (PMAT) and one plug to connect the OMT keyboard stowed on the wall just near from the OMT.
- In addition to the OMT the mechanics can use the CAPT & F/O Control and Display System (CDS) outer displays dedicated to OIS function. To interact with these DUs, the crews can use associated keyboards installed on the sliding tables.
- Capt and F/O can get access to flight crew related applications (perfos, Flight folder, etc.) and databases on the CDS Outer displays. These applications are computed either by the OIS cabinets or by the Electronic Flight Bag laptops stowed in two docking stations located behind each flight crew.
- Flight or maintenance crew can use the cockpit printer to print any necessary reports; some reports can be also printed automatically upon logic.
- on the overhead panel, some information are also available in order to control the OIS, such as the OIS reset breakers.

OIS - General (2)

OIS Maintenance Application access and navigation from CAPT OIS
On OMT, when OIS starts-up, the OMS Home page is automatically displayed
On CAPT OIS Display, when OIS starts-up, "OIS Menu" dedicated to Flight OPS Applications is automatically displayed.
Nevertheless it is possible for mechanics to get access to the OMS Applications from the OIS Displays:
- On CAPT side: with OIS Menu page displayed, select Ctrl+OIS Menu keys on the keyboard: OMS home page replaces OIS menu page. Note that same philosophy is applied on F/O side.
OIS Flight OPS Application access and navigation
The OIS MENU page gives possibility to select several applications on two different parts:
- Avionics part (upper part) gives access to the Logbook and Company COM applications hosted in OIS cabinets
- EFB part gives access to the following flight crew dedicated applications hosted in the EFB laptop (non-exhaustive list):
  OPS LIBRARY
  FLT FOLDER
  FLT OPS STATUS
  T/O PERF
  LOADSHEET
  CHARTS
  IN-FLT PERF
  LDG PERF
There are several ways to switch from Avionics to EFB Applications:
First case: EFB software are provided by airbus:
- software switching (automatic/transparent for the user) by pointer selection on the screen
- in case of software switching failure, use the "OIS AVNCS/EFB" toggle switch to select Avionics or EFB part.
Second case: EFB software are not provided by airbus:
- software switching may be not possible; in this case, use the "OIS AVNCS/EFB" toggle switch to select Avionics or EFB part.
OIS isolation from Flight or cabin domains
It is possible to interrupt the flow of data from different FSA-NG domains through the following PB/SW located on the overhead panel:
- "OIS DATA TO AVNCS" pushbutton: to stop communication between flight domain and OIS

- "CAB DATA TO OIS" pushbutton: to stop communication between Wireless and In-Flight Entertainment System (IFE) and OIS
- "GATELINK": to stop IP communication with the ground.

Activation of PMAT Plugs

It is possible for maintenance purposes to connect PMAT laptop in particular for work outside of the aircraft. In this case, the "MAINT GND CONNECTION" pushbutton located on the overhead panel must be pushed in, "ON" legend illuminated. This enables all PMAT to exchange data with the OIS platform.

OIS ASFC and OSFC reset

- On overhead panel:
- the "OIS AVNCS" reset switch is used to reset the Avionics Server Function Cabinet
- the "OIS CAB & MAINT " reset switch is used to reset the Open-World Server Function Cabinet.

Printer Controls (2)

Cockpit and Cabin Printer Manager from OMT (Cabin printer is optional)
On OMT, select "Utilities" menu, then select "Printer Manager": this page gives the mechanics the list of all documents sent to the printer with the following information:

- Filename
- Date
- Domain
- Pages
- Source
- Status: pending, printing, failed

Utilities Function (2)

Data Export function:
On OMT, select Utilities Menu, select "Export Box:
This page enables the mechanics first to select files available for export and then to select export mean in order to trigger the export. Another page then enables to monitor the status of the export jobs (exporting, exported, export failed...).

Import/Export Status Function:
On OMT, select Utilities Menu, select "Import/Export Msg Queue":
This page enables the mechanics to monitor the import/export transfer status with associated priority information.

A/C COM Status Function:
On OMT, select Utilities Menu, select "A/C COM Status":
This page enables the mechanics to monitor the status of all communications means (available, not avail, connect,...).

Technical Logbook Consultation and Use (2)

Access to Technical Logbook from Capt OIS display.
On Capt Outer display, OIS Menu page:

- Select "LOGBOOK STATUS" button or "Status" in eLogbook" Menu,
- Select "OPEN" in TECHNICAL Logbook area: this pages gives the view of all technical logbook entries with associated information,
- Select "DEFERRED Entries": gives the view of all deferred technical logbook entries with associated information.

Now, in header part of OMS HMI, select Menu, then eLogbook:

-Select 'Specific Functions" tab: this page shows specific functions used to manage the eLogbook: it enables to manage synchronization with the ground and to get access to data administration functions (such as history erase and user account management),

-Select "Board Configuration" tab: this page enables to get access to the eLogbook configuration status.

Maintenance Logbook Consultation and Use (2)

Create a new Logbook Entry
On OMT, on the Logbook status page, select "Add Logbook Entry" button or Add Logbook Entry in Logbook Status Page: then select either:

- "ECAM ALERT" button: to select entry among the ECAM Alerts list,
- or "KEYWORD" button: to select the entry from keyword search,
- or "FREE TEXT" button: to write the entry as free text.

Then it is necessary to store the new entry in the Technical Logbook to record it.
Get access to Serviced Report.
On OMT, select "LOGBOOK STATUS" button, then select "OPEN" button in the Serviced area: this page enables the mechanics to report on the eLogbook all servicing actions he has done on the aircraft.
Get access to Maintenance Release
On OMT, select "LOGBOOK STATUS" button, then select "OPEN" button in the Maintenance Release area: the mechanics use this page to answer to logbook entries in order to make the aircraft release possible.

Digital Cabin Logbook Consultation and Use (2)

Digital Cabin Logbook Use
On the MP-FAP, click on Service Overview Menu button
Then in "Cabin OPS Applications" lateral menu, select "DCL" (Digital Cabin Logbook): "Log" page comes into view: this page shows all cabin logbook entries with detailed associated information (such as component/defect, fault code, severity, time...).
Then on the left area menu, select "Cabin Service Availability" function: the "CDL>>Cabin Service Availability" page comes into view: this page gives a graphical view of defects in the cabin and associated status (open, deferred).
Then in "Cabin OPS Applications" lateral menu, select "Scratchpad".
Then select "Create Report": the "DCL>>Scratchpad>>Create Report" page comes into view: this page is used to enter a new cabin defect. Defect can be entered from several criteria (keyword search, or location, etc...).

Wireless Manager Status and Reset (2)

Access Wireless Manager Control and Monitoring.
On the MP-FAP, click on Service Overview Menu button.
Then in "In flight Entertainment" lateral menu, select "VM" (Wireless Manager): "Wireless Manager" control and monitoring page comes into view: this page is used to monitor the status of the Cabin Wireless Communication Systems (WLAN Unit and RF-Combiner if installed). It is also possible to reset these components through this page.

Open World (OSF) Local Maintenance Function (LMF) (2)

Access to Open-World Interactive BITE
On OMT, select "Administration" Menu, select "Open-World System Report/Test" Menu.
Then select OSF button: this menu gives access to the interactive tests functions of the OSFC components through three menus:
-TEST: system or modules tests
- REPORTS:
- Service Statuses: to see the status of basic services applications,
- Application Statuses: to see the status of OSF applications,
- LED Statuses: to see the status of the modules.
-SPECIFIC FUNCTIONS:
- RESET Applications: to reset OSF applications,
- BITE Memory Download: to download BITE Memory.
The "Open-World System Report/Test" also gives access to maintenance functions of the Cabin Wireless LAN system:
- Wireless Radio Switch ON/OFF,
- WLAN Unit reset,
- RF-Combiner (If installed) reset.

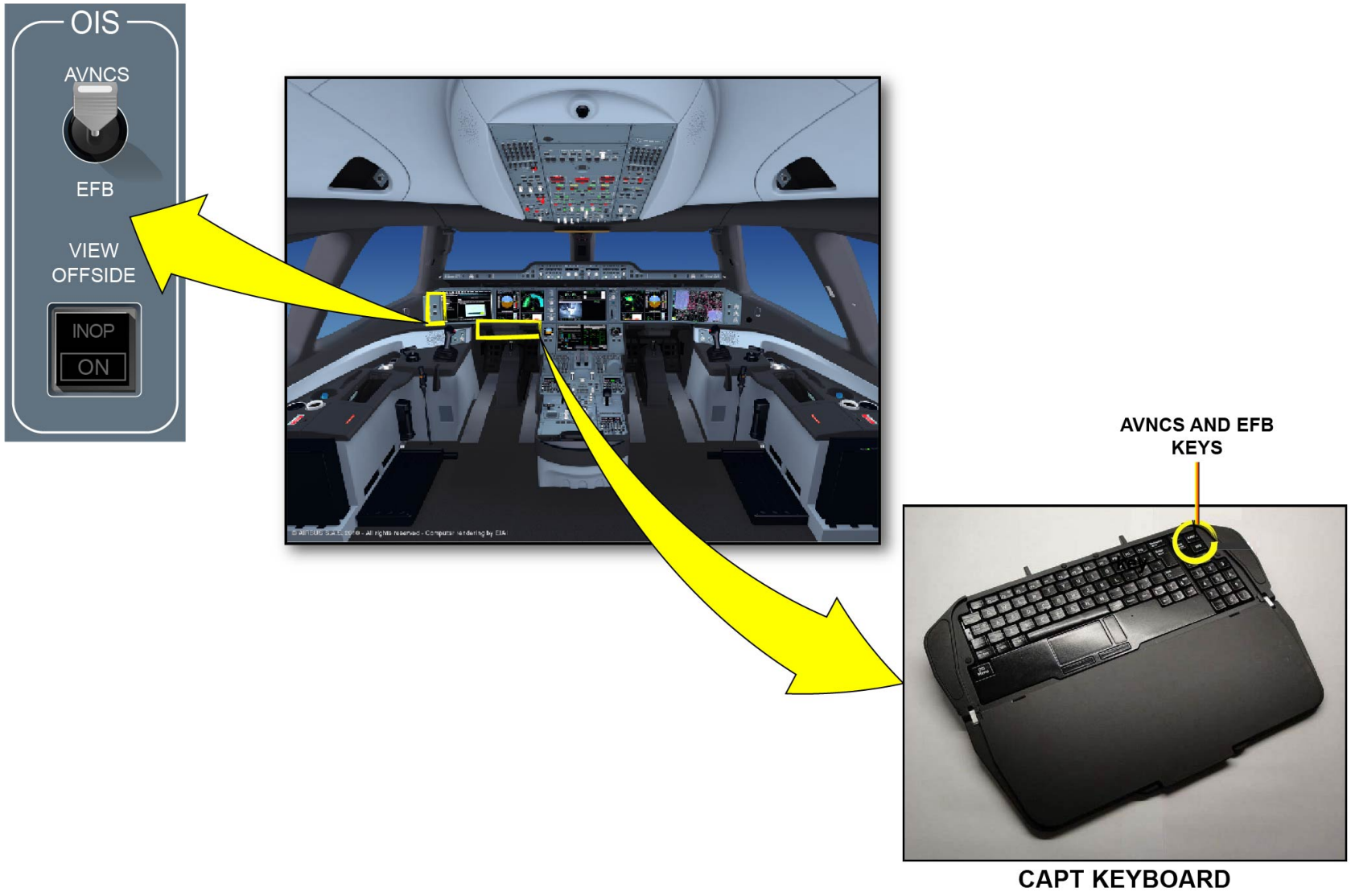
Open World (OSF) Simple Data Loader (SDL) (2)

Access to Open-World Upload & Configuration Validation.
On OMT, select "Administration" Menu, select "Open-World Upload & Config Validation" Menu.
PN Upload (Or SDL-TARGET LIST) page: this page is used to select the software to upload into the OSFC.
Software can be selected from Inbox (Further Data import) or from the Reference (Software currently available).
After software selection, click on "Upload" button to launch the upload phase.

Once uploaded, is performed, software must be validated. Use Access to validate button to select the software you want to validate. Further, upload and validation, a reboot of OSFC should be performed. Use the Reboot button.

Air Traffic Control (ATC) (2)

Perform basic management of ATC function
ATC function can be reset using reset switch on the overhead panel
When a message from an Air Traffic Control (ATC) Controller is received onboard the aircraft a ring is heard in the cockpit and the "ATC MSG" pushbuttons on each sides of the glareshield are illuminated.
The flight crew acknowledges incoming message by pressing CAPT or F/O ATC MSG pushbutton
Then the crew checks the message content in the ATC Mailbox area, on Center display unit above the Warning Display area. Through the Keyboard and Cursor Control Unit (KCCU) the flight crew can also ask for pre-formatted or free text questions to the ATC Controller (such as change flight level, departure clearance, oceanic clearance, etc...).



