HERCULES | Lockheed Martin Aeronautics Company
Marietta, Georgia 30063

SERVICE BULLETIN

* REVISION NOTICE *

FUEL – SFAR 88 – DRY BAY ZONAL INSPECTION, INSPECTION/REPAIR OF STATIC GROUND TERMINALS OF FUEL SYSTEM PLUMBING, AND MARKING OF FUEL QUANTITY INDICATING SYSTEM WIRING

Attached is Revision 4, dated September 18, 2008, to Service Bulletin 82-770/382-28-19. Information added or changed in this issue is indicated by a vertical revision bar in the margin of affected pages, or pointing hand for illustrations.

This revision updates contact information, clarifies accomplishment instructions, and changes Section 2, Paragraph C.(8)(a)2a to agree with text of Figure 29.

This revision is a complete reissue and replaces Revision 3 of this Service Bulletin dated November 30, 2006. Retain this notice with your copy of this Service Bulletin.

Aircraft previously modified by this Service Bulletin should be re-inspected to ensure compliance.

Basic	October 17, 2003
Revision 1 (Reissue)	November 5, 2003
Revision 2 (Reissue)	January 28, 2004
Revision 3 (Reissue)	November 30, 2006

_____#_____

File: CSB 907 / M41057 / I-3042

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SERVICE BULLETIN

FUEL – SFAR 88 – DRY BAY ZONAL INSPECTION, INSPECTION/REPAIR OF STATIC GROUND TERMINALS OF FUEL SYSTEM PLUMBING, AND MARKING OF FUEL QUANTITY INDICATING SYSTEM WIRING

1. PLANNING INFORMATION

A. EFFECTIVITY

(1) **382-28-19, FAA Certificated Aircraft:** This Service Bulletin is applicable to all model 382, 382B, 382E, 382F, and 382G series FAA Certificated Hercules aircraft (excluding 382J series aircraft).

(2) **82-770, Foreign Direct Sales Aircraft:** This Service Bulletin is applicable to all model 282, 382, 382C, and 382T series Hercules aircraft (excluding 382U and 382V series aircraft).

(3) **82-770, MAP/FMS/SAP Aircraft:** This Service Bulletin is applicable to all model C-130 series Hercules aircraft (excluding C-130J Hercules aircraft).

B. REASON

(1) As part of compliance with Special Federal Aviation Regulation (SFAR) 88, the following four requirements were identified, which are addressed in this Service Bulletin.

- Develop maintenance documents to implement repetitive detailed inspections for the Fuel Level Control Valve (FLCV) wires and conduits to verify there is no damage.
- Develop maintenance documents to implement repetitive detailed inspections of the power wiring on the leading and trailing edges of the wing to verify that the separation of these wires to the tank wall has not been compromised. This action is to preclude any arcing to the fuel tank. This is the Zonal Inspection. This ensures that the original design remains intact and is not defeated by subsequent installations and inspections.

NOTE: Lockheed Martin used the Honeywell FG220A and FG430A class fuel quantity probes, not the Honeywell FG420A, Series 1, 2, and 3 that were brought into question by NTSB Recommendations A98-34 and A98-35.

- Develop service information to implement a program where any Honeywell Series 1-3 Fuel Quantity tank probe connectors are replaced with Series 4 type connectors.
- Develop service information to implement repetitive inspections of the fuel system electrical bonding system. These inspections should have measurements for critical bonds (i.e. electrical conduit, electrical components) and visual inspection for less critical bonds (i.e. fuel tube static bonds).
- Add identity marker for fuel quantity indicating system wire.

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(2) The following background information resulted in a requirement to generate this Service Bulletin.

(a) Federal Aviation Regulation (FAR) Section 25.901(b)(4) requires electrically bonding the major components of the propulsion system to other parts of the aircraft. The affected major components of the propulsion system include the fuel tank system. Compliance with this requirement for fuel tank systems must be demonstrated by showing that all major components of the fuel tank are electrically bonded to the airplane structure. This precludes accumulation of electrical charges on the components and the possible arcing in the fuel tank that could otherwise occur. In most cases, electrical bonding is accomplished by installing jumper wires from each major fuel tank system component to the airplane structure. Advisory Circular (AC) 25-8, "Auxiliary Fuel Tank Installations," also provides guidance for bonding of fuel tank system components and means of precluding ignition sources within transport airplane fuel tanks.

(b) FAR Section 25.954 requires that the fuel tank system be designed and arranged to prevent the ignition of fuel vapor within the system due to the effects of lightning strikes. Compliance with regulation is shown by incorporation of design features such as minimum fuel tank skin thickness, location of vent outlets out of likely lightning strike areas, and bonding of fuel tank system structure and components. Guidance for demonstrating compliance with this regulation is provided in AC 20-53A, "Protection of Aircraft Fuel Systems Against Fuel Vapor Ignition Due to Lightning".

(c) AC 25.981-1C Draft paragraph 7.C, requires several inspections to verify that the components are in acceptable working order and will not result in a catastrophic event in case of failure.

(3) An operator reported a fire in the No. 2 main tank. According to the operator, two of three breakers associated with the No. 2 fuel dump boost pump opened during a fuel tank purging operation. When the tank was entered to troubleshoot the failed boost pump, evidence of a fire was found. A "teardown" of the pump in the lab found a conductor had an internal path to the pump housing (short). The lab also found that a non-conductive coating on the mounting base of the subject pump most likely prevented the pump from being electrically bonded to the aircraft structure. These two findings support the theory that an arc occurred between the pump housing and a surrounding entity (possibly either a conduit or fuel line) and resulted in ignition of fuel vapors in the ullage areas of the fuel tank.

The mishap pump, P/N 60-371D, S/N 9249, is not the correct part number for this application. The correct part number is 60-371B. The electrical conduit connection for this pump was altered for installation. This may have been a contributing factor to the pump internal failure.

(4) Lockheed Martin Aeronautics Company recommends that those operators who have not accomplished the previous revision to this Service Bulletin comply with this revision on each affected aircraft at the next heavy maintenance but no later than 1 year after receipt of this Service Bulletin. Lockheed Martin Aeronautics Company further recommends that the Fuel Quantity Indicating System Wire Marker modification specified in Section 2, Paragraph C(8)(b) herein be accomplished during this inspection or at the next heavy maintenance period after January 1, 2008.

(5) Aircraft previously modified by this Service Bulletin are affected by this revision by adding identity marker for fuel quantity indicating system wire.

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SERVICE BULLETIN

C. DESCRIPTION

This Service Bulletin consists of visual/electrical inspections of fuel system plumbing grounding/bonding connections for corrosion and/or incorrect resistance, misplaced or inappropriately installed grounding/bonding jumpers, installation of new grounding/bonding jumpers, visual inspection of fuel system electrical wires, and visual inspection of fuel tanks for contamination. This Zonal Inspection further expands into any system capable of developing enough energy to cause an ignition of the fuel system or is a source of fuel for a primary/root cause fire.

This Service Bulletin also modifies fuel quantity indicating system (FQIS) wiring by installation of color coded identification cable markers or heat shrink sleeving to the existing FQIS wires from plugs that exit the fuel tanks or bladders, through outer wing breaks and wheel well pressure breaks to the individual fuel tank indicator plugs on the Fuel System Control Panel.

D. APPROVAL

(1) The aircraft owner/operator shall make an appropriate entry in the aircraft log records upon compliance with this Service Bulletin.

(2) Please complete and mail a Notice of Service Bulletin Compliance after the work has been completed on each affected aircraft.

(3) **382-28-19, FAA Certificated Aircraft:** The rework instructions described in this Service Bulletin have been approved by the FAA as complying with applicable Federal Aviation Regulations.

E. MANPOWER

NOTE: This Service Bulletin is based upon the configuration of the aircraft as it was delivered from Lockheed Martin. Previous service bulletins issued by Lockheed Martin have been considered in the preparation of this Service Bulletin, but no consideration has been given to peculiar changes made to the aircraft by the owner/operator since its delivery.

The work prescribed in this Service Bulletin has not been performed at the Lockheed Martin facility exactly as described herein. Therefore, the manpower estimates provided have not been validated, and should not be construed as being acceptable for use in making fixed price quotes for accomplishment of the work. These estimates are provided only as a convenience for customer planning purposes. It is estimated that approximately 952 man-hours (a crew of 4) will be required to accomplish the work described herein on each affected aircraft. This inspection will take approximately 238 hours elapsed time while the aircraft is out of service.

F. MATERIAL

Parts listed in paragraph 3 may also be purchased from Lockheed Martin, as noted, if desired. Direct inquiries concerning prices and availability to the following:

Phone: (877) 456-7278
E-Mail: 4.lmparts@lmco.com
Mail: Lockheed Martin Global Supply Chain Services
210 Industrial Park Road
Johnstown, PA 15904, USA

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G. TOOLING

AVTRON model T477W, P/N C15292 Bonding Meter with P/N C22161 Pistol Grip Probe or equivalent
Stainless Steel Rotary Brush
Manual or Power Drill
Abrasive Paper or Cloth Sheet (150 to 400 grit aluminum oxide)

H. WEIGHT AND BALANCE

Not Applicable

I. REFERENCES

Special Federal Aviation Regulation 88
Federal Aviation Regulation Section 25.901
Federal Aviation Regulation Section 25.954
Advisory Circular 25-8
Advisory Circular 20-53A
Hercules Wiring Diagram Manual
Advisory Circular 25.981-1C Draft
SAE-AS81531, Marking of Electrical Insulating Materials
Hercules Corrosion Prevention and Control Manual

(1) **382-28-19, FAA Certificated Aircraft**:

Hercules Maintenance Manual
Hercules Airfreighter Progressive Inspection Procedures

(2) **82-770, Foreign Military Aircraft**:

Hercules Maintenance Instructions Manual
Hercules Airfreighter Series Progressive Inspection Procedures

J. OTHER PUBLICATIONS AFFECTED

(1) **382-28-19, FAA Certificated Aircraft**:

Hercules Airfreighter Progressive Inspection Procedures

(2) **82-770, Foreign Military Aircraft**:

Hercules Airfreighter Series Progressive Inspection Procedures

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2. ACCOMPLISHMENT INSTRUCTIONS

WARNING: ENSURE THAT APPLICABLE SAFETY PRECAUTIONS PERTAINING TO WORK IN FUEL/FUME AREAS ARE STRICTLY OBSERVED. PERSONNEL SHALL WEAR NONSPARKING PROTECTIVE CLOTHING. ENTRY INTO TANKS AND DRY BAY MUST NOT BE MADE UNTIL AREAS HAVE BEEN PURGED TO A FIRE-SAFE 20 PERCENT LOWER EXPLOSION LIMIT (LEL), AS DETERMINED USING FUEL VAPOR DETECTION AND MEASURING EQUIPMENT. FULL-FACE RESPIRATORS MUST BE WORN UNTIL AREA HAS BEEN PURGED TO THE HEALTH-SAFE 0.0- TO 1.5-PERCENT LEL AND 19.5 PERCENT OXYGEN CONTENT. FAILURE TO COMPLY MAY RESULT IN SERIOUS INJURY OR DEATH.

WARNING: FUEL TANK DEFUELING, DRAINING, PURGING AND MAINTENANCE REQUIRING ENTRY INTO THE TANK(S) SHALL BE PERFORMED ONLY IN DESIGNATED AREAS HAVING CLEAR ACCESS PATHS FOR FIRE FIGHTING AND EMERGENCY EQUIPMENT. THESE AREA(S) SHALL BE PROMINENTLY IDENTIFIED AS FUEL SYSTEM WORK AREA(S) AND POSTED WITH NO SMOKING AND AUTHORIZED PERSONNEL ONLY SIGNS.

WARNING: PORTABLE FIRE EXTINGUISHERS MUST BE POSITIONED IN CONVENIENT LOCATIONS. FIRE FIGHTING PERSONNEL AND EQUIPMENT SHALL BE STATIONED NEARBY DURING DEFUELING, DRAINING, AND PURGING OPERATIONS.

CAUTION: MAINTENANCE AND INSTALLATION PERSONNEL MUST EXERCISE CAUTION WHILE INCORPORATING THIS SERVICE BULLETIN TO ENSURE THAT WIRING SYSTEMS ARE PROTECTED AND KEPT CLEAN AT ALL TIMES. NOTE THAT METAL SHAVINGS CAUSED BY DRILLING AND OTHER FORMS OF DEBRIS THAT CONTACT WIRE BUNDLES MAY IMPAIR WIRE SYSTEM INTEGRITY AND SHORTEN SYSTEM AND COMPONENT SERVIES LIFE.

CAUTION: DO NOT ATTEMPT TO AIR-PURGE TANKS IF AN ELECTRICAL STORM OR WIND IN EXCESS OF 15 KNOTS IS FORECAST. DUST OR OTHER FOREIGN MATTER MAY ENTER THE TANK OPENINGS.

