

Cross Reference of
WG-10 Aircraft Evaluation Results
to
AC 43.13-1B Inspection criteria

Wiring Condition

- Corrosion
 - 11-8. BUS BARS. Annually check bus bars for general condition, cleanliness, and security of all attachments and terminals. Bus bars that exhibit corrosion, even in limited amounts, should be disassembled, cleaned and brightened, and reinstalled.

Wiring Condition

- Corrosion
 - 11-97. WIRING REPLACEMENT. Wiring must be replaced with equivalent wire (see paragraph 11-78) when found to have any of the following defects:
 - h. Shielded wiring on which the metallic shield is frayed and/or corroded. Cleaning agents or preservatives should not be used to minimize the effects of corrosion or deterioration of wire shields.

Wiring Condition

- Fluid/Chemical Contamination
 - 11-2. INSPECTION AND OPERATION CHECKS.
Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. A list of suggested problems to look for and checks (Refer to the glossary for a description of the check types) to be performed are:
 - a. Damaged, discolored, or overheated equipment, connections, wiring, and installations.

Wiring Condition

- Fluid/Chemical Contamination
 - 11-96. GENERAL. Wires and cables should be inspected for adequacy of support, protection, and general condition throughout. The desirable and undesirable features in aircraft wiring installations are listed below and indicate conditions that may or may not exist. Accordingly, aircraft wiring must be visually inspected for the following requirements:
 - u. Ensure that wires and cables are routed so that there is not a possibility of damage from battery electrolytes or other corrosive fluids.

Wiring Condition

- Fluid/Chemical Contamination
 - 11-97. WIRING REPLACEMENT. Wiring must be replaced with equivalent wire (see paragraph 11-78) when found to have any of the following defects:
 - d. Wiring that is known to have been exposed to electrolyte or on which the insulation appears to be, or is suspected of being, in an initial stage of deterioration due to the effects of electrolyte.
 - f. Wiring on which the insulation has become saturated with engine oil, hydraulic fluid, or another lubricant.

Wiring Condition

- Exposed Conductors/Shields
 - 11-97. WIRING REPLACEMENT. Wiring must be replaced with equivalent wire (see paragraph 11-78) when found to have any of the following defects:
 - a. Wiring that has been subjected to chafing or fraying, that has been severely damaged, or that primary insulation is suspected of being penetrated.
 - b. Wiring on which the outer insulation is brittle to the point that slight flexing causes it to crack.
 - c. Wiring having weather-cracked outer insulation.
 - h. Shielded wiring on which the metallic shield is frayed and/or corroded. Cleaning agents or preservatives should not be used to minimize the effects of corrosion or deterioration of wire shields.

Wiring Condition

- Broken Shield/Conductors
 - 11-97. WIRING REPLACEMENT. Wiring must be replaced with equivalent wire (see paragraph 11-78) when found to have any of the following defects:
 - h. Shielded wiring on which the metallic shield is frayed and/or corroded. Cleaning agents or preservatives should not be used to minimize the effects of corrosion or deterioration of wire shields.

Wiring Condition

- Indirect Damage (hyd, pneu leaks)
 - 11-2. INSPECTION AND OPERATION CHECKS. Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. A list of suggested problems to look for and checks (Refer to the glossary for a description of the check types) to be performed are:
 - a. Damaged, discolored, or overheated equipment, connections, wiring, and installations.
 - 11-97. WIRING REPLACEMENT. Wiring must be replaced with equivalent wire (see paragraph 11-78) when found to have any of the following defects:
 - f. Wiring on which the insulation has become saturated with engine oil, hydraulic fluid, or another lubricant.

Wiring Condition

- Heat/Vibration Damage
 - 11-2. INSPECTION AND OPERATION CHECKS. Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. A list of suggested problems to look for and checks (Refer to the glossary for a description of the check types) to be performed are:
 - a. Damaged, discolored, or overheated equipment, connections, wiring, and installations.
 - b. Excessive heat or discoloration at high current carrying connections.

Wiring Condition

- Heat/Vibration Damage
 - 11-97. WIRING REPLACEMENT. Wiring must be replaced with equivalent wire when found to have any of the following defects:
 - e. Check wiring that shows evidence of overheating (even if only to a minor degree) for the cause of the overheating.

Wiring Condition

- Previous Repairs/condition of
 - 11-53. SWITCHES.
 - a. Electrical Switch Inspection. ... During inspection, attention should also be given to the possibility that improper switch substitution may have been made.

