

FLIGHT STANDARDIZATION BOARD REPORT

Boeing Class 3 Electronic Flight Bag

BLOCKPOINT 4

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Revision Record

Date	Revision	Description	Release Description	Page
May 18, 2009	NEW	Block Point 4	Original release	
April 14, 2011	1	Block Point 4	Report now generic to all Boeing aircraft models Added Graphic Description details Added Electronic Flight Folder application Added extra version of Airport Moving Map application Added caution on use of USB drives Added paragraph on button layout	9 12 13 15 18
November 18, 2011	2	Block Point 4 CMC Block Point 2	Added Table of contents for CMC Class 3 EFB Added Addendum Boeing CMC Class 3 EFB	4 32

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Preamble

Boeing has requested a Flight Standardization Board (FSB) evaluation of the Boeing Class 3 Electronic Flight Bag at revision level of Block Point 4.

The first example of the installation of this EFB was on the Boeing B777-300ER. Initially, the FSB evaluation of the EFB was carried out on the B777. At an early stage, Boeing requested that the EFB be considered as generic equipment and not as an integral part of the B777-300ER, as it was optional equipment. The request was granted and it has been approved for all Boeing models. The Boeing EFB has subsequently been installed on Boeing 737, 747-400, 747-8, 757, 767 and 787 aircraft.

This Flight Standardization Board evaluation has been performed using the following methods:

- Review of a CBT-based EFB Training Programme recommended by Boeing
- Inspection of the EFB and conduct of functional tests

This Report specifies the requirements for training and operational procedures for the Boeing Class 3 Electronic Flight Bag (EFB)

Code of Federal Regulations (CFR) requirements have been considered together with the material in AC120-76A (Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices).

FAA recommends the Boeing proposed training course and operational procedures as specified in this report.

The MMEL for the specific aircraft type or variant in which the EFB is installed is the document recommended for approval by the FAA.

Software evaluated for use with the Boeing Class 3 EFB is contained in “List of Evaluated Loadable Software Parts” appendices of this report.

The Seattle Aircraft Evaluation Group found that the Boeing Class 3 Electronic Flight Bag and the applications evaluated satisfy the requirements of FAA AC 120-76A for approval. This report does not constitute Operations Approval and individual operators will need to obtain approval from their Principal Inspector prior to use of these applications. Approval to use the EFB will be contained in paragraph A061 of the Operations Specifications (OpsSpecs) for part 121, 125 and part 135 operators, in the Letters of Authorization (LOAs) for 125M Letter of Deviation (LODA) holders and in the Management Specifications (MSpecs) for part 91K program managers. Other part 91 operations do not require any other specific authorization for EFB operations unless operating regulations require specific functionally and/or equipage.

Flight Standardization Board Report

1. Purpose and Applicability

1.1 Flight Standardization Board Report Findings and Recommendations

This Flight Standardization Board (FSB) report specifies FAA requirements applicable to operators seeking operational approval to use the Boeing Class 3 Electronic Flight Bag (EFB) under 14 CFR parts 91K, 121, 125 and 135. Findings and recommendations made in this report are consistent with the guidance contained in AC120-76A and assume that appropriate airworthiness certification for installation and operation of the EFB has been accomplished. The following information related to operational approval is included:

- A general description of the EFB system considered by this Report
- List of software applications currently available and considered by this Report
- Operations Manual procedures for EFB use during all phases of flight
- A revision process and method that ensures appropriate database accuracy and currency
- Acceptable training syllabi and courseware
- Checking and currency standards including specification of those checks that must be administered by the operator
- The role of the EFB Administrator
- Configuration of an aircraft performance application
- List of documents to meet the recommendations of AC120-76A for operational approval (Appendix 1)
- Acceptable Initial EFB Training (Appendix 2)

1.2 Flight Standardization Board Report Contents

This report includes:

- Minimum requirements which should be applied by FSDOs, and
- Information which is advisory in general, but is mandatory for particular operators if the designated configurations apply and if approved for that operator.

Various sections within the report are qualified as to whether compliance is required, considering the provisions of 14 CFR parts 91K, 121, 125 and 135 or whether it is advisory in nature.

Provisions of this report are effective until amended, superseded, or withdrawn by subsequent Flight Standardization Board determinations.

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2. General Description Of the Boeing EFB System

2.1 System Overview

The Boeing Class 3 Electronic Flight Bag (EFB) is intended for installation on Boeing 737/747/757/767/777 and 787 aircraft.

The EFB system provides the Flight Crew with display and user-interface devices with which to access the functional capabilities of the EFB System.

The system configuration described in this document is intended to be generic, meaning that it does not describe a configuration unique to any specific customer or aircraft model. Where appropriate, configuration items for a particular aircraft model, such as the 777 aircraft, are noted.

The Global Positioning, Flight Management, Air Data and Inertial Reference Functions provide the basic inputs required by the EFB system. The following interfaces may be basic or optional depending on the aircraft model: a flight deck printer, ACARS data link, Flight Deck Entry Video Surveillance System (FDEVSS) system, Satcom, Terminal Wireless LAN Unit (TWLU), and an on-board network server. When installed on 777 and 787 aircraft, the EFB system also interfaces with the Cursor Control Devices (CCDs).

Functionality of an installed Flight Deck Printer is dependent on the type of printer installed. An ARINC 740 (narrow) printer or an ARINC 744 (wide) printer is able to print text only. An ARINC 744A (wide) printer is able to print both text and graphics. A printer may be connected directly to both EFBs via a 429 connection and to the right EFB via an Ethernet connection. If an on-board network server is installed, the printer's Ethernet connection is to the on-board network server.

An on-board network server is a key component to the e-Enabling System. The on-board network server (if installed) is intended to reside on Boeing 737/747/757/767/777 and 787 airplanes and will be installed in an EE bay location. It is part of a system architecture designed to expand the network connectivity of the EFB system and provide airlines with a platform to host software applications with airborne components. Airborne components of aircraft applications can reside on either the EFB or the on-board network server. Their ground peers can reside on BEGSS, in the airline's back office, or on MyBoeingFleet.

The Boeing ePlane Ground Support System (BEGSS) is a ground communications system, hosted at the airline, to enable all EFB communications modes. BEGSS supports airline management of fleet communication over the wide variety of networks utilized. BEGSS secures messaging, data transfer, and staging of loadable software parts over shared and open Internet Protocol (IP) networks. It also provides ACARS messaging capability. It offers an interface to other airline systems and applications that communicate directly with EFB-provisioned aircraft.

The system is comprised of several devices located in both the Flight Deck and in the Electronic Equipment (EE) bay. Crew interface devices consist of the following components:

- Two Display Units (DU)
- Two External Keyboard Ports
- One Data Load Port

The DUs are installed in the Flight Deck sidewalls forward of each pilot. The keyboard and data load ports are installed in the Flight Deck. A typical location of these ports is shown in Figure 2-1.

Each DU interfaces with one of the dedicated EUs located in the Electronic Equipment (EE) Bay.

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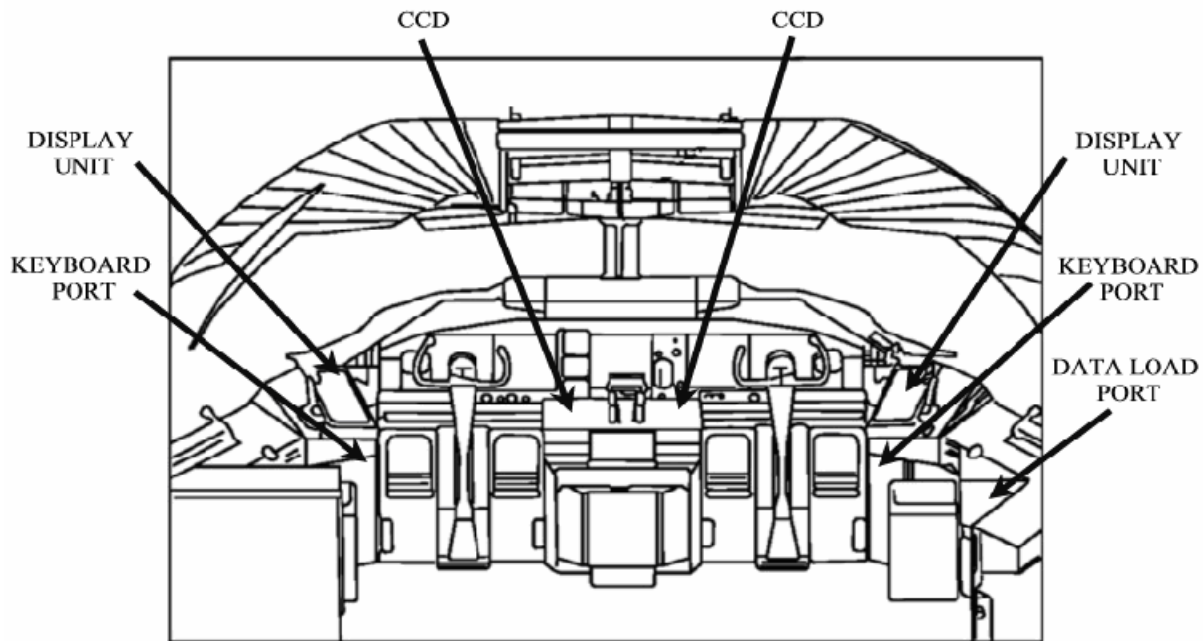


Figure 2-1 EFB 777 Crew Compartment Interface

2.2 Operational Overview

The EFB system is designed for use throughout all phases of aircraft operation. Its open architecture allows airlines to select from (or develop) and install applications that meet their needs. While the EFB is designed to replace many of the paper materials used aboard the aircraft, the EFB may also be used in conjunction with existing paper products.

