

Design Approval Holders Familiarization Briefing for:

Enhanced Airworthiness Program for Airplane Systems - (EAPAS)

Presented to: Design Approval Holders

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EASA Headquarters
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**Federal Aviation
Administration**



Outline



- **Origin of EAPAS Rule**
- **Explanation of EWIS**
- **Overview of EAPAS Rule Package**
- **Part 26 General Strategy**
- **EAPAS – Specific Part 26 DAH Requirements**
- **EWIS ICA**
- **FAA/EASA/DAH Roles and Responsibilities**

Goal of EAPAS Rule

**Enhance safety by
improving all aspects of
aircraft electrical wiring**

Goal is based on –

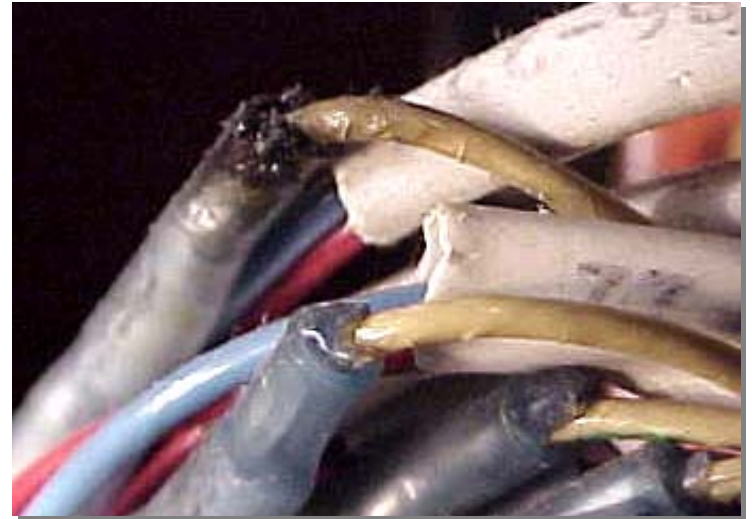
- Industry/government committee data-driven recommendations**
- Maximizing harmonization**

