

*HWG-10 Final Report  
Presentation to ATSRAC*

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# *Presentation Outline*

- ◆ LTA Vs. STA Differences
- ◆ HWG-10 Tasking
- ◆ HWG-10 Activities
  - Aircraft Evaluations
  - Service History Review
  - Intrusive Inspections
  - HWG-6 to -9 Final Report Review

# *Presentation Outline*

- ◆ HWG-10 Additional Recommendations
- ◆ Conclusions and Summary
- ◆ HWG-10 Proactive Stances

# *LTA Vs. STA Differences*

- ◆ Maintenance Program Development Philosophy
  - LTA = Owner/Operators Develop and Maintain their own Maintenance Programs derived from
    - ◆ MRB and
    - ◆ MSG3 reports
  - Ultimately, these programs are approved by their local Certificate Management Office and future changes are negotiated at the CMO level

## *LTA Vs. STA Differences*

- ◆ STA operators maintain their aircraft under 91.409 f.3 “manufacturer approved inspection programs”
- ◆ OEMs own the maintenance programs.
  - FAA accepted inspection/maintenance programs
  - 14 CFR Part 25.1529 Appx. H “ICA”

# *LTA Vs. STA Differences*

- ◆ Aircraft configurations (e.g. Avionics packages and interiors)
  - LTA = typically standardizes the fleet with avionics packages and interiors
  - STA = each aircraft as with each owner/operation is typically unique
    - ◆ Avionics packages vary from aircraft to aircraft
    - ◆ Interiors configuration and the associated wiring vary from aircraft to aircraft
    - ◆ The frequency of changes for alterations are much higher.

## *LTA Vs. STA Differences*

- ◆ Ratio of Aircraft fleet per owner/operator
  - LTA = Carrier vs. Aircraft 1 to 108
  - STA = Owner/Operator vs. Aircraft is 1 to 1.4

# *LTA Vs. STA Differences*

- ◆ Organizational differences
  - LTA = many departments, functions, and generally large number of staff
  - STA = typically small departments, small number of staff and these people may have cross functional responsibilities (e.g. Pilot responsibility for ensuring maintenance programs are adhered to and scheduled)

# *LTA Vs. STA Differences*

- ◆ Organizational Differences
  - ◆ Owner/Operators are directly dependent on the manufacturers and service providers for ICA for the TC and STC.

- ◆ Prime objective is safe airplanes
  - The approach to address the ultimate safety objective is different
  - And there are multiple regulatory paths to accomplish these objectives

## *HWG-10 Tasking*

- ◆ Investigate the applicability of previous ATSRAC recommendations to STA electrical wire systems

# *HWG-10 Tasking*

- ◆ Identify issues unique to these aircraft and recommend appropriate actions based on results from
  - Performing a sample inspection of in-service and retired small transport airplanes
  - Review fleet-service history to identify trends or areas for action
  - Coordinating with other ATSRAC HWGs to ensure that the ATSRAC reports to the FAA/JAA consider the needs of STA

## *HWG-10 Tasking*

- ◆ Make recommendations to ATSRAC.

# *HWG-10 Activities*

- Performed aircraft evaluations
- OEMs performed service history review
  - ◆ Service Documentation Review
  - ◆ Repetitive Inspection AD Review
- Conducted intrusive inspection and testing (RTSC)
- Reviewed HWG-6 through HWG-9 final reports

# *Aircraft Evaluations*

- ◆ Non-intrusive wiring inspections of 39 airplanes:
  - 2,281 discrepancies associated with the condition or installation of the electrical wiring,
  - 73 items were deemed significant enough to require additional review for possible corrective action.
- ◆ None of the findings were immediate fleet wide safety of flight concerns.

NOTE: One significant item was identified during the aircraft evaluations, which the OEM felt that an engineering review was necessary.

## *Service History Review*

- ◆ OEMs performed a detailed review of 726 service documents related to airplane wiring.
- ◆ The outcome did not warrant additional emphasis since conditions noted during evaluations did not necessarily correlate with service bulletin incorporation or the lack of specific service bulletin compliance.

# *Repetitive Inspection AD Review*

- ◆ OEM review of airworthiness directives
  - All had terminating action.
  - No repetitive inspection airworthiness directives were identified, therefore no further action was recommended.

