

## Proposed Change #1, submitted by CAE after the comment period

### 1.1 Purpose

The intent of this standard is to provide guidance so the documentation provided with the Flight Simulation Training Device (FSTD) reflects and describes the delivered FSTD, including the description and definition of third party equipment and content.

In the context of documentation guidance found in this report, the term FSTD is meant to include all levels of flight simulation devices.

The documentation described herein is required for the operator to independently support the FSTD in the maintenance, operation, and update of the device throughout the lifetime of the device.

This report describes a superset of a possible range of documentation involved in the initial delivery or an update of a FSTD. The deliverable documentation set for a particular FSTD may vary depending on the level of device (e.g., flat panel trainer versus a full flight simulator) as well as issues related to intellectual property, export compliance, technical requirements, and/or contractual agreements.

**PROPOSED NEW TEXT:** Therefore this report should only be used for the purpose of obtaining general guidelines on documentation, due to the complexities of data availability and associated licensing agreements the requirements contained herein should not be used for contractual reference, and TDMs and OEMs cannot be bound such requirements through this report.

Industry Consensus: **Text rejected in its entirety.**

## Proposed Change #2, submitted by LFT after the comment period

### 2.5 Deliverable Format

Electronic media is preferred, although hard copy may be provided upon request for certain documentation. If electronic media is used, system suppliers, TDMs, and operators should communicate and control changes/updates and may utilize a mechanism to provide simple capabilities to download and verify authenticity.

Simulator operators may prefer that some documentation be in an interactive format. Examples of this interaction include hyperlinks, parts listings, figures, drawings, and OEM documents. **NEW TEXT:** Documentation should be interactive / exportable / convertible (i.e., excel from which contents may be extracted and converted in a table layout suitable for import in a maintenance IT tool).

A specific example of this type of interactive documentation are maintenance manuals based on the Interactive Electronic Technical Publication (IETP) package, derived from the S1000D International Specification for Technical Publications.

The operator should initiate a method of recording any document changes made by the operator. For more information about revision control, see Section 2.7.2.

Industry Consensus: **Text accepted in its entirety.**

Proposed Change #3, submitted by LFT after the comment period

4.1.2 Scheduled Maintenance Manuals

A scheduled maintenance manual contains a checklist of scheduled maintenance procedures and recommended equipment cleaning procedures. This list can reference other maintenance documents, or be a compendium of maintenance procedures. This manual may also include procedures to perform periodic database updates such as those required for Flight Management Systems (FMS).

PROPOSED ADDITIONAL TEXT: Information on preventative maintenance shall ~~include~~ contain:

Task reference

Task title

Worksteps

Interval

First run date in reference to Entry Into Service (i.e., 21 days after EIS)

Industry Consensus: **Text accepted in its entirety.**

Proposed Change #4, submitted by LFT after the comment period

4.1.3 First Line Maintenance Manuals

First line maintenance is maintenance performed onboard the simulator, typically preventative, scheduled, and relatively simple removal and replacement of components.

This documentation contains the descriptive and setup information on principles of operation, explaining how the system (or integrated systems) functions normally.

Further guidance is included on troubleshooting, corrective actions, equipment removal and installation, and setup and calibration.

PROPOSED ADDITIONAL TEXT: Information on first line maintenance shall ~~include~~ contain:

Task reference

Task title

Worksteps

Interval

First run date in reference to Entry Into Service (i.e., 21 days after EIS)

Industry Consensus: **Text accepted in its entirety.**

Proposed Change #5, submitted by LFT after the comment period

4.2.1 Parts and Equipment List

Information on all training device equipment, subassemblies, test equipment, parts an spare shall be delivered to the operator as comprehensive as possible, containing drawings and specifications where applicable. This information commonly includes:

- Manufacturer, sub-tier supplier, or vendor information (physical address, website, phone, etc.)
- Part numbers, including revision level
- Information on what systems each part is used on (Next Higher Assembly)
- Export control information (ECCN, EAR, HTS, etc.)
- Specialized tools and test equipment
- Consumables
- Recommended Spares List

