

CHAPTER

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CREW INFORMATION SYSTEM

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ONBOARD NETWORK SYSTEM INTRODUCTION

General

The onboard network system (ONS) is a computer based information system that supports flight, maintenance, and cabin operations.

The main hardware component of this system is the network file server (NFS). The server controls communications between connected airplane systems. With optional communications equipment installed, NFS can support network connections between airplane systems and ground-based networks.

The NFS hosts the mass storage device (MSD) function. The MSD gives software parts and data storage capacity.

The NFS can operate installed applications that support maintenance actions, and cabin operations.

An approved maintenance laptop (ML) gives access to the ONS user interface. The tool is connected to a network data port using Ethernet cable. The NFS operates as a web server, and hosts the ONS maintenance browser interface.

Acronyms and Abbreviations

- ADIRU - air data inertial reference unit
- AIS - Airplane Information System
- APP - application
- ARINC - Aeronautical Radio Incorporated
- ATA - Airline Transport Association
- ATC - air traffic control
- AVM - airborne vibration monitor
- BEDS - Boeing electronic distribution (of) software
- CPU - central processing unit
- CSR - certificate signing request
- DEU - display electronic unit
- DHCP - dynamic host configuration protocol
- DNS - domain name server
- EGPWS - Enhanced ground proximity warning system
- EVSC - engine vibration signal conditioner
- FMC - flight management computer
- Gb - gigabyte
- GUI - graphic user interface
- ICAO - International Civil Aviation Organization
- ID - identification
- IP - internet protocol
- LAN - local area network
- LED - light emitting diode
- LRU - line replaceable unit
- LSAP - loadable software airplane part
- Mb - megabyte
- ML - maintenance laptop
- MMR - multiple mode receiver
- MSD - mass storage device
- NED - network extension device
- NFS - network file server
- NTP - network time protocol
- OAS - operationally approved software
- OAS - Oracle™ application server
- OBEDS - onboard Boeing electronic distribution (of) software
- ODLF - onboard data load function
- ONS - onboard network system
- OPC - operation program code
- OS - operating system
- ROM - read-only memory
- SAPS - standard airline parameter service
- SBC - single board computer
- SDRAM - synchronous dynamic random access memory

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ONBOARD NETWORK SYSTEM INTRODUCTION

- SPD - serial presence detect
- SSD - solid state drive
- TLS - transport layer security
- TWLU - terminal wireless LAN unit
- UDS - uplink-downlink service
- URL - uniform resource locator
- V ac - volts, alternating current
- V dc - volts, direct current
- VPN - virtual private network
- WAN - wide area network
- WoW - weight on wheels.

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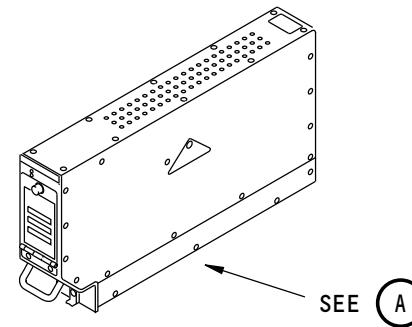
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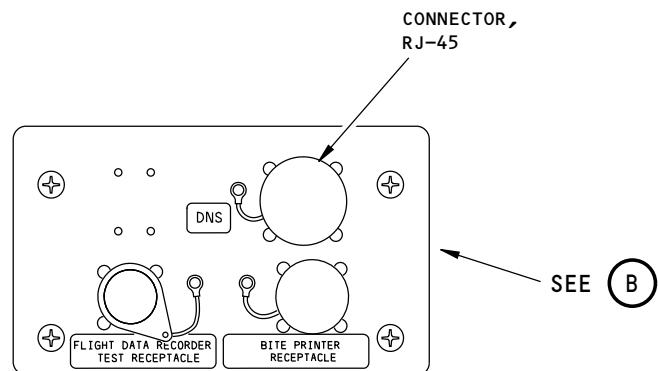
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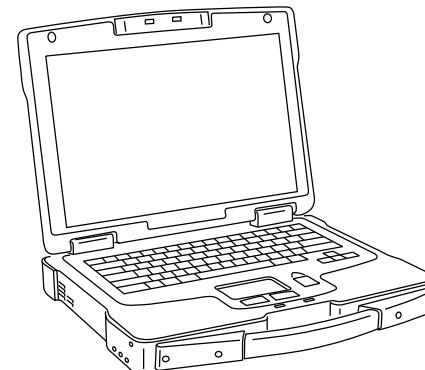


**NETWORK FILE SERVER
(NFS)**



TEST RECEPTACLE





**MAINTENANCE LAPTOP
(REMOTE)**



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ONBOARD NETWORK SYSTEM INTRODUCTION



ONBOARD NETWORK SYSTEM DESCRIPTION

General

The Onboard Network System (ONS) is the central component of the Airplane Information System (AIS) domain on ONS-equipped aircraft. The system gives connectivity with onboard systems. Future development will include communications with off-board, ground-based systems.

Network File Server

The primary line replaceable unit (LRU) is the network file server (NFS). The NFS is installed on shelf E5-2 in the electrical bay.

During usual service, NFS operation is fully automatic. The user interface for NFS is a portable laptop computer.

Aircraft Ethernet Connectivity

The NFS is connected to the systems that follow, using Internet Protocol (IP) over Ethernet wiring:

- Enhanced Ground Proximity Warning System (EGPWS)
- Maintenance laptop

Discrete

The NFS uses a discrete signal for awareness and control.

- Weight on wheels.

Mass Storage Device

The mass storage device (MSD) is a partition on the server available for file and data storage. For example, loadable software airplane parts (LSAP) are saved (or, staged) to the MSD for future installation into the NFS, or other systems on the network.

Parts can be transferred manually or automatically to or from the MSD. A method of manual transfer can be with a maintenance laptop. An automatic transfer can use a laptop (application), or wireless connection.

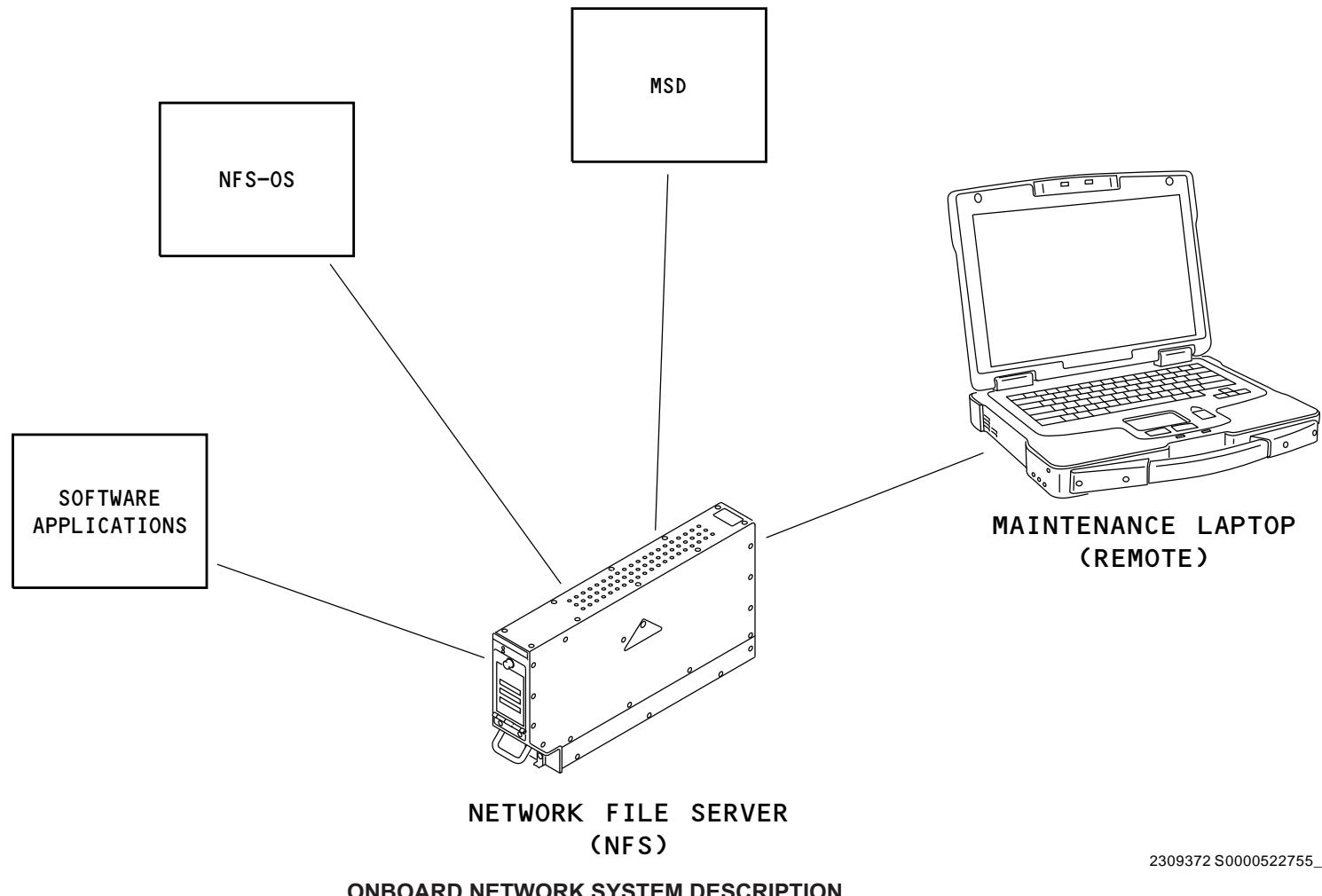
Application Data Processing

The NFS can host operationally approved software (OAS) that supports the cabin crew, the maintenance crew, or other airline interests.

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737-600/700/800/900 AIRCRAFT MAINTENANCE MANUAL

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ONBOARD NETWORK SYSTEM - NETWORK FILE SERVER

General

The primary hardware unit of the onboard network system is the network file server (NFS). The NFS contains two isolated computer systems. They are as follows:

- Network file server (NFS, single board computer)
- Network extension device (NED, single board computer).

There is one internal power supply that energizes the two computers.

NFS Server

The NFS server has an Intel™ processor with two isolated drives. The boot-drive is a 256Mb (megabyte) flash memory drive. The operational drive is a 64Gb (gigabyte) solid state drive (SSD).

Physical Description

These are the dimensions and weight of the Network File Server (NFS):

- Height 7.62 in. (19.35 cm)
- Width 2.27 in. (5.77 cm)
- Depth 15.12 in. (38.40 cm)
- Weight 6.75 lb (3.06 kg) maximum.

NED Router

The NED router has a Cavium™ processor. Software parts for the NED are recorded in flash read-only memory (ROM). The NED receives and transmits three types of data:

- ARINC 429
- Discrete
- Ethernet.

Power Supply Circuit Card Assembly

The NFS power supply gets 115V ac (volts alternating current), 400Hz (Hertz) aircraft power, with maximum power consumption of less than 50 watts. The power supply makes these voltages for operation of the Single Board Computer (SBC):

- Plus 3.3V dc (volts direct current)
- Plus 5V dc
- Plus 12V dc
- Minus 12V dc.

The power supply has these circuits:

- A voltage monitor circuit to find over voltage conditions
- A temperature sensor to find over temperature conditions
- Fault detection circuit.

NED Adapter Card Circuit Card Assembly

The Network Extension Device Adapter Card (NAC) communicates with an internal Network Extension Device (NED) SBC.

Single Board Computer Assembly

The SBC is a Central Processing Unit (CPU) card that has these functions:

- Onboard control logic from a network processor and a Field Programmable Gate Array (FPGA)
- Local power supply and voltage monitor
- Temperature monitor
- Memory - Synchronous Dynamic Random Access Memory (SDRAM), boot Read Only Memory (ROM), Compact Flash
- Ethernet controllers and a reset generator.

The SBC has these types of interface:

- Ethernet

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ONBOARD NETWORK SYSTEM - NETWORK FILE SERVER

- Aeronautical Radio Incorporated (ARINC) 429
- ARINC 717
- Serial
- Aircraft discrete.

For the control logic the network processor does these functions:

- Gives the interface between the control logic and onboard SDRAM
- Interface between the control logic and the onboard Ethernet Interface
- Gives the interface between the control logic and onboard boot ROM when the SBC starts operation
- Controls how the processor gets temperature data from the temperature monitor circuit
- Gives the clock and data interface for the SDRAM Serial Presence Detect (SPD) interface
- Gives the Medium Dependent Interface (MDI) clock
- Data path for the Ethernet interface
- Gives the control signals and data path for the onboard serial interface
- Monitors the signal outputs from the onboard power monitor and reset generator circuits, and starts the reset of the onboard circuits
- Operates with the FPGA to give an interface from the SBC discrete interface, ARINC 429 interface and onboard memory, and external discrete and ARINC 429 devices.

The SBC has these memory components:

- SDRAM
- Boot ROM
- Compact Flash.

The one Giga byte Small Outline Dual In-line Memory Module (SODIMM) SDRAM device gives Random Access Memory (RAM) for the network controller. The SDRAM supports a 133 MHz (Megahertz) bus cycle and Column Address Strobe (CAS) latency of 3 cycles.

The boot ROM is a one 256 Megabit flash ROM device. The SBC uses the boot ROM during the start of operation to load operating software for the SBC.

The Compact Flash socket accepts a one Gigabyte Compact Flash card for mass data storage. The socket supports true Integrated Drive Electronics (IDE) mode using the integrated expansion bus of the network controller.

The discrete interface receives eight discrete inputs and three program pin inputs, and has eight discrete outputs. The discrete interface does the line conditioning and conversion of the front end lines to low voltage Complementary Metal Oxide Semiconductor (CMOS) levels.

The ARINC 429 is the interface between the SBC and external ARINC 429 devices. The ARINC 429 interface has four transmit channels and 12 receive channels. The ARINC 429 interface does the line conditioning and conversion of the ARINC 429 transmit and receive lines to low voltage CMOS levels for the FPGA.

These are the serial interfaces:

- RS-232 interface
- RS-485 auxiliary interface.

These are the Ethernet interfaces:

- Twelve 10BASE-T/100BASE-TX downlink channels
- Two gigabit Ethernet 1000BASE-SX fiber optic channels.

Mass Storage Device

The Mass Storage Device (MSD) is a software function of the Onboard Network System (ONS). The storage is on the 64 Gigabyte (GB) Solid State Drive (SSD). The MSD is 5 GB of that space.

Input Output Connector Circuit Card

The Input/Output Connector (IOC) gives the connectors and filters necessary to connect the NFS with the aircraft equipment. The Interface connector P1 on the back of the NFS connects the NFS with the aircraft equipment.

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ONBOARD NETWORK SYSTEM - NETWORK FILE SERVER

General

The NFS is an ARINC 763 integrated network server unit.

The NFS operates as a server and a computer.

When the NFS operates as a server, it does these operations:

- Ethernet router between connected devices
- Data storage unit.

When the NFS operates as a computer, it operates these types of software:

- Operating systems
- Operates specified Boeing software applications
- Operates third-party software applications.

The NFS is a part of the data network for the aircraft to ground. It uses interfaces to specified onboard Ethernet devices. With the applicable equipment, you can replace digital files between the NFS and a ground network with these procedures:

- On the ground - with a maintenance laptop.

The primary user interface is through a maintenance laptop. Use the maintenance laptop to do these operations:

- Download reports (from ONS to the laptop)
- Install software
- Erase software
- Examine software.

Front Panel

These are the front panel indications on the NFS:

- Power - green Light Emitting Diode (LED)
- Fault - amber LED
- Disk - green LED

- NED - green LED
- Link - green LED
- ACT - green LED
- RJ45 link - green LED
- RJ45 activity - green or amber LED.

The power indicator is on when the internal power supply of the NFS has power from the airplane. The power indicator is off when there is a power supply fault or no power to the NFS.

The fault indicator is on when the initialization operation of the Boot Operating Software (OS) is not correct or done. This light stays on during the normal initial Boot up, and goes off after two minutes. The light stays on, for more than 1 power cycle, if it is necessary for the NFS, to have the Boot OS installed, or there is a hardware fault. The LED does not come on when you do a software reboot from the maintenance screens.

The DISK indicator is on when the Server subsystem reads or writes to the Serial Advanced Technology Attachment (SATA) hard drive.

The NED indicator is on when the NED subsystem is on. These operation cause the NED indicator to go on and off quickly:

- When the Boot OS for the subsystem operates
- While the NFS is dataloading, the 46 NED Operational Program Software (OPS)
- While the NFS is dataloading, the 46 NED Operation Program Code (OPC).

The frequency the indicator goes on and off will go down to approximately one time during each second if the NED system is operational. This occurs when the unit changes from boot/dataload mode to a normal operational condition. The indicator stays on if the subsystem for the NED has a fault.

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ONBOARD NETWORK SYSTEM - NETWORK FILE SERVER

The LINK indicator is on when the Ethernet for the NFS subsystem is connected to the NED subsystem. It is typical for this to be solid green during normal operation. It is typical for this light to be off when the unit is running in the Boot OS, because the interface to the NED subsystem does not operate in the Boot OS. If the communication with the internal NED has a fault, this light is off and there will be an applicable NFS Fault Message for the internal NED.

The ACT indicator is on when Ethernet data moves between the internal NED subsystem and the server subsystem. It is typical for this indicator to go on and off during normal operation. It is typical for this light to be off when the unit is running in the Boot OS, because the interface to the NED subsystem does not operate in the Boot OS. If the communication with the internal NED has a fault, this light is off and there will be an applicable NFS Fault Message for the internal NED.

There are two LEDs for the RJ45 connection behind the front panel. These indications are equivalent to a standard link and an activity on a laptop connection. They will be off during these conditions:

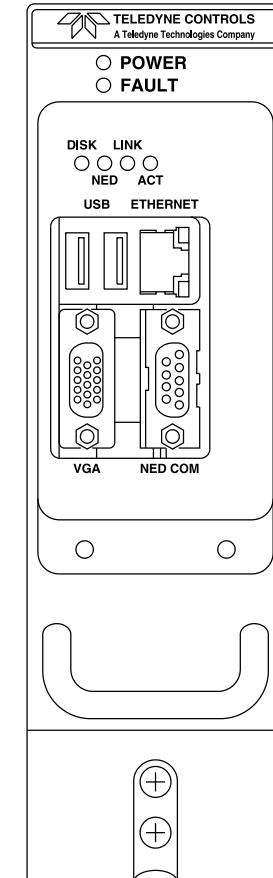
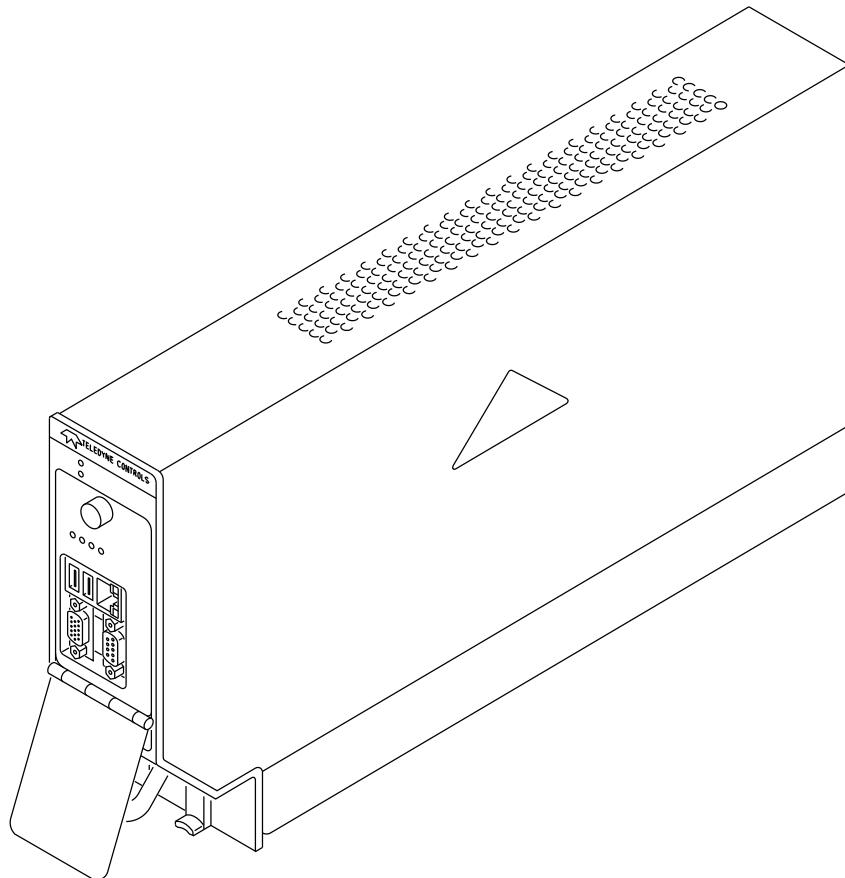
- There is no cable connected
- The cable is defective
- The interface is disabled by an internal server or connected computer.

The activity light will go on and off when there is a data transfer on the interface. The activity light can be amber or green.

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ONBOARD NETWORK SYSTEM INTERFACES

General

The onboard network system (ONS) network file server (NFS) uses four types of data connections:

- Aeronautical Radio Incorporated (ARINC) 429
- ARINC 717
- Analog discrete
- Ethernet 10/100 BASE-T.

Each type of connection can do one or more functions:

- Data acquisition
- Fault reporting of network communication problems
- Software installation.

ARINC 429 Connections

ARINC 429 refers to the avionics data bus, using a two-wire connection. These line replaceable units (LRU) communicate with the NFS using ARINC 429:

- ADIRU-L (air data inertial reference unit)
- ATC-1 (air traffic control transponder)
- AVM (airborne vibration monitor)
- Data Loader Control Panel
- DEU-1 (display electronic unit)
- DEU-2
- FMC-1 (flight management computer)
- FMC-2
- MMR-1 (multimode receiver)

ARINC 717 Connection

ARINC 717 refers to the acquisition of flight data for recording. This LRU communicates with the NFS using ARINC 717:

- DFDAU (digital flight data acquisition unit).

Ethernet Connections

10/100 BASE-T Ethernet uses two pairs of wires (or 4 wires, total). These devices communicate with the NFS using Ethernet:

- DFDAU (digital flight data acquisition unit)
- GPWS (ground proximity warning system)
- Maintenance laptop, through the flight deck port

Analog Discretes

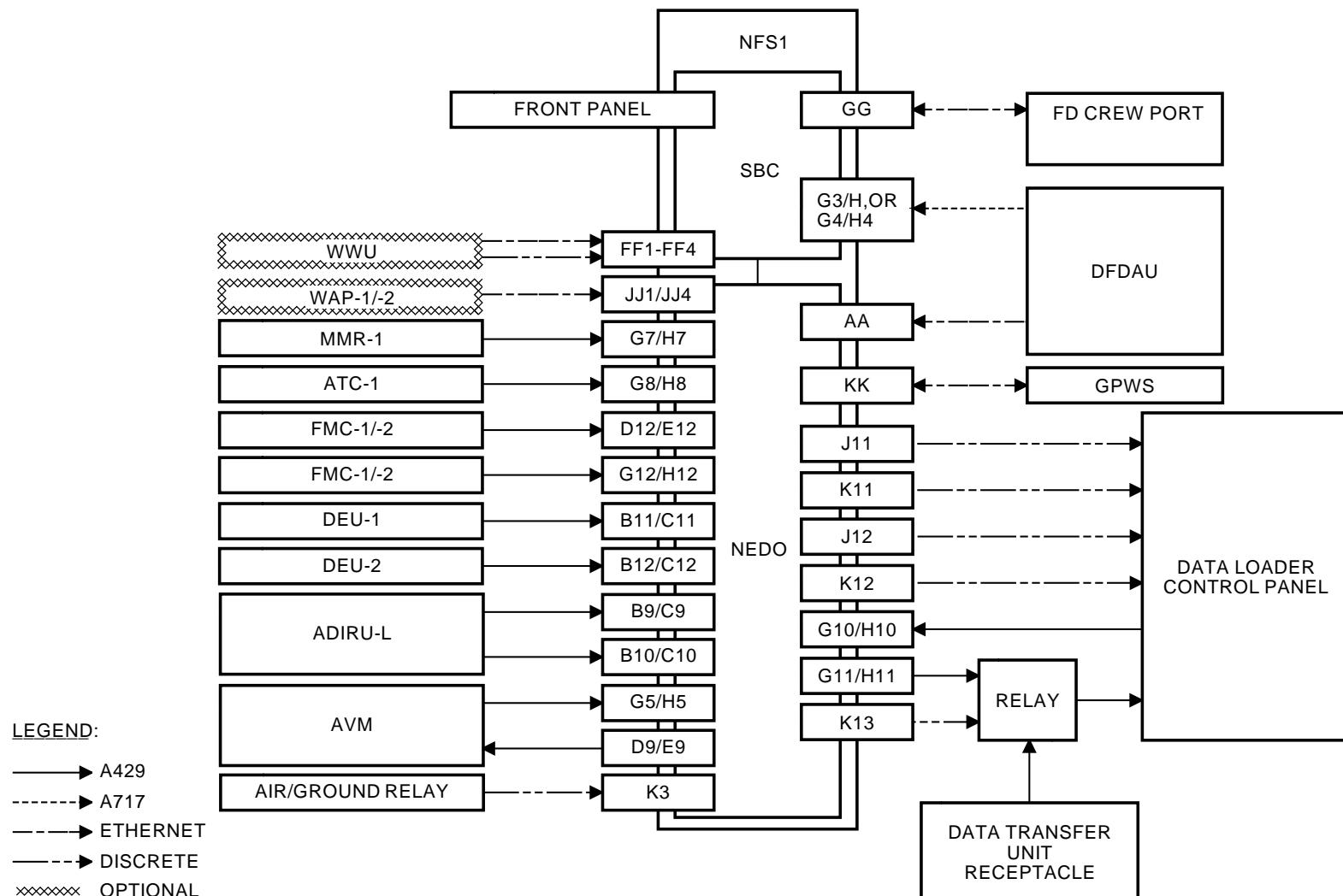
Typically, an analog discrete is a circuit using one wire, and aircraft ground. These devices communicate with the NFS using discretes:

- Air-Ground relay
- Data Loader Control Panel.

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2308955 S0000522838_V2



ONBOARD NETWORK SYSTEM SOFTWARE

General

The network file server (NFS) uses software parts to operate the two internal single-board computers. These are the server, and a network extension device (NED). When the system is serviceable, additional applications and software parts can be installed.

The NFS is delivered to the customer with a specific record of software parts. These parts are required as part of the aircraft certification.

The airline or operator can also specify software parts for installation. For additional information regarding this category of loadable software aircraft parts, you can refer to FAA Advisory Circular 120-76.

Minimum Software Parts

Six software parts must be installed to boot and operate the NFS. These parts can not be erased, but they can be installed again, or replaced with new LSAPs. Four parts operate the server, and two parts operate the internal network extension device (NED) card. They are as follows:

NFS Software Parts

LSAP Nomenclature	Computer	Location
46 NFS BOOT OS	Server	Boot drive
46 NFS SERVER OS	Server	Operational drive
46 NFS NETMANAGER APP	Server	Operational drive
46 NFS OPC	Server	Operational drive
46 NED OPS	Router	NED flash memory
46 NED OPC	Router	NED flash memory

Boot Software

The LSAP identified as NFS Boot OS contains the basic boot-up instructions. During the normal boot sequence, the NFS Boot OS is activated, and launches the Operational OS to complete the boot sequence. The NFS Boot OS part then stops running. During normal operation, the NFS operational disk is the primary drive.

To do maintenance on the operational drive, NFS Boot OS is activated but does not hand-off to the Operational OS. The flash memory remains the primary drive.

For each of the two conditions, the maintenance laptop is the user-interface. NFS Boot OS can be replaced only after the NFS has booted completely in Operational OS.

NED Software

The NED Boot software is sufficient to boot-up the NED computer. The parts are recorded in internal memory on the NED card. These parts can not be erased, but they can be installed again, or replaced with new LSAPs.

The NED operational program software (OPS) runs the NED during normal operation.

Operational OS Software

During normal service, the NFS is controlled by a group of parts referred to as the operational OS (operating system). These parts are recorded in a partition on the solid state (operational) drive. Specifically, the parts are identified as:

- 46 NFS SERVER OS
- 46 NFS NETMANAGER APP
- 46 NFS OPC.

User Modifiable Software (UMS) Parts

User modifiable software (UMS) parts add functions to the server that support airline operations or business purposes. Typically, UMS parts can contain account information, airport data for off-airplane communication, or other configuration data.

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SOFTWARE TYPE	LSAP NOMENCLATURE	COMPUTER	INSTALLED LOCATION
USER MODIFIABLE SOFTWARE	46 NFS (PART NAME-EXAMPLE) UMS	SERVER (FUTURE)	OPERATIONAL DRIVE
NED SOFTWARE	46 NED OPC	ROUTER	NED FLASH MEMORY
NED SOFTWARE	46 NED OPS	ROUTER	NED FLASH MEMORY
NFS BOOT SOFTWARE	46 NFS BOOT OS	SERVER	BOOT DRIVE
OPERATIONAL OS	46 NFS NETMANAGER APP	SERVER	OPERATIONAL DRIVE
OPERATIONAL OS	46 NFS OPC	SERVER	OPERATIONAL DRIVE
OPERATIONAL OS	46 NFS SERVER OS	SERVER	OPERATIONAL DRIVE

ONBOARD NETWORK SYSTEM SOFTWARE PARTS
(EXAMPLE)

2308939 S0000524588_V1

ONS SOFTWARE

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ONBOARD NETWORK SYSTEM USER INTERFACE

General

The network file server (NFS) is host to a web site called Onboard Network System (ONS). Access to the web site is by using a maintenance laptop computer and web browser application. With a serviceable Ethernet connection to ONS, the browser application shows the ONS menu bar, with these three selections:

- Line Maintenance
- Extended Maintenance
- Other Functions.

This menu bar is the starting point for ONS operation and maintenance.

Access - Data Ports

On the aircraft, you will connect the maintenance laptop to ONS using an Ethernet cable, connected to an RJ-45 data port.

In the airplane's electrical compartment, the network file server (NFS) has one data port directly on the face of the LRU.

In the flight compartment, the data access port is installed in the flight compartment closet liner, aft of the captain's seat.

The two ports each give network access to NFS.

Maintenance Laptop

Access to the ONS website is by using a specified laptop computer, with a web browser application installed. Your airline or operator can specify additional requirements.

NOTE: The Boeing Company recommends Mozilla Firefox as the web browser application for ONS access and operation.

Maintenance Browser

Typically, the desktop of the laptop shows an icon that will automatically launch the web browser and connect to the ONS web site. Or, you can manually type the URL into web browser's address bar.

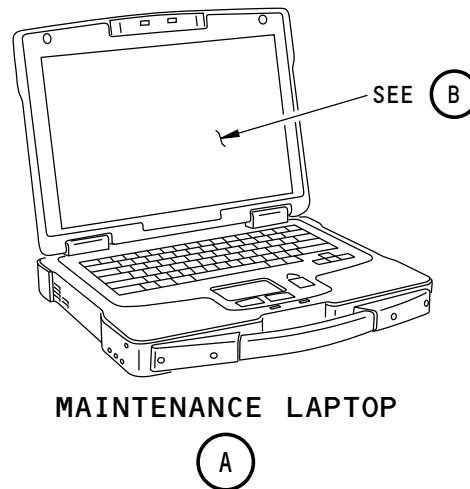
NOTE: The URL for ONS access is: <http://ms.ons.pnet>.