Wiring Condition

- Previous Repairs/condition of
 - 11-97. WIRING REPLACEMENT. Wiring must be replaced with equivalent wire (see paragraph 11-78) when found to have any of the following defects:
 - i. Wiring showing evidence of breaks, cracks, dirt, or moisture in the plastic sleeves placed over wire splices or terminal lugs.
 - j. Sections of wire in which splices occur at less than 10-foot intervals, unless specifically authorized, due to parallel connections, locations, or inaccessibility.

Installations (General)

- Significant Dust and Lint Buildup
 - 11-2. INSPECTION AND OPERATION CHECKS. Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. A list of suggested problems to look for and checks to be performed are:
 - e. Dirty equipment and connections.

Installations (General)

- Significant Dust and Lint Buildup
 - 11-4. CLEANING AND PRESERVATION.
Annual cleaning of electrical equipment to remove dust, dirt, and grime is recommended.

Installations (General)

- T-strip Condition/Hardware Buildup
 - 11-197. **HARDWARE ASSEMBLY.** Details of bonding connections must be described in maintenance manuals and adhered to carefully when connections are removed or replaced during maintenance operations. ... Threaded fasteners must be torqued to the level required by SAE ARP-1928.

Installations (General)

- Excessive Slack/Sag Between Clamps
 - 11-96. GENERAL. Wires and cables should be inspected for adequacy of support, protection, and general condition throughout. The desirable and undesirable features in aircraft wiring installations are listed below and indicate conditions that may or may not exist. Accordingly, aircraft wiring must be visually inspected for the following requirements:
 - a. Wires and cables are supported by suitable clamps, grommets, or other devices at intervals of not more than 24 inches, except when contained in troughs, ducts, or conduits. The supporting devices should be of a suitable size and type, with the wires and cables held securely in place without damage to the insulation.

Installations (General)

- Excessive Slack/Sag Between Clamps
 - 11-118. SLACK. Wiring should be installed with sufficient slack so that bundles and individual wires are not under tension. Wires connected to movable or shock-mounted equipment should have sufficient length to allow full travel without tension on the bundle. Wiring at terminal lugs or connectors should have sufficient slack to allow two reterminations without replacement of wires. This slack should be in addition to the drip loop and the allowance for movable equipment. Normally, wire groups or bundles should not exceed 1/2-inch deflection between support points, as shown in figure 11-9a. This measurement may be exceeded provided there is no possibility of the wire group or bundle touching a surface that may cause abrasion. Sufficient slack should be provided at each end to:
 - a. Permit replacement of terminals.
 - b. Prevent mechanical strain on wires.
 - c. Permit shifting of equipment for maintenance purposes.

Installations (General)

- Debris Accumulations on Wire Bundles
 - 11-2. INSPECTION AND OPERATION CHECKS. Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. A list of suggested problems to look for and checks to be performed are:
 - e. Dirty equipment and connections.

Installations (General)

- Debris Accumulations on Wire Bundles
 - 11-4. CLEANING AND PRESERVATION.
Annual cleaning of electrical equipment to remove dust, dirt, and grime is recommended.

Installations (General)

- Missing/Deteriorated Grommets
 - 11-96. GENERAL. Wires and cables should be inspected for adequacy of support, protection, and general condition throughout. The desirable and undesirable features in aircraft wiring installations are listed below and indicate conditions that may or may not exist. Accordingly, aircraft wiring must be visually inspected for the following requirements:
 - a. Wires and cables are supported by suitable clamps, grommets, or other devices at intervals of not more than 24 inches, except when contained in troughs, ducts, or conduits. The supporting devices should be of a suitable size and type, with the wires and cables held securely in place without damage to the insulation.

Installations (General)

- Missing/Deteriorated Grommets
 - 11-96. GENERAL. Wires and cables should be inspected for adequacy of support, protection, and general condition throughout. The desirable and undesirable features in aircraft wiring installations are listed below and indicate conditions that may or may not exist. Accordingly, aircraft wiring must be visually inspected for the following requirements:
 - c. 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.

Installations (General)

- Missing/Deteriorated Grommets
 - 11-147. WIRE AND CABLE CLAMPS INSPECTION. Inspect wire and cable clamps for proper tightness. Where cables pass through structure or bulkheads, inspect for proper clamping and grommets. Inspect for sufficient slack between the last clamp and the electronic equipment to prevent strain at the cable terminals and to minimize adverse effects on shock-mounted equipment.