**NEW BULLETS:**

- Number of Parts
- Positon (if applicable)

Industry Consensus: **Text accepted in its entirety.**

Proposed Change #6, submitted by TRU Simulation after the comment period

4.3 Software Documentation

- Software documentation should include:
- Software integration overview
- Operating system, including manufacturer's modification
- FSTD executive program document
- Software module design documentation
- Software styles and practices manuals
- Interface Control Documentation
- List of Loadable Software Parts (LSP)
- Software revision control documentation
- Utilities program document (user guide)
- Customer configuration options guide

**NEW TEXT:** The scope of this Standard does not include in-depth material related to Loadable Software Aircraft Parts (LSAP). Please refer to ARINC Report 445: *Guidance for Configuration and Control of Loadable Software Parts In Flight Simulation Training Devices* to specify requirements for actual FSTD software derived from aircraft software.

Descriptions of each are provided in the following sections.

Industry Consensus: **Text accepted in its entirety, but added as commentary.**

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## 1.0 BACKGROUND

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#### 1.1 Purpose

The intent of this standard is to provide guidance so the documentation provided with the Flight Simulation Training Device (FSTD) reflects and describes the delivered FSTD, including the description and definition of third party equipment and content.

In the context of documentation guidance found in this report, the term FSTD is meant to include all levels of flight simulation devices.

The documentation described herein is required for the operator to independently support the FSTD in the maintenance, operation, and update of the device throughout the lifetime of the device.

This report describes a superset of a possible range of documentation involved in the initial delivery or an update of a FSTD. The deliverable documentation set for a particular FSTD may vary depending on the level of device (e.g., flat panel trainer versus a full flight simulator) as well as issues related to intellectual property, export compliance, technical requirements, and/or contractual agreements.

#### 1.2 Scope

This report provides guidance on the following key points:

- The first objective is to outline the document and data requirements of the operator, to sufficient depth and completeness upon initial delivery.
- Secondly, the documentation should be maintained current, accurate, and relevant to the device. This remains important throughout the life of the device, regardless of any potential transfer of ownership.
- Thirdly, communication between aircraft manufacturers, Training Device Manufacturers (TDMs), and FSTD operators is important for the successful maintenance of the device and documents.

#### 1.3 Reference Documents

The latest versions of the referenced documents apply, as well as the sources of the terms and definitions used in this ARINC Standard. The reader should ensure that the most current versions of all documents, websites, and contacts are referenced. In many cases, the standards referenced below also contain specific documentation requirements.

- **ARINC Report 434:** *Synthetic Training Device (STD) – Life Cycle Support*
- **ARINC Report 437:** *Guidelines for Training Facilities*
- **ARINC Report 438:** *Guidance for Acceptance of Flight Simulation Training Devices*
- **ARINC Report 440:** *Guidelines for the Provisioning and Support of Training Equipment Data*
- **ARINC Report 441:** *Guidelines for the Supply of Binary Format Software for Training Purposes*
- **ARINC Report 442:** *Guidelines for the Supply of Source Code/Electronic Diagrams for Training Purposes*

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- ARINC Report 444: *Overview of Export Control Issues for Flight Training Devices*
- **ARINC Report 445:** *Guidance for Configuration and Control of Loadable Software Parts in Flight Simulation Training Devices*
- ARINC Report 674: *Standard for Cost Effective Acquisition for Aircraft Lifecycle Support*
- **ARINC Report 835:** *Guidance for Security of Loadable Software Parts using Digital Signatures*
- **ATA iSpec2200:** *Information Standards for Aviation Maintenance*
- **S1000D:** *International Specification for Technical Publications*

### COMMENTARY

The terminology of other ARINC standards has been applied to this document in the interest of consistency. This document has a broader scope and therefore does not follow the existing terminology precisely in all cases.

