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US Army Aviation EWIS Integration and Sustainment



Agenda



- RAM Engineering & System Assessment Division
- MIL-STD-1798D
- EWIS MECSIP
- WUC 59
- ADDEWIS
- AWTS
- ADDEWIS Demonstrations
- Path Forward
- Summary





RAM Engineering & System Assessment Division: What We Do



Aviation Systems

- Supports All PEO Aviation PMOs
- Aviation RAM Support
 - Analyses / Assessments
 - Models
 - Design for Reliability & Maintainability (R&M)
- Aviation System Assessment Program (ASAP) Analyses / Assessments
- Reliability Centered Maintenance (RCM)
- Reliability Improvement Projects (RIP)
- Fault Tree Analysis
- Foreign Military Sales (FMS) RAM Analyses



Missile Systems

- All PEO M&S PMOs and MDA
- Materiel Release RAM Certification
- Missile and Ground Support Equipment RAM Support
- Stockpile Reliability Programs (Army & FMS)
- Sustainability Support for Missile Operations
- Missile Health Monitoring
- Supportability Analysis
- Logistics Assessments



RAM Technology

- Reliability, Availability, Maintainability Analysis
- Failure Reporting and Corrective Action System (FRACAS)
- Science & Technology (S&T) Development & Support
- Data Driven AI and Machine Learning Analytics using ASAP data
- Policies and Procedures
- Failure Modes, Effects and Criticality Analysis (FMECA)



Improved Reliability, Availability, and Maintainability

Ensuring System Readiness



How We Got Here: MIL-STD-1798D

- Scope
 - *MIL-STD-1798D Mechanical Equipment and Subsystems Integrity Program (MECSIP) defines the requirements necessary to achieve mechanical equipment and subsystems while managing cost and schedule risks through a series of disciplined, time-phased tasks.*
- Identifies aircraft mechanical subsystems.
 - These subsystems contain Electrical Wiring Interconnection System (EWIS) as an aircraft subsystem that is mechanical in nature.
- MECSIP Program broken into five primary tasks.
 - Task V – Sustainment
 - Sub tasks 1, 2, 4, and 5 reference the EWIS system MECSIP program via MIL-HDBK-525



EWIS MECSIP and RAM ENG & SA Div

- MIL-HDBK-525 ELECTRICAL WIRING INTERCONNECT SYSTEM (EWIS) INTEGRITY PROGRAM
 - Establishes Mechanical Equipment and Subsystems Integrity Program (MECSIP) tasks for an aircraft Electrical Wiring Interconnect System.
 - The FAA developed programs to address EWIS integrity concerns in the late 1990's.
 - These programs culminated in FAA EWIS Advisory Circulars and programs to address service life of aircraft wiring in transport aircraft.
 - MIL-HDBK-525 leverages FAA EWIS ACs and applies them in a tailored form to military aircraft electrical systems. (*Ref 1.2 pg1*)
- Section 4 identifies tailorable “Core Process Tasks” that can be used to assess EWIS condition, support service life extensions, and establish or sustain airworthiness.
 - Task 1 – Overall EWIS Documentation
 - **Task 2 – Data Analysis**
 - **Task 3 – Physical Aircraft Inspection**
 - Task 4 – Component Assessment
 - Task 5 – Risk Assessment
 - Task 6 – Action Plan



History of WUC 59 EWIS



IMPORTANCE OF EWIS WUCs FOR RAM DATA SCORING

- RAM ASAP sorts scored data by Work Unit Code (WUC).
 - With no EWIS WUC, EWIS faults are scored to parent component or system.
 - This hides EWIS failures in other aircraft systems.
- Dedicated EWIS WUCs allow for EWIS failures to be identified on their own merit.
 - Allows for accurate and timely EWIS failure analysis.

WUC 59 Electrical Wiring Interconnect System

- WUC 59 was selected by AMCOM as the EWIS WUC.
- In January 2024, WUC 59 builds were implemented for all Army model aircraft.
 - This includes all MDS of CH-47, H-60, AH-64, UAS, and fixed wing aircraft.
- WUC 59 structure is the same for all Army aircraft at the three-digit level.



What is ADDEWIS



The Automatic Detection and Determination of the Electrical Wiring Interconnecting System is a Reliability Improvement Project (RIP) specifically for the CH-47F helicopter that was run from the RAM Eng & SA Division. This program acquired and fielded 4 complete Automatic Wire Test Set Systems (AWTS) to selected units in the US Army and US Army National Guard.

The RAM Eng & SA Division learned about the benefits of the AWTS systems while working on a projects for PM Cargo and attendance of the Joint Services Wiring Action Group (JSWAG) Technical Interchange Meetings (TIMs). At the TIMs, the Eclipse team showcased the AWTS and discussed their Certified Test Protocol (CTP) test methods, while also discussing on-going efforts that Eclipse has supported across the armed services.