Installations (General)

- Clamp Condition/Sizing/Spacing
 - 11-96. GENERAL. Wires and cables should be inspected for adequacy of support, protection, and general condition throughout. The desirable and undesirable features in aircraft wiring installations are listed below and indicate conditions that may or may not exist. Accordingly, aircraft wiring must be visually inspected for the following requirements:
 - a. Wires and cables are supported by suitable clamps, grommets, or other devices at intervals of not more than 24 inches, except when contained in troughs, ducts, or conduits. The supporting devices should be of a suitable size and type, with the wires and cables held securely in place without damage to the insulation.

Installations (General)

- Clamp Condition/Sizing/Spacing
 - 11-96. GENERAL.
 - e. Clamp retaining screws are properly secured so that the movement of wires and cables is restricted to the span between the points of support and not on soldered or mechanical connections at terminal posts or connectors.

Installations (General)

- Clamp Condition/Sizing/Spacing
 - 11-146. GENERAL. Wires and wire bundles must be supported by using clamps meeting Specification MS-21919, or plastic cable straps in accessible areas if correctly applied within the restrictions of paragraph 11-158. Clamps and other primary support devices must be constructed of materials that are compatible with their installation and environment, in terms of temperature, fluid resistance, exposure to ultraviolet (UV) light, and wire bundle mechanical loads. They should be spaced at intervals not exceeding 24 inches.

Installations (General)

- Clamp Condition/Sizing/Spacing
 - 11-146. GENERAL.
 - a. Clamps on wire bundles should not allow the bundle to move through the clamp when a slight axial pull is applied. Clamps on RF cables must fit without crushing and must be snug enough to prevent the cable from moving freely through the clamp, but may allow the cable to slide through the clamp when a light axial pull is applied.

Installations (General)

- Bend Radius (10x Wire/Bundle Diameter)
 - 11-96. GENERAL. ... aircraft wiring must be visually inspected for the following requirements:
 - aa. The minimum radius of bends in wire groups or bundles must not be less than 10 times the outside diameter of the largest wire or cable, except that at the terminal strips where wires break out at terminations or reverse direction in a bundle. Where the wire is suitably supported, the radius may be 3 times the diameter of the wire or cable. Where it is not practical to install wiring or cables within the radius requirements, the bend should be enclosed in insulating tubing. The radius for thermocouple wire should be done in accordance with the manufacturer's recommendation and shall be sufficient to avoid excess losses or damage to the cable.

Installations (General)

- Bend Radius (10x Wire/Bundle Diameter)
 - 11-117. MINIMUM WIRE BEND RADII. The minimum radii for bends in wire groups or bundles must not be less than 10 times the outside diameter of their largest wire. They may be bent at six times their outside diameters at breakouts or six times the diameter where they must reverse direction in a bundle, provided that they are suitably supported.
 - a. RF cables should not bend on a radius of less than 6 times the outside diameter of the cable.
 - b. Care should be taken to avoid sharp bends in wires that have been marked with the hot stamping process.

Installations (General)

- Sleeving/Conduit Condition
 - 11-96. GENERAL. ... aircraft wiring must be visually inspected for the following requirements:
 - h. Insulating tubing is secured by tying, tie straps or with clamps.
 - k. Insulating tubing must be kept at a minimum and must be used to protect wire and cable from abrasion, chafing, exposure to fluid, and other conditions which could affect the cable insulation. However; the use of insulating tubing for support of wires and cable in lieu of stand-offs is prohibited.

Installations (General)

- **Sleeving/Conduit Condition**
 - 11-102. **CONDUIT - RIGID METALLIC, FLEXIBLE METALLIC AND RIGID NONMETALLIC.** Inspection of conduit assemblies should ascertain that:
 - a. Conduit is relieved of strain and flexing of ferrules.
 - b. Conduit is not collapsed or flattened from excessive bending.

Installations (General)

- **Sleeving/Conduit Condition**
 - 11-102. CONDUIT - RIGID METALLIC, FLEXIBLE METALLIC AND RIGID NONMETALLIC. Inspection of conduit assemblies should ascertain that:
 - c. Conduits will not trap fluids or condensed moisture. Suitable drain holes should be provided at the low points.
 - d. Bonding clamps do not cause damage to the conduit.
 - e. Weatherproof shields on flexible conduits of the nose and main landing gear and in wheel wells are not broken; that metallic braid of weatherproof conduit is not exposed; and that conduit nuts, ferrules, and conduit fittings are installed securely.

