Empowering Airline Customers through Support Data

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Presentation RROI Number is: 17-00614-CORP
Empowering Airline Customers through Support Data

- Presentation Overview
  - Regulatory requirements
    - Engineering
    - Maintenance
- Data Sources
- Types of data
  - Engineering
  - Maintenance
- Delivery methods
- Access Methods
- Wrap-up/Q&A
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- What are the pertinent regulations from the FAA for Airlines and Aircraft Manufacturers?
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• Federal Aviation Administration CFR Part 121 – Operating Requirements: Domestic, Flag, and Supplemental Operations
• Federal Aviation Administration CFR Part 135 – Rules for Commuter and On-demand Operations (e.g. Corporate, etc…)
• Federal Aviation Administration CFR Part 25 – Airworthiness Standards: Transport Category Airplanes
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- Sounds awesome! Where does the data come from for Engineering and Maintenance data customers use?
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Flight Operations Data (paper)

Engineering Data (Aperture Cards)

Maintenance Data (paper/microfilm)

REDARS

Boeing On-Line Data

Portable Maintenance Aid

Electronic Flight Bag

MyBoeingFleet.com

Support Data Solutions

Maintenance Performance Toolbox

1980’s

1990’s

2000’s

paper
microfilm
aperture cards

PDF / SGML / CGM / TIFF

XML / 2D/3D Images

HTML5/SVG
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- Engineering Data
  - LOPA (Layout of Passenger Arrangements)
  - Standard Parts
  - Engineering Bill of Materials (EBOM)
  - Material and Process Specifications
  - Drawings & new Graphics formats (e.g. 3DPDF)
  - Extrusions & Shapes
  - Markers & Placards
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Engineering Data used by Airline Customers

- Understand Overall Configuration of Parts
- Find Part Number Based on Illustration
- View Shape of Part
- Identify Interchangeability
- View Part Dimensions & Tolerances
- Identify Part Effectivity
- Bill of Material Part Information/Notes
- Find Used-On and Component Breakdown of Parts
- Composite Ply-Layup Data

Engineering Drawings/ 3DPDFs

Engineering BOM

Primary User Communities

- **Engineering Maintenance Support**
  - Support Inspection and Repair of Damage
  - Create Specification for Part Fabrication

- **Project Engineers**
  - Write EO (Engineering Order) to Support Boeing-Generated Industry Service Bulletin
  - Write EO to Support Airline-Solicited Service Bulletin
  - Write EO to Support Internal Modification of Aircraft
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Maintenance Data used by Airline Customers

- Maintenance and Repair Documents
  - Aircraft Maintenance Manual (AMM)
    - Part 1 (System Description Section, SDS)
    - Part 2 (AMM)
  - Fault Isolation Manual (FIM)
  - System Schematics Manual (SSM)
  - Wiring Diagram Manual (WDM)
  - Standard Wiring Practices Manual (SWPM)
  - Illustrated Parts Catalog (IPC)
  - Structural Repair Manual (SRM)
- Service Documents
  - Service Bulletins (SB) and Service Letters (SL)
- Component Maintenance Manual (CMM)
- Structure of the Manuals
- Change Management
  - Revision Cycles
  - Temporary Revisions
  - Customer Originated Change (COC)
Aircraft Maintenance Manual

- **AMM Part 1 - System Description Section (SDS)**
  Contains information on component location, system operation, and Training Information Points for all systems and equipment installed in the airplane.

- **AMM Part 2 – Practices and Procedures**
  Contains information required to service, troubleshoot, functionally check, and repair or replace all systems and equipment installed in the family of airplanes normally requiring such action on the line or in the maintenance hangar. The Airplane Maintenance Manual (AMM) also contains information on inspection and maintenance of airplane structure; however, information on repair of airplane structure is contained in the Structural Repair Manuals.
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Aircraft Maintenance Manual

CHAPTER 23
Communications
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Synoptics

Contents
- Description and Operation
- System Description Section
- Synoptics
- 3D Location Diagrams
- Photos
- 3D Component Illustration
- Task Learning Aids
- Maintenance Procedures
- Fault Isolation
- Parts
- Schematics
- Wiring
- Maintenance Planning
- Engineering Data
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3D Component Locator Guide