What is AWTs



- Physical Hardware
 - Stand Alone Central Processing Unit
 - Test Control Unit (TCU)
 - Switch Module (SM)
 - Test Adapter Cable's (TAC's)
 - Probe TAC
 - ESP Handheld Fault Locator
- Software
 - Aircraft Specific Test Program Sets (TPS)





Why We Need AWTs



- Current wiring inspection methods heavily rely on sight and volt meters.
 - These methods identify less than 25% of EWIS faults.
 - Large sections of aircraft wiring are hidden or obstructed.
 - Visual inspections are ineffective at detecting and identifying defects.
- As a result, the symptoms of failure are observed, but root causes often goes unrecognized.
 - No built-in test for wiring systems.
 - Intermittent faults in flight that are not repeatable on ground in a maintenance environment.
 - Component line replaceable unit (LRU) replacements resulting in no evidence of failure found (NEOFF) when bench tested.
- These NEOFF removals impact readiness and reliability by increasing maintenance, reducing asset availability, and increasing the need for additional spares on hand.





What AWTs Does



- AWTs uses multiple testing methods;
 - Traditional electrical testing methods to identify and eliminate hard faults in aircraft EWIS system.
 - Certification Test Protocols (CTP) that use the physical uniformity of the wiring to identify subtle hard to find anomalies.
- How does CTP work?
 - Designed to detect non-linear and/or unstable conductive paths.
 - AWTs takes multiple precision resistance measurements with milliohm accuracy and repeatability.
 - Sets pass/fail limits based upon expected resistance for continuity path.
 - Processes multiple measurements to detect non-linear and/or unstable resistance in the conductive path.
 - *CTP can detect EWIS system degradation before it creates a failure, allowing for EWIS preventative maintenance.*



Recommended Use of AWTs

- Phase Inspection
 - Planned use of AWTs during phase maintenance prior to induction and during post-phase maintenance operational checks.
 - Will detect unstable and non-linear conductive paths, identifying wiring trouble areas that should be inspected during phase.
 - Allows for maintainers to correct these faults during scheduled aircraft downtime.
 - Validates that wiring faults are fixed, as well as confirmation of EWIS system health prior to aircraft return to service.
 - Reduction of unscheduled maintenance between phase inspections.
 - Reduction of unnecessary LRU replacements.
- Unscheduled Flightline Maintenance
 - Reduces downtime by pin pointing faults without excessive troubleshooting.
 - Only used when required due to fault complexity.



ADDEWIS Project Demonstrations

- **Locations-** Huntsville, AL; Ft. Rucker, AL; MO AVCRAD
- **Dates-** June 2025 (RTC), Oct 2025 (FT. Rucker), April 2026 (MO AVCRAD)
- **Attendees-** PM Cargo, PM Apache, PM Utility, PM MV-75, AMCOM, 160th SOAR, RAM, RTC, Boeing, CDID.
- **Overview**
 - To showcase the ease of use and benefits of the ADDEWIS.
 - Demonstrations were held with the help of the JFOAWG (Joint Fiber Optic & Avionics Working Group) at the Redstone Test Center (RTC) and Ft. Rucker.
 - Eclipse International led the demos to answer any technical questions about the equipment.
 - Members from the 160th Special Operation Aviation Regiment discussed issues encountered in the field with aircraft that have been eliminated since the implementation of their AWTs program using the ADDEWIS equipment.





Other Users of AWTs

- US Navy and US Air Force
 - Used over multiple different rotary and fixed wing platforms.
- 160th Special Operations Aviation Regiment (SOAR)
 - Utilized since 2016 for MH/AH-6, MH-47G, and MH-60M
 - Tracks wiring health and wiring faults over entire fleet.
- Aircraft OEMs use AWTs for reduction of peculiar test equipment during manufacturing
- ADDEWIS Project Fielded 4 AWTs units
 - CA/CT Army National Guard TASM-G
 - 101st CAB
 - 10th Mtn CAB
- Post fielding, CT ARNG TASM-G has purchased multiple systems and is developing TPSs with Eclipse.



Path Forward



- ADDEWIS program initial stages complete.
- US Army purchases more ATWS test sets.
 - AWTs Equipment
 - CPE Aviation Mission Systems and Architecture (AMSA) for fielding, maintenance, and sustainment.
 - Test Program Sets (TPS) and Implementation
 - Maintained by aircraft CPE Offices and Individual Units
 - Test Adaptor Cables
 - Maintained by aircraft CPE Offices and Individual Units
- Implement Scheduled Maintenance Plan
 - Scheduled use of AWTs at intervals to improve overall EWIS system health.
 - Aircraft baseline wiring health report upon delivery from OEM manufacturer when DD250 signed.
 - Possibly Baseline Electrical Aircraft Report (BEAR)



Summary



- WUC 59 Implemented for all US Army aircraft.
 - EWIS system data collection and scoring implementation ongoing.
- ADDEWIS initial AWTs fielding completed.
- RAM has briefed the ADDEWIS program, AWTs capabilities, and data analytics capability to;
 - Department of War Maintenance Symposium
 - Capability Development Integration Directorate – Aviation at Ft. Rucker, AL
 - The product support managers (PSMs) for AH-64, CH-47, H-60, and Aviation Mission Systems and Architecture.



Questions?