To exit the Onboard Network System web site, and return to the PC desktop, click once on the X in the upper right-hand corner.

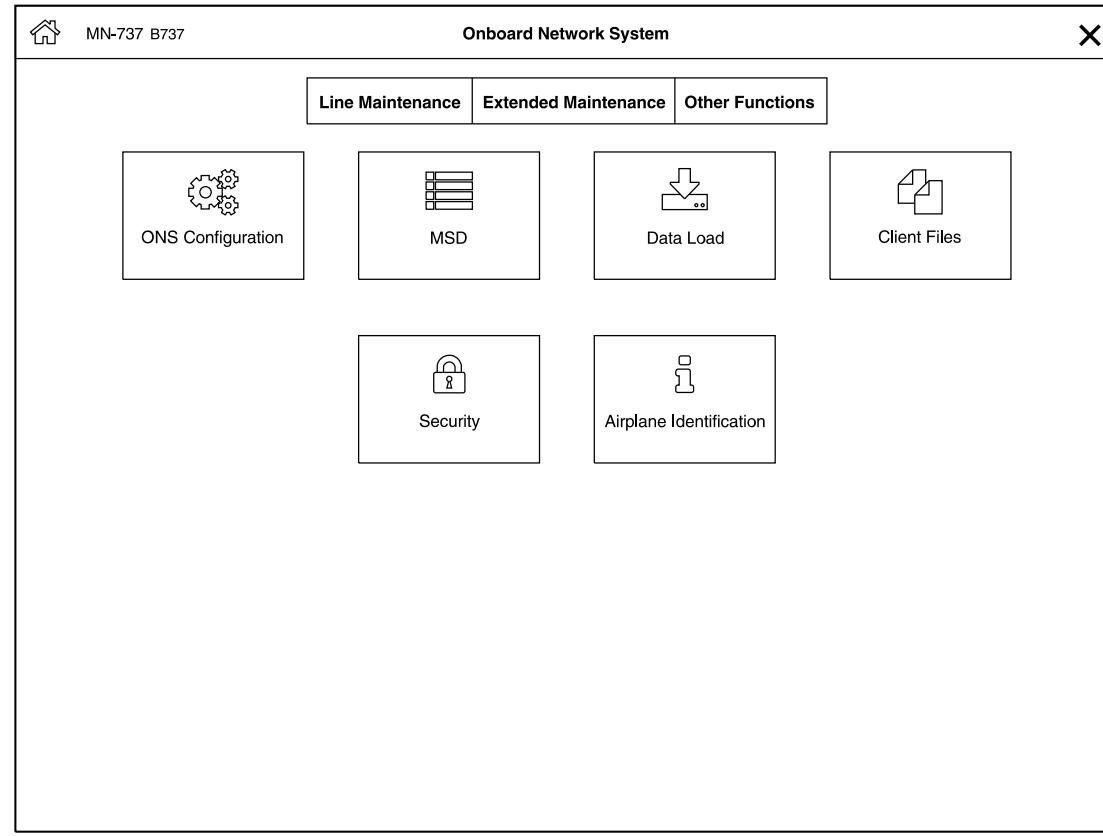
EFFECTIVITY

AKS 006-999

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MAINTENANCE LAPTOP



2322282 S0000522783_V1

ONS USER INTERFACE

EFFECTIVITY

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE

General

The default home page for the ONS maintenance browser is the Line Maintenance page. This is a web page you access using a standard web browser.

Navigation Bar

The system navigation bar is near the top of the page, and has these selections:

- Extended Maintenance
- Line Maintenance
- Other Functions.

All ONS functions are organized into one of these groups.

NOTE: The system description pages that follow are organized by the navigation bar and icon nomenclature. The > symbol refers to the path that shows a specific screen. For example, Extended Maintenance > Client Files shows the necessary selections to show the Client Files page.

Line Maintenance Selections

The Line Maintenance selection shows these icons:

- Airplane Identification
- Client Files
- Data Load
- MSD (mass storage device)
- ONS Configuration
- Security.

To return to the Line Maintenance page from other pages in the system, use the Line Maintenance function in the navigation bar.

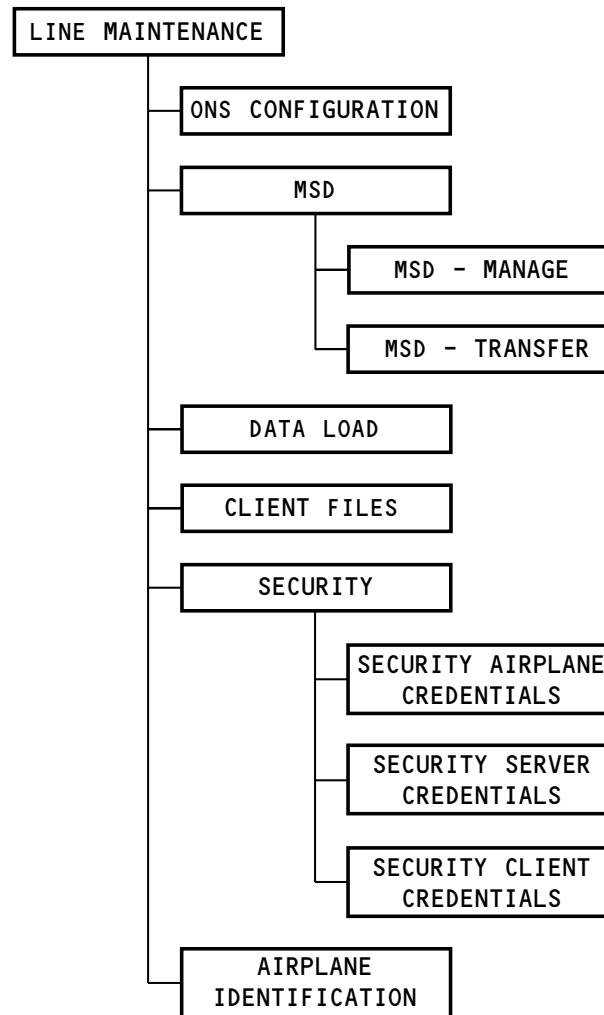
EFFECTIVITY

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2309394 S0000522880_V1

ONBOARD NETWORK SYSTEM - LINE MAINTENANCE PAGE



ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - ONS CONFIGURATION

General

The ONS CONFIGURATION page gives a record of connected LRUs, and the software parts installed in network file server that support the specified line replaceable unit (LRU). There are functions to print or download a record of the installed parts, and a function that removes these parts from the network file server (NFS).

Using the ONS maintenance browser, access to the page is by the selection: LINE MAINTENANCE > ONS CONFIGURATION.

The page shows a table of LRUs. Each LRU shown represents a folder, or container of software parts. These are the data columns:

- LRU NAME
- SOFTWARE PART NUMBER
- NOMENCLATURE.

The ONS configuration page gives access to these functions:

- UNINSTALL NFS PARTS
- PRINT REPORT
- DOWNLOAD REPORT

To exit ONS CONFIGURATION, and return to the main menu, click once on the Home icon, at the upper left corner of the page.

Details of Selected Hardware

ONS CONFIGURATION shows a data box below the words: Details of Selected Hardware. When a single LRU is highlighted, the data box shows the hardware part number, and hardware serial number.

UNINSTALL NFS PARTS

To remove or erase an LSAP from the NFS, use the UNINSTALL NFS PARTS function.

This process requires that you first select the target LRU container, and then make the selection UNINSTALL NFS PARTS. The result then shows the parts within the container that can be removed.

The container shows the words: Select LSAP(s) to erase from ONS. After highlighting one or more parts, the ERASE button cause the parts to be removed.

DOWNLOAD REPORT

The download report function makes a digital record of the hardware and software configuration of the NFS. The report includes the configuration of each network-connected system.

When selected, the ONS browser lets you save the file to the maintenance laptop, or to an external storage device.

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MN1234 B737 ONS Configuration

ONS Configuration

LRU NAME	SOFTWARE PART NUMBER	NOMENCLATURE
NFS	BCG40-0000-01DC	46 NFS SERVER OS
NFS	BCG41-0000-01DC	46 NFS BOOT OS
NFS	NET-Z-NFS1-55FE	46 NFS OPC
NFS	NET-Z-NFS1-53CE	46 NFS OPC
NFS	737-Z-DNFS-53CC	46 NFS OPC
NFS	737-Z-DNFS-53CM	46 NFS OPC
NFS	0NS-Z-NM05-400A	46 NFS NETMANAGER APP
NFS	0NS-Z-ADM5-4A0E	46 NFS DATA MONITOR OPS
NFS	0NS-Z-BS05-300A	46 NFS BOOT OS
NFS	0NS-Z-ADR5-4A0E	46 NFS DATA RECORDER OPS

Details of Selected Hardware

Hardware Part Number	2246900-1
Hardware Serial Number	**123456**

ONS Configuration Page

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2311904 S0000524947_V1

ONS CONFIGURATION PAGE

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - MASS STORAGE DEVICE

General

Select the MANAGE MSD display button to control the software parts that are on the Mass Storage Device (MSD). The MANAGE MSD function shows a list of software parts and their attributes.

The page starts with the ATA CHAPTER column in a sequence from lowest to highest. Click on the underlined column title to change the sequence of the list. You can use the three columns to change the sequence.

These are the columns that shows on the MANAGE MSD screen:

- Air Transport Association (ATA) CHAPTER
- Software part number
- Nomenclature.

For an Aeronautical Radio Incorporated (ARINC) 615 formatted part this data shows:

- Media Set part number
- Loadable Software Airplane Part (LSAP) part numbers - indented below the Media Set part number.

NOTE: These are only available when the parts have been packaged using the Boeing Ground Tools.

The ATA CHAPTER column is the ATA chapter for the Line Replaceable Unit (LRU) for the applicable software part. If more than one LRU is applicable, the list uses the ATA of the first LRU.

The SOFTWARE PART NUMBER column is the part number of the software on the MSD or the media set part. The data comes from the part header if the format contains the data. For ARINC 615 parts, the part number comes from the packaging data. The packaging data comes from the Boeing Ground Tools. If the packaging data is not available, the part number shows as the top directory name in the archive file uploaded.

The NOMENCLATURE column is the description of the part of the software on the MSD or media set part. The data comes from the part header if the format is ARINC 665-3. For all other formats, the part description comes from the packaging data from the Boeing Ground Tools. If the packaging data is not available, the ATA and the system type of the first LRU applicable with the software sets the part description.

The MSD SUMMARY section shows this data:

- The quantity of free space of the space applicable to the MSD function
- Total used storage.

When you make a selection of one or more parts, the SELECTED LSAP SUMMARY section shows. The summary data is for the selection of the LSAP or LSAPs. The summary shows the number of files and the total quantity in bytes.

The MANAGE MSD screen has the Onboard Network System (ONS) Maintenance Web Graphical User Interface (GUI) user an options for these functions:

- PRINT REPORT
- DOWNLOAD REPORT
- ERASE.

Use the PRINT REPORT button to send a report of the MSD configuration data to a printer.

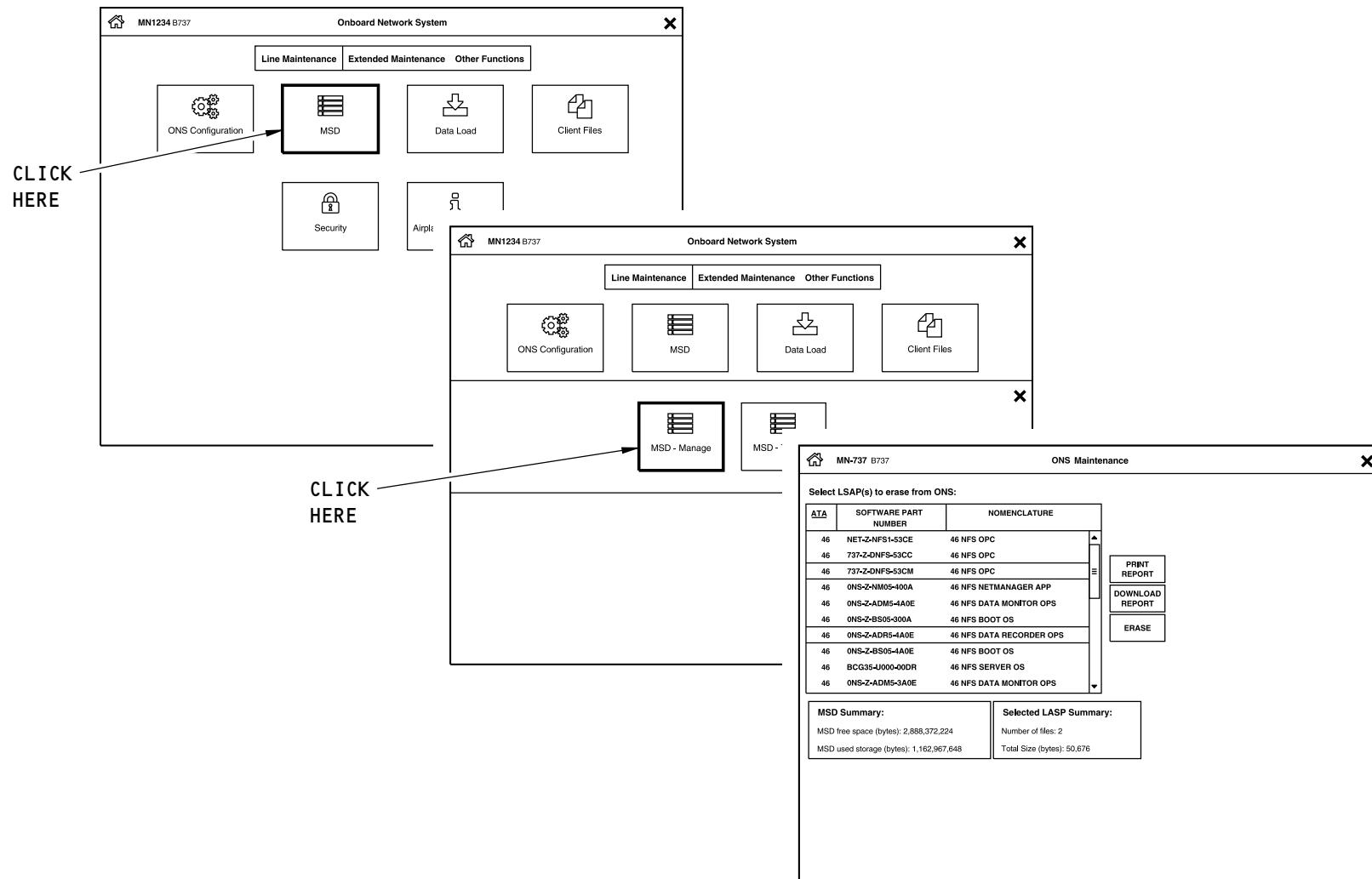
Use the DOWNLOAD button to send a report of the system configuration data to the laptop or to media that is connected to the laptop.

Use the ERASE button to remove the LSAP from the MSD.

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - MSD - MANAGE

General

The mass storage device (MSD) manage page shows a table of loadable software airplane parts (LSAP). These parts shown are not in service. They are available for future installation into the applicable LRU.

The MSD - Manage page has functions to print, or download a configuration report. There is also a function to erase one or more LSAP from the MSD.

To show MSD - MANAGE from the ONS menu bar, make the selections:
Line Maintenance > MSD > MSD - Manage.

MSD - Manage

These are the columns that show on the MANAGE MSD page:

- ATA - refers to ATA (or, Air Transport Association) chapter number
- SOFTWARE PART NUMBER
- NOMENCLATURE.

The ATA column refers the chapter number assigned by the Air Transport Association, for that Line Replaceable Unit (LRU), for the specified software part. If two or more LRUs share the part, the ATA of the first LRU is specified.

The SOFTWARE PART NUMBER column refers to the software, or media set part number. The data shown comes from the software part header, when provided.

The NOMENCLATURE column refers to the software part's description. When the part format is Aeronautical Radio Incorporated (ARINC) 665-3, then the part header gives the nomenclature data. For all other formats, the part description comes from the packaging data from the Boeing Ground Tools. If the packaging data is not available, the Air Transport Association (ATA) and the system type of the first LRU applicable with the software sets the part description.

The MSD SUMMARY section shows the amounts of available, and storage used.

When one or more parts is selected, the SELECTED LSAP SUMMARY section shows the quantity of LSAPs selected, and the amount of storage they occupy.

The DOWNLOAD function makes a record of the MSD configuration.

The ERASE function removes the highlighted software part from the MSD.

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LINE MAINTENANCE > MSD > MSD MANAGE

ONS Maintenance

ATA	SOFTWARE PART NUMBER	NOMENCLATURE
46	NET-Z-NFS1-53CE	46 NFS OPC
46	737-Z-DNFS-53CC	46 NFS OPC
46	737-Z-DNFS-53CM	46 NFS OPC
46	ONS-Z-NM05-400A	46 NFS NETMANAGER APP
46	ONS-Z-ADM5-4A0E	46 NFS DATA MONITOR OPS
46	ONS-Z-BS05-300A	46 NFS BOOT OS
46	ONS-Z-ADR5-4A0E	46 NFS DATA RECORDER OPS
46	ONS-Z-BS05-4A0E	46 NFS BOOT OS
46	BCG35-U000-00DR	46 NFS SERVER OS
46	ONS-Z-ADM5-3A0E	46 NFS DATA MONITOR OPS

MSD Summary:
 MSD free space (bytes): 2,888,372,224
 MSD used storage (bytes): 1,162,967,648

Selected LASP Summary:
 Number of files: 2
 Total Size (bytes): 50,676

X

SELECTION

SELECTION

SHOWS RESULT OF SELECTION

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2312287 S0000525174_V1

MSD - MANAGE PAGE
46-13-00



ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - MSD - TRANSFER

General

The mass storage device (MSD) transfer page is the function that moves digital files from the maintenance laptop to the MSD.

To get access to the page, use the ONS maintenance browser menu bar, and make the selections: Line Maintenance > MSD > MSD - Transfer.

To exit the MSD functions, and return to the ONS main menu, click on the home icon, in the upper left-hand corner.

MSD - Transfer

The page shows with no initial information.

The upper section of page shows:

- The words: Select a file with parts to transfer:
- An empty box - that will show the directory path. You can manually type the path into this box, or use the Browse button.
- The Browse button - lets you navigate to the target file, and make your selection.
- The Transfer button - executes the transfer function.

The lower portion of the page shows the Transfer Results table. The data shows as follows:

- File name
- Part number
- Status.

NOTE: The transfer function accepts only files that meet strict engineering conditions.

Transfer Process

The process to add a file to the MSD is as follows.

- Connect the maintenance laptop to ONS.
- Show the MSD - Transfer page.

- Use the Browse function to find and select the source file.
- Make sure the transfer page accepts the part for transfer.
- Make the Transfer selection.
- Make sure the part shows the transfer status: Success.

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Select a file with parts to transfer:

Transfer Results to: ONS

FILE NAME	PART NUMBER	STATUS

LINE MAINTENANCE > MSD > MSD-TRANSFER

MN-737 B737 ONS Maintenance

Select a file with parts to transfer:

File Upload
 Transfer
 Favorites
 Libraries
 Homegroup
 Computer
 Network
 Parts > Parts for upload
 Search Parts for upload
 Organize ▾ New folder
 Name Date modified Type
 crateS_ONS-Z-0S05-4A0E 9/4/2013 4:24 PM Compressed (zip)
 File name: crateS_ONS-Z-0S05-4A0E Open Cancel

LINE MAINTENANCE > MSD > MSD-TRANSFER > BROWSE > (FIND LSAP)
 2312246 S0000525636_V1

MSD - TRANSFER PAGE

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 MN-737 B737

ONS Maintenance 

Select a file with parts to transfer:

Transfer Results to: ONS

FILE NAME	PART NUMBER	STATUS
crateS_0NS-Z-0S05-4A0E.zip		TRANSFERRING

TRANSFER TO MSD

Please wait...

File is being uploaded...2%



LINE MAINTENANCE > MSD > MSD-TRANSFER > BROWSE > (FILE SELECTION) > OPEN

2312257 S0000525735 V1

MSD - TRANSFER PAGE

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Select a file with parts to transfer:
C:\Parts for upload\createS_ONS-Z-0S05-4A0E.zip Browse

TRANSFER

Transfer Results to: ONS

FILE NAME	PART NUMBER	STATUS

CLICK HERE

MN-737 B737 ONS Maintenance X

Select a file with parts to transfer:
C:\Parts for upload\createS_ONS-Z-0S05-4A0E.zip Browse

TRANSFER

Transfer Results to: ONS

FILE NAME	PART NUMBER	STATUS
createS_ONS-Z-0S05-4A0E.zip	ONS-Z-0S05-4A0E	SUCCESS

RESULT

LINE MAINTENANCE > MSD > MSD-TRANSFER >
BROWSE > (LSAP SELECTED FOR TRANSFER)

LINE MAINTENANCE > MSD > MSD-TRANSFER > TRANSFER > SUCCESS STATUS
2312265 S0000525736_V1

MSD - TRANSFER PAGE

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - DATA LOAD

General

Dataload refers to the software installation process into connected onboard network system (ONS) devices.

Using the maintenance browser, the selection LINE MAINTENANCE > DATALOAD shows a function that installs software parts automatically into a specific LRU. The NFS always shows as an available installation target. Additional LRU-systems can show when installed.

Dataload Process

The dataload function lets you select a target LRU for software installation, and make the target LSAP selection. When the LRU and LSAP are selected, the function completes the software installation. The target LSAP must be present on the mass storage device (MSD).

When you install to the NFS only, you can install one part, or multiple parts at the same time. When you install into an LRU other than NFS, you can install only one selection at a time.

When the installation is complete, the page then shows the DATA LOAD RESULT page. This page shows the part number and load status (or condition) of the installed LSAP. A serviceable installation will show the LOAD STATUS: SUCCESS.

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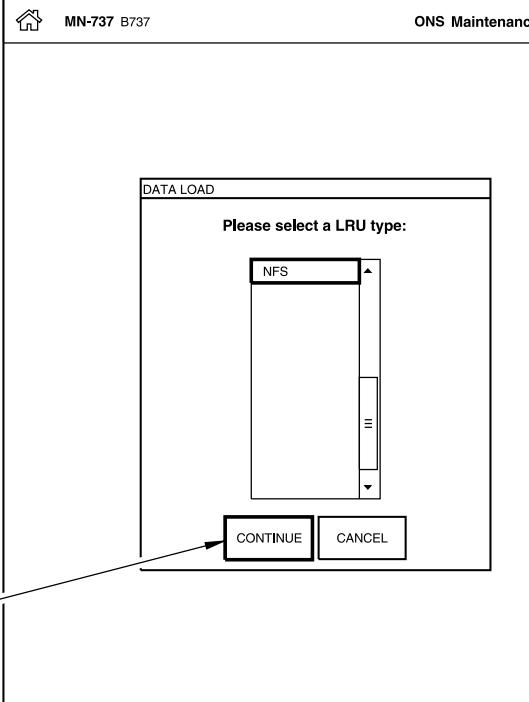
46-13-00-0012

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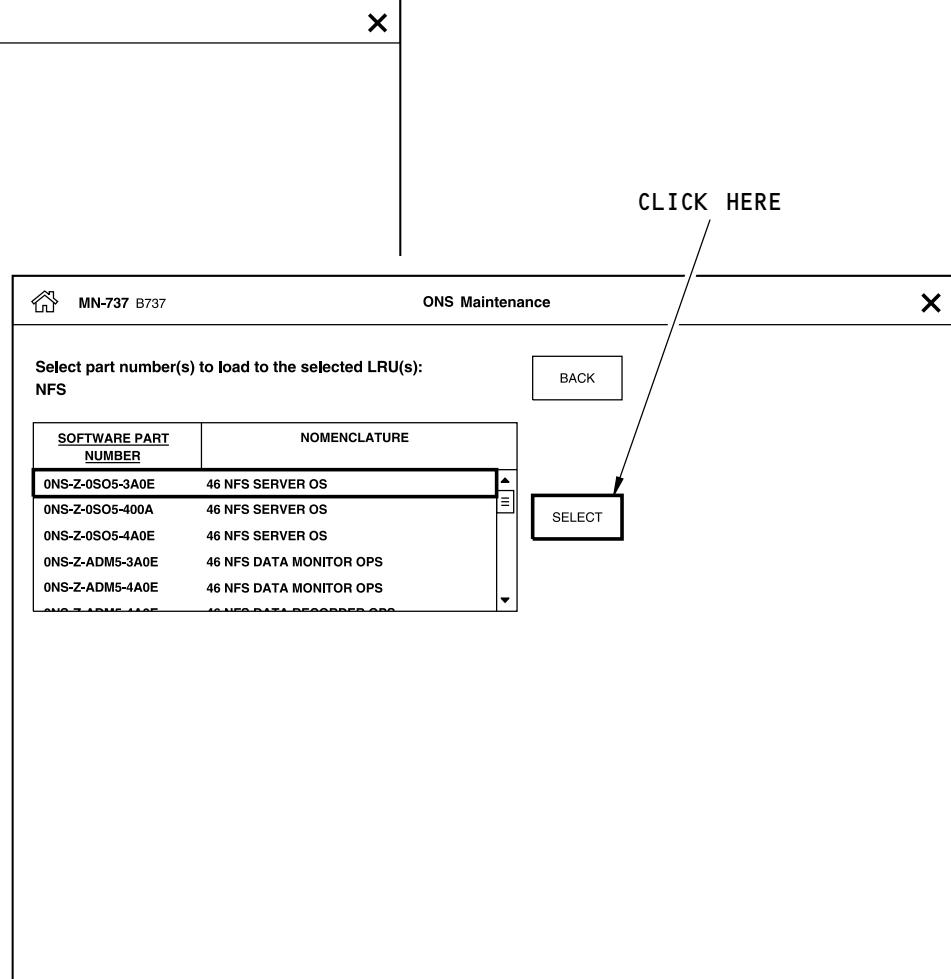
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CLICK HERE

LINE MAINTENANCE > DATA LOAD:



CLICK HERE

ONS Maintenance

Select part number(s) to load to the selected LRU(s):
NFS

SOFTWARE PART NUMBER	NOMENCLATURE
ONS-Z-0S05-3A0E	46 NFS SERVER OS
ONS-Z-0S05-400A	46 NFS SERVER OS
ONS-Z-0S05-4A0E	46 NFS SERVER OS
ONS-Z-ADM5-3A0E	46 NFS DATA MONITOR OPS
ONS-Z-ADM5-4A0E	46 NFS DATA MONITOR OPS
...and more...	

BACK SELECT

LSAP TO INSTALL INTO SELECTED LRU.

2312125 S0000525745_V1

ONS DATA LOAD PAGE
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<p>MN-737 B737</p> <p>ONS Maintenance</p> <p>Select part number(s) to load to the selected LRU(s): NFS</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th style="width: 20%;">SOFTWARE PART NUMBER</th> <th style="width: 80%;">NOMENCLATURE</th> </tr> </thead> <tbody> <tr> <td>831-7075-F17cr(MSP)</td> <td>CMU COMBINED EW</td> </tr> <tr> <td colspan="2">Contained LSAPs:</td> </tr> <tr> <td colspan="2">815-4545-17E</td> </tr> <tr> <td colspan="2">815-5679-117</td> </tr> <tr> <td colspan="2">832-9929-17E</td> </tr> </tbody> </table> <p style="text-align: right;">BACK</p> <p style="text-align: center;">SELECT</p>	SOFTWARE PART NUMBER	NOMENCLATURE	831-7075-F17cr(MSP)	CMU COMBINED EW	Contained LSAPs:		815-4545-17E		815-5679-117		832-9929-17E		<p>CLICK HERE</p> <p>MEDIA SET PART NUMBER WITH INCLUDED LSAP PART NUMBERS</p> <p>LSAP SELECTED WILL SHOW HERE.</p> <p>CLICK HERE</p> <p>PART SELECTION COMPLETE</p> <p>ONS DATA LOAD PAGE</p>
SOFTWARE PART NUMBER	NOMENCLATURE												
831-7075-F17cr(MSP)	CMU COMBINED EW												
Contained LSAPs:													
815-4545-17E													
815-5679-117													
832-9929-17E													
<p>NOTE: DATA SHOWN IS FOR EXAMPLE ONLY</p> <p>2312164 S0000525806_V1</p>													



MN-737 B737 ONS Maintenance X

Select part number(s) to load to the selected LRU(s):
CMU BACK

DATA LOAD > CMU

Installing parts to CMU

Elapsed time: 00:00:15

PART NUMBER	LRU NAME	STATUS	DESCRIPTION
831-7075-F17cr(MSP)	CMU	RUNNING	Load Status in Progress Load Ration UNAVAILABLE Description Initializing

Installation in process

STOP

DATA LOAD PROGRESS INDICATOR POP-UP

MN-1234 B737 Data Load X

Results of loading to the following LRUs:
NFS LRU STATUS

SOFTWARE PART NUMBER	LOAD STATUS
0NS-Z-0SBL-000F	SUCCESS

DATA LOAD DETAILED RESULTS VIEW (SUCCESS)

2312166 S0000525821_V1

ONS DATA LOAD PAGE

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - CLIENT FILES

General

A client file refers to digital file made by a network client, and stored on the network file server (NFS). Typically, client files are saved in the file store for the specified client.

You use the client files page to get access to these files. These are examples of client files:

- Certificate signing request - a digital file created using server credential page.
- LRU Report - a digital file created using the LRU Reports page.
- ONS client file - one or more digital files created by a client LRU on the network.

A certificate signing request (CSR) is a file saved to the client files store. An LRU Report can be saved to the client files store. When specified by a maintenance action, you will download files like these to the maintenance laptop using the Client Files page.

Currently, no 737-NG network clients are configured to save files to the file store.

In contrast to client files, for example, a loadable software airplane part (LSAP) is not stored in the client files store. LSAP are found in the mass storage device (MSD).

From the menu bar, you get access to the Client Files page by making the selections: Line Maintenance > Client Files. To exit Client Files, and show the Line Maintenance menu, click on the home icon, in the upper left-hand corner.

Client Files Page

The client files screen shows a list of client stores available in the File Store. The client files screen has this data:

- CLIENT NAME
- TOTAL NUMBER OF FILES
- USED SPACE (BYTES)

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- FREE SPACE (BYTES)
- TOTAL SPACE (BYTES).

Below the words File Store Summary is the result of all files in all stores combined. The summary has this data:

- Total number of files in the file store
- Total used space in bytes
- Total free space in bytes
- Total file store space in bytes.

When you make a selection of client name, the CONTINUE button becomes serviceable. Click the CONTINUE button to show the client files store screen.

The screen for the client files store shows this data for the files in the client file store:

- FILE NAME
- FILE SIZE (BYTES)
- DATETIME OF CREATION.

On the bottom of the screen for the client files store is a summary of the client file store. The summary has this data:

- Total number of files in the client file store
- Total used space in bytes
- Total free space in bytes
- Total client file store space in bytes.

These are the three functions you can do from the screen for the client files store:

- List
- Copy
- Delete.