- Description and Operation
- System Description Section
- Synoptics
- 3D Location Diagrams
- Photos
- 3D Component Illustrations
- Task Learning Aids
- Maintenance Procedures
- Fault Isolation
- Parts
- Schematics
- Wiring
- Maintenance Planning
- Engineering Data
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Photos
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Tasks Training Materials

- Description and Operation
- System Description Section
- Synoptics
- 3D Location Diagrams
- Photos
- 3D Component Illustrations
- Task Learning Aids
- Maintenance Procedure
- Fault Isolation
- Parts
- Schematics
- Wiring
- Maintenance Planning
- Engineering Data
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AMM Part 2 – Practices and Procedures
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Fault Identification Manual

• **What it is:**
  The Fault Isolation Manual contains information necessary to isolate and correct faults in systems and equipment installed.

• **What it’s for:**
  Troubleshooting identified faults on the airplane

• **Primary Fault Identification:**
  • EICAS Messages (the message that appears to the pilots on the instrument panel)
  • Observed Faults (those faults that are detected by means other than BIT)
  • Maintenance Messages (numeric code indicating a fault from a BIT)
  • Cabin Faults (faults that appear in the cabin specifically)
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FIM Example

[Diagram showing a fault isolation process]

- You find a fault with an airplane system.
- Use the MAT to get more information.
- If you have an EIACAS message, go to the MAT to find its fault code and the corresponding maintenance message number. For details, see Figure 2.
- Go to the fault isolation task in the FIM.
- Use the fault code or description to find the task in the FIM. There is a numerical list of fault codes for each chapter. There are lists of fault descriptions at the front of the FIM. For details, see Figure 3.
- Follow the steps of the fault isolation task.

23-HOW TO USE THE FIM

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Dec 06 2004
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Wiring Diagram Manual (WDM)

- **What it is:**
  - The Boeing Wiring Diagram Manual (WDM) is a collection of diagrams, drawings, and Lists which define the wiring and hookup of associated equipment installed on the listed Boeing airplanes.

- **What it’s for:**
  - Detailed troubleshooting and engineering research

- **Example of when you would use a WDM:** A mechanic receives a fault report from the pilot and uses the FIM to troubleshoot the fault. The fault isolation procedure leads the mechanic to the conclusion that there is a problem with a signal flow between two components. The mechanic needs to check the signal between the two components.
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WDM Example
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Chapter 20

STANDARD WIRING PRACTICES
MANUAL

Chapter 20

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Original Issue Date: Aug 04 1996
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Illustrated Parts Catalog
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Systems Schematic Manual

• **What it’s for:**
  • The System Schematic Manual (SSM) is a collection of diagrams which define the airplane systems. The System Schematic Manual (SSM) was prepared to serve as a source of information to assist in understanding system function and to facilitate fault isolation to the Line Replaceable Unit (LRU) level.

• **Example of when to use an SSM:** A mechanic needs to find out which circuit breaker provides power to a particular component, and does not need to see information at the level of detail provided in a wiring diagram.
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Systems Schematic Manual Examples
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Structures Repair Manual

• **What it’s for:**
  • This Structural Repair Manual gives general data and special instructions for the repair of the airplane structure. This manual gives general airplane data, usual procedures, and repair materials. This manual also includes material identification, allowable damage, and repair data for the airplane structure. Procedures usually done together with the structural repair (such as an airplane symmetry check or support of the airplane in the jigged position) are also given.

• **Example of when to use an SRM:** A catering truck crashes into the forward leading edge of the wing of an airplane, leaving a 6” gouge that is ¼” deep. The mechanic needs to determine whether or not the damage is within allowable limits to fly the airplane, or if a repair must be made.
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Structures Repair Manual Example

1. Applicability
   A. Use this chapter-section-subject for the investigation, inspection and removal of any type of damage to the airplane skin and structure.
   B. This chapter-section-subject also gives the general definitions for the types of damage that are given in the different chapters of this structural repair manual.

2. References

3. Damage Classification
   A. Make sure that you refer to the applicable chapter-section-subject for "Allowable Damage" in chapters 51 through 55 of this structural repair manual for the correction work limits and the specified shot peening data.
   B. Use your good judgment to find the type of damage and an estimate of the cross-sectional area changes by a visual inspection of a specified area.

NOTE: Measure the damage or the combination of damage for both the correct depth and the correct length.