Origin of EAPAS Rule

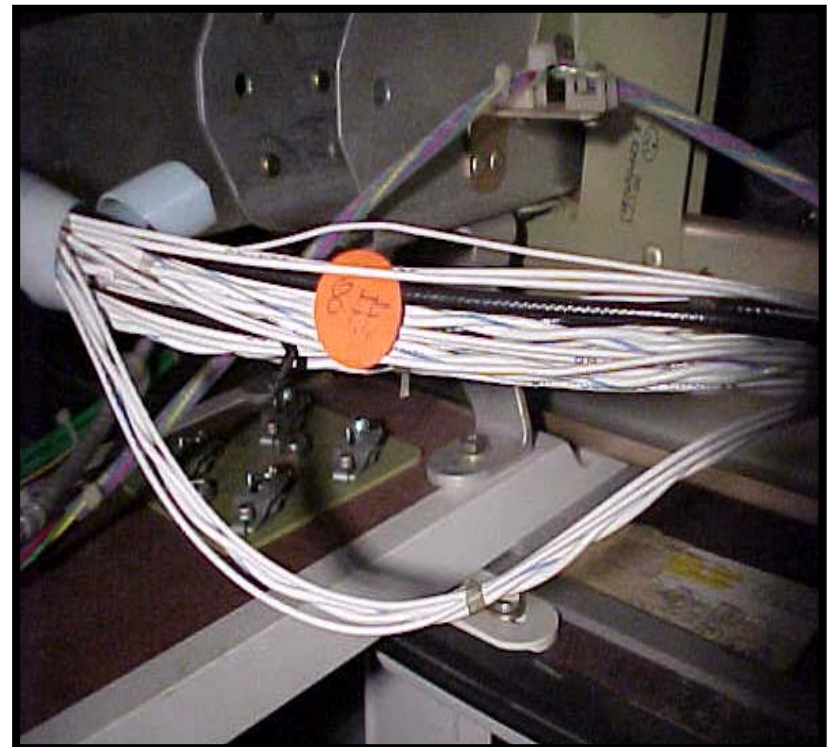


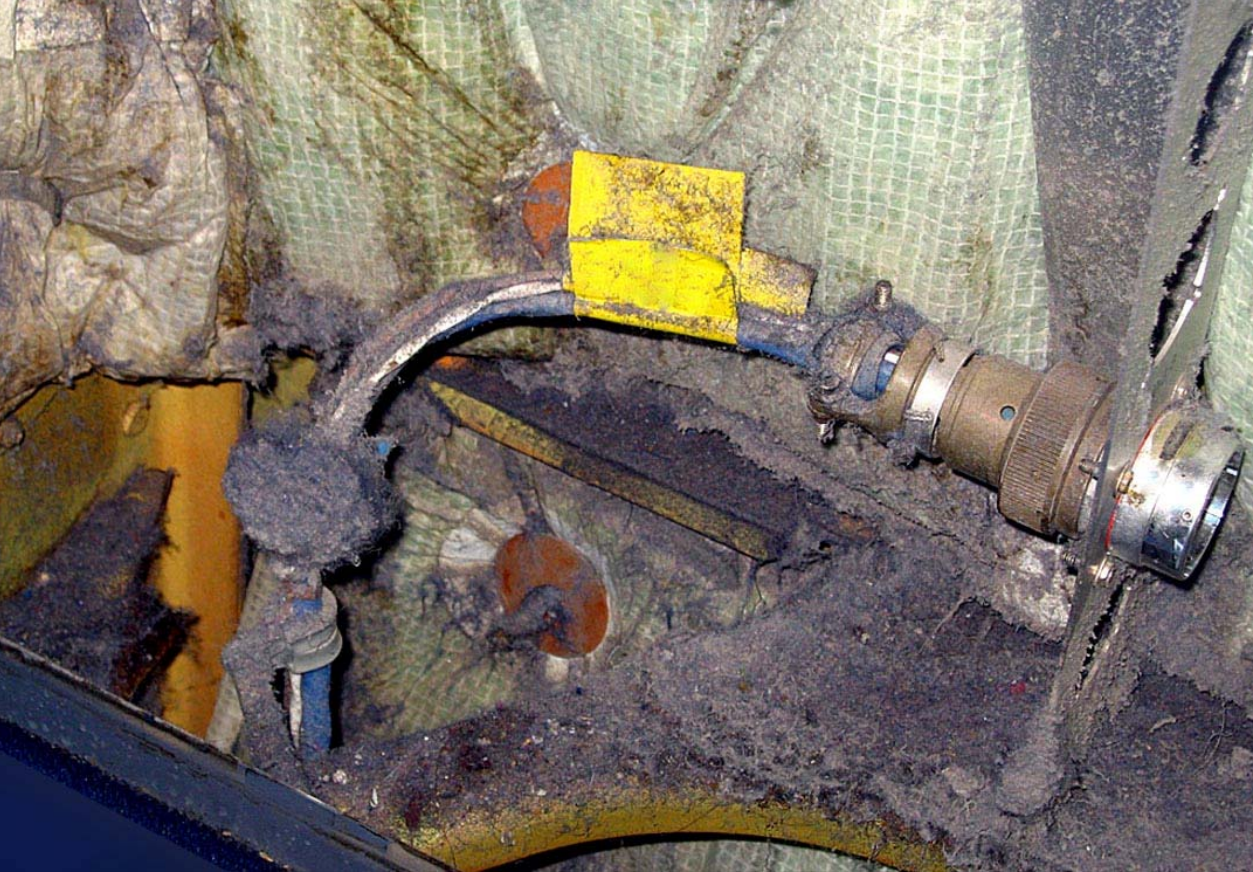
Introduction

- **Late 1980s, wiring safety concerns raised due to accidents & incidents**
- **Investigations found common degrading factors in airplane electrical wiring systems**
- **Investigation into wiring issues done by industry, civil aviation authorities, other government agencies**



Routing/Chafing In-Service Examples







Wiring Investigation Findings

Wiring is affected by:

- Design
- Maintenance
- Operation
- Training
- Repair
- Installation
- Environment
- Awareness
- Abuse
- Time



Previous Regulations Inadequate

- **Previous regulations fell short of providing specific wiring-related requirements**
- **These specific wiring-related requirements needed to be included in certification and operational regulations**

Culture Shift: EAPAS Safety Initiative

Recognizing importance of electrical wiring in safe operation of airplanes leads to being more proactive; FAA is

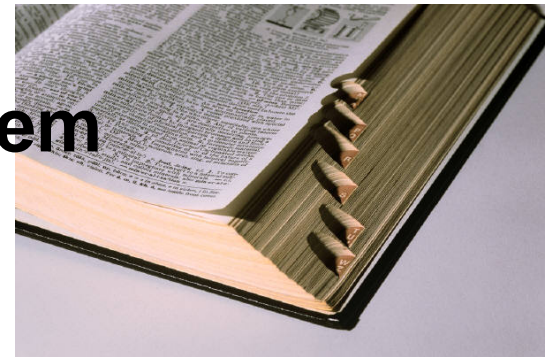
- Treating wiring as a system**
- Mandating DAH support of the initiative**
- Integrating FAA lines of business: joint AFS/AIR activity; and cooperation with & between DAHs and operators**

ELECTRICAL WIRING INTERCONNECTION SYSTEM



EWIS Definition

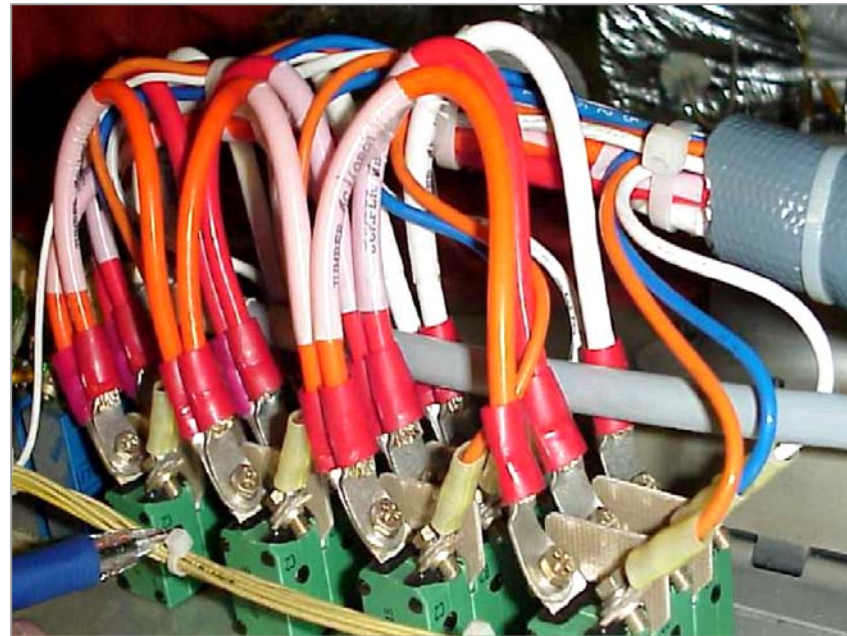
- **Why have a definition?**
 - **Current regulations do not provide a definition of a wiring system**
 - **Without one, new EWIS rules could be inconsistently applied to various wire-related components**
 - **There is more to a wiring system than just wire**



EWIS Definition

An EWIS is [per new 25.1701(a)]:

Any wire, wiring device, or combination of these, including termination devices, installed in any area of the airplane for the purpose of transmitting electrical energy between two or more intended termination points . . .



... *EWIS is not* [25.1701(c)]

- **Electrical equipment or avionics qualified to acceptable environmental conditions and testing procedures**
- **Portable electrical devices not part of airplane's type design**
- **Fiber optics**



Key Point to Remember . . .

**Wire and associated
components now treated
as an airplane system**

Overview of EAPAS Rule Package



EAPAS Rule

- **Notice of proposed rulemaking (NPRM)**
 - Issued in **September 22, 2005**
 - Published on **October 6, 2005**
- **Final rule**
 - Issued on **October 22, 2007**
 - Published on **November 8, 2007**
 - Effective on **December 10, 2007**

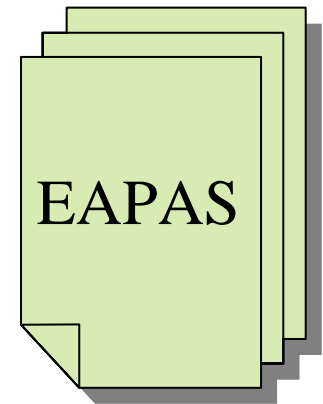


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- III. General Discussion of the Proposal
 - A. Nature of the Problem
 - B. Relationship of this Proposal to Other Aging Aircraft Initiatives
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- IV. Overview of Proposal
- V. Section-by-Section Discussion of Proposed Rules
 - A. Part 25 Subpart H-Electrical Wiring Interconnection Systems (EWIS)
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SEVENTY
THREE

Part 1
Defines “EWIS”

Part 21
Enabling requirements

Part 25
New and revised EWIS
certification requirements
New EWIS ICA requirements

Part 26
Design Approval Holder
Requirements.