A. PREPARE AIRCRAFT FOR INSPECTION AND/OR MODIFICATION

WARNING: ALL EQUIPMENT, INCLUDING WORK STANDS, SHALL BE ELECTRICALLY GROUNDED TO THE AIRPLANE AND TO AN APPROVED GROUNDING POST. GROUND WIRES SHALL BE SECURELY ATTACHED TO CONNECTING POINTS TO MINIMIZE ACCIDENTAL DISCONNECTION. WORK STANDS SHALL BE EQUIPPED WITH COPPER, ZINC, OR ZINC-COATED GROUNDING PLATES THAT CAN BE CONVENIENTLY CONTACTED BY PERSONNEL ENTERING THE WORK AREA.

(1) Static ground aircraft in accordance with appropriate Hercules Maintenance Manual or Hercules Maintenance Instructions Manual.

(2) Lower flaps to full down position to allow access to wing trailing edge.

(3) Remove electrical power from aircraft (including external ground power). Disconnect aircraft battery and tag battery cable.

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(4) Rope off an area for a 50-foot radius from all open tanks and vents. Post fuel hazard banners or signs in the area.

(5) Remove access panels to fuel tanks, dry bays, wing trailing edges, pylon tank(s) and cross beam sections as needed.

(6) Air-purge tank(s) as described in appropriate Hercules Maintenance Manual or Hercules Maintenance Instructions Manual. After fumes have dissipated, maintain a continuous supply of fresh air for personnel working in the tank(s).

CAUTION: WORK DIRECTLY ASSOCIATED WITH THIS SERVICE BULLETIN SHALL BE ALLOWED ONLY DURING FUEL TANK MAINTENANCE.

CAUTION: AT ALL TIMES, CARE MUST BE TAKEN TO PREVENT ENTRY OF CONTAMINANTS INTO THE FUEL TANK(S) THROUGH THE OPENING. OPENING SHALL BE COVERED WITH LINT-FREE CHEESECLOTH WHENEVER THE TANK COVERS ARE REMOVED AND WORK IS NOT IN PROGRESS.

CAUTION: USE RUBBER MATS TO PROTECT THE BOTTOM OF TANK(S).

NOTE: Should any inspection fail, rework the failed article in accordance with Hercules Corrosion Prevention and Control Manual.

B. INSIDE FUEL TANKS

(1) Visual Inspection

Perform all inspections described in the following paragraphs. Using a high powered explosion-proof light, inspect all ground/bonding jumpers attached to fuel components (tubes, plumbing adapters, tube connections) for evidence of corrosion and security. Visible corrosion is defined as discoloration, jumper strand separation, or jumper strand breakage and all are cause for rejection and repair or replacement.

(a) Bonding Jumpers:

1 Inspect for corrosion of bonding jumper wires. Corrosion can result in failure of the jumper.

2 Inspect ground attachment points for good contact and tightness.

3 Inspect for jumpers that are worn or frayed.

4 Inspect all tubing and plumbing fittings greater than 3 inches in length for presence of bonding jumpers or other means of bonding.

5 Any bonding jumper or attach points that fail the visual inspection should be reworked in accordance with Hercules Corrosion Prevention and Control Manual

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(b) Electrical Wiring Conduits in Tank

Ensure that, where electric wires are routed through conduits installed in a fuel tank; these conduits show no evidence of high surface temperatures or arcing through the conduit wall. All wiring conducting power (e.g., fuel pump(s), power supplies, fuel level sensor(s), Fuel Level Control Valves (FLCV), etc.) into or through a fuel tank should be evaluated assuming arcing to surfaces such as metallic conduits or wing surfaces, unless fail-safe protective features are provided.

If evidence of arcing is present rework or replace the conduit.

(c) Fuel Quantity Indicating System (FQIS) Wiring

1 Ensure that wires are not spot tied inside fuel tanks.

NOTE: Steps 2 and 3 are not applicable to Lockheed Martin serial numbers 4144 through 4715 and aircraft with bayonet type connectors.

2 Ensure that shields are terminated within 0.5-inch of the HI-Z terminal lug using solder sleeves and 20 AWG jumper wire (if required).

3 Ensure that terminal lug size on FQIS wires are:

- HI-Z – size 6.
- LO-Z – size 10.
- Ground – size 8.

4 Should FQIS wiring not be in accordance with steps 1, 2, or 3 above ensure it is brought within specification immediately.

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(d) Other Items:

1 Inspect for corrosion that could diminish the effectiveness of the bonding surfaces for all fuel tank access panels.

2 Inspect for loose or corroded rivets that are along the bond-path for any component that is to be bonded. For example, inspect the rivets used to install any bracket that a pump or valve is bonded to, or a bracket that a bonding jumper is terminated to it.

NOTE: If inspection reveals a missing or deteriorated bonding jumper, or if bonding jumpers fail inspection, the bonding jumper is to be removed and replaced. Jumpers meeting the requirements of MIL-C-83413/8 type C (part number M83413/8-C(length)(lug)(lug)) are the preferred replacement bonding jumper inside the fuel tank, but if not available in stock, MS25083-2 bonding jumpers are authorized for use in fuel cells. Refer to the following chart for bonding jumpers inside of fuel tanks only:

REPLACEMENT JUMPER	EXISTING JUMPER
M83413/8-C004BB	MS25083-1BB3
M83413/8-C004BB	MS25083-1BB4
M83413/8-C006BB	MS25083-1BB6
M83413/8-C004BB	MS25083-2BB4
M83413/8-C007BB	MS25083-2BB7
M83413/8-C004BB	MS25083-3BB4

(2) Fuel Pump Inspection

WARNING: ENSURE METER IS CERTIFIED FOR USE IN FUEL OR OXYGEN-RICH EXPLOSIVE ENVIRONMENTS. FAILURE TO COMPLY MAY RESULT IN SEVERE INJURY OR DEATH.

Inspect all fuel pumps to ensure proper grounding.

NOTE: Maximum resistance between aircraft structure and fuel pump should be 0.37 milliohms.

(a) Remove every fuel pump in accordance with appropriate Hercules Maintenance Manual or Hercules Maintenance Instructions Manual.

(b) Clean the faying surface of each pump to remove all anodized coating in accordance with paragraph (14).

(c) Clean the aircraft mounting surface for each pump to remove all primer in accordance with paragraph (14).

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(d) Reinstall fuel pumps in accordance with appropriate Hercules Maintenance Manual or Hercules Maintenance Instructions Manual.

(e) Perform resistance measurement in accordance with paragraph (4).

(f) If the resistance check fails repeat steps (a) through (e) above.

(3) Fuel Level Control Valve (FLCV)

Check conduit for evidence of arcing or discoloration.

NOTE: Should the conduit show evidence of arcing or discoloration replace it.

(4) Grounding/Bonding Measurements

WARNING: ENSURE METER IS CERTIFIED FOR USE IN FUEL OR OXYGEN-RICH EXPLOSIVE ENVIRONMENTS. FAILURE TO COMPLY MAY RESULT IN SEVERE INJURY OR DEATH.

The maximum resistance between aircraft structure and the following should be:

- Fuel pump and associated conduit – 0.37 milliohms.
- FLCV and associated conduit – 1.86 milliohms.
- Fuel tank access panels – 0.37 milliohms.
- Fuel lines – 1.00 ohm.

Perform resistance measurements on all fuel pumps and Fuel Level Control Valves (FLCV) in accordance with paragraphs (5) through (17).

NOTE: If the measurement fails the test, the bonding/grounding termination shall be reworked and retested until the resistance is less than maximum listed above.

(5) Bonding Verification

Bonding verification should be performed and identified at a logical point so that any rework can be accomplished in a timely manner.

(a) Measure bond resistance with connector plugs removed from equipment mounted on plastic tanks, pipes, etc.

(b) In all cases, the resistance values refer to the overall resistance measured across the bond interface from the object to structure into which the bond is installed, unless otherwise indicated.

(c) Measurement instrument probes will be applied as near as possible to the bond.

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(d) For bonds using a jumper or ground lead, the point for measuring the resistance will be any cleaned area on the same piece of metal, within 4-inches of the jumper or ground lead terminal being checked.

(e) Do not use test currents in excess of 50 amps when measuring the bond resistance of current ground paths.

NOTE: Notify the local Fire and Safety Authority, or equivalent, and obtain permission before measuring bond resistance in any area where pure oxygen may combine with any fossil fuel or combustible liquid.

(f) All meters used for measuring bonding resistance will have the appropriate certified measuring range.

(g) Do not measure bonding resistance from an insulated terminal.

1 Install a dummy (uninsulated) terminal and take the measurement from that terminal.

2 Do not pierce the insulation of terminals.

(h) Impressions on electrical wire terminals caused by resistance measuring equipment that do not expose the base metal are acceptable.

(i) Any part from which the original finish has been removed to perform bonding resistance measurements will be refinished in accordance with paragraph (15).

(j) Perform a bonding meter check, when a unit requiring electrical bonding is removed and replaced, before the installation/reinstallation is accepted by Quality Assurance.

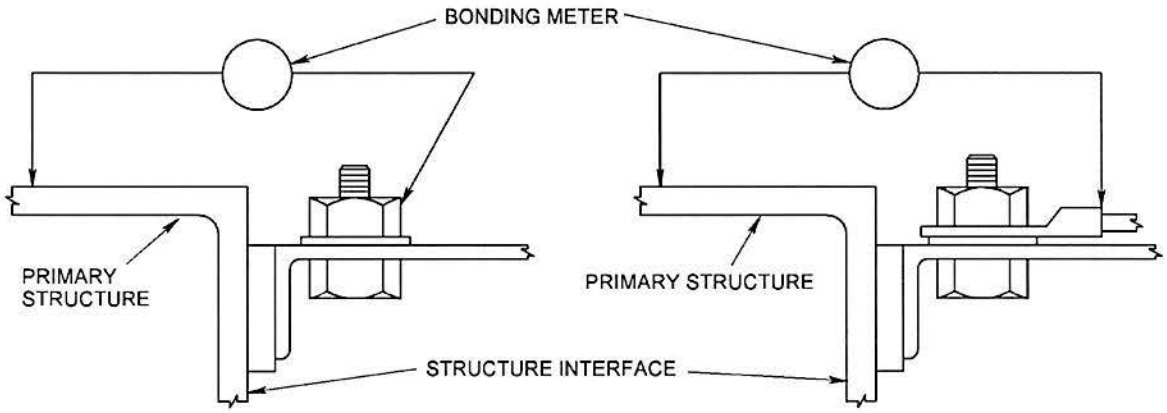
(k) Should any inspection point fail the visual (corrosion) or resistance inspection, that item shall be reworked in accordance with Hercules Corrosion Prevention and Control Manual.

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(6) Resistance Measurement of Grounds

WARNING: ENSURE METER IS CERTIFIED FOR USE IN FUEL OR OXYGEN-RICH EXPLOSIVE ENVIRONMENTS. FAILURE TO COMPLY MAY RESULT IN SEVERE INJURY OR DEATH.

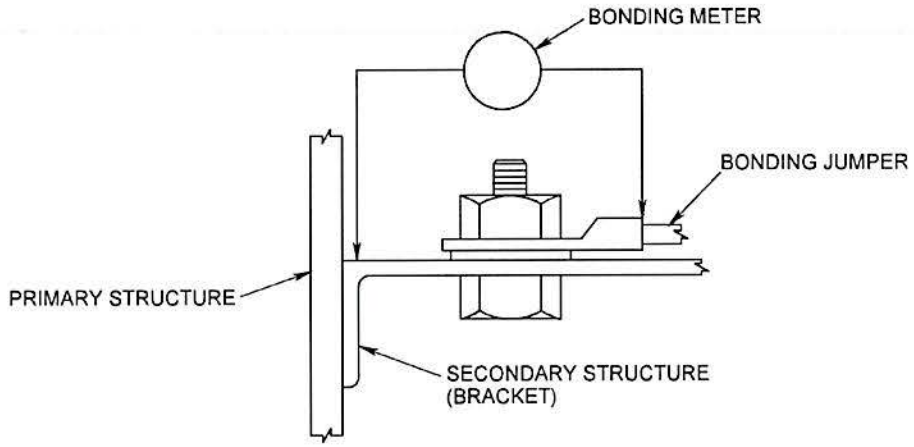
For direct measurement with a bonding meter, use secondary structure-to-primary structure bonds for resistance measurement. (See figures 1, 2, and 3.)