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LINE MAINTENANCE > CLIENT FILES:

N737BO B739 Client Files X

Select a client from the list below and press CONTINUE to proceed to the selected file store:

CLIENT NAME	TOTAL NUMBER OF FILES	USED SPACE (BYTES)	FREE SPACE (BYTES)	TOTAL SPACE (BYTES)
NFS.OAS	0	0	52,428,800	52,428,800
NFS.ONSMaintApp	1	3,209	52,425,591	52,428,800

MAKE SELECTION

File Store Summary (across all clients):

Total number of files in file store: 1
Total used space (bytes): 3,209
Total free space (bytes): 104,854,391
Total space (bytes): 104,857,600

CLICK HERE

CONTINUE

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2322237 S0000525748_V1

ONS CLIENT FILES PAGE

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LINE MAINTENANCE > CLIENT FILES > CLIENT FILE STORE

FILE NAME	FILE SIZE (BYTES)	DATA/TIME OF CREATION
ACP_20140130_213357.zip	3,209	2094-01-30 21:34:37

Select from NFS.ONSMaintApp client files:

Client Files

X

MAKE SELECTION

SELECT ALL

UNSELECT ALL

MAKE SELECTION

DOWNLOAD

DELETE

File Details for ACP_20140130_213357.zip

File Size (bytes): 3,209

Date/Time of Creation: 2014-01-30 21:34:37

Time until expiration (minutes): File never expires

BACK

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2322251 S0000526883_V1

ONS CLIENT FILES STORE PAGE

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - SECURITY

General

The page named SECURITY is a sub-menu within the selection Line Maintenance. These are the functions shown on the Security menu.

- Security Airplane Credentials
- Security Server Credentials
- Security Client Credentials.

To get access to the Security menu, from the main menu bar, make the selections: Line Maintenance > Security. To exit the security menu, and show the Line Maintenance menu, click on the home icon in the upper right-hand corner.

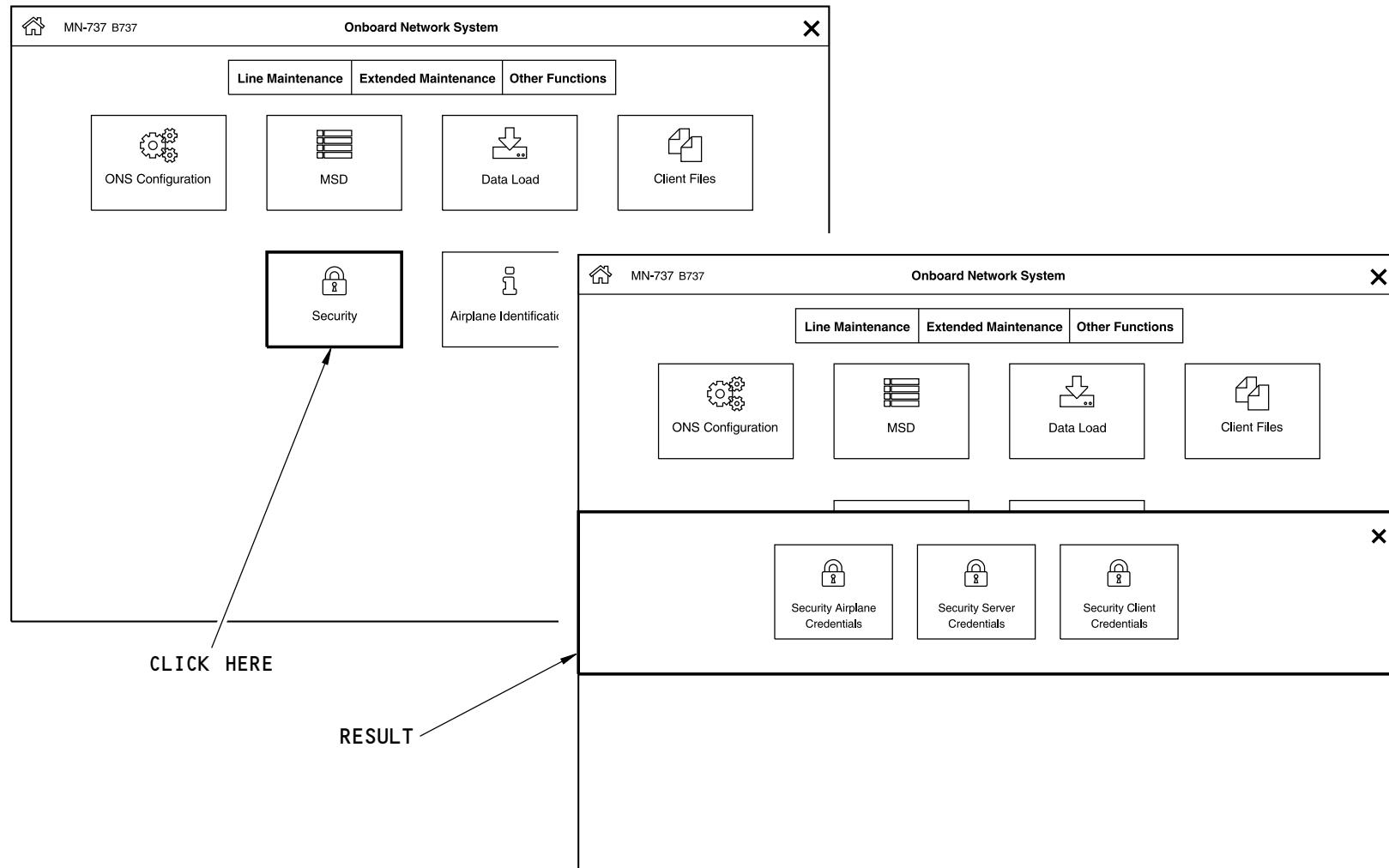
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LINE MAINTENANCE > SECURITY

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2322417 S0000526896_V1

ONS SECURITY PAGE



ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - SECURITY - SECURITY AIRPLANE CREDENTIALS

General

The airplane credential is a necessary digital data file for encrypted network communication. The airplane credential refers to airplane identification, for use by onboard network system (ONS). In contrast, client credentials refer to the connected client devices. And the server credential identifies the unique NFS LRU. The airplane, server and client credential files all must agree for serviceable ONS communications.

The Airplane Credentials page lets you see the condition of the security credentials of an airplane, and generate a new set of credentials.

To show the airplane credentials page, use the ONS menu bar, and make the selections: Line Maintenance > Security > Security Airplane Credentials.

Airplane Credentials

These are the conditions of the airplane credentials that show on the airplane credentials screen:

- A successful credential request was generated on (Date, Time) but no certificates exist on the aircraft
- A valid certificate exists
- A valid certificate exists and another credential request was made on (Date, Time)
- No valid certificate exists nor has a credential request been made
- A credential request could not be processed due to unavailability of required aircraft parameters from the Standard Airplane Parameter Service (SAPS) service.

The GENERATE CREDENTIALS button will operate only if SAPS parameters are available. The SAPS parameters are necessary to make a self-signed certificate and key pair. The SAPS gives the Onboard Network System (ONS) clients access to airplane parameters. These are the airplane parameters that the SAPS give to the ONS clients for the Certificate Signing Request (CSR):

- Date
- Time

EFFECTIVITY

AKS 006-999

- Tail identification (ID).

If you click the GENERATE CREDENTIALS button and a CSR is in the system, then the overwrite confirmation pop-up shows.

The overwrite confirmation pop-up has CONTINUE button and a CANCEL button. Click on the CONTINUE button to continue the overwrite operation. Click the CANCEL button to go back to the airplane credentials screen.

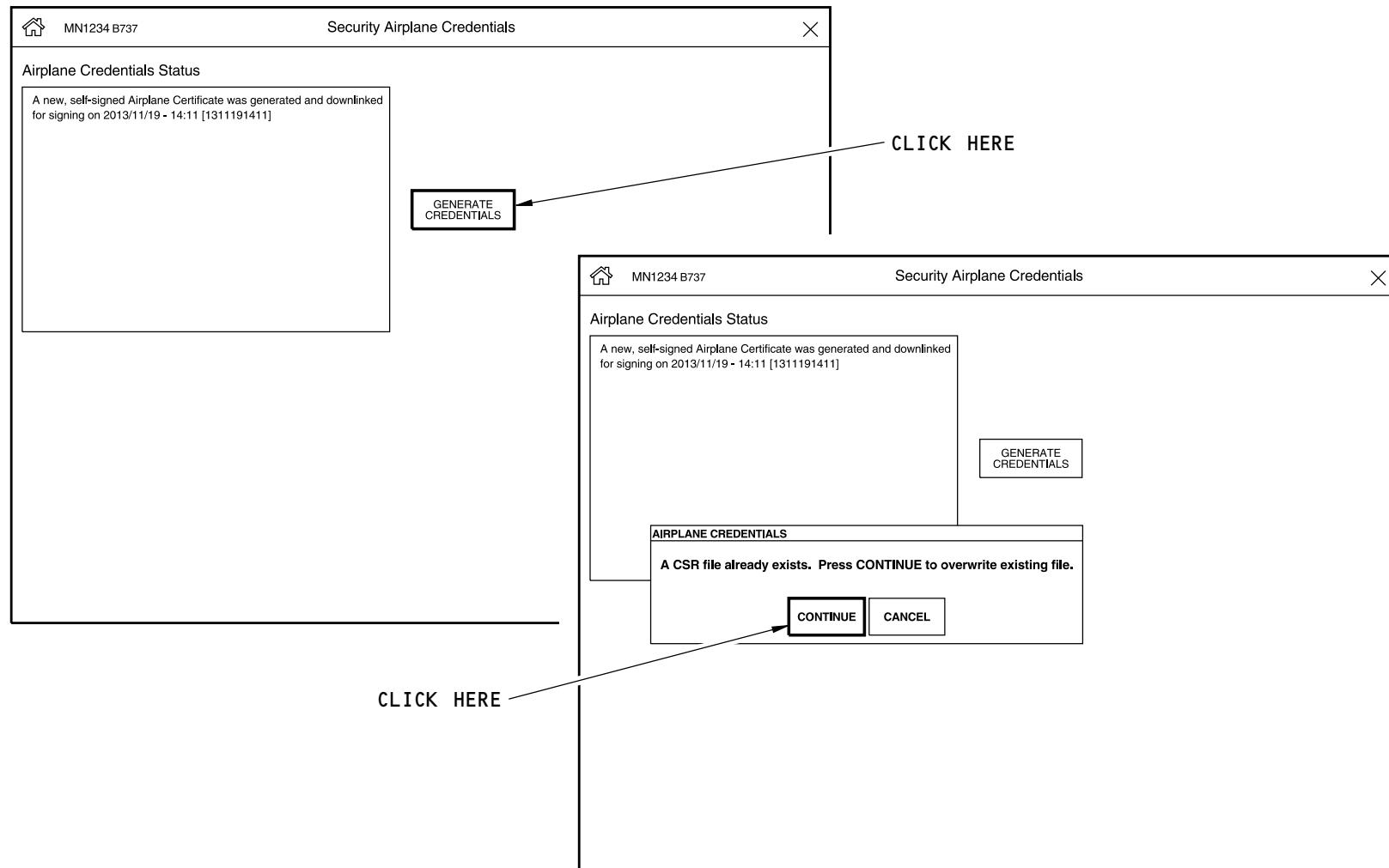
If you click the CONTINUE button on the overwrite confirmation pop-up, then the generate credentials confirmation pop-up shows. This is the data on the generate credentials confirmation:

- System date - from SAPS
- System time - from SAPS
- Tail number - from SAPS
- CONTINUE button
- CANCEL button.

Click on the CONTINUE button to continue the overwrite operation. Click the CANCEL button to go back to the airplane credentials screen.

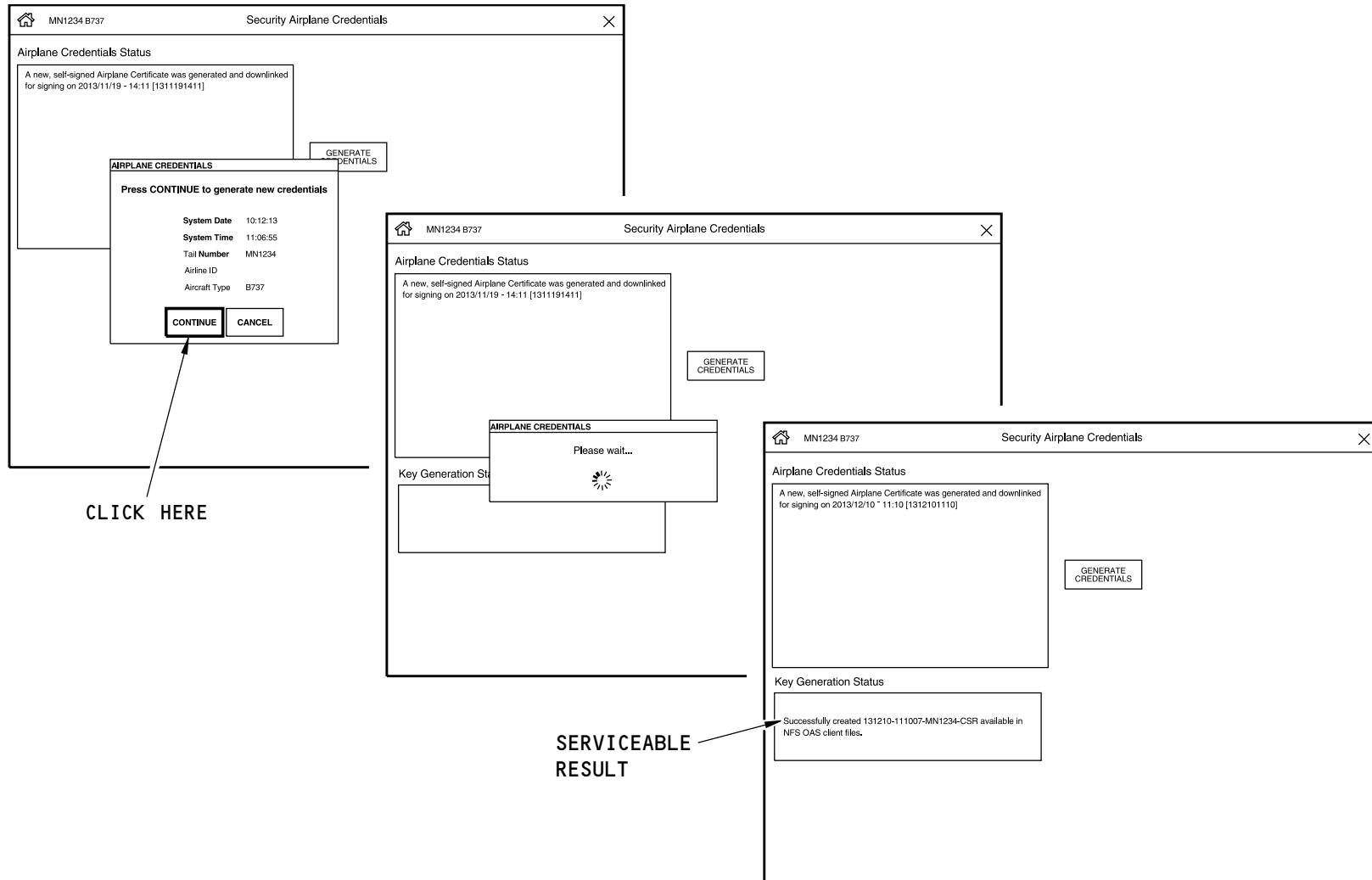
If you click the CONTINUE button on the generate credentials pop-up, the progress indicator pop-up shows. The progress indicator pop-up shows until the overwrite function completes. The result screen shows when the overwrite function completes.

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LINE MAINTENANCE > SECURITY > SECURITY AIRPLANE CREDENTIALS

ONS AIRPLANE CREDENTIALS
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**ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - SECURITY - SECURITY SERVER CREDENTIALS****General**

A server credential is a necessary digital data file for encrypted network communication. The server credential refers to network file server. In contrast, the client files refer to the connected client devices. The server and client files must agree for serviceable ONS communications.

The server credentials page has a function to generate all-new server and client credentials in one action.

Server Credentials Page

To show the server credentials page, begin from the ONS menu bar, and make the selections: Line Maintenance > Security > Security Server Credentials. The weight-on-wheels discrete must be in the ground condition.

The Security Server Credentials page shows the presence of the server credential, and its date and time stamp.

Generate Credentials Function

The Generate Credentials button is adjacent to the credentials status. This function makes the server credential, and all client credentials unserviceable, and makes all new ones.

NOTE: When you generate a new server credential, ONS installs all-new client credentials at the same time. The server and client credentials must agree.

Click on the GENERATE CREDENTIALS button on the server credentials display to start the generate credentials operation. The pop-up for confirmation shows when the operation starts. The pop-up for confirmation has a CONTINUE button and a CANCEL button. Click on the CONTINUE button to continue the generate credentials operation. Click on the CANCEL button to cancel the generate credentials operation.

When the generate credentials operation starts to operate the pop-up for progress shows this data:

- Header – Generating new sever credentials
- A time counter of the generate credentials operation

- Generating credentials in process.

Access Denied Problems

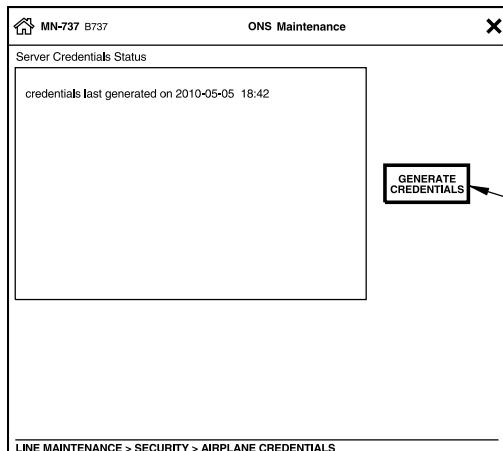
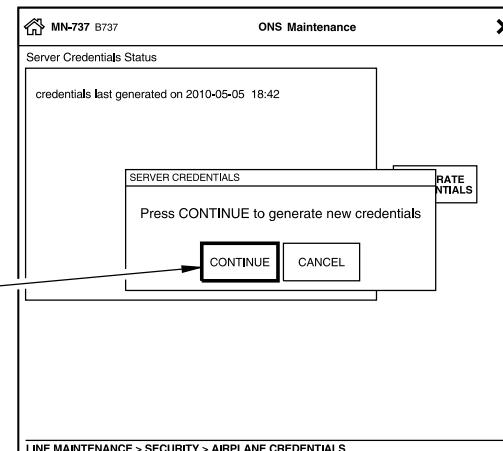
Access to the server credential page is blocked when another application is in service and has control.

Each of these operations that follow can prevent access to the server credential page.

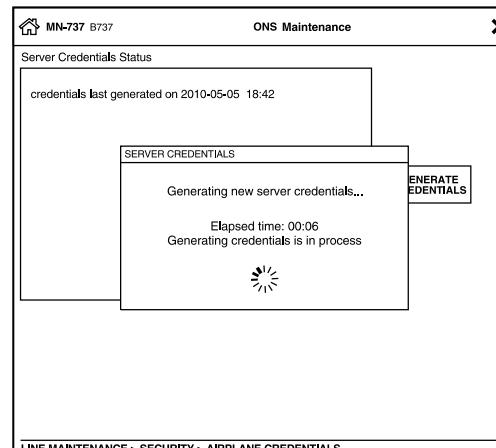
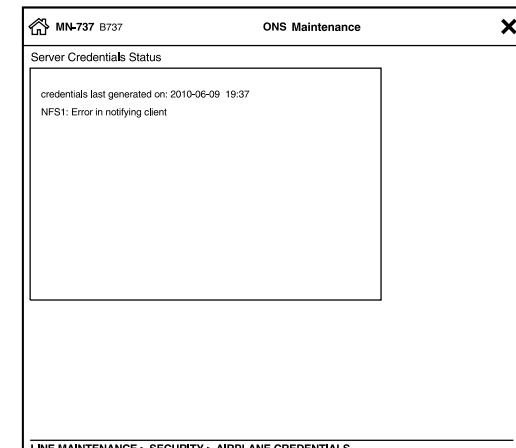
- Dataload
- Uninstall NFS Parts
- Reboot To Boot OS
- Client Credentials
- Server Credentials.

The access denied pop-up for server credentials shows when an operation, that does not agree with the server credentials function, is in operation. The access denied pop-up for server credentials has a OK button. Click on the OK button to return to the server credentials screen.

To resolve the problem and get access, the in-service operation must be stopped or closed.


SERVER CREDENTIALS


CLICK HERE
CLICK HERE

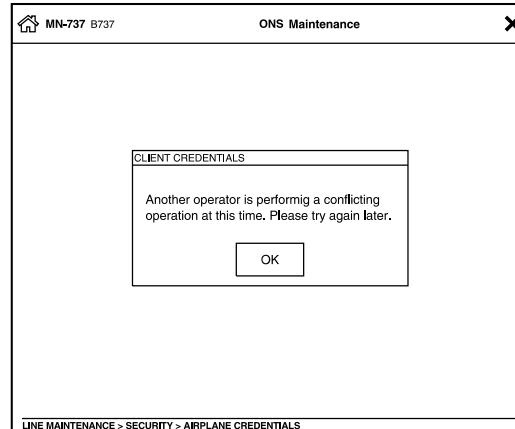
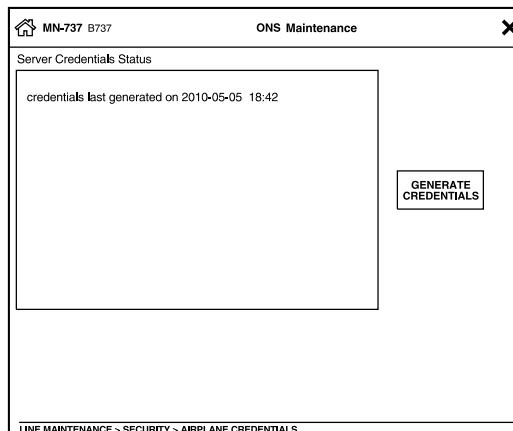
**SERVER CREDENTIALS
CONFIRMATION POP-UP**

PROGRESS POP-UP

RESULTS
2313931 S0000526043_V1

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

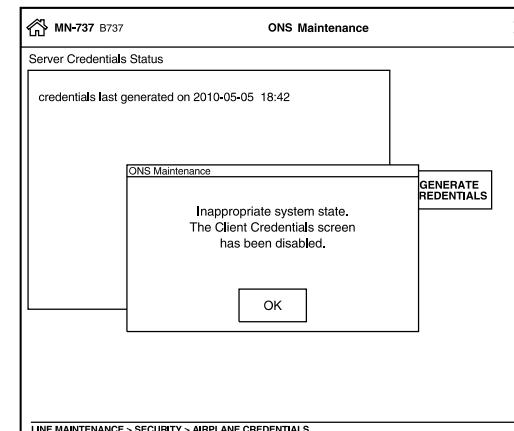
ONS SECURITY SERVER CREDENTIALS PAGE
EFFECTIVITY

AKS 006-999

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**SERVER CREDENTIALS - ACCESS DENIED****SERVER CREDENTIALS**

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

ONS SECURITY SERVER CREDENTIAL PROBLEMS**SERVER CREDENTIALS NOT
AVAILABLE POP-UP**

2313993 S0000526091_V1

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - SECURITY - SECURITY CLIENT CREDENTIALS

General

A client credential is a necessary digital data file for ONS network security. The client credential refers to the network-connected line replaceable unit (LRU). In contrast, the server credential refers to the network file server (NFS). The server and client credentials must agree for serviceable ONS communications.

Typically, the client credential is generated after LRU installation, or to resolve an ONS fault log message.

The client credential is serviceable when the NFS fault log shows no messages or faults for the specified LRU.

Client Credentials Page

To show the Client Credentials page, use the ONS maintenance browser to make the selections: Line Maintenance > Security > Security Client Credentials.

The page shows a table with columns for client name, and credential status. Adjacent to the data, are three function buttons:

- SELECT ALL
- UNSELECT ALL
- GENERATE CREDENTIALS.

Generate Credentials Function

To operate the GENERATE CREDENTIALS function, one or more target clients must be selected (or, highlighted). Click once on the GENERATE CREDENTIALS button, and follow the instructions in the pop-up windows.

When complete, the Security Client Credentials page shows the credential with a new date and time stamp.

To make sure the new credential is serviceable, examine the NFS fault log for messages. The credential is serviceable when no NFS fault log messages show.

Access Denied Problems

Access to the client credential page is blocked when another operation, or application, is in service and has control.

Each of these operations that follow can prevent access to the client credential page.

- Dataload
- Uninstall NFS Parts
- Reboot To Boot OS
- Client Credentials
- Server Credentials.

The access denied pop-up for client credentials shows when an operation, that does not agree with the client credentials function, is in operation. The access denied pop-up for client credentials has a OK button. Click on the OK button to return to the client credentials screen.

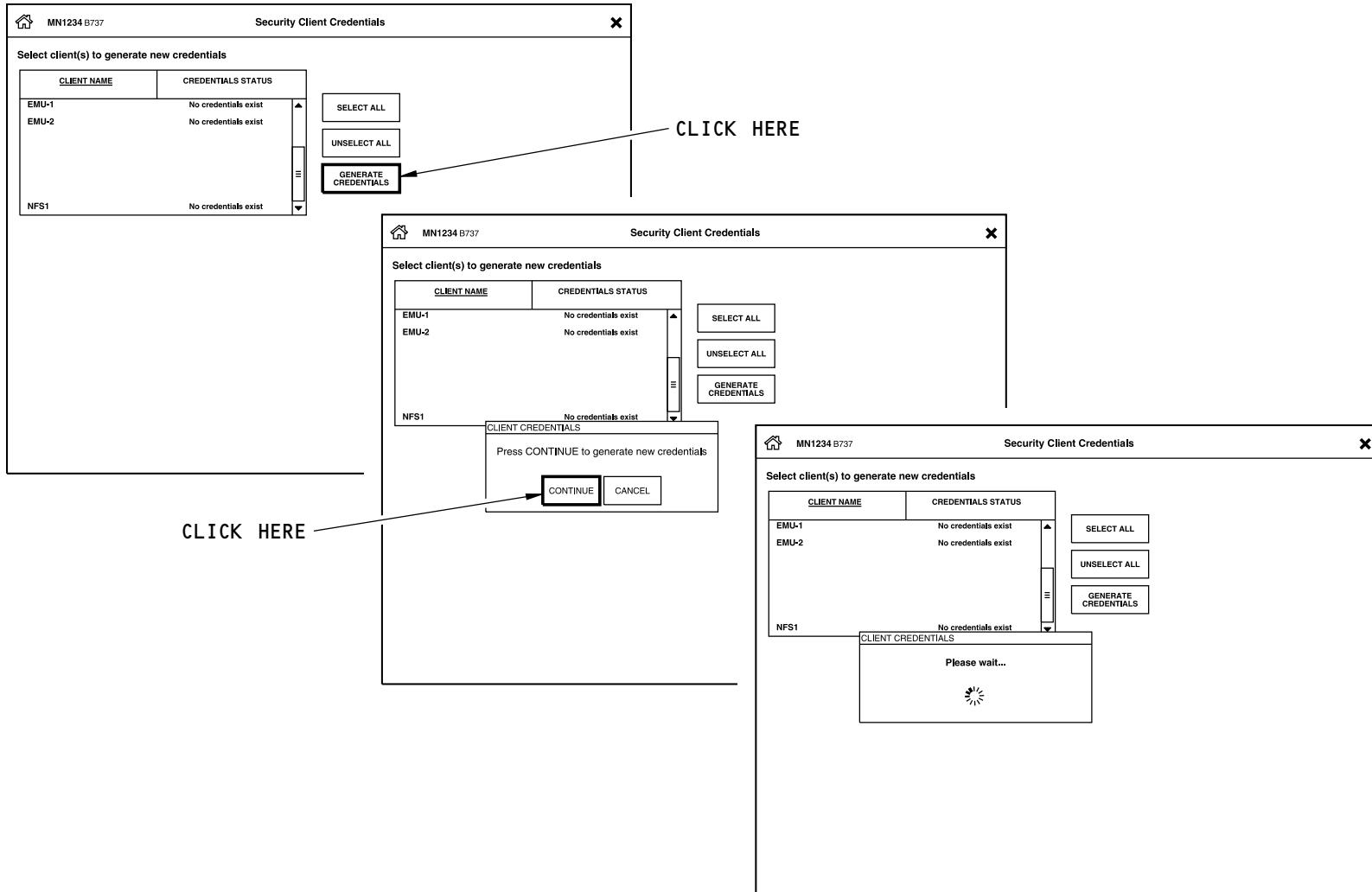
To resolve the problem and get access, the in-service operation must be stopped or closed.

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The figure consists of three vertically stacked screenshots of a software window titled "Security Client Credentials".

- Screenshot 1:** Shows a list of clients: EMU-1, EMU-2, and NFS1. Each client has a status message below it: "No credentials exist". On the right side of the window are three buttons: "SELECT ALL", "UNSELECT ALL", and "GENERATE CREDENTIALS". A callout arrow labeled "CLICK HERE" points to the "GENERATE CREDENTIALS" button.
- Screenshot 2:** Shows the same list of clients. The "NFS1" row now has a status message: "No credentials exist". Below this row is a box labeled "CLIENT CREDENTIALS" containing the text "Press CONTINUE to generate new credentials". At the bottom of this box are two buttons: "CONTINUE" and "CANCEL". A callout arrow labeled "CLICK HERE" points to the "CONTINUE" button.
- Screenshot 3:** Shows the same list of clients. The "NFS1" row now has a status message: "No credentials exist". Below this row is a box labeled "CLIENT CREDENTIALS" containing the text "Please wait..." and a small circular progress indicator icon.

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

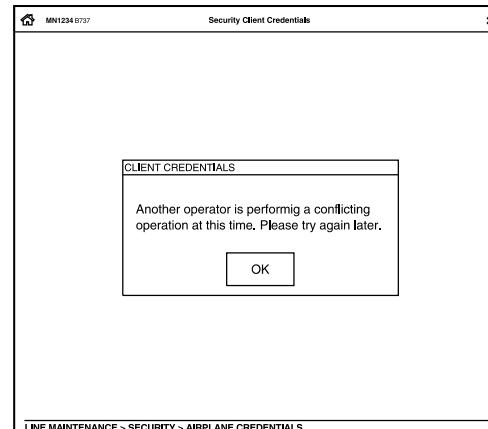
2313690 S0000526096_V1

ONS CLIENT CREDENTIALS PAGE

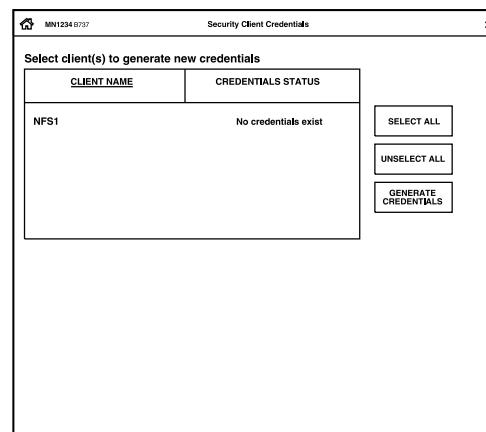
EFFECTIVITY

AKS 006-999

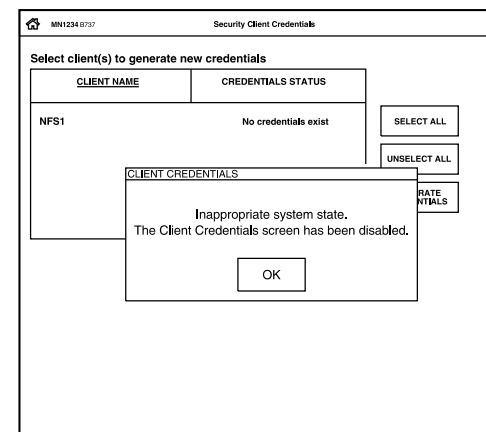
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CLIENT CREDENTIALS NOT AVAILABLE POP-UP



CLIENT CREDENTIALS



CLIENT CREDENTIALS -
ACCESS DENIED

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2313733 S0000526093_V1

ONS SECURITY CLIENT CREDENTIAL PROBLEMS

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ONBOARD NETWORK SYSTEM - LINE MAINTENANCE - AIRPLANE IDENTIFICATION

General

The airplane identification (ID) page is the data entry page. The page tells ONS specific information about the airline and airplane. ONS uses this information for network communications and security.