Part 91
Fuel tank system maintenance

Part 121
EWIS maintenance &
Fuel tank system maintenance

Part 125
Fuel tank system maintenance

Part 129
EWIS maintenance &
Fuel tank system maintenance

Parts 1 and 21

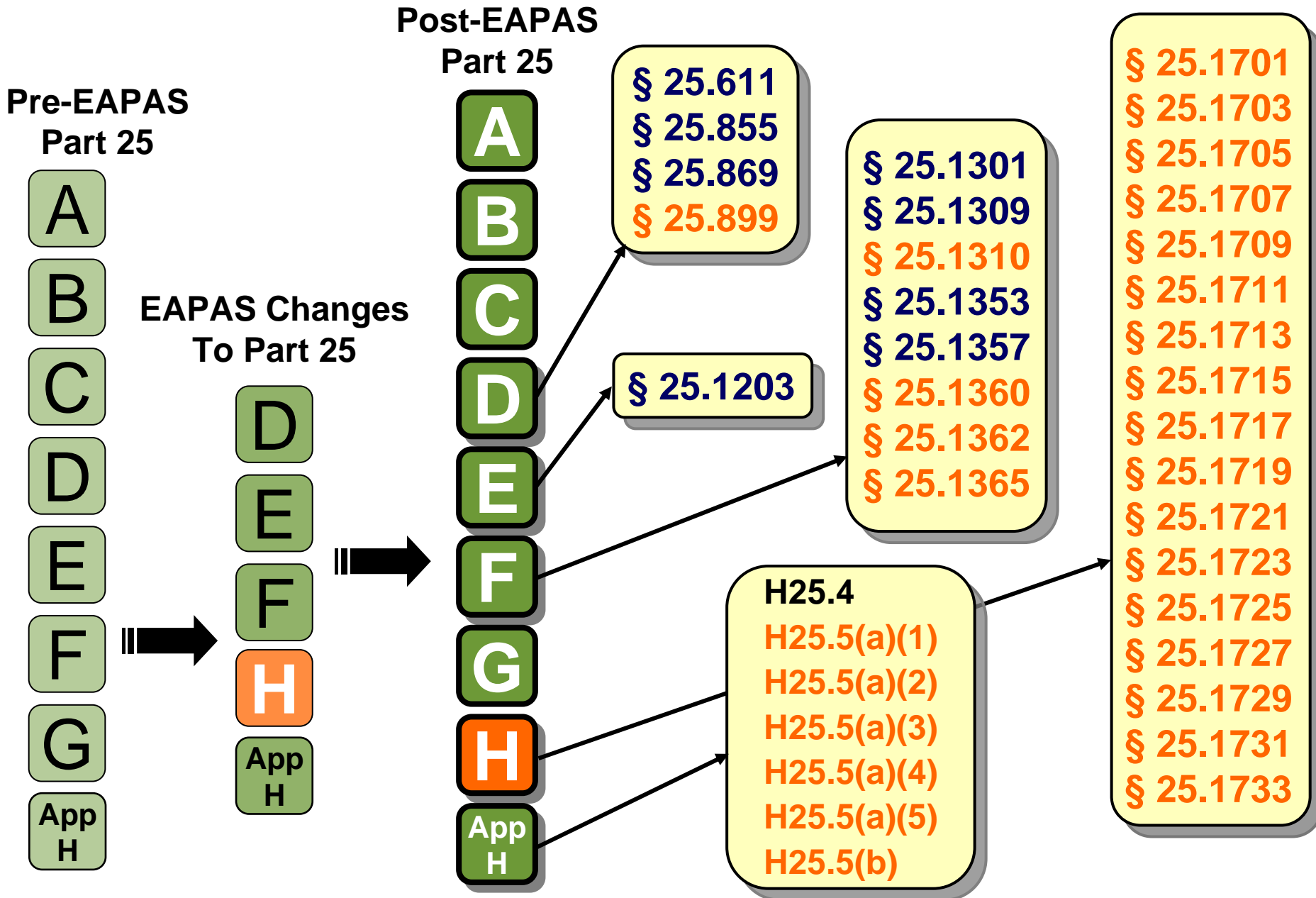
Part 1: Added acronym EWIS

**Part 21: Clarified relationship
between the existing part
21 and new part 26**

Part 25

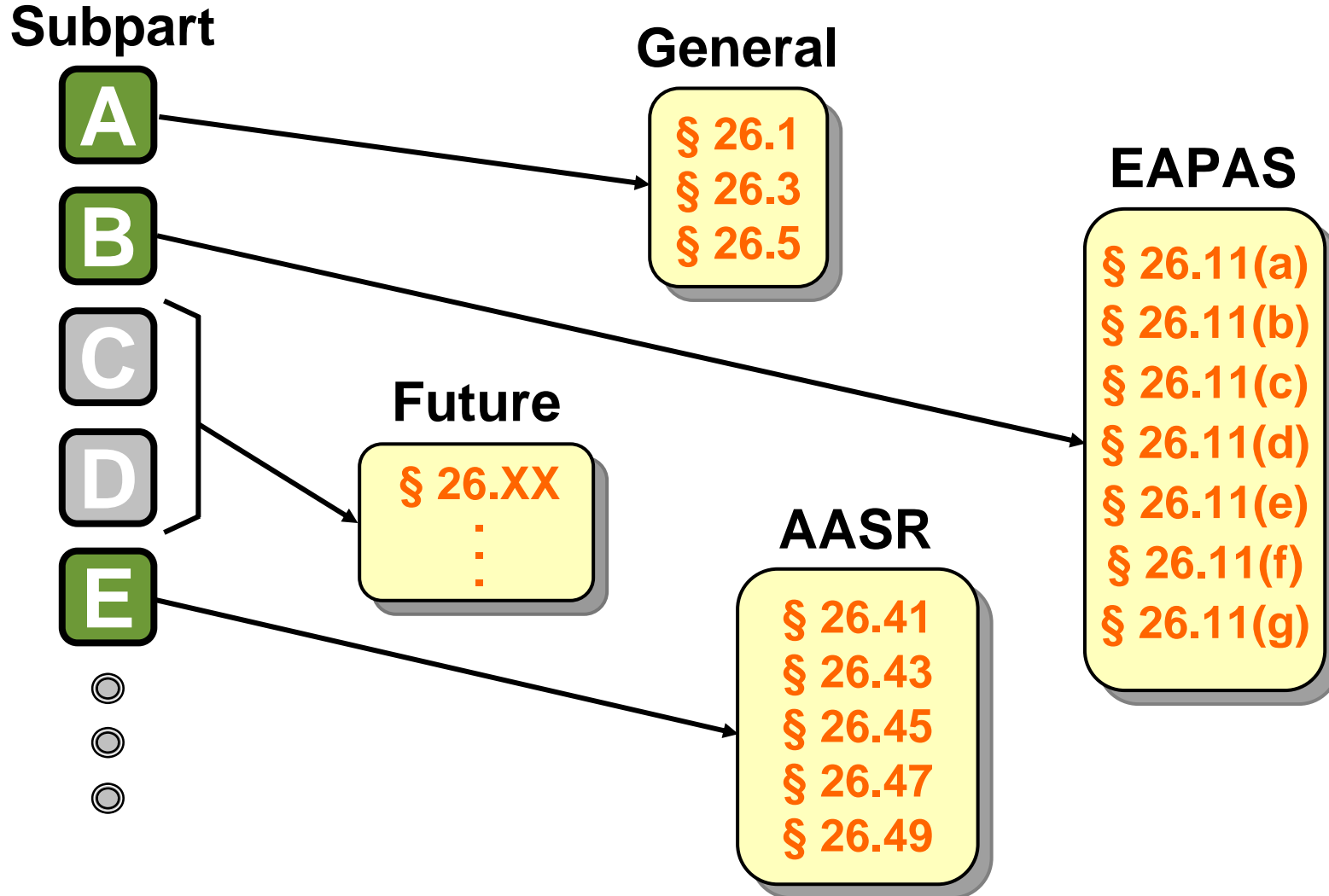
- **New part 25 requirements for certification of electrical wiring interconnection systems (EWIS)**
 - **Revises existing EWIS related certification requirements and relocates some of them**
 - **Creates new EWIS certification requirements and places them in a new subpart H**
 - **New EWIS ICA requirements**

Part 25 EAPAS Revisions



Part 26

Continued Airworthiness and Safety Improvements for Transport Category Airplanes



New Part 26



- **Requires DAH to:**
 - **Develop EWIS maintenance instructions for certain transport category airplanes**
 - **Ensure SFAR 88 fuel tank ICA and EWIS ICA compatible with each other**
 - **Submit a compliance plan that outlines how they will demonstrate compliance**
- **Applies to transport category airplanes with:**
 - **Maximum type certificate passenger capacity of 30 or more, or**
 - **Maximum payload capacity of 7500 pounds or more**

Parts 91, 121, 125 and 129

- **Operators operating under these four parts required to incorporate SFAR 88 ICA**
- **Operators operating under parts 121 and 129 (N registered) also required to incorporate EWIS ICA**



EAPAS – 12 New/Revised ACs



AC No.	Title
26-1	Part 26, Continued Airworthiness and Safety Improvements
25-26	Development of Standard Wiring Practices Documentation
25-27	Development of Transport Category Airplane Electrical Wiring Interconnection Systems Instructions for Continued Airworthiness Using an Enhanced Zonal Analysis Procedure
25.869-1A	Fire Protection Systems
25.899-1	Electrical Bonding and Protection Against Static Electricity

EAPAS – 12 New/Revised ACs, cont.



AC No.	Title
