



# Alterations and Field Approvals

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# Alterations and Field Approvals



- **FAA Order 8300.10 Change 15, issued on the 30<sup>th</sup> of October 2002**
  - Guidance regarding
    - » Determining the category of a alteration or repair
    - » Field approval – Is one acceptable means to approve technical data
    - » Acceptable Data
    - » Substantiating data
    - » Approval for returning the Aircraft to Service
    - » **Important References: Order 8110.45 and 8110.46**

# FAA Order 8110.46



- **FAA Order 8110.46, Major Alterations That Require Supplemental Type Certificates, issued on the 30<sup>th</sup> of September 2002**
  - Guidance regarding
    - » FAA Order 8110.45, Use of Data Approved by DERs to Support Major Alterations
    - » Determining when a major alteration requires an STC

# FAA Order 8110.46



- **FAA Order 8110.46, 5(a)(cont.)**

- The organization performing the alteration is responsible for conformity and returning the aircraft to service
  
- DER approved data can be used In support of Form 337, with Aviation Safety Inspector (ASI) signing Block 3

# FAA Order 8110.46



- **FAA Order 8110.46 (cont.)**

- Other Means of Field Approval

- » The ACO could advise the Flight Standards District Office (FSDO) that a coordinated Field Approval could be accomplished (8110.46, 5(b))

# FAA Order 8110.45



- **FAA Order 8110.45, Use of Data Approved by DERs to Support Major Alterations, issued on the 30<sup>th</sup> of August 2002**
  - Guidance regarding
    - » Specially authorized DERs can approve data on FAA form 8110-3 to support a major alteration to a Type-Certificated product
    - » “An altered product may be approved for return to service if the alteration was accomplished in accordance with FAA approved data”
    - » DERs are not authorized to perform FAA field approvals or to approve altered products for returning the aircraft to service

# FAA Order 8110.45



- **UPDATE, FAA Order 8110.45 (cont.)**

- Guidance regarding

- » “The product can be inspected for conformity to the data by a person authorized to perform such an inspection, and approved for return to service by a person authorized to approve altered products for return to service”
- » “If only some of the data supporting compliance with applicable airworthiness regulations is DER-approved, then additional approval, such as an FAA field approval or STC is required”

# FAA Order 8110.45



- **UPDATE, FAA Order 8110.45 (cont.)**

- Limitations on DERs

- » Data approved by DERs may not be sufficient by itself to support a major alteration
- » If alteration requires approval of data beyond the DER authority, then additional approval, such as an FAA field approval or STC, is required
- » The organization performing the alteration work is responsible for certifying that the alteration was accomplished in accordance with all applicable sections of 14 CFR and FAA-approved data

# Field Approvals



- Field Approval similar to an STC **except**:
  - Not a basis for production approval
  - Data not adequate to produce duplicates
    - » Drawings and drawing control system
  - Intended for one time approval of the installation, not generally intended for multiple installation approvals
    - » Data specific to the subject installation

# Field Approvals



- **Alterations which appreciably affect the items identified below will require an STC** (8110.46, (7))

**Note – Some of these items are categorized as “could be approved by other means than an STC” (reference 8110.46 for additional detail and those items that are candidates for “other means”)**

- Weight and Balance
- Structural Strength
- Reliability
- Operation characteristics
- Airworthiness
- Crashworthiness
- Other: Primary navigation, heads-up displays, TCAS, FDR, GPWS, EFIS, TAWS (Class A), EVAS

# Field Approvals



## ■ Plan the Alteration

- Define the alteration, configuration, certification basis, and design features
- How will the project be managed
- Define the time line for the project
- Identify the resources, DER, installation, etc
- Coordinate with the ACO/FSDO
- Define the data items that will be required
- Define the aircraft installation plans and availability
- Determine if an Airplane Flight Manual Supplement (AFMS) be required
- Define the conformity plans
- Determine if Instructions for Continued Airworthiness (ICA)
- How will conformity be substantiated and documented
- How will the aircraft be returned to service
- How to show the installation does not compromise the aircraft certification basis

# Field Approvals



## ■ Developing the Alteration Submittal Package

- How to develop a “good” Data Package that substantiates the alteration
- What constitutes acceptable Data (8300.10, chg.. 15 (5)&(6))
- What are the elements of the data package (8300.10 chg.. 15 (5))
- What is the timing and required availability each data item
- How will the data items be approved (8110.45 (4) & 8110.46 (5)(a))
- Use check lists to ensure all processes are completed