The introduction and use of EFB Operationally Approved Software in the flight deck for 91K, 121, 125, and 135 operations requires operational approval as described in AC 120-76A. The intended function of the EFB system in meeting these operational requirements is the responsibility of the operator.

Operators are responsible to update their Minimum Equipment Lists (MEL) to reflect the installation of this equipment. Changes made to the operator's MEL must be made in accordance with the approved Master Minimum Equipment List (MMEL) or as agreed with the airlines Operations Inspector. The dispatch requirements of the EFB are evaluated by the Flight Operations Evaluation Board (FOEB).

2.3 Display and Controls

Interaction with the EFB display applications can occur through the display bezel keys, (external) cursor control device, integral touch screen panel installed as part of the EFB DU LCD glass assembly, and an optional external QWERTY keyboard. These controls are identical for each pilot and both pilots have equal access to any of these controls at their option.

2.3.1 Display Unit Bezel Keys

Each EFB Display Unit (DU) consists of an active matrix LCD surrounded by a bezel as illustrated in Figure 2-2. The bezel consists of pushbutton dedicated function keys, pushbutton line select keys, a rocker switch to control display brightness, a power switch to turn display backlighting on/off and a bezel

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light sensor for automatic control of display brightness. Depending on the aircraft model, DU brightness may also be controlled by a master brightness control

Twelve pushbutton dedicated function keys, located across the top and bottom of the EFB bezel, are described in Table 2-1. Not all keys are active for each application. Sixteen side-mounted line-select keys (LSK), located along the left and right sides of the EFB bezel (eight on each side) activate the displays or functions described by the labels on their corresponding soft (programmable) menu buttons, which are centrally aligned adjacent to each key.

As shown in Figure 2-2, each EFB is equipped with an individual display brightness control rocker switch, mounted on the upper left corner of the bezel, to provide for manual adjustment of the DU brightness. Pressing on the bottom portion of the rocker decreases the brightness, while pressing on the top portion of the rocker increases the brightness.

A (bezel) light sensor mounted in the lower left hand corner of the bezel provides automatic brightness control for the EFB display. The EFB automatic brightness control function controls display luminance as a function of inputs from these four sources: DU brightness control manual input, the bezel light sensor, master brightness control inputs, and remote light sensor input.

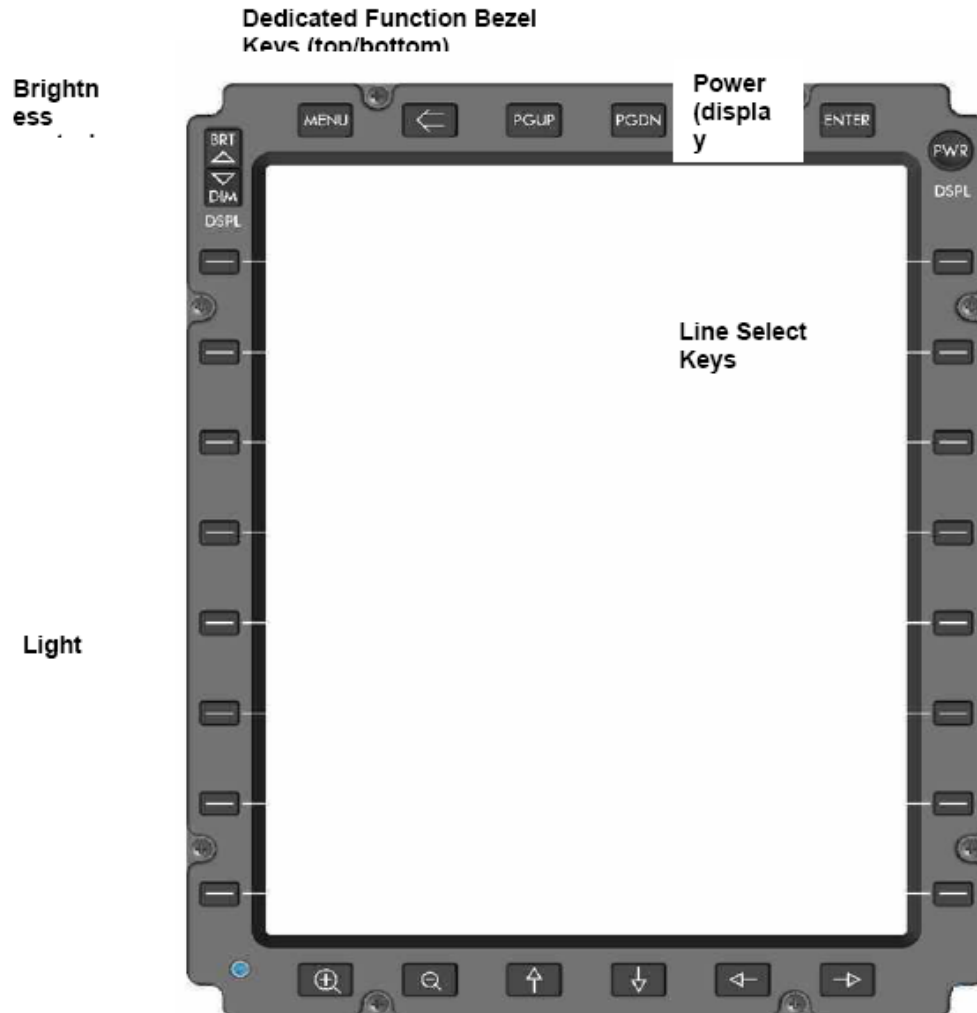





Figure 2-2 EFB Display Unit

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The PWR button controls the display back light only. Pressing the PWR button once turns the display backlight off but the system remains active. Pressing the PWR button a second time instantaneously turn the display backlight back on, restoring the last setting set by the pilot using the BRT/DIM switch to control the backlight intensity.

Table 2-1 EFB Display Unit Bezel Key Descriptions

Key	Function
MENU	Immediately displays the top-level EFB Application Manager Main Menu on demand and overrides all other operations in flight mode only. (that is, when <i>not</i> in ground maintenance mode).
 (Back)	Each actuation returns user to the previous navigation level <i>within</i> the active application, but does not navigate from the application back to the Main Menu. At the highest navigation level in the active application, the key is non-functional.
PGUP	Displays the next page for those displays that exceed one display page in length. PGUP displays the next complete page, so that no lines or text from the previous page are displayed.
PGDN	Displays the previous page for those displays that exceed one display page in length when the display is at page 2 or higher. PGDN displays the previous complete page, so that no lines or text from the previous page are displayed.
XFR	The first actuation of the XFR key slaves the screen to the (video) image of the off-side EFB display. No manipulation of the XFR displayed image is possible (from the side requesting XFR). The second actuation of the XFR key returns the user to his/her own on-side display and all its functions. When in XFR mode, only the MENU and XFR keys are active. Pressing the MENU key performs its normal function and cancels the XFR function.
ENTER	Executes the function of the current focus item.
 (Zoom In)	Enlarges the display image through x levels of zoom. The center of the display remains centered. Default levels of zoom and the initialization default zoom level are application dependent.
 (Zoom Out)	Decreases the display image through x levels of zoom. The center of the display remains centered. Default levels of zoom and the initialization default zoom level are application dependent.
Up Arrow	Within a format or a list, moves the focus point up. (If a list extends beyond the upper edge of the screen, the list scrolls down so that the focus point just remains on the screen). Also used to pan graphic presentations, such as airport maps or terminal area charts.
Down Arrow	Within a format or list, moves the focus point down. (If a list extends beyond the lower edge of the screen, the list scrolls up so that the focus point just remains on the screen). Functions as a tab when selection lists are oriented horizontally. Also used to pan graphic presentations,

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Key	Function
	such as airport maps or terminal area charts.
Left Arrow	Within a format or horizontally-oriented set of selections, moves the focus point to the left. Also used to pan graphic presentations, such as airport maps or terminal area charts.
Right Arrow	Within a format or horizontally-oriented set of selections, moves the focus point to the right. When selection lists are oriented vertically, this key functions as a tab. Also used to pan graphic presentations, such as airport maps or terminal area charts.

2.3.2 Cursor Control Device (CCD) / Touchscreen

Interaction with and selection of various functions within EFB display applications may also occur through the use of an existing external (777) Cursor Control Device (CCD) and the integral touchscreen overlay on the displays. On the CCD, selection of the various functions on an EFB display is via the selection switch. On the touchscreen, finger contact with the screen highlights the desired function and releasing contact with the screen selects the function. The SIDE display selection switch (see Figure 2-3) activates the CCD to the onside pilot EFB display unit.

To be consistent with other aircraft system displays, the following techniques are not used with the CCD: press and move (drag function), double-click, multi-click, double-press, and multi-press. The DU integrated touch screen, however, allows the use of a drag function when interacting with displayed scroll bars and for drag-panning graphical presentations (such as the static map in the Airport Moving Map application).

