



Announcements

The Fall JSWAG/JFOWG Technical Interchange Meeting is scheduled for September 6-7, 2016 at MCAS Cherry Point, NC. For more information, visit the JSWAG website.

Resources

- The Wiring Awareness (806881), Fiber Optic Awareness (806707) and Joint Service Wiring Manual Maintenance Techniques (806994) DVDs can be ordered by calling 888-743-4662 or by submitting a ticket at <http://www.dimoc.mil/customer/contact.html>
- Heatless Splice Application Video- <https://www.youtube.com/watch?v=Op1YMaz454E&feature=youtu.be>
- MIL-HDBK-522A- Guidelines for Inspection of Aircraft Wiring Interconnect Systems http://quicksearch.dla.mil/qsDocDetails.aspx?ident_number=277535
- MIL-HDBK-525- Electrical Wiring Interconnect System (EWIS) Integrity- http://quicksearch.dla.mil/qsDocDetails.aspx?ident_number=279725
- Need help locating information on connectors, contacts or accessories? If so, email us at jswag@navy.mil.

Newsletter Contact

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Found in the Field

In the ever increasing push to reduce weight on aircraft, new materials are being introduced to the Electrical Wiring Interconnect System (EWIS) environment. Traditionally, accessories (backshells) have been constructed of aluminum (Figure 1). As part of the push to reduce weight, composite material high grade engineering thermoplastic replaces aluminum for AS85049/91/92/93/103/104/105 accessories (Figure 2). The weight savings per accessory adds up when applied to the number of connectors on an aircraft.



Figure 1: Traditional Metal Accessory



Figure 2: Composite Material (High Temperature Thermoplastic) Accessory

With new materials come new issues and opportunities. Connector accessory specifications (e.g. SAE AS85049) and AIR6151 (Torque, Threaded Application, Electrical Connector, Accessory and Terminal Board Installation) provide the minimum and maximum torques required to keep accessories fastened to the rear of electrical connectors through harsh environments. This is the source data for the joint service general wiring maintenance manual (NA 01-1A-505-1).

Recent inspections of naval aircraft have shown cracks and failures of composite accessories (Figures 3 through 6).

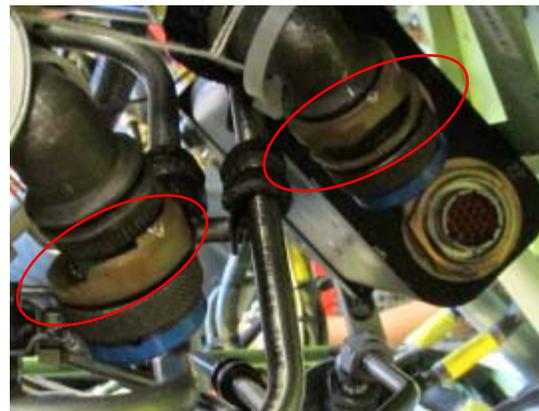


Figure 3: In The Fleet Cracked Size 14 Coupling Nuts

Accessory from page 1

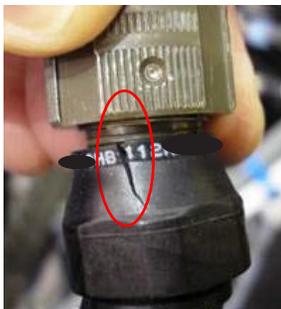


Figure 4: In The Fleet Cracked Size 11 Coupling Nuts



Figure 5: In The Fleet Cracked Size 9 Coupling Nuts

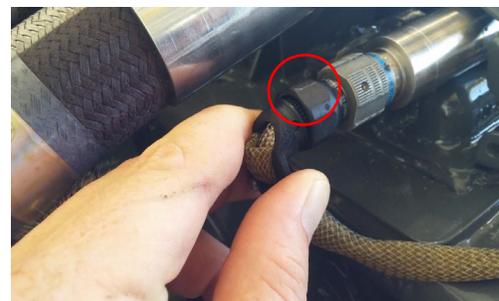


Figure 6: In The Fleet Cracked Size 9 Coupling Nuts

An engineering evaluation was performed to determine if the correct torques were being applied to the composite accessories in question. The evaluation confirmed tightening backshells to the recommended maximum torques would cause failure in some shell sizes. In looking at providing practical guidance to the maintainer, samples were tested to hand tight, hand tight plus 1/8 rotation and hand tight plus 1/4 rotation. These torques were applied with various tools available: hex pliers, crows foot wrench and strap wrench. It was found that on some sizes, even 1/8 turn past hand tight cracked the accessory coupling nuts (Figures 7 and 8).

Based on this data, vibration testing was performed on the following samples:

1. Each shell size (9 to 23) torqued by hex wrench to maximum permissible torque by specification
2. Each shell size (9 to 23) torqued by hand to hand tight
3. Each shell size (9 to 23) torqued by hex wrench to 1/8 turn past hand tight

Wired plug samples were mated to populated but unwired mating receptacles mounted to vibration fixtures. The samples were run through 1g²/Hz random vibration, 8 hours axial and 8 hours perpendicular. There was no indication of uncoupling rotation, cracking, or other damage found post testing.

The success of the anti-rotation design feature of the M85049/91 accessory composite coupling nut combined with the probability for cracking damage caused by over-torque will lead to a requirement change. There will be a change of the specified accessory torques in SAE AS85049, followed by an update to the installation procedure in the NA 01-1A-505-1 (WP 024 00). The composite accessories will be installed hand tight plus 1/8 turn or torqued to the specified value using the hex or strap wrench only. For on-aircraft, inaccessible areas, hand tight will be acceptable. For the metallic accessories the same tools are employed, but to the higher torque values provided. To further clarify the two accessory removal and installation procedures (composite and metallic), two separate job performance aids (JPAs) videos were created and inserted in the maintenance manual. Updates are due out with Change 2 expected release by October 2016.



Figure 7: Composite Backshell Coupling Nut Crack - 1/8 Turn Past Hand Tight



Figure 8: Composite Backshell Coupling Nut Crack

Find the Answer

Current Question:

Which sizes of lacing tape / tie string (A-A-52083 or A-A-52084) are approved?

Resources: NA 01-1A-505-1, WP 010 00, MIL-HDBK-522 or SAE AS50881

Answer will be provided in Winter 2017 Newsletter

Previous Question/Answer:

What is the maximum allowable broken/nicked strands of a 19-strand copper conductor?

2 allowable nicks, no broken strands

References: MIL-HDBK-522A, Page 35, Table 9-1; NA 01-1A-505-1 WP 009 00, Page 9, Table 5; SAE AS50881, Para. 3.17.2, Page 50, Table 2