## 1.4 Documentation Types

The documentation delivered with an FSTD should be a comprehensive suite intended to provide the operator all of the information required to test, accept, operate, maintain, qualify, update, modify, and upgrade their device.

While the following sections describe different levels of complexity, some documents may be considered to fall into multiple categories.

### 1.4.1 Documentation Guide

A guide that lists all documentation delivered with an FSTD.

### 1.4.2 Simulator Operational Documents

The following examples of documents are used for simulator operational tasks:

- Simulator Safety Equipment and Emergency Procedures
- Simulator Startup and Shutdown
- Instructor Operating Station
- Lesson Plan Editors

More information on operational documents is provided in Chapter 3.

### 1.4.3 Simulator Support Documentation

The following sub-sections briefly describe commonly found material used in the engineering and maintenance of flight training devices.

More information on support documentation is provided in Chapter 4.

#### 1.4.3.1 Acceptance Documents

Acceptances are accomplished pursuant to a device purchase or relocation. These documents are used to ensure an FSTD operates safely, efficiently, and with the appropriate level of fidelity when representing the aircraft. These documents may also be used for regression testing, or following a major update.

For more information, see **ARINC Report 438:** *Guidance for Uniform Acceptance Procedures of Flight Simulation Devices*.

## 1.0 BACKGROUND

Although not all inclusive, the following examples of acceptance documentation may include:

- Acceptance Test Manuals (ATMs)
- Qualification Test Guides (QTGs)
- Operational Test Manuals (OTMs)
  - OTMs are also known as Operational Checkout Documents (OCDs)
- Malfunction Checkout Documents (MCDs)

### 1.4.3.2 Maintenance Documents

Maintenance documents support the following tasks used for the majority of simulator maintenance:

- Health and safety precautions (prior and during maintenance tasks)
- Operational safety (equipment, motion, power, etc.)
- Setup and calibration
- Remove, replace, and repair hardware
- Software maintenance procedures
- Preventive maintenance

### 1.4.3.3 Engineering and Development Documents

The following are examples of more in-depth level of documentation used to support simulation engineering and development, updates/upgrades, and system replacements.

- System description documents
- Software description documents
- User Guides
- Hardware specifications
- Interface Control Documents

## 1.5 Simulator Operations and Maintenance Training Based on Documentation Package

The simulator support documentation should be sufficient in breadth, depth, and clarity and will support simulator maintenance training needs with minimal supplementation.

If an operator creates new, or modifies the TDM's existing technical material to accomplish training, a feedback mechanism should be implemented to allow the TDM to review the supplementary technical information. Coordination will reduce configuration issues, communication errors, and potentially device downtime. For more discussion on communication, see Section 2.7.1.

## 1.6 Emphasis on Safety

All documentation should include accurate health and safety information. Both the originator and reader should consider the safety and security of personnel and equipment as their primary objective. National, regional, and local regulations should be closely followed.

## 2.0 GENERAL CONSIDERATIONS

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#### 2.1 Introduction

While the Training Device Manufacturer (TDM) is responsible for delivering an FSTD that faithfully represents an aircraft, it is the simulator operator that will be responsible for the maintenance, discrepancy resolution, and updates of the device.

Each operator should have the opportunity to maintain and update their FSTD to suit their training needs. Similarly, simulator operators need to maintain their documentation current and accurate to the simulator throughout the device's lifecycle. . Documentation should be available to the operator in a format maintainable by the operator.

It is important to note that the practice of the operator maintaining their documentation should not be taken lightly. Misrepresented documentation could lead future maintenance and engineering efforts astray. Additionally, the TDM (or third parties) would not have the traceability to troubleshoot or update a system if the documentation is not maintained accurate, current, and up-to-date – this would necessitate the use of the original documentation. .

The mechanism for identifying systems, sub-systems, components (including software) in any documentation should be correlated to either the codification of the aircraft manufacturer's. For example, the ATA index, or the methods found in S1000D.