# Field Approvals

- 
- **Acceptable data substantiating and documenting the Alteration**  
**(8300.10, chg. 15, (6))**
    - » Electrical / installation design drawings
    - » Equipment manufactures installation data
    - » Electrical Load analysis
    - » Data contained in a Structural Repair Manual, or structural substantiations, damage tolerance analysis
    - » Major Repair or Alteration data from a previous 337
    - » Type Certificate Data Sheet
    - » Supplemental Type Certificate (STC) data
    - » Appliance manufactures manuals or instructions
    - » Airworthiness Directive (AD)
    - » DER or DAS approved data
    - » FAA-approved Service Bulletin, or letters
    - » Foreign bulletins as applied to use on US-certified products
    - » Other data approved by the administrator
    - » FAA-approved repairs on non-pressurized areas of the aircraft
    - » Aircraft alteration conformity data

# Field Approvals



- How to develop a “good” Data Package that substantiates the alteration
  - Develop a data check list early on in the project
  - Rely on “approved” data, if data is not previously approved define what it will take to get the data approved within the timeline constraints
  - DERs are always a good source for review/approval of data
  - Ensure that all requirements of Part 21 and Part 43 met (8300.10, chg.. 15, (c))

# Field Approvals



- Airplane Flight Manual Supplement (AFMS)
  - An AFMS is not always required
    - » The AFMS describes the effect of the alteration on the aircraft
    - » Not all alterations are considered major and not all alterations dictate the requirement for an AFMS
  - AFMS required if
    - » Aircraft operating limitations changed
    - » Aircraft procedures are changed and safe operation of the aircraft
    - » AC 23-7 (append 5), 23.1581, (25.1581)

# Field Approvals



- Developing the AFMS
  - Determine which section of the existing Airplane Flight Manual (AFM) are affected by the alteration
  - The cover page of the AFMS should include a statement that the AFMS should be attached to the FAA approved AFM when the subject alteration is incorporated into the aircraft, and should reference the certification approval basis for the alteration (Form 337, STC, Field Approval DER data)
  - The cover page must contain a signature block for the FAA
  - Page two should be log of revisions page, page 3 Table of Contents
  - Arrange the sections of the AFMS to exactly correspond to the Airplane Flight Manual sections

# Field Approvals



- Developing the AFMS (cont.)
  - Add, Modify, or Update the information contained in the AFM and place in the appropriate section of the AFMS
  - For those section of the AFM not affected by the alteration, enter “No Change” in the corresponding section of the AFMS
  - The typical sections of the AFMS are: Limitations, Emergency Procedures, Abnormal Procedures, Normal Procedures, Performance
  - Once the AFMS is completed, Flight Test/Analyst DER review should review the document and submit to the ACO

# Sample AFMS cover page



FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT  
FOR  
ISRAEL AIRCRAFT MODEL 1124  
EQUIPPED WITH THE  
INNOVATIVE SOLUTIONS & SUPPORT, INC (IS&S)  
DUAL AIRDATA SYSTEM  
AND STANDBY ALTIMETER

Serial No. \_\_\_\_\_ Reg. No. \_\_\_\_\_

This supplement must be attached to the FAA approved Airplane Flight Manual when the airplane is modified by the installation of the IS&S dual Air Data System and standby altimeter in accordance with STC No. \_\_\_\_\_.

For aircraft with an FAA Approved Airplane Flight Manual, this document serves as the FAA Approved Flight Manual Supplement for this installation. For aircraft that do not have an approved flight manual, this document serves as the FAA Approved Supplemental Flight Manual for the dual airdata system.

The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this supplement, consult the appropriate basic Airplane Flight Manual.

APPROVED BY \_\_\_\_\_

Manager, Flight Test Branch, ANM-160L  
Federal Aviation Administration  
Los Angeles Aircraft Certification Office  
Transport Airplane Directorate

# Field Approvals



- Develop the Instructions For Continued Airworthiness (ICA)
  - Evaluate alteration against aircraft maintenance instructions. Alterations determines the ICA (8300.10, chg.. 15 (21)(A))
  - ICA ensures Flight Standards are maintained in accordance with the regulations (21.50), and how to maintain the altered aircraft
  - ICA checklist is a good tool for ensuring all items are addressed (16 items identified) (8300.10, chg.. 15 (fig. 1))

