

Overview

This standard identifies the competences you need to carry out fault diagnosis on aircraft airframe and mechanical components and systems, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft, and covers a range of mechanical equipment and systems such as power plant and auxiliary engines, flying controls, engine starting and monitoring, fuel and lubrication, hydraulic, pneumatic, environmental, power transmission, ice and rain protection, propeller control, cabin equipment and furnishings and airframe, at sub-assembly or component level, as applicable.

You will be expected to use a variety of fault diagnostic methods and techniques, and to utilise a number of diagnostic aids and equipment. From the evidence gained, you will be expected to identify the fault and its probable cause and to determine appropriate action to remedy the problem.

Your responsibilities will require you to comply with organisational policy and procedures for the fault diagnostic activities undertaken and to report any problems with these activities or with the tools and equipment used that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. You must ensure that all tools, equipment and materials used in the maintenance activities are removed from the aircraft on completion of the activities and that all necessary job/task documentation is completed, accurately and legibly.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying appropriate fault diagnostic procedures to aircraft airframe and mechanical equipment and systems. You will understand the various fault diagnostic methods and techniques used and their application. You will know how to apply and interpret information obtained from diagnostic aids and equipment, in adequate depth to provide a sound basis for carrying out the activities and for identifying faults or conditions that are outside the required specification.

You will understand the safety precautions required when carrying out the fault diagnostic activities, especially those for isolating the equipment. You will be required to demonstrate safe working practices throughout and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the

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workplace.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. review and use all relevant information on the symptoms and problems associated with the components or systems
3. investigate and establish the most likely causes of the faults
4. select, use and apply diagnostic techniques, tools and aids to locate faults
5. complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved
6. determine the implications of the fault for other work and for safety considerations
7. use the evidence gained to draw valid conclusions about the nature and probable cause of the fault
8. record details on the extent and location of the faults in an appropriate format
9. leave the aircraft and systems in a safe and appropriate condition, free from foreign object debris on completion of the activities

Knowledge and understanding

You need to know and understand:

1. the health and safety requirements of the area in which you are carrying out the fault diagnostic activities and the responsibility these requirements place on you
2. the specific safety precautions to be taken when carrying out the fault diagnosis of the particular aircraft airframe/mechanical system
3. the isolation and lock-off procedure or permit-to-work procedure that applies
4. the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to
5. the importance of wearing protective clothing (PPE) and other appropriate safety equipment during the fault diagnostic activities, the type of safety equipment to be used and where to obtain it
6. hazards associated with carrying out fault diagnosis on aircraft mechanical systems (such as working on pressurised systems, hot or moving parts, using faulty or damaged tools and equipment, using practices and procedures that do not follow laid-down procedures) and how to minimise them and reduce any risks
7. what constitutes a hazardous voltage and how to recognise victims of electric shock
8. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
9. where to obtain, and how to interpret drawings, circuit diagrams, specifications, manufacturers' manuals and other documents needed for the fault diagnostic activities
10. the principles of how the mechanical system functions and the working purpose of the various units and components
11. the various fault finding techniques that can be used and how they are applied (such as half-split, input-to-output, six point technique, functional testing, unit substitution, injection and sampling techniques, and equipment self- diagnostics)
12. the importance of applying electrostatic discharge (ESD) procedures when working on sensitive equipment or devices

13. how to evaluate the various types of information available for fault diagnosis (such as pilot reports, monitoring equipment, aircraft history records, function of the equipment/system)
14. how to evaluate sensory information from sight, sound, smell, touch
15. how to conduct test for cracks or fatigue in airframe structure components
16. the procedures to be followed to investigate faults and how to deal with intermittent conditions
17. how to use the various aids and reports available for fault diagnosis
18. the types of equipment that can be used to aid fault diagnosis (such as mechanical measuring instruments, electrical measuring instruments, test rigs, pressure and flow devices), and how to check that the equipment is calibrated or configured correctly for the intended use, and that it is free from damage and defects
19. the application of specific fault finding methods and techniques that are best suited to the problem
20. how to analyse and evaluate possible characteristics and causes of specific faults/problems
21. why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities
22. how to make use of previous reports/records of similar fault conditions
23. how to evaluate the likely risk of running the aircraft with the displayed fault and the effects the fault could have on the aircraft performance and safety
24. how to prepare a report which complies with the company policy on fault diagnosis
25. the extent of your own authority 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 diagnostic activities:

- 1.1 plan the fault diagnosis activities prior to beginning the work
- 1.2 obtain and use the appropriate documentation (such as job instructions, aircraft manuals, technical instructions, and other relevant maintenance documentation)
- 1.3 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
- 1.4 obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures (such as mechanical, electricity, gas, air or fluids)
- 1.5 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
- 1.6 where appropriate, apply electrostatic discharge (ESD) protection procedures
- 1.7 provide and maintain a safe working environment for the diagnostic activities
- 1.8 carry out the fault diagnostic activities, using approved techniques and procedures
- 1.9 collect equipment fault diagnostic evidence from live and isolated systems
- 1.10 disconnect or isolate components or parts of the system, when appropriate, to confirm the diagnosis
- 1.11 identify the fault and determine the appropriate corrective action
- 1.12 return all tools and equipment to the correct location on completion of the activities

2.

Carry out fault diagnosis on three of the following aircraft airframe/mechanical systems, to sub-assembly or component level, as appropriate:

- 2.1 power plant (including APU)
- 2.2 propeller control
- 2.3 auxiliary engines
- 2.4 hydraulic
- 2.5 engine starting and monitoring
- 2.6 pneumatic
- 2.7 fuel
- 2.8 environmental (cabin conditioning, pressurisation, oxygen)
- 2.9 lubrication
- 2.10 ice and rain protection
- 2.11 power transmission
- 2.12 cabin equipment and furnishings
- 2.13 flying controls

- 2.14 airframe (including freight)
- 2.15 undercarriage
- 2.16 cabin systems (such as water, galley, sanitary)

3.

Collect information about the fault from four of the following sources:

- 3.1 the person who reported the fault
- 3.2 approved sensory checks (such as sight, sound, smell, touch)
- 3.3 monitoring equipment or gauges
- 3.4 aircraft log/documentation
- 3.5 recording devices
- 3.6 operation of the equipment
- 3.7 aircraft self-diagnostics
- 3.8 fault records

4.

Use a range of fault diagnostic techniques, to include three of the following:

- 4.1 pressure/leak test
- 4.2 injection and sampling
- 4.3 six point technique
- 4.4 functional testing
- 4.5 half-split technique
- 4.6 non-destructive testing techniques
- 4.7 input-to-output
- 4.8 unit substitution

5.

Use a variety of diagnostic aids and equipment, to include two of the following:

- 5.1 aircraft maintenance manual (AMM)
- 5.2 component maintenance manual (CMM)
- 5.3 fault analysis charts (such as fault trees)
- 5.4 equipment self-diagnostics
- 5.5 troubleshooting guides
- 5.6 circuit diagrams/specifications
- 5.7 algorithms/flow charts

6.

Use two of the following types of test equipment to help in the fault diagnosis:

- 6.1 mechanical measuring equipment (such as measuring instruments, dial test indicators, torque instruments)
- 6.2 electrical/electronic measuring instruments (such as a multimeter)
- 6.3 fluid power test equipment (such as test rigs, flow meters, pressure gauges)
- 6.4 built in test equipment (BITE)
- 6.5 'special-to-type' test equipment
- 6.6 ferrous or non-ferrous crack detection equipment

7.

Diagnose faults from two of the following breakdown categories:

- 7.1 intermittent problem

7.2 partial failure or reduced performance

7.3 complete breakdown

8.

Provide a record of the outcome of the fault diagnosis, using one of the following:

8.1 step-by-step analytical report

8.2 aircraft service/flight log

8.3 aircraft log book

8.4 corrective action report

8.5 company-specific reporting procedure

8.6 computer records

Behaviours

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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