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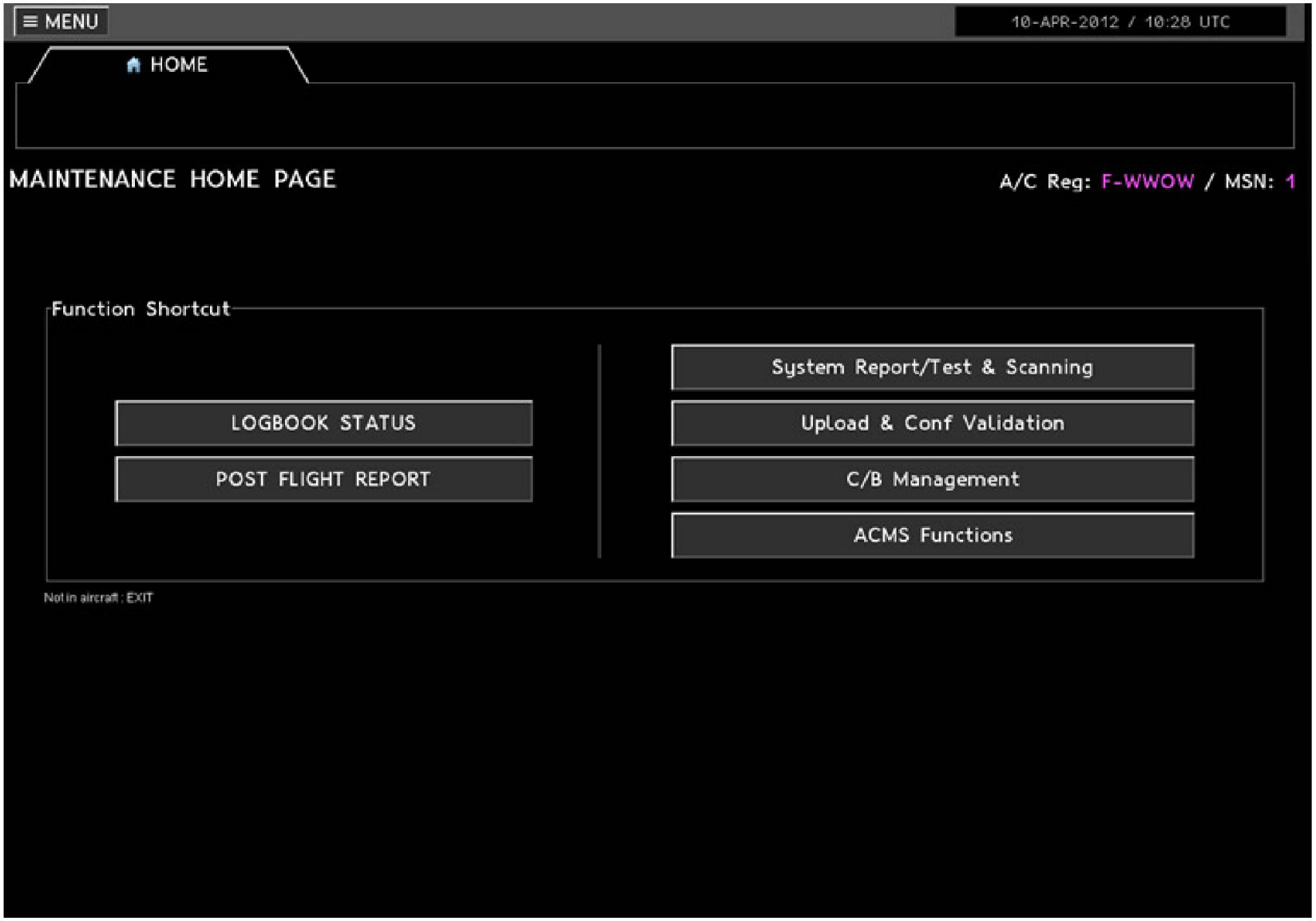

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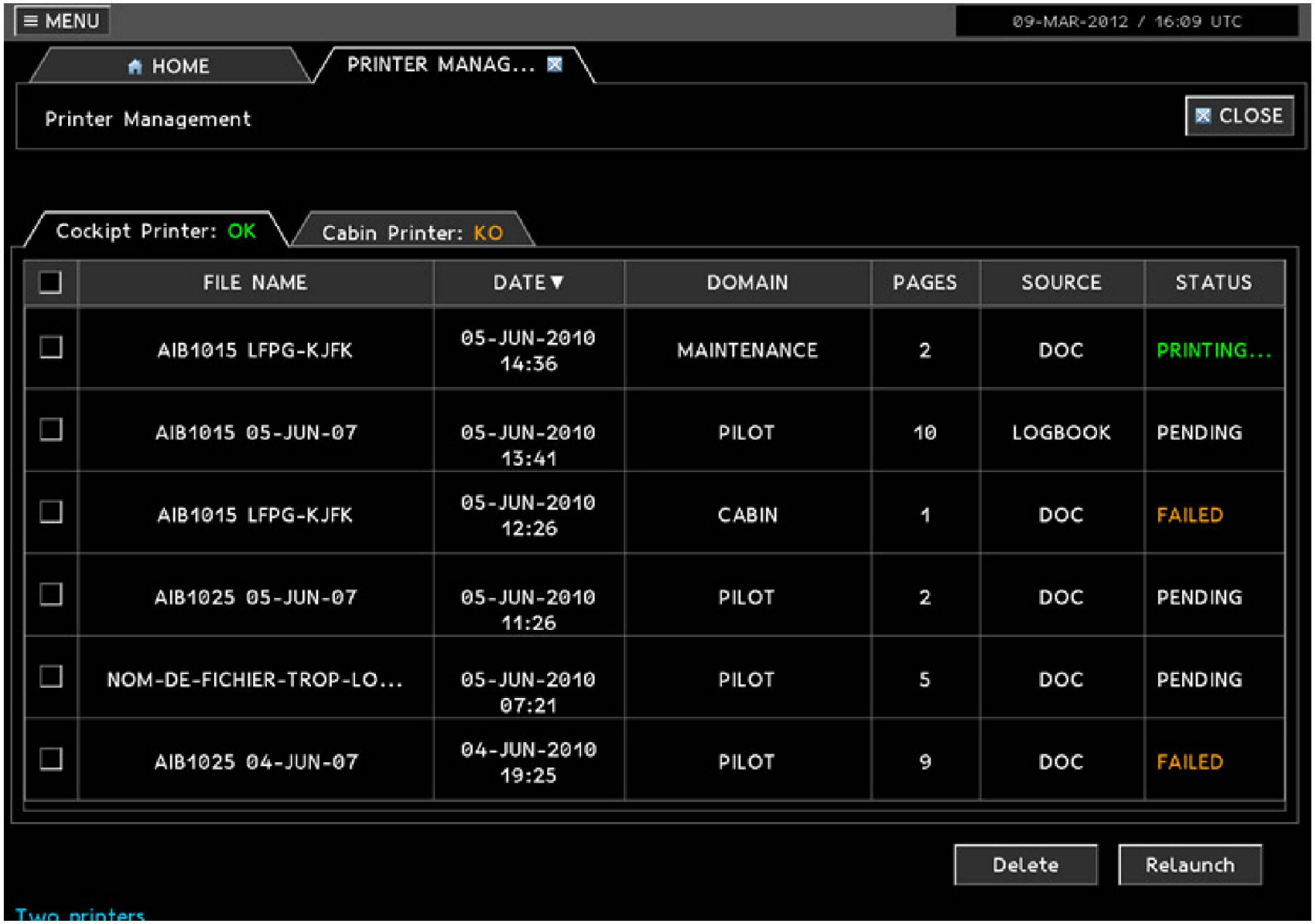

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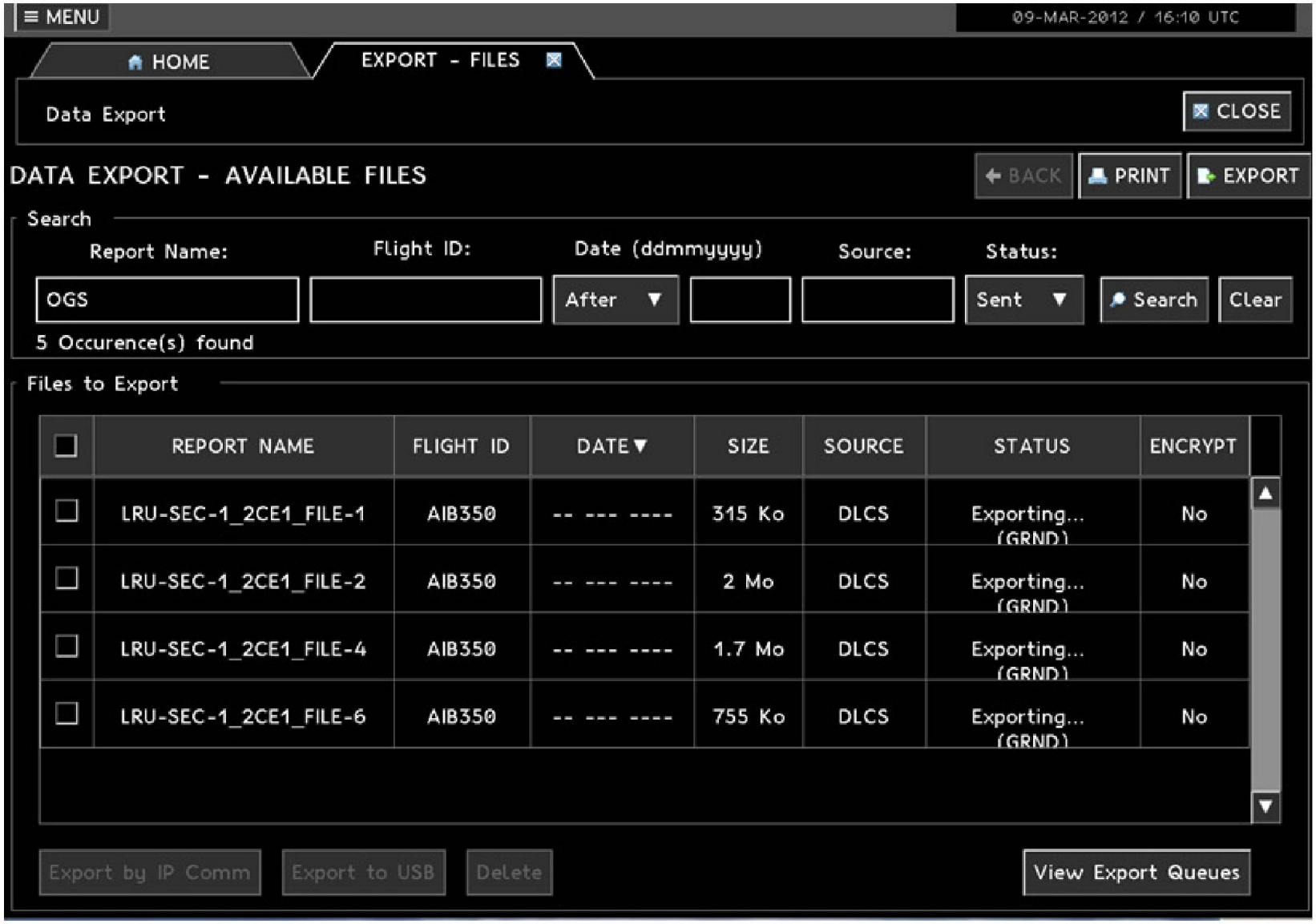

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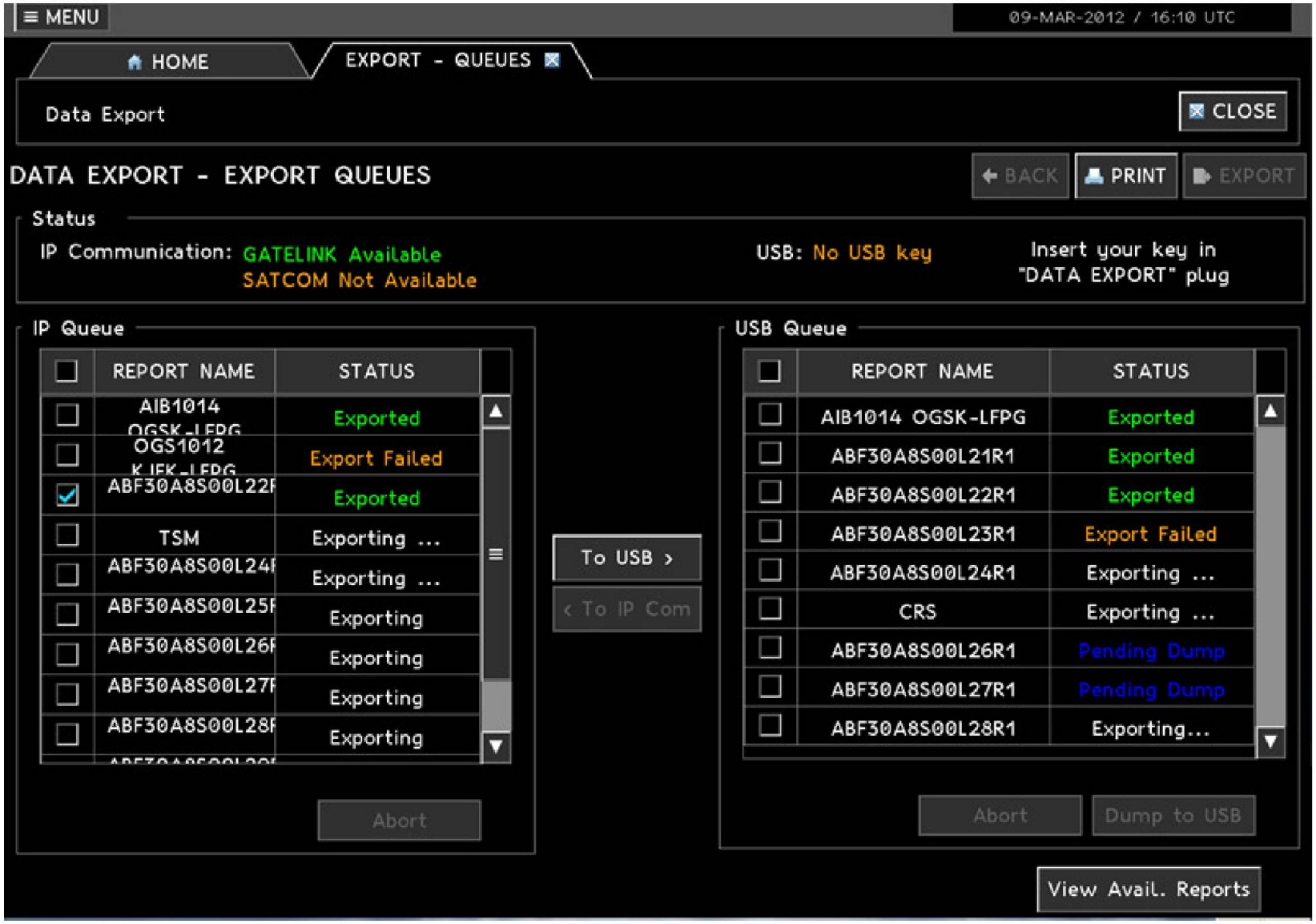