#### 2.2 Intellectual Property and Export Compliance

The operator and the TDM need to have a clear understanding of both the export compliance and intellectual property issues that surround a FSTD delivery, particularly with regards to the documentation.

For more information about export compliance, see ARINC Report 444: *Guidance for Export Control in Flight Training Devices*.

For more information on management of intellectual property see ARINC Report 674: *Standard for Cost Effective Acquisition for Aircraft Lifecycle Support*.

#### 2.3 Documentation Standards

The TDM is encouraged to use industry standards such as Simplified Technical English as referenced in S1000D, ATA iSpec 2200, etc.

It is also encouraged that documentation standards be considered as part of the engineering design standards used in the development of the FSTD.

#### 2.4 Documentation Maintainability and Format

In general, the documentation developed by the TDM (and third party supplier, if applicable) should be available to the operator in a maintainable format, using typical commercial standard word processing, spreadsheet, drawing software, or other editing utilities. A non-standard commercial software product is not recommended. If a non-standard product is used, the software and appropriate licensing must be made available.

It is expected that the TDM's original developed documentation may be modified by the FSTD operator over the lifetime of the device, as simulated systems are modified, and as the simulator systems themselves are updated, such that the simulator documentation continues to accurately represent the actual simulator configuration.

## 2.0 GENERAL CONSIDERATIONS

While some TDM documents or third party supplied documents are used as-is and may not be revised by the operator, there may be instances where these documents are annotated for clarity during use. It is encouraged that third party documentation be provided at the highest maintainable level available.

Documents should include text identifying the TDM, user, title, revision, Table of Contents (TOC), and pagination as appropriate.

### 2.5 Deliverable Format

Electronic media is preferred, although hard copy may be provided upon request for certain documentation. If electronic media is used, system suppliers, TDMs, and operators should communicate and control changes/updates and may utilize a mechanism to provide simple capabilities to download and verify authenticity.

Simulator operators may prefer that some documentation be in an interactive format. Examples of this interaction include hyperlinks, parts listings, figures, drawings, and OEM documents.

Documentation should be interactive, exportable, and convertible. The latter term can be described as contents of an excel file being extracted and converted to a table structure suitable for import into a maintenance tool.

A specific example of this type of interactive documentation are maintenance manuals based on the Interactive Electronic Technical Publication (IETP) package, derived from the S1000D International Specification for Technical Publications.

The operator should initiate a method of recording any document changes made by the operator. For more information about revision control, see Section 2.7.2.

### 2.6 Standardized Introductory Material

The entire documentation package should have a standardized method to denote:

- Warnings, cautions, and notes
- Abbreviations
- Dimensional units
- Electrostatic Discharge (ESD)
- Control of Substances Hazardous to Health (COSHH)
- Restriction of Hazardous Substances (RoHS)
- Material Safety Data Sheets (MSDS)

### 2.7 Documentation Change

It cannot be overstated the importance of maintaining the documentation over the life of the device (20+ years). The documents need to remain in step with any and all hardware and software changes.

This practice of maintaining hardware, software, and documentation with equal emphasis directly impacts the operator's successful configuration management.

#### 2.7.1 Communication

Throughout the lifecycle of an FSTD, communication between the aircraft manufacturer, TDM, and operator is key to maintaining document configuration and accuracy with each entity. This provision applies bi-directionally. For example, an

**2.0 GENERAL CONSIDERATIONS**

operator may need to notify their TDM (and/or aircraft manufacturer) of an important documentation error or shortfall.

Likewise, the TDM may also initiate documentation updates and need to communicate these to the operator. It is recommended that the operator ensure that accurate contact information is maintained with the TDM.

Any critical or safety issues should be communicated using the highest urgency possible. Widest distribution, along with targeted communication, is a goal to ensure affected entities are notified. For messages of critical importance, a feedback mechanism for positive confirmation of change implementation is advised (by both parties).