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Jan 19, 2009

51-10-02

DSPM 25-01

51-10-02-0G-0

Inspection and Removal of Damage

Subject 51-10-03 - REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATION

Subject 51-10-04 - GENERAL - ANALYSIS AND CONTINUED
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Service Bulletins and Service Letters

• **What they’re for:**
  - Service Bulletins provide operators with FAA approved instructions for modification or inspection of in-service airplanes and Boeing-built components.
  - Service Letters provide operators with a variety of technical information for delivered airplanes.

• **Example of Service Bulletin:** Boeing provides instructions to modify the video surveillance system from the Electronic Flight Bag to display on the flight deck.

• **Example of Service Letter:** Boeing informs customers of a change to the hardware of the Cabin Control Panel along with interchangeability information.
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Service Bulletin Example

Commercial Airplanes

Service Bulletin

Number: 777-23-0283
Original Issue: March 17, 2009
Revision 1: May 13, 2009
ATA System: 2375 3161

SUBJECT: COMMUNICATIONS - Audio and Video Monitoring - Change of Flight Deck Entry Door Video Surveillance System (FDEVSS) Interface from Electronic Flight Bag (EFB) to Flight Deck Multi Function Display (MFD)

CONCURRENT REQUIREMENTS
None.

BACKGROUND

This service bulletin and a kit of parts were prepared to give instructions to change the Flight Deck Entry Door Video Surveillance System (FDEVSS) with video display on Electronic Flight Bag (EFB) to the Flight Deck Multi Function Display (MFD).

This change was requested by the operator.

ACTION (MC 2370MK7080)

In the Flight Compartment, do these changes:

- Group 1-10 airplanes:
  - On the Pilot’s Main Instrument Panel, route and change wire bundle W1004.
  - On the P3 Forward Panel, change wire bundle W1002.
  - On the AF0202 disconnect bracket, change wire bundle W1052.
  - From AE0232 disconnect bracket to AF0202 disconnect bracket, route and change wire bundle W4207.
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Service Letter Example

<table>
<thead>
<tr>
<th>Commercial Aviation Services</th>
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<tbody>
<tr>
<td><strong>SERVICE LETTER</strong></td>
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<tr>
<td>ATA: 2339-00</td>
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<tr>
<td>12 September 2008</td>
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</table>

**SUBJECT:** CABIN CONTROL PANEL (CCP) INTERCHANGEABILITY AND INTERTWINABILITY

**MODEL:** 777 Series

**APPLICABILITY:** All 777 airplanes with CCP P/N 285W0863 installed

**REFERENCES:**

1. Airplane Service Bulletin 777-23-0178
3. BAE Systems Component Service Bulletin 285W0863-23-02

**SUMMARY:**

This service letter informs operators of the changes made to the hardware of the Cabin Control Panel (CCP). This service letter also provides operators with interchangeability and intermixability information of all CCP and backlight sub-assembly delivered as of 31 July 2007 on 777 airplanes.

**BACKGROUND:**

The CCP hardware was changed to address the nuisance power cycles condition, insulator material compliance with FAA flammability requirements, and LCD obsolescence.
Component Maintenance Manuals

• **What it’s for:** Information required to check, repair, adjust, and test units or assemblies, normally performed away from the airplane because of the need for special equipment, are contained in the Boeing Component Maintenance Manual or vendors’ component maintenance manual(s).

• **Example of when to use a CMM:** A mechanic removes a component that reports a failure. Further troubleshooting of the component is required to correct the fault.
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Component Maintenance Manuals Example

Universal Passenger Control Unit (UPCU)

23-00-54

Component Maintenance Manual

REINSTALLATION FOR TOILET PUNISH ASSEMBLY

1. Repair
   A. Repair Materials
      1. Adhesive, 560-PT-329 with 502-PT catalyst
      2. Brush, paint
      3. Container, glass
      4. Cup, polyethylene coated paper
      5. Ethyl alcohol
      6. Refined beeswax
      7. Rollers, hard rubber
      8. Screws, metallic
      9. Seals, silicone, RTV-ES with RTV-910 catalyst
      10. Adhesive, silicone sealant, Dow Corning Corp.
      11. Sandpaper, 180 grit
      12. Spatulas
      13. 1.1. Trichloroethene
      14. Wipers, cotton, lint-free