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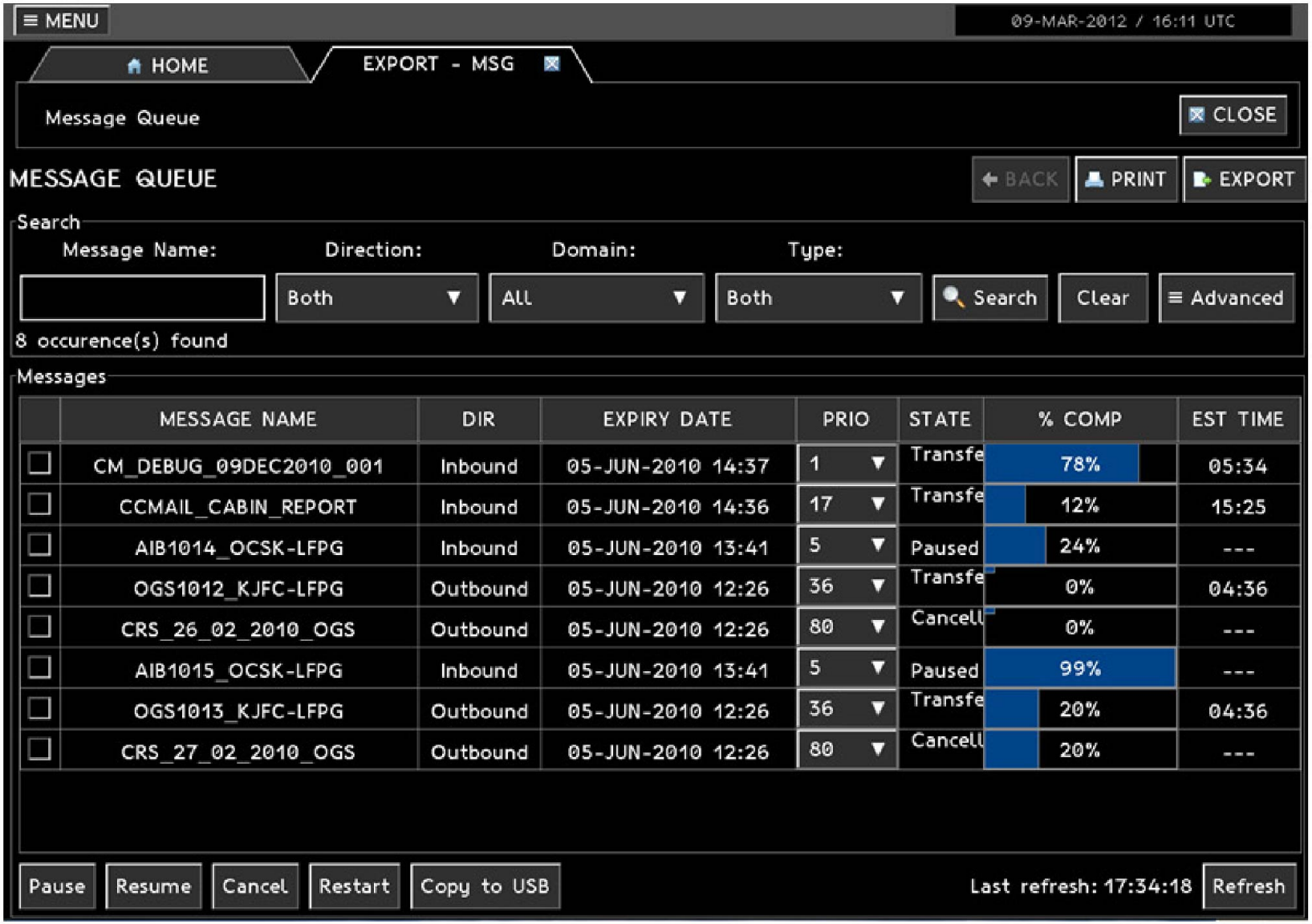

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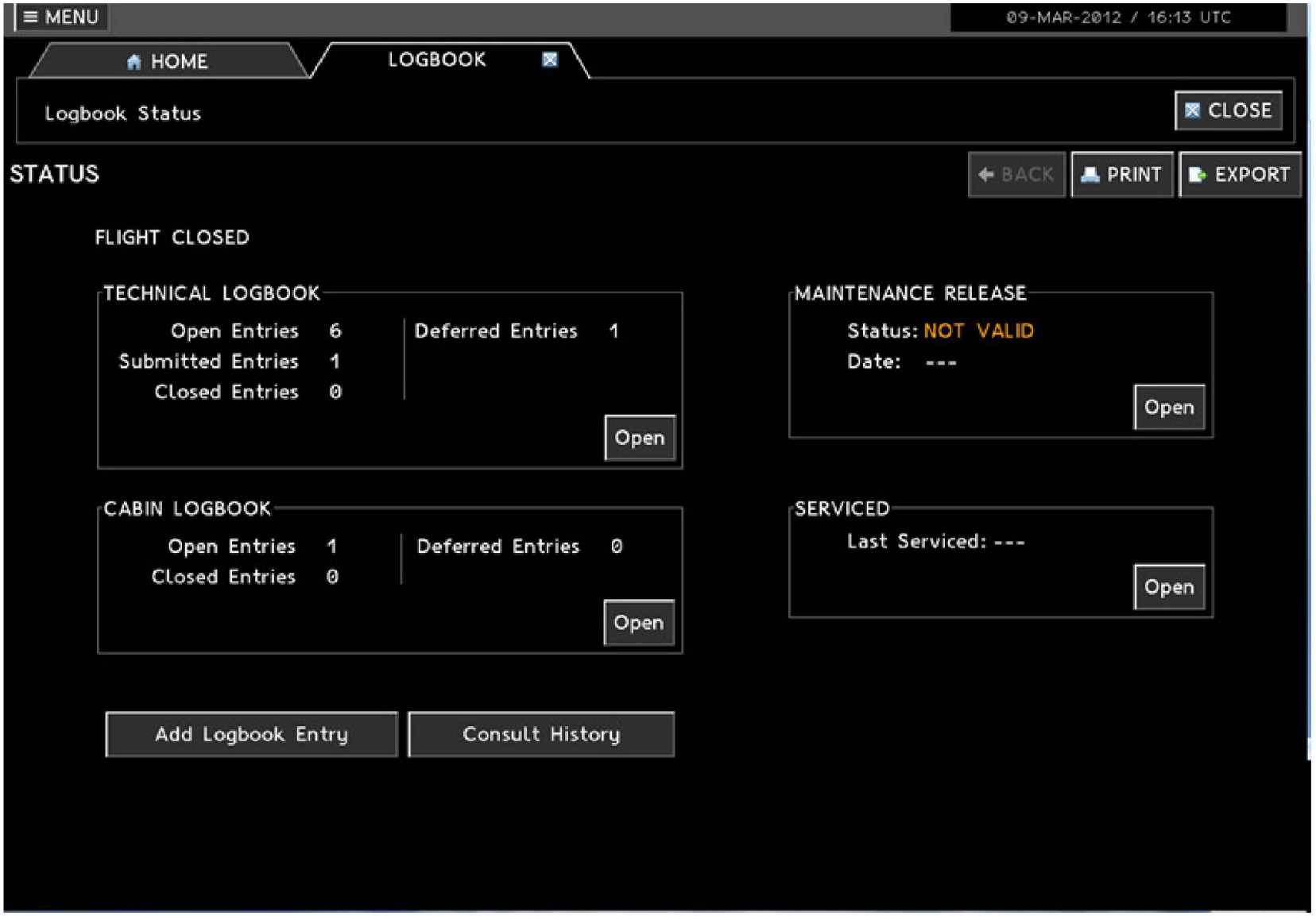

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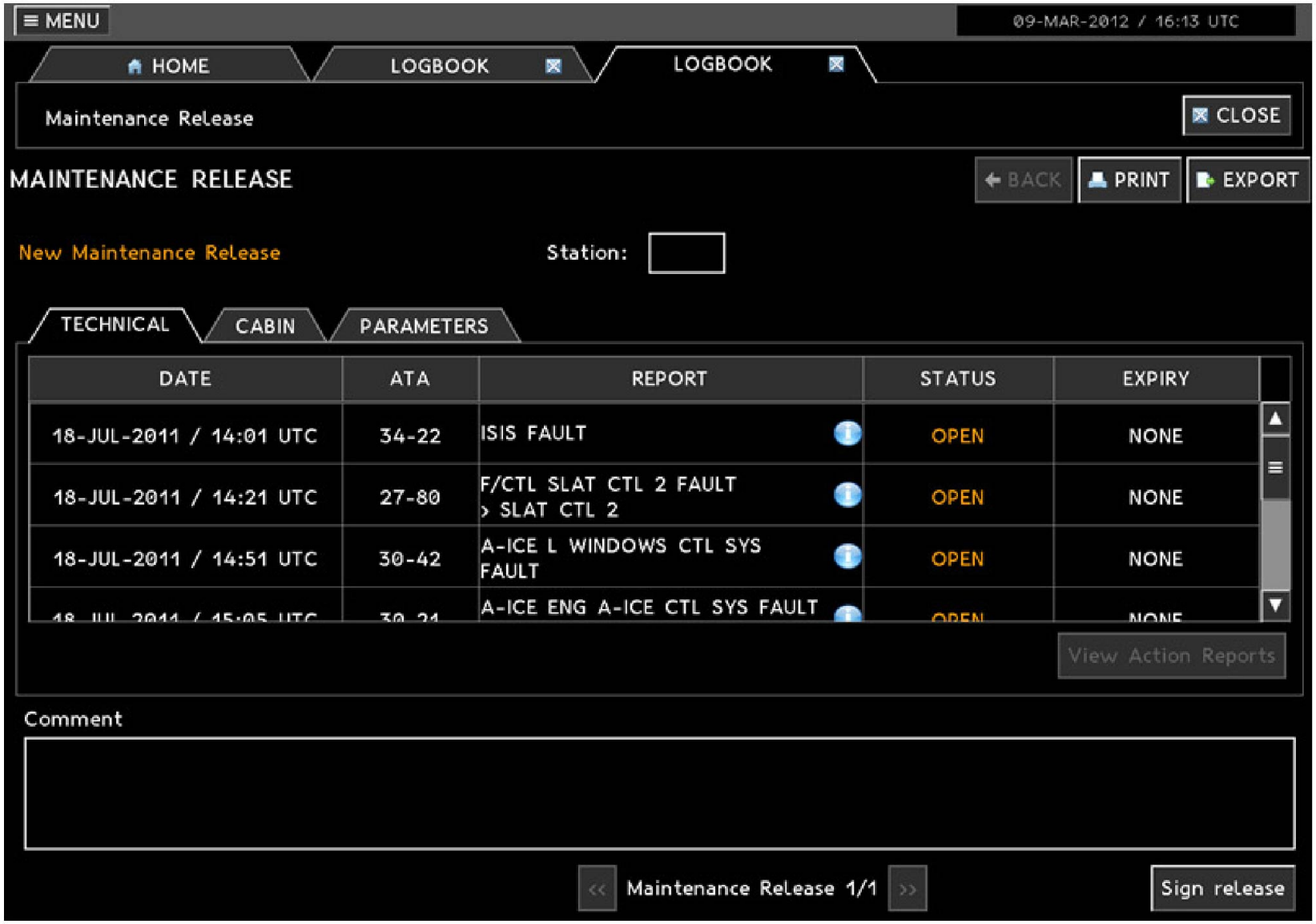

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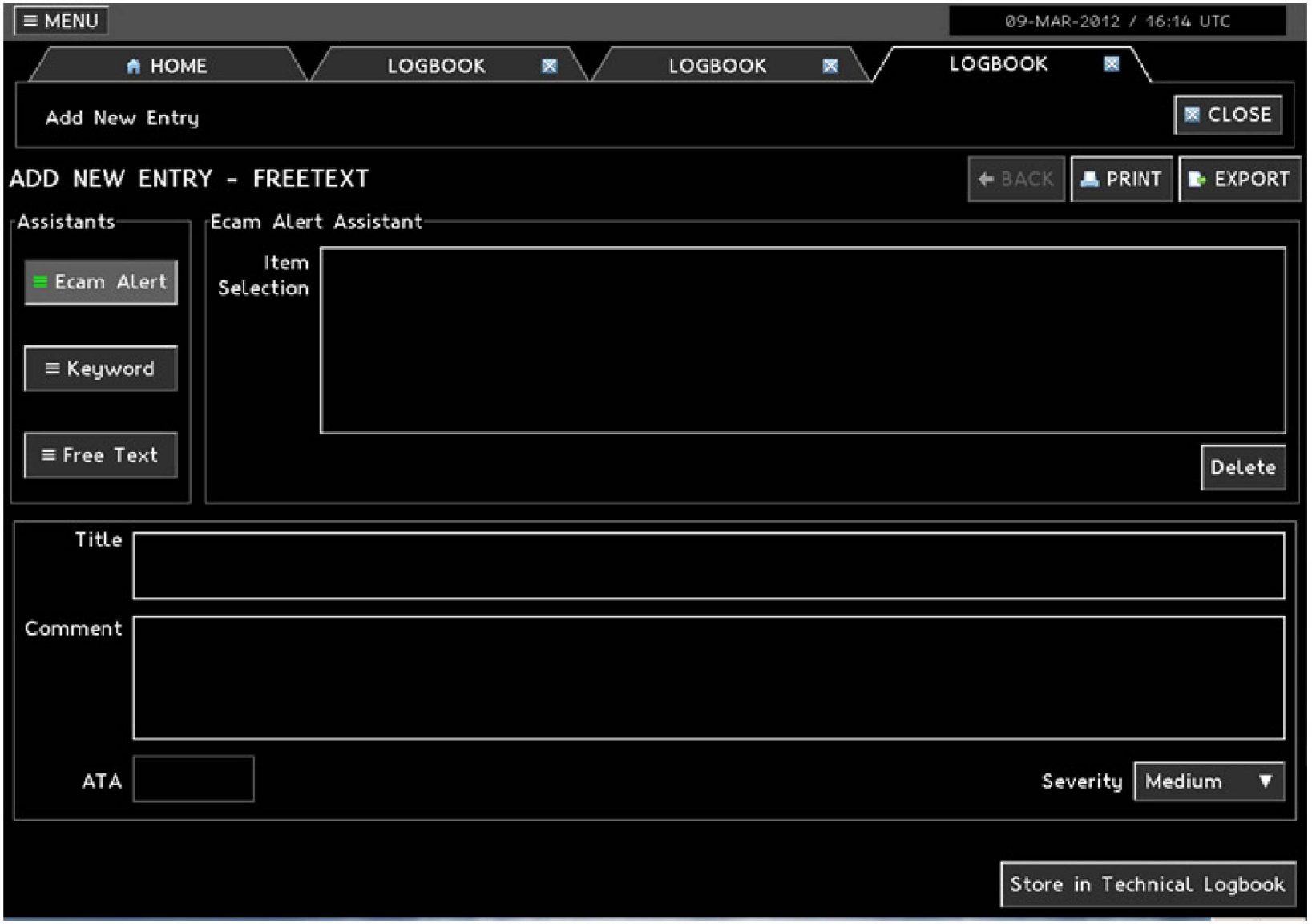