Installations (General)

- Missing/Deteriorated Pressure Seals
 - No reference

Installations (General)

- Inadequate Clearance to Structure
 - 11-2. INSPECTION AND OPERATION CHECKS. Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. A list of suggested problems to look for and checks to be performed are:
 - i. Insufficient clearance between exposed current carrying parts and ground or poor insulation of exposed terminals.

Installations (General)

- Inadequate Clearance to Structure
 - 11-96. GENERAL. ... aircraft wiring must be visually inspected for the following requirements:
 - a. Wires and cables are supported by suitable clamps, grommets, or other devices at intervals of not more than 24 inches, except when contained in troughs, ducts, or conduits. The supporting devices should be of a suitable size and type, with the wires and cables held securely in place without damage to the insulation.

Installations (General)

- Inadequate Clearance to Structure
 - 11-96. GENERAL. ... aircraft wiring must be visually inspected for the following requirements:
 - b. Metal stand-offs must be used to maintain clearance between wires and structure. Employing tape or tubing is not acceptable as an alternative to stand-offs for maintaining clearance.

Termination

- Heat Damage/Corrosion
 - 11-2. INSPECTION AND OPERATION CHECKS. Inspect equipment, electrical assemblies, and wiring installations for damage, general condition, and proper functioning to ensure the continued satisfactory operation of the electrical system. A list of suggested problems to look for and checks to be performed are:
 - a. Damaged, discolored, or overheated equipment, connections, wiring, and installations.
 - b. Excessive heat or discoloration at high current carrying connections.

Termination

- Correct Hardware buildup/Torque
 - 11-177. WIRE TERMINALS AND BINDING POSTS. All wire terminals in or on electrical equipment, except case ground, must be firmly held together with two nuts or suitable locking provisions, or should be secured in a positive manner to equipment in such a way that no insulation material is involved in maintaining physical pressure between the various current carrying members of an electrical connection. Terminal studs or binding posts should be of a size that is entirely adequate for the current requirements of the equipment and have sufficient mechanical strength to withstand the torque required to attach the cable to the equipment. All terminals on equipment should have barriers and covers provided by equipment manufacturers.

Termination

- Correct Hardware buildup/Torque
 - 11-197. **HARDWARE ASSEMBLY.** Details of bonding connections must be described in maintenance manuals and adhered to carefully when connections are removed or replaced during maintenance operations. Installation of fasteners used in bonded or grounded connections should be made in accordance with SAE ARP-1870. Threaded fasteners must be torqued to the level required by SAE ARP-1928.

Termination

- Correct Hardware buildup/Torque
 - 11-179. LOCK WASHERS FOR TERMINALS ON EQUIPMENT. Where locknuts are used to ensure binding and locking of electrical terminals, they should be of the all metal type. In addition, a spring lock washer of suitable thickness may be installed under the nut to ensure good contact pressure. A plain washer should be used between the spring washer and the terminal to prevent galling. A plain nut with a spring lock washer and a plain washer may be used to provide binding and contact pressure.

Termination

- Inadequate Drip Loop (s)
 - 11-96. GENERAL. Wires and cables should be inspected for adequacy of support, protection, and general condition throughout. ... aircraft wiring must be visually inspected for the following requirements:
 - p. Make sure that drain holes are present in drip loops or in the lowest portion of tubing placed over the wiring.

Termination

- Inadequate Drip Loop (s)
 - 11-96. GENERAL. Wires and cables should be inspected for adequacy of support, protection, and general condition throughout. ... aircraft wiring must be visually inspected for the following requirements:
 - p. Make sure that drain holes are present in drip loops or in the lowest portion of tubing placed over the wiring.

Termination

- Inadequate Drip Loop (s)
 - 11-118A. DRIP LOOP IN WIRE BUNDLE. A drip loop is an area where wire is dressed downward to a connector, terminal block, panel, or junction box. In addition to the service termination and strain relief, a trap or drip loop shall be provided in the wiring to prevent fluid or condensate from running into the above devices. Wires or groups of wires should enter a junction box or piece of equipment in an upward direction where practicable. Where wires must be routed downwards to a junction box or unit of electric equipment, the entry should be sealed or adequate slack should be provided to form a trap or drip loop to prevent liquid from running down the wires in the box or electric unit.