You get access to the page from the main menu bar by making the selections: Line Maintenance > Airplane Identification.

NOTE: The data shown on ONS Airplane Identification must agree with the airplane data plate, and airworthiness certificate.

Typically, you will examine the airplane identification data every time you install a network file server (NFS).

Airplane Identification page.

The airplane identification page shows three data fields.

- Airplane ID
- Aircraft type
- Airline ID.

The airplane ID is the airplane registration number. Use between four and seven uppercase alphanumeric characters. The dash character can also be used.

The aircraft type is the major-minor model of the airplane. The data field uses a predefined drop-down menu. The available selections will show as four uppercase alphanumeric characters (for example; B739).

The airline ID is a two-letter code. Use uppercase alpha-characters only, and not numeric.

Use the laptop keyboard to enter characters into the Airplane, and Airline ID fields. To make the Aircraft Type selection, use the laptop's cursor and selection bar.

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LINE MAINTENANCE > AIRPLANE IDENTIFICATION:

N737BO B739 Airplane Identification X

Airplane ID: N737BO ⓘ

Aircraft Type: B739 (737-900) ⓘ

Airline ID: BO ⓘ

N737BO B739 Airplane Identification X

Airplane ID: N737BO ⓘ

Aircraft Type: B739 (737-900) ⓘ

Airline ID: B736 (737-600)
B737 (737-700)
B738 (737-800)
B739 (737-900)
B748 (747-8)
B76C (767-2C)
B772 (777-200)
B772 (777-200ER)
B77L (777-200ER)
B77L (777-F)
B773 (777-300)
B77W (777-300ER)

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2322440 S0000526618_V1

ONS AIRPLANE IDENTIFICATION PAGE



ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE

General

On the ONS main menu bar, the second selection is Extended Maintenance.

ONS Extended Maintenance shows a menu with these selections:

- ONS Maintenance
- Input Monitoring
- LRU Reports

To see the Extended Maintenance menu, use the Extended Maintenance selection in the navigation bar.

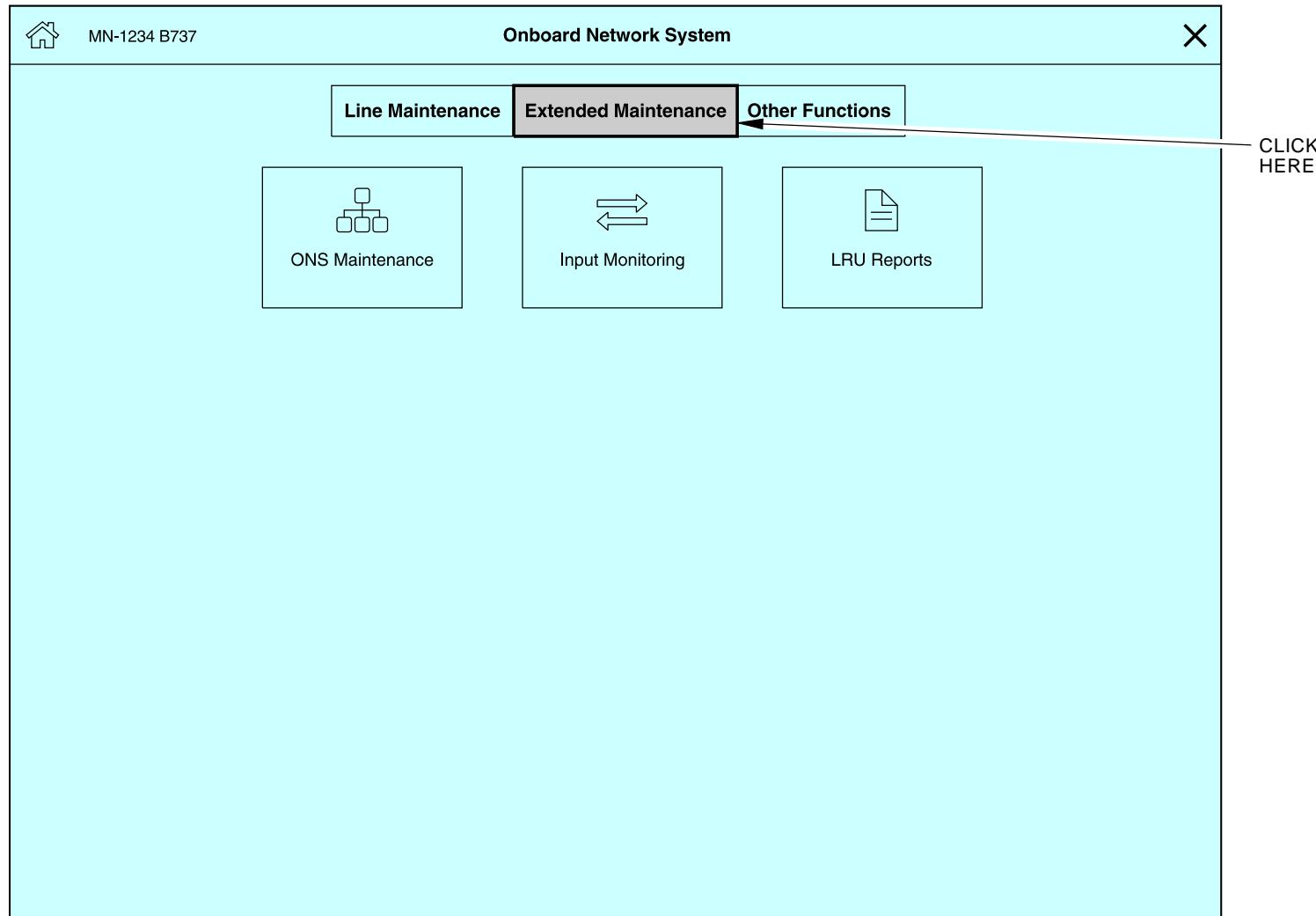
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2378673 S0000545264_V1

ONS EXTENDED MAINTENANCE MENU

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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - ONS MAINTENANCE

General

The page named ONS Maintenance is a sub-menu within the selection Extended Maintenance. These are the functions shown on the ONS Maintenance menu:

- Existing Faults
- Logs
- Services Test
- Reboot to BootOS
- Data Reset.

To get access to the ONS Maintenance menu, from the main menu bar make the selections: Extended Maintenance > ONS Maintenance.

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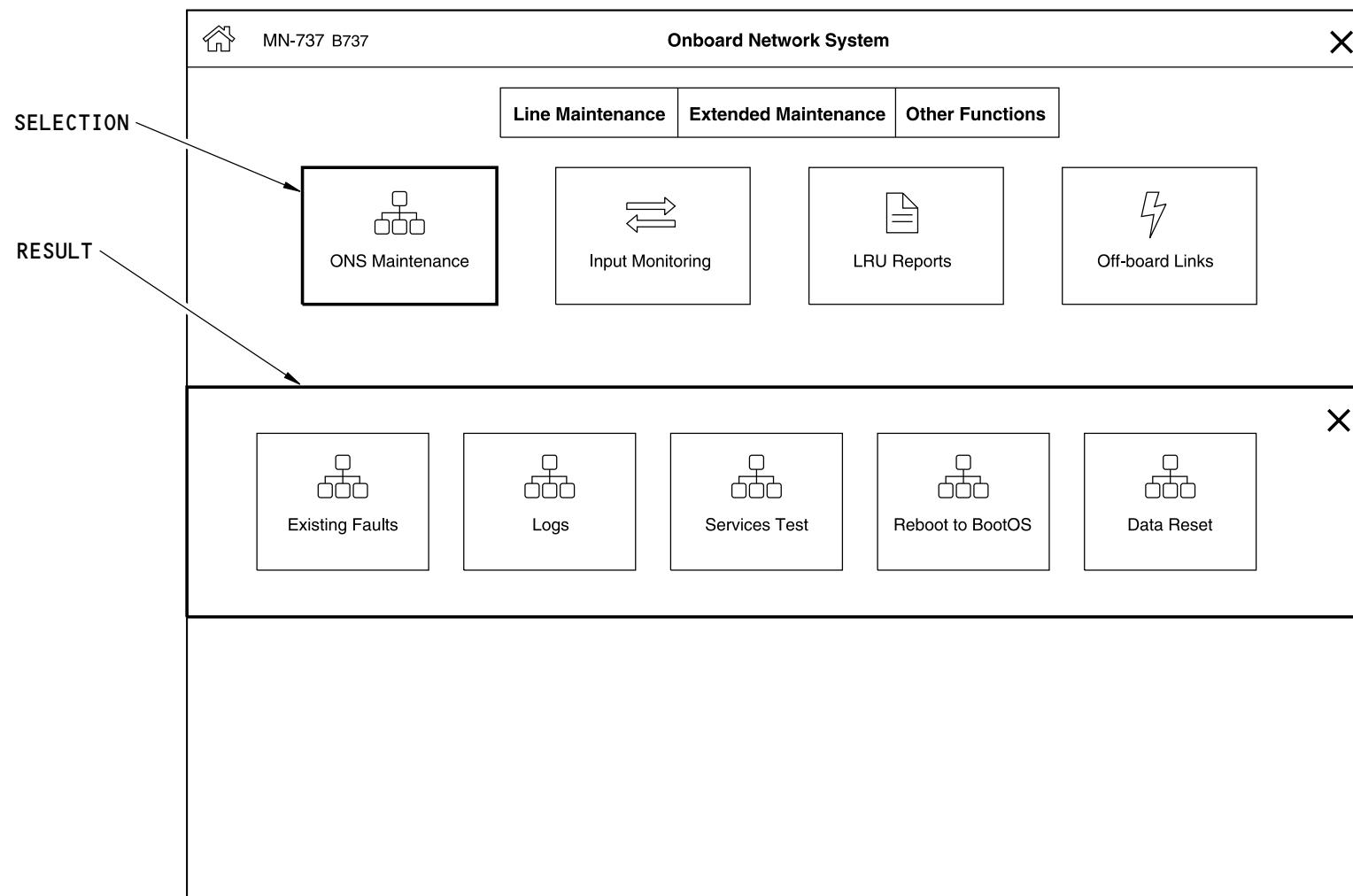
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EXTENDED MAINTENANCE > ONS MAINTENANCE



ONS MAINTENANCE PAGE

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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - ONS MAINTENANCE - EXISTING FAULTS

General

The existing faults page gives a record of NFS-to-LRU communication problems.

To get access to this page from the ONS menu bar, make your selections:
Extended Maintenance > ONS Maintenance > Existing Faults.

Fault Results

The Existing Faults page shows the words Fault Results, and a table with two columns:

- LRU NAME
- MESSAGE.

When the NFS senses a communication problem with the LRU, the LRU name shows, with the quantity of messages. If a network-connected LRU has no messages, it does not show in the table. To refresh the fault results data, the user can select a different page, and then return to the NFS MESSAGES page or can select refresh on the browser.

When no LRU shows, with no messages, then the ONS (system) is serviceable.

Fault Details

When the LRU row is selected, the message shows in box below the words Fault Details. Use the scroll bar to examine all of the messages.

When a fault does show, refer to the same fault code number in the Fault Isolation Manual.



EXTENDED MAINTENANCE > ONS MAINTENANCE > EXISTING FAULTS:

MN1234 B737	Existing Faults	X				
Fault Results						
<table border="1"><thead><tr><th>LRU NAME</th><th>MESSAGE</th></tr></thead><tbody><tr><td>NFS1</td><td>5 Messages, Select for more Details.</td></tr></tbody></table>		LRU NAME	MESSAGE	NFS1	5 Messages, Select for more Details.	
LRU NAME	MESSAGE					
NFS1	5 Messages, Select for more Details.					

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2314629 S0000526322_V1

ONS EXISTING FAULTS PAGE

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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - ONS MAINTENANCE - LOGS

General

The network file server (NFS) has three types of log files:

- Performance
- Security
- Syslog.

There is a separate page for each log type. Each of the three log pages has the same functions, and operates the same way.

To get access to these pages from the onboard network server (ONS) main menu, make the selections: Extended Maintenance > ONS Maintenance > Logs.

To exit the Logs page, and return to the main menu, click once on the Home icon in the upper left-hand corner. To exit the maintenance browser, and show the laptop's desktop, click once on the X in the upper right-hand corner.

Logs Page

To examine all of the log names on the page, use the vertical scroll bar.

When the table of data exceeds 100 records, then four page selection buttons show. Use the page navigation buttons, and the vertical scroll bar, to examine all files in the log. The buttons are as follows:

- FIRST - shows the initial page of log files.
- PREV - shows the previous page of log files.
- NEXT - shows the following page of log files.
- LAST - shows the last page of log files.

When one or more log files is highlighted, use the DOWNLOAD function to copy the file to an internal drive, or removable media.

When one or more log files is highlighted, use the DELETE function to erase the file from the ONS.

Performance Logs

The selection Extended Maintenance > ONS Maintenance > Performance shows a record of performance log files, and functions to download or erase them.

Performance log files contain a record of specified operations that can help troubleshoot data-load problems.

Security Logs

The selection Extended Maintenance > ONS Maintenance > Security shows a record of network security log files, and functions to download or erase them.

Security log files contain a record of specified operations that can help identify security violations.

All log files can be downloaded. However, certification rules require that log files be kept onboard for a specified minimum time. Therefore, logs that do not meet that minimum can not be erased.

Syslogs Logs

The selection Extended Maintenance > ONS Maintenance > Syslogs shows a record of system log files, and functions to download or erase them.

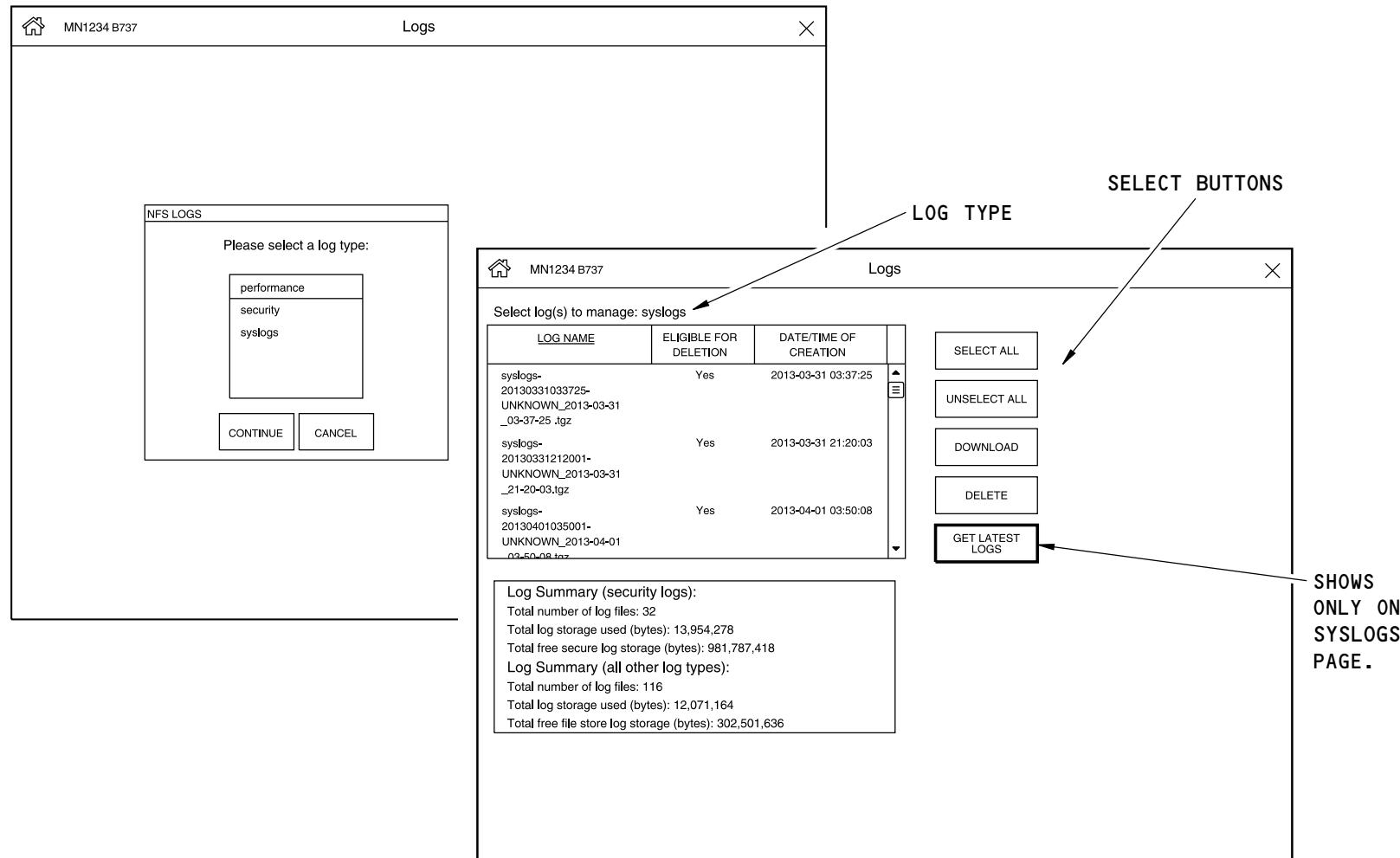
Syslog files contain a record of specified operations that can help troubleshoot software problems.

Syslog files can be downloaded or erased. There is no system restriction.

The function GET LATEST LOGS is an automated feature to isolate the newest syslog files for download.

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EXTENDED MAINTENANCE > ONS MAINTENANCE > LOGS:

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2323302 S0000526229_V1

ONS MAINTENANCE - LOGS PAGE

LOGS > SYSLOGS > DOWNLOAD:

MN1234 B737 Logs

LOG NAME	ELIGIBLE FOR DELETION	DATE/TIME OF CREATION
syslogs-20130331033725-UNKNOWN_2013-03-31_03-37-25.tgz	Yes	2013-03-31 03:37:25
syslogs-20130331212001-UNKNOWN_2013-03-31_21-20-03.tgz	Yes	2013-03-31 21:20:03
syslogs-20130401035001-UNKNOWN_2013-04-01_03-50-08.tgz	Yes	2013-04-01 03:50:08

L- FIRST < PREV NEXT > **L**- LAST Page 1 of 2

Log Summary (security logs)

Total number of log files: 33
 Total log storage used (bytes): 13,956,972
 Total free secure log storage (bytes): 981,784,724
 Log Summary (all other log types):
 Total number of log files: 276
 Total log storage used (bytes): 25,136,069
 Total free filestore log storage (bytes): 289,436,731

**NAVIGATION FUNCTIONS
SHOW WHEN 100 RECORDS
OR MORE ARE PRESENT.**

**HIGHLIGHT THE LOG NAME,
THEN MAKE A SELECTION.**

MN1234 B737 Logs

LOG NAME	ELIGIBLE FOR DELETION	DATE/TIME OF CREATION
syslogs-20130331033725-UNKNOWN_2013-03-31_03-37-25.tgz	Yes	2013-03-31 03:37:25
syslogs-20130331212001-UNKNOWN_2013-03-31_21-20-03.tgz	Yes	2013-03-31 21:20:03

NFS LOGS > syslogs

Press CONTINUE to download the selected log(s) - Size: 126788 bytes

L- FIRST < PREV NEXT > **L**- LAST

CONTINUE **CANCEL**

Log Summary (security logs)

Total number of log files: 33
 Total log storage used (bytes): 13,956,972
 Total free secure log storage (bytes): 981,784,724
 Log Summary (all other log types):
 Total number of log files: 276
 Total log storage used (bytes): 25,136,069
 Total free filestore log storage (bytes): 289,436,731

**SAVE THE FILE TO THE
MAINTENANCE LAPTOP**

MN1234 B737 Logs

LOG NAME	ELIGIBLE FOR DELETION	DATE/TIME OF CREATION	SELECT ALL
syslogs-20130331033725-UNKNOWN_2013-03-31_03-37-25.tgz	Yes	2013-03-31 03:37:25	<input checked="" type="checkbox"/>
syslogs-20130331212001-UNKNOWN_2013-03-31_21-20-03.tgz	Yes	2013-03-31 21:20:03	<input type="checkbox"/>
syslogs-20130401035001-UNKNOWN_2013-04-01_03-50-08.tgz	Yes	2013-04-01 03:50:08	<input type="checkbox"/>

Opening 20131218-184202-MN1234_syslogs.zip

You have chosen to open:
 20131218-184202-MN1234_syslogs.zip
 which is a Compressed (zipped) Folder (124 KB)
 from: http://msons.net

What should Firefox do with this file?

Open with Windows Explorer (default)
 Save File
 Do this automatically for files like this from now on.

OK **Cancel**

Log Summary (security logs)

Total number of log files: 33
 Total log storage used (bytes): 13,956,972
 Total free secure log storage (bytes): 981,784,724
 Log Summary (all other log types):
 Total number of log files: 276
 Total log storage used (bytes): 25,136,069
 Total free filestore log storage (bytes): 289,436,731

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

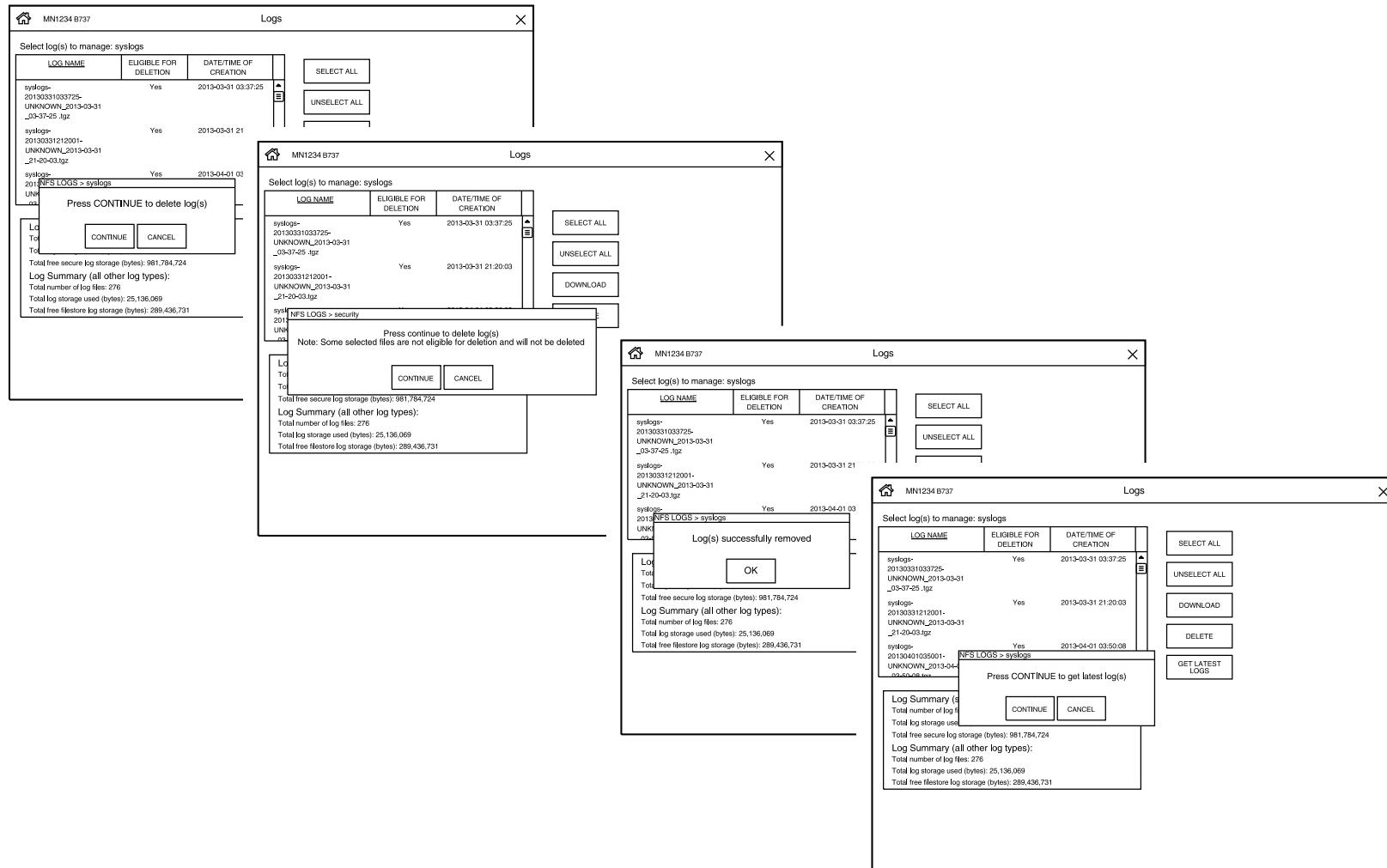
2323407 S0000527084_V1

ONS MAINTENANCE - LOGS PAGE
46-13-00

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AKS 006-999

D633A101-AKS

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LOGS > SYSLOGS > DELETE:


The sequence of five screenshots illustrates the process of deleting syslogs from the aircraft system:

- Screenshot 1:** Shows the 'Logs' screen with two syslogs listed for deletion. The first log is 'syslog-20130331033725-UNKNOWN_2013-03-31_03-37-25.tgz' and the second is 'syslog-20130331120001-UNKNOWN_2013-03-31_21-20-03.tgz'. Both are marked as eligible for deletion.
- Screenshot 2:** A confirmation dialog box asks 'Press CONTINUE to delete log(s)'. It shows the selected logs and their details. Below it, a summary indicates total free secure log storage (981,784,724 bytes), total number of log files (276), total log storage used (25,136,069 bytes), and total free filesystem log storage (289,436,731 bytes).
- Screenshot 3:** Another confirmation dialog box states 'Note: Some selected files are not eligible for deletion and will not be deleted'. It shows the same logs and summary information.
- Screenshot 4:** A success message 'Log(s) successfully removed' is displayed. An 'OK' button is present. The summary information remains the same.
- Screenshot 5:** A final summary screen shows the logs removed ('syslog-20130331033725-UNKNOWN_2013-03-31_03-37-25.tgz' and 'syslog-20130331120001-UNKNOWN_2013-03-31_21-20-03.tgz') and the newly selected log 'syslog-20130331033725-UNKNOWN_2013-03-31_03-37-25.tgz'. It includes buttons for 'CONTINUE', 'CANCEL', 'DELETE', and 'GET LATEST LOGS'.

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2323556 S0000527089_V1

ONS MAINTENANCE - LOGS PAGE
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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - ONS MAINTENANCE - SERVICES TEST

General

The ONS Services Test is a function that examines each installed network service, and reports the condition.

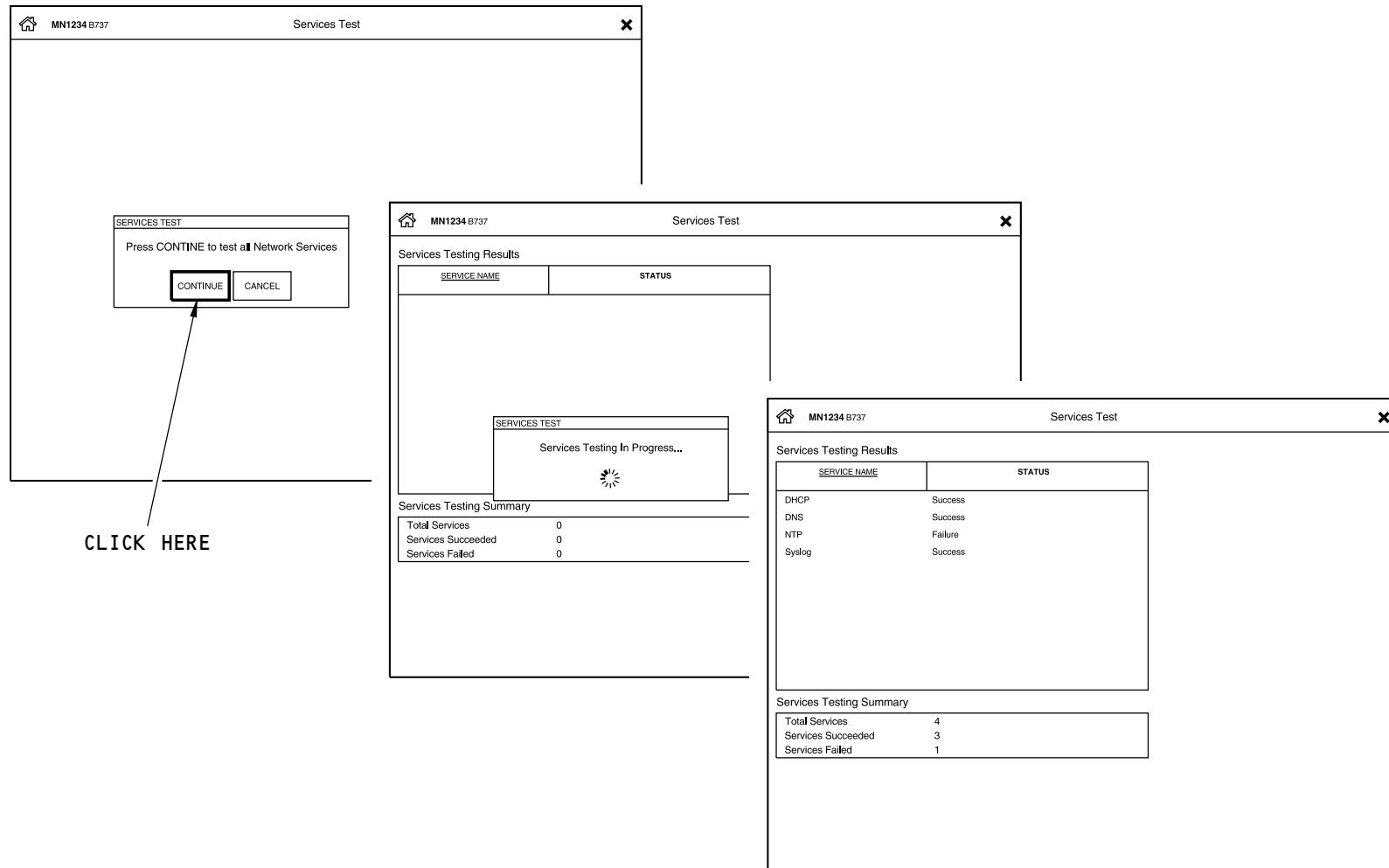
To show the page from the ONS menu bar, make the selections: Extended Maintenance > ONS Maintenance > Services Test.

Services Test

The Services Test page shows the results in a table with the headings SERVICE NAME, and STATUS. Typically, these are the names of the services installed:

- DHCP (dynamic host configuration protocol)
- DNS (domain name server)
- NTP (network time protocol)
- Syslog (system log).

Operation of the test is automatic. The results of the test shows below the word STATUS. A serviceable result shows the word Success. If the word Failure shows, then a maintenance action can be required.

EXTENDED MAINTENANCE > ONS MAINTENANCE > SERVICES TEST:

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2315203 S0000526230_V1

ONS MAINTENANCE - SERVICES TEST PAGE
EFFECTIVITY

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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - ONS MAINTENANCE - REBOOT TO BOOT OS

General

BootOS (operating system) is a minimum, temporary operating system for use during network file server (NFS) OS maintenance. BootOS is stored in NFS firmware.

The Reboot to BootOS (operating system) function sets the network file server (NFS) to transfer control from NFS OS to BootOS. When BootOS is in service, then maintenance can be done to NFS OS software parts. BootOS is not serviceable during flight.