Conversely, routine communication of general information, as well as notification of document changes, would be considered to have little risk of adverse outcome to personnel or equipment. Examples of communication include Field Service Bulletins or Service Information Letters.

**2.7.2 Identifying Revised Material**

Each operator and/or TDM will have a predetermined method of noting changes in the documentation. A revision history at the front of each document that clearly identifies all changes should be utilized in most cases. An example of a common revision table is shown in Table 2-1.

**Table 2-1 – Example of Revision History**

Date	Revision Number	Affected Pages	Initials
2015/01/31	28-40 Fuels Sys Rev A	pp. 1, 4, 9-13, App A, Attach 1	SLS
2015/02/28	28-40 Fuels Sys Rev B	pp. 2, 8, 16, 64, 128, 256	TCB

Some operators may require a more detailed descriptive identification of changed material, correlating with a revision number. This could entail a high level abstract of a system change driving a documentation change, or be a very detailed explanation.

<b>Revision Letter</b>	<b>B</b>		
<b>Changes in This Revision</b>	1. Revised – Appendix A Atmosphere and Environment A.2		
	2. New – Appendix A Circuit Breakers A.4		
	3. Revised – Appendix A Options Controls A.6		
	4. Revised – Appendix A TestAircraftReposition Event Table A.8.2		
	5. New – Appendix A Transport Delay Controls A.8.5		
	6. Revised – Appendix A AircraftReposition Event Table A.9		
	7. Revised – Appendix B Interface Port Offsets		
AUTHOR:	<u>R. Lee Erney</u>	<u>CP-01-L8A</u>	<u>                    </u> Date
		Org. Number	
AUTHOR:	<u>Erik Estrada</u>	<u>CP-01-L8A</u>	<u>                    </u> Date
		Org. Number	

**Figure 2-1 – Example of Detailed Revision Page**

In electronic formatted documents, the change history may be embedded directly in the pages themselves, and can be extracted as needed. Similarly, documents may possibly be compared to previous versions to highlight changes using common utilities (e.g., MS Word, PDF, etc.).

### 3.0 SIMULATOR OPERATIONAL DOCUMENTS

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The majority of the information provided for the safe operation of the FSTD originates from the TDM, and may be supplemented by the operator. Examples of these are outlined in the following sections.

##### 3.1 Simulator Safety Equipment and Emergency Procedures

The simulator safety equipment and emergency procedures manual provides specific safety-related instructions to the operators, instructors, and maintenance personnel of the flight simulator for its correct use. These may include general safety precautions, procedures, and operation of the flight simulator emergency and safety features.

##### 3.2 Simulator Startup and Shutdown Guide

Provides procedures for normal startup and shutdown of equipment.

##### 3.3 Instructor Operating Station Manual

The Instructor's Operating Station (IOS) manual (sometimes referred to as an IOS user guide) provides information on the IOS page structure, content, and usage.

Due to the need to distribute the IOS manual (user-guide) widely amongst numerous instructors, including potentially third-party instructors, the operator may request that the manufacturer's copyright on this specific document be waived or removed. The manufacturer should note that the purpose of this is to facilitate the use of their device, not the commercial exploitation of their documentation and IP.

##### 3.4 Lesson Plan Editor Guide

Provides guidance for creating and editing lesson plans. This guide may be combined with the IOS manual. Provisions for editing lesson plans offline on platforms other than the IOS should also be supported.

##### 3.5 Customer Option Selection

An operator needs to be able to select a customer-specific configuration for training. The method of selection may be included in the IOS manual or the Startup and Shutdown Guide.