25.1353-1A	Electrical Equipment and Installations
25.1357-1A	Circuit Protective Devices
25.1360-1	Protection Against Injury
25.1362-1	Electrical Supplies for Emergency Conditions
25.1365-1	Electrical Appliances, Motors, and Transformers
25.1701-1	Certification of Electrical Wiring Interconnection Systems on Transport Category Airplanes
120-94	Aircraft Electrical Wiring Interconnection Systems Training Program

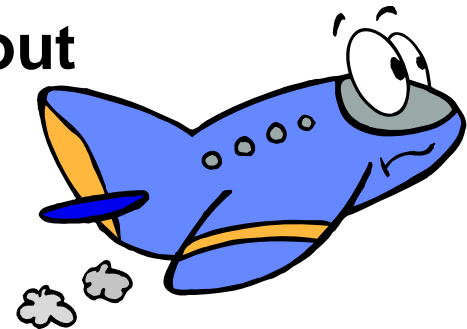
General Strategy

Part 26 – Continued Airworthiness and Safety Improvements for Transport Category Airplanes



Why New DAH Approach?

- **Two approaches for addressing safety issues:**
 - Airworthiness Directives
 - General rulemaking
- **Operators have expressed concerns about the timely availability of data to support compliance with operational rules**
- **Voluntary Support Problems**
- **As a result, the FAA has determined that Design Approval Holder (DAH) requirements will be adopted as necessary to support certain future safety initiatives which will be implemented via operational rules**



Design Approval Holder (DAH)

**The holder of any design approval,
including –**

- Type certificate (TC),**
- Amended TC,**
- Supplemental type certificate (STC),**
- Amended STC . . .**



DAH Rule Purpose & Scope

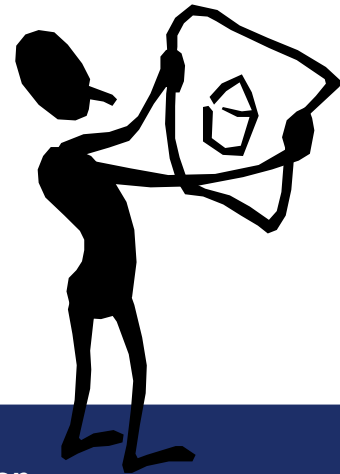
- **Affects continued airworthiness issues and/or safety improvements for transport airplanes addressed via operational rules**
- **Supports the ability of operators to comply with the operational rule requirements**
- **May apply to TC, STC holders, and certain applicants, as appropriate**
- **May Require actions of DAHs, such as:**
 - **compliance plan,**
 - **design changes (although not required by EAPAS),**
 - **instructions for continued airworthiness,**
 - **distribution of information to affected operators**

Typical Rulemaking Component with New DAH Concept

- **Certification rules (Part 25)**
- **DAH rules (Part 26)**
- **Operational rules
(Parts 91, 121, 129, etc.)**