From the main menu bar, you can get access to Reboot to BootOS using these selections: Extended Maintenance > ONS Maintenance > Reboot to BootOS.

Reboot to Boot OS

The Reboot to BootOS page has two buttons: REBOOT, and BACK.

To complete the BootOS process, make your selections REBOOT, followed by CONTINUE on the confirmation pop-up window.

To exit, and show the ONS maintenance menu, you can click once on the BACK button, or click once on the home icon, in the upper left-hand corner.

Reboot to Boot OS Problems

The Reboot to BootOS function can be unserviceable when another function is already in service. A pop-up window will show the words Access Denied. These are operations that do not agree with the Reboot to BootOS sequence:

- Client Credentials
- Dataload
- Reboot To BootOS
- Server Credentials.
- Uninstall NFS Parts.

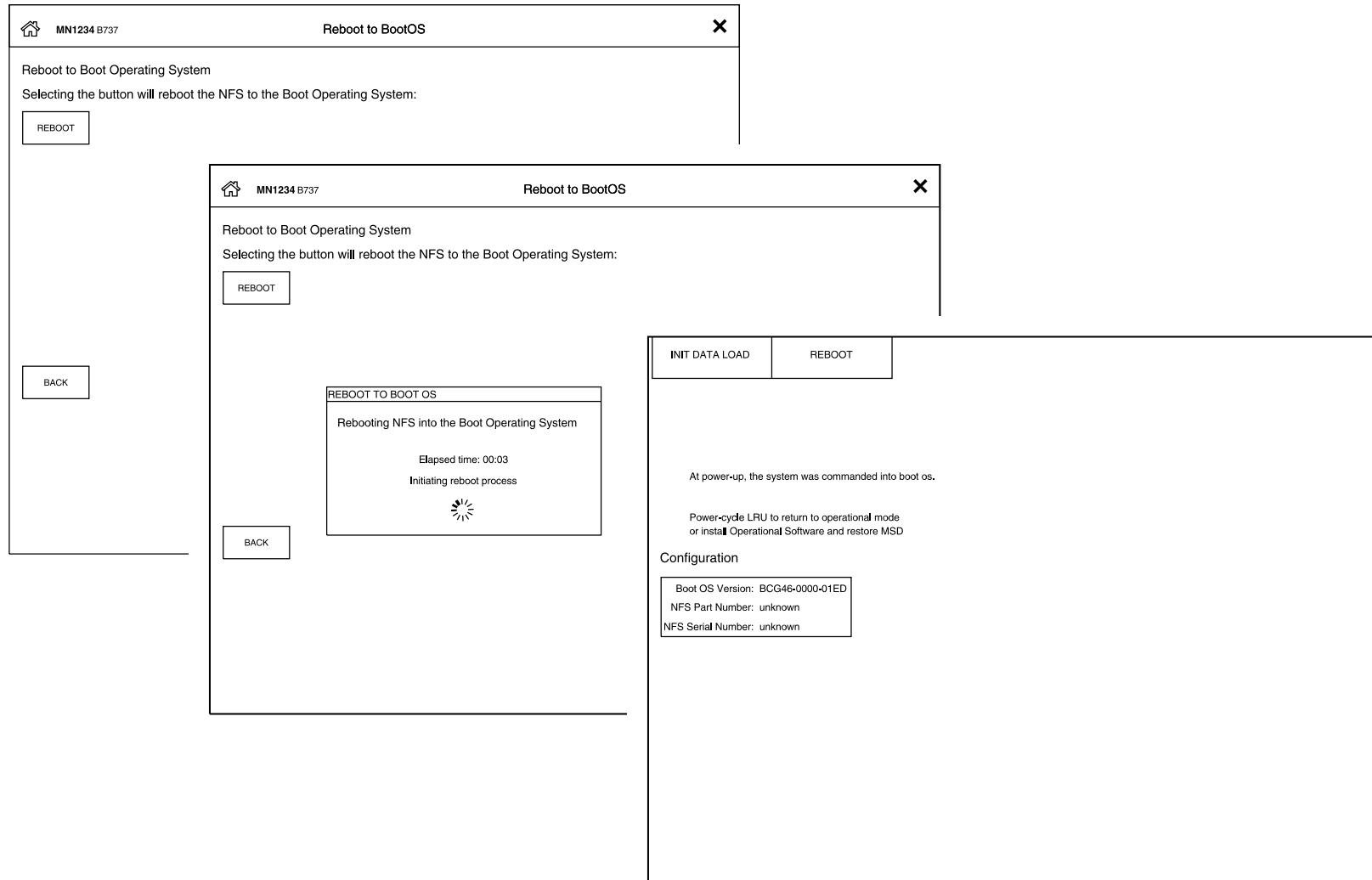
The access denied window shows when an operation, that does not agree, is in operation. On the pop-up window, click on the OK button to show again the Reboot to BootOS page. These steps can make the Reboot to BootOS function serviceable again:

- Go to another screen, but not one shown on the list.
- Close or terminate the ONS browser.
- Begin a new session with the ONS Maintenance website.

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NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2314085 S0000526232_V1

ONS MAINTENANCE - REBOOT TO BOOTOS PAGE



ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - ONS MAINTENANCE - DATA RESET

General

The data reset function can restore a specified ONS application to its default condition. All data used by the application is erased permanently.

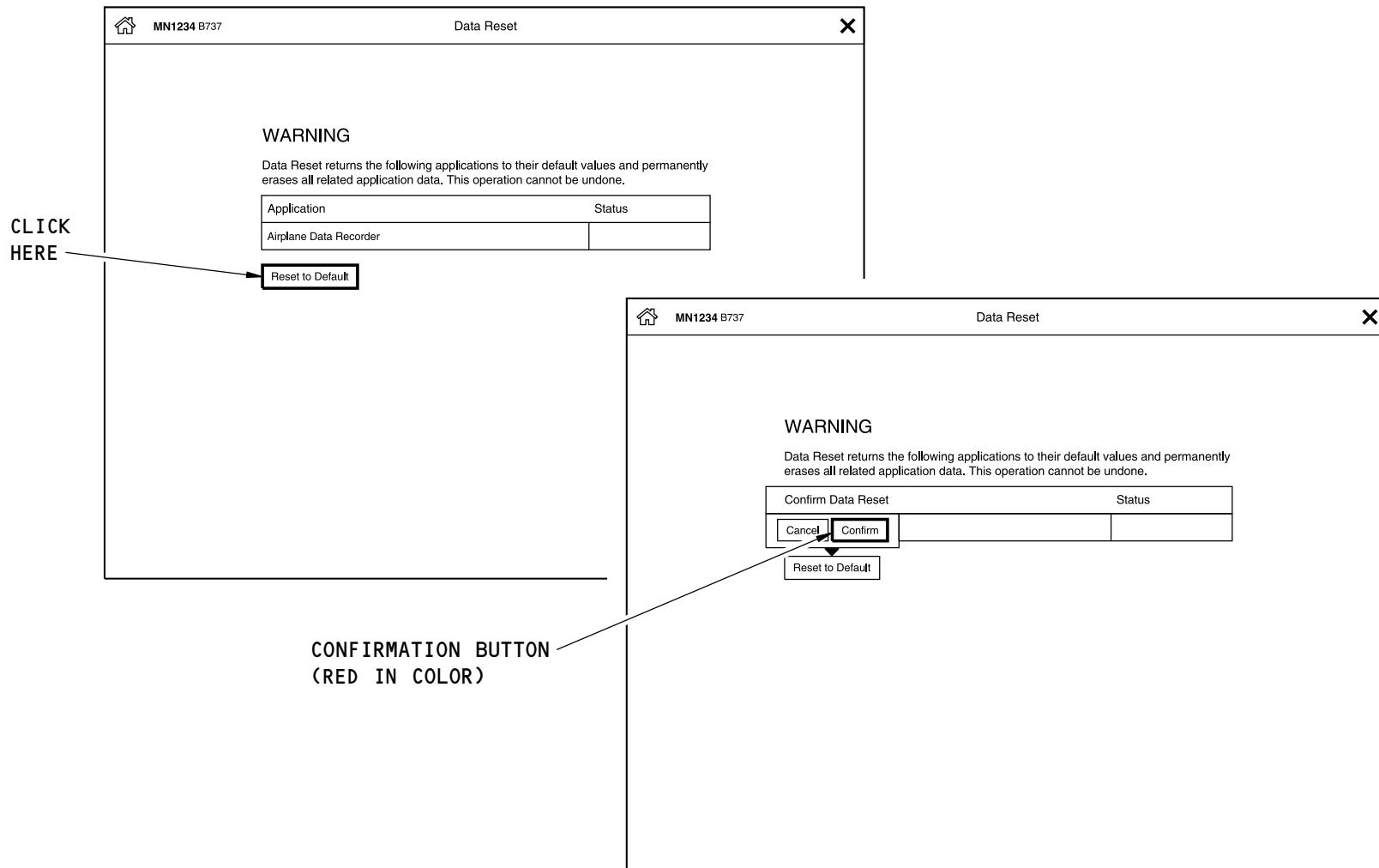
From the ONS menu bar, you get access by making the selections: Extended Maintenance > ONS Maintenance > Data Reset. To exit the function, and show the ONS Maintenance menu, click once on the X in the upper right-hand corner.

Data Reset

The data reset page shows a table with the columns Application, and Status. An application name that shows can be set to its originally installed condition, with no prior records or data. This operation does not install the application. It only erases data files that support the application.

To begin the data reset process, make the selection: Reset to Default. Follow the on-screen confirmation steps. When complete, the result shows below the word Status. A serviceable result shows the word Success.

In the upper right-hand corner, click on the X to show again the main menu.

EXTENDED MAINTENANCE > ONS MAINTENANCE > DATA RESET:


2323665 S0000526246_V1



**SERVICEABLE
RESULT**



**UNSERVICEABLE RESULT
(EXAMPLE)**

2323778 S0000527169_V1

ONS MAINTENANCE - DATA RESET RESULTS PAGE

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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - INPUT MONITORING

General

The input monitoring function gives the condition of ONS communications between network file server (NFS) and the connected system or device.

To get access from the main menu bar, make your selections: Extended Maintenance > Input Monitoring.

A pop-up window will show with the available network devices. Of the possible selections, avionics parameters and NFS always will show. If an additional system or device shows, the pages will look and operate the same as the NFS descriptions that follow.

To exit this menu and show the main menu, click on the home icon in the upper left-hand corner. To exit the ONS maintenance session and show the laptop's desktop, click on the X in the upper right-hand corner.

Input Monitoring > Avionics Parameters

The INPUT MONITORING selection, followed by the Avionics Parameters selection shows selected avionics data. The data shown (or, parameters) shows:

- Aircraft tail identification (ID)
- Aircraft Type
- Airline ID
- International Civil Aviation Organization (ICAO)
- Time
- Date
- Origin
- Destination
- Weight on Wheels.

These parameters can be helpful for ONS troubleshooting.

Input Monitoring > NFS

The INPUT MONITORING selection, followed by the NFS selection, shows a page with five buttons as follows:

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- ETHERNET
- 429 RECEIVE
- 429 TRANSMIT
- 717 RECEIVE
- INPUT DISCRETES
- OUTPUT DISCRETES.

These functions are the data bus and discrete interfaces of the NFS. Each button shows the condition and settings for that interface.

Input Monitoring > NFS > Ethernet

The Ethernet page shows each Ethernet port of the rear connector on NFS. The configuration as described in the End Connection column will match the system wiring diagram, and the present status of the interface is provided with the following definitions:

- UP - the interface is serviceable.
- DOWN - the interface is unserviceable.
- ADMIN DOWN - the interface is set to OFF in the configuration software part.
- UNAVAILABLE - unserviceable, in that the protocol to read the condition was unsuccessful.

NOTE: The UNAVAILABLE condition can suggest that the client and server credentials do not agree.

Input Monitoring > NFS > 429 Receive

The 429 RECEIVE page shows a record with each NFS 429 receive bus, the interface connection name, and the interface condition (or status).

The data below END CONNECTION is the interface name. The interface name shown, and the same interface name on the wiring diagram shall agree.

The data below STATUS gives the condition of the interface at the time the page was selected. The condition can be as follows:

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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - INPUT MONITORING

- High - the interface is serviceable, with a high-speed connection.
- Low - the interface is serviceable, with a low-speed connection.
- Failed - the interface is unserviceable (specifically, the input signal label does not agree with the OPC specified label).
- Disabled - the interface is unserviceable (specifically, turned off in the configuration part).
- Unavailable - the protocol to read the condition was unsuccessful.

NOTE: The UNAVAILABLE condition can suggest that the client and server credentials do not agree.

Input Monitoring > NFS > 429 Transmit

The 429 TRANSMIT page shows a record with each NFS 429 transmit bus, the interface connection name, and the interface condition (or, status).

The data below END CONNECTION is the interface name, The interface name shown, and the same interface on the wiring diagram shall agree.

The data below STATUS gives the condition of the interface at the time the page was selected. The condition can be as follows:

- High - the interface is serviceable, with a high-speed connection.
- Low - the interface is serviceable, with a low-speed connection.
- Failed - the interface is unserviceable (specifically, an internal fault prevents the data transmission).
- Disabled - the interface is unserviceable (specifically, turned off in the configuration part).
- Unavailable - the protocol to read the condition was unsuccessful.

NOTE: The UNAVAILABLE condition can suggest that the client and server credentials do not agree.

Input Monitoring > NFS > Input Discretes

The INPUT DISCRETES page shows a record with each NFS input discrete, the interface connection name, and the interface condition (or, status).

The data below END CONNECTION is the interface name, The interface name shown, and the same interface on the wiring diagram shall agree.

The data below STATUS gives the condition of the interface at the time the page was selected. The condition can be as follows:

- Open - the interface has no path to aircraft ground.
- Ground - the interface senses a path to aircraft ground.
- Unavailable - the protocol to read the condition was unsuccessful.

NOTE: The UNAVAILABLE condition can suggest that the client and server credentials do not agree.

Input Monitoring > NFS > Output Discretes

The OUTPUT DISCRETES page shows a record with each NFS output discrete, the interface connection name, and the interface condition (or, status).

The data below END CONNECTION is the interface name, The interface name shown, and the same interface on the wiring diagram shall agree.

The data below STATUS gives the condition of the interface at the time the page was selected. The condition can be as follows:

- Open - the interface has no path to aircraft ground.
- Ground - the interface senses a path to aircraft ground.
- Unavailable - the protocol to read the condition was unsuccessful.

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EXTENDED MAINTENANCE > INPUT MONITORING

MN1234 B737 Input Monitoring X

INPUT MONITORING

Please select an item to monitor:

Avionics Parameters	
NFS	
CONTINUE	CANCEL

**SELECTION:
AVIONICS PARAMETERS**

MN1234 B737 Input Monitoring X

Avionics Parameters

PARAMETER	VALUE
Airline ID	Not Available
Aircraft Type	Not Available
Aircraft Tail ID	Not Available
ICAO	123456
Time	19:41:26
Date	28/01/14
Origin	KEWWR
Destination	KYKRM
Weight On Wheels	false

NOTE: DATA SHOWN IS FOR EXAMPLE ONLY

2323908 S0000526247_V1

ONS INPUT MONITORING PAGE



EXTENDED MAINTENANCE >
INPUT MONITORING > NFS (MENU):

CLIENT NAME AND CONNECTION TYPE

NFS :: Ethernet

PORT	END CONNECTION	STATUS
1	DFDAU	Unavailable
2	FMC-R	Unavailable
3	EIU-L	Unavailable
4	EIU-C	Unavailable
5	EIU-R	Unavailable
6	NED-1 PORT 1	Unavailable
7	FLIGHT DECK CREW PORT	UP
8	SUPERNUMERARY CREW PORT	Unavailable
9	FLIGHT DECK PRINTER	Unavailable
10	GROUND PROX WARN	UP
11	NED-2 PORT 1	Unavailable

BACK

EXTENDED MAINTENANCE > INPUT MONITORING > NFS > ETHERNET:

2323913 S0000527271_V1

ONS INPUT MONITORING PAGE

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ONBOARD NETWORK SYSTEM - EXTENDED MAINTENANCE - LRU REPORTS

General

An LRU (line replaceable unit) report is a digital data file used for use by maintenance or engineering. This report can be a built-in test (BIT) result, or other data specified by the airline, or equipment manufacturer. The LRU Reports page gives the functions to do these steps:

- Choose a specific onboard network system (ONS) client
- Set the network client to make one or more new reports
- Download the reports to the laptop or external memory.

From the ONS main menu, you get access to LRU Reports by making the selections: Extended Maintenance > LRU Reports. To exit the function, click once on the home icon in the upper left-hand corner.

LRU Reports

When selected, the LRU Reports page shows a pop-up window with the words: SELECT LRU TYPE. These LRUs can make a report:

- ACP - audio control panel
- DEU - display electronic unit
- FCC - flight control computer
- FMCS - flight management control system

An additional pop-up can show, to select the left or right-hand, or, LRU-1 or LRU-2.

The main LRU Reports page then shows. Find the target report, and use to buttons to add to your reports to the selected group. When a report is selected, it shows in second data box, below the first.

When the report selection is set, make the Continue selection. Follow the on-screen confirmation step. When the report is ready, save the file to the maintenance laptop, or external memory.

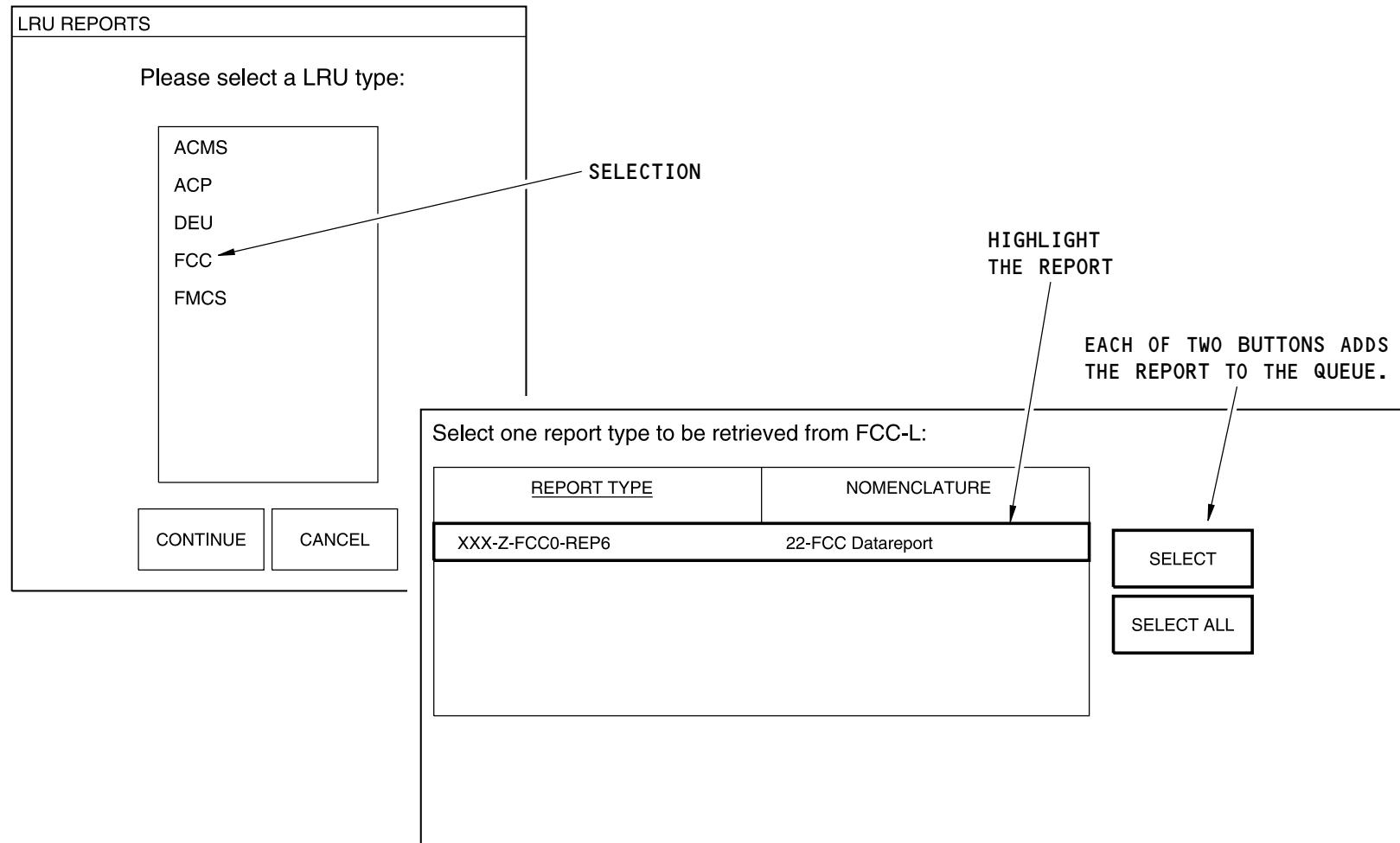
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EXTENDED MAINTENANCE > LRU REPORTS:



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2323803 S0000526248_V1

ONS LRU REPORTS PAGE

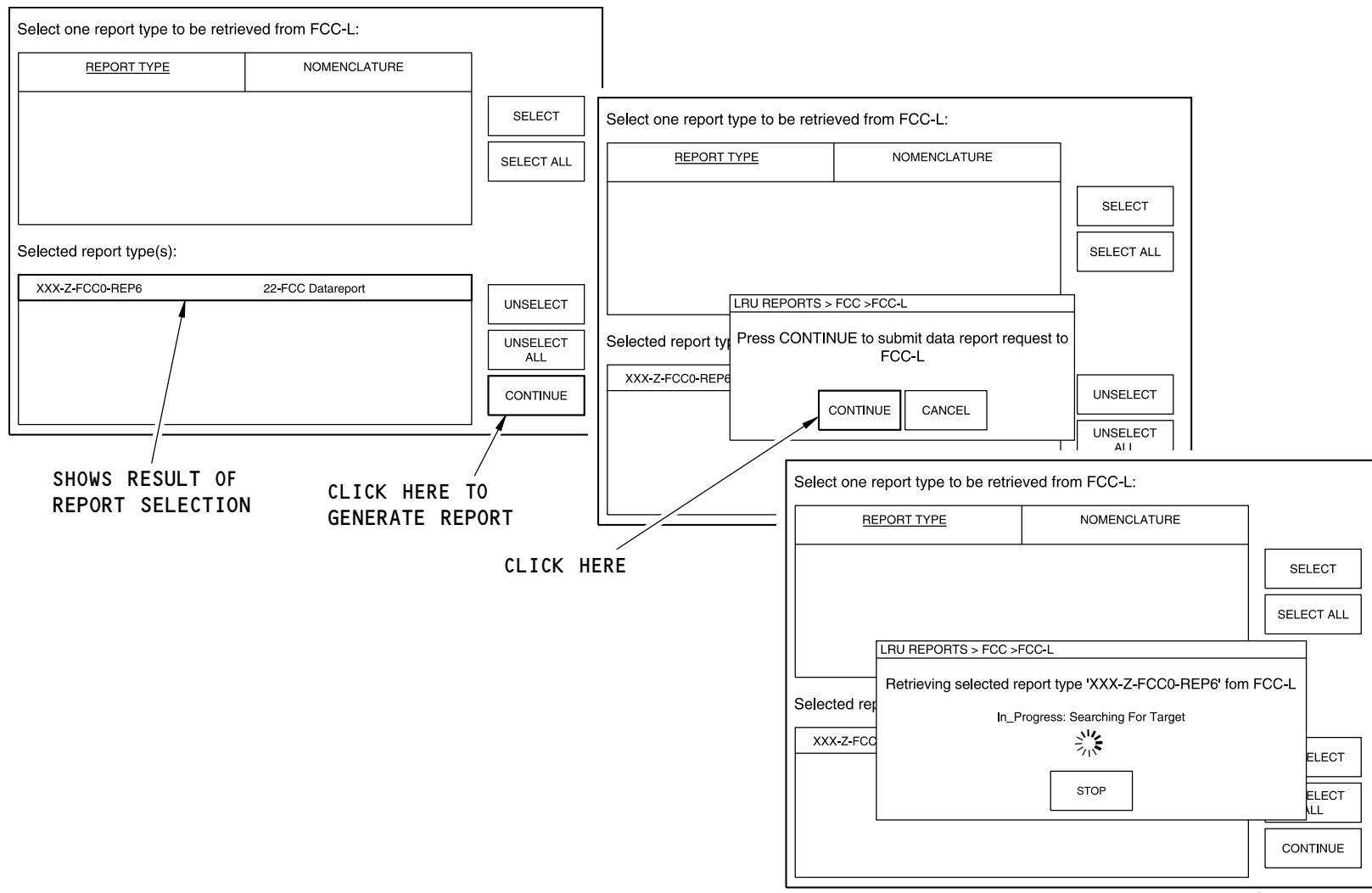
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ONS LRU REPORTS PAGE



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ONBOARD NETWORK SYSTEM - OTHER FUNCTIONS

General

On the ONS main menu bar, the third selection is named Other Functions.

ONS Other Functions shows a menu. The menu shows applications specified by your airline or operator. For example, these selections can show:

- Airplane Data Monitor
- Airplane Data Recorder
- Engine Trim Balance.

NOTE: These three applications are shown for example only.

To see the Other Functions menu, use the Other Functions selection in the navigation bar.

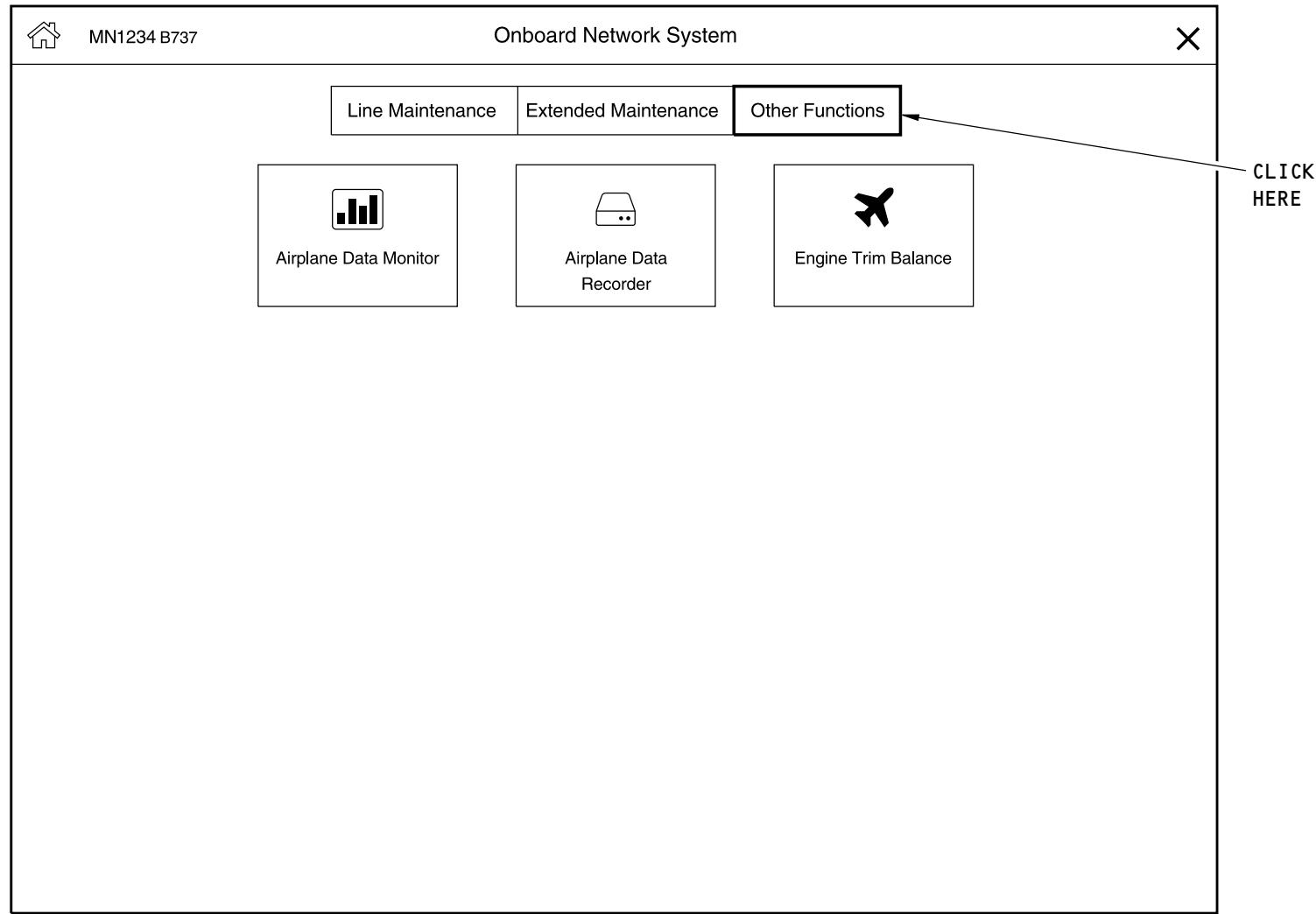
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ONS - OTHER FUNCTIONS MENU

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EFB - INTRODUCTION

General

The Electronic Flight Bag (EFB) is a computer-based information system for the captain and first officer. It gives the flight crew access to flight operation data, general purpose computing and communications.