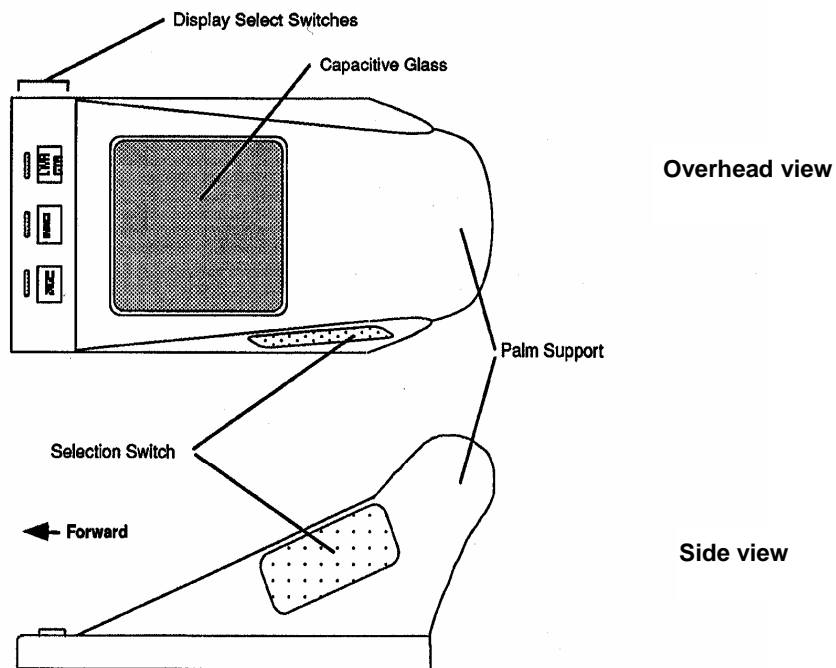


Figure 2-3 777 Cursor Control Device

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2.3.3 Keyboard Interface

Optional QWERTY keyboard(s) can be connected via an aircraft (ship-side) connector port, located below each pilot's Display Unit (on the sidewall adjacent to the hand-mike ports). These external keyboards utilize a standard aircraft connector instead of the more typical PS2 keyboard connector.

External QWERTY keyboard interaction with the display may be useful for applications that require input comprised of long text strings whose length makes use of the integrated virtual keyboard impractical or time-consuming. An external keyboard also provides the capability to navigate through text blocks using the arrow and PgUp / PgDn keys, which are absent on the virtual keyboard. The external QWERTY keyboard Backspace key has the same function as the CLR key on the virtual keyboard, which is modelled after the CDU. External keyboard function keys (e.g., F1, F2, etc.) are inactive when connected to the EFB.

2.3.4 Display Header

The top 0.5 inch of the EFB screen is controlled and managed by the Application Manager. This area is reserved for the display header and EFB-related fault alerting (FAULT, MEMO AND MSG (Message)). A fourth flag (XFR) indicates when the display is slaved to the off-side EFB. The header is illustrated in Figure 2-4.



Figure 2-4 EFB Display Header

Note that the Screen Title may occupy two lines. Two line titles display the name of the application on the top line and the name of the current (in focus) screen on the second line.

When the system displays a FAULT, MEMO, and/or MSG flag in the header, the user can return to the MAIN MENU page to determine which application generated the fault, as illustrated in Figure 2-5, and to access the System page for additional information.

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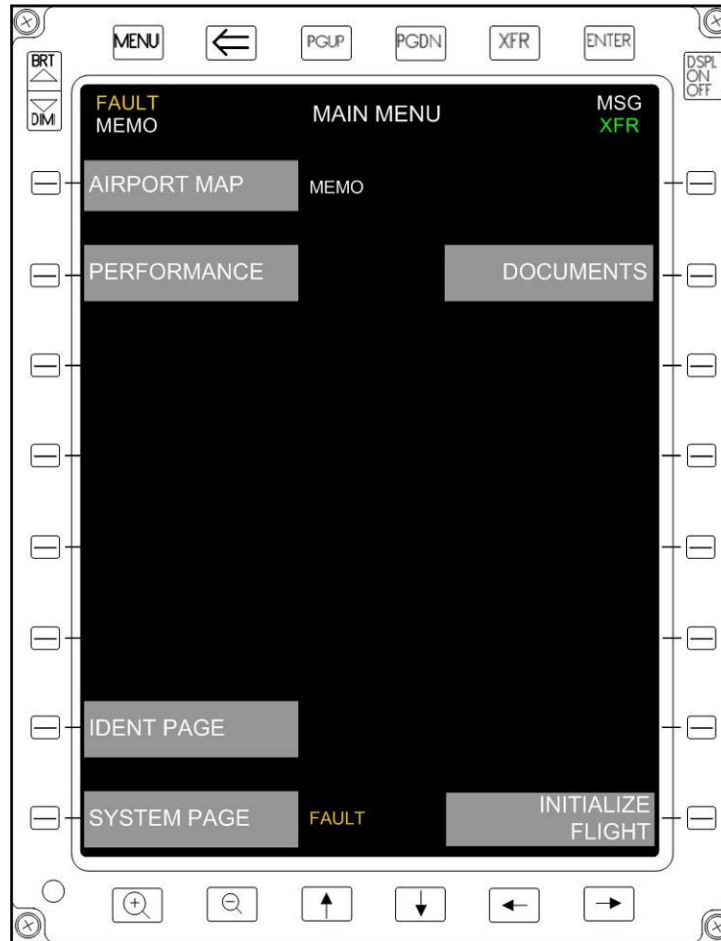


Figure 2-5 MAIN MENU page

The display header uses the graphical conventions described in Table 2-2.

Table 2-2 EFB Display Header Graphical Conventions

Type	Color	Meaning
FAULT	amber	Indicates a fault identified within an application or the system.
MEMO	white	Indicates that one or more applications need attention.
MSG	white	Communication message – indicates one or more applications have an uplink available for crew review. Used only if the EFB system is connected to an external communications device.
XFR	green	Indicates the display is in transfer mode to view the content of the other EFB display. While in this mode, the display cannot be manipulated. Pressing the display bezel XFR key again removes the EFB from transfer mode.

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2.3.5 Menu / Command / Keyboard Buttons

Display applications within the EFB contain menu, command, and/or keyboard buttons that are activated via bezel line select keys (LSK), CCD, and/or touch screen. Selection via bezel line select keys requires that the button be centrally aligned and located adjacent to the line select key.

The graphic conventions for Command and Menu buttons are defined consistently across all applications to indicate their states.

Table 2-3 Graphical Conventions for EFB Display Application States

State	Color Key	Functionality
Active	White text on a gray field	Available to respond to the focus and to selected states. When these areas appear shaded, they provide visual indicators of functions that are selectable using the cursor control device, a line select key (LSK), the touch screen, or keyboard. Shading allows the user to quickly see the actions that are available on each screen.
In focus	White border Magenta border (B787)	Border color changes to provide user feedback when the cursor (or user's finger) is within the active area for selection of the control. Supports user selection of the intended function when multiple active areas are immediately adjacent to each other. Controls remain in the in-focus state until another control is selected, so that users can easily see their navigation path.
Selected	Green field (retains white border)	Indicates that the control/button is selected and is initiating its function. Selection can occur via CCD button press, finger-off touch screen, LSK push button, or on external keyboards, Enter.
Inhibited	Cyan text and border on a black field	Indicates that a normally active control is unavailable for selection. This state occurs when the function associated with the control is temporarily unavailable, such as a print control that is unavailable due to a printer malfunction.
Data Source	Green border	Data appropriate to that button has been pulled from aircraft data busses.

2.4 EFB System Configuration

The configuration of the EFB installation for a particular model aircraft is described in Chapter 46 of the appropriate Aircraft Maintenance Manual.

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3. Software Applications Considered Under This Report

3.1 Flight Standardization Board evaluation

The FSB evaluation considered the following:

Type A applications:

- Electronic Document Browser

Type B applications:

- On-Board Performance Tool (Takeoff & Landing performance; Weight & Balance)
- Terminal Charts
- Electronic Log Book
- Flight Deck Entry Video System
- Electronic Flight Folder

Type C applications:

- Airport Moving Map (Taxi Moving Map Display)

3.2 Application Summaries

A summary of each application evaluated is below.

3.2.1 Electronic Document Browser

The EFB Document Browser (EDB) application enables flight crew to view and search documents in a variety of electronic formats. EDB currently supports PDF, HTML and XML formats.

Documents intended for viewing on the EDB are uploaded through a Web-based EDB Administration tool, which manages configuration settings and effectivity dates and groups documents into EDB libraries. The Administration tool then prepares the libraries for uploading to the aircraft and to a ground viewer application.

Once documents are loaded on the aircraft EFB or ground viewer, users have access to a variety of search and linking tools that provide easy navigation through the flight library. Text and graphics zoom capability and day/night display modes provide readability in a variety of conditions and by individuals with various visual acuities.

Airlines are responsible for the content of each document. Boeing provides information on how to prepare documents for seamless operation in each supported format.

With the presence of the optional Graphics Flight Deck Printer, text and graphics in EDB documents may be printed. With the presence of the optional text-only Flight Deck Printer, only text in EDB documents may be printed.

3.2.2 On-Board Performance Tool

With operational approval, the EFB Performance Tool can be used as the primary means of determining runway-specific takeoff and landing performance, and for determining weight and balance information. The Takeoff Performance feature is active in the default configuration; however, the Landing Performance

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feature and the Weight and Balance feature are options that must be placed in active service by the airline. For example, an airline may decide to only use the Takeoff Performance feature. The configuration and policies governing use of the Performance Tool should be set by the airline Flight Operations department under the guidance of a qualified performance engineer.

For takeoff, the airline can decide if one or both EFBs will be used to calculate performance. When takeoff data is calculated independently on both EFBs, calculation differences may occur due to inconsistent input between the two sides. In this scenario, the crew should always compare values and resolve any differences or inconsistencies before using the data. The airline must establish a policy for resolving any conflict or uncertainty in the validity of EFB data. If the takeoff data is calculated by one EFB only, then the crew can use the transfer button on the other DU to view and cross-check the data.