Communication of New Strategy

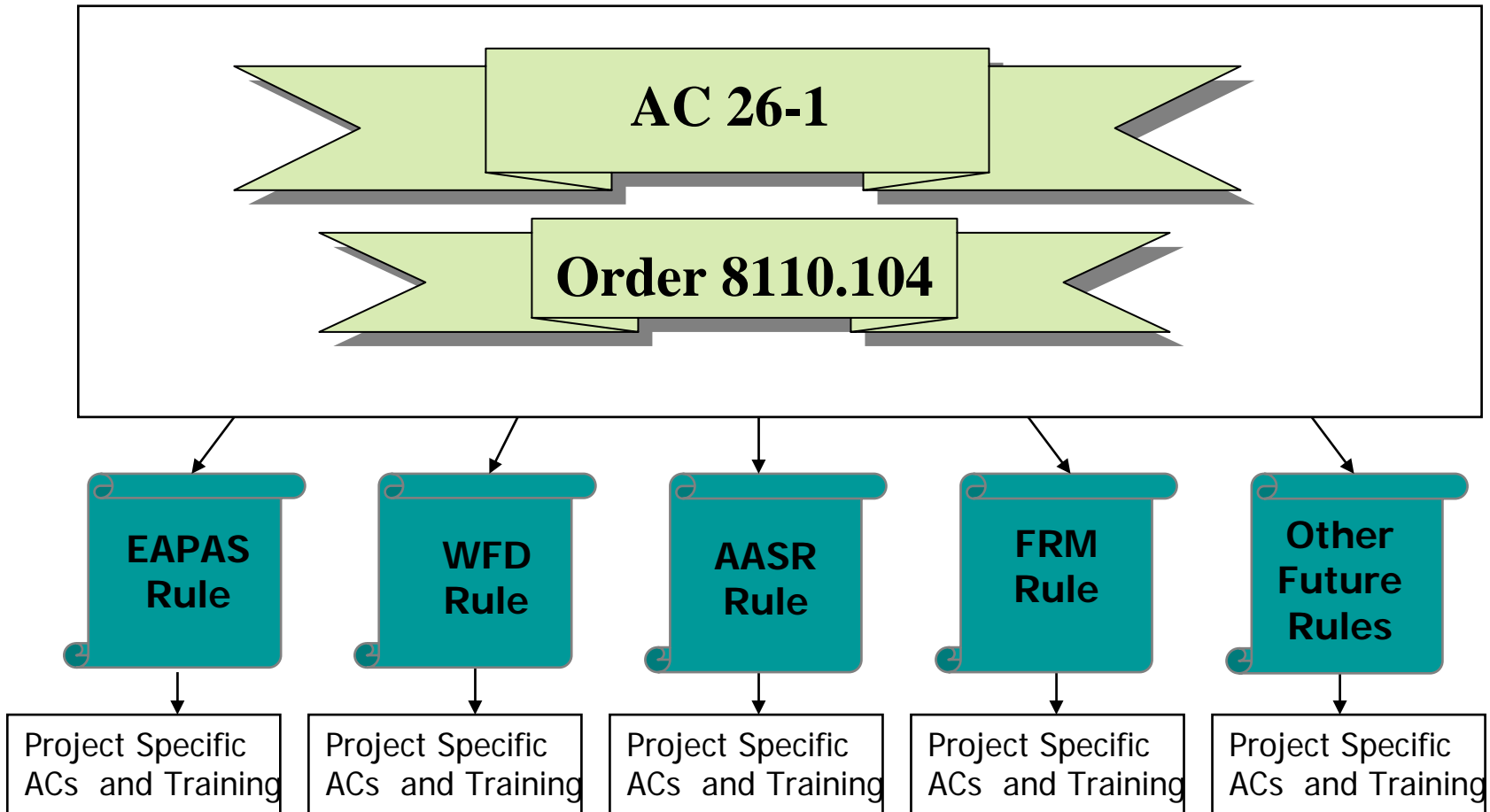
- **FAA published the Aging Airplane Program Update on July 30, 2004**
- **The FAA published an Aging Airplane Program comment disposition document on July 12, 2005**
- **The FAA published a DAH policy statement on July 12, 2005**
- **EAPAS/FTS NPRM published for comment on October 6, 2005**



Current DAH Rulemaking Initiatives

- **Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety (EAPAS)**
 - In part, it requires DAH to develop Electrical Wiring Interconnection System (EWIS) Instructions for Continued Airworthiness (ICA)
- **Aging Airplane Safety Rule (AASR)**
 - Requires DAH to develop damage tolerant inspection instructions for continued airworthiness
- **Fuel Tank Flammability (FRM)**
 - Requires DAH to develop flammability exposure analyses of fuel tank. High risk fuel tanks require new design and ICA.
- **Widespread Fatigue Damage (WFD)**
 - Requires DAH to establish a Limit of Validity of the engineering data that supports the maintenance program.

DAH Rule Implementation



EAPAS – Specific Part 26 DAH Requirements



Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

- a. Applicability
- b. What do TC holders do if 26.11(a) applies?
- c. Evaluation of impact on previously approved EWIS ICA due to design changes
- d. Compliance times
- e. Compliance plan development
- f. Compliance plan implementation
- g. List of exceptions to the rule



Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

a. Applicability

b. What do TC holders do if 26.11(a) applies?

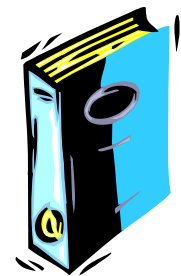
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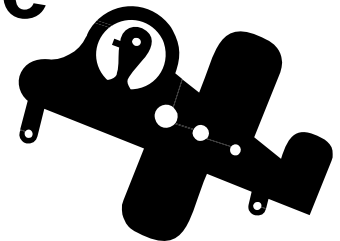
f. Compliance plan implementation

g. List of exceptions to the rule



Airplane Model Applicability

- Airplanes with a maximum type-certificated passenger capacity of 30 or more, or
- Airplanes with a maximum payload capacity of 7,500 pounds or more (reference § 119.3)



Note, airplane models with a type certificate issued prior to January 1, 1958 are not affected. In addition, § 26.11(g) lists 13 airplane models where part 26 does not apply.