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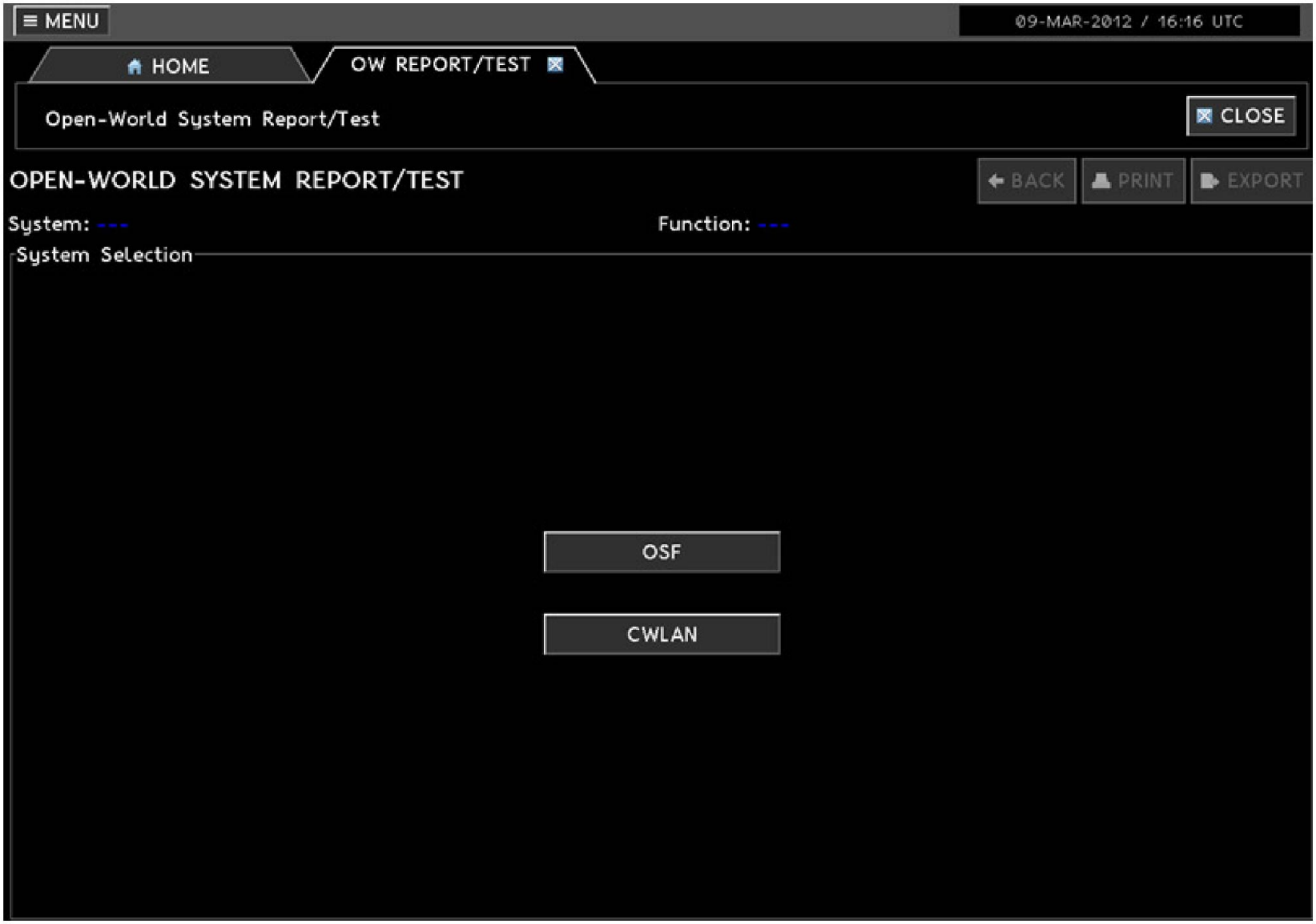

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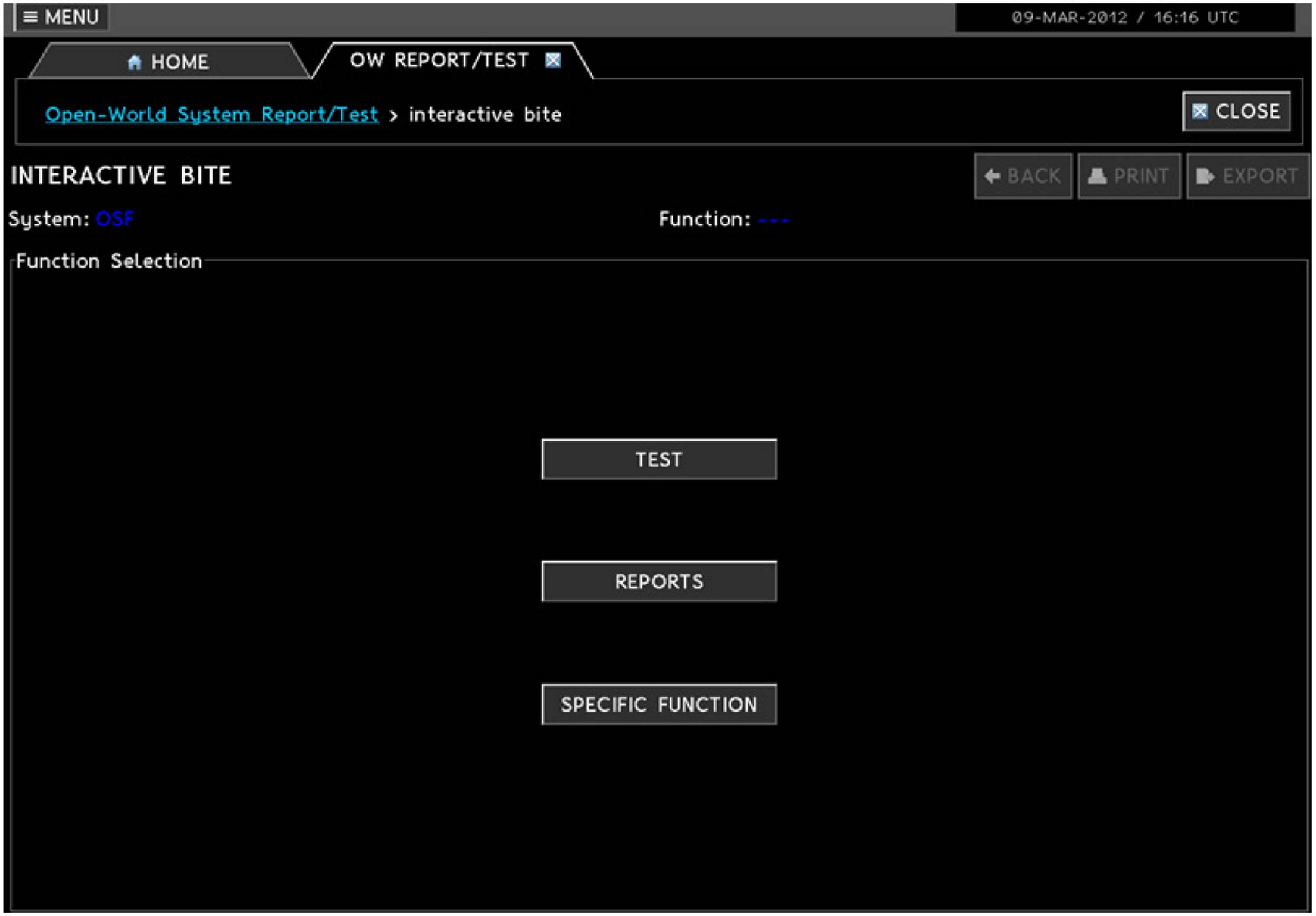

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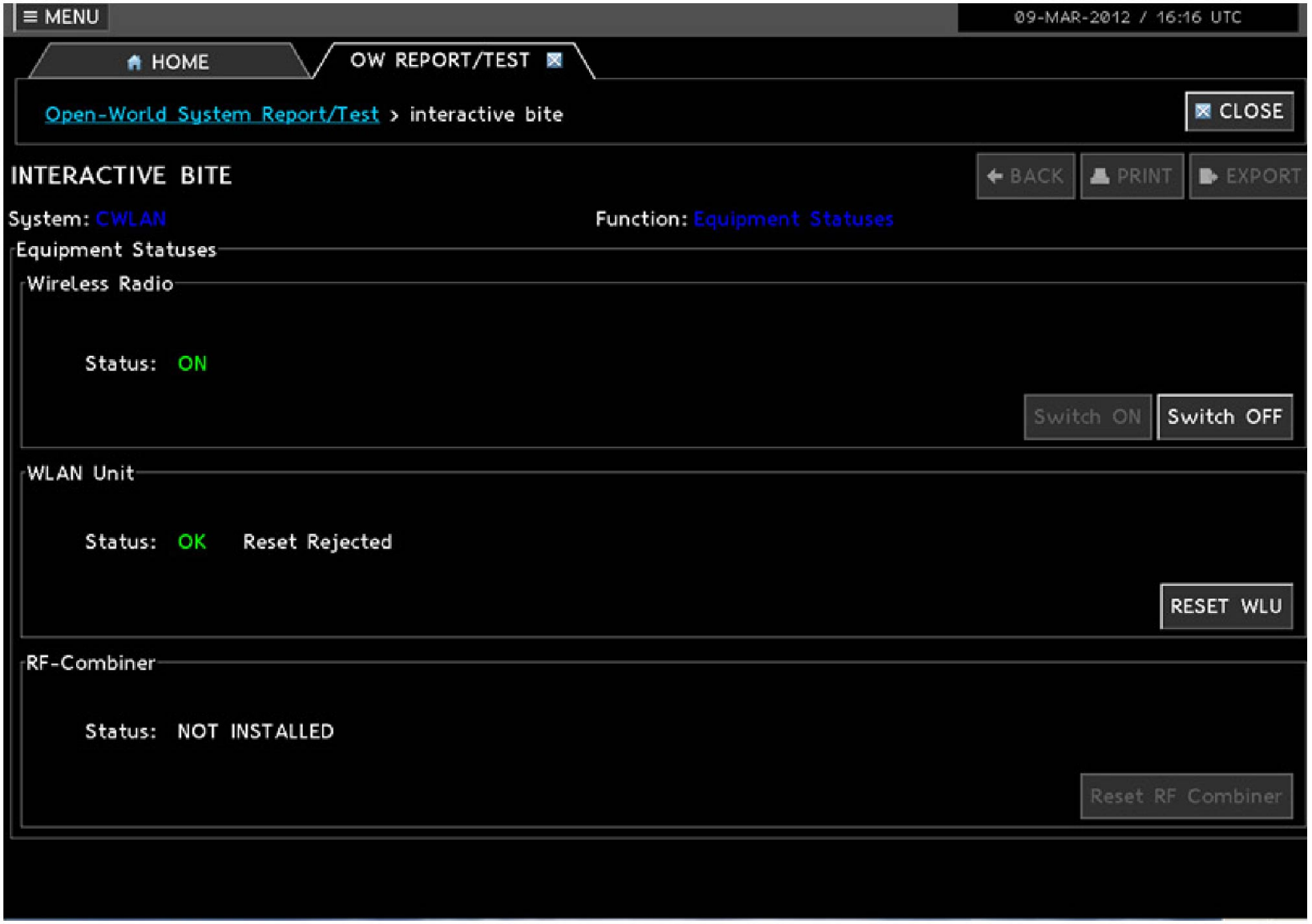

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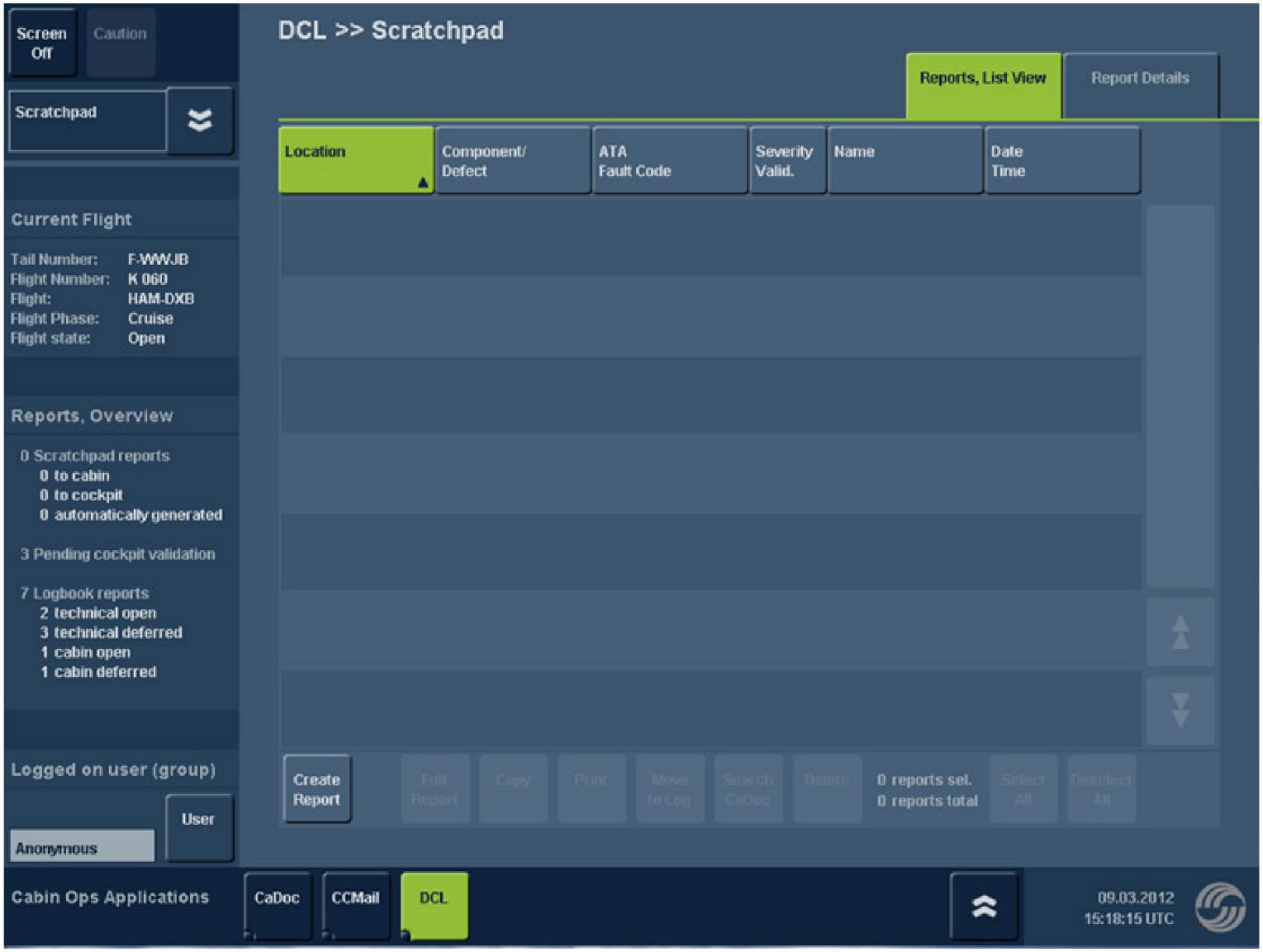