## 4.0 SIMULATOR SUPPORT DOCUMENTATION

### 4.0 SIMULATOR SUPPORT DOCUMENTATION

This chapter includes definitions and guidance for:

- Maintenance manuals
- Hardware documentation
- Software documentation
- Test and Verification Documentation
- Third Party Supplier Documentation
- Third Party Equipment Configuration Detail
- Facilities and Installation Documentation

#### 4.1 Maintenance Manuals

These manuals support troubleshooting, diagnostics, installation, setup, and maintenance. They can vary by operator and TDM. The following are examples of maintenance manuals commonly found in an FSTD operator's documentation library:

- Troubleshooting guide
- Scheduled maintenance manual
- First line maintenance manuals
- Second line maintenance manuals

Simulator operators may prefer that maintenance manuals be in an interactive format. One example is the Interactive Electronic Technical Publication (IETP) package, derived from the S1000D International Specification for Technical Publications.

##### 4.1.1 Troubleshooting Guide

The troubleshooting guide provides top-level troubleshooting information for major FSTD systems, and may include:

- Online diagnostic tools
- Fault code retrieval/cross reference
- Fault descriptions
- Log files

##### 4.1.2 Scheduled Maintenance Manuals

A scheduled maintenance manual contains a checklist of scheduled maintenance procedures and recommended equipment cleaning procedures. This list can reference other maintenance documents, or be a compendium of maintenance procedures. This manual may also include procedures to perform periodic database updates such as those required for Flight Management Systems (FMS).

Information on preventative maintenance shall include:

- Task reference
- Task title
- Worksteps
- Interval(s)
- First run date (in reference to Entry-Into-Service. I.e., 21 days after EIS)

## 4.0 SIMULATOR SUPPORT DOCUMENTATION

### 4.1.3 First Line Maintenance Manuals

First line maintenance is maintenance performed onboard the simulator, typically preventative, scheduled, and relatively simple removal and replacement of components.

This documentation contains the descriptive and setup information on principles of operation, explaining how the system (or integrated systems) functions normally.

Further guidance is included on troubleshooting, corrective actions, equipment removal and installation, and setup and calibration.

Information on preventative maintenance shall include:

- Task reference
- Task title
- Worksteps
- Interval(s)
- First run date (in reference to Entry-Into-Service. I.e., 21 days after EIS)

### 4.1.4 Second Line Maintenance Manuals

Second line maintenance is the repair of hardware and software components off-board the simulator.

These manuals contain repair information on Line Replaceable Units (LRU), power supplies, circuit cards, including component repair or replacement. The following are examples of repair information commonly found in an FSTD operator's documentation library.

- PCB test and repair
  - Circuit board testing station materials list
  - ROHS, COSHH, MSDS data sheets
  - Reference to general maintenance
- Instrument repair
- Mechanical assemblies repair
  - Remove and replace, repair, disassembly, etc.
  - Detailed materials list (piece parts, consumables, etc.)
- Repair information on FSTD Subsystems
  - Motion, visual, smoke, sound, controls, etc.

## 4.2 Hardware Documentation

This documentation is comprised of mechanical, electrical, and electronic information, including the following examples:

- Simulator technical specification
- Top level drawing
- Documentation tree
- Interface Control Documents (hardware specific)
- Assembly drawings
- Dimensional mechanical drawings

#### 4.0 SIMULATOR SUPPORT DOCUMENTATION

- System, circuit, wiring diagrams
- Wiring list, including spare positions
- Cable assemblies
- Simulated or modified instruments/panels
- Computer systems and simulator architecture and description
- Number of parts
- Position (if applicable)

##### 4.2.1 Parts and Equipment List

Information on all training device equipment, subassemblies, test equipment, parts and spare shall be delivered to the operator as comprehensive as possible, containing drawings and specifications where applicable. This information commonly includes:

- Manufacturer, sub-tier supplier, or vendor information (physical address, website, phone, etc.)
- Part numbers, including revision level
- Information on what systems each part is used on (Next Higher Assembly)
- Export control information (ECCN, EAR, HTS, etc.)
- Specialized tools and test equipment
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- Recommended Spares List
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##### 4.3 Software Documentation

Software documentation should include:

- Software integration overview
- Operating system, including manufacturer's modification
- FSTD executive program document
- Software module design documentation
- Software styles and practices manuals
- Interface Control Documentation
- List of Loadable Software Parts (LSP)
- Software revision control documentation
- Utilities program document (user guide)
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Descriptions of each are provided in the following sections.