## *Intrusive Inspection*

- ◆ A total of 14 samples were used from 3 different aircraft. Ages of these aircraft were:
  - 32
  - 20
  - 19

## *Intrusive Inspection*

- ◆ The intrusive inspection and testing of the wiring indicate that overall the wiring is performing as designed.
- ◆ The visual examination of these wire specimens on a very general scale indicated that the wires appeared to be fairly clean.
  - Closer examination revealed traces of lint, shavings, and chemical contamination.

## *Intrusive Inspection*

- ◆ Most of the damage appears to have been incurred by mechanical means, such as chafing, nicks, etc.
- ◆ The performance tests suggest that although the wire is degenerating, it continues to maintain its ability to perform electrically unless specific physical damage has occurred.
- ◆ Results show that some of the damage was not detectable through GVI.

# *HWG-6 Review and Recommendations*

- ◆ HWG-10 agrees in principle with HWG-6 proposals and that the concepts contained in those proposals are applicable to small transport category aircraft.

## *HWG-6 Review and Recommendations*

- ◆ HWG-10 is not in agreement with the need for a dedicated Subpart H.
- ◆ Definition of EWIS (25.1701) needs to be incorporated into Part 1 and included in 25.1300 series. **(Revision will be made to the HWG-10 Final Report to incorporate this comment. Inadvertently, left out of the draft Final Report).**

## *HWG-6 Review and Recommendations*

- ◆ Retain the concepts contained in the proposed 25.1705, 25.1709, & 25.1711. HWG-10 feels that with revision to 25.1300 series rules, EWIS would be adequately addressed and have the visibility required.

## *HWG-7 Review and Recommendations*

- ◆ HWG-10 agrees in form and content, generally, as described in HWG-7 final report and work product.

## *HWG-7 Review and Recommendations*

- ◆ Inspection Methods – expand the statement: “as determined by the enhanced zonal analysis procedure”. The statement should read “ as determined by the enhanced zonal analysis procedure or equivalent process”.

## *HWG-7 Review and Recommendations*

- ◆ In the proposed Advisory Circular recommend to include examples applicable to Part 91, Part 135 and Part 121 and not only Part 121.
- ◆ Use of the terminology “Component Manufacturer” and “EWIS Component Manufacturer” should be carefully chosen.

## *HWG-7 Review and Recommendations*

- ◆ Recommend to the FAA that better defined structure, content, and standards for how the MBI will follow ATA or FAA JASCC format are needed.
- ◆ We recognize that accomplishing this may be beyond the tasking of ATSRAC, but it is an industry recommendation and is needed.

# *HWG-7 Review and Recommendations*

- ◆ Replace the word “airline” in the appendix tables with the words “airline and/or owner/operator”.

# *HWG-8 Review and Recommendations*

- ◆ HWG-10 recognizes the need for enhanced training in the STA industry.
- ◆ There are differences between how LTA and STA are structured in operation. (e.g. 65% of the STA Operations do not have an in-house maintenance function)
- ◆ The Advisory Circular is tailored to the “Airline” industry with the various target groups that may not match the operations of Part 91.

# *HWG-9 Review and Recommendations*

- ◆ HWG-10 concurs with HWG-9 final report and tasking products.
- ◆ HWG-10 further recommends revision to the proposed FAR 25.1529 requirement from “EZAP” to “EZAP or equivalent analytical logic procedure”.
- ◆ HWG-10 recommends STA be excluded from HWG-9 EZAP tasking products for previously approved and installed STCs.

## *HWG-9 Review and Recommendations*

- ◆ HWG-10 recommends the OEMs of STA perform a review of current maintenance programs to ensure that the EWIS concepts are incorporated.
  - The OEMs should enhance their maintenance programs with additional requirements based on their aircraft design, HWG-10 aircraft evaluations, and their service histories.

# *HWG-10 Additional Recommendations*

- ◆ HWG-10 recommends that the FAA and industry implement an “EWIS Awareness” program.

## *Rationale*

- The aircraft evaluations support the need for TC and STC holders, approvers, designers, installers, and technicians to become more aware of the concepts of EWIS during design, certification, installation and maintenance. HWG-10 feels that the current regulations with modifications are adequate if properly communicated and enforced.

# *HWG-10 Additional Recommendations*

## *Rationale (cont.)*

- Communication avenues are available through industry organizations (i.e. AEA, GAMA, PAMA, NBAA...) and regulatory agencies (i.e. D.E.R renewals, IA Renewal...).

