SEMAE3124

Removing and replacing components of aircraft pitot static systems

Overview

This standard identifies the competences you need to carry out the removal and replacement of components in aircraft pitot static systems and associated instrumentation, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft and includes units and components associated with height, speed, rate of climb, navigation, auto-pilot, flying control surfaces, ice and rain protection, as applicable to the aircraft type.

You will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the components to be removed or replaced. The pitot static components will include items such as gauges, controllers, and amplifiers, indicating devices, position transmitters and selectors. The removal and replacement activities will include making all necessary checks to ensure that the components are safely and correctly removed and replaced and that the component is left in a safe condition and ready for testing.

Your responsibilities will require you to comply with organisational policy and procedures for the removal and replacement activities undertaken and to report any problems with these activities that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed, accurately and legibly. 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.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying the appropriate removal and replacement techniques and procedures for the pitot static components in the relevant aircraft systems. You will understand the removal and replacement methods and procedures, and their application, along with the systems maintenance requirements. You will know how the pitot static equipment functions, the common problems that can occur, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the removal and replacement activities and for ensuring that the equipment is replaced to the required standard. In addition, you will have sufficient knowledge of these components to ensure that they are fit for purpose

and meet the specifications, thus providing a sound basis for carrying out the replacement to the required specification.

You will understand the safety precautions required when working on the various pitot static systems and when using the associated tools and

equipment. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace.

Notes To display competence in this standard it is necessary to both remove and replace pitot static components. You must remove components; however, you may fit a replacement component where the original was previously removed by another person.

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. follow the relevant aircraft manuals and publications to carry out the required work
3. establish and where appropriate, mark component orientation for re-assembly
4. carry out the removal and replacement activities, within the limits of your personal authority
5. remove and replace the required components, using approved tools and techniques
6. take suitable precautions to prevent damage to components and the surrounding structure
7. complete the relevant documentation, in accordance with organisational requirements
8. label and store (in an appropriate location) components that require repair
9. dispose of waste materials and scrap components, in accordance with approved procedures
10. leave the aircraft and the pitot static system 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 specific safety practices and procedures that you need to observe when working with aircraft pitot static systems (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the importance of maintenance on and impact upon (extended twin operations procedures) ETOpS systems, legislation and local procedures
3. the hazards associated with removing and replacing aircraft pitot static system components and with the tools and equipment used and how to minimise them and reduce any risks
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 protective equipment that you need to use for both personal protection (PPE) and protection of the aircraft
6. how to extract and use information from aircraft manuals, history/maintenance reports, flight logs, charts, circuit and physical layouts, specifications, symbols used in aircraft pitot static systems and other documents needed in the maintenance process
7. how to carry out currency/issue checks on the specifications you are working with
8. terminology used in aircraft pitot static systems and the use of system diagrams and associated symbols
9. the principles of operation of the pitot static system being worked on and the performance characteristics and function of the components within the system
10. the various mechanical fasteners that are used and their method of removal and replacement (such as threaded fasteners, special securing devices)
11. the importance of using the specified fasteners for the installation and why you must not substitute others
12. why securing devices need to be locked and labelled and the different methods that are used to remove and install them
13. the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved
14. the various types of electrical connector that are used, methods of unlocking, orientation indicators and locating and locking in of the connections

15.
the importance of applying electrostatic discharge (ESD) procedures when working on sensitive equipment or devices
16.
what constitutes a hazardous voltage and how to recognise victims of electric shock
17.
how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
18. the techniques used to remove components from aircraft pitot static systems, without damage to the components or surrounding structure (such as release of pressures/force, draining of fluids, proof marking, the need to protect the circuit integrity by covering and labelling exposed circuits)
19. the need to correctly label and store components that require repair or overhaul and to check that replaced components have the correct part/identification markings
20. the techniques used to position, align, adjust and secure the replaced components to the aircraft without damage to the components or surrounding structure
21. the quality control procedures to be followed during the removal and replacement operations
22. procedures for ensuring that you have the correct tools, equipment, components and fasteners for the activities
23. methods of lifting, handling and supporting the components/equipment during the removal and replacement activities
24. the use of seals, sealant and adhesives and anti-electrolysis barriers and the precautions to be taken
25. why electrical bonding is critical and why it must be both mechanically and electrically secure
26. how to conduct any necessary checks to ensure the system integrity, accuracy and quality of the removal and replacement
27. the tools and equipment used in the removal and replacement activities and their calibration/care and control procedures
28. 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
29. the problems that can occur with the removal and replacement operations and how these can be overcome

30. why it is important not to apply surface finishes/coverings to aircraft static vents
31. how to recognise defects (such as poor seals, misalignment, incorrectly seated plugs and sockets, ineffective fasteners, foreign object damage or contamination)
32. the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation
33. the procedure for the safe disposal of waste materials and scrap components
34. 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 removal and replacement activity:

1.1 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
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 ensure that all relevant safety devices and mechanical/physical locks are in place (where appropriate)
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 use approved removal and replacement techniques and procedures at all times
1.7 where appropriate, apply electrostatic discharge (ESD) protection procedures
1.8 ensure that components and surrounding structures are maintained free from damage and foreign objects
1.9 return all tools and equipment to the correct location on completion of the activities
1.10 leave the aircraft and the pitot static system in a condition ready for testing

2.

Remove pitot static components from three of the following aircraft systems and replace pitot static components in three of the following aircraft systems:

2.1 rate of climb
2.2 aircraft height indication
2.3 auto-pilot
2.4 air speed indication
2.5 navigation
2.6 oxygen drop out
2.7 flying controls (such as flaps, elevators, ailerons/tailerons, spoilers, wing sweep, reaction controls, rudder, rotor, airbrakes, horizontal stabiliser, artificial feel, gust alleviation, modal suppression)
2.8 engine control systems (such as FADEC, FAFC, EEC)
2.9 environmental control systems (such as pressure control)
2.10 ice and rain protection systems (such as pitot static protection, ice accretion)

3.

During the activities identified in scope 2 above, you must cover the removal and replacement of the following:

Major pitot static components: Remove and replace three of the following:

1. airspeed indicators
2. heaters
3. analogue/digital converters
4. altitude indicators
5. static ports
6. pitot probes/pressure heads
7. rate of climb indicators
8. transducer units
9. air data computers/modules
10. cabin altitude alerter
11. digital displays
12. mach meters

Other system components: Remove and replace four of the following:

13. wires/cables
14. plugs/sockets
15. rigid pipes
16. switches
17. circuit breakers
18. flexi-pipes
19. relays
20. moisture drains/traps
21. other specific system component

1.

Carry out all of the following removal and replacement activities:

1.1 disconnecting electrical connections
1.2 positioning and aligning replaced components
1.3 removal of earth bonding
1.4 making mechanical connections
1.5 removing cable/pipe/tube securing devices
1.6 making electrical connections
1.7 removing bolt securing devices and mechanical fasteners
1.8 carrying out earth bonding
1.9 installing cable/pipe/tube securing devices
1.10 applying and removing covering/protection to exposed components, wires, pipe work or vents
1.11 tightening fastenings to the required torque
1.12 replacing all `lifed' items (such as seals, filters, gaskets)
1.13 checking components for serviceability

1.14 carrying