The Landing tool can be used to determine landing performance at the destination airport before departure. Landing calculations can also be made in flight (prior to the approach phase) to account for any changes at the destination or for failed equipment that may occur while en route. To minimize workload and crew distraction, it is viable to re-calculate landing distance data only when a significant change in landing conditions occurs.

Weight and Balance calculations allow the crew to determine aircraft center of gravity (CG) position. Proper loading data (such as passengers, baggage, cargo, and fuel) input is required for the performance tool to produce accurate CG values for the FMC.

3.2.3 Terminal Charts

The Terminal Charts application displays Terminal Area procedural charts and chart Change Notices to the pilot. The charts are pre-composed digitally to replicate paper Terminal Area charts. The Terminal Charts button on the EFB MAIN MENU page leads to the display of the Terminal Charts application. ORIGINATION and DESTINATION data are pre-populated within the application after a FLIGHT INIT event. Upon initial selection of the application after a FLIGHT INIT, the ROUTE SETUP screen is displayed. The pilot can check the ORIG and DEST information in the ROUTE SETUP page as well as enter up to four (4) ALTERNATE airports. The pilot can also SEARCH for an airport in the Term Charts database following the entry of any search string.

The main Terminal Charts page is the CHART CLIP page. The CHART CLIP page borrows from the familiar pilot chart clip metaphor to display pilot selected chart clips for Origin, Destination, and all Alternate airports. For each airport, the main airport chart (10-9, 10-8, etc.) and chart Change Notices for the airport are pre-selected into the chart clip. The pilot can add or remove individual charts to or from the chart clip through the EDIT CHART CLIP function. The EDIT CHART CLIP function also allows pilots to PREVIEW individual chart content for inclusion into the chart clip. In the EDIT CHART CLIP mode, charts are organized by Chart Index number and all chart procedures are clearly listed on PROCEDURE ID menu buttons. Charts can also be filtered according to chart type (AIRPORT, INFORMATION, APPROACHES, DEPARTURES, ARRIVALS). When the optional Flight Deck Graphics Printer is installed, charts in the CHART CLIP may be printed.

After the pilot populates his or her CHART CLIP with selected charts, the charts can be viewed at any time by selecting the appropriate PROCEDURE ID menu buttons. Once displayed, the zoom feature allows zoom -in or zoom-out, panning using either arrow bezel keys or touch screen or rotated on the EFB DU. The charts can be viewed in order using the PGUP and PGDN bezel keys. Charts are automatically ordered according to phase of flight.

From the CHART CLIP page, the pilot also has access to an AIRPORT SEARCH page as well as a CHART UTILITIES function that provides NEAREST AIRPORT information based on GPS position data, as well as a CHART CLIP sharing function that allows one pilot to select the manually composed CHART CLIP data for Origin, Destination and alternate airports from the offside EFB. For instance, the First Officer can manually pre-populate chart clips for the to-be-briefed airports and the Captain can then

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review the First Officer's chart clips and automatically populate the chart clips on his own EFB based on the First Officer's chart selection. If Terminal Charts are installed on the EFB, the application can make airport diagram data (airport 10-9 or equivalent) available with a single button press from the Airport Map application.

3.2.4 Electronic Log Book

The Electronic Logbook (ELB) system replaces a variety of current paper logbooks by providing the logbook user community a variety of interfaces for accessing and manipulating logbook data. Data entered at any point within the ELB system will automatically be sent to other points to ensure users are accessing near real-time information. The user community served by the ELB system includes flight crew, cabin crew, line maintenance, maintenance control, dispatch, and other back-office personnel.

ELB uses an onboard logbook database that is synchronized with an ELB Fleet database containing data for multiple tail numbers. The Fleet database is hosted as part of the MyBoeingFleet.com service which provides wide access from across the airline enterprise and provides key links to complementary maintenance services such as Aircraft Health Management (AHM) and associated maintenance documentation.

The ELB workflow is based on the activities surrounding flight operations recordkeeping, aircraft discrepancy reporting, corrective maintenance actions, and other maintenance activity. The workflow covers various logbook user communities and their inputs to the logbook dataset. It also shows certain data types that initiate a chain of events and/or logbook data creation. The workflow in all cases ultimately leads up to a set of maintenance actions, which are followed by the maintenance release of the aircraft.

The EFB Logbook application is intended for use by flight crew and as a backup for data entry by maintenance. It provides the primary functions of flight log data entry, technical logbook defect entry, and review of logbook history.

An EFB Logbook home page will summarize for the flight crew the state of the logbook, including current flight information. Current flight data will be maintained by the ELB application, with flight crew creation capability.

A history page will provide a running record of entries made into the logbook database. The list of historical items can be sorted, filtered & searched based on user inputs.

A graphical fault finder will be provided as means to locate and report flight crew observed faults. A fault database search & filter function will be provided to allow flight crew a text based search capability to complement the primary graphical search. A preset fault database filter to view only EICAS messages will be provided. Fault data located through the use of fault finders will be inserted into the ELB standard fault reporting form where additional fault data (phase of flight, various fault attributes, flight crew comments) can be added.

3.2.5 Flight Deck Entry Video System

The flight deck door is closed and locked during preflight preparations and remains locked until post flight (the aircraft has been shutdown and is secured at the gate). The video display is used to verify the identity of persons requesting flight deck access while the flight deck door is locked.

3.2.6 Electronic Flight Folder

The Electronic Flight Folder (EFF) application is developed in order to replace today's day-of-flight paper briefing processes; to reduce pilot workloads; and to provide efficiencies in the data delivery, pilot workflow, flight progress monitoring and logging, air-ground communications, and record keeping. EFF

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guides the Flight Crew through the whole mission, from briefing to post-flight. EFF is a Type B application, as defined in FAA AC 120-76A.

EFF runs as a hosted version on the EFB, and a ground version. There is also a Boeing ePlane Ground Support System (BEGSS) hosted EFF application, to manage the interface between the operator's back office systems and the pilots' application. EFF provides information to the pilot in the form of flight folders that can contain the following topics: the Flight Plan, Weather information, NOTAM information, Loadsheets information, and NOTOC.

3.2.7 Airport Moving Map

There are two versions of the Airport Moving Map application. Both versions are certified.

One version operates on the certified partition of the EFB. The other operates on the Operationally Approved Software (OAS) Partition and is certified as an incomplete system under TSO-C165 using the provisions of AC 20-159. Both versions of the application are functionally equivalent.

Only one version of this application will be installed on a single aircraft. The version installed can be identified from the List of Evaluated Loadable Software Parts appendices attached to this report.

3.2.8 Airport Map Intended Use

Crews must use existing normal taxi procedures and visual observation of external references as the primary means of taxi navigation. The Airport Map is intended as a supplemental flight crew aid to provide increased positional awareness to support taxi planning and assist in monitoring taxi progress and orientation. This capability must incorporate, or be supplemented by, applicable operational information from electronic or paper airport diagrams and any applicable NOTAM's. Reference to an airport diagram and NOTAM's provides the pilot with information (e.g., radio frequency change points, taxiway weight restrictions) relevant to own-ship operation on the airport movement areas.

Runway, Taxiway, Ramp, Concourse and Gate identifiers on the airport map aid the flight crew to do either of the following:

- Cross check the ATC-cleared taxi route using external visual references.
- Ascertain an appropriate taxi route to the runway, ramp, or the terminal, in the absence of specific taxi instructions.

The Airport Moving Map function is **not** intended to replace outside visual references, the required paper or digital airport diagrams (10-9's etc), or provide taxi navigation guidance. Specifically, the AMM capability is *not* intended to enable:

- A pilot to establish the own-ship position or orientation on the airport solely by reference to the airport map,
- Taxi operations without adequate external visual references (poor weather or low visibility)
- Taxi operations below normal approved weather minima.
- Initiation or termination of a turn or stop by reference to the depicted own-ship position on the airport map.

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3.2.9 On-Ground

Crews must use normal taxi procedures and use direct visual observation out the cockpit window as the primary taxi navigation reference for planning and initiating turns and required stops and so on. During Airport Map display use, the flight crew are expected to detect any significant difference in displayed and actual own-ship position by cross-checking displayed position with outside visual references, such as signage and geometry. The Airport Map display enhances own-ship position awareness and can be used by the crew to:

- Aid taxi planning per the ATC assigned route
- Monitor taxi progress and direction
- Cross-check present position, upcoming turns and required stops (pilot not taxiing)

3.2.10 In-Flight

The pilot briefing the approach and landing should review the airport diagrams (e.g., 10-8, 10-9) and then display the Airport Map as a visual aid to discuss runway exit planning, runway length, width, the probable taxi route, restrictions, and NOTAMs. The other pilot may also display the Airport Map during the briefing, as required, to gain a mutual understanding of the plan.

4. Operations Manual Procedures for Use of EFB

4.1 Normal Procedures

Depending on the software applications installed, the use of this Class 3 EFB is likely to result in normal EFB operating procedures being integrated into standard aircraft operating procedures (SOPs). Normal EFB operating procedures for each software application installed should therefore be described in the applicable aircraft Operations Manual.

Normal EFB operating procedures should contain guidance on the intended use of each software application together with limitations and prohibitions on their use.

Where software applications that impact safety-critical areas of operation such as aircraft performance and terminal charts are installed, normal EFB procedures should address the need for careful confirmation of its applicability and the cross-checking by both pilots of the data being used.

The Operations Manual should establish precedence where alternative sources of information are available from other aircraft systems (e.g. performance data from the FMC).

4.2 Non-Normal and Emergency Procedures

There are no non-normal or emergency procedures arising from EFB malfunction.