SFAR-88-SB-2-001

Figure 1
Direct Resistance Measurement of Current Return Grounds

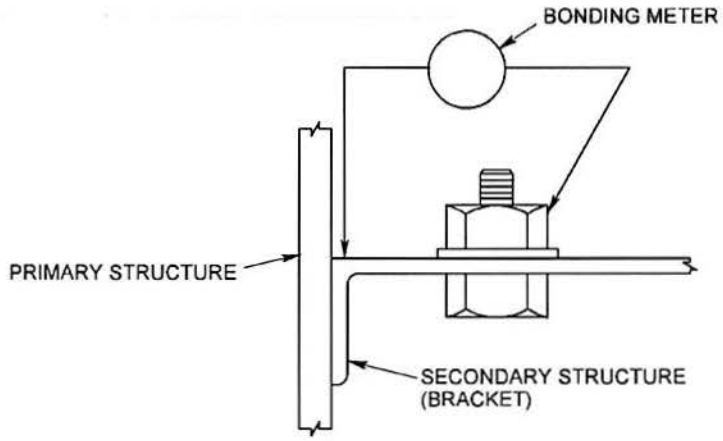
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SFAR-88-SB-1-002A

Figure 2
Direct Resistance Measurement of a Bonding Jumper

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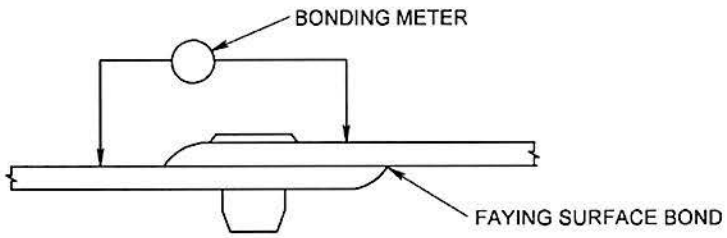
SFAR-88-SB-1-002B

Figure 3
Direct Resistance Measurement of a Stud Installation

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(7) Resistance Measurement of Faying Surfaces

For resistance measurement of faying surfaces, reference paragraph (6) for meter connection procedures and figure 4.



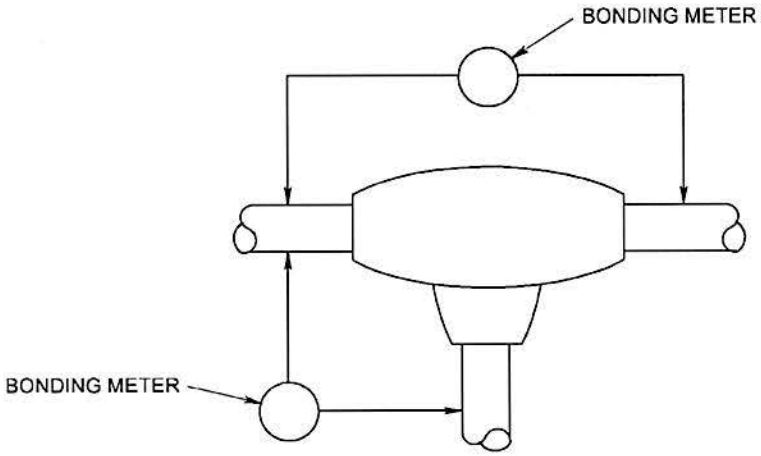
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Figure 4
Resistance Measurement of Faying Surface Bonds

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(8) Resistance Measurement Across Hydraulic Fittings and Tubing Installations

For resistance measurement across hydraulic fittings and tubing installations, reference paragraph (6) for meter connection procedures and figure 5.



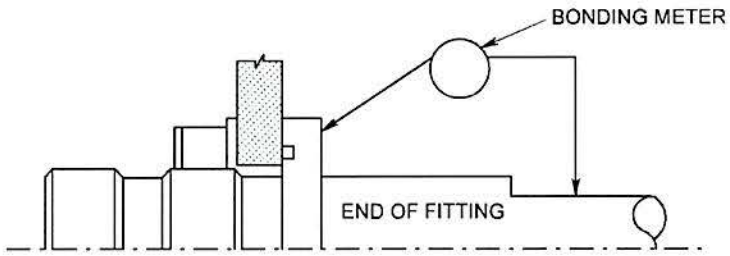
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Figure 5
Resistance Measurement of Hydraulic Fittings and Tubing Installations

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(9) Resistance Measurement of Tube-To-Bulkhead Fittings

For resistance measurement of tube-to-bulkhead fittings, reference paragraph (6) for meter connection procedures and figure 6.

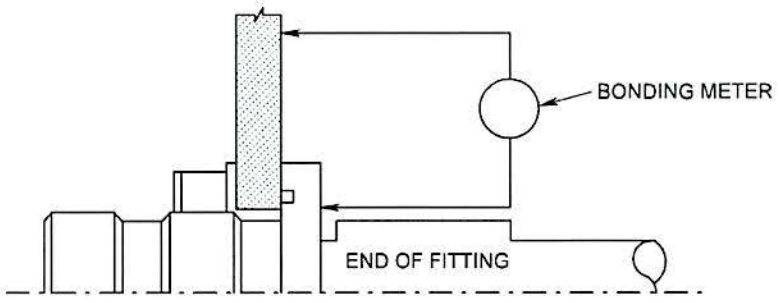


SFAR-88-SB-1-004B

Figure 6
Resistance Measurement of Tube-To-Bulkhead Fittings

(10) Resistance Measurement of Bulkhead Fittings to Primary Structure

For resistance measurement of bulkhead fittings to primary structure, reference paragraph (6) for meter connection procedures and figure 7.



SFAR-88-SB-1-005

Figure 7
Resistance Measurement of Bulkhead Fittings to Primary Structure

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(11) Repairs

When repairs are necessary, appropriate cleaning and surface preparation is required. Refer to paragraph (12) for cleaning methods and procedures.

(12) Cleaning Methods and Procedures

The following paragraphs provide approved cleaning methods and procedures.

(a) Abrasive Cleaning – Cleaning Method 1

1 Anodic films vary in thickness and may be very difficult to remove with a wire brush.

2 If wire brushing fails to remove anodic film, use an abrasive disc. Ensure the area is cleaned properly if a disc is used.

3 Any one, or combination, of the following procedures will be used followed by a solvent wipe with a clean dry cloth.

NOTE: Complete the electrical bond within 4 hours after completing the following procedures.

4 Method 1 - Abrasive Sheet

a Abrasive sheets will be reused only on the same type of material on which they were used originally.

b The surface will be prepared by hand, using Cleaning Method 3 - paragraph (12)(c).

c A circular motion will be maintained with the abrasive sheet.

d The operation will be continued until the coating is removed, and a clean, bare metal surface is visible throughout the required bond area.

5 Method 1 – Stainless Steel Rotary Brush

a The surface will be prepared using a rotary, stainless steel brush, mounted in a manual or power drill.

b The wire brush is to be used with light, intermittent pressure, keeping the cutting face parallel with the surface being prepared.

c The results must be inspected after each intermittent application.

d A minimum of the metal structure, carbon-composite structure, or conductive finish will be removed to expose a clean, bare metal surface throughout the required bond area.

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6 Method 1 – Abrasive Disc

a The surface will be prepared using a 150 to 400 grit abrasive paper or cloth disc.

b The abrasive disc must be fixed to a rotary mandrel mounted on a manual or power drill and the appropriate sized mandrel selected.

c As an alternate material, a fine or very fine Scotch-Brite or Bear-Tex pad disc wetted with water may be used.

d The abrasive disc will be re-used only on the same type material on which it was originally used.

e The abrasive disc will be used with light, intermittent pressure, keeping the cutting face parallel with the surface being prepared.

f The operation will be continued until the coating is removed and a clean, bare metal surface is visible throughout the required bond area.

g The disc must be replaced when it becomes plugged with the material being removed.

h Only a minimum of the metal will be removed.

(b) Light Abrasive Cleaning – Cleaning Method 2

1 Any one, or combination, of the following procedures will be used followed by a solvent wipe with a clean dry cloth.

2 Complete electrical bond within 4 hours after these procedures.

3 See paragraph (13) for treatment of surfaces cleaned with this method.

4 Method 2 – Abrasive Sheet

a Abrasive sheets will be re-used only on the same type of material on which they were used originally.

b The surface must be prepared by hand, using an abrasive sheet of paper or cloth (240 to 400 grit), or very fine to ultra fine Scotch-Brite/Bear-Tex pads.

c A circular motion will be maintained with the abrasive sheet.

d The operation will be continued until the coating is removed and a clean, bare metal surface is visible throughout the required bond area.

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5 Method 2 – Abrasive Disc

a The surface will be prepared using a 240 to 400 grit abrasive paper or cloth disc.

b The abrasive disc will be fixed to a rotary mandrel mounted on a manual or power drill and the appropriate sized mandrel selected.

c As an alternate material, a fine or very fine Scotch-Brite or Bear-Tex pad disc wetted with water may be used.

d The abrasive disc must be re-used only on the same type material on which it was originally used.

e The abrasive disc will be used with light, intermittent pressure, keeping the cutting face parallel with the surface being prepared.

f The operation will be continued until the coating is removed and a clean, bare metal surface is visible throughout the required bond area.

g The disc must be replaced when it becomes plugged with the material being removed.

h Only a minimum of the metal will be removed.

(c) Solvent Cleaning – Cleaning Method 3

This method will be used for the cleaning of terminals, plated and Class II conversion coated metals, and passivated CRES.

NOTE: When using this method, complete electrical bond within 24 hours.

1 Remove excess debris (chips, shavings, loose soil, etc.) and excess grease, oil, or other loose contamination from the bond area by vacuuming, wiping, scrubbing, or other physical means.

2 Using a non-metallic brush or wiper, clean a width approximately two times wider than the width of the bond surface.

3 Wipe off all solvent while the surface is wet, using clean wiping material or non-metallic bristle brush.

4 Apply light pressure between the brush or wiper and the surface.

5 Avoid the use of excessive amounts of solvent.

6 Make applications of cleaning solvent and wiping (or brushing), using clean materials, until no residue is visible on the bonding surface area.

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(d) Light Abrasive Polish Cleaning – Cleaning Method 4

This method will be used for cleaning on scale free, lightly oxidized, bare titanium alloys and nickel base alloy surfaces.

NOTE: When using this method, complete electrical bond within 24 hours after cleaning.

1 Wash/solvent wipe bond area.

2 Abrade the faying surfaces with 400 grit aluminum oxide abrasive paper or cloth, ultra fine pads, or fine grit metal polish.

3 Wipe off polishing residue with a dry, clean, soft, cotton cloth.

(13) Treatment of Abrasively Cleaned Aluminum

This procedure applies to aluminum that has been abrasively cleaned in accordance with paragraph (12)(a) and (12)(b).

(a) Initiate this treatment step within 2 hours after the abrasive cleaning.

(b) Re-clean the surfaces in accordance with paragraph (12)(c) if the 4-hour period is exceeded.

(c) Using a brush apply the conversion coating evenly and liberally to the surface.

(14) Removal of Polysulfide Sealing Compounds from Faying Surfaces

If the surface is to be electrically bonded, the polysulfide sealing compounds must be removed from the mating (faying) surfaces using non-metallic trimmers (scrapers). On the following surfaces, (See table 1) use the cleaning method specified:

NOTE: The bond surfaces must be solvent cleaned using clean wipers soaked with solvent.

(a) Group 1. Cleaning Method 2 - paragraph (12)(b).

(b) Group 2. Passivated, plated and conversion coated. Cleaning Method 3 - paragraph (12)(c).

(c) Group 2. Primed, top coated and anodized. Cleaning Method 1 - paragraph (12)(a).

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Table 1. Surface Cleaning Methods

SURFACE CLEANING METHODS					
MATERIAL	SURFACE FINISH	FINISH CODES	CLEANING METHOD	CLEANING AGENTS	ADDITIONAL INFO.
GROUP 1: ALUMINUM	Primed Topcoat MIL-A-8625, Type III Anodized	1, F, S, A 51, 46 AAA	1 Para. (12)(a)	Abrasive paper, cloth, pads, and glass beads. Brushes or discs	Conversion coating Class 2. Post treatment required on bare aluminum surface
	Bare MIL-C-5541, Class 1A MIL-A-8625, Types I and II Anodized	N/A F A	2 Para. (12)(b)	Fine to ultra-fine abrasive paper Cloth pads, discs, metal polish	Conversion coating Class 2. Post treatment required on bare aluminum surface
	MIL-C-5541, Class 3	S	3 Para. (12)(c)	Solvent Clean	Includes previous masked areas
GROUP 2: TITANIUM, STEEL (MILD TO HIGH STRENGTH CRES) TERMINALS	Passivated (CRES)	M	3 Para. (12)(c)	Solvent Clean	Includes previous masked areas
	Plated metals Conversion Coatings	C, CC G	3 Para. (12)(c)	Solvent Clean	Includes previous masked areas
	Phosphate Fluoride on Titanium	----	3 Para. (12)(c)	Solvent Clean	Includes previous masked areas
	Primed Topcoat	1, C, CC, M 51, 46	1 Para. (12)(a)	Abrasive paper, cloth, pads, and glass beads. Brushes or discs	— — —
	Chromate Conversion Coated Cadmium Plated	— — —	2 Para. (12)(b)	Fine to ultra-fine abrasive paper, cloth pads, discs, metal polish	— — —
	Bare	— — —	4 Para. (12)(d)	Ultra-fine abrasive paper, cloth, paper, metal polish	Includes masked areas
See paragraphs (12) and (13) for time limits.					

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(15) Refinishing and/or Resealing

(a) After assembly and bond resistance tests on the fasteners to structure, fray surface bonds, etc., when required; reapply all primers and sealants to within 1/32-inch minimum of bond joint or test probe area.

(b) Masked areas for electrical disconnect panels require no touch-up if the masked area after installation is less than 1/8-inch.

