



Australian Government

MEA263 Modify/repair aircraft component multi-layer printed circuit boards

Release: 2

MEA263 Modify/repair aircraft component multi-layer printed circuit boards

Modification History

Release 2. Equivalent to MEA263 Modify/repair aircraft component multi-layer printed circuit boards with amended prerequisite codes.

Application

This unit of competency requires application of hand skills (including those required to gain access to inner layers and repair outer layers after track repair), including high reliability hand soldering, and knowledge of standard practices and techniques in the repair of multi-layer printed circuit boards from aircraft avionic components that are repaired in aviation workshops during scheduled or unscheduled maintenance. Work may be performed individually or as part of a team.

This unit is part of the Avionic Certificate IV training pathways.

The unit is used in workplaces that operate under the airworthiness regulatory systems of the Australian Defence Force (ADF) and the Civil Aviation Safety Authority (CASA).

Pre-requisite Unit

MEA261	Use electronic test equipment
MEA296	Use electrical test equipment in aviation maintenance activities

Competency Field

Aviation maintenance

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Inspect multi-layer printed circuit cards and associated components	1.1 Relevant maintenance documentation, including component defect reports where applicable, is interpreted and matched by part and serial number

- 1.2 Preparation of work area and circuit card assemblies is appropriate to allow for effective detailed inspection of all substrate, circuit tracks, edge connectors and attached components, taking into account any static discharge procedures
 - 1.3 Circuit card assemblies are visually or physically inspected for physical integrity of substrate, circuit tracks, edge connectors and attached components
 - 1.4 Modification status is established to assist in determining repair requirements
 - 1.5 Defects are correctly identified and reported
2. Test multi-layer printed circuit cards and associated components
 - 2.1 Circuit card assemblies are correctly prepared and connected to the appropriate test facility in accordance with approved procedures, or circuit card assemblies are correctly prepared and connected in situ to allow required test procedures to be performed
 - 2.2 Circuit card assemblies are functionally tested in accordance with normal trade practice and approved maintenance documentation for evidence of serviceability or malfunction
 - 2.3 Circuit card assemblies, attached hardware and electronic components are electronically and/or physically adjusted/aligned in accordance with maintenance manuals or other prescribed procedures
3. Troubleshoot multi-layer printed circuit cards and associated components
 - 3.1 Maintenance documentation, physical inspection and test results are used, where applicable, to assist in fault determination
 - 3.2 Maintenance manual fault diagnosis guides, logical processes and test equipment are used appropriately to ensure efficient and accurate troubleshooting
 - 3.3 Component faults are located and the causes of the faults are clearly identified and recorded in maintenance documentation, where required
 - 3.4 Rectification requirements are determined
4. Dismantle multi-layer printed circuit cards
 - 4.1 Conformal/protective coatings are removed from the circuit card assembly to the extent required to effect

and associated components		necessary repairs and in accordance with maintenance manuals, industry or enterprise standards as applicable
	4.2	Appropriate work health and safety (WHS) requirements are observed at all times during maintenance procedures and applicable material safety data sheets (MSDS) and personal protective equipment (PPE) are used
	4.3	Circuit card assembly is dismantled to the extent necessary to allow repair of all identified faults
	4.4	Parts for processing are correctly tagged and despatched
	4.5	Parts for retention and re-fitment are correctly packaged and stored in accordance with approved procedures to avoid physical and electrostatic damage
	4.6	Parts for disposal are correctly packaged and processed to accord with statutory requirements pertaining to dangerous goods
5. Assemble multi-layer printed circuit cards and associated components	5.1	Parts removed for access, and replacement parts, are collected ensuring appropriate modification status, component tolerances and assembly configuration is maintained
	5.2	Any conformal/protective coatings removed are replaced to the approved standard of the equipment manufacturer, or industry standard, as appropriate
	5.3	Rework techniques are in accordance with industry approval procedures and relevant WHS precautions are observed and applicable MSDS and items of PPE are used
	5.4	Printed circuit card and associated components are assembled in accordance with maintenance manuals, and all electrical joints meet the approved standard of the equipment manufacturer, or industry standard, as appropriate
	5.5	Circuit substrate material, circuit tracks, edge connectors and through-hole eyelets are reworked, as necessary, to restore printed circuit card to a serviceable condition

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Circuit card attached components include:

- Capacitors, resistors, wires, semiconductors, inductors, transformers, switches, connectors, multi-pin ICs, terminal posts and heat-sink materials, and will include electrostatic sensitive devices

Procedures and standards include:

- Procedures and standards for repair of printed circuit card assemblies, including a range of general engineering hand skills in addition to specific high reliability soldering skills.
- Standards applicable in a given situation will be defined by equipment manufacturers and/or regulatory authorities and the enterprise

Unit Mapping Information

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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371>

Assessment Requirements for MEA263 Modify/repair aircraft component multi-layer printed circuit boards

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Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- applying relevant WHS practices
- using approved repair procedures and processes relating to multi-layer circuit cards
- recognising unacceptable soldered connections, damaged circuit card components, circuit tracks integrity, substrate damage and edge connector condition
- applying static-safe work area practices
- reworking unacceptable printed circuit board soldered connections via acceptable de-soldering and soldering techniques
- disassembling and assembling printed circuit board cards to approved industry standards and prescribed specifications
- performing printed circuit board tests using relevant test equipment and processes to isolate printed circuit board track faults and assess serviceability state post repair
- correctly disassembling, preparing repair area, reworking the card to industry standards, replacing faulted components and assembling card for post-repair inspection and testing

It is essential that substrate abrasion and rebuilding techniques and precautions associated with handling and assembly of electrostatic and temperature sensitive devices are fully observed, understood and complied with. A high level of awareness of safety precautions associated with beryllium materials and use of fluxes and solvents is to be demonstrated.

Evidence of transferability of skills and knowledge related to multi-layer printed circuit card assembly and repair is essential before undertaking any action. This may be demonstrated through application of the techniques involved across a representative range of circuit card substrate materials and attached components. Use of high precision, high reliability soldering techniques and handling of components, including application of anti-static equipment, must be demonstrated.

Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- component operation
- basic principles/functions relating to electrical and electronic components on printed circuit boards

- substrate materials
- types of conformal coating
- types of soldering equipment and solders used in track repair and component assembly
- de-soldering techniques
- optical equipment and tools used in multi-layer printed circuit board repair
- how to obtain MSDS
- WHS procedures
- relevant maintenance manuals
- relevant regulatory requirements and standard procedures.

Assessment Conditions

- Competency should be assessed in the work environment or simulated work environment, using tools and equipment specified in maintenance manuals. It is also expected that applicable general and special-purpose test equipment found in most routine situations would be used where appropriate.
- The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- The following conditions of assessment represent the requirements of the Regulators (ADF and CASA) and maintenance stakeholders and must be rigorously observed.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on a representative range of cards with various substrate materials and components. This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide (for details refer to the Companion Volume Assessment Guidelines).
- Assessors must satisfy the requirements of the National Vocational Education and Training Regulator (Australian Skills Quality Authority, or its successors).

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