#### COMMENTARY

The scope of this Standard does not include in-depth material related to Loadable Software Aircraft Parts (LSAP). Please refer to **ARINC Report 445: Guidance for Configuration and Control of Loadable Software Parts In Flight Simulation Training Devices** to specify requirements for actual FSTD software derived from aircraft software.

## 4.0 SIMULATOR SUPPORT DOCUMENTATION

### 4.3.1 Software Integration Overview

The software integration overview provides a description of the architecture, features, operation, and interaction of the major simulation software components, and how the software integrates into the hardware.

This overview should list all modules and software elements delivered with the FSTD. Examples of software elements include:

- Operating System (OS) libraries and configuration files
- Simulation module source code
- Compiler libraries
- Executables
- Objects
- Data files

### 4.3.2 Operating System

This describes the operating system, for example, UNIX, Windows, etc. This should include modifications, versioning, real-time extensions, and patches implemented by the TDM.

### 4.3.3 FSTD Executive Program Document

This document details the operation of the executive scheduler. This software comprises the master timing, subroutine running, and the scheduling of simulation tasks. At a minimum, a list of all modules under executive control should be provided at delivery.

While subject to business considerations, an FSTD operator may wish to have guidance on software module management (add, modify, delete).

### 4.3.4 Software Module Design Documentation

These documents detail the operation of simulation modules operating within the overall system architecture. These include a description of the FSTD functions and systems and their interaction. The intent of these documents is to:

- Describe/document the relationship between the source data & the real-time implementation of the system concern,
- Describe the structure of the software module(s) for the system concerned,
- Provide sufficient data to allow the operators engineering group to maintain, correct and update the software models for the duration of the operational life of the device.

The documentation of aircraft system models should include logic tables, model variables, and development of equations. All should be fully referenced to the data provider's documentation (avoiding ambiguous abbreviations). This may also include flow diagrams, pseudo-code, and Universal Modeling Language (UML) examples. References to the appropriate functions in the simulation module source code should also be provided.

## 4.0 SIMULATOR SUPPORT DOCUMENTATION

### 4.3.5 Software Styles and Practices Manuals

This information includes guidance for syntax, layout, semantics, code commenting, meaningful variable and function naming conventions, programming languages, and standards.

If software code commenting standards are strictly adhered to, commercially available utilities such as Doxygen, or Robodoc may be used to assist in building and maintaining software design documents.

### 4.3.6 Interface Control Documentation

The interface control document defines the Input/Output (I/O) of the individual software modules and how they interact. Supplied documentation should include third party supplied software Interface Control Documents (ICD), where available.

### 4.3.7 List of Loadable Software Parts

This is a listing of Loadable Software Parts (LSP) installed or delivered with an FSTD, as defined in **ARINC Report 445: *Guidance for the Configuration and Control of Loadable Software Parts in Flight Simulation Training Devices***. The list should contain identifying information including at a minimum:

- Description
- Part number
- Revision number

This list can be considered an initial configuration control document. This may not be applicable in all cases, but is prevalent in software intensive aircraft and FSTDs.

### 4.3.8 Software Revision Control Documentation

A mechanism to track changes to software should be implemented for configuration control. This is often referred to as a software log, record of changes, version description document, etc. In any case, this will remain a historical, living record throughout the life of a device.

Software Control Documentation can benefit from tools that extract comments in the check-in headers to provide revision tracking.

Software revision control, may also use an integrated defect tracking tool. For example, commonly available utilities such as Trac, Redmine, Youtrack, and others can be easily integrated into standard software revision control systems such as RCS, CVS, Git, Subversion.