(c) Do not paint machine-finished flanges of fuel or hydraulic pumps, valves, and similar equipment that must maintain a liquid-tight seal at the mounting surface.

(d) Any exposed surfaces, from which paint or other non-conductive coatings have been removed, must be reapplied.

(e) Any surfaces which have had the anodic finishes removed will be refinished with varnish.

(f) Refinishing of the bonded areas of magnesium alloy parts must be completed within 24 hours of the removal of the protective finish.

(g) After assembly, clamped, riveted, or bolted joints will be refinished with one coat of epoxy primer and a top coat to match the adjacent parts.

(16) Installation of Faying Surface Bonds

(a) Prepare the faying surfaces using the appropriate cleaning method provided in paragraph (12).

WARNING: ENSURE METER IS CERTIFIED FOR USE IN FUEL OR OXYGEN-RICH EXPLOSIVE ENVIRONMENTS. FAILURE TO COMPLY MAY RESULT IN SEVERE INJURY OR DEATH.

(b) Measure the resistance of the bond.

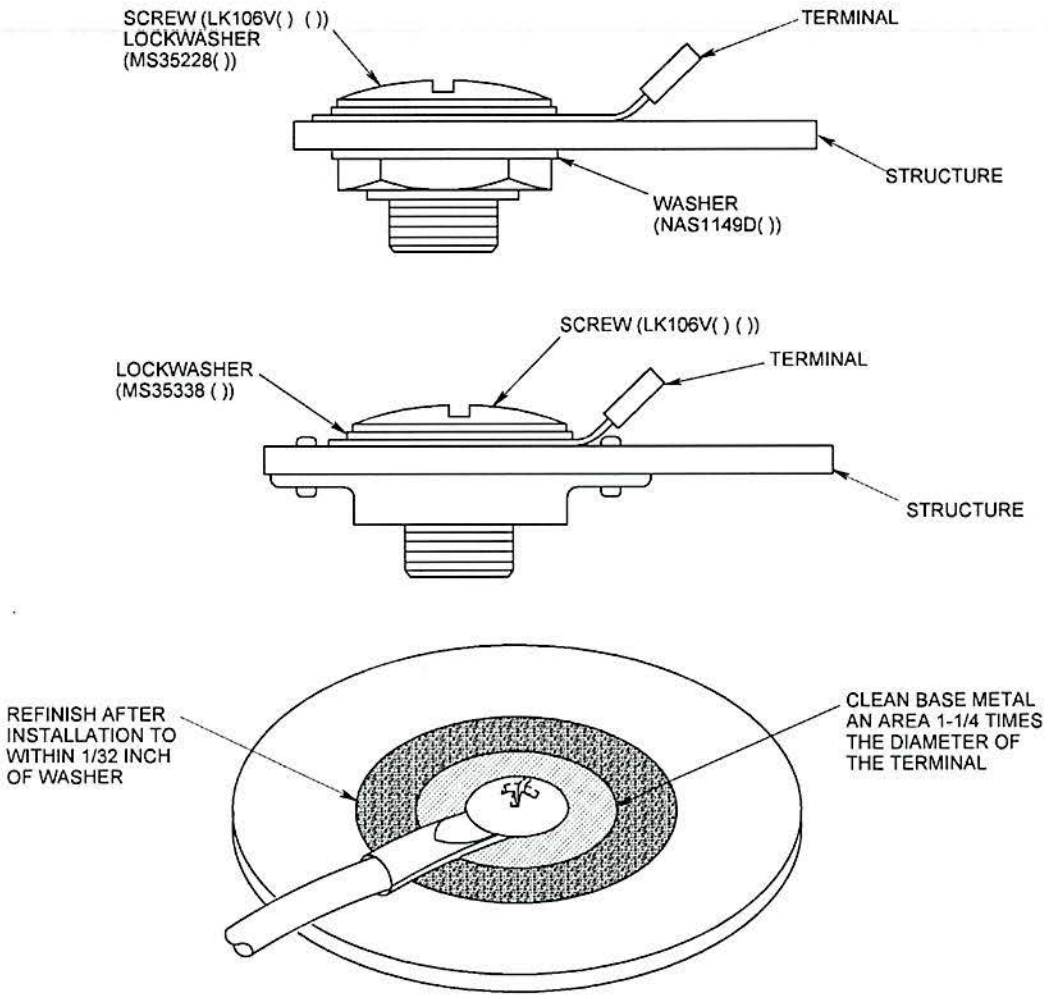
- Fuel pump and associated conduit – 0.37 milliohms.
- FLCV and associated conduit – 1.86 milliohms.
- Fuel tank access panels – 0.37 milliohms.
- Fuel lines – 1.00 ohm.

(c) Resistance testing made on all items must meet the bonding requirements specified in this Service Bulletin.

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(17) Assembly of Bond Jumpers and Ground Leads

(a) Assemble jumper to plated steel, CRES, or titanium bolted connection as shown in figure 8.

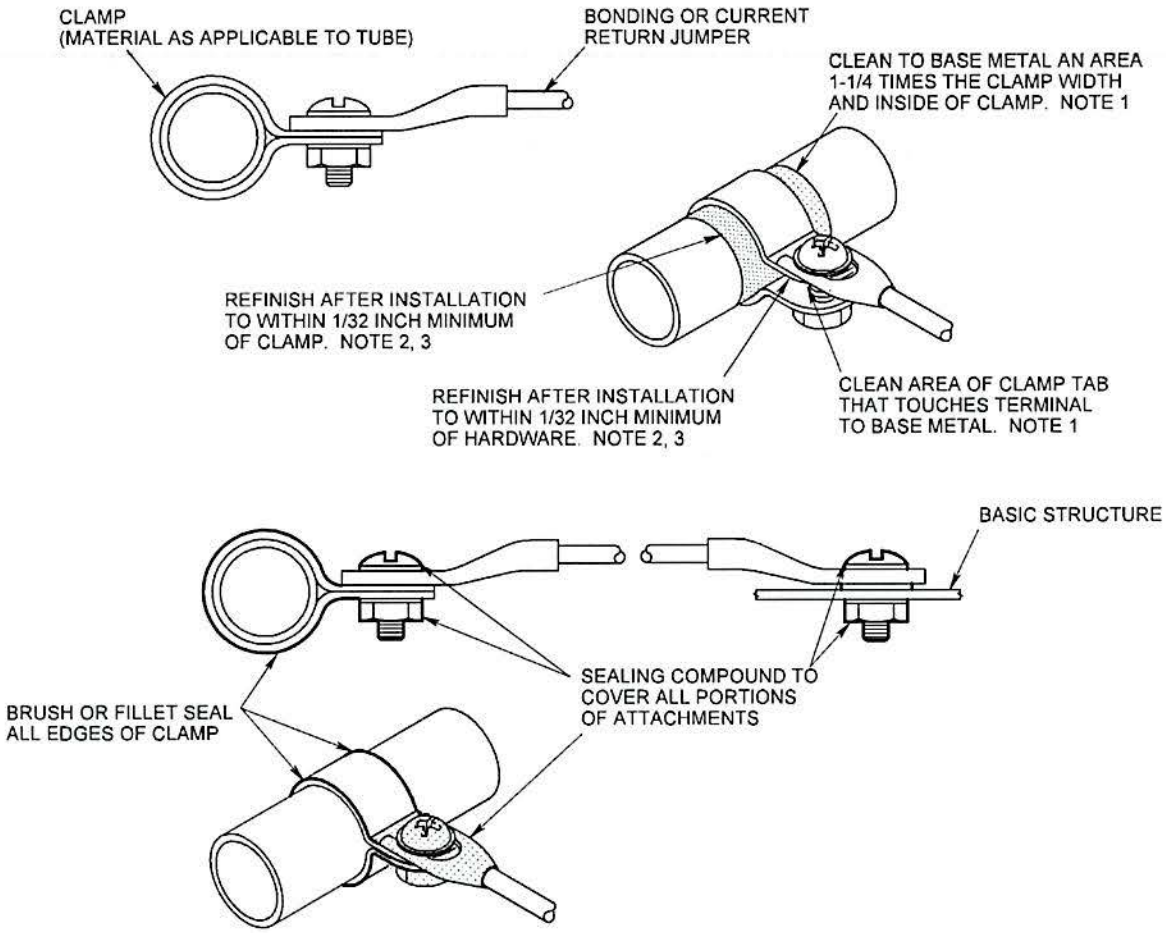


CLEAN AND REFINISH IN ACCORDANCE WITH PARAGRAPHS (12) AND (15)
USE ONLY TITANIUM OR CRES FASTENER COMPONENTS IN TITANIUM STRUCTURE

Figure 8
Jumper to Plated Steel, CRES, or Titanium Bolted Connection

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(b) Assemble jumper to tube clamp connection as shown in figure 9.



NOTE

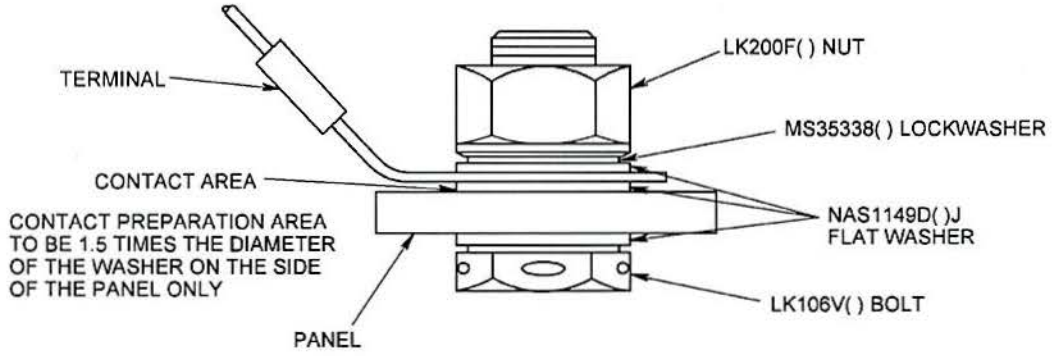
1. CONTACT AREA PREPARATION 1-1/4 TIMES CONTACT AREA.
2. SEAL AN AREA 1-1/4 TIMES THE PREPARED AREA, WHEN REQUIRED.
3. REFINISH IN ACCORDANCE WITH PARAGRAPH (15).

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Figure 9
Jumper to Tube Clamp Connection

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(c) Assemble jumper to aluminum bolted connection as shown in figure 10.



NOTE

1. PREPARE SURFACE AREA IN ACCORDANCE WITH PARAGRAPH (12).
2. REFINISH TO WITHIN 1/32 INCH MINIMUM OF WASHER.
3. SEAL IN ACCORDANCE WITH PARAGRAPH (15) WHEN SEALING IS REQUIRED.

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Figure 10
Jumper to Aluminum Bolted Connection

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C. ZONAL INSPECTION OF DRY BAY AREAS AND OTHER REQUIRED AREAS

The Zonal Safety Analysis (ZSA) formed a part of the safety compliance documents required to meet the requirements of Federal Aviation Administration, Special Federal Aviation Regulation SFAR 88 "Transport Airplane Fuel Tank System Design Review, Flammability Reduction, and Maintenance and Inspection Requirements." The ZSA used SAE Aerospace "Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment" (SAE ARP4761) as a suggested format. The ZSA identified design and installation requirements and individual failure modes, which may have the potential to lead to a catastrophic or hazardous failure event. The analysis recognized the potential hazards of the physical installation of system hardware and the effect it has on the independence of associated systems. It also incorporated analysis, of events outside the system(s) concerned, but which may influence events within the system(s). To assess these potential hazards or threats, the ZSA considered the installation aspects of new and/or modified individual system/components and the mutual influence between several systems/components installed in close proximity on the airplane. To accomplish this task the engineering drawing package and actual aircraft installations were inspected to prove compliance with Lockheed Drawings and Specifications and FAA requirements. The aircraft as delivered to each customer met the design requirements that Lockheed Martin feels is the minimum to assure fuel tank safety.

This section should be accomplished on any changes to the aircraft since delivery to the customer. Original installations by the Lockheed Martin meet these requirements. The following documents are to be used in bringing the installation/repair into compliance:

- Hercules Corrosion Prevention and Control Manual
- Hercules Airfreighter Progressive Inspection Procedures or Hercules Airfreighter Series Progressive Inspection Procedures
- Hercules Maintenance Manual or Hercules Maintenance Instructions Manual
- Hercules Wiring Diagram Manual

The center wing dry bay, dry bays 1, 2, 3, and 4, the wing leading-edge, the wing trailing edge, and the fuel probes, shall be inspected in accordance with the following paragraphs:

(1) Electrical Systems Inspection

Perform all inspections described in the following paragraph.

(a) Aluminum Wire

Ensure aluminum wire is not used in the following locations:

1 Aluminum wire smaller than No. 4 AWG shall not be used for main generator cables.

2 Aluminum wire shall not be installed in areas of corrosive fumes or severe vibration.

3 Aluminum wire shall not be connected to engine mounted accessories.

4 Aluminum wire installation shall be permanent.

5 Aluminum wire runs shall be longer than three feet.

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(b) Copper Wire

Ensure that no wire smaller that AWG 22 is used for inter-connecting equipment(s).