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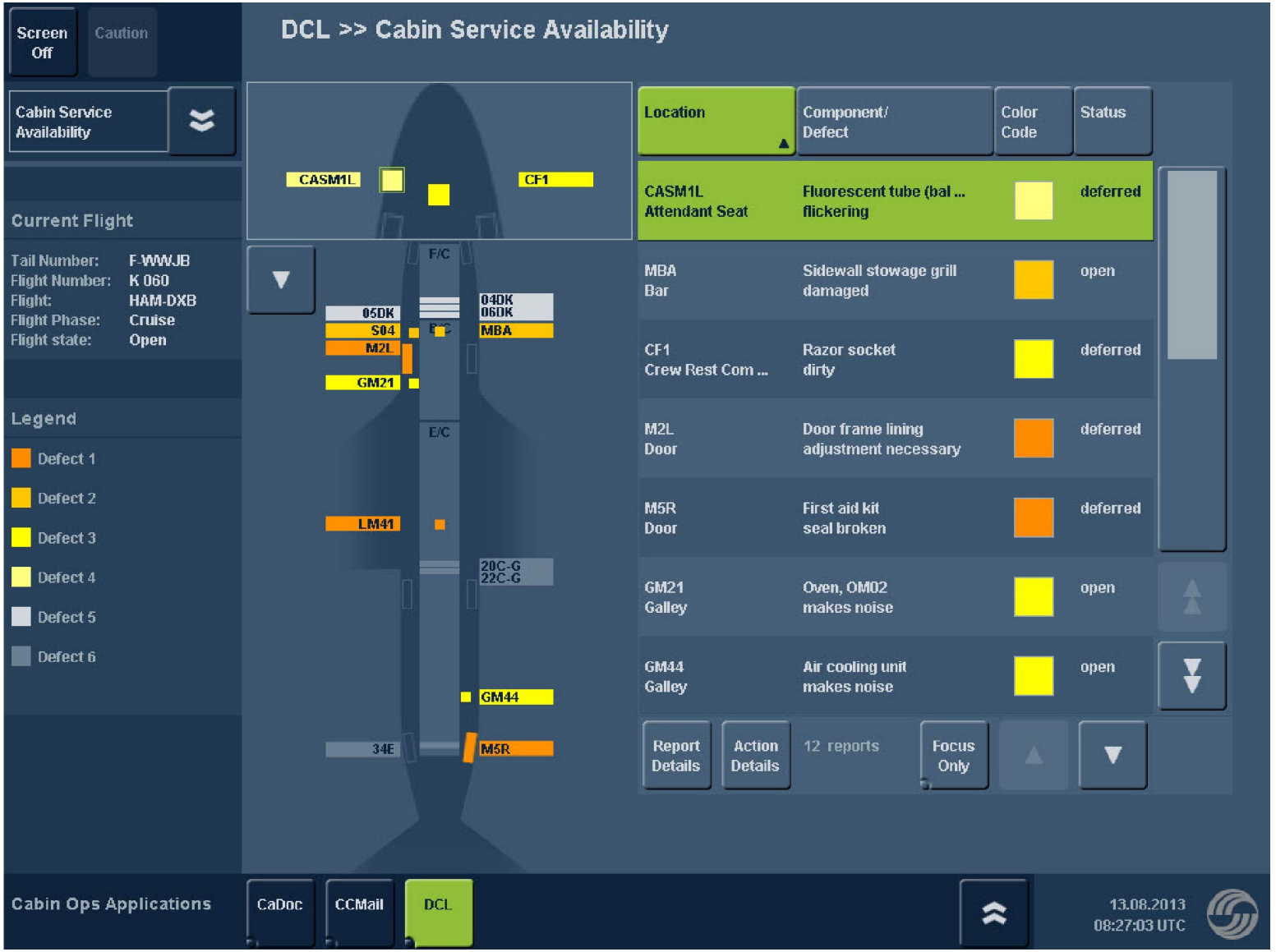

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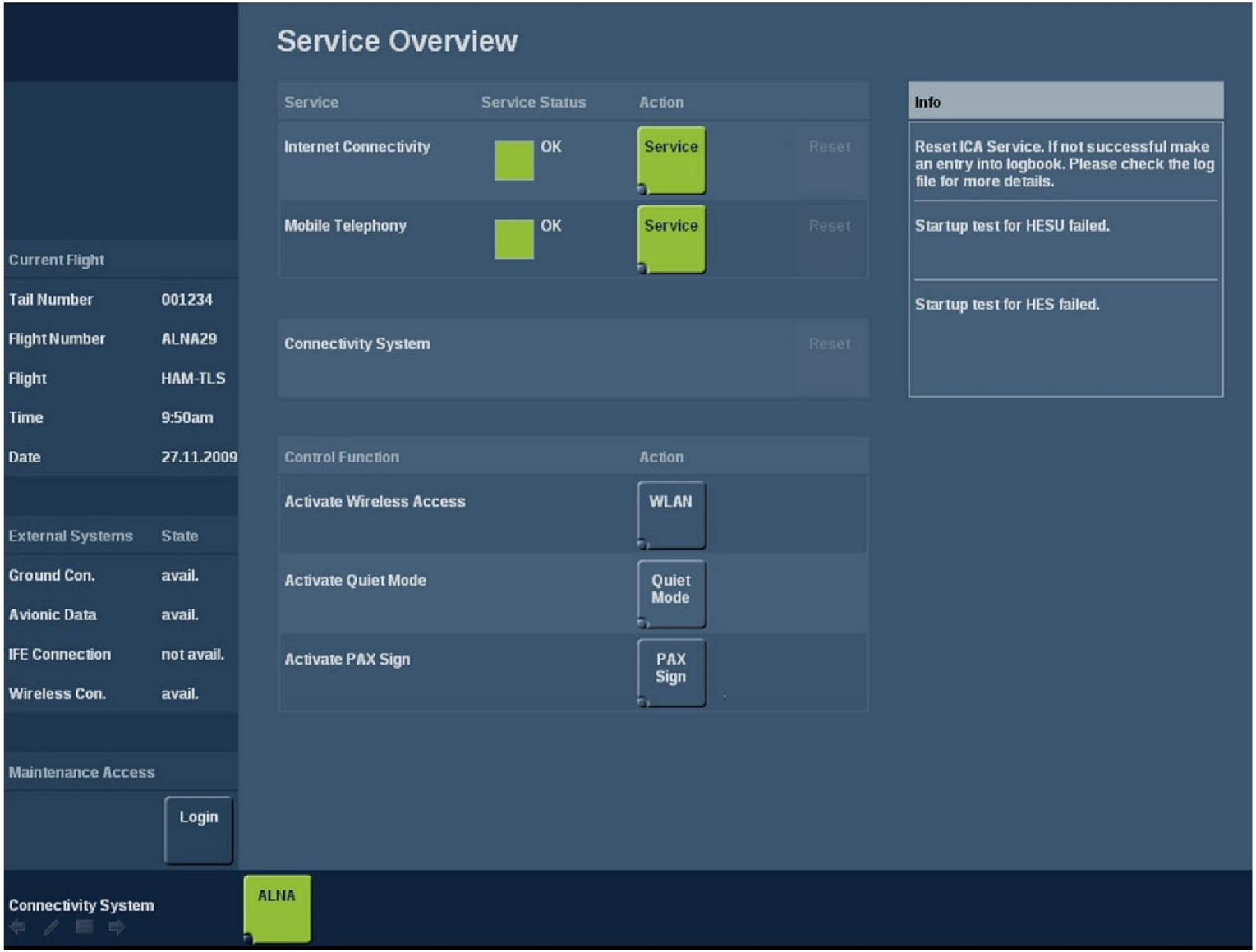

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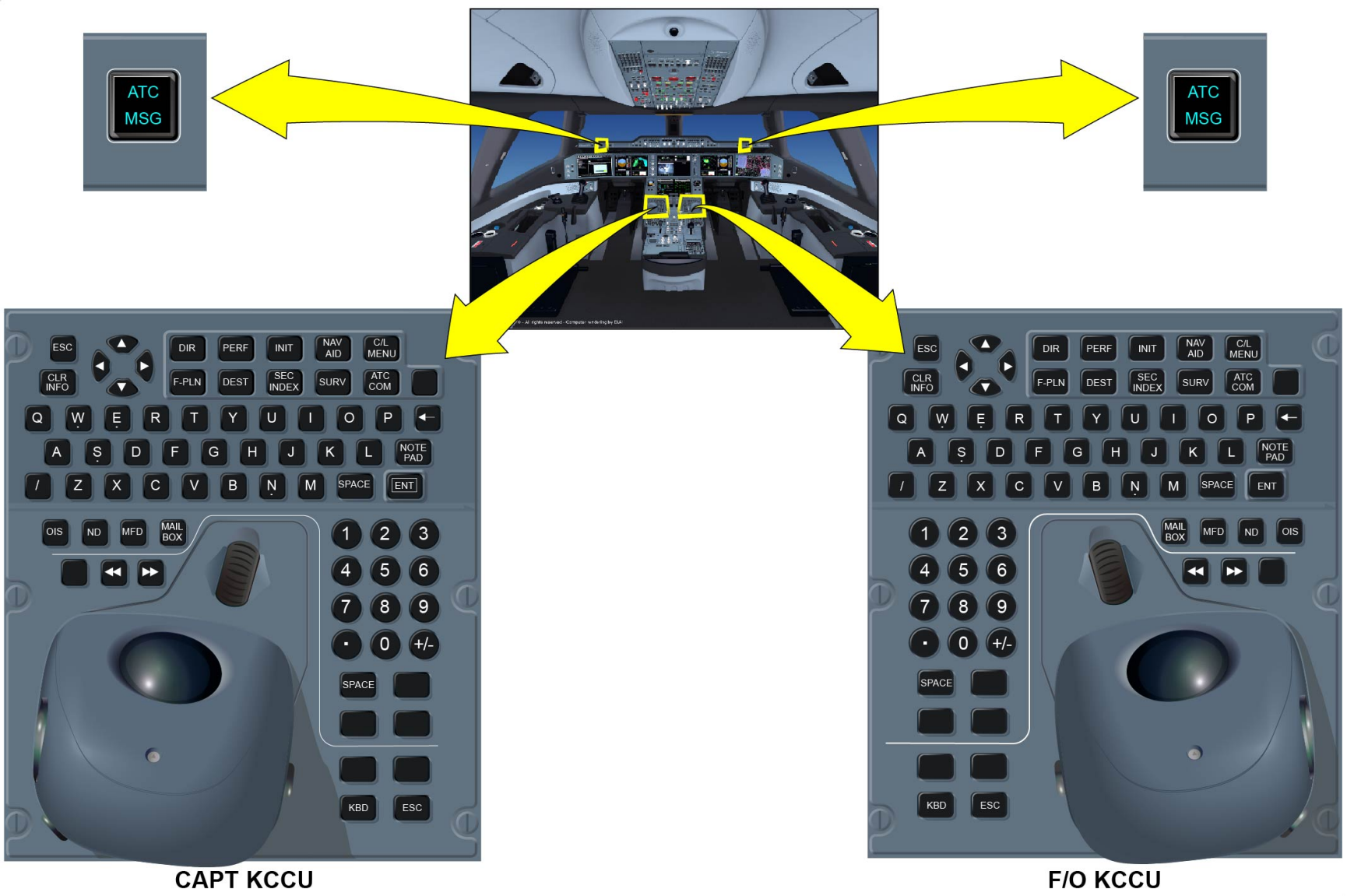

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ONBOARD INFORMATION SYSTEM (OIS) CONTROL AND INDICATING (3)

OIS Controls (3)

Access to backup OIS menu
In case the default menus on the MHM are no more operational, the users, Mechanics and/or Pilots can get access to a back-up menu hosted on ASFC. On CAPT keyboard, depress Shift+OIS Menu keys: Back-up Menu is displayed.