Abbreviations and Acronyms

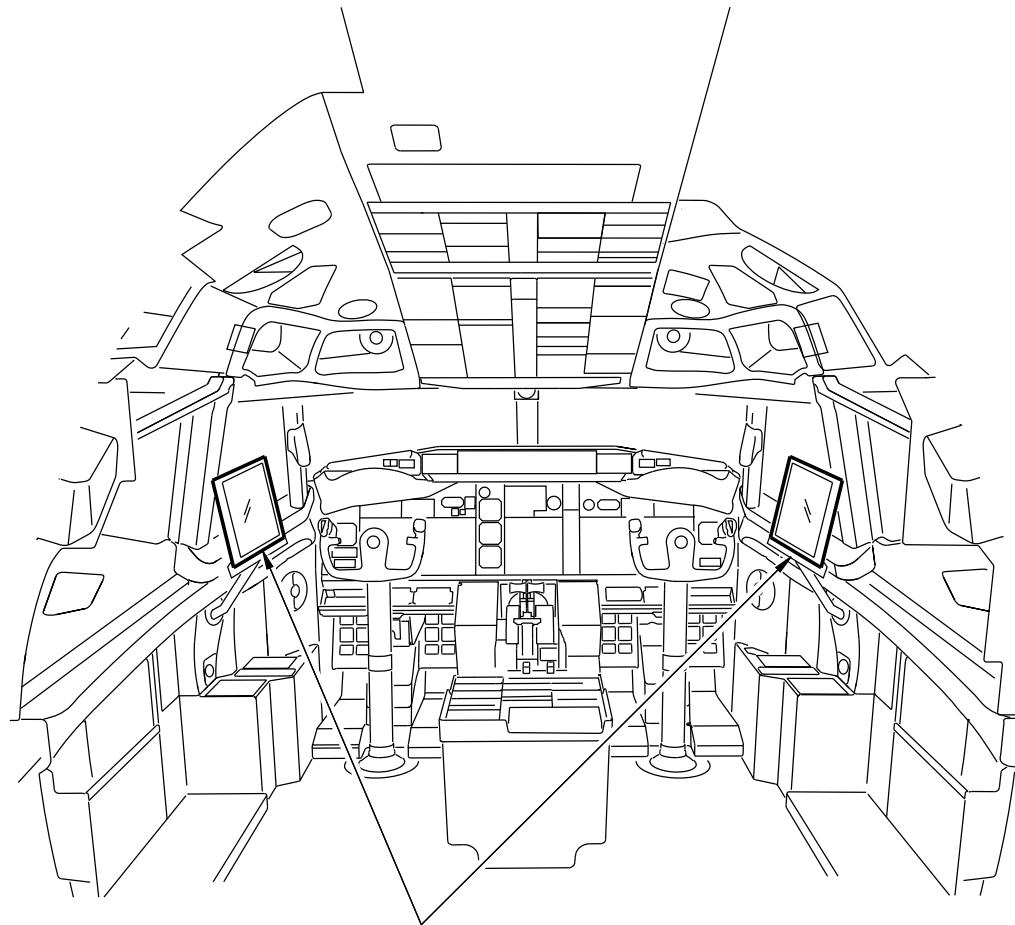
- ACARS - aircraft communication addressing and reporting system
- ADC - application dispatch controller
- ADIRU - air data inertial reference system
- AMLCD - active matrix liquid crystal display
- ARINC - aeronautical radio, incorporated
- BIT - built-in test
- BITE - built-in test equipment
- CAT - common administrative tool
- CCA - circuit card assembly
- CD-ROM - compact disc, read-only memory
- CDS - common display system
- CPU - central processing unit
- CRC - cyclic redundancy check
- DDM - distributed data management
- DEU - display electronics unit
- DSPL - display
- EDU - electronic display unit
- EEC - electronic equipment center
- EFB - electronic flight bag
- EICAS - engine indicating and crew alert system
- ESMU - electronic switching module unit
- FAA - federal aviation administration
- FAR - federal aviation regulation
- FDEVSS - flight deck entry video surveillance system

- FIND - find identification of network devices
- FMC - flight management computer
- GPS - global positioning system
- IO - input output
- JAA - joint airworthiness authorities
- LAN - local area network
- LRU - line replaceable unit
- LSAP - loadable software airplane parts
- LSK - line select key
- MAU - microwave antenna unit
- MMR - multi-mode receiver
- NIC - network interface card
- NOTAM - notice to airmen (FAA)
- OAS - operationally approved software
- OS - operating system
- PCU - power converter unit
- PDL - portable data loader
- PMAT - portable maintenance access terminal
- PWR - power
- SATCOM - satellite communication
- SMF - security management function
- TSO - technical service order
- TWLU - terminal wireless LAN unit
- VAC - volts, alternating current
- VDC - volts, direct current
- VPN - virtual private network
- XFR - transfer

EFFECTIVITY

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ELECTRONIC
FLIGHT BAG
CLASS 2

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EFB - INTRODUCTION

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EFB - GENERAL DESCRIPTION AND COMPONENT LOCATION

General

The Electronic Flight Bag (EFB) is an information system computer for the captain and first officer. The EFB decreases the quantity of paper in the flight compartment, and increases the quality of data given to the crew.

For typical airplane components installations, system interface connections and software, the EFB has these functions:

- Navigation maps and charts
- Airport maps and taxi charts, with real-time position reports
- Manuals, fault reports and operations procedures
- Minimum equipment lists and logbooks.

EFB System

The Electronic Flight Bag System has two Electronic Display Units (EDUs). There are two Electronic Switching Module Units (ESMUs) and two Power Converter Units (PCUs). There are also two EFB Power Cutoff Switches for the EFB system.

The EFB is a non-essential, stand-alone system that receives data from the MMR, ADIRU, DEU and FMC through ARINC 429 interfaces. The EFB can also have interfaces with ACARS, a printer and the flight deck entry video surveillance system (FDEVSS).

Software applications installed on the EFB system give the flight crew access to electronic documents, operational manuals and charts.

Component Location

The EFB System has two Electronic Display Units (EDUs) on the Captain's and the First Officer's outboard sliding windows. There are two Electronic Switching Module Units (ESMUs) and two Power Converter Units (PCUs) in the aft flight kit stowage areas. Also, two EFB Power Cutoff Switches are installed in the flight compartment.

EFB Configuration and Setup

Airlines can change user-modifiable software (UMS) parts of the application manager using the Common Administration Tool (CAT) as follows:

- Assign applications to specific names and button positions on the main menu.
- Finds if an internal or external communication system is installed.
- Finds specific flight crew applications that are installed.

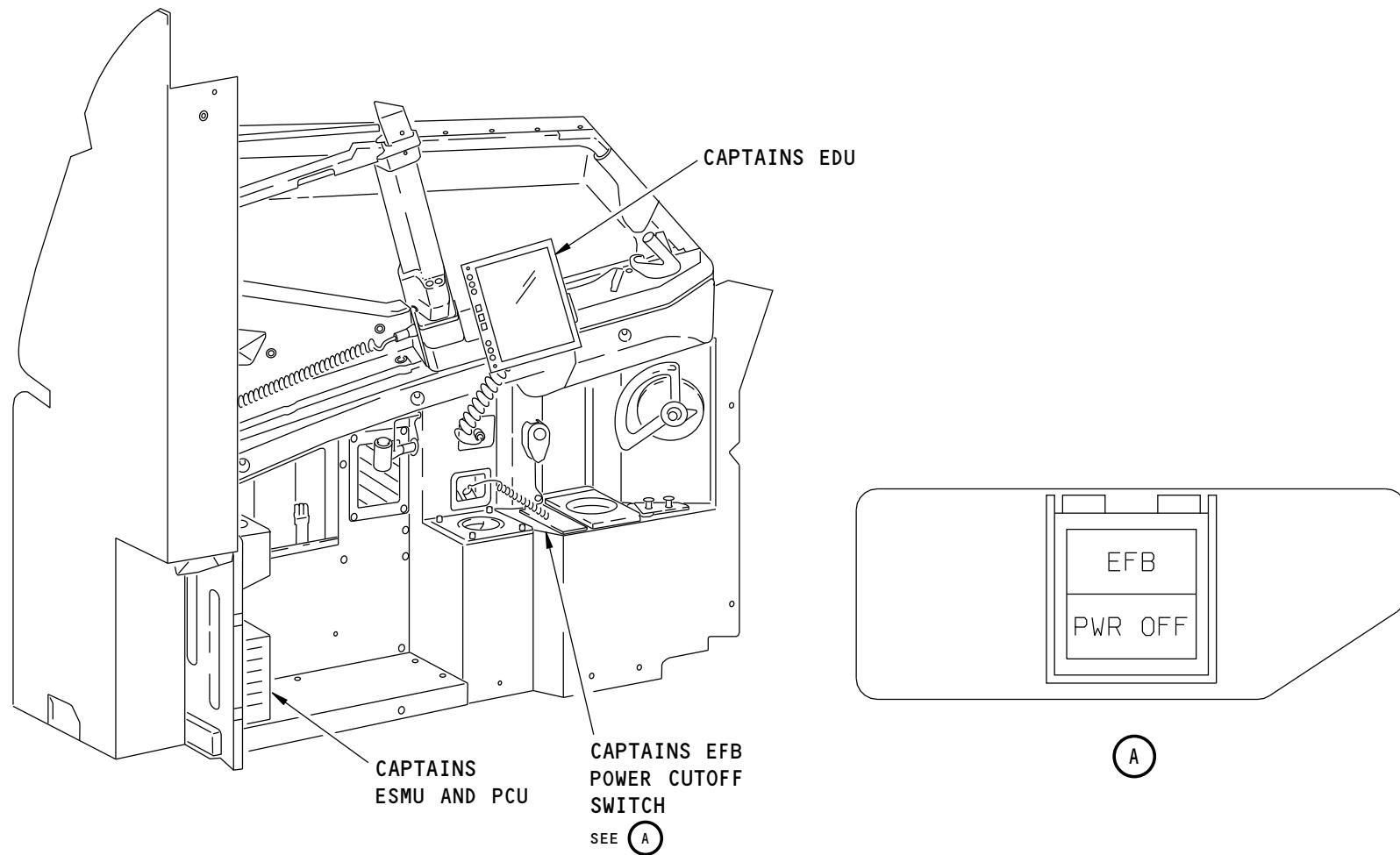
Training Information Point

Usual access for EFB maintenance is by using the on-screen menus. If the EFB main menu is unserviceable, the OSLoader Installer tool can download log files, and save to removable USB media.

EFFECTIVITY

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EFB - GENERAL DESCRIPTION AND COMPONENT LOCATION

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EFB - ELECTRONIC DISPLAY UNIT

General

The EDU is a battery-powered tablet computer. There is an EDU installed in the left and in the right flight compartment windows. Each EDU gets electrical power through the EDU Mount Assembly from the EFB ESMU. The ESMU gets power from the Power Converter Unit that is connected to the aircraft power bus. The EDU shows graphic information and optional video to the flight crew. The EDU has software applications installed that show displays of maps and charts from a hard drive assembly in the EDU.

Description

The EDU has a 10.4" (214mm) diagonal screen that is installed in portrait format. The EFB is an avionics grade Class 2 Commercial-Off-the-Shelf (COTS) System. It is designed to give real-time data to the flight crews.

The EDU has an Active Matrix Liquid Crystal Display (AMLCD), bezel mounted pushbuttons and a touch-screen for display and control of many software applications. The fully dimmable AMLCD lets the flight crew see the display in all cockpit lighting conditions. A "film-on-glass" touch-sensitive screen has up to nine bezel keys that give the user quick access to:

- Approach, airport or en-route electronic charts
- Checklists
- Electronic documents
- Performance calculations
- Video surveillance

Internal to the EDU are a CPU computer processor, RAM, network interface, memory and a mass storage device, graphics controller and drivers, software and batteries.

The EDU has a Lithium-Ion rechargeable battery pack of ~25 watt hours. On battery power, the EDU has 40 minutes nominal run time from 100% charge. The batteries will go to full, 100% charge in less than 2 hours. The actual run time depends upon a number of factors, primarily the selected backlight intensity and the CPU utilization. Therefore, the actual run time can range from 30 minutes up to 2 hours. The batteries are inside the EDU. To replace them is shop-level maintenance because it is necessary to open the case.

The EDU has two redundant fans. The processor, internal temperature of the EDU and battery temperature controls the fans and fan speed.

Physical Description

EDU dimensions are as follows:

- Length: 39.1 mm (1.54 in)
- Width: 243.0 mm (9.57 in)
- Height: 202.9 mm (7.99 in)
- Weight: 2.05 kg (4.5 lbs)

Mechanical Description

There is an EDU Mount Assembly. The EDU mount secures the EDU and provides the electrical connections to the EDU.

The EDU has a machined aircraft grade aluminum alloy casing with a black anodized finish. The EDU gives two ways to get access to applications and to enter data:

- Control keys
- On-screen virtual keyboard (application specific)

All keys have positive tactile feedback (snap action) to confirm activation. They are single pole, normally open momentary action switches. They are backlit and software controls them. The EDU has these connections at the perimeter of its case:

- CardBus/PCMCIA
- Remote (Desktop) Power
- Two USB ports
- I/O Connector
- Mechanical Latching Device
- Connector for interface with the EFB ESMU

EFFECTIVITY

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EFB - ELECTRONIC DISPLAY UNIT

Bezel Keys

There are three active Bezel keys on the EDU that give access to functions of the EFB. The Bezel button descriptions are as follows:

POWER: The EDU power button is at the top left corner of the EDU bezel. The EDU power button turns the EDU ON or OFF. When aircraft power is available to the EFB system and both EFB Power Cutoff Switches are in the ON position, the EDU power button will come on amber in color when the EDU is in the OFF condition. When aircraft power is available to the EFB system and both EFB Power Cutoff Switches are in the OFF position, the EDU power button will not come on when the EDU is in the OFF condition. When aircraft power is available to the EFB system and both EFB Power Cutoff Switches are in the ON position, the EDU power button will come on white in color when the EDU is in the ON condition. When aircraft power is not available to the EFB system, the EDU power button will come on white in color when the EDU is in the ON condition when there is sufficient EDU battery charge to power up the EDU. You can power up the EDU when you push and hold the EDU power button for approximately 15 seconds. The EDU gets power when you push the EDU power button for approximately 1 second.

MENU: The MENU button is the fifth button down from the top of the EDU. After power boot up of the EDU, when you push the MENU button, the EDU will return the display to the MAIN MENU.

BACK: The BACK key is a left-pointing arrow and is the sixth button down from the top of the EDU. When you push the BACK button, the previously displayed page will display. When you push this key or the BACK control key, the EDU shows the previous page. This key will not make the MAIN MENU show.

Power

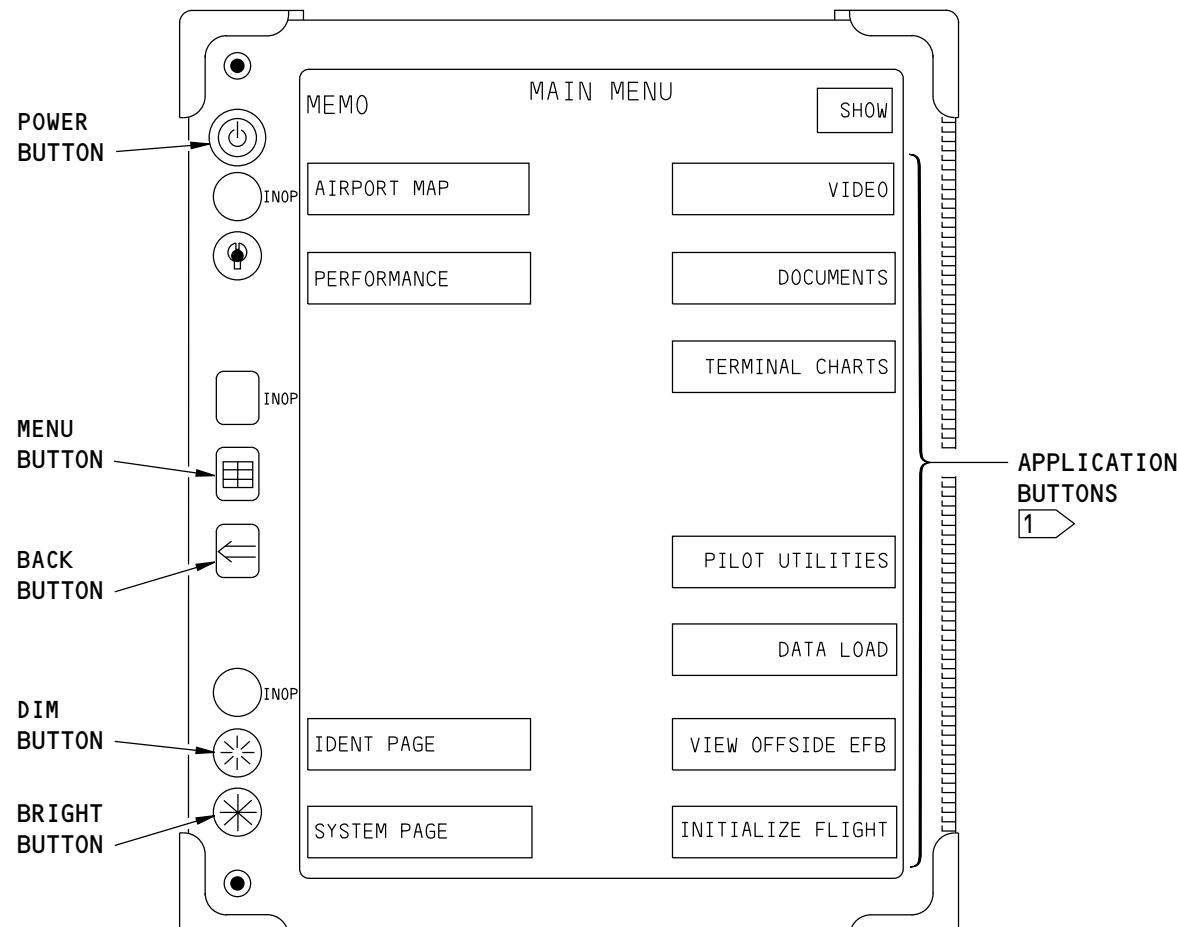
Under normal conditions the EDUs get power from the Electronic Switching Module Units (ESMUs). The ESMUs get power from the Power Converter Units when aircraft power is available to the EFB system and the EFB Power Cutoff Switches are in the ON position.

Battery backup in the EDU provides up to 50 minutes of independent power in the event of aircraft power failure. When used outside of the aircraft in a portable manner, the EDU is powered by an optional 110V AC (50-60Hz) Power Supply Adapter.

EFFECTIVITY

AKS 001-006, 009, 010, 013, 015-018, 020-025, 027

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[1] THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

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EFB - ELECTRONIC DISPLAY UNIT



EFB - ELECTRONIC SWITCHING MODULE UNIT

General Description

The Electronic Switching Module Unit (ESMU) is the EFB system component that gives the interface between the Electronic Display Unit (EDU) and aircraft systems. The ESMU also gives conditioned aircraft power to the EDU.

Physical Description

The ESMU dimensions are as follows:

- Length: 138.2 mm (5.44 in)
- Width: 174.2 mm (6.86 in)
- Height: 70.1 mm (2.76 in)
- Weight: 0.90 kg (2 lb)

Mechanical Description

The ESMU is a metal enclosure with four attachment points, two on each side. The internal printed circuit board is one-half the size of the metal enclosure. The ESMU has the following:

- LED indicator that is on steady when the unit has power
- 22-32VDC interface and power conditioner with connector
- One RS-232 port with connector
- Two USB ports with power and standard USB connectors
- Four 10/100 BaseT Ethernet interface with RJ-45 connector (with green and yellow LED)
- Interface to EDU with 1x USB 2.0 and power
- Two ARINC 429 interfaces
- One NTS Video input connector
- Optional video interface RS-170 and NTSC.

Power

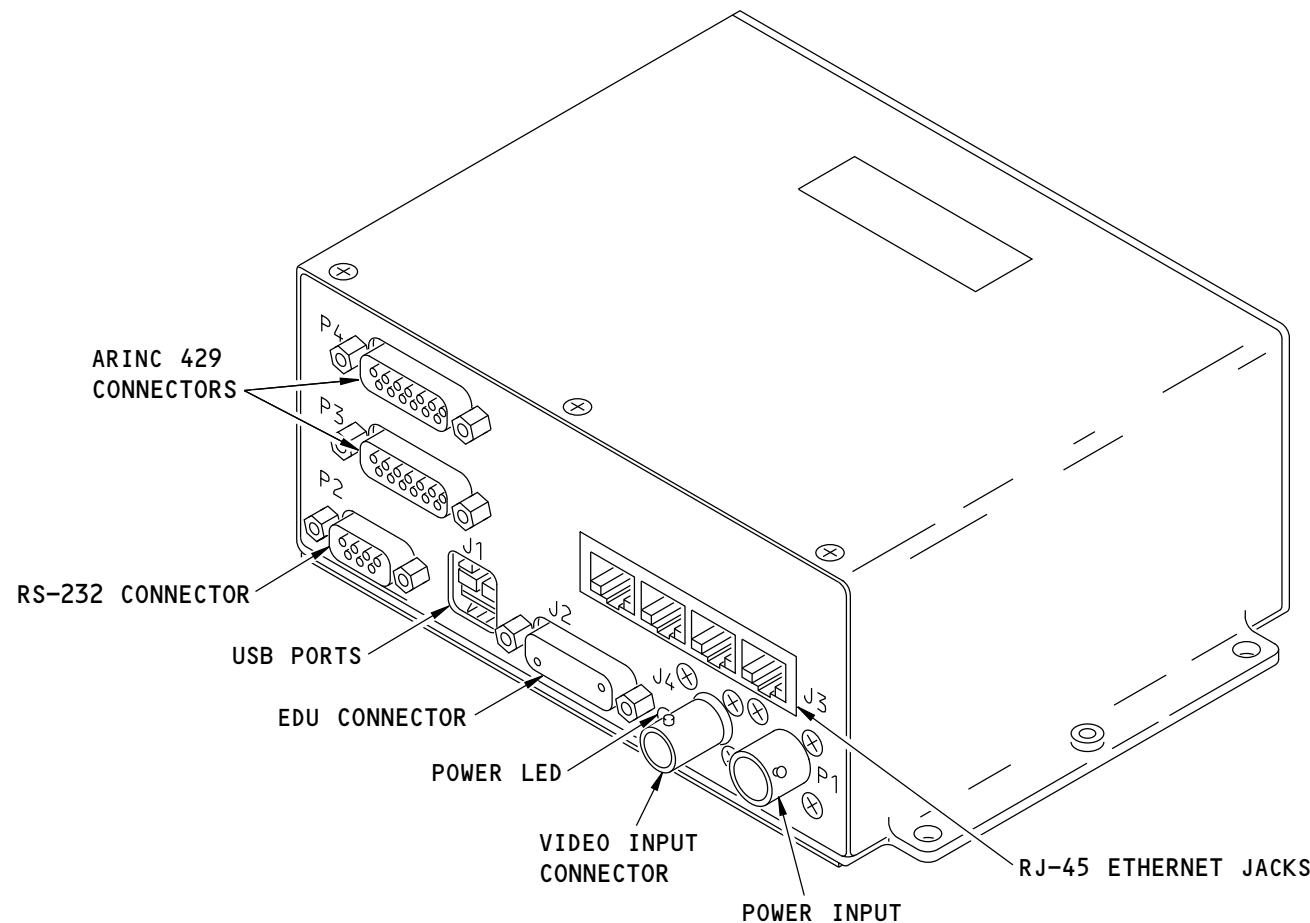
The ESMU gets 28 VDC power input from the Power Converter Unit (PCU). It does power conditioning between the input and the power feed output to the EDU. The ESMU supplies 18 VDC to the EDU. The ESMU also gives the interface between the EDU and aircraft systems.

EFFECTIVITY

AKS 001-006, 009, 010, 013, 015-018, 020-025, 027

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EFB - ELECTRONIC SWITCHING MODULE UNIT

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EFFECTIVITY
 AKS 001-006, 009, 010, 013, 015-018, 020-025, 027

46-15-00

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EFB - POWER CONVERTER UNIT

General Description

The Power Converter Unit (PCU) is a component in the EFB System. It is installed in the flight compartment. The PCU is a power supply that changes the 115 VAC input voltage from the airplane electrical power system into a single 28 VDC voltage output. The 28 VDC power goes from the PCU to the Electronic Switching Module Unit (ESMU). The nominal output power of the PCU is 75 Watts and the maximum output power is 100 Watts.

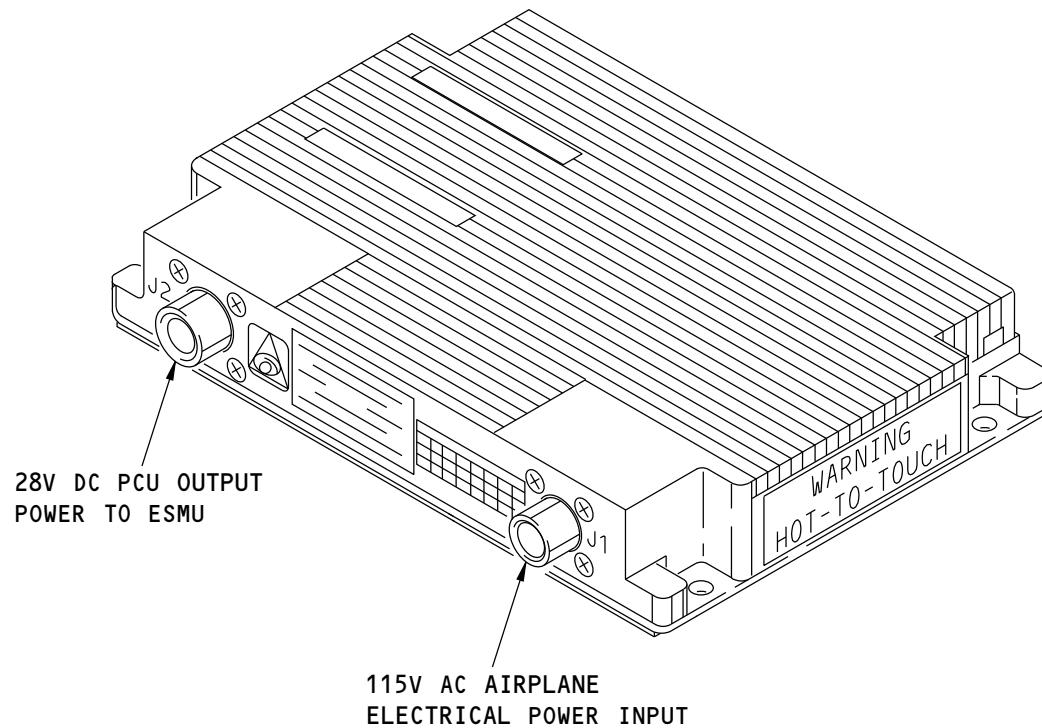
EFFECTIVITY

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EFB - POWER CONVERTER UNIT**46-15-00**

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EFFECTIVITY
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EFB - POWER INTERFACES

General Description

The EFB System gets airplane electrical power from two 115V ac (volts alternating current) circuit breakers on the P6 circuit breaker panel. There is one circuit breaker for the Captain's EFB and one circuit breaker for the First Officer's EFB.

Electrical Power Components

There are two EFB Power Cutoff Switches. The Captain's and First Officer's EFB Power Cutoff Switches are installed in the left and right side consoles. Each side panel has the EFB Power Cutoff Switch that controls relays to route the 115V ac from the EFB circuit breakers to the Power Converter. The power cutoff switches show the status of the 115V ac to the EFB system. The power cutoff switches have two positions. The EFB button applies electrical power and the PWR OFF button removes electrical power. When you push the EFB switch, a light comes on. When you push the PWR OFF switch, the light in the EFB switch goes off.

In the EFB power circuit, there are three relays. All three relays are installed on the P18 panel. The relays are as follows:

- EFB Relay 1 - R1093, EFB Power
- EFB Relay 2 - R1094, Announcer Control
- EFB Relay 3 - R1095, EFB Control

There are two circuit breakers on the P6 panel. There is a CAPT EFB circuit breaker and a F/O EFB circuit breaker. The circuit breakers supply 115V ac to the Power Converter unit.

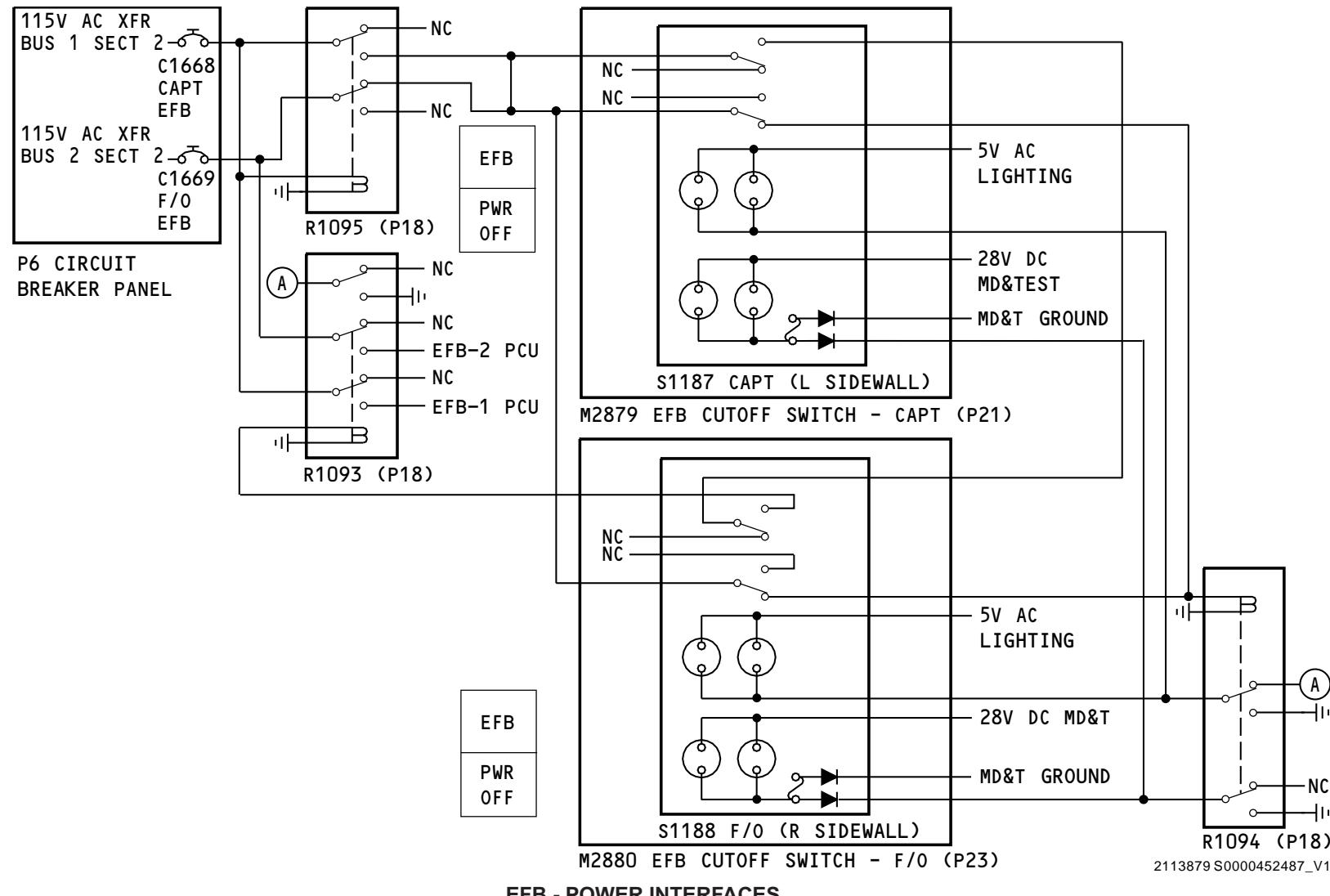
Electrical Power Flow

115V ac is applied to the EFB control relay R1095 when airplane electrical power is available, and the circuit breakers are closed. When power is available to the EFB system and the CAPT and F/O Power Cutoff Switches are in the OFF (out) position, annunciator control relay R1094 is energized and the EFB and PWR OFF annunciator lights are on.

When you push the CAPT's and F/O's power cutoff switches to the ON position, EFB power relay R1093 is energized. The energized EFB power relay R1093 maintains illumination of the EFB annunciator and applies 115V ac power to the CAPT and F/O power converter units (PCU). The left and right PCU convert the 115V ac input to 28V dc (volts direct current) output. The 28V dc output from the PCU goes to the Electronic Switching Module Units. With the CAPT and F/O's power cutoff switches in the ON position, annunciator control relay R1094 is de-energized and the PWR OFF annunciators are dark (not illuminated).

The captain's and first officer's power cutoff switches must be in ON (out) position to energize the captain's or first officer's EFB. Setting either power shutoff switch in the OFF (out) position turns off power to the Capt's and F/O's EFB at the same time.

NOTE: For example, if you open the circuit breaker for the captain's EFB, the first officer's EFB will remain energized. But, if you open the captain's or first officer's power cutoff switch, the two EFBs will de-energize at the same time.