(c) Engine Mounted Accessories

Ensure that for direct attachment to engine mounted accessories wire and cable smaller than No. 20 AWG high strength alloy shall not be used.

(d) Spare Cable Length

Ensure that harnesses are installed to permit replacement or repair of individual cables without removal of the entire harness. At least two inches of spare cable length shall be provided to allow for broken connections.

(e) Insulating Tubing

Ensure that insulating tubing is placed over terminals (except pre-insulated types) to provide electrical protection and mechanical support and is secured to prevent slippage of the tubing from the terminal.

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(f) Dead-Ended Wires

Perform an inspection to ensure that electrically energized conductors are not dead-ended. If wires must be dead-ended, however, wire end caps shall be used. A minimum of 0.2-inch between the end caps and/or metallic objects shall be maintained. (See figures 11 and 12.)

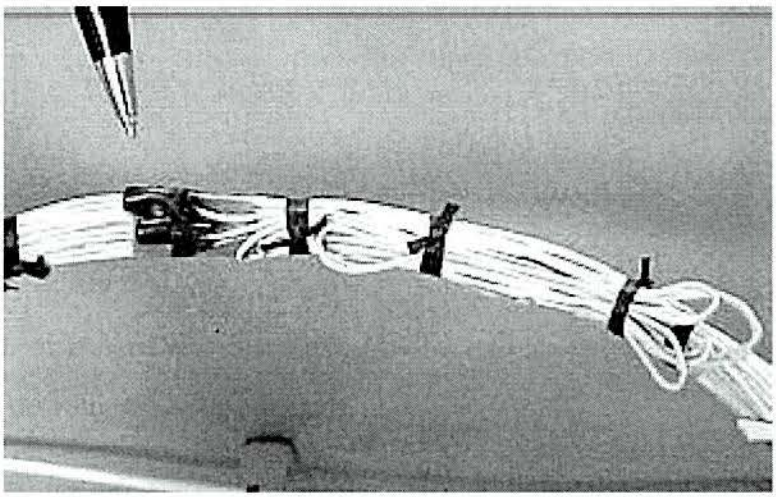


Figure 11
Properly Installed Wire End Caps

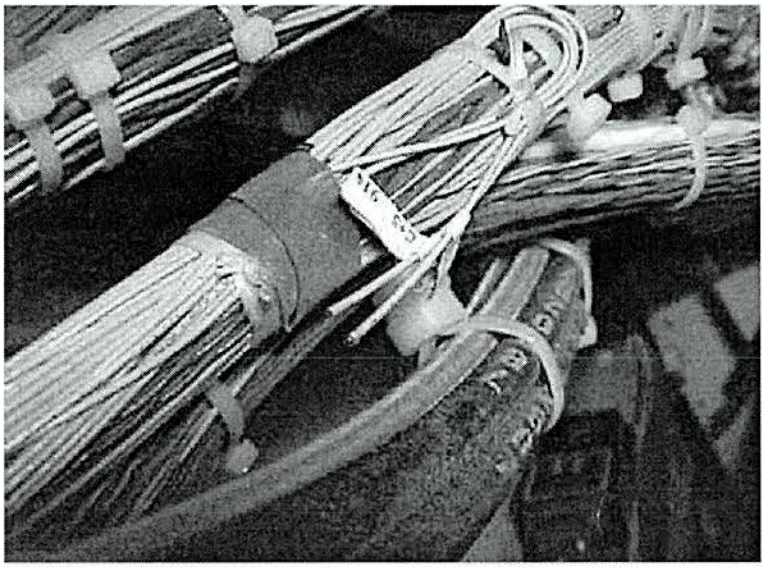


Figure 12
Improperly Terminated Wires

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(g) Wire Routing

1 Ensure that electrical wire is not routed under fluid carrying tubes.

2 Ensure that when running wires over a fluid line that sufficient cable clamps are installed so that a broken wire cannot contact the fluid line. (See figure 13.)

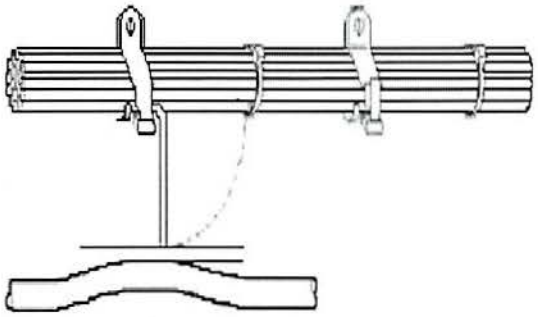


Figure 13
Broken Wire Over Fluid Line

3 Ensure that wire bundles within clamps are not larger than two inches in diameter.

4 Ensure that generator feeder wires are bundled separately from all other wires in the wing leading edge and fuselage areas. Ensure that all generator wire bundles, feeder and control, are separated from fuel tank boundaries (wall or bulkheads) in the wing leading edge area per original type design; i.e., feeder wires in cable clamp and stand-off brackets in accordance with Step 2.C.(2)(a)2 and control wires tightly tied in accordance with Step 2.C.(1)(g)7 using suitable material.

5 Ensure the electrical power leaves the nacelle in the upper left quadrant and fuel is delivered to the engine in the lower right quadrant.

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6 Ensure that wires are routed at least six inches away from lines or equipment containing flammables. Wires or cables closer than six inches shall be supported so that they will not deflect closer than 0.5-inches from the lines or equipment, except where intervening structure or barriers exist between the lines or equipment and the wire or cables, which would make contact impossible. Where these requirements cannot be met, protection such as conduit or insulating material shall be used. (See figure 14.)

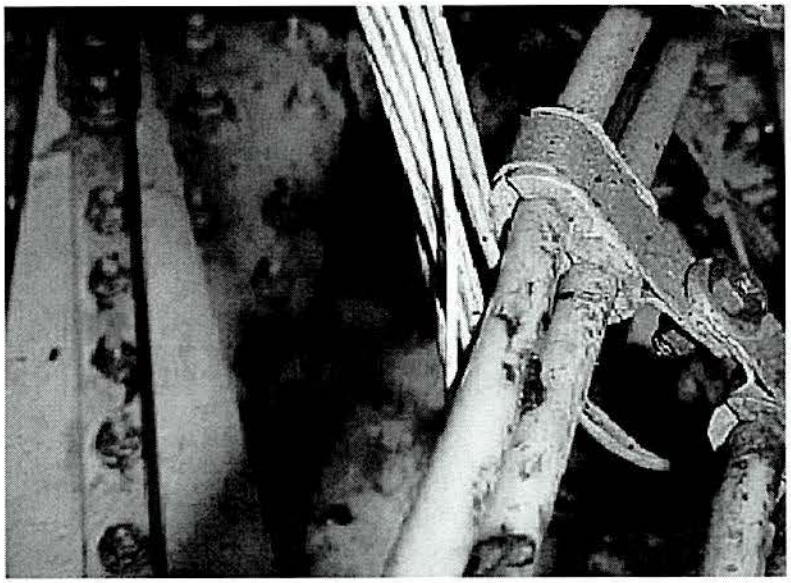


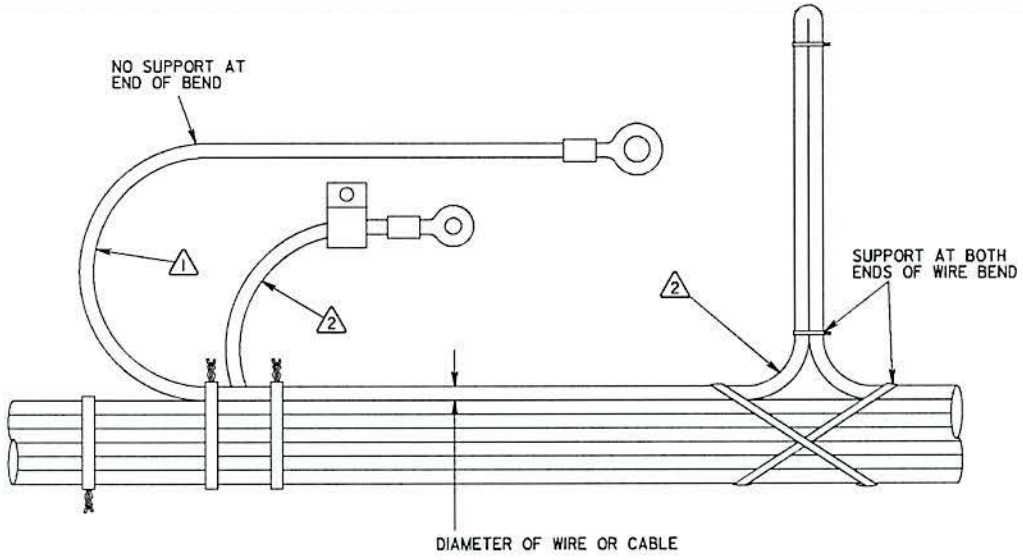
Figure 14
Hydraulic – Electrical Lines Routed too Close

7 Ensure that wires are routed away from, or protected from, all hot equipment and lines to prevent insulation breakdown. The normal safe distance from bundles to bleed air ducts is twelve inches, and essential coaxial cables are nine inches. Ensure all bundles with 2 to 12 inches of hot equipment and lines are spot-tied using flame resistant lacing braid. Use fiberglass braid in power plant areas.

8 Ensure that electrical wires are not routed through areas where they can be immersed in or saturated with fluids. When this is impossible, they should be enclosed in rigid conduit, plastic tubing, or shrinkable tubing for a sufficient distance to prevent any fluid contact with the wires or cables.

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9 Ensure that provisions have been installed to prevent insulation chafing. Wires and bundles should be installed by routing and clamping to ensure sufficient spacing from structure or other parts after any single failure. Bend radii should be large enough to ensure that insulation cracking does not occur. (See figure 15.)



MINIMUM BEND RADIUS FOR WIRE INSTALLATION

NOTE

1. MINIMUM BEND RADIUS - 10 TIMES THE DIAMETER OF THE WIRE OR CABLE.
2. MINIMUM BEND RADIUS - 3 TIMES THE DIAMETER OF THE WIRE OR CABLE.

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Figure 15
Minimum Bend Radii

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(h) Wiring Supports

1 Ensure that wires and cables are adequately supported to prevent excessive movement in areas of high vibration (all wing areas).

2 Ensure that no friction or plastic tape has been used on the wires and/or cables under clamps.

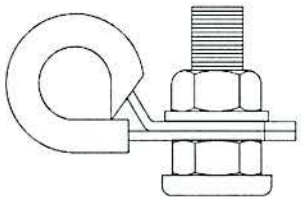
NOTE: Plastic type tapes will dry out in service and produce a chemical reaction with the wire or cable insulation, or absorb moisture.

3 Ensure that suitable clamps, grommets, or other devices support wire and cables at intervals of not more the 24-inches.

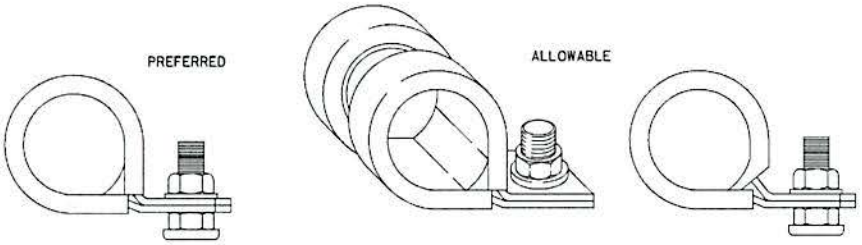
4 Ensure that metal standoffs are used to maintain clearance between wire and structure. Employing tape or tubing is not acceptable as an alternative to standoffs for maintaining clearance.

5 Ensure that clamps and ties around bundles do not present a rough surface that may damage the wire insulation. The clamps should be tight enough to hold the wires in place, but not so tight that insulation damage would occur during installation, or later. (See figures 16 and 17.)

NOTE: Filler rods may be used when a clamp does not ensure adequate clamping and there is not a smaller clamp, which will clamp properly. (See figure 18.)