Affected DAHs

- **Existing TC Holders**
- **Pending* TC Applicants**
- **Pending* and Future Applicants for**
 - **Amended TCs (includes service bulletins),**
 - **STCs, and**
 - **Changes to existing STCs**

* **Pending - when application is before December 10, 2007 and approval is on or after the December 10, 2007**

What Types of Design Changes Must Comply?

- **Section 26.11 applies to all design changes, even if there is no change to wiring**
 - Requires an evaluation to determine if the modification requires revision to previously approved EWIS ICA
- **Examples**
 - New hydraulic lines may introduce new sources of contamination that were not previously addressed by EWIS ICA
 - Structural cut-out in previously enclosed zone may introduce new sources of contamination



Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

a. Applicability

b. What do TC holders do if 26.11(a) applies?

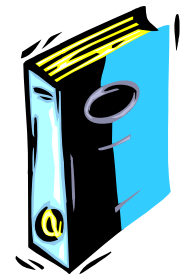
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Existing and Pending TCs - § 26.11(b)

- **Holders of TCs and applicants of pending TCs must:**
 - Develop EWIS ICA for the “**representative airplane**” in accordance with part 25, Appendix H, Sections H25.5(a)(1) and (b)
 - Submit those ICA for review and approval by the “**FAA Oversight Office**”

(EASA will be assisting FAA in review and approval)

What is a “Representative Airplane”?

The configuration of each model series airplane that incorporates all variations of EWIS used in production on that series airplane, and all TC-holder-designed modifications mandated by airworthiness directive as of the effective date of this rule.

(as stated in 26.11(b))

What is the “FAA Oversight Office”?

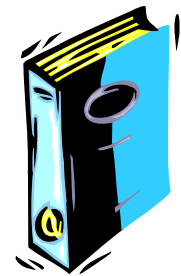
- The aircraft certification office (ACO) or office of the Transport Airplane Directorate with oversight responsibility for the relevant TC or STC
- Defined in § 26.3
- TC examples:
 - Boeing (Puget Sound) - Seattle ACO
 - Airbus - Transport Standards Staff
 - Bombardier - New York ACO
 - Embraer – Transport Standards Staff



Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

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Amended TCs and STCs - § 26.11(c)

- **Applicants for amended TCs, STCs and amended STCs must evaluate if the design change requires revision to EWIS ICA (those developed in accordance with § 26.11(b)), and, if it does:**
 - **Develop and submit new/revised ICA for approval by FAA Oversight Office**
 - **Ensure new/revised EWIS ICA are compatible with SFAR 88 ICA and that redundant requirements are minimized**

Why STCs?

- Under **21.101**, it may be determined not necessary to require applicants to comply with new airworthiness standards
- However, it is appropriate for applicants to comply with same requirements being imposed on existing TC holders
 - Otherwise, safety improvements resulting from TC holder compliance with part 26 could be undone by later modifications

In other words, 21.101 cannot be utilized to avoid having to comply with the applicable sections of 26.11

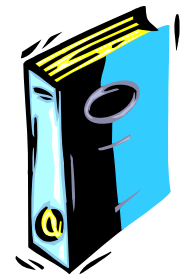
Changes to Existing STCs

- **Section 26.11 applies to the changed area**
- **Unchanged areas do not need to be evaluated**
- **Example:**
 - **If an applicant applies for an amendment to an STC that installs an in-flight entertainment (IFE) system, then § 26.11 would apply *only* to the amended portion of the original design**

Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

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Compliance Times



Submittal of EWIS ICA to FAA:

Compliance Time	Dec 10, 2009	June 7, 2010
Existing TC Holder	X	
Pending TC & ATC, Future ATC	X*	
Pending/Future STC & amended STC		X*

* or when the certificate is issued, whichever is later

Certificate Issuance & Compliance Times

- **Required to meet part 26 by compliance date, or certificate issuance date, whichever occurs later**
- **STC and ATC may be issued if compliance to part 26 has not yet been shown if certificate issuance is prior to compliance date**
- **If applicant elects or is required to show compliance to § 25.1729, the above does not apply**
 - **(i.e., EWIS ICA must be complete & approved before the certificate is issued)**

Certificate Issuance & Compliance Times

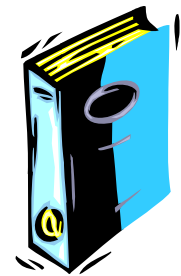
The FAA is considering adding the following limitation when the EWIS ICA evaluation has not been completed prior to the STC issuance:

“This modification may not be installed after June 7, 2010 unless (1) previously approved EWIS ICA have been evaluated and determined to be adequate for this installation, or (2) revised EWIS ICA have been submitted and/or approved by the FAA Oversight Office. (Refer to § 26.11)”

Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

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Who Must Submit a Compliance Plan?

- **Existing TC Holders**
- **All applicants whose application was before December 10, 2007 and certificate was issued after December 10, 2007**
 - Includes TCs, Amended TCs, STCs, and amended STCs

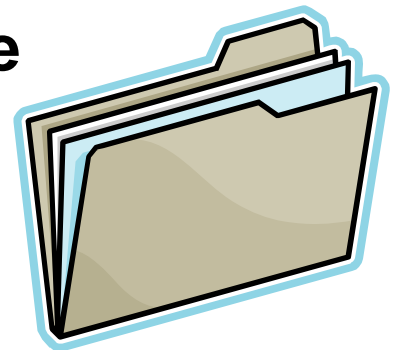


Compliance Plan Not Needed....

- Applicants whose application is after December 10, 2007 do not need to submit a compliance plan
- However, the plan for compliance should be included in the certification plan, similar to how other airworthiness standards are addressed

Compliance Plan Elements

1. **Proposed project schedule for meeting compliance dates**
2. **Proposed means of compliance and identification of required compliance submittals**
3. **Proposal for submitting drafts of all compliance items**
4. **Proposal for how approved ICA will be made available to operators**



Proposed Schedule



- **Must identify all major milestones**
- **Basis for monitoring the plan implementation**
- **Good practice: milestones that include operator reviews of planned data to ensure data and documents acceptable for operator compliance**

Proposed Means of Compliance

- **Must identify all required submissions, including all data to be developed to substantiate compliance**
- **AC 25-27 define acceptable means of compliance**
- **If proposed means of compliance differ from the AC, the DAH should provide rationale**

What to do when a modification does not necessitate a change to previously approved EWIS ICA –

Refer to AC 25-27, Appendix B for guidance:

If the applicant determines that no revisions to previously approved EWIS ICA are necessary, the applicant can submit the statements contained in the AC and provide a detailed rationale of the reasons why the determination is true.