4.3 Alternate Procedures (MEL)

Where alternate procedures (O) are required by the MEL for dispatch with EFB partially or completely inoperative, such procedures must be established in advance and described in either the MMEL or the operator's MEL.

Where an aircraft performance application is installed, any alternate procedure must establish an equivalent level of safety for the cross-checking of data input and output.

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Where a terminal charts application is installed, an alternate procedure must ensure that each pilot, whilst seated at his station, retains independent and direct access to charts for the departure, destination and destination alternate airfields.

4.4 Suitable EFB Procedures

The Jeppesen Electronic Flight Bag Pilot User's Guide has been evaluated by the FAA and found to be suitable to form the basis of a technical description of the device, initial pilot training and for the establishment of operational procedures for EFB use.

5. EFB Data Revision Process

An acceptable data revision process is to use the Data Distribution and Management system established by Boeing and Jeppesen. Data will be loaded to the EFB via an ARINC 615 data loader, an approved maintenance laptop or via a Terminal Wireless LAN Unit using procedures included in the Aircraft Maintenance Manual.

Where physical media is used to load software parts on a data loader, especially if widely known types of physical media are used (such as USB drives), then the operator should use technologies and/or procedures to assure that unauthorized content cannot enter the EFB system through these media.

The currency of the EFB database is required to be checked by the flight crew during pre-flight checks.

6. Specifications for Training

6.1 General

6.1.1 Assumptions Regarding Flight Crew Previous Experience

Training for the use of the EFB is not intended to provide basic competence in areas such as aircraft performance etc. The provisions of Section 6 of this Report, therefore, apply to training programs for flight crew who have experience on multi-engine turbojet/turboprop operated aircraft under FAR121 or similar and who may be expected to have basic competence in the functions addressed by the software applications installed. For flight crew not having this experience, additional requirements may be appropriate as determined by the operator's POI.

6.1.2 Programs Crediting Previous EFB Experience

Training programs for the EFB may take credit for previous EFB experience. For example, previous experience of an aircraft performance application hosted on a Class 1 or Class 2 EFB and using similar software may be credited toward training on this Class 3 EFB. POIs may approve programs for operators initially introducing a new EFB system where such programs are consistent with programs previously approved. The Seattle AEG should be consulted for information regarding previously approved programs or programs crediting previous EFB experience.

6.1.3 EFB Training Integration

Training required for the grant of an aircraft type rating does not recognise variants within the type nor the installation of particular equipment. Any training for the grant of a B777 type qualification need not, therefore, recognize the installation of the EFB. However, where training for the issue of the type rating is combined with the operator's conversion course, the training syllabus should recognise the installation of the EFB.

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The EFB is considered to be similar to the Electronic Checklist as installed on the B777. Neither device is essential to the operation of the aircraft and the aircraft may be dispatched with either device inoperative. However, any training or checking conducted without the device installed could not be seen as representative, given the level of integration of the use of each with SOPs. The only difference between the two devices is that the EFB is optional equipment.

6.2 Initial EFB Training

6.2.1 General

Initial EFB training should be accomplished as specified by this FSB Report at Appendix B. Initial EFB Training may consist of both ground-based and in-flight training. An operator may use many methods for ground-based EFB training including classroom instruction, pictures, videotape, ground training devices, computer-based instruction, and static aircraft training. Ground-based training for EFB use lends itself particularly to CBT-based instruction. In-flight EFB training should be conducted by a suitably qualified person during line flying under supervision or during a pilot's Initial Operating Experience flying.

6.2.2 Areas of Emphasis

- The intended use of each software application together with limitations and prohibitions on their use must be emphasised.
- The need to avoid fixation on the Airport Moving Map display during taxi operations must be emphasised during both CBT and simulator training (if applicable), and during line flying under supervision.
- If an aircraft performance application is installed, proper cross-checking of data input and output must be emphasised.
- If a terminal chart application is installed, proper verification of the applicability of the information being used must be emphasised.
- Failure of component(s) of the EFB should be addressed

6.2.3 Suitable Ground-Based Initial EFB Training

Jeppesen CBT-based training has been evaluated by the FAA and found to be suitable for ground-based Initial EFB Training.

6.3 Conversion Training

Initial EFB training is required when Conversion Training is being carried out and EFB is installed on the type or variant for which training is being conducted.

6.4 Differences and Familiarization Training

Initial EFB training is required when EFB installation requires Differences or Familiarization Training to be carried out.

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6.5 Recurrent Training

Recurrent training is not normally required for EFB operation provided the functions are used regularly in line operations. Operators are encouraged, however, to include EFB as a component of recurrent training to the extent practical.

In the case of Mixed Fleet Flying or where the EFB is not installed across the fleet POIs should consider additional recurrent training requirements.

6.6 Simulator Requirements

Where EFB use is an integral part of standard operating procedures, POIs must consider the suitability of the simulator when granting an operator approval.

7. Specifications for Checking

7.1 General

Appropriate knowledge of EFB and competence in its use should be checked following any EFB training.

7.1.1 Areas of Emphasis

The following should be addressed during checks as appropriate:

- Proficiency in the use of each EFB application installed should be demonstrated
- Proper outside visual scan without prolonged fixation on EFB operation should be demonstrated
- Proper selection and use of EFB displays should be demonstrated, particularly during taxi operations
- Where an aircraft performance application is installed, proper cross-checking of data input and output should be demonstrated
- Where a terminal chart application is installed, a proper use of the chart clip function should be demonstrated
- Failure of component(s) of the EFB should be addressed

7.2 Check Following Ground-Based Initial EFB Training

The check conducted following the ground-based element of Initial EFB Training may be accomplished as an automated component of EFB computer-based training.

7.3 Proficiency Check

Following initial, transition, upgrade, recurrent or differences training and where EFB use is an integral part of standard operating procedures for the type or variant, proficiency in the use of the EFB should be assessed in the appropriate areas.

7.4 Operator Proficiency Check

Pertinent regulations require that flight crew demonstrate their competence in carrying out normal procedures during the Operator Proficiency Check. Therefore, where EFB use is an integral part of standard operating procedures, proficiency in the use of the EFB should be assessed.

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7.5 Line Check

Pertinent regulations require that flight crew demonstrate their competence in carrying out normal procedures during the Line Check. Therefore, where EFB use is an integral part of standard operating procedures, proficiency in the use of the EFB should be assessed.

7.5.1 Simulator Requirements

Where EFB use is an integral part of standard operating procedures, FSDOs must consider the suitability of the simulator when granting an operator approval.

8. Specifications for Currency

If EFB use is included in recurrent training and recurrent Line Checks, no unique currency provisions apply to the EFB.

9. Specifications for Training Devices and Simulators

(reserved)

10. Application of Flight Standardization Board Report

Relevant parts of this report are effective when the report is approved by FAA.

11. Alternate Means of Compliance

Alternate means of compliance to the provisions of this Report must be approved by the AEG and the operator's FSDO. If alternate compliance is sought, operators will be required to establish that any proposed alternate means provides an equivalent level of safety to the provisions of AC120-76A and this FSB Report. Analysis, demonstrations, proof of concept testing, differences documentation or other evidence may be required.

12. Miscellaneous

12.1 The Role of the Administrator

The operator should appoint a person or persons to the role of EFB Administrator. The EFB Administrator is responsible for hardware and software configuration management and for ensuring, in particular that no unauthorised software is installed. The EFB Administrator is also responsible for ensuring that only a valid version of the application software and current data packages are installed on the EFB system.

The EFB Administrator should have received detailed training in both the ground systems hardware and the software applications used to configure the EFB.

Administration procedures for the configuration of the EFB system, its updating, operational feedback, quality assurance functions and software configuration control should be established by the operator and documented.

12.2 Configuration of an Aircraft Performance Application

It is a requirement that any performance application, if installed, must be configured so that it operates in compliance with the Aircraft Flight Manual and relevant FARs.

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The person responsible for configuration of the performance application should have completed training in performance requirements to an advanced standard of competence.

FSDOs should consider seeking a compliance statement from operators in relation to the configuration and customisation of any aircraft performance application installed.

12.3 EFB Button Layout

When an operator has Boeing EFBs on more than one model of aircraft the layout of the application buttons should be the same on all models and all classes of EFB.

Appendix A- List of Required Documents for Operational Approval

Applicants will need to develop the following documents to support their Operational Approval application:

- Flight Crew Operations Manual
- Flight Crew Training Manual
- Airline MEL/DDG
- Training syllabus and training courseware for:
 - Flight Crew
 - EFB Administrator and ground support personnel
 - Maintenance
- Software
 - Data revision process
 - Configuration Control process
 - Quality Control and Quality Assurance process
- Maintenance documents (relevant sections for EFB)
 - Aircraft Maintenance Manual (Chapter 46)
 - Fault Reporting Manual
 - Fault Isolation Manual
 - Illustrated Parts Catalogue
- Maintenance procedures

Appendix B - Acceptable Initial EFB Training

1. Typical Training Program

A typical initial EFB training programme will consist of ground-based and flight-based elements.

Ground-based training may be accomplished by the Jeppesen CBT and written material specific to the operator.

Flight-based training should assume a basic knowledge of the system and the software applications and should concentrate on their practical use. In particular, flight training should address CRM and other human factors issues associated with the installation of such as excessive concentration on the EFB.

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1.1 Ground-Based Training

The ground-training syllabus should consist of the following:

1. System architecture overview
2. Display Unit features and use
3. Limitations of the system
4. Restrictions on the use of the system
 - a. Phases of flight
 - b. Alternate procedures (MEL)
5. Applications as installed
 - a. Use of each application
 - b. Restrictions on the use of each application
 - i. Phases of flight
 - ii. Alternate procedures (MEL)
 - c. Data input
 - d. Cross-checking data input and output
 - e. Use of data output

1.2 Flight Training

Where a suitably equipped and qualified simulator is used, the flight training syllabus should be additionally integrated into simulator training.