EFB - POWER INTERFACES



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EFB - MAIN MENU AND DISPLAY DESCRIPTION

General Description

The MAIN MENU lets the flight crew and maintenance persons do the tasks that follow:

- Get access to all applications (for example, airport maps, charts, performance, documents, video surveillance, pilot utilities)
- Get access to the IDENT PAGE and SYSTEM PAGE
- Find the application that set the MEMO message, FAULT message or MSG icon that needs attention.
- VIEW OFFSIDE EFB – Selection of this button causes the EFB to enter transfer mode. The display shows the contents of the other EFB in the flight compartment.
- INITIALIZE FLIGHT – When a pilot initializes the flight, EFB applications perform necessary operations to prepare for flight (for example, updating expiration status of data). All faults on the SYSTEM page will also be removed. This function is active when on the ground.
- CLOSE FLIGHT - When a pilot closes out a flight, EFB applications perform necessary operations at the end of a flight (for example, clearing flight specific data). This function is active when on the ground.
- Get access to the DATALOAD function
- SHOW - When you push the SHOW button, it gives access to HIDE, MENU, BACK, PGUP, PGDN, ZOOM (+) and ZOOM (-) functions.

Applications

Airlines can configure the user-modifiable portions of the application manager through the common administration tool (CAT). The operator can define which flight crew applications are installed.

Some examples are as follows:

- AIRPORT MAP - This application shows airplane position on the runway moving map while taxiing, thus enhancing situational awareness and safety.
- PERFORMANCE - This electronic application lets the flight crew calculate takeoff and landing performance parameters for a specific airport/runway.

- DOCUMENTS - This application gives access to electronic versions of flight operations related documents and maintenance documents.
- VIDEO - This application lets the flight crew see the flight compartment entry door area. It is used to identify persons that request entry and to detect suspicious behavior or potential threats.

Menu Flow

The Electronic Flight Bag (EFB) functions are organized into three menus: MAIN MENU, EFB MAINTENANCE, and LOAD MENU. Once a Tail ID has been entered, the EFB normally powers up to the MAIN MENU.

NOTE: During power up, other text and windows can show intermittently. This is its usual operation, and not a fault.

Touchscreen and Button Color

A button's color tells the status of the function or application:

- A gray background with white text indicates the function is available for selection
- A green background with white text indicates the function has been selected
- A black background with blue border and text indicates that the function is not available to select

When you touch the touchscreen in an active function area, the border changes to white in color. When you remove your finger from the touchscreen within an active function area, you activate the function.

Messages

The EFB shows these messages that tell the condition of the EFB as follows:

- FAULT: This message, amber in color, shows that there is a fault in an application or the system. Go to the SYSTEM page for more information.

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EFFECTIVITY

AKS 001-006, 009, 010, 013, 015-018, 020-025, 027



EFB - MAIN MENU AND DISPLAY DESCRIPTION

- MEMO: This message, white in color, shows that an application wants attention for any reason other than a message. When MEMO shows, go to the application to see the issue.
- MSG: This message, white in color, shows that one of the communication applications has an uplink message and wants attention. This is used only if the EFB system has an internal communication device and/or is connected to an external communication device.
- XFR: This message, green in color, shows that the system is currently in transfer mode. One EFB (one EDU) shows the contents of the other EFB (the other EDU). When in this mode, the display can not be changed. Push MENU to remove the EFB from transfer mode.

Training Information Point

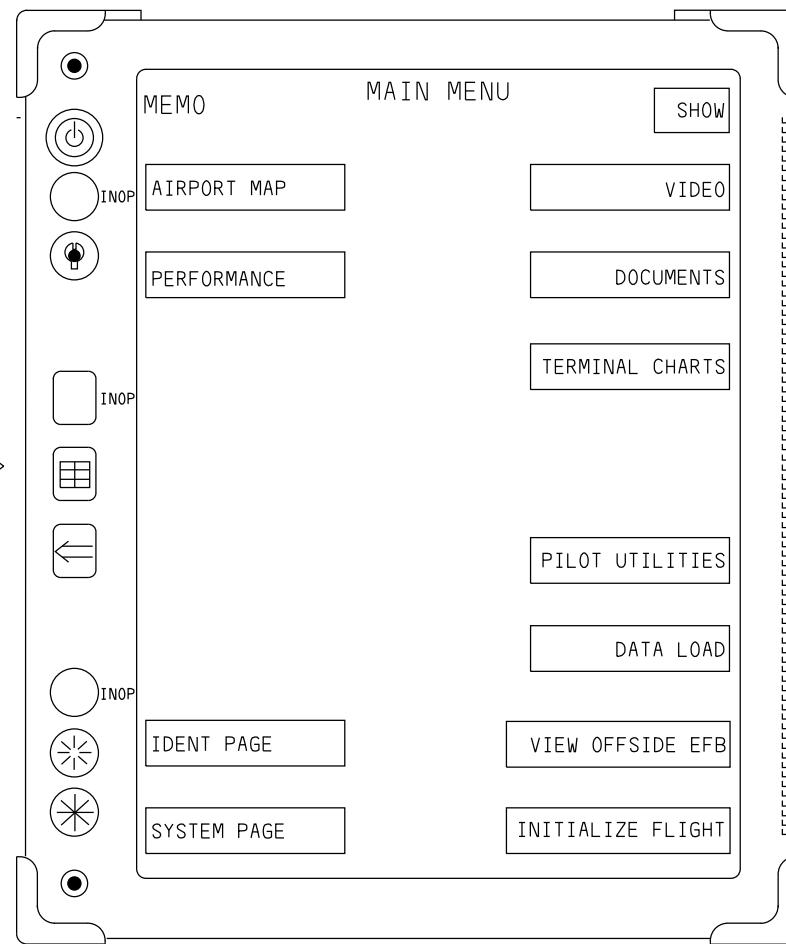
To show the MAIN MENU on the display unit, these conditions must exist as follows.

- The LSAP with the nomenclature 46 FLEET UMS must be installed.
- The correct aircraft tail identification number must be set.
- If the captains and first officers EFB are installed and energized, the tail ID must agree in the two units.

EFFECTIVITY

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EFB - MAIN MENU AND DISPLAY DESCRIPTION

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EFB - IDENT PAGE

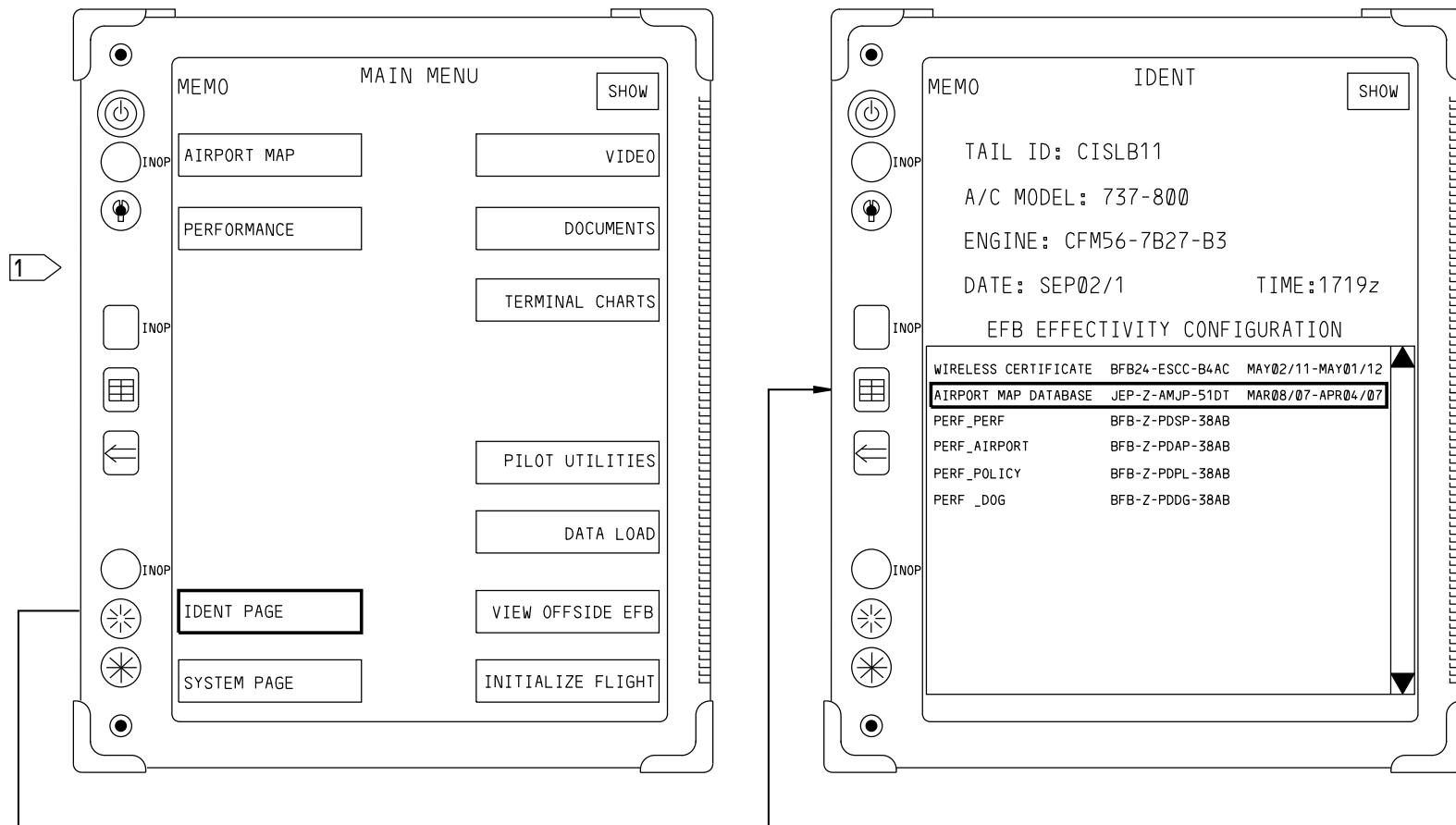
General Description

The IDENT page gives information about the airplane and date-critical software parts installed in the EFB and their status. You get access to the IDENT page from the MAIN MENU. When the IDENT page shows, it gives the information that follows:

- The airplane major and minor model
- The airplane tail number
- The current date and time
- SHOW - When you push the SHOW button, it gives access to HIDE, MENU, BACK, PGUP, PGDN, ZOOM (+) and ZOOM (-) functions.
- The EFB effectivity configuration table - This table shows all software parts that have an effective date and/or an expiration date (for example, AIRPORT MAP database). Every software part in the table shows its part name, part number and an effective date and/or an expiration date. Expired parts show as amber in color. Valid parts show as white in color. Also, it shows software effectivity expiration status of all applicable installed software parts (for example, databases, charts, documents, etc.). This lets the crew evaluate quickly the operational readiness of the system along with the dispatch ability of all required data and documents required for that flight.

NOTE: The EFB EFFECTIVITY CONFIGURATION table is updated when you select INITIALIZE FLIGHT from the EFB MAIN MENU.

NOTE: If necessary, change the airplane tail number from the TAIL ID ENTRY page. The time and date come from the Global Positioning System (GPS).



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DISPLAY IS ONLY AN EXAMPLE.

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EFB - IDENT PAGE



EFB - SYSTEM PAGE

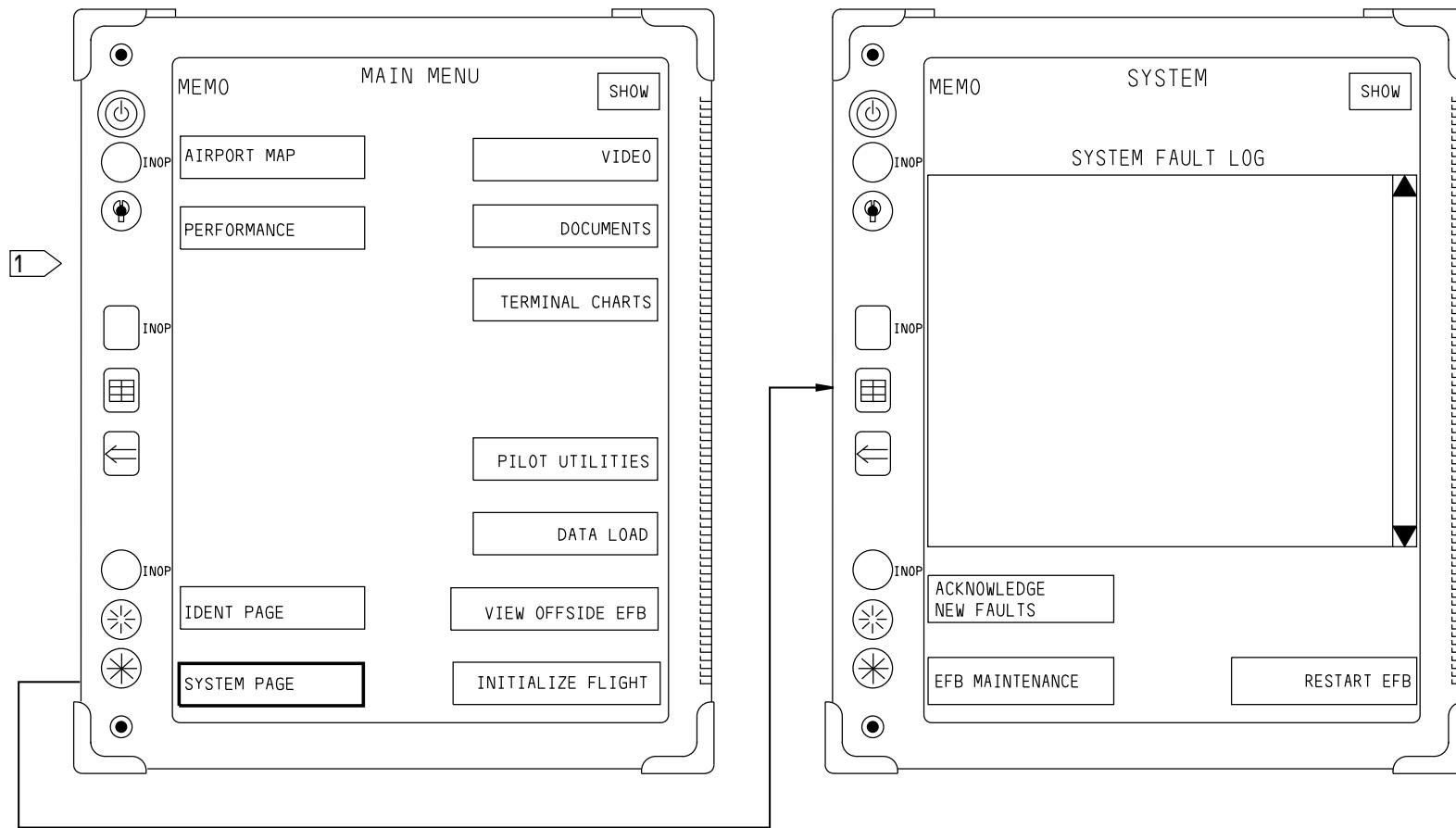
General Description

The SYSTEM PAGE gives access to fault messages from the EFB to inform the flight crew. It is possible the messages require flight crew attention. You get access to the SYSTEM PAGE from the MAIN MENU. When a new message is logged to the SYSTEM PAGE, the amber colored FAULT message shows in the upper left corner of the menu header. When the user sees the FAULT message, they get access to the SYSTEM PAGE to see the fault. When you go to the SYSTEM PAGE, the FAULT message in the left corner of the display will go off.

| **NOTE:** When you push the INITIALIZE FLIGHT button on the EFB MAIN MENU, all faults (acknowledged and unacknowledged) on the SYSTEM page will be permanently removed.

The functions available from the EFB SYSTEM page are:

- RESTART - Restarts the EFB
- ACKNOWLEDGE NEW FAULTS - Gives the user the ability to acknowledge all faults in the fault list. This button stays inhibited until all unacknowledged faults are viewed. If there are more faults than what show on the SYSTEM page, use the touchscreen arrows to view the remaining faults in the list. When all the faults are acknowledged, the FAULT message that shows adjacent to the SYSTEM PAGE button on the MAIN MENU goes out. Unacknowledged faults show as white in color on the faults list and acknowledged faults show as blue in color.
- EFB MAINTENANCE - Gets access to all maintenance functions and to the LOAD MENU
- SHOW - When you push the SHOW button, it gives access to HIDE, MENU, BACK, PGUP, PGDN, ZOOM (+) and ZOOM (-).



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DISPLAY IS ONLY AN EXAMPLE.

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EFB - SYSTEM PAGE



EFB - EFB MAINTENANCE PAGE

General Description

The EFB MAINTENANCE page gives access for maintenance crew tasks such as the LOAD MENU functions. You get access to the EFB MAINTENANCE page from the SYSTEM PAGE.

All menu pages in the maintenance menu tree, unless noted otherwise, should use the BACK bezel key or touchscreen button to return to the previous page.

Functions on the EFB Maintenance Page

The functions that show on the EFB MAINTENANCE page are:

- SYSTEM CONFIG - The system configuration page shows all loadable software parts in the EFB.
- FAULT LOG - The fault log page gives the user access to all recorded faults and events. This function is active when on the ground.
- INPUT MONITORING - The input monitoring page shows the status of the different EFB interfaces.
- INTERNAL CONFIG - Gives access to the hardware and non-loadable software part numbers. This information includes the EFB's serial number and the version of the Operating System.
- LOAD MENU - Gives maintenance access to the LOAD MODE menu that has functions such as crossload, external dataload and software delete functions. This function is active when on the ground.
- SHUTDOWN - Does an orderly shutdown of all software. This lets the software applications store required data. After you select SHUTDOWN, all other functions are inhibited. This function is active when on the ground.
- CONFIG COMPARE - This lets the user find any software mismatch between EFB-L and EFB-R. It is necessary that the two EFBs are the same.
- COMM MAINTENANCE - Gives the user status and control functions for EFB wireless communication. This is used if the EFB system has an internal communication device and/or is connected to an external communication device.

- STAGING AREA - Gives the user status and control functions for loadable software airplane parts (LSAPs) that are staged. This is used only if the EFB system has access to an internal or external communication device.
- BATTERY STATUS - Gives the user status for CURRENT POWER SOURCE (AC POWER or BATTERY POWER). Also, this display shows BATTERY POWER REMAINING (XX %, and if less than 100%, "charging" shows).
- SHOW - When you push the SHOW button, it gives access to HIDE, MENU, BACK, PGUP, PGDN, ZOOM (+) and ZOOM (-).

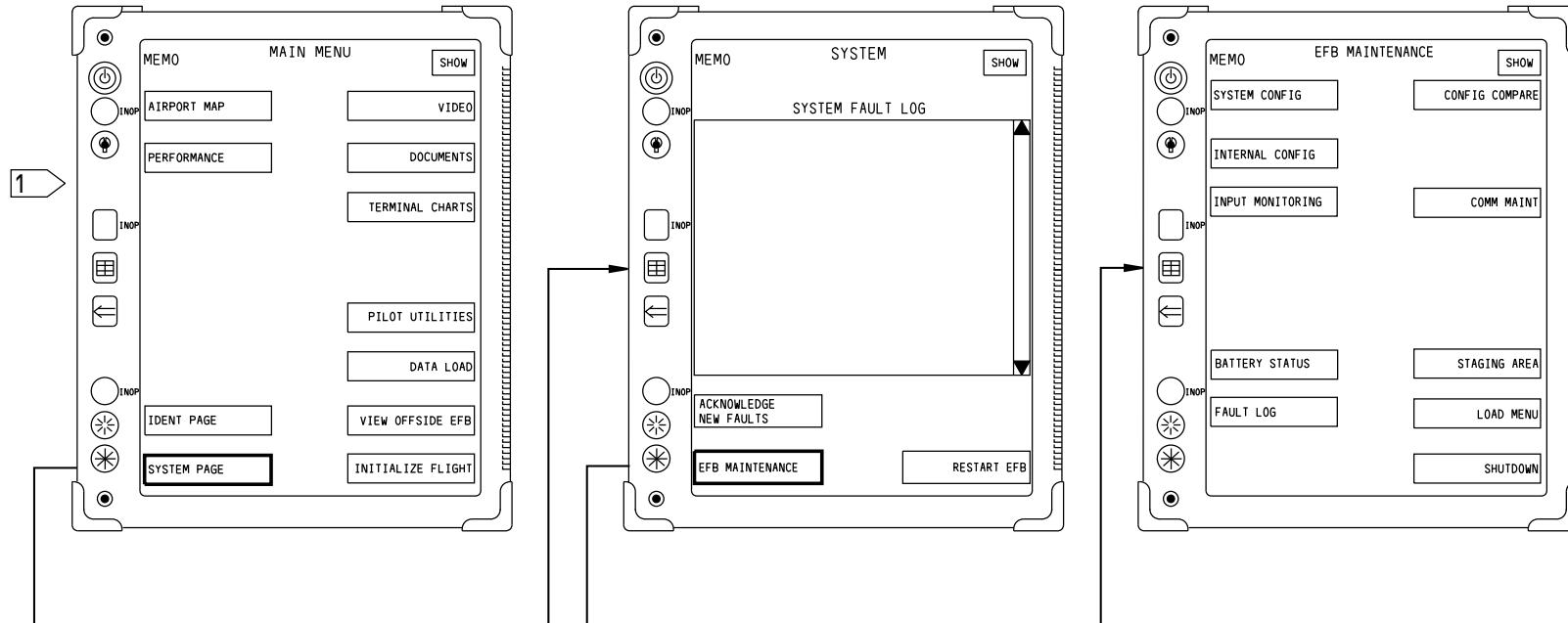
NOTE: Use the SHUTDOWN function to shut-down the EFB system, for example when maintenance replaces the ESMU or the EDU.

NOTE: The EFB will not show the MAIN MENU until a tail number has been entered. If the other EFB is on and connected, the tail number in both EFBs must be the same to show the MAIN MENU.

EFFECTIVITY

AKS 001-006, 009, 010, 013, 015-018, 020-025, 027

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EFB - EFB MAINTENANCE PAGE



EFB - SYSTEM CONFIG PAGE

General Description

The SYSTEM CONFIG page gives access to a list of all the software installed on the system. You get access to the SYSTEM CONFIG page from the EFB MAINTENANCE page.

All software names show in the left column and software part numbers show in the right column. Software shows in alpha-numerical sequence based on part number. Use the scroll up and scroll down touchscreen buttons to see all of the software parts.

The SYSTEM CONFIG page shows the status of all software parts. The mechanic makes sure that all software parts are serviceable. The EFB does a check with Cyclic Redundancy Checking (CRC) for the applications in the EFB system. The color of the software shows its status and the color code is as follows:

- Software that is cyan in color shows that a Cyclic Redundancy Check (CRC) is not complete on that software.
- Software that is amber in color shows that the CRC check was completed and the software is not serviceable. It is necessary to reinstall software parts that are amber in color.
- Software that is white in color shows that the CRC check was completed and the software is serviceable.

NOTE: The EDU calculates the software condition and updates the page continuously, but at a lower priority than some other functions. It is possible that ten (10) minutes is necessary to see the software status changes.

If a printer is connected to the EFB, the SYSTEM CONFIG page gives the user access to the PRINT button. When you push the PRINT button, the EFB prints the contents of the SYSTEM CONFIG page. When you print the contents of the SYSTEM CONFIG page, a "+" symbol can show adjacent to the software part numbers. This shows that the software passed the CRC check. Also, a "-" symbol can show adjacent to the software part numbers. This shows the parts that failed the CRC check. If there is no character before the part number, the CRC check is not complete.

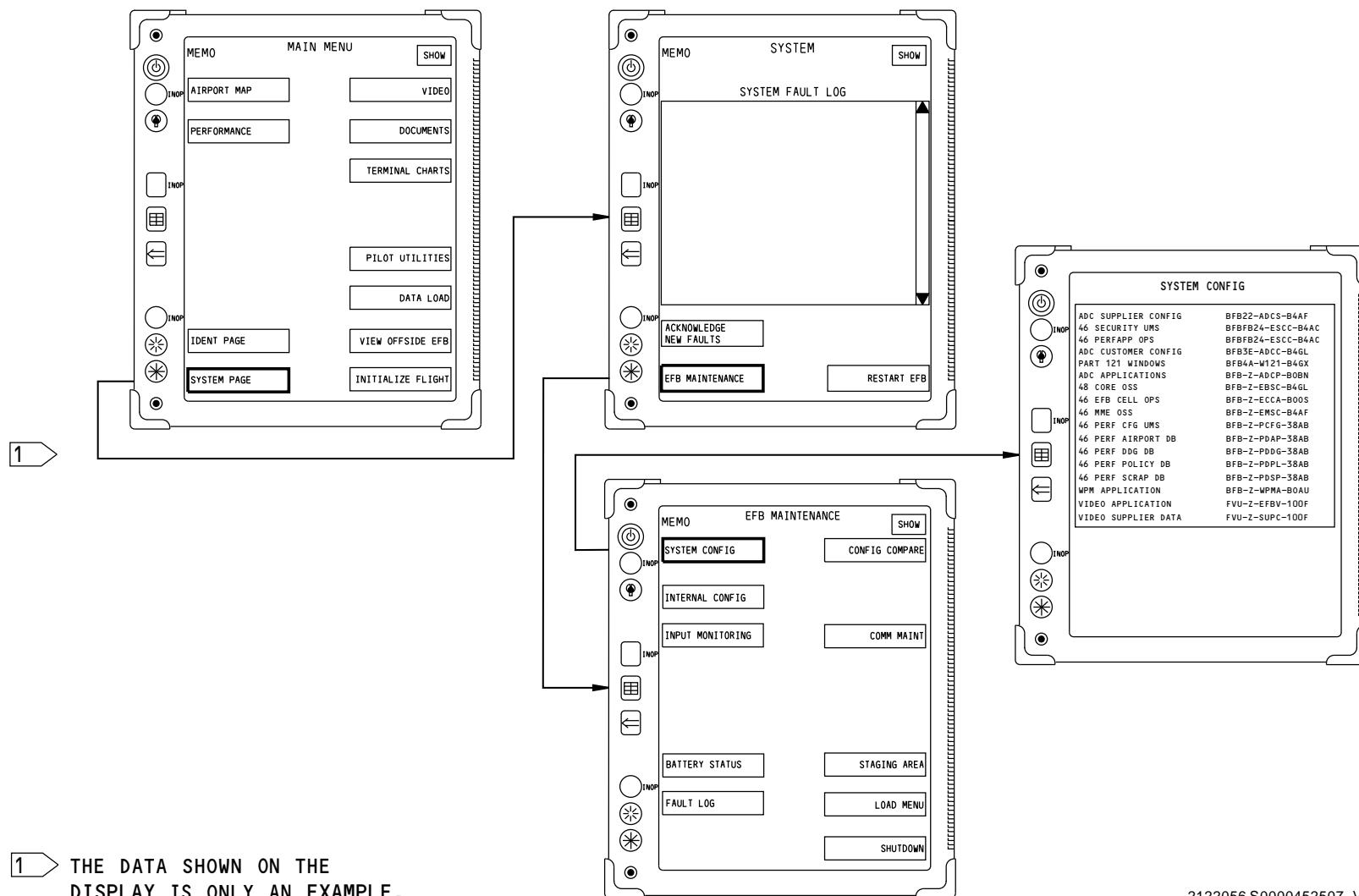
NOTE: If the print function does not operate in one (1) minute, push the PRINT button again.

NOTE: The header with TIME/DATE, airplane tail number and EU location (CPT = captain and FO = first officer) shows on the printout.

EFFECTIVITY

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EFB - SYSTEM CONFIG PAGE



EFB - FAULT LOG PAGE

General Description

The FAULT LOG page gives access to all recorded faults. You get access to the FAULT LOG page from the EFB MAINTENANCE page.

Each fault that shows on this page has a name and a fault time stamp. The fault received last is at the top of the fault list. Use the scroll up and scroll down touchscreen keys to see other faults in the fault log.

All SYSTEM PAGE faults with date and time stamps also show. Faults and events that show on the FAULT LOG page give data for ground maintenance. The faults that show on the SYSTEM PAGE are for the flight crew.

The items that show on the FAULT LOG page are stored in a file identified as fault.log. When the FAULT LOG file is more than its capacity of 10 MB, a new fault will replace the oldest fault in the display. Another file, identified as fault.log.bak, will store the previous 10MB of faults.

CLEAR FAULT LOG will let the user clear the contents of the FAULT LOG page. After you push the CLEAR FAULT LOG button, a message shows to confirm or cancel this action. Cleared faults do not erase the faults from the log file.

Fault log files (fault.log and fault.log.bak) can be downloaded using the dataloader. When the fault log files are downloaded, the content of the FAULT LOG page is not erased.

If a printer is connected to the EFB, the FAULT LOG page gives the user access to the PRINT button. When you push this button, the EFB prints the FAULT LOG data. When you look at the FAULT LOG display, you see only the first thirty (30) characters. But, when you print the FAULT LOG, the printed copy shows all characters.

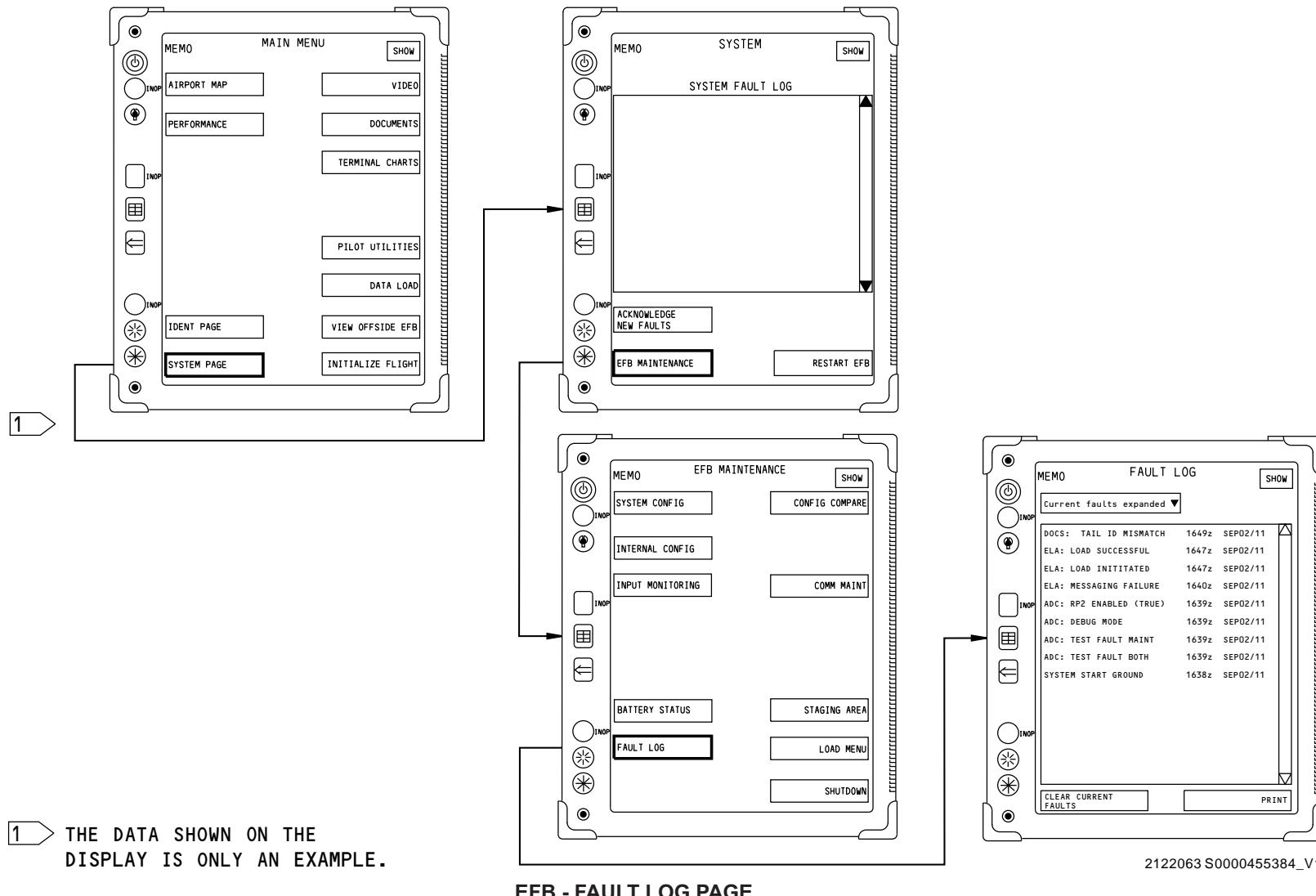
NOTE: If the print function does not operate in one (1) minute, push the PRINT button again.