WEDGE POSITION ON SIZE 2 AND 3 CLAMPS



WEDGE POSITION ON SIZE 4 AND UP CLAMPS

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Figure 16
Proper Installation of Cable Clamps

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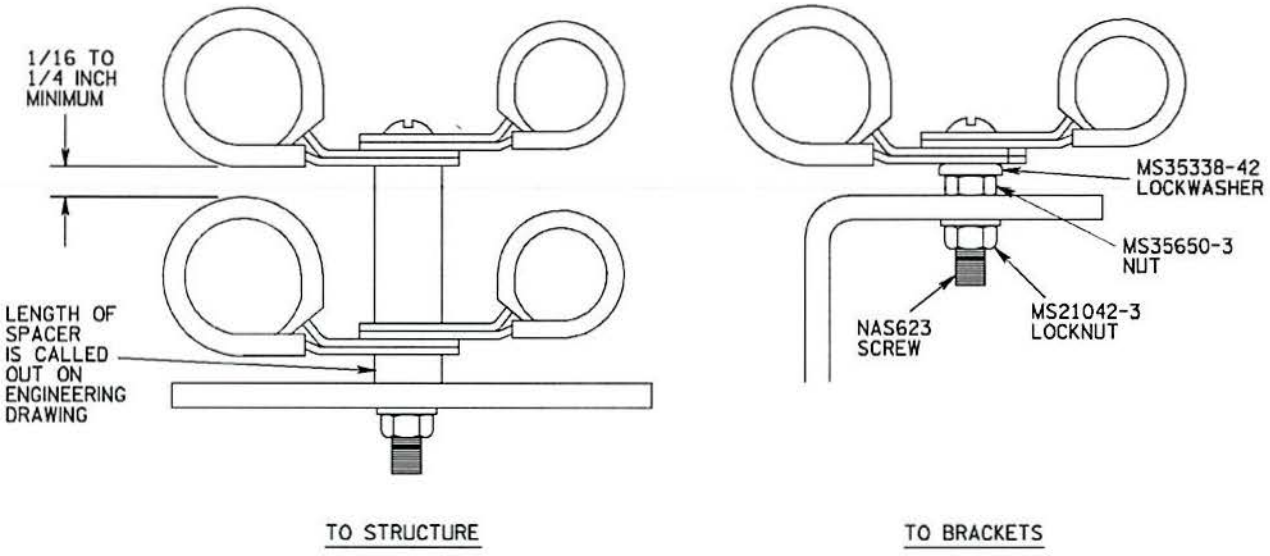


Figure 17
Mounting Multiple Clamps

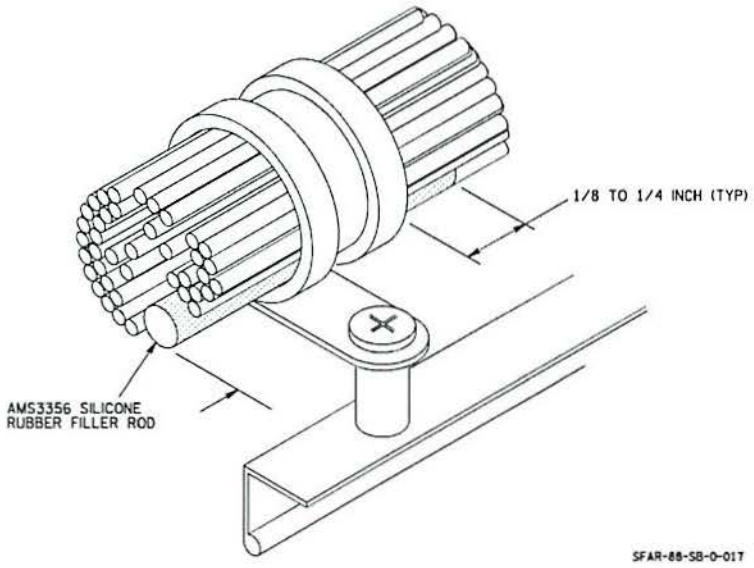


Figure 18
Filler Rod Installation

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6 Ensure that phenolic blocks, plastic liners, or rubber grommets are installed in holes, bulkheads, floors, or structural members where it is impossible to install off-angle clamps to maintain wiring separation. In such cases, additional protection in the form of plastic or insulating tape may be used. (See figures 19 and 20.)

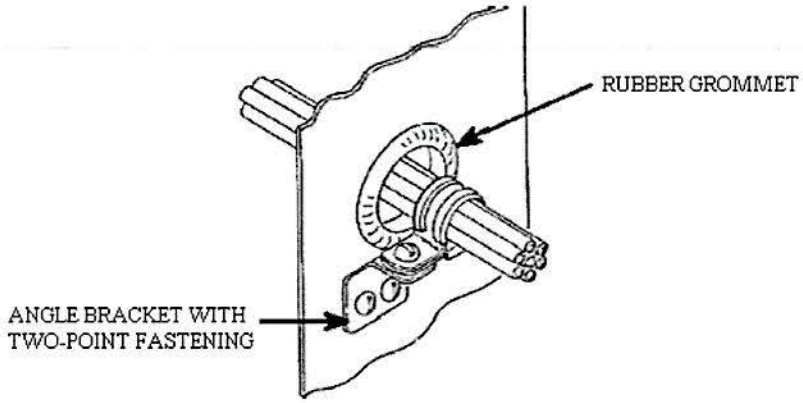


Figure 19
Protection for Wire or Cable when Passing through Bulkhead

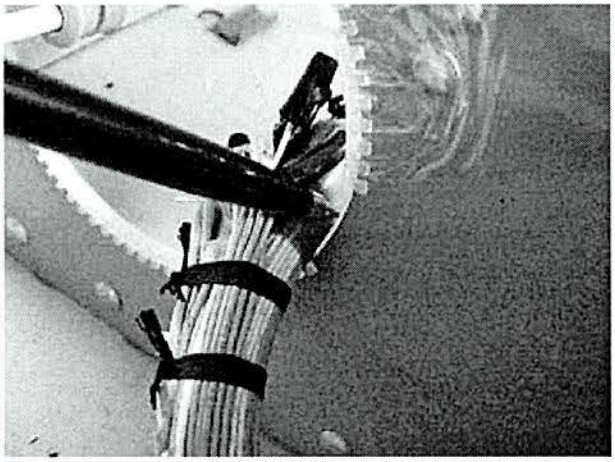


Figure 20
Wire Resting on Lightening Port (Not Allowed)

7 Ensure that insulating tubing is kept at a minimum and must be used to protect wire and cable from abrasion, chafing, and exposure to fluids, and/or other conditions, which could affect the cable insulation. The use of insulating tubing for support of wires and cables in lieu of standoffs is prohibited.

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8 Ensure that wire is routed in such a manner as to prevent chafing of insulation. Support wire to prevent harnesses from sagging into sharp metallic edges or rubbing the structure. (See figures 21 through 23.)

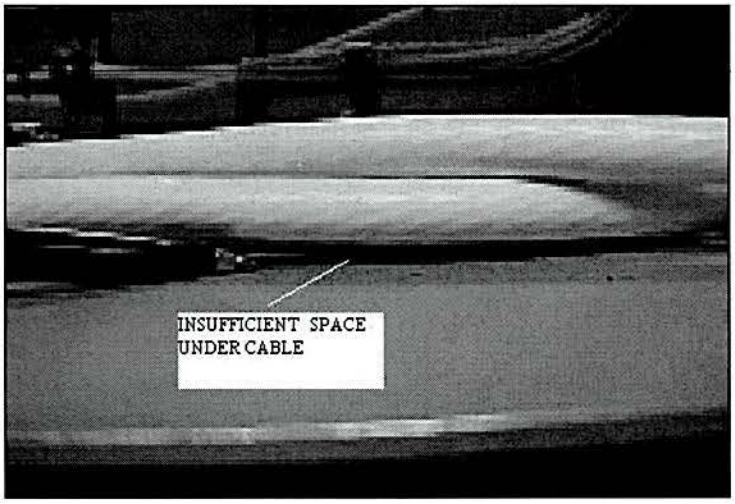


Figure 21
Insufficient Space Under Cable

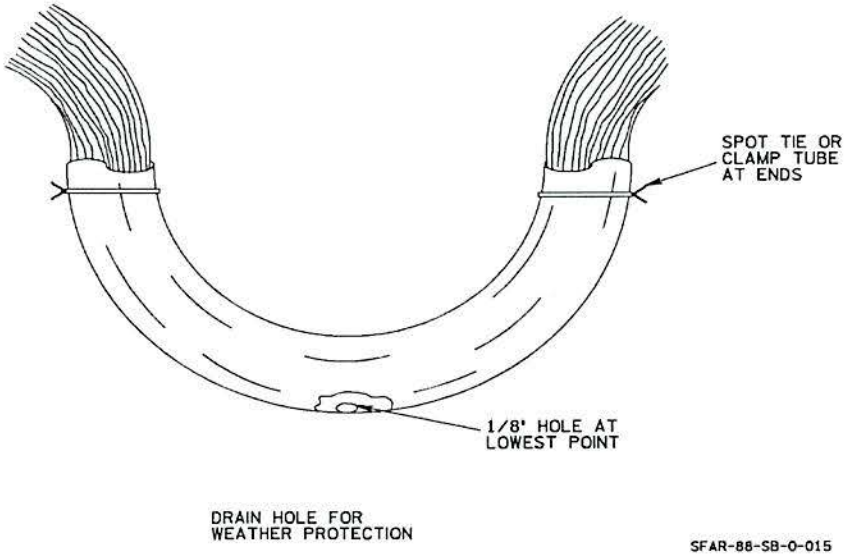


Figure 22
Drain Hole in Slack Wiring Bundle

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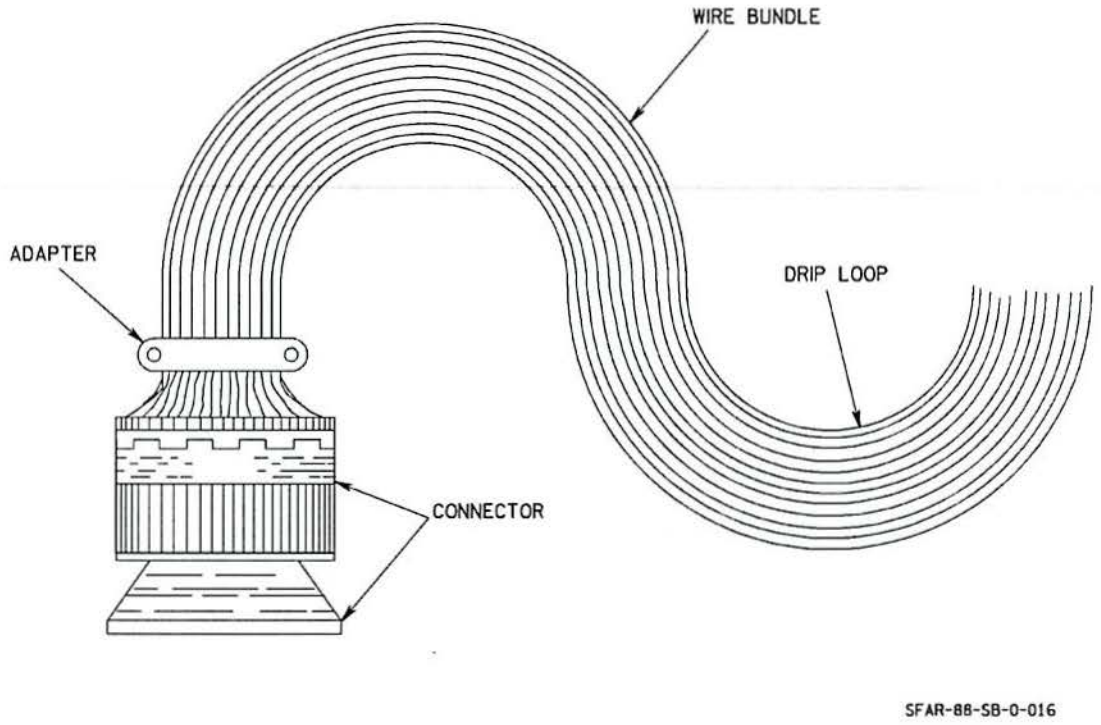


Figure 23
Drip Loops in Wiring Bundle

(i) Tying of Electrical Wires

Ensure that tying of wires with plastic straps and tying braid provide the proper wire bundle and breakout integrity.

NOTE: The tying material has to be appropriate for the location within the aircraft. Figures 24 through 27 presents a sample of the proper use of tying material and knot configurations.

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1 Bundles shall be tied together with an approved plastic strap or braid. The number of spot ties should be kept to a minimum, but shall be used as necessary to produce a neat and orderly bundle. (See figure 24.)

NOTE: Plastic straps shall meet the requirements of MIL-S-23190.

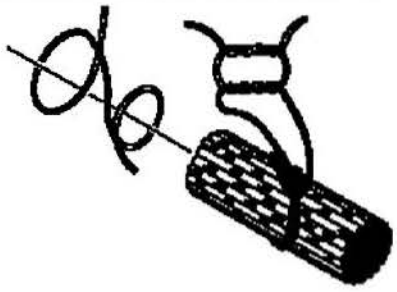


Figure 24
Spot Tying Method

2 Unless otherwise specified by an approved engineering drawing, straps shall not be used under the following restrictions:

a Where the total temperature exceeds 185°F (85°C).

b Failure of the strap would permit movement of the wires and cables against parts which could damage the insulation, foul mechanical linkage, or permit the strap to fall into moving mechanical parts.

c Do not use in high vibration areas, in areas of severe wind and/or where moisture problems exist such as wheel wells, near wing flap etc.; do not use on wire bundles containing coaxial cables or other than those with solid dielectric.

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3 When one or more wires break away from a bundle or harness, tie the breakout as shown in Figures 25, 26, and 27. When cable ties are used at "Y" breakouts, they must be wrapped around each section of the breakout. When cable ties are used at "T" breakouts on cable diameters over 3/4-inch, they must be wrapped around each section of the breakout.

