
Overview

This standard identifies the competences you need to locate faults on electronic equipment/circuits, in accordance with approved procedures. You will be required to investigate faults on a range of electronic equipment such as power supplies, motor control systems, sensors and actuators circuits, digital circuits and systems, analogue circuits and systems, and hybrid circuits and systems, at assembly or component level. You will be expected to use a variety of fault location methods and procedures, such as gathering information from the person who reported the fault, using recognised fault finding techniques and diagnostic aids, measuring, inspecting and operating the equipment. You will be expected to take care that you do not damage the equipment/circuit during the maintenance activities and, where appropriate, the application of electrostatic discharge procedures will be a critical part of your role.

Your responsibilities will require you to comply with organisational policy and procedures for the fault location activities undertaken, and to report any problems with these activities, or with the tools and equipment used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying fault location procedures to electronic equipment and circuits. You will have an understanding of the basic fault location methods and techniques used, and their application. You will also know how to interpret the information obtained from diagnostic aids and equipment, in adequate depth to provide a sound basis for carrying out the activities.

You will understand the safety precautions required when carrying out the fault location activities, especially those for isolating the equipment. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect yourself and others in the workplace.

Performance criteria

You must be able to:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- P2 review and use all relevant information on the symptoms and issues associated with the products or assets
- P3 investigate and establish the most likely causes of the faults
- P4 select, use and apply diagnostic techniques, tools and aids during the fault location activity
- P5 deal with problems within your control and report those that cannot be solved
- P6 determine the implications of the fault for other work and for safety considerations

- P7 use the evidence gained to draw valid conclusions about the nature and probable cause of the fault
- P8 complete and store all relevant documentation in accordance with organisational requirements

Knowledge and understanding

You need to know and understand:

- K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
- K3 the procedure to be adopted to establish the background of the fault
- K4 how to use the various diagnostic aids to help identify the location of the fault
- K5 the various fault location techniques that can be used, and how they are applied
- K6 how to evaluate sensory information
- K7 how to assess evidence and evaluate the possible causes of faults/issues
- K8 how to use a range of fault diagnostic equipment to investigate the problem
- K9 the care, handling and application of electrical test equipment
- K10 the precautions to be taken to prevent electrostatic discharge (ESD) damage to electronic circuits and components
- K11 how to use a range of fault diagnostic equipment to investigate the problem
- K12 how to check that electronic test equipment is within calibration and that it is free from damage and defects
- K13 how to obtain and interpret information from job instructions and other documentation used in the maintenance activities
- K14 the functions of different types of electronic components (analogue or digital), and their operation
- K15 how to evaluate the likely risk to yourself and others, and the effects the fault could have on the overall process or system
- K16 the issue that can occur during the fault location activity, and how they can be minimised
- K17 the importance of completing the correct documentation, following the maintenance activity
- K18 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the fault location activity:
 - 1.1. plan the fault location methods and procedures in conjunction with others
 - 1.2. obtain and use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records)
 - 1.3. adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.4. ensure the safe isolation of equipment (such as electricity, mechanical, gas, air or fluids)
 - 1.5. ensure that safe access and working arrangements have been provided for the maintenance area
 - 1.6. use grounded wrist straps and other electrostatic discharge (ESD) precautions, where appropriate
 - 1.7. disconnect or isolate components or parts of the circuit to confirm the diagnosis, where appropriate
 - 1.8. carry out the fault location activities using approved procedures
 - 1.9. identify the fault, and consider appropriate corrective action
 - 1.10. in conjunction with others, take actions to resolve the problem
 - 1.11. dispose of waste items in a safe and environmentally acceptable manner
 - 1.12. leave the work area in a safe and tidy condition
2. Carry out fault location on two of the following types of equipment:
 - 2.1. power supply systems (such as switched mode, series regulation, shunt regulation)
 - 2.2. motor control systems (such as closed-loop servo/proportional, inverter control)
 - 2.3. sensors and actuators (such as linear, rotational, temperature, level, photo-optic, pressure, flow)
 - 2.4. digital circuits and systems (such as programmable controller, microprocessor, ROM/RAM, logic gates)
 - 2.5. analogue circuits and systems (such as frequency modulation/demodulation, amplifiers, filters, oscillators)
 - 2.6. hybrid circuits and systems (such as analogue to digital converters (ADC), d-to-a converters (DAC))
3. Use four of the following diagnostic techniques, tools and aids to assist in locating

the fault:

- 3.1. information gathered from the person who reported the fault
 - 3.2. fault finding techniques (such as six point, half-split, input/output, unit substitution, emergent sequence)
 - 3.3. diagnostic aids (such as manuals, flow charts, troubleshooting guides, electronic aids, equipment records)
 - 3.4. inspecting (such as checking for breakages, wear/deterioration, overheating, missing parts, poor joints)
 - 3.5. operating (such as manually switching off and on, test buttons, running the equipment)
4. Use two of the following types of instruments to assist in locating faults:
- 4.1. oscilloscope
 - 4.2. multimeter
 - 4.3. logic probe
 - 4.4. signal tracer
 - 4.5. signal generator
 - 4.6. ammeter
 - 4.7. logic analyser
 - 4.8. temperature measuring devices
 - 4.9. computer-aided diagnostic equipment
 - 4.10. special purpose testing equipment
 - 4.11. automatic test equipment
5. Locate faults that have resulted in two of the following breakdown categories:
- 5.1. intermittent action or circuit failure
 - 5.2. partial failure or reduced performance
 - 5.3. complete breakdown
6. Complete one of the following maintenance records, and pass it to the appropriate person:
- 6.1. scheduled maintenance report
 - 6.2. step-by-step analytical report
 - 6.3. preventative maintenance log/report
 - 6.4. corrective action report
 - 6.5. organisational-specific reporting procedure
 - 6.6. electronic reports

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Carrying out fault location on electronic equipment and circuits



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