Maintenance Logbook Consultation and Use (3)

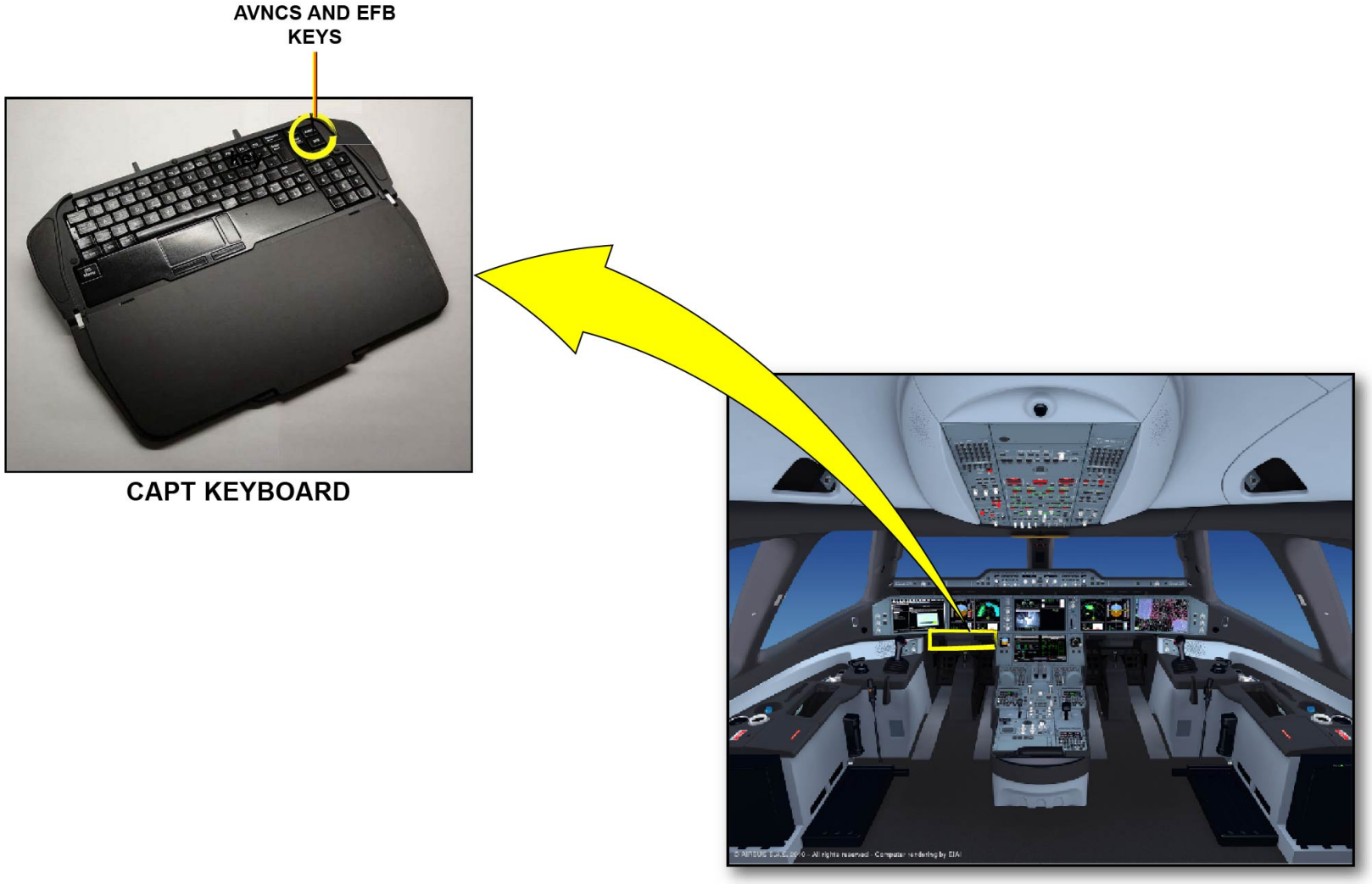
Access to and use electronic Maintenance Logbook
On OMT Maintenance Home Page, select "eLogbook" and then select "Consult History" to show logbook events history

Open-World (OSF) Local Maintenance Function (LMF) (3)

Access to Open-World Interactive BITE
On OMT, select "Administration" Menu, select "Open-World System Report/Test" Menu.
Then select OSF button - REPORTS:
- IP COM Connected APPS: to see the applications currently connected with IP COM Means,
- Troubleshooting: to support OSF troubleshooting activities.
Then select OSF button - SPECIFIC FUNCTIONS:
- BITE Memory Clear: to clear the memory of BITE,
- PKI Management: to manage security aspect in terms of certificates,
- COMM Manager Debug.

Open-World (OSF) Simple Data Loader (SDL) (3)

Access to Open-World Configuration History
On OMT, select "Administration" Menu, select "FSA-NG Platform Management" "Open-World Config History"
Using Search function, select an equipment you want to identify the:
. Current config by selecting CURRENT VALIDATED CONFIG (N),
. Previous config by selecting PREVIOUS VALIDATED CONFIG (N-1),
. Oldest config by selecting OLDEST VALIDATED CONFIG (N-2).



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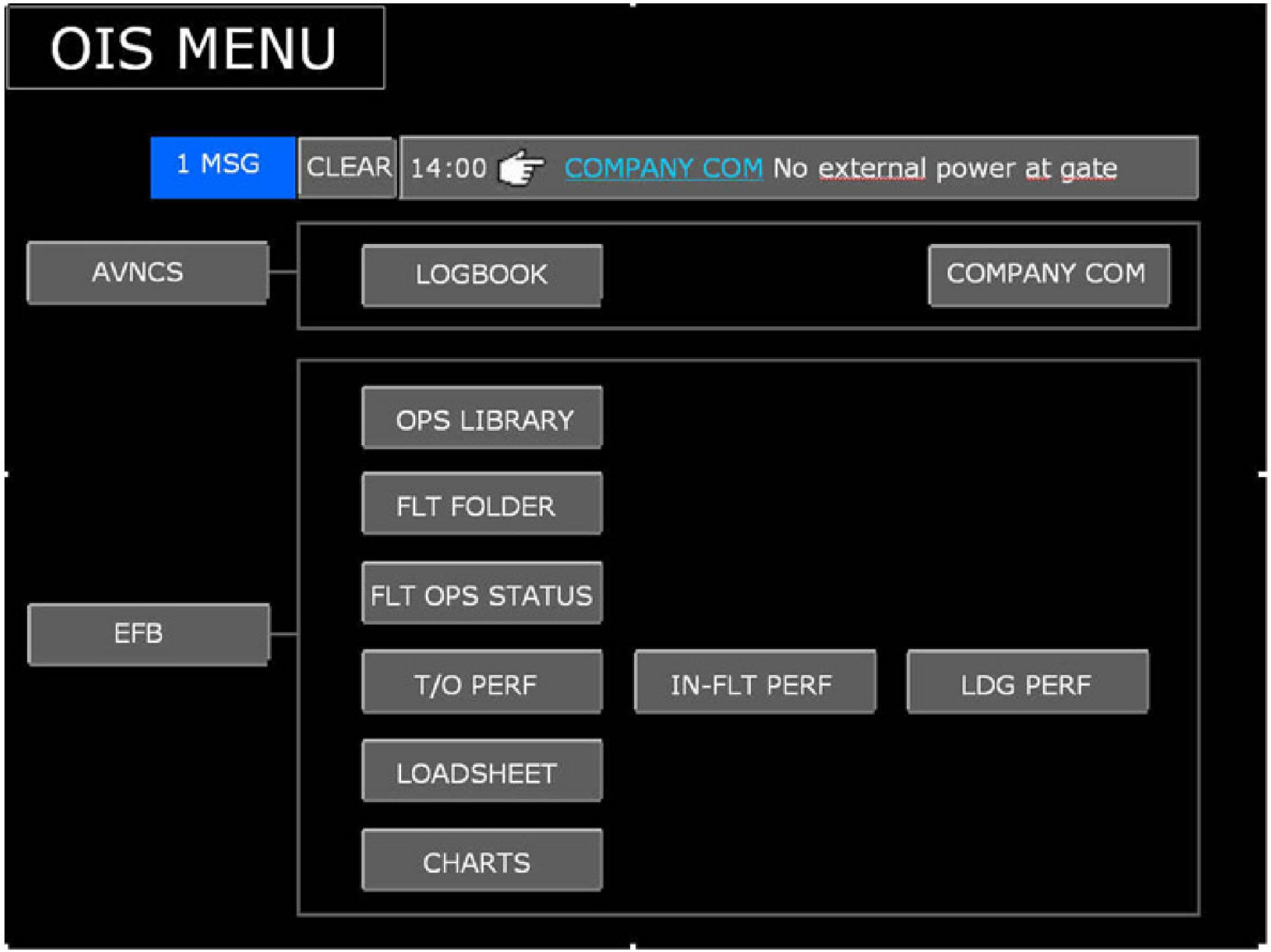

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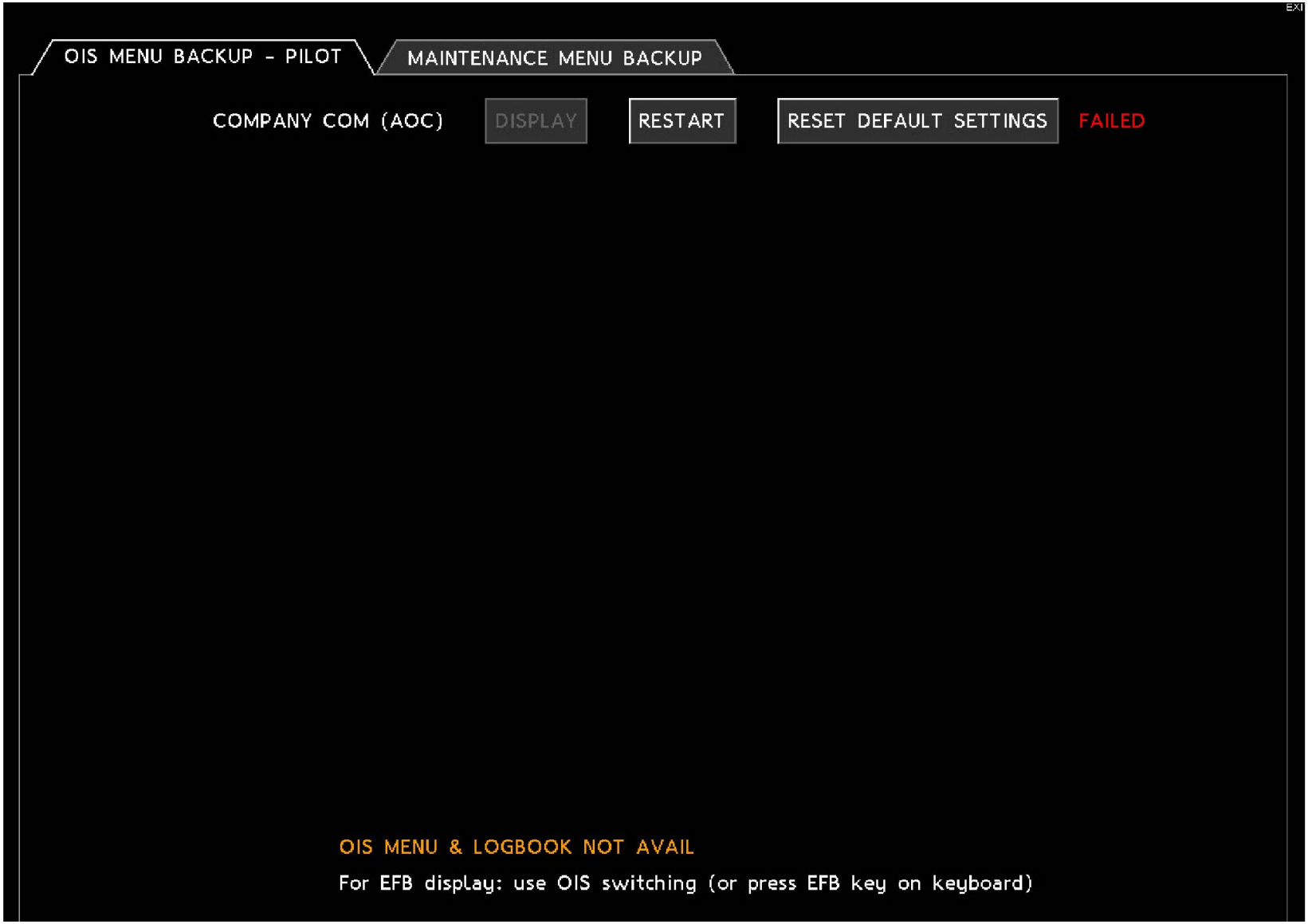

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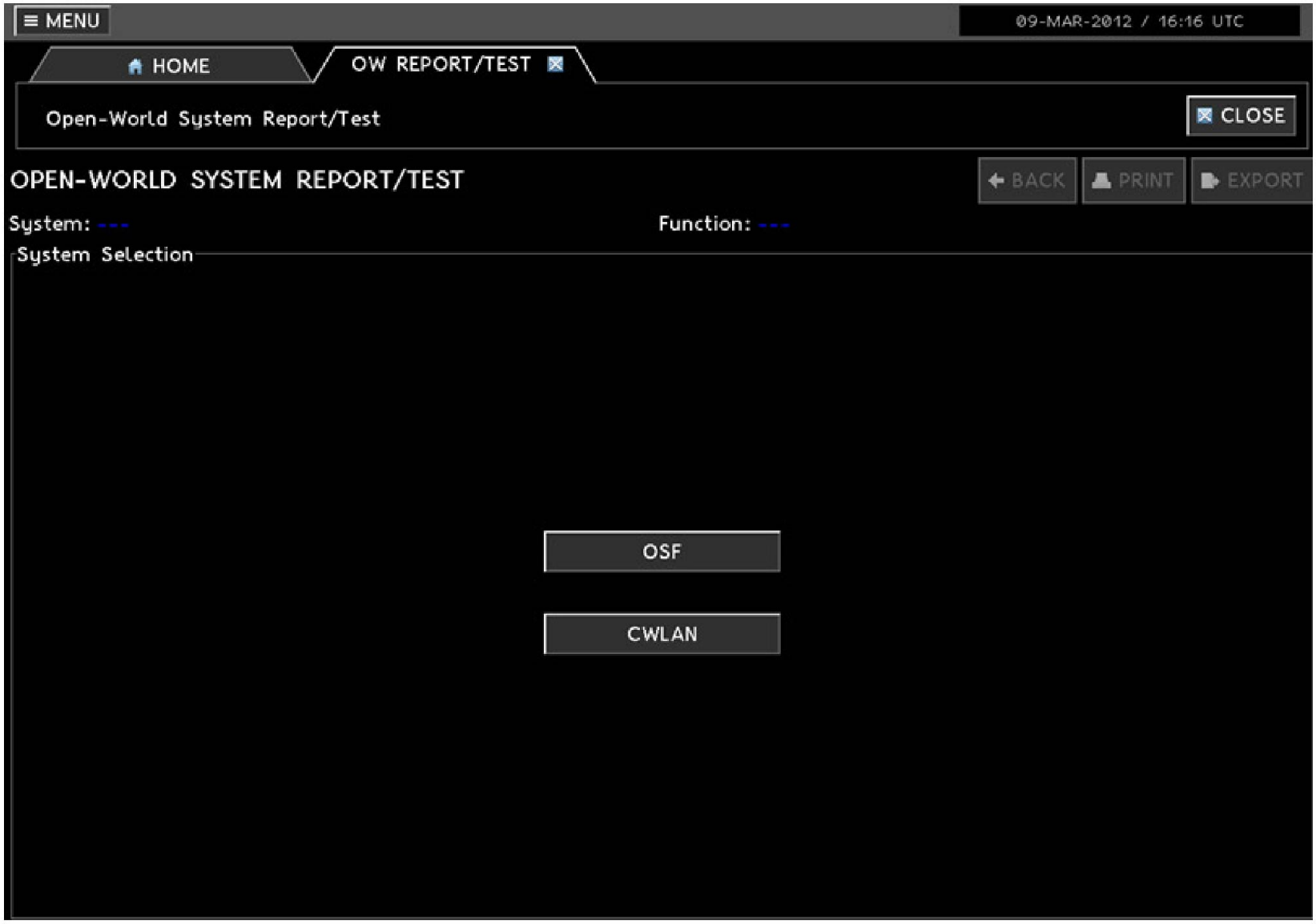