### 4.3.9 Utilities Program Document (User Guides)

A collection of manuals for utilities related to the operation, maintenance, discrepancy resolution, and update of the FSTD and its systems. For example:

- IOS editor
- QTG manager
- Lesson plan editor
- Sound tuning applications
- Navigation database editor
- Motion and flight controls tuning applications
- Debug, diagnostic, and testing tools
- Visual modeling and alignment tools

#### 4.0 SIMULATOR SUPPORT DOCUMENTATION

- Customer configuration options manager
- Software development environment
- Aircraft option loaders for:
  - Operational Program Configuration (OPC)
  - Operational Program Software (OPS)
  - Airline Modifiable Information (AMI)
  - Other LSPs

The documentation for the software development environment (including operating system version and variable requirements) should include details of the utilities' version and associated libraries. For example, although rare, the compiler can proceed through an update evolution (often driven by host computer replacement) and affect the software after the modification.

##### 4.3.10 Customer Configuration Options Guide

The simulator may need to support the creation and management of multiple customer configurations. This functionality should be identified and specified early in contractual negotiation between the TDM and the operator.

Developed and delivered by the TDM, the customer configuration options guide provides instructions and methods to accomplish these types of modifications.

#### 4.4 Test and Verification Documentation

To support the installation, commissioning, acceptance, qualification, and continuing maintenance of a device, the TDM should provide all test and verification results and documentation. Test and verification documentation may include:

- Acceptance Test Manuals (ATMs)
  - Systems, IOS, motion, visual, engineering facilities, safety, etc.
- Qualification Test Guides (QTGs)
- Operational Test Manuals (OTMs) also known as Operational Checkout Documents (OCDs)
- Malfunction Checkout Documents (MCDs)
  - Detailed in **ARINC Report 441: Guidelines for the Supply of Binary Format Software for Training Purposes**
- Commissioning procedures documents
  - Commissioning is the process of bringing a newly assembled (or reassembled) device to operational readiness. For example, motion startup and full extension/excursion testing

#### 4.5 Third Party Supplier Documentation

TDMs should include third party documentation for components or systems including software components and software systems. TDMs should provide a list of third party suppliers, their equipment, applicable licenses, and associated documentation.

Examples include:

- User manuals
- Maintenance manuals

#### 4.0 SIMULATOR SUPPORT DOCUMENTATION

- Technical reference manuals
- Licenses of third party equipment/software
- Third party software ICDs

#### 4.6 Third Party Equipment and Software Configuration Detail

This TDM-produced document describes how third party equipment and software is configured for simulator use. For example, this could include considerations for network addressing conventions, device drivers, customized firmware loads of embedded PROM's and PLC's, etc. The TDM should provide instructions or guidance defining the interface, interaction, and operation of third party equipment and software within the FSTD environment.

#### 4.7 Facilities and Installation Documentation

The building and infrastructure requirements for device installation and usage should be provided to the operator as early as possible. More information can be found in **ARINC Report 437: *Guidelines for Training Facilities***.

**APPENDIX C  
THE THIRD APPENDIX****APPENDIX A ACRONYMS**

AMI	Airline Modifiable Information
ATM	Acceptance Test Manual
COSHH	Control of Substances Hazardous to Health
COTS	Commercial Off The Shelf
CVS	Control Version System
ESD	Electrostatic Device
FSTD	Flight Simulation Training Device
ICD	Interface Control Document
IETP	Interactive Electronic Technical Publication
I/O	Input/Output
IOS	Instructor Operating Station
LSP	Loadable Software Part
MCD	Malfunction Checkout Document
MSDS	Material Safety Data Sheet
OCD	Operational Checkout Document
OEM	Original Equipment Manufacturer
OPC	Operational Program Configuration
OPS	Operational Program Software
OTM	Operational Test Manual
PDF	Portable Document Format
QTG	Qualification Test Guide
RoHS	Restriction of Hazardous Substances
RCS	Revision Control System
SSP	Simulator Software Part
STD	Synthetic Training Device
TDM	Training Device Manufacturer
TOC	Table of Contents
UML	Universal Modeling Language