NOTE: The header with TIME/DATE, airplane tail number and EU location (CPT = captain and FO = first officer) shows on the printout.

EFFECTIVITY

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EFB - INPUT MONITORING PAGE

General Description

The INPUT MONITORING pages let the maintenance crew see the EFB interface activity. You get access to INPUT MONITORING from the EFB Maintenance page.

The input monitoring page is a sub-menu, with a separate button for each input. The three functions are as follows.

- Analog discrete inputs
- ARINC 429 inputs
- Ethernet Inputs.

A button that is not an input, but that also shows on the input monitoring page is:

- SHOW - When you push the SHOW button, it gives access to these functions: HIDE, MENU, BACK, PGUP, PGDN, ZOOM (+) and ZOOM (-).

ARINC 429 Inputs

The ARINC 429 INPUTS page gives the condition of incoming EFB ARINC 429 interfaces that report to the Electronics Display Unit (EDU) by the ESMU. The status of each interface that shows is PRESENT, or ABSENT or UNKNOWN. The display that shows is defined with optional system interfaces, connected aircraft wiring and optional equipment selected by the airline. The inputs that follow are examples of input interfaces that are possible:

- PR1 -Printer
- GPS - MMR
- ADIRU-IR –Inertial Reference
- CDS-DEU –Common Display System
- FMC 02 –Flight Management Bus 2
- ADIRU-ADR –Air Data Reference
- FMC 09 – Flight Management Bus 9

The interfaces that show on ARINC 429 INPUTS are set by the EFB configuration (BFEBSC and PART 121 WINDOWS software parts). If a device is not listed in the EFB System software configuration, ARINC 429 INPUTS does not show that interface.

The EDU sets the status condition using inputs from connected devices. During this automatic check, the display shows the word: UNKNOWN. After the check, the display shows the words PRESENT or ABSENT. If an installed device is unserviceable, ARINC 429 INPUTS shows the interface as ABSENT.

Analog Discrete Inputs

The ANALOG DISCRETE INPUTS page shows condition of the incoming EFB analog discrete interfaces as reported to the EDU. The page can shows the analog discrete as one of these conditions:

- OPEN
- GROUND
- UNKNOWN.

The interfaces show on the page are set by these EFB System software parts:

- BFEBSC (that is, using its shortened part number)
- PART 121 WINDOWS.

The EDU sets the interface status using inputs from connected devices. During this automatic check, the display shows the word: UNKNOWN. After the check, the display can show the words PRESENT or ABSENT.

Ethernet Inputs

The ETHERNET INPUTS page shows the condition of EFB system Ethernet interfaces that report to EFB system. The page can show the Ethernet status as PRESENT or ABSENT.

**EFB - INPUT MONITORING PAGE**

The interfaces that show on ETHERNET INPUTS are set by the EFB System software configuration (PART 121 WINDOWS software parts). If a device is not specified by the EFB System software configuration, ETHERNET INPUTS does not show that interface.

When the status of the interface is being determined, UNKNOWN is displayed and will change automatically to PRESENT or ABSENT.

EFFECTIVITY

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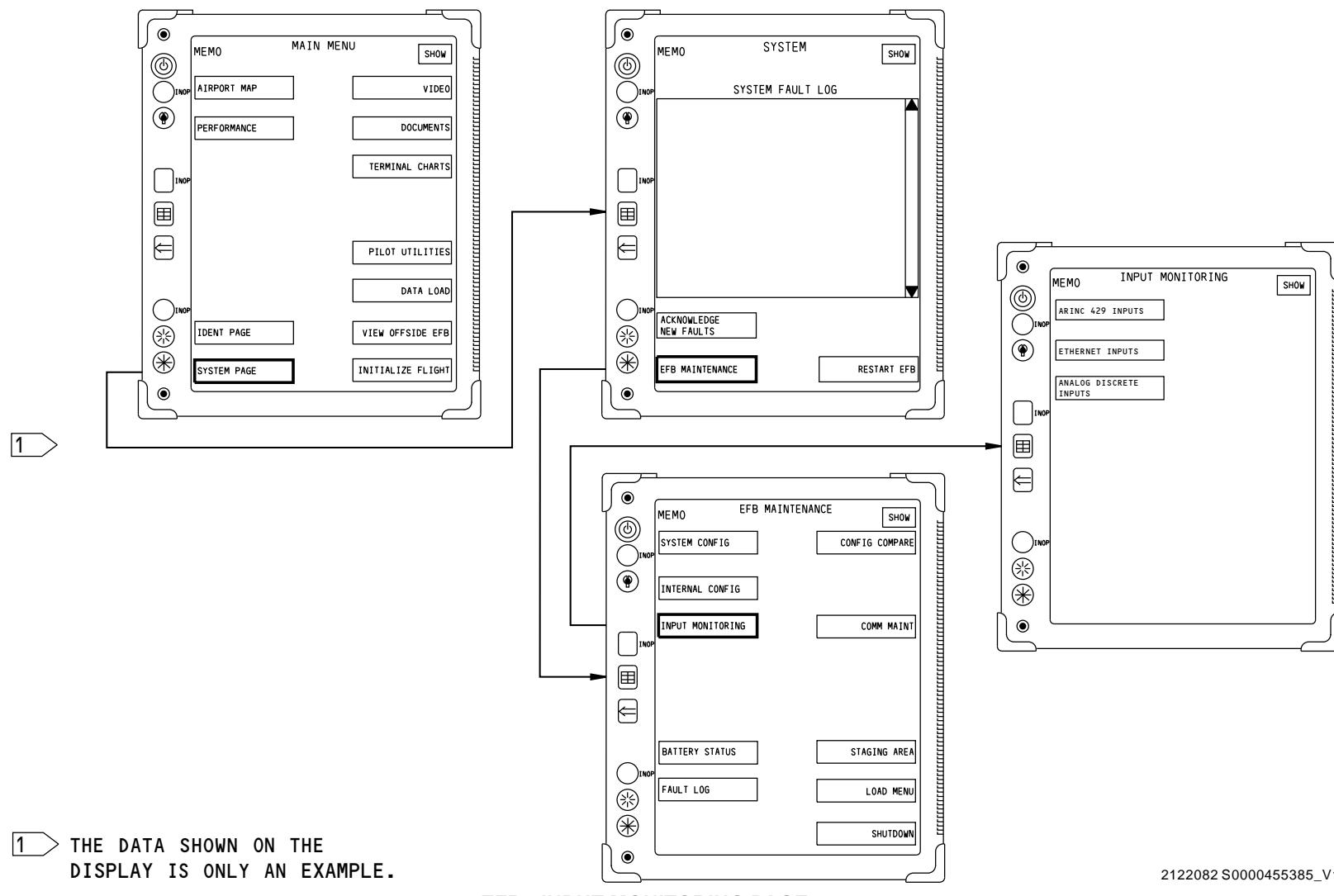
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EFFECTIVITY

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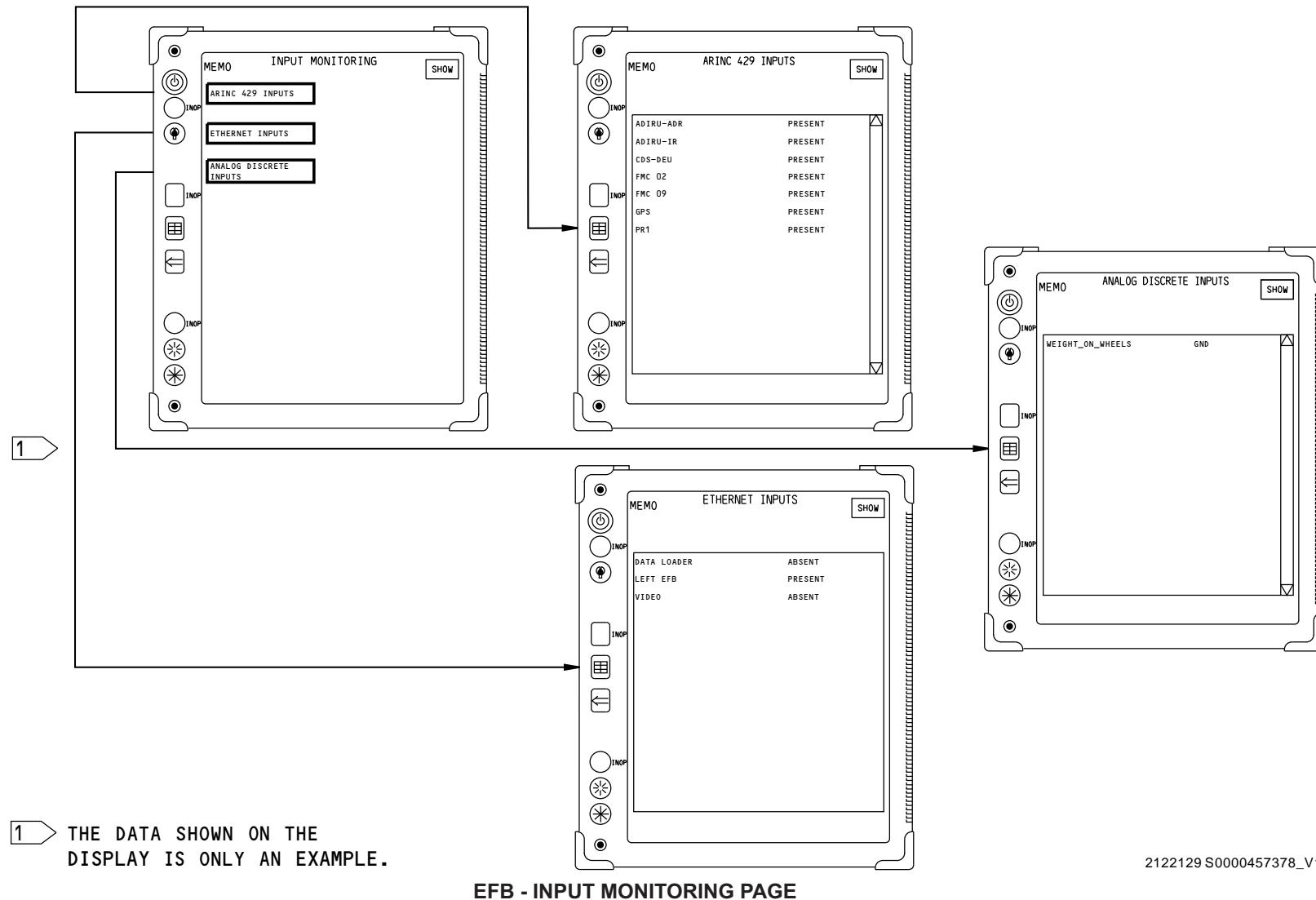
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EFB - LOAD MENU

General Description

The LOAD MENU gives access to functions that install, delete and transfer software parts on the EFB. You get access to the LOAD MENU page from the EFB MAINTENANCE PAGE.

NOTE: When you select LOAD MENU on the EFB MAINTENANCE page, the buttons on the screen change to cyan in color, the message "IN PROGRESS" shows above the LOAD MODE button, and then the LOAD MODE page shows.

In LOAD MENU, if you push the MENU or BACK bezel key or touchscreen button, the EFB stays in the LOAD MENU.

NOTE: If a load operation is in progress, you will see a progress indicator. "ACCEPTING LOAD – WORKING", or "ACCEPTING LOAD – RECEIVING [LSAP PART NUMBER]", or "LOADING TO LEFT EFB", or "LOADING TO RIGHT EFB" are examples. If a load operation is in progress when you select the MENU or BACK bezel key or touchscreen button, you may abort the load operation and negatively affect EFB operation.

Load Mode Page Functions

The functions that show on the LOAD MENU page are:

- ACCEPT LOAD – Sets the EFB to receive software parts from an approved dataloader or the other EFB. This function also allows the EFB to upload data to an approved dataloader. This function is controlled from the dataloader or the other EFB.
- CROSSLOAD – Lets the user select, then transfer software parts from one EFB to the other EFB.
- DELETE LSAP – Lets the user select, then delete installed software parts from the EFB.
- DELETE TEMP – Lets the user remove all temporary (not installed) data from the EFB.
- CONFIG COMPARE - Lets the user identify any software mismatch between EFB-L and EFB-R.

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- MEDIA LOAD – Lets the user select, then install software parts from removable external media.
- RESTORE OS - Causes an automatic sequence to install Windows OS and OPTADMW software parts.
- RETURN TO MAIN – Lets the user go to the MAIN MENU. Push this button only when you are complete with all LOAD MENU procedures.
- STAGED LOADS – Lets the user select, then install software parts from the staging area. Software parts will only be available if the EFB system has an internal communication device and/or is connected to an external communication device.
- SYSTEM CONFIG - A display of the system configuration page that shows all loadable software parts in the EFB.
- TAIL ID ENTRY – Lets the user set the tail number in the EFB.

NOTE: When you select RETURN TO MAIN, the following dialog box will show. It is possible that the EFB will shutdown and startup when you select OK. If a full shutdown and startup are not necessary, the MAIN MENU will quickly be displayed.

"RETURN TO MAIN"

"Returning to MAIN will restart EFB software to complete the operation. Do you wish to continue?"

"[OK] [CANCEL]"

ACCEPT LOAD

If you install software from the dataloader, connect the dataloader to the EFB data port using an RJ-45 connector on an Ethernet cable. The EFB data port is located as follows: Flight deck, second observer's panel, P18-1, M23218 (direct to EU-L).

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EFB - LOAD MENU

If you are only installing software in one EFB, select the ACCEPT LOAD button (on the LOAD MENU page) on only that EFB. To load both EFBs, push the ACCEPT LOAD button (on the LOAD MENU page) on both EFBs. On the dataloader, select the software parts to be loaded and load to both EFB-L and EFB-R.

NOTE: If a load operation is in progress you will see a progress indicator (for example, "ACCEPTING LOAD – WORKING", or "ACCEPTING LOAD – RECEIVING [LSAP PART NUMBER]"). If a load operation is in progress and you select the MENU or BACK bezel key or touchscreen button, you may abort the load operation and negatively affect EFB operation.

NOTE: If you have changed the software configuration of the EFB, you should always select RETURN TO MAIN. Then, use the SYSTEM CONFIG page on the EFB MAINTENANCE menu page to make sure software parts are correct.

CROSSLOAD Page

The CROSSLOAD page lets you install software from one EFB into the opposite EFB. You get access to the CROSSLOAD page from the LOAD MENU page.

Push the ACCEPT LOAD button (on the LOAD MENU page) on the other EFB. On the EFB that has the software part installed, push the CROSSLOAD button. A scrollable list of available software part(s) will show. All software titles show in the left column with part numbers in the right column. Software shows in alphanumerical order, based on part number. Use the scroll up and scroll down touchscreen buttons to see the complete list. Select the software part(s) to be crossloaded.

NOTE: To select individual software part number(s), touch the check box adjacent to the software part number on the touchscreen. The check mark, green in color, shows the part is selected. To select all software part numbers on the EFB, push the SELECT ALL button. To deselect all software on the EFB, select the DESELECT ALL button. If time is short and you have many software part numbers to load, push the SELECT ALL button and then deselect software parts that you do not want to install.

NOTE: Before you select a software part to crossload, START CROSSLOAD is inhibited and is cyan in color. The START CROSSLOAD button becomes active (and changes to white in color) when you select a minimum of one software part number.

When you have selected all the software parts to be crossloaded, push START CROSSLOAD. You should see LOADING TO LEFT EFB or LOADING TO RIGHT EFB on the EFB you are operating. You should see ACCEPTING LOAD – WORKING or ACCEPTING LOAD – RECEIVING [LSAP PART NUMBER] on the opposite EFB.

NOTE: If a load operation is in progress you will see a progress indicator (for example, ACCEPTING LOAD – WORKING, or ACCEPTING LOAD – RECEIVING [LSAP PART NUMBER], LOADING TO LEFT EFB, LOADING TO RIGHT EFB). If a load operation is in progress when you select the MENU or BACK bezel key or touchscreen button, you may abort the load operation and negatively affect EFB operation.

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EFB - LOAD MENU

STAGED LOADS Page

The STAGED LOADS page lets you install software from an EFB's staging area into the opposite EU. The STAGED LOADS page is selected from the LOAD MENU page.

NOTE: Software parts will only be available if the EFB system has an internal communication device and/or is connected to an external communication device. Software parts only stage to the LEFT EFB's staging area.

NOTE: Both EFBs should always have the same software part configuration. If you are loading software parts from staging or media, Boeing recommends that you first load software parts to one EFB, then load the other EFB using the CROSSLOAD function.

When you select the STAGED LOADS button of the LEFT EFB, a scrollable list of available software part(s) will show. All software titles show in the left column and part numbers show in the right column. Software is listed in alphanumerical order, based on part number. Use the scroll up and scroll down touchscreen buttons to see the complete list. Select the software part(s) to be loaded.

NOTE: To select individual software part number(s), touch the check box adjacent to the software part number on the touchscreen. The check mark, green in color, shows the part is selected. To select all software part numbers on the EFB, push the SELECT ALL button. To deselect all software on the EFB, select the DESELECT ALL button. If time is short and you have many software part numbers to load, push the SELECT ALL button and then deselect software parts that you do not want to install.

NOTE: Before you select a software part for installation, LOAD to LEFT EFB (and LOAD to RIGHT EFB) are inhibited and is cyan in color. The LOAD to LEFT EFB (and LOAD to RIGHT EFB) buttons become active and change to white in color when you select a minimum of one software part number.

When you have selected the software part(s) to be loaded, select LOAD to LEFT EFB. You should see LOADING TO LEFT EFB on the EFB you are operating. Once the loading is complete, CROSSLOAD the software parts to the RIGHT EFB.

NOTE: If a load operation is in progress you will see a progress indicator (for example, LOADING TO LEFT EFB). If a load operation is in progress when you select the MENU or BACK bezel key or touchscreen button, you may abort the load operation and negatively affect EFB operation.

NOTE: Loading software parts from the staging area does not remove the software part(s) from the staging area. If you want to remove software part(s) from the staging area, you must use the STAGING AREA page which is selectable from the EFB MAINTENANCE menu.

MEDIA LOAD Page

The MEDIA LOAD page lets the user to select, then install software parts from removable external media.

RESTORE OS Function

The RESTORE OS (operating system) function lets the user install a new Windows operating system. The installation source data is kept in a protected memory partition in the EDU.

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EFB - LOAD MENU

The RESTORE OS selection causes an automatic sequence that replaces the Windows OS and OPTADMW. This can take approximately 20 minutes. This process does not erase other software parts present in the EFB.

NOTE: When you select the RESTORE OS button, you will be asked to confirm the restoration. Once you confirm the restoration, you cannot undo the instruction. Once you have confirmed the restoration, the EFB System will install a fresh copy of the WINDOWS OS from an internal repository. The WINDOWS OS in the internal repository is the LSAP with software nomenclature WINDOWS OS displayed on the SYSTEM CONFIG page. Other loaded LSAPs, temporary data and log files will remain intact and be unaffected.

SYSTEM CONFIG Page

The SYSTEM CONFIG page shows the system configuration for all loadable software parts in the EFB.

CONFIG COMPARE Page

It is necessary that the EFB-L and the EFB-R has the same software installed. The CONFIG COMPARE page lets the user see any software mismatch between EFB-L and EFB-R. When you go to this page, it shows the left EFB in one column and the right EFB in one column. If a software part is installed in one EFB but is not installed in the other EFB, the word MISMATCH shows. MISMATCH shows amber in color adjacent to the software part that is not the same for the two EFBs. The software part shows white in color for the EFB that has the software part. LSAP NOT LOADED shows blue in color for the EFB that does not have the software. If there is a software mismatch, it is necessary to install the same software in the other EFB. If there are no mismatches, the CONFIG COMPARE page shows NO MISMATCH FOUND.

TAIL ID ENTRY page

The TAIL ID ENTRY page lets you set the tail ID on the EFB. You get access to the TAIL ID ENTRY page from the LOAD MENU page.

NOTE: It is necessary to set the tail ID on the EFB when you install the EFB on the airplane. It is necessary that the same tail ID is in the left EFB and the right EFB.

The functions you see from the TAIL ID ENTRY page are:

- CURRENT TAIL ID – This field shows the current tail ID stored on the EFB.
- NEW TAIL ID – This field lets the user enter a new tail ID when you use the virtual keyboard that shows on the TAIL ID ENTRY page.
- USE OFFSIDE ID – When the opposite EFB's tail ID is available, you can copy the tail ID from the other EFB when you push this button.
- SAVE TAIL ID – When the NEW TAIL ID field has been filled in, when you push this button, it stores the NEW TAIL ID and makes it the CURRENT TAIL ID.

NOTE: When you select SAVE TAIL ID, the EFB will compare the new tail ID to the opposite EFB's tail ID. If the Tail IDs are not the same, the tail ID you entered will be saved, but you can not leave the TAIL ID ENTRY page.

DELETE LSAP

The DELETE LSAP page lets you delete installed software parts from the EFB. You get access to the DELETE LSAP page from the LOAD MENU page.

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EFB - LOAD MENU

When you push the DELETE LSAP button, a scrollable list of loadable software airplane parts (LSAP's) show. All software titles are in the left column and software part numbers show in the right column. Software shows in alphanumerical order, based on part number. Use the scroll up and scroll down touchscreen buttons to see the complete list.

NOTE: To select individual software part number(s), touch the check box adjacent to the software part number on the touchscreen. The check mark, green in color, shows the part is selected. To select all software part numbers on the EFB, push the SELECT ALL button. To deselect all software on the EFB, select the DESELECT ALL button. If time is short and you have many software part numbers to delete, push the SELECT ALL button and then deselect software parts that you do not want to delete.

NOTE: Before you select a software part to delete, DELETE is inhibited and is cyan in color. The DELETE button becomes active and changes to white in color when you select a minimum of one software part number.

Select the software part(s) to be deleted. When you select DELETE and confirm your action, all highlighted software parts will be erased permanently. Make your selections carefully.

NOTE: Boeing recommends that you use the delete LSAP functions only when you have a maintenance action from your engineering department.

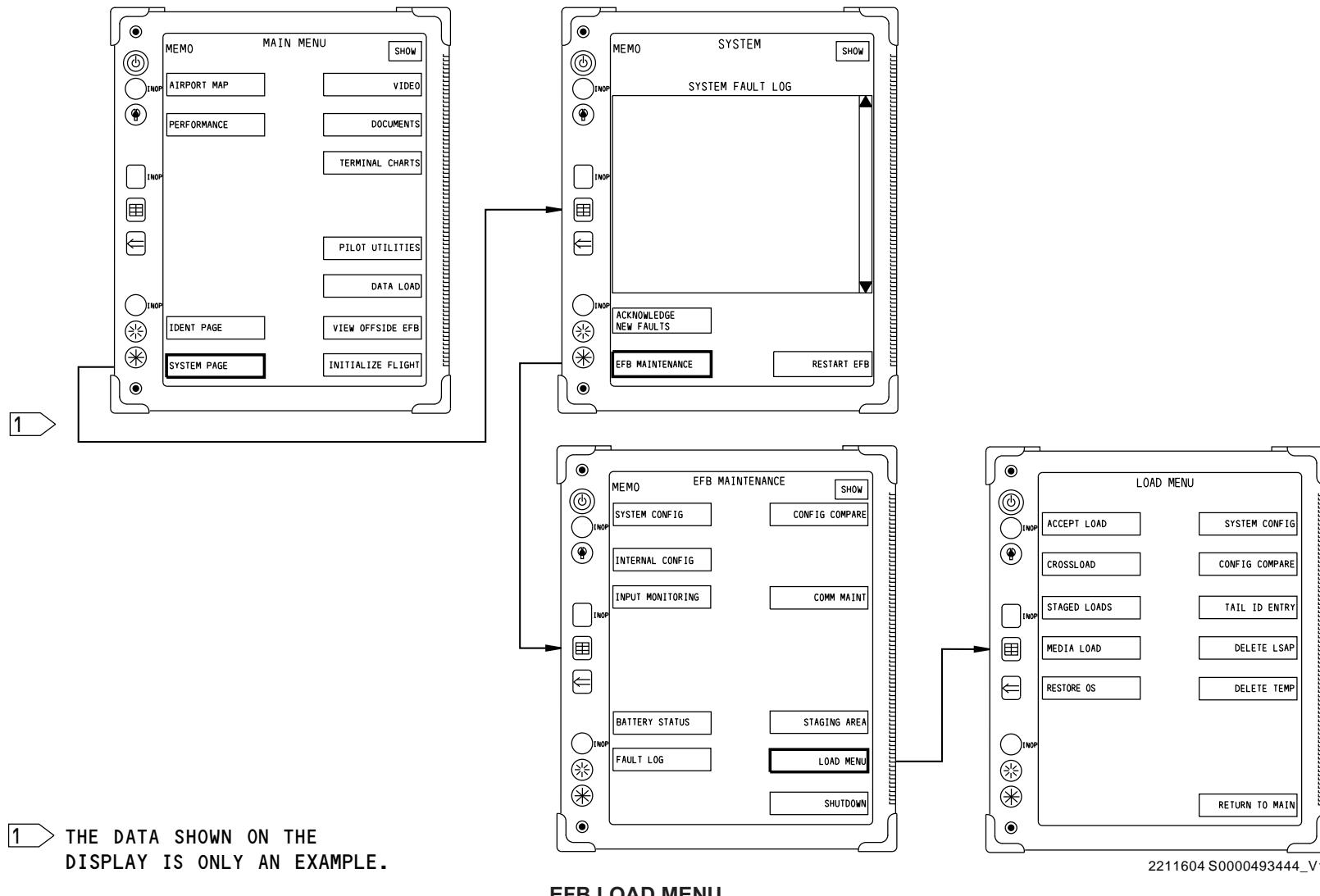
DELETE TEMP

When you select the DELETE TEMP button, you will be asked to confirm the deletion. Once you confirm, all temporary data (for example, PERFORMANCE calculations) and log files will be permanently erased.

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EFB - SOFTWARE PARTS

General

To be serviceable, the EFB system must have a specified minimum group software parts installed, including an OS Loader.

The OS Loader is installed as part of the EFB System Maintenance Practice - Initialization and Recovery. The OS Loader must be installed first in order to install and maintain the EFB system's loadable software airplane parts (LSAP). The OS Loader remains resident on the EFB system, even when the Windows OS LSAP is loaded or restored.

To examine installed software parts, refer to the SYSTEM CONFIG page.

EFB Minimum Software Parts List

The table of parts that follows shows the minimum of loadable software airplane parts that must be installed for the EFB to be serviceable.

Software Nomenclature	Short Part Number (SPN)	Source
46 ADMW AND CL OPS	OPTADMW	Boeing-supplied
46 CORE OSS	BFBEBSC	Boeing-supplied
46 FLEET UMS	[selected by your airline]	Owner-Operator
ADC APPLICATION	BFBADCP	Boeing-supplied
ADC CUSTOMER CONFIG	[selected by your airline]	Owner-Operator
PART 121 WINDOWS	[selected by your airline]	Owner-Operator
WINDOWS OS	CMPAAAA	Boeing-supplied

NOTE: If one or more parts is missing or unserviceable, the EFB will not operate.

Boeing-Supplied Software Parts

For a serviceable EFB system, these Boeing loadable software airplane parts (LSAP) must be installed.

Software Nomenclature	Short Part Number (SPN)
WINDOWS OS	CMPAAAA
46 ADMW AND CL OPS	OPTADMW
46 CORE OSS	BFBEBSC
ADC APPLICATION	BFBADCP

The short part number (SPN) is made using the first 3 characters, and middle 4 characters of the software part number. For example, the ADC Supplier Configuration part has a long part number of: BFBxx-ADCS-xxxx. The short part number shows as BFBADCS.

The EFB SYSTEM CONFIG page shows the software nomenclature, and software part number of each installed LSAP.

Owner or Operator-Supplied Software Parts

User modifiable software (UMS) parts can add functions to the EFB that support airline operations or business purposes. Typically, UMS parts can contain airplane or fleet information, or other configuration data.

For a serviceable EFB system, these user-modifiable software airplane parts must be installed:

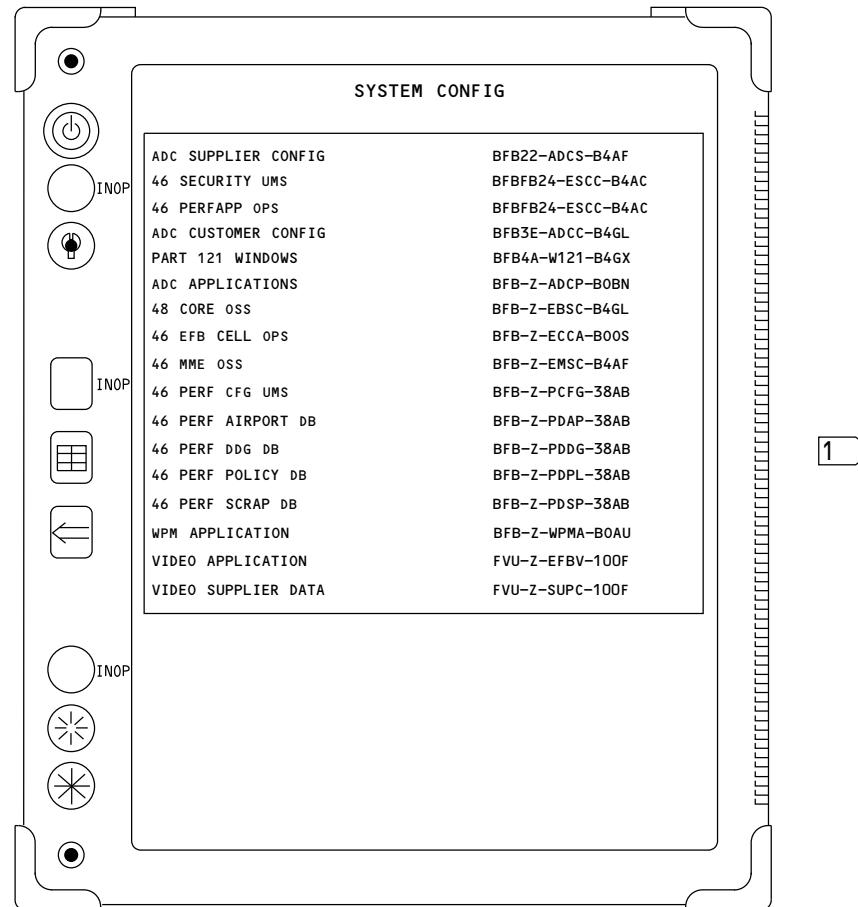
Software Nomenclature	Short Part Number (SPN)
46 FLEET UMS	[selected by your airline]
ADC CUSTOMER CONFIG	[selected by your airline]
PART 121 WINDOWS	[selected by your airline]

The airplane owner or operator can use the common administration tool (CAT), and ePlane CAT application module (CAM) to make user-modifiable LSAP.

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1 THE DATA SHOWN ON THE
DISPLAY IS ONLY AN EXAMPLE.

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EFB SOFTWARE PARTS

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