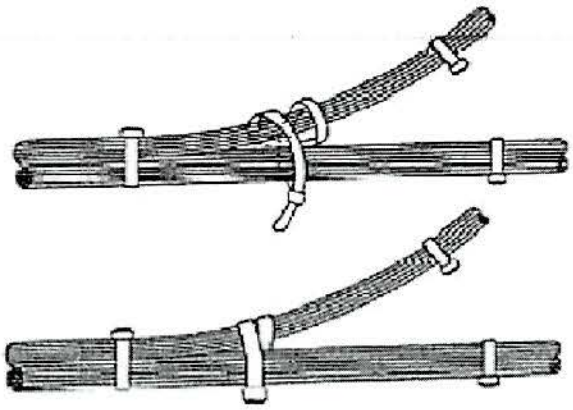
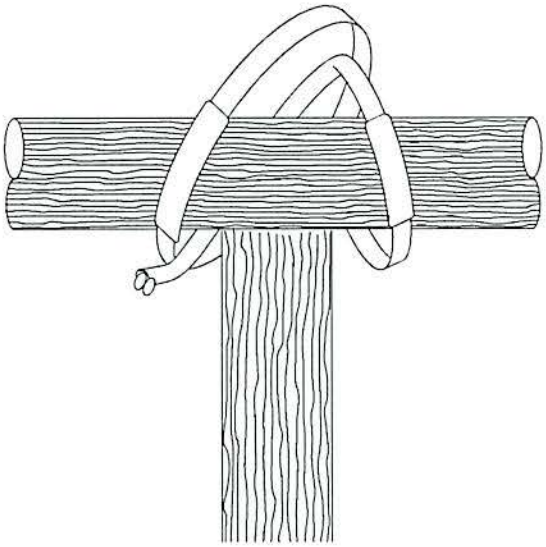


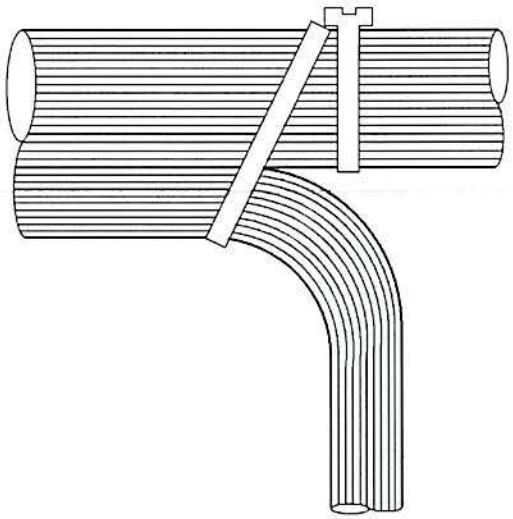
Figure 25
Tying Harness for Multiple Breakouts



SFAR-88-SB-0-013

Figure 26
Cable Ties for "T" Breakout

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SFAR-88-SB-0-012

Figure 27
Cable Ties for "Y" Breakout

(j) Terminal Modules

1 Ensure that terminal connections on terminal block studs and nuts on unused studs are tight.

2 Ensure that terminal modules are securely mounted and provided with adequate electrical clearances or insulation strips between mounting hardware and conductive parts, except those used for grounding purposes. (See table 2 and figure 28.)

Table 2. Torque Value for Terminal Lugs

Stud Size	Torque Value in Inch-Pounds		
	Copper Terminals		Aluminum Terminals
	Plain Nuts	Self-Locking Nuts	Plain or Self-Locking Nuts
No. 6	12 to 17	16 to 20	
No. 10	15 to 20	25 to 30	
1/4 inch	45 to 60	45 to 60	45 to 60
5/16 inch	70 to 80	120 to 130	135 to 165
3/8 inch	110 to 120	180 to 190	220 to 250
1/2 inch	135 to 150	245 to 260	440 to 470

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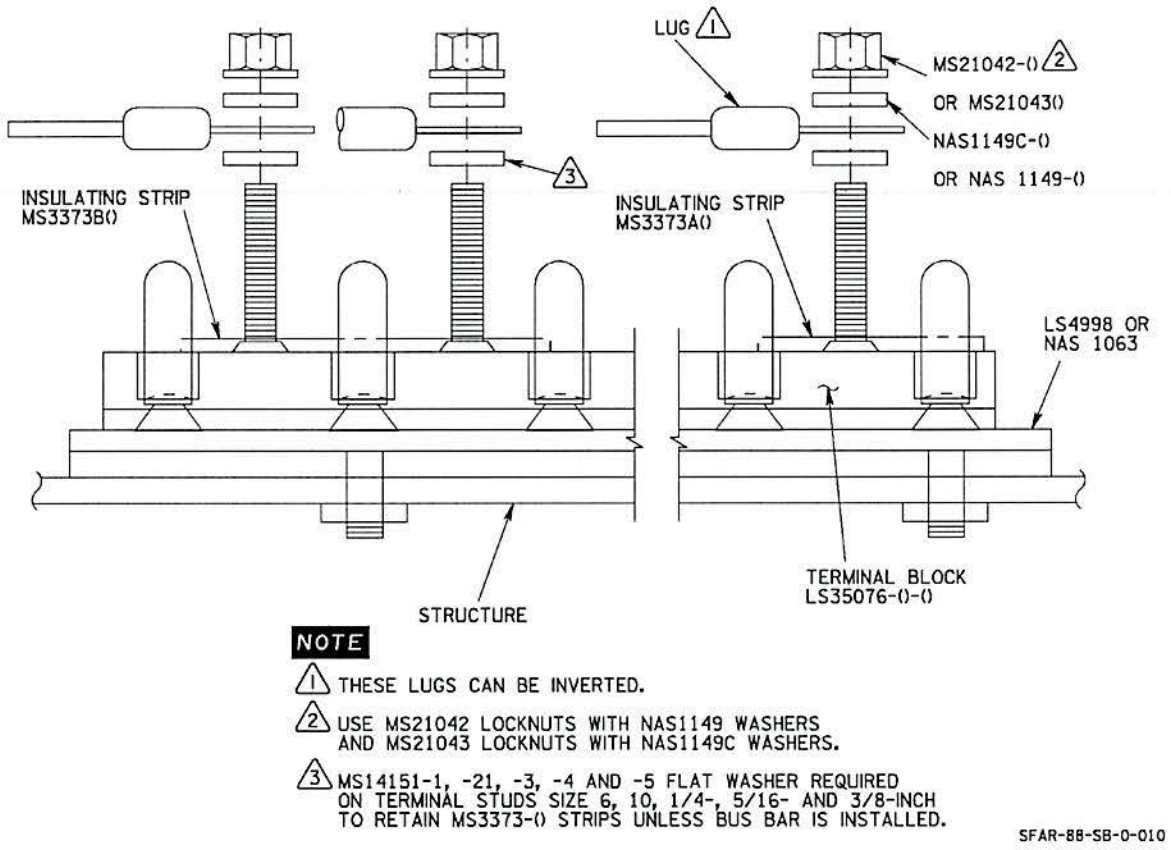


Figure 28
Installation of Terminal Block Assembly, Including MS 14151 Washers

(k) Connectors

1 Perform an inspection to identify evidence of overheating (cause of over-heating shall be corrected), and the exteriors for corrosion and cracks. Also, wires leading to connectors must be inspected for deterioration due to overheating. Replace all corroded connections and overheated connectors.

2 Ensure the installation of a cable clamp (MIL-C-85049) on all connectors, except those that are moisture-proof.

3 Ensure that silicone tape is wrapped around wire that is secured with MS3057 cable clamps.

4 Ensure that connectors are fully mated by checking position and tightness of coupling ring or its alignment with fully mated indicator line on receptacle, if applicable.

5 Ensure that the coupling nut is safetied, by wire or other mechanical locking means.

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(2) Unit Essential to Safe Operation

Perform all units essential to safe operation inspection described in the following paragraphs.

(a) Main Power Cables

1 Ensure that main power cables (including generator cables) in the wing are installed to allow for a reasonable degree of deformation and stretching without failure and that they:

a Are isolated from flammable fluid lines.

b Run along the front wing spar, if they are generator cables, to provide isolation from the fuel tanks.

2 Heavy-Current Carrying Cables (Leading Edge)

CAUTION: CHANGES TO GENERATOR CABLES STANDOFF BRACKETS ARE NOT PERMITTED.

Ensure no modification has been made to compromise generator wires standoffs.

(b) High Energy Wiring

Ensure that high energy wiring is not routed through conduit or adjacent to fuel tank surfaces such that damage, inappropriate maintenance, or other failure/wear conditions could result in arcing to the conduit or metallic tank surface and development of an ignition source in the fuel tank. The exception to this is the fuel pump conduit and fuel level control valves.

(3) Lightning Protection

Ensure that individual bonding jumpers for lightning protection are not less the No.12 AWG for tinned stranded copper or No. 10 AWG for tinned stranded aluminum wire.

(4) Pneumatic System Failures

Ensure that there is no leakage of air from ducting located near fuel tanks due to duct failure resulting in undetected heating of tank surfaces above the auto-ignition temperature.

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(5) Structural and Non-Electrical Equipment Bonding

WARNING: ENSURE METER IS CERTIFIED FOR USE IN FUEL OR OXYGEN-RICH EXPLOSIVE ENVIRONMENTS. FAILURE TO COMPLY MAY RESULT IN SEVERE INJURY OR DEATH.

Perform all structural and non-electrical equipment bonding requirements described in the following paragraphs.

NOTE: If conductive couplings or fittings are used, bonding may be achieved through the equipment; if not, bonding jumpers shall be used on each isolated section.

(a) Ensure that any lines carrying fluids or gases in motion are bonded to the structure.

NOTE: Resistance shall not exceed 1 ohm for each metal-to-metal joint when dry.

(b) Ensure that plumbing equipment and control devices with a linear dimension over three inches are electrically bonded directly to the airplane structure to prevent static buildup.

(6) ATA/JASC 28 – Fuel Systems

Perform all ATA/JASC 28 Fuel System requirements described in the following paragraphs.

(a) Ensure that fuel lines have been routed such that they do not chafe against control cables, airframe structure, or come in contact with electrical wiring or cables. In no case should the fuel line support wiring.

(b) Ensure that bends in tubing are aligned with all support clamps and end fittings and are not drawn, pulled, or otherwise forced into place by the clamps.

(c) Ensure that support clamps or bracket for metallic lines are as shown below:

Tube O.D.	Approximate Distance Between Supports
1/8 inch – 3/16 inch	9 inches
1/4 inch – 5/16 inch	12 inches
3/8 inch – 1/2 inch	16 inches
5/8 inch – 3/4 inch	22 inches
1 inch – 1-1/4 inches	30 inches
1-1/2 inches – 2 inches	40 inches

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(7) Drains and Vents

Perform an inspection at metal drains and vent fittings on the aircraft that shall satisfy a Class L bond requirement (dump mast).

Class L – Lightning: minimizes potential caused by DC or audio frequency (f <500kHZ) currents such as those caused by lightning strikes. (Resistance value is 0.0025 ohm).

(8) Fuel Quantity Indicating System (FQIS) Wiring

Perform all FQIS wiring requirements described in the following paragraphs.

(a) Inspection

1 Inspect the FQIS wiring for any visible damage, wear, chafing, or indications of electrical arcing. Repair FQIS wiring in accordance with appropriate Hercules Wiring Diagram Manual, Hercules Maintenance Manual, or Hercules Maintenance Instructions Manual and procedures.

2 Ensure physical separation requirements have been maintained for FQIS wiring as follows:

a Ensure that FQIS wires are routed separately from all AC power wires in areas between FS 245.0 and FS 457.0 in the cargo compartment and in the wing root area outside the pressure vessel and along the wing trailing edge except where wires pass through cutouts in the structure. A minimum of 6 inches separation shall be maintained in these areas. If impractical to obtain 6 inches, a minimum of 4 inches shall be obtained and if impractical to obtain 4 inches, a minimum of 1 inch shall be obtained.

NOTE: Under certain conditions, lightning discharges have sufficiently high rates of current rise that they produce an inductive potential that induces voltages into the fuel capacitance gage wiring and other wiring leading into the fuel tanks. It is, therefore necessary that wiring from antennas, pitot heaters, wing tip lights, etc., be routed away from the electric wiring leading into fuel tanks and/or wiring should be shielded.

b Ensure that shielded wires are in accordance with MIL-C-27500.

c Ensure that AC ground wires from FQIS system are NOT grounded to DC or signal ground stud.

d Ensure wire terminations at fuel probes are undamaged.

- Remove wires from fuel probes.
- Inspect wires for damage.
- If wires are damaged replace wires.
- Connect wires to fuel probes.

3 Notify Lockheed Martin Technical Support Center of any discrepancies found during inspection.

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(b) Modification

1 FQIS wires shall be marked in accordance with SAE-AS81531 with "FQIS" every 18 inches beginning at the plugs that exit the fuel tanks or bladders, through outer wing breaks and wheel well pressure breaks to the individual fuel quantity indicator plugs on the Fuel System Control Panel.