The flight training syllabus should consist of the following:

1. Practical use of the Display Unit
 - a. Display Unit Controls
 - b. Data input devices
2. Selection of applications
3. Practical use of applications
4. CRM and human factor considerations
 - a. Situational awareness
 - b. Avoidance of fixation

Boeing Class 3 EFB – Block Point 4

- c. Cross-checking data input and output
5. Practical integration of EFB procedures into SOPs

Appendix D – List of Evaluated Loadable Software Parts

Appendix D – List of	DATE
Revision – NEW	May 18, 2009
Part Description	Part Number
EFB System Core Software	
DACORE	ACZ35-7YWU-0100
ADM	ACZ27-811F-0100
FLIGHT_MM	ACZ26-811G-0100
APP_SYS_SUP	ACZ25-805A-0100
MAINTENANCE MODE	ACZ5C-8049-0100
WINDOWS OS	ACZ56-8241-0100
ADC APPLICATION	BFB55-ADCP-4001
ADC SUPPLIER CONFIG	BFB56-ADCS-4001
EFB WIRELESS SW	OPT5D-EWCB-0401
DDM APPLICATION (for DDM Jeppesen Hosted with CAT 4.1 or 3.3)	JEP34-DMEP-B005
or	
DDM APPLICATION (for DDM Local Edition 5.1)	JEP34-DMEP-A006
WPM APPLICATION (ARINC 744 or 744A)	BFB4A-WPMA-0007
WPM CFG AND DRIVERS	BFB4A-WPMC-4001
EFB SERVICES	BFB51-ESRV-4001
Airport Moving Map	
TPA APPLICATION	JEP42-TPAP-0008
TPA SUPPLIER CONFIG	JEP4C-TPCS-0007
Performance (OPT)	
46 PERF APP OPS (Ver. 3.3)	BFB42-PRFA-0032
or	
46 PERF APP OPS (Ver. 3.31) for JAL Only	BFB43-PRFA-0033
EFB Document Browser (EDB)	

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Appendix D – List of	DATE
Revision – NEW	May 18, 2009
Part Description	Part Number
46 EDB APP OPS (Ver. 4.0)	BFB55-EDCP-0010
46 EDB STYLES DB (Ver. 4.0)	BFB5C-EDCY-0010
Terminal Charts	
TERM CHARTS APP (Ver. 4.0.1)	JEP50-CHTP-0011
TERM CHARTS SUPP CFG (Ver. 4.0.1)	JEP44-CHCS-0011
Flight Deck Entry Video System (Goodrich)	
VIDEO APP	ROZ46-V01P-7001
VIDEO SUPPL CONFIG	ROZ45-V01S-7001
Network File Server (NFS) System Core Software (NFS BP 3.0)	
NFS NFS-OS	BFB5D-NFSF-0006
NFS FRAMEWORK	TET4D-FMWP-0004
NFS MAINT APP	TET45-MXAP-0004
NFS NETWORK CTRLR	OPT4A-NNCB-0330
NFS SERVICES	BFB4F-NFSS-0001
NFS COMM CTRLRS	OPT47-NCCB-0331

Hardware Dependency

Block Point 4 software is functionality dependent on EU Part Number 261700-1.

Configuration Files

Configuration files dependent on aircraft model or customer preferences are not included in this list.

ADDENDUM

Boeing Class 3 Electronic Flight Bag
FLIGHT STANDARDIZATION BOARD REPORT

CMC Electronics

Class 3 Electronic Flight Bag (EFB)

Applicable STC's: ST03006CH, and ST02992CH

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(Addendum) Preamble

Boeing has requested a Flight Standardization Board (FSB) evaluation of the Boeing CMC Class 3 Electronic Flight Bag at revision level of Block Point 2.

The Boeing CMC Class 3 Electronic Flight bag was first conceived as a Class 2 device which fit the descriptors and definitions contained in AC 120-76A for PEDs and portability; however, subsequent engineering decisions elevated it to the regulatory definition of a Class 3. Notwithstanding the regulatory definition of this product, the Boeing Company has chosen to market it as a Class 2, and marketing literature and catalogue options will refer to it as such.

This addendum to the legacy Class 3, Block Point 4 FSB Report does not deviate from the main body of the Class 3, Block Point 4 report concerning the requirements of applicable Federal Aviation Regulations and has been condensed where possible to include only the descriptive differences between the legacy Boeing Class 3 EFB and the Boeing CMC Class 3 EFB. Basic user interface and data loading are common to both systems, as are operator ground procedures.

Application software referenced in the main body of this report has been demonstrated and approved for use on both the Boeing legacy Class 3 (Block Points 3 and 4) and this Boeing CMC Class 3 EFB (Block Point 2). Evaluated applications include Terminal Charts, Windows based Airport Moving Map Display, Onboard Performance Tool, Electronic Document Browser, Electronic Flight Folder, Pilot Utilities, and Pilot Data Loading.

The Seattle Aircraft Evaluation Group found that the Boeing CMC Class 3 Electronic Flight Bag and the applications evaluated satisfy the requirements of FAA AC 120-76A for approval. This report does not constitute Operational Approval and individual operators will need to obtain approval from their Principal Inspector prior to use of these applications. Approval to use the EFB will be contained in paragraph A061 of the Operations Specifications (OpsSpecs) for part 121 and part 135 operators or in the Management Specifications (MSpecs) for part 91K operators.

1. Purpose and Applicability

The purpose of this Addendum to the Boeing Class 3 EFB FSB report is to include an additional Class 3 product known as the Boeing CMC Class 3 EFB. The FAA requirements applicable to operators seeking approval to use the Boeing CMC Electronics Class 3 Electronic Flight Bag are the same as those identified in the main body of this report. Provisions of this report are consistent with the guidance defined in FAA Advisory Circular 120-76A and assume that appropriate airworthiness certification for installation of the EFB has been accomplished. All artefacts relating to airworthiness certification and AC 120-76A operational approval are available from The Boeing Company.

1.1 General Description of the Boeing CMC Class 3 EFB System

The Boeing CMC Class 3 Electronic Flight Bag (EFB) is intended for installation on Boeing 737, 747, 757, and 767 aircraft. The CMC EFB system provides the Flight Crew with display and user-interface devices with which to access the functional capabilities of the EFB.

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The system configuration described in this document is intended to be generic, meaning that it does not describe a configuration unique to any specific customer or aircraft model. Where appropriate, configuration items for a particular aircraft model, such as the 737 NG aircraft, are noted.

The Global Positioning, Flight Management, Air Data and Inertial Reference Functions provide the basic inputs required by the EFB system. The following interfaces may be basic or optional depending on the aircraft model: a GSM cellular modem, ACARS communication, and a flight deck printer.

Functionality of an installed Flight Deck Printer is dependent on the type of printer installed. An ARINC 740 (narrow) printer is able to print text only. A printer may be connected directly to both EFBs via an AIRINC 429 connection.

The Boeing ePlane Ground Support System (BEGSS) referenced in the main body of this report supports both Class 3 EFB systems.

The CMC EFB system is comprised of several devices located on the Flight Deck. Crew interface devices consist of the following components:

- Two Electronic Display Units (EDU) with the following characteristics/specifications:
 - Compact display-processor design (4 lb)
 - 9.6-in x 8-in x 1.6-in with 10.4-in diagonal display
 - High performance sunlight readable touch screen display, 0.5 – 800 nits
 - LED backlit XGA (768x1024)
 - Dual USB 2.0 ports
 - Integral WiFi (802.11b/g)
 - 1.4Ghz Intel® Centrino Mobile with graphics co-processor
 - (2) 32G solid state disks (64 GB total)
 - (2) GB ECC DDR RAM (1 GB total)
 - Powered from ESMU/PCU by combined USB/Ethernet cable to dock connector
 - Dual internal lithium ion battery (~45 minute capability)
- Two Enhanced Switching Module Units (ESMU) providing interface between the EDU's and Aircraft avionics, Ethernet cross talk between Capt and FO EFBs, and power to the EDU's.
 - size: 6.9" x 5.1" x 2.6"
 - Weight: 2.4 lbs
 - 8 ARINC 429 receiver and 4 ARINC 429 transmitter interfaces
 - 4 Ethernet ports
 - Each EFB connected to independent non-shedable Essential Power buses

Boeing CMC Class 3 EFB – Block Point 2

- Supports Customer Supplied GSM USB modem interface
- Two 28-110 V Power Converter Units (PCU)
- One Data Load Port

The EDU's are mounted on the Flight Deck window sill next to each pilot. Two ESMU/PCU sets, one for the Captain and the other for the FO are installed on the floor in the Flight Deck at the aft of each pilot's flight bag stowage. The data load port is integrated into the First Officer's (FO) Enhanced Switching Module Unit (ESMU). A typical B737 NG flight deck with Boeing CMC Class 3 installation is shown in figure 2-1