Compliance Statement for § 26.11(c) & (e) if the Modification Does Not Require Revisions to Previously Approved EWIS ICA

Refer to AC 25-27, Appendix B for guidance:

“The modification has been reviewed per the guidance provided in FAA AC 25-27. It has been determined that the modification does not necessitate a revision to the EWIS ICA that were required to be developed by § 26.11(b).”

Proposal for Submitting Drafts

- **Must provide a proposal for submitting a draft of all compliance documents for review by the FAA Oversight Office**
- **The draft compliance documents must be submitted no later than 60 days before final compliance date required by § 26.11(d)**



Proposed Distribution of Approved EWIS ICA

- **Must propose how the approved EWIS ICA will be made available to affected persons**
- **Approved EWIS ICA must be made available as soon as possible**
 - **This does not require the DAH to provide the ICA free of charge**
- **Operator's maintenance program must be based on the approved data**



Additional Compliance Plan Element

Although this is not required by § 26.11(e), it is strongly recommended:

- Proposed communication and coordination plan**



Communication & Coordination Plan

- **To help ensure good communication between the FAA, EASA and DAH, the compliance plan should identify:**
 - **DAH contacts for EASA/FAA Oversight Office**
 - **EASA/FAA Oversight Office contact**
 - **Frequency and mechanism for status updates to facilitate early identification of issues**



Compliance Time

Per § 26.11(e), submittal of compliance plan to FAA must be no later than **March 10, 2008**

This means EU DAH will have to submit Compliance plans to EASA no later than March 10, 2008.



More Than One Compliance Plan?

- **TC holder or applicant may submit one compliance plan to cover multiple modifications if they choose**
- **In some cases, it may be simpler to have multiple compliance plans**

FAA Approval of Compliance Plan

- **Approval of compliance plan is retained by FAA, following recommendation for approval made by EASA**
- **If proposed plan complies with § 26.11(e), EASA, on behalf of FAA, will inform DAH of approval.**

If Proposed Plan is NOT Acceptable

EASA, on behalf of the FAA, will –

- identify deficiencies**
- notify DAH of deficiencies by letter.**
- work with DAH expeditiously to identify mutually acceptable corrections.**



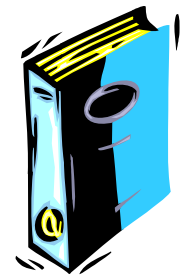
If Proposed Plan is NOT Acceptable (cont.)

- **If revised plan acceptable, EASA, on behalf of FAA, will inform DAH of that approval, by letter.**

Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

- a. Applicability
- b. What do TC holders do if 26.11(a) applies?
- c. Evaluation of impact on previously approved EWIS ICA due to design changes
- d. Compliance times
- e. Compliance plan development
- f. Compliance plan implementation
- g. List of exceptions to the rule



Compliance Plan Implementation

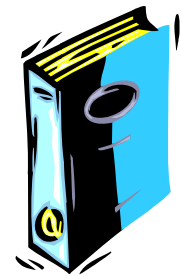
Per § 26.11(f), DAH is required to implement the compliance plan, or later FAA approved revisions



Part 26 – Subpart B - EAPAS

§ 26.11 EWIS Maintenance Program

- a. Applicability
- b. What do TC holders do if 26.11(a) applies?
- c. Evaluation of impact on previously approved EWIS ICA due to design changes
- d. Compliance times
- e. Compliance plan development
- f. Compliance plan implementation
- g. List of exceptions to the rule



Exceptions

Section 26.11 does not apply to the following airplane models:

- Lockheed L-188
- Bombardier CL-44
- Mitsubishi YS-11
- British Aerospace BAC 1-11
- Concorde
- deHavilland D.H. 106 Comet 4C
- VFW-Vereinigte Flugtechnische Werk VFW-614
- Illyushin Aviation IL 96T
- Bristol Aircraft Britannia 305
- Handley Page Herald Type 300
- Avions Marcel Dassault – Breguet Aviation Mercure 100C
- Airbus Caravelle
- Lockheed L-300

EWIS ICA



EWIS ICA Requirements for § 26.11

- **Must be developed in accordance with part 25, Appendix H, paragraphs H25.5(a)(1) and (b)**
 - **EWIS ICA developed using an EZAP per H25.5(a)(1)**
 - **Documentation of the EIWS ICA per H25.5(b)**



Appendix H, Paragraph 25.5(b)

- **EWIS ICA must be:**
 - In document appropriate for information to be provided
 - Easily recognizable as EWIS ICA
- **Document must**
 - Contain required EWIS ICA or
 - Specifically reference other portions of the ICA that contain this information

Appendix H, Paragraph 25.5(b)

Purpose of requirement is to be able to maintain traceability of the EWIS-related maintenance tasks once they are integrated into an operator's maintenance or inspection program

What is an EZAP?

(Enhanced Zonal Analysis Procedure)

- **An analytical procedure required by Part 25, Appendix H, Section H25.5(a)(1) that**
 - **Identifies the physical & environmental conditions contained in each zone of an airplane,**
 - **Analyzes the effects of these conditions on electrical wiring and components, and**
 - **Assesses the possibilities for smoke and fire**

What is an EZAP? (cont.)

- The end result of the analysis are inspection and restoration tasks in the form of EWIS ICA
- Details on how an EZAP is done is provided in AC 25-27, *“Development of Transport Category Airplane EWIS ICA Using an EZAP”*

Why Do You Need an EZAP?

- **EZAP used to develop ICA to prevent the possibility of smoke and fire by**
 - **Minimizing accumulation of combustibles on and around EWIS**
 - **Detecting EWIS degradations**
- **This leads to fewer EWIS and other airplane systems failures and to safer operation**

Contaminants in Wheel Well



Form of EWIS ICA Data

- **Specific data form is not prescribed by the EWIS ICA requirements of H25.5(b)**
- **Form the EWIS ICA data takes is at the discretion of the applicant**
 - Stand alone document,
 - Wholly contained in same document, or
 - Combination of the two

FAA Approval of EWIS ICA

- **Sections 25.1729, 26.11(b), and 26.1(c) requires that EWIS ICA be approved by FAA Oversight Office**
- **ICA approval process is outlined in AC 25-27**



Review of Draft Compliance Data

- **EASA, on behalf of FAA, will review draft data, and notify DAH if the data is acceptable, or not acceptable**
- **If data is not acceptable, EASA will work with DAH to identify mutually acceptable solutions to correct deficiencies**