2 FQIS wires shall not be bundled with high voltage carrying wires.

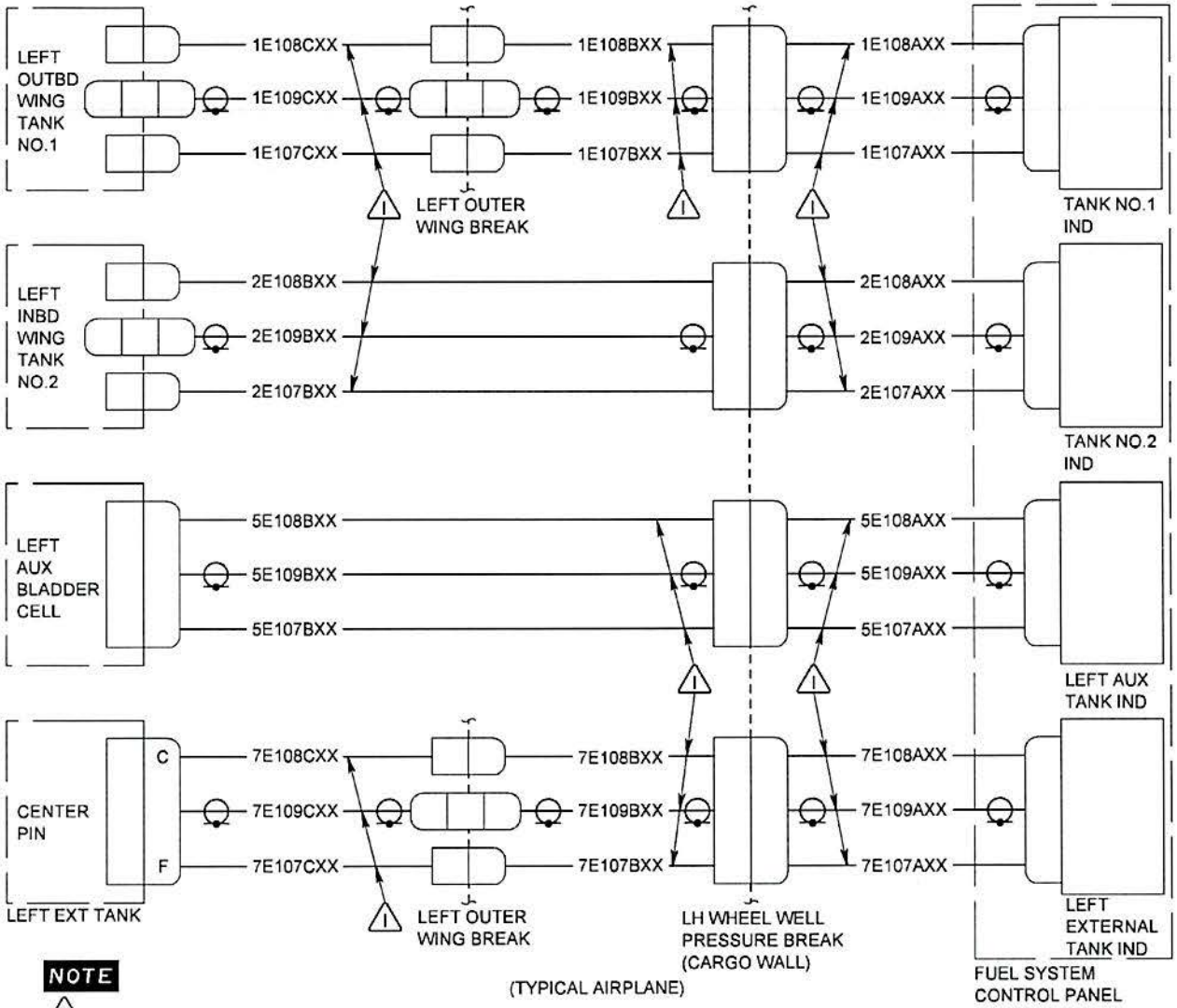
3 Fabricate pink identification cable markers (base part numbers CM-SCE-1/4-4H-2L or CM-SCE-1/2-4H-2L) or sleeving (base part numbers M23053/5-106-P or M23053/5-108-P).

4 Install identification cable markers or sleeving on the wires within 8 inches of the end connector (near the existing wire identification) in accordance with Hercules Wiring Diagram Manual.

5 See figure 29 for a listing of the typical FQIS wire numbers that will require identification cable markers.

NOTE: Refer to the appropriate aircraft wiring diagrams for specific aircraft FQIS wire XX numbers, 1E108CXX, 5E109BXX, etc.

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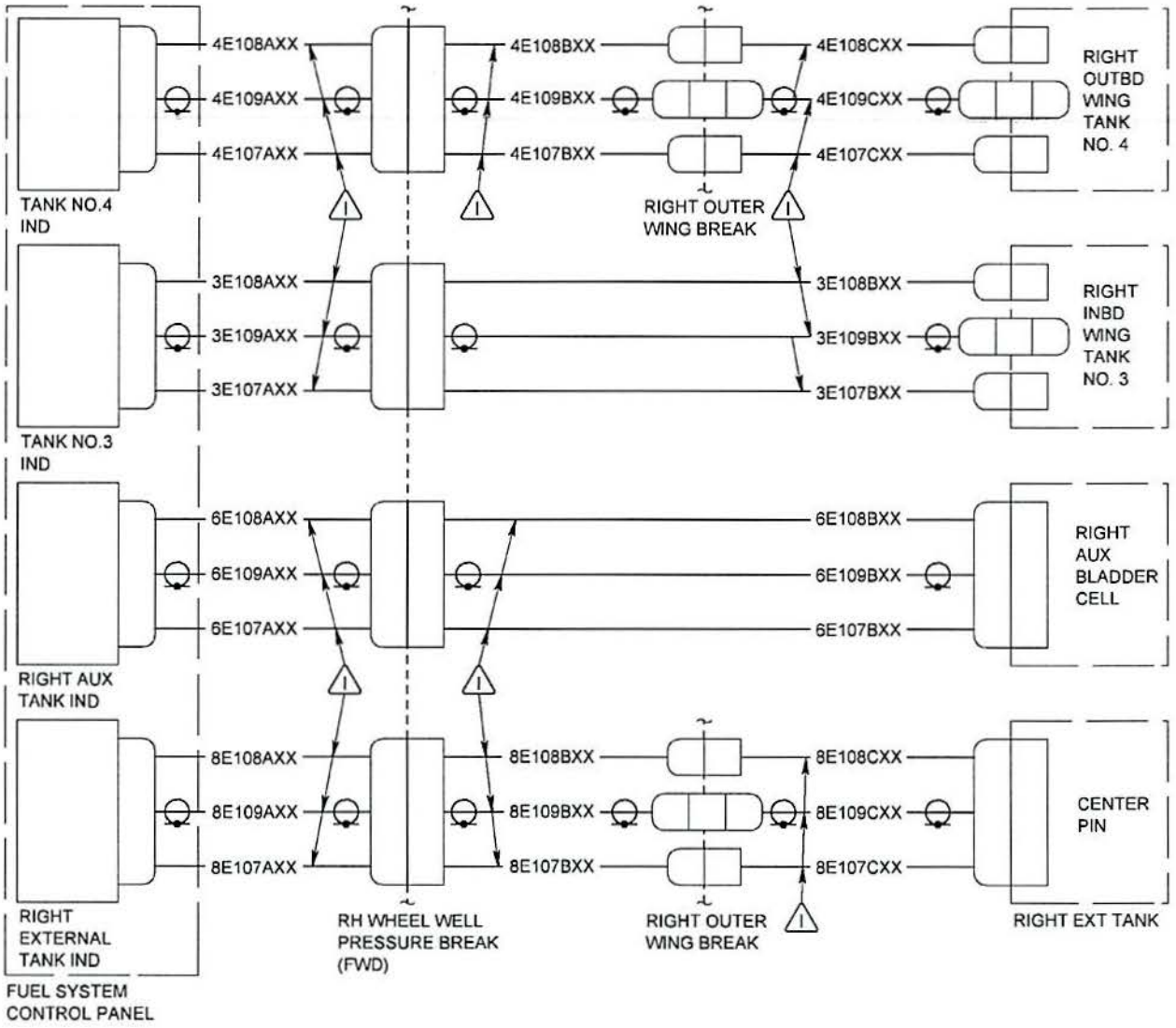
NOTE

1. ROUTE THESE WIRES SEPARATELY FROM ALL AC POWER WIRES IN AREAS BETWEEN FUS STA 245 AND 457 AND ALONG THE WING TRAILING EDGE EXCEPT WHERE WIRES PASS THROUGH CUTOUTS IN STRUCTURE. A MINIMUM OF 6 INCHES SEPARATION SHALL BE OBTAINED IN THESE AREAS. IF IMPRACTICAL TO OBTAIN 6 INCHES, A MINIMUM OF 4 INCHES SHALL BE OBTAINED AND IF IMPRACTICAL TO OBTAIN 4 INCHES, A MINIMUM OF 1 INCH SHALL BE OBTAINED. ANY SEPARATION UNDER 6 INCHES IN THESE AREAS MUST BE APPROVED BY ENGINEERING.
2. INSTALL MARKER WITHIN 8 INCHES OF CONNECTIONS AND EVERY 18 INCHES ALONG WIRES.
3. REFER TO THE APPROPRIATE AIRCRAFT WIRING DIAGRAMS FOR SPECIFIC AIRCRAFT FQIS WIRE XX NUMBERS, 1E108CXX, 5E109BXX, ETC.

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Fuel Quantity Indicating System (FQIS) Wiring Marker
Figure 29 (Sheet 1 of 2)

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(TYPICAL AIRPLANE)

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Fuel Quantity Indicating System (FQIS) Wiring Marker
Figure 29 (Sheet 2)

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(9) ATA/JASC 29 – Hydraulic Systems

Perform all ATA/JASC-29 Hydraulic Systems requirements described in the following paragraphs.

(a) Ensure hydraulic lines are located at least four inches from any heat source and never above a heat source.

(b) Ensure hydraulic lines are routed below electrical bundles.

Find hydraulic system components located on the wings and inspect for damaged tubing, worn or damaged hoses, wear of moving parts, and security of mounting for all units, safetying, and any other condition specified in Hercules Corrosion Prevention and Control Manual, Hercules Wiring Diagram Manual, Hercules Maintenance Manual or Hercules Maintenance Instructions Manual, and Hercules Airfreighter Progressive Inspection Procedures or Hercules Airfreighter Series Progressive Inspection Procedures

D. Return Aircraft to Service

(1) Reinstall removed components and access panels.

(2) Remove equipment and supplies from the inspection area.

(3) Perform operational checkout as required in accordance with appropriate Hercules Maintenance Manual or Hercules Maintenance Instructions Manual.

(4) Return aircraft to normal service.

(5) The aircraft owner/operator shall make an appropriate entry in the aircraft log records upon compliance with this Service Bulletin and maintenance planning documents to require a repeat inspection of FQIS wiring, not to exceed 12 years.

(6) After the work has been completed on each affected aircraft, please complete and mail or fax (770-494-5682) a Notice of Service Bulletin Compliance; or notify Lockheed Martin Aeronautics Company of compliance with this Service Bulletin at website address: www.lockheedmartin.com/ams and log into Data Library.

NOTE: If assistance pertaining to this Service Bulletin or information regarding your Hercules aircraft is needed, contact your local Lockheed Martin Aeronautics Company representative or the Technical Support Center in Marietta, Georgia, USA, as follows:

Telephone: (770) 494-9131
Fax: (770) 494-9122
E-Mail: hercules.support@lmco.com
Mail: Lockheed Martin Aeronautics Company
86 South Cobb Drive
Department 3E1M, Zone 0591
Marietta, GA 30063-0591, USA

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SERVICE BULLETIN

3. MATERIAL INFORMATION

The following parts/materials, required to modify each aircraft listed in paragraph 1.A., will be provided by the aircraft owner/operator. Parts may be obtained from Lockheed Martin Aeronautics Company in accordance with paragraph 1.F.

NEW PART NUMBER	QUANTITY	KEY WORD	OLD PART NUMBER	INSTRUCTIONS/ DISPOSITION
MIL-T-43435	AR	Lacing Tape		
CM-SCE-¼-4H-2L	AR	Cable Marker-Tie in Place ¼-inch		(1)(2)
CM-SCE-½-4H-2L	AR	Cable Marker-Tie in Place ½-inch		(1)(2)
M23053/5-106-P	AR	Cable Marker, Wraparound, Heat-Shrinkable Polyolefin ¼-inch		(3)
M23053/5-108-P	AR	Cable Marker, Wraparound Heat-Shrinkable Polyolefin, ½-inch		(3)

NOTE: 1. Specify pink cable marker-tie. Select appropriate size of cable marker-tie for each wire.

2. Tyco Electronics Raychem
DBA Raychem
Electronics Division
300 Constitution Dr.
Menlo Park, CA 94025

3. Specify pink cable marker wraparound.

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