Techno Systems Inc.
Commercially available
Commercially available
Commercially available
Commercially available
Commercially available
General Electric Co.
Commercially available
Commercially available
Commercially available
Commercially available
Commercially available

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Oct 26, 2012

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GPDIS_2017.ppt | 32
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- Specifications for Maintenance Manuals
  - ATA – Air Transport Association (ISpec 2200)
    - Specification for the creation and development of technical manuals for aerospace
  - S1000D – Specification 1000D
    - Specification for the creation of all technical manuals – not limited only to aerospace
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Decoder Ring for Maintenance Manuals

Emergency Locator Transmitter Antenna Installation

(ATA Ispec 2200)
23 - 24 - 02 - 400 - 801

CH SEC SUB PB TASK

(S1000D)
DMC-B787-A-23-24-02-00A-720A-A

DATA MODULE CH SEC SUB INFORMATION CODE CODE
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Specification Code Examples

### ATA Specification

<table>
<thead>
<tr>
<th>ATA Structure</th>
<th>Description &amp; Operation Pageblock</th>
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<tbody>
<tr>
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<tr>
<td>1-99 Description and Operation</td>
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<tr>
<td>AMM Fault Isolation Pageblock</td>
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<tr>
<td>101-199 Troubleshooting</td>
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<tr>
<td>AMM Maintenance Procedures Pageblocks</td>
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<tr>
<td>201-299 Maintenance Practices</td>
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<tr>
<td>301-399 Servicing</td>
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<tr>
<td>401-499 Removal/Installation</td>
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<tr>
<td>501-599 Adjustment/Test</td>
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<tr>
<td>601-699 Inspection/Check</td>
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<td>701-799 Cleaning/Painting</td>
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<tr>
<td>801-899 Approved Repairs</td>
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<td>WDM</td>
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<td>Ch-Sec-Subj arrangement in separate manual</td>
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<td>IPC</td>
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<td>Ch-Sec-Unit-Figure arrangement in separate manual</td>
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### S1000D Specification

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<tr>
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<td>Fault Isolation</td>
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<tr>
<td>400 Fault reports and isolation procedures</td>
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<tr>
<td>Maintenance Procedures</td>
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<td>200 Servicing</td>
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<td>300 Examinations, tests, and checks</td>
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<tr>
<td>500 Disconnect, remove and disassemble procedures</td>
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<td>600 Repairs and locally make procedures and data</td>
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<td>700 Assemble, install and connect procedures</td>
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<td>800 Storage procedures and data</td>
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<td>Wiring</td>
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<td>Schematics</td>
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<td>900 Miscellaneous – Service Bulletins</td>
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<tr>
<td>Engineering Data</td>
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</table>
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• Traditional maintenance manuals are revised and published per schedule. Some have quarterly revisions, others have semi-annual revisions, and others have ad-hoc revisions.
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Temporary Revisions

- **What they’re for:**
  - To provide changed data to airlines that cannot wait until the next published revision to the manual.

  - **Example of a TR:** a correction to a torque value for the installation of a component is discovered.

  - **Example that would not result in a TR:** a simple clerical error that does not result in any compromise to safety or standard maintenance practices.
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Temporary Revision Example

Chapter 28
TEMPORARY REVISION 28-1044 20May2009
TEMPORARY REVISION 28-1041 20May2009
TEMPORARY REVISION 28-1042 20May2009
TEMPORARY REVISION 28-1043 20May2009
TEMPORARY REVISION 28-1045 20May2009
TEMPORARY REVISION 28-1046 29May2009
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Customer Maintenance Manual Changes

- Customer Originated Change (COC)
- Publication Change Request (PCR)
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Customer Originated Changes (COC)

• **What they are:**
  Changes or additions to Boeing data as requested by the customer. These changes are provided for a fee.

• **Example of a COC:** A customer purchases and installs a new In Flight Entertainment System that replaces the system that Boeing had installed. The airline wishes to keep all maintenance data for this new system together with existing Boeing maintenance data, and submits the data to Boeing for inclusion into the maintenance manual.
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Publication Change Request

• **What it is:**
  • Corrections to Boeing provided data. Customers can send in a PCR if an error in the data is identified and Boeing will fix it free of charge.
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- **Methods for Accessing Maintenance Data**
  1. On-Line Application
  2. Data Download (SGML/Bulk)
  3. Offline or Mobile
Questions ?