# Field Approvals



- ICA Check List (16 items)
  - **#1 Introduction** (Brief overview of project)
  - **#2 Description** (intended function, systems perspective)
  - **#3 Control** (special procedures if any, may be nothing entered)
  - **#4 Servicing Information** (service points, access, etc)
  - **#5 Maintenance Instructions** (if the alteration adds additional maint. Items this is where they are explained)
  - **#6 Trouble Shooting Information** (potential malfunctions and how to identify these malfunctions)
  - **#7 Removal / Replacement** (methods, and/or special techniques or considerations)
  - **#8 Diagrams** (inspection diagrams or information)
  - **#9 Special Inspection** (specialized, unique, or highly technical)
  - **#10 Appliance Protection** (post inspection operations)

# Field Approvals



- ICA Check List (16 items)
  - **#11 Data** (special or unique specifications or tolerances)
  - **#12 List Of Special Tools** (unique or special tools)
  - **#13 For Commuter Category Aircraft** (ELA, Methods of balancing flt. Cntrls., primary/secondary structures, special repair methods)
  - **#14 Recommended Overhaul Periods** (mfg. Component required maint. or inspection, if no overhaul then state so)
  - **#15 Airworthiness Limitations Section** (note the limitations identified by the FAA or mfg.)
  - **#16 Revision** (information on how to revise the ICA)
  
- **Many alterations will not require the majority of these items to be completed, and may not even require an ICA at all!**

# Field Approvals



## ■ Conformity

- The applicant must substantiate the alteration instructions are the same as the alteration
- The applicant must also substantiate that the alteration is compliant to the regulations
- The aircraft can be inspected for conformity to the data by a person authorized to perform such an inspection (8110.45 (4))
- The organization performing the alteration can conduct the conformity inspection, or a DAR can perform the conformity

# Field Approvals



- How to show the installation does not compromise the aircraft certification basis
  - Identifying the certification basis
  - Development of the compliance checklist
  - Defining the method(s) of compliance

# Field Approvals



- Compliance Checklist Format

14 CFR Part/CAR Paragraph	Subject	Method of Compliance	Substantiating Data or Documentation

# Field Approvals



- Sample Compliance Checklist Data and Format
  - 14 CFR/CAR Paragraph:
    - » 14 CFR, Part 25, section 25.1333(b)
  - Subject:
    - » Display of altitude will remain available to the pilots, without additional crewmember action, after any single failure, or combination of failures that is not shown to be extremely improbable
  - Method of Compliance:
    - » By analysis, compliance with 25.1333(b) can be demonstrated. Additionally, the MTBF data available from the manufacturer substantiates a low probability of failure.
  - Documentation Reference:
    - » Reference manufactures MTBF report: “Avionics Top Gun Innovations & Products”, report P/N: 7XYZ; and DER analysis report: ACS ST1023Z-4

# Field Approvals



- Returning the aircraft to service
  - The organization performing the alteration is responsible for returning the the aircraft to service (8110.46, 5(a))
  - The organization performing the alteration is responsible for certifying that an alteration was accomplished in accordance with all applicable sections of 14 CFR and FAA-approved data (8110.45 (6))
  - The aircraft can be returned to service by a person authorized to approve altered products for return to service (8110.45 (4))
  - The organization performing the alteration can return the aircraft to service, or a DAR can return the aircraft to service

# Field Approvals



## ■ Other Consideration

- Change Product Rule does not cover field approvals (8300.10, chg. 15, (11)(A))
- Projects that may require ACO or DER concurrence
  - » An alteration that requires a change to the Airplane Flight Manual
  - » An alteration that requires Flight Testing
  - » An alteration that affects the operating limitations or Minimum Equipment List (MEL) (8300.10, chg. 15, (11))

# Field Approvals



## ■ Other Considerations (cont.)

- Incomplete or Piecemeal Installations
  - » Data approved by FAA, can be safely operated, equip. remains deactivated, wt./bal. reflects alteration, maint. Records completed and signed, conformity required (8300.10, chg.. 15, (13)(A)&(B))
- Flight Test / Operational Check
  - » Must be coordinated with ACO flight test / DER, Experimental certificate required for show compliance flight test, alterations requiring a AFMS must be coordinated with the ACO (8300.10 chg.. 15, (17))

# Field Approvals



## SUMMARY

# Potential Complications Regarding Field Approvals



## ■ Alterations

- Major alteration, more complex and time consuming, requires a lot of planning
- Engineering / DER support will be required to develop substantiating data
- DER support can ensure the alteration complies with the requirements and applicable regulations
- Major alteration, Technical aspects may require either ACO or DER involvement

# Field Approvals



# QUESTIONS?

# Contact Information

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**\* DER = FAA Designated Engineering Representative**