Termination

- Ground Points
 - SECTION 15. GROUNDING AND BONDING
 - Good Description/ No specific inspection criteria:
specific inspection criteria covered under general wiring inspections.

Connectors

- 11-100. CONNECTORS
 - Limited Specific Inspection Criteria

Connectors

- Loose or Worn B-nuts
 - 11-100. CONNECTORS. Ensure reliability of connectors by verifying that the following conditions are met or that repairs are effected as required.
 - a. Inspect connectors for security and evidence of overheating (cause of overheating must be corrected), and exteriors for corrosion and cracks. Also, wires leading to connectors must be inspected for deterioration due to overheating. Replace corroded connections and overheated connectors.
 - b. Ensure installation of cable clamp (reference MIL-C-85049) adapters on applicable MS connectors, except those that are moisture-proof.
 - e. 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.
 - f. Ensure that the coupling nut of MS connectors is safetied, by wire or other mechanical locking means, as required by applicable aircraft instructional manuals.

Connectors

- Connector Backshell Strain Relief
 - 11-103. JUNCTIONS. Ensure that only aircraft manufacturer approved devices, such as solderless type terminals, terminal blocks, connectors, disconnect splices, permanent splices, and feed-through bushings are used for cable junctions. Inspect for the provisions outlined below:
 - a. Electrical junctions should be protected from short circuits resulting from movement of personnel, cargo, cases, and other loose or stored materials. Protection should be provided by covering the junction, installing them in junction boxes, or by locating them in such a manner that additional protection is not required, etc.
 - b. Exposed junctions and buses should be protected with insulating materials. Junctions and buses located within enclosed areas containing only electrical and electronic equipment are not considered as exposed.
 - c. Electrical junctions should be mechanically and electrically secure. They should not be subject to mechanical strain or used as a support for insulating materials, except for insulation on terminals.

Connectors

- Connector Backshell Strain Relief
 - 11-118. SLACK. Wiring should be installed with sufficient slack so that bundles and individual wires are not under tension. Wires connected to movable or shock-mounted equipment should have sufficient length to allow full travel without tension on the bundle. Wiring at terminal lugs or connectors should have sufficient slack to allow two reterminations without replacement of wires. This slack should be in addition to the drip loop and the allowance for movable equipment. Normally, wire groups or bundles should not exceed 1/2-inch deflection between support points, as shown in figure 11-9a. This measurement may be exceeded provided there is no possibility of the wire group or bundle touching a surface that may cause abrasion. Sufficient slack should be provided at each end to:
 - a. Permit replacement of terminals.
 - b. Prevent mechanical strain on wires.
 - c. Permit shifting of equipment for maintenance purposes.

Connectors

- Insert Damage/Deterioration
 - 11-100. CONNECTORS. Ensure reliability of connectors by verifying that the following conditions are met or that repairs are effected as required.
 - d. Make sure unused plugs and receptacles are covered to prevent inclusion of dust and moisture. Receptacles should have metal or composite dust caps attached by their normal mating method. Plugs may have a dust cap similar to above or have a piece of polyolefin shrink sleeving shrunk over the connector, starting from the backshell threads, with a tail sufficiently long enough to doubleback over the connector and be tied with polyester lacing tape behind the coupling nut. The cable identification label should be visible behind the connector or a tag should be attached identifying the associated circuit or attaching equipment. The connector should be attached to structure by its normal mounting means or by the use of appropriate clamps.
 - h. Ensure that there is no evidence of deterioration such as cracking, missing, or disintegration of the potting material.

Connectors

- Loose or Worn B-nuts
 - 11-100. CONNECTORS. Ensure reliability of connectors by verifying that the following conditions are met or that repairs are effected as required.
 - a. Inspect connectors for security and evidence of overheating (cause of over-heating must be corrected), and exteriors for corrosion and cracks. Also, wires leading to connectors must be inspected for deterioration due to overheating. Replace corroded connections and overheated connectors.
 - b. Ensure installation of cable clamp (reference MIL-C-85049) adapters on applicable MS connectors, except those that are moisture-proof.
 - e. 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.
 - f. Ensure that the coupling nut of MS connectors is safetied, by wire or other mechanical locking means, as required by applicable aircraft instructional manuals.

Conclusion

- 2041 (89.4%) Findings covered by AC
 - (9.8% other)
- With the exception of Connectors AC 43.13-1B provides adequate inspection criteria.