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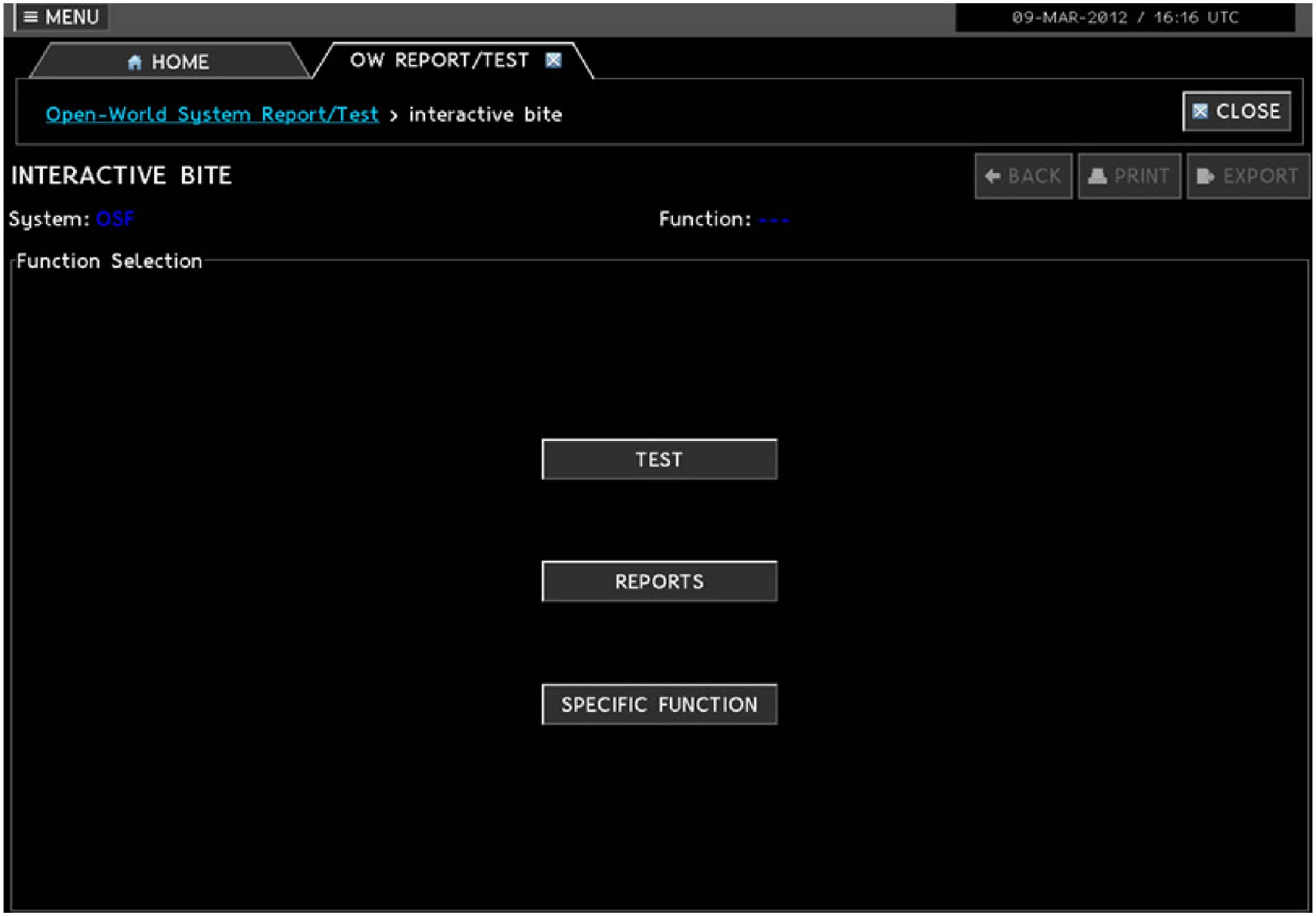

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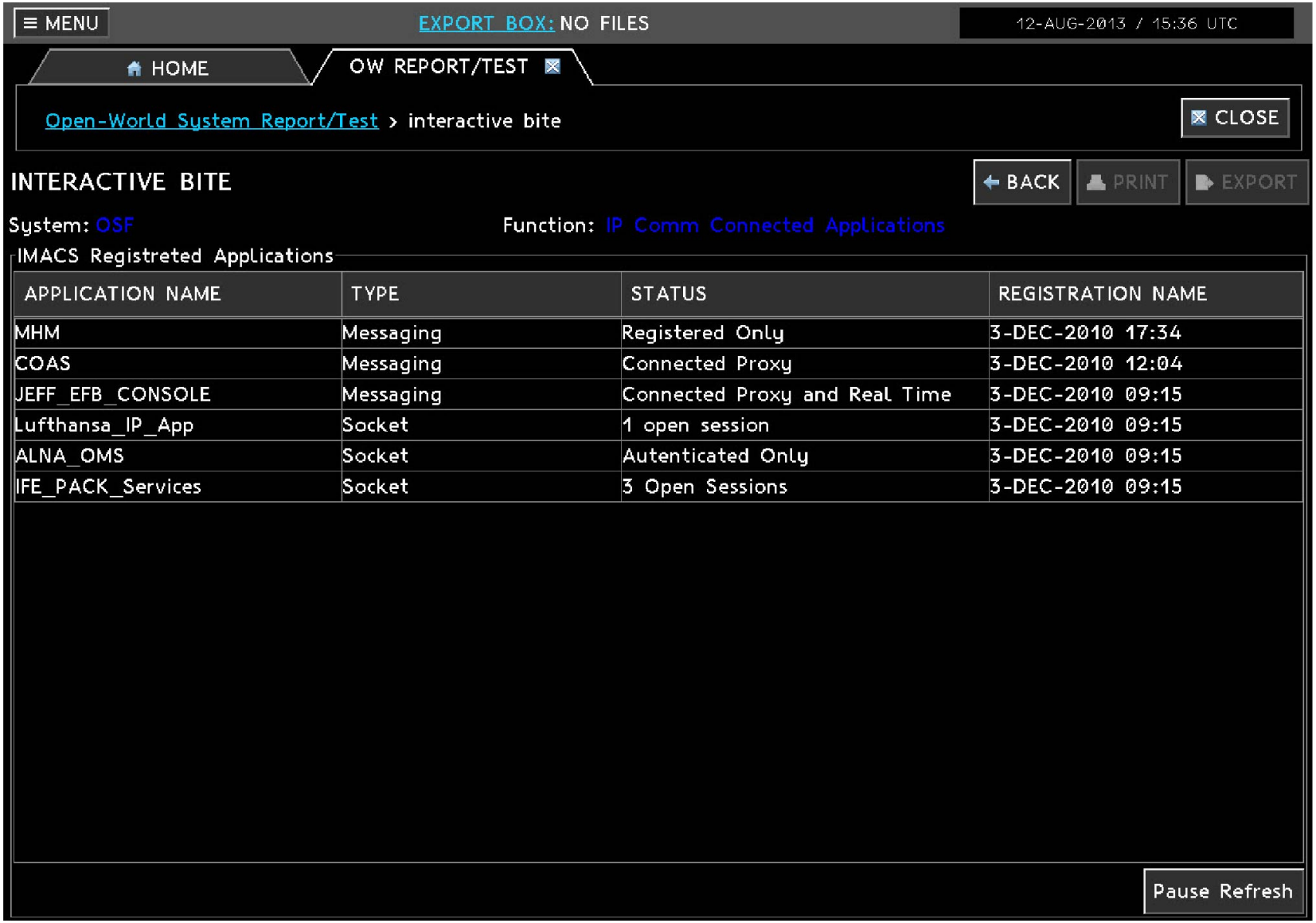

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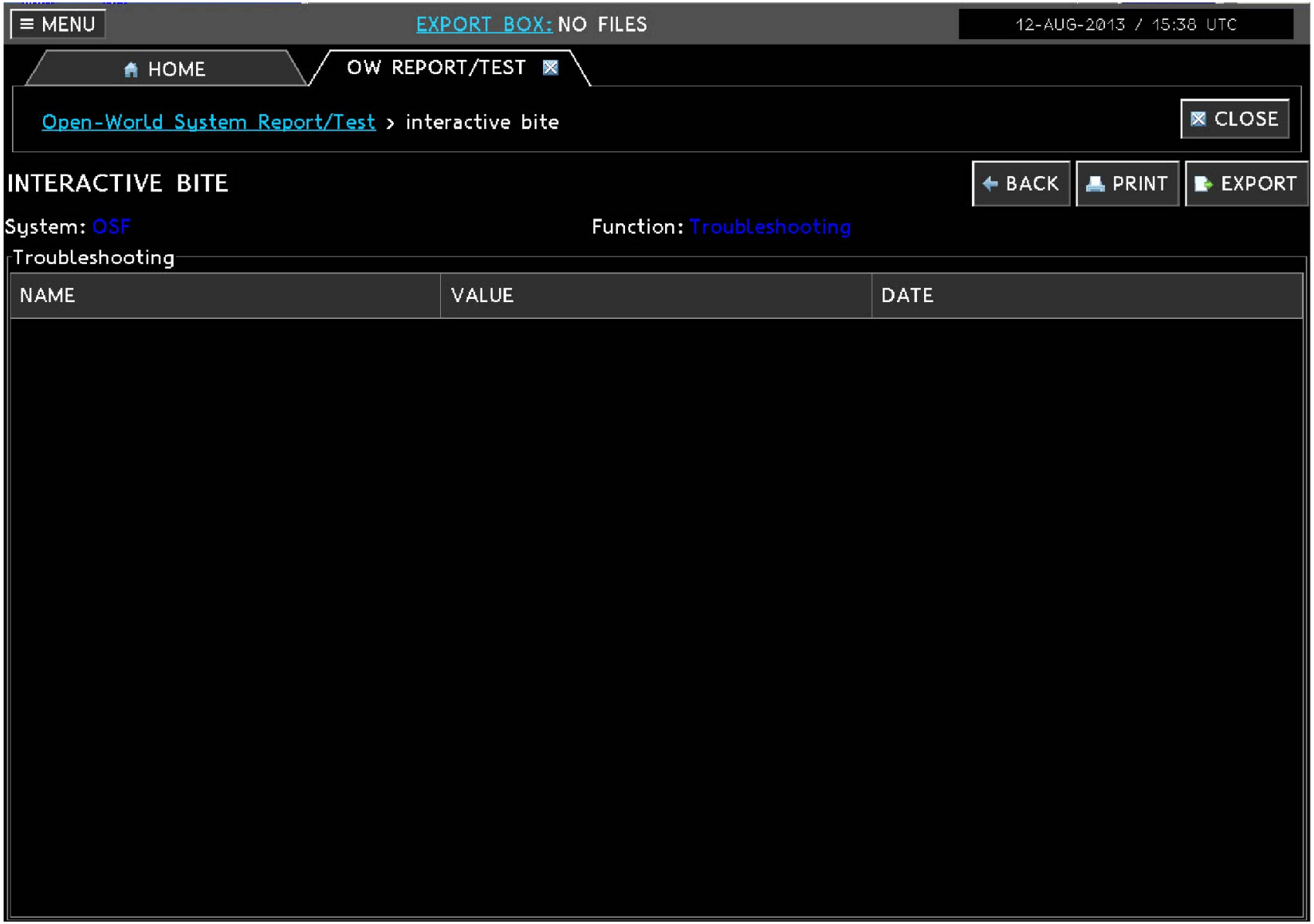