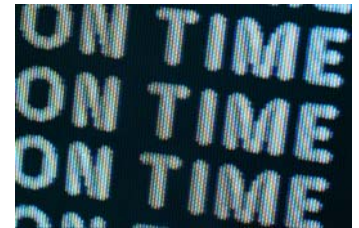
Approval of Final Compliance Data

- **EASA, on behalf of FAA, will review final data, and if acceptable, EASA will notify DAH of FAA approval**
- **If not acceptable, EASA, on behalf of FAA, will –**
 - **Identify and notify DAH of deficiencies and**
 - **Work with DAH to identify mutually acceptable solutions to correct deficiencies**
- **EASA will review revised data, and if acceptable, EASA will notify DAH of FAA approval**

FAA/EASA/DAH Roles and Responsibilities



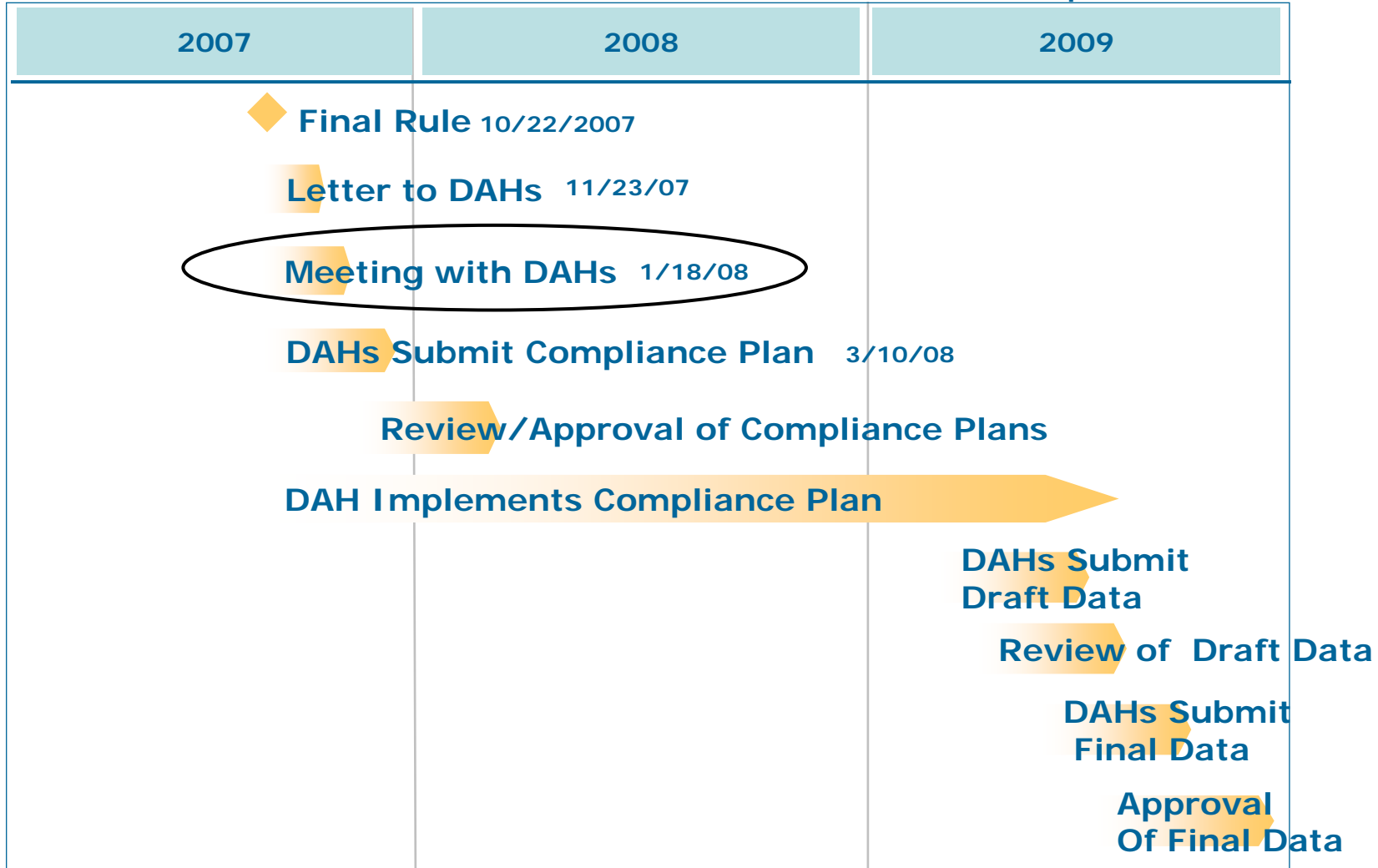
Major Goal



- **FAA, EASA, and DAHs working together to achieve on-time compliance with objectives & requirements of EAPAS Safety Initiatives**
- **Implementation strategy will –**
 - **Involve a structured, proactive project management approach for the FAA, EASA, and DAH**
 - **Ensures early awareness of risks to acceptable compliance, and**
 - **Allows the FAA, EASA, and DAH to facilitate resolution of issues to ensure on-time compliance**

Timeline for FAA/DAH Actions

Example for TC/ATC



DAH Responsibilities

Per § 26.11, DAH is required to:

- 1. Submit compliance plan no later than March 10, 2008**
- 2. Implement FAA-approved compliance plan**
- 3. Submit draft compliance data & documents no later than 60 days before final data and documents are required**

DAH Responsibilities

Per § 26.11, DAH is required to (cont.):

5. Submit final data and documents

- December 10, 2009 for TCs and amended TCs**
- June 7, 2010 for STCs and amended STCs**

6. Make documents and data available to support operator compliance

FAA/EASA Responsibilities

- **Familiarize DAH with EAPAS part 26 rules and guidance**
- **Monitor development and achievement of DAH's compliance plan**
- **Review and approve compliance plan, data & documents**
- **Work closely with DAH to resolve issues in a timely manner**



FAA/EASA Technical Assistance Agreement

- **EASA provides technical assistance to the FAA in the following areas:**
 - Review and recommend approval of compliance plan
 - Review and recommend approval of the compliance data
 - Manage development of compliance plan
 - Manage implementation of compliance plan
 - Review draft compliance data and documents



DAH Communications

- **All compliance plan and compliance data are submitted through EASA**



In Summary....

**Obtain compliance
through
cooperative efforts between
the FAA, EASA, and DAH**