# *HWG-10 Additional Recommendations*

- ◆ FAR Part 147 Appendix E is revised to include the concepts of AC 120-YY (EWIS, Detailed Inspection (DET), General Visual Inspection (GVI), and Special Detailed Inspection (SDI)).

## *Rationale*

- ◆ To fully effect a culture change, in the aviation industry, this should include a “ground up” approach (e.g. future technicians are trained from day one on EWIS concepts)

# *HWG-10 Additional Recommendations*

- ◆ The following Advisory Circulars be revised to include EWIS concepts:
  - 43.13 (-1B and -2A)
  - 43.204
  - 65-9A
  - 65-11B
  - 65-12A
  - 65-15A

# *HWG-10 Additional Recommendations*

## *Rationale*

- These Advisory Circulars are the basis to certification, maintenance, and training of industry personnel. Their revision with the concepts of EWIS would generate awareness to a large group of existing and future approvers, designers, installers, and technicians.

# *HWG-10 Additional Recommendations*

- ◆ The development of AC/ACJ 65.XX on the concepts and language with standardized criteria for EWIS.

## *Rationale*

- HWG-10 recognizes through the aircraft evaluations that there is a lack of guidance material for alteration, inspection, installation, and maintenance of the EWIS. Development of AC/ACJ 65.XX would increase awareness to the industry.

# *Conclusions and Summary*

- ◆ During our review and/or performance of:
  - Aircraft evaluations
  - Service history reviews
  - Intrusive inspections
  - HWG-6 through HWG-9 final reports

# *Conclusions and Summary*

- ◆ HWG-10 determined areas of need are:
  - Enhanced Awareness and Training
  - Improved Alteration (Installation) Guidance (FAA driven – Standardization Issues)
  - Enhanced Maintenance Procedures
  - Enhanced Inspection Criteria
  - Enforcement of Current Regulations

# *Awareness and Training*

- ◆ EWIS = New Concepts
- ◆ Lack of Proper Awareness to Wiring by:
  - Approvers
  - Designers
  - Installers
  - Inspectors
  - Maintainers

# *Awareness and Training*

## ◆ Lack of Training to:

- Approvers
- Designers
- Installers
- Inspectors
- Maintainers

# *Installation Guidelines*

- ◆ Standardization of Installation Guidelines must be FAA driven
  - Currently, Installation Guidance is based off of:
    - ◆ AC43.13 – Outdated Needs to Be Revised to Latest Technologies
      - ❖ New Age Non-Turbine Powered Aircraft have more technology than AC can support
    - ◆ ATA Spec 117
    - ◆ ANM-104 – Created Confusion throughout ACOs and subsequently industry

# *Maintenance Procedures*

- ◆ STA OEMs and STC Holders need to enhance the current Maintenance Procedures
  - Enhancement doesn't necessarily drive to EZAP.
    - ◆ Maintenance Program Development Philosophies of the Various STA OEMs should be capable of enhancing current programs incorporating concepts of EWIS
    - ◆ Future Small Transport Aircraft Designs will most likely follow the version of MSG-3 of that time period or applicable analytical logic process of that time period.

# *Inspection Criteria*

- ◆ There is a lack of Inspection Criteria for wiring and its subcomponents.
- ◆ Development of this Criteria will ensure that inspectors know what is to be inspected.

# *Enforcement of Current Regulations*

- ◆ Installation and maintenance of wiring has not had the emphasis of the Approvers it required.
- ◆ Function of the LRU took precedence over the wiring and its related components.
- ◆ The future actions will increase the EWIS priority.

## *Proactive Stances by HWG-10*

- ◆ Additionally, members from HWG-10 are taking a proactive stance in making the small transport category aircraft industry more aware of the results of our working groups findings.
  - Presentations are scheduled through industry organizations to make its membership more aware of the concepts and needs of the Electrical Wiring Interconnect System.
  - An article will be published in the near future through industry/technical publication on the subject of EWIS.

## *Proactive Stances by HWG-10*

- A member has developed an Inspection Authorization renewal seminar that will include concepts of EWIS.
- A member, during an installation of an avionics package, performing a quality assurance inspection found several issues of deficiency and affected installation improvements as a result of the increased awareness learned as a direct result our aircraft evaluations.

*Thank You*

Comments Or Questions?