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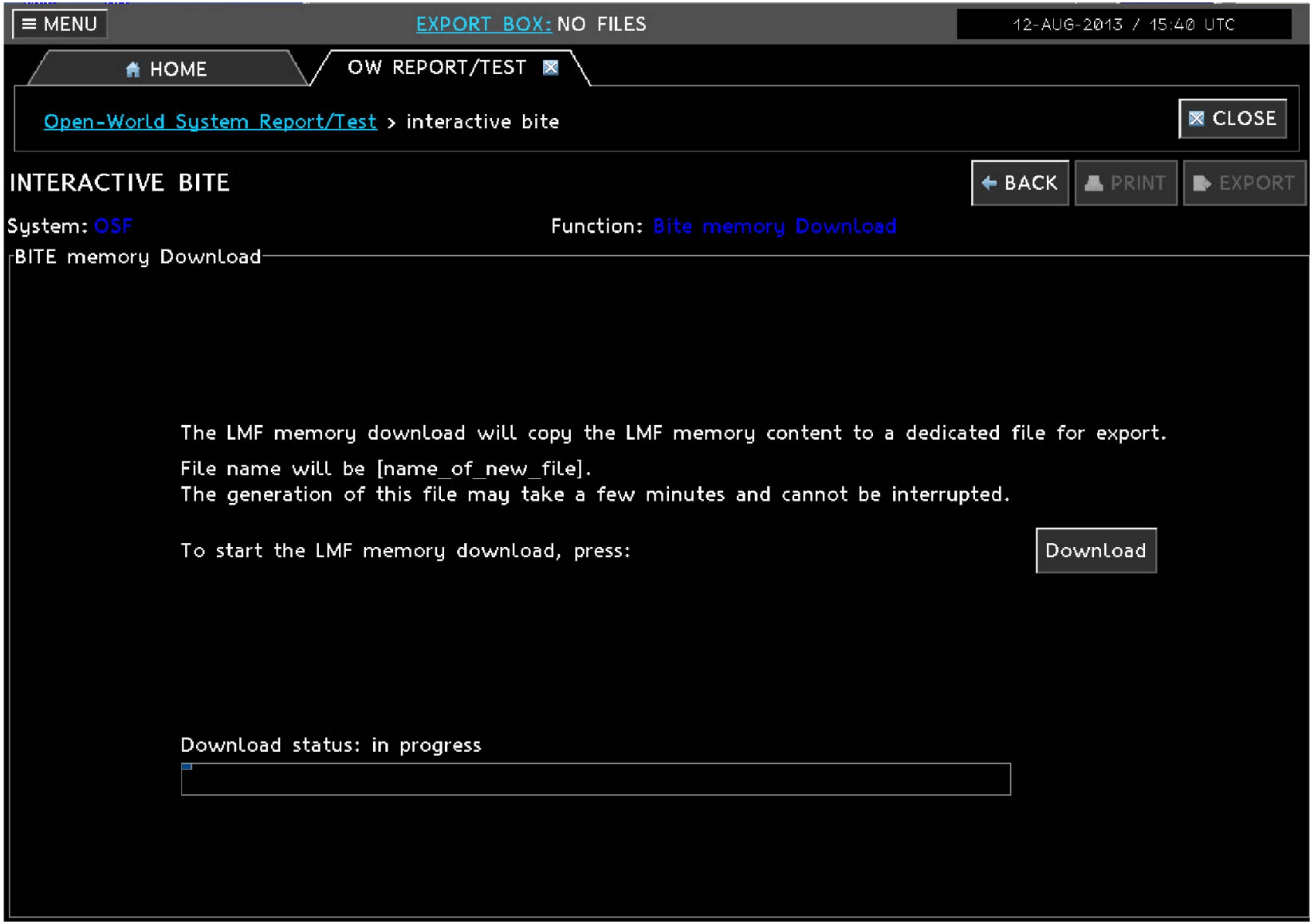

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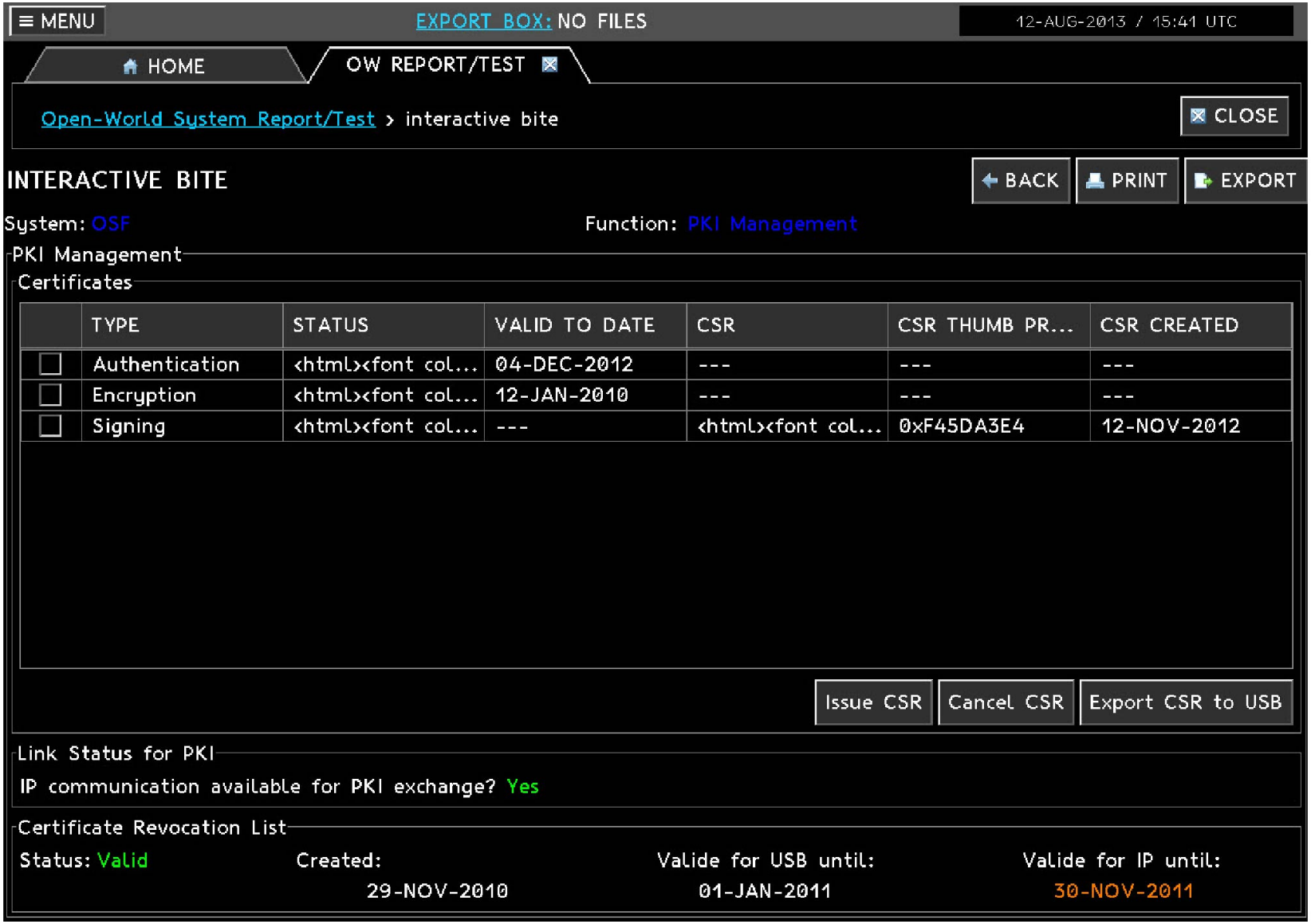

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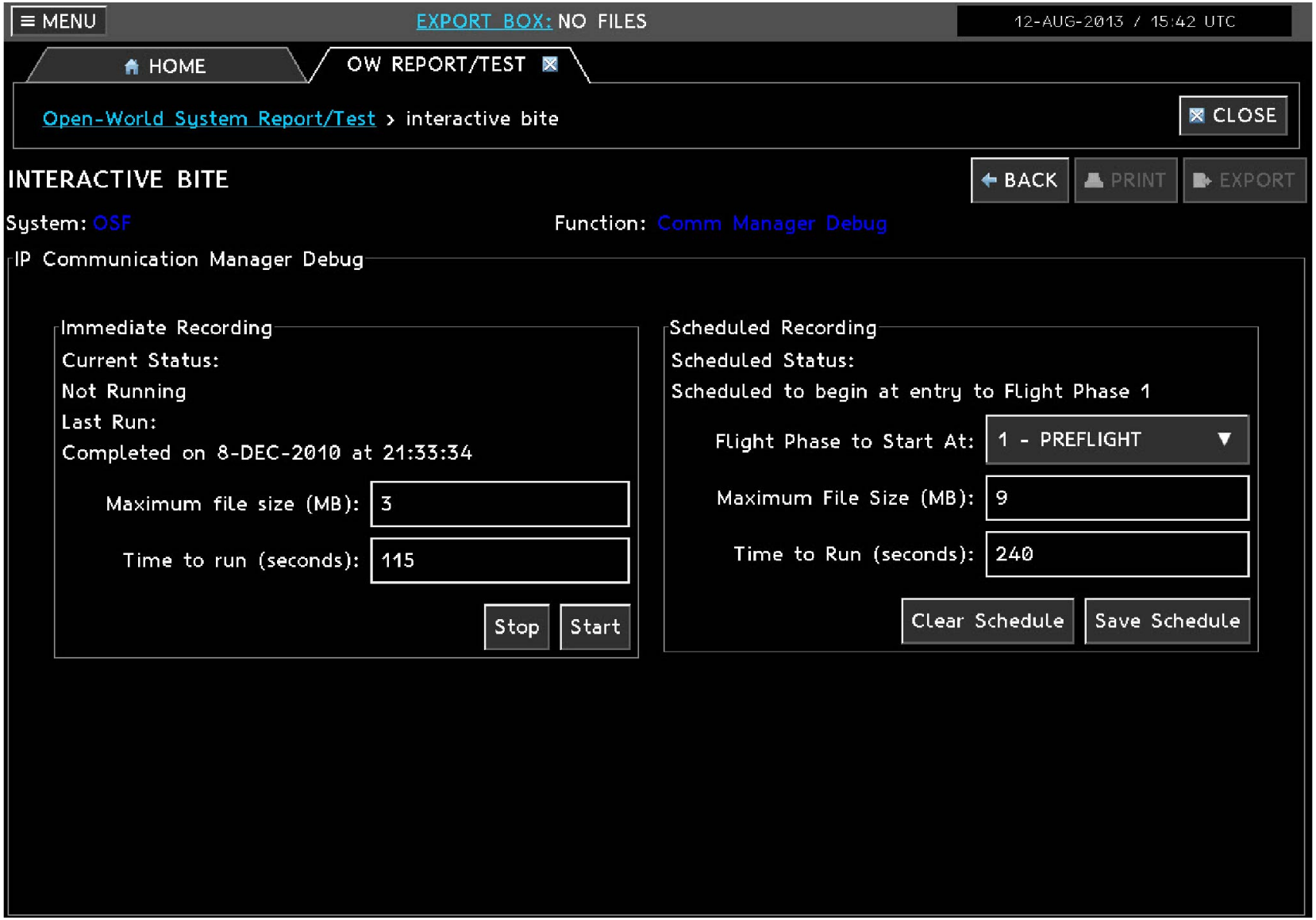

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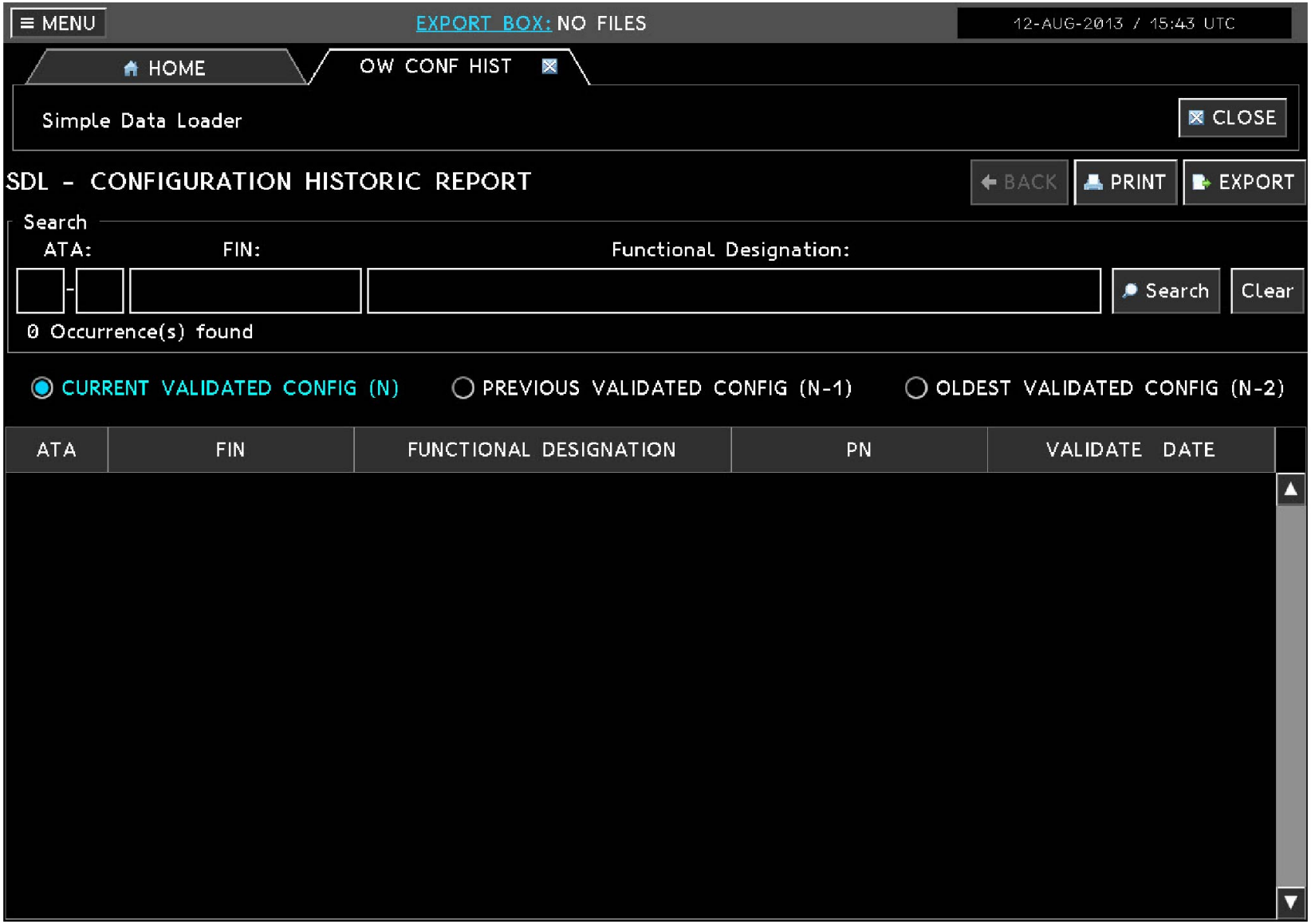

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