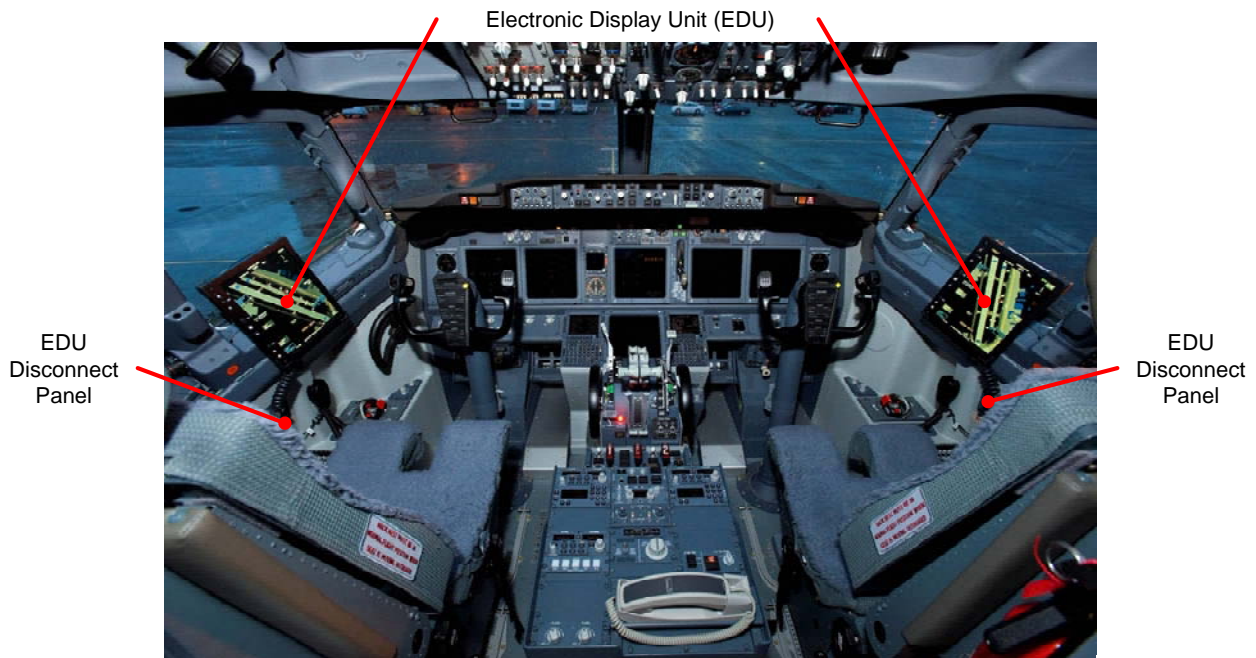


Figure 2-1 EFB 737 NG Crew Compartment

1.2 Operational Overview

The Boeing CMC Class 3 EFB system is designed for use throughout all phases of aircraft operation. Paragraph 2.2 in the main body of this report contains the required references and operator responsibilities.

1.3 Display and Controls

Interaction with the EFB applications can occur through the display bezel keys and integral touch screen panel installed as part of the EFB EDU Liquid Crystal Display (LCD) glass assembly. These controls are identical for each pilot and both pilots have equal access to any of these controls at their option.

Boeing CMC Class 3 EFB – Block Point 2

1.3.1 Display Unit Bezel Keys

Each EFB EDU consists of an active matrix liquid crystal display and bezel as illustrated in Figure 2-2. The bezel consists of pushbutton dedicated function keys, pushbuttons for display brightness, a pushbutton power switch to turn display backlighting on/off and a bezel light sensor for automatic control of display brightness.

Five pushbutton dedicated function keys, located across the left side of the EFB bezel, are described in Table 2-1. As shown in Figure 2-2, each EFB is equipped with an individual display brightness control pushbutton, mounted on the lower left corner of the bezel, to provide for manual adjustment of the EDU brightness. Pressing on the top brightness pushbutton decreases the brightness, while pressing on the bottom brightness pushbutton increases the brightness. Bezel light sensors mounted in the upper and lower left corners of the bezel provide automatic brightness control for the EFB display. The EFB automatic brightness function controls display luminance as a function of inputs from the manual EDU brightness controls and the bezel light sensors.

Boeing CMC Class 3 EFB – Block Point 2

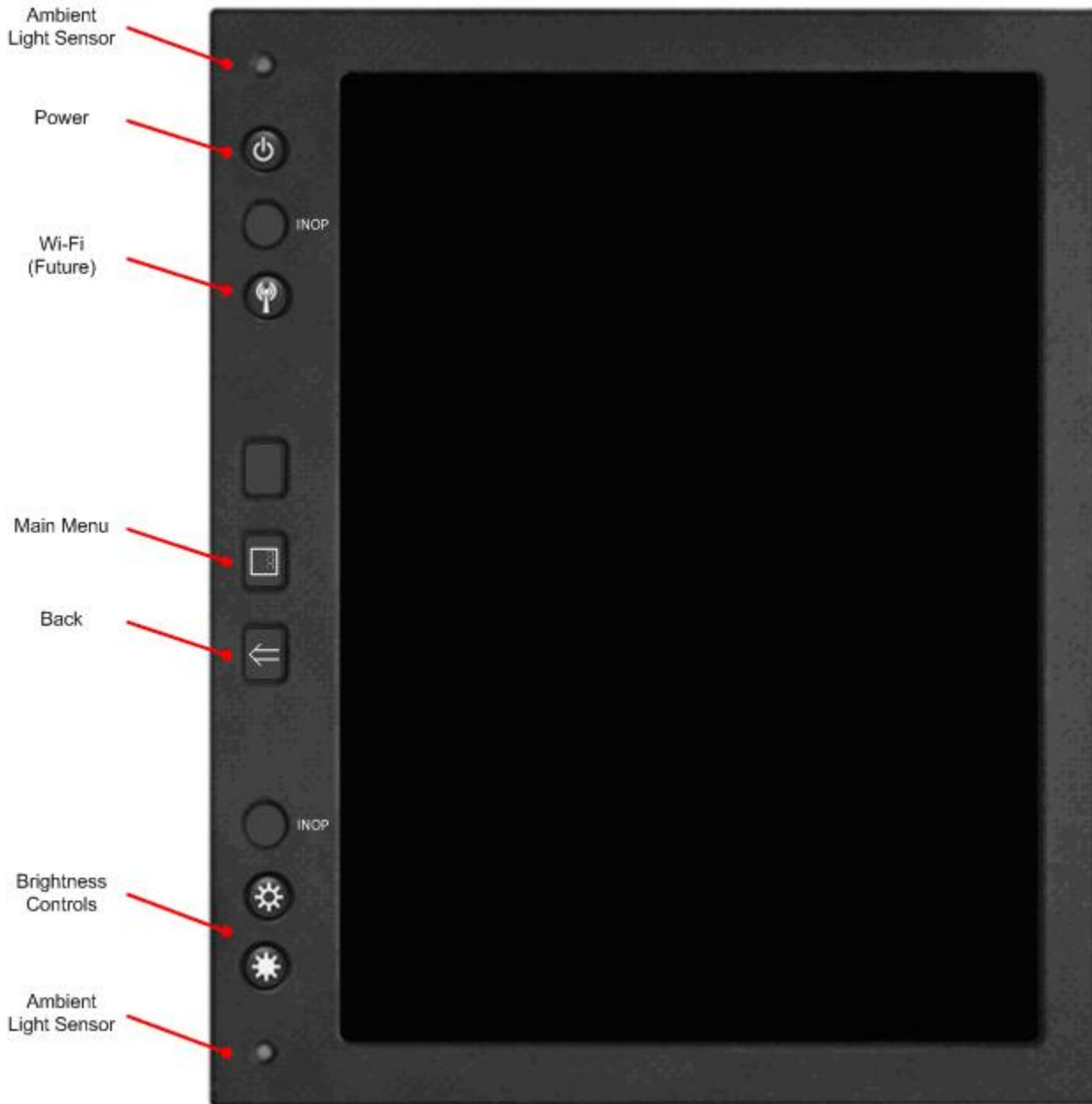








Figure 2-2 EFB Display Unit

Table 2-1 EFB Display Unit Bezel Key Descriptions

Key	Function
	The power pushbutton controls the display back light only. Pressing the power button once turns the display backlight off but the system remains active. Pressing the PWR button a second time instantaneously turns the

Boeing CMC Class 3 EFB – Block Point 2

Key	Function
(Power)	display backlight back on, restoring the last setting set by the pilot.
 Wireless Connectivity	This button is currently unused. A future software enhancement will provide this functionality.
 (Menu)	Displays the top-level EFB Application Manager Main Menu on demand and overrides all other operations.
 (Back)	Each actuation returns user to the previous navigation level <i>within</i> the active application, but does not navigate from the application back to the Main Menu. At the highest navigation level in the active application, the key is non-functional.
 (Decrease Brightness)	Each actuation decreases the screen brightness by one interval.
 (Increase Brightness)	Each actuation increases the screen brightness by one interval.

1.3.2 Display Header

The top 0.5 inch of the EFB screen is controlled and managed by the Application Manager. This area is reserved for the display header and EFB-related alert annunciation icons (FAULT, MEMO AND MSG (Message)). A fourth annunciation icon (XFR) indicates when the display is slaved to the off-side EFB. A SHOW button displays a control bar which enables bezel functionality (MENU, BACK, PGUP, PGDN, ZOOM OUT, ZOOM IN, and HIDE). The header is illustrated in Figure 2-3 and 2-4.

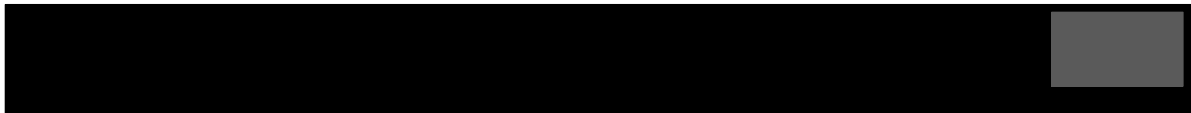


Figure 2-3 EFB Display Header

Boeing CMC Class 3 EFB – Block Point 2



Figure 2-4 EFB Display Header with Control Bar Expanded

NOTE: The Screen Title may occupy two lines. Two line titles display the name of the application on the top line and the name of the current (in focus) screen on the second line.

When the system displays a FAULT, MEMO, and/or MSG alert annunciation icon in the header, the user can return to the MAIN MENU page to determine which application generated the fault, as illustrated in Figure 2-5, and to access the System page for additional information.

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Figure 2-5 MAIN MENU page

The display header uses the graphical conventions described in Table 2-2.

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Table 2-2 EFB Display Header Graphical Conventions

Type	Color	Meaning
FAULT	Amber	Indicates a fault identified within an application or the system.
MEMO	White	Indicates that one or more applications need attention.
MSG	White	Communication message – indicates one or more applications have an uplink available for crew review. Used only if the EFB system is connected to an external communications device.
XFR	Green	Indicates the display is in transfer mode to view the content of the other EFB display. While in this mode, the display cannot be manipulated. Pressing the display bezel XFR key again removes the EFB from transfer mode.

1.3.3 Menu Command Buttons display applications within the EFB that are activated via bezel buttons and/or touch screen.

The graphic conventions for Command and Menu buttons are defined consistently across all applications to indicate their states.

Table 2-3 Graphical Conventions for EFB Display Application States

State	Color Key	Functionality
Active	White text on a gray field	Available to respond to the focus and to selected states. When these areas appear shaded, they provide visual indicators of functions that are selectable using the touch screen. Shading allows the user to quickly see the actions that are available on each screen.
In focus	White border	Border color changes to provide user feedback when the cursor (or user's finger) is within the active area for selection of the control. Supports user selection of the intended function when multiple active areas are immediately adjacent to each other. Controls remain in the in-focus state until another control is selected, so that users can easily see their navigation path.
Selected	Green field (retains white border)	Indicates that the control/button is selected and is initiating its function. Selection can occur via, finger-off touch screen.

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State	Color Key	Functionality
Inhibited	Cyan text and border on a black field	Indicates that a normally active control is unavailable for selection. This state occurs when the function associated with the control is temporarily unavailable, such as a print control that is unavailable due to a printer malfunction.
Data Source	Green border	Data appropriate to that button has been pulled from aircraft data busses.

1.4 EFB System Configuration

The configuration of the EFB installation for a particular model aircraft is described in Chapter 46 of the appropriate Aircraft Maintenance Manual.

Two aircraft configurations are available for EFB installation. The basic installation is EFB with optional text printer, cellular modem, portable data loader, and media data loading. All optional equipment is shown in the following schematic diagrams. The evaluated configuration included data transfer via the optional cellular modem.

The EFB interfaces include Universal Serial Bus (USB), digital ARINC 429 signals, and ARINC 664 Ethernet. The EFB is designed to work in multi-models. Figure 2-6 illustrates the EFB interfaces from a 737 NG-model perspective.

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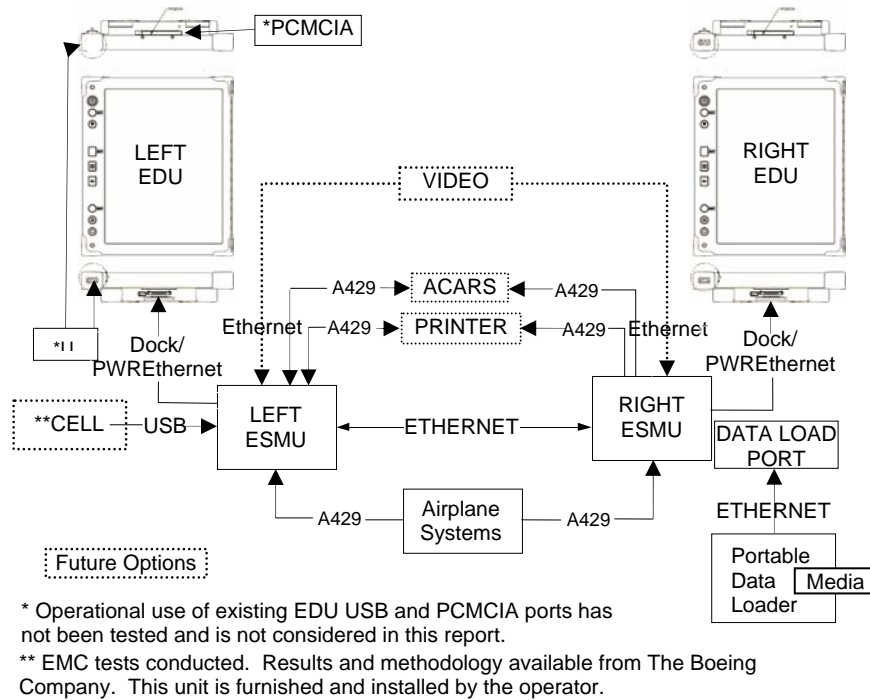


Figure 2-6 EFB Basic Plus Optional Equipment Installation Schematic (737 NG)

2. EFB Mounting System

The EFB mounting system approved under this report is manufactured by CMC Electronics. The part numbers for each pilot station are: Capt, 245-604382-000, and F/O, 245-604382-001

This mounting system has been evaluated by the Seattle AEG and found to be acceptable for use in all phases of flight.

The mounting system has been Part 25 certified. The STC number for this mounting system is ST03006CH

There are no operating limitations associated with this EFB mounting system.

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3. EFB Display Lighting and Reflectivity

3.1 Display lighting.

This EFB display lighting has been evaluated in daylight, night, and shafting light conditions. The display is readable under the full range of lighting conditions.

3.2 Display Reflectivity.

The display reflectivity has been evaluated during all phases of flight in day and night conditions. There was no distracting reflectivity observed.

5. Electromagnetic Compatibility (EMC/EMI)

This document does not address EMC/EMI analysis and testing of the CMC Class 3 EFB system hardware. Demonstrating hardware EMC compliance is the responsibility of the STC holder.

Extensive EMC/EMI testing was done by Boeing to address concerns regarding operator use of an optional USB wireless wide area network (WWAN) modem located in the flight deck. The test procedures and conditions were accomplished in accordance with industry standards and FAA guidance documents, and are on file at the Boeing Company. This testing was specific to the Boeing Next Generation 737 models, and must be repeated for each model employing the WWAN modem.

6. Optional Wireless Wide Area Network (WWAN) Modem

An installed WWAN modem is optional equipment, and is furnished by the airline to enable wireless updating of the EFB over a GSM cellular network. It is disabled in flight and on the ground at speeds greater than 30 knots. Operational approval of the modem is the responsibility of the operator.

The model and manufacturer of the modems tested are listed in an airline guidance document which Boeing provides to operators, and have been found to exhibit no unacceptable levels of electromagnetic radiation. An operator desiring to use modem hardware not listed in this document may be required to provide evidence of equivalent EMI testing.

7. Rapid Depressurization Testing

The Boeing CMC Class 3 EFB Electronic Display Unit has been tested by the manufacturer, CMC Electronics, for survivability of a rapid depressurization in accordance with RTCA/DO-160E, section 4.6.2, category A1, max altitude 45,100 feet. No faults were evident after the rapid depressurization that would prevent continued normal operation of the EFB.

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Appendix 1

The following documents have been reviewed and evaluated by the SEAAEG during the determination of this report.

Flight Crew Operations Manual

Flight Crew Training Manual

Electronic Flight Bag Pilot's Guide

Fault Isolation Manual

Illustrated Parts Catalogue

Airplane Maintenance Manual

Dispatch Deviation Guide (including Minimum Equipment List)

Data Delivery and Management Description and Procedures

EFB Configuration Control Description and Procedures

WWAN modem EMC/EMI test plan

Boeing D6-83064-3801 Vol. 1 and 2 (WWAN Test Report)

Boeing D6-83064-4101 Airline WWAN Modem Deployment Guide

STC documentation

TSOA documentation

Training Courseware

- Flight Crew
- Maintenance
- Back-Office

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CMC Appendix A– List of Evaluated Loadable Software Parts

REVISION	DATE
CMC Appendix A Rev –New	November 16, 2011
Part Description	Part Number
EFB System Core Software	
46 ADMW AND CL OPS	OPT56-ADMW-0406
46 EFB2 OS OPS MSP	CMP2F-AAAA-C002
ADC APPLICATION	BFB57-ADCP-0007
ADC SUPPLIER CONFIG	BFB50-ADCS-0012
EFB WIRELESS SW	OPT5A-EWCB-0406
DDM APPLICATION (for DDM 6.0 Jeppesen Hosted & LE)	JEP42-DMEP-0010
46 EFB CELL OPS (Modem Installed)	BFB40-ECCA-0002
Airport Moving Map (AMM)	
**Windows Airport Moving Map (Requires Terminal Charts 5.0 or later. See TSOA and AEG letters)	
Performance (OPT)	
46 PERF APP OPS (Ver. 3.5)	BFB48-PRFA-0038
EFB Document Browser (EDB)	
46 EDB APP OPS (Ver. 4.4)	OPT5B-EDCP-0406
46 EDB STYLES DB (Ver. 4.4)	OPT51-EDCY-0405
Terminal Charts	
TERM CHARTS APP (Ver. 5.1)	JEP54-CHTP-0015
TERM CHARTS SUPP CFG	JEP46-CHCS-0013
Electronic Flight Folder	
46 EFF APP OPS (V. 1.2)	OPT4E-EFFB-0406

Configuration Files

Configuration files dependent on aircraft model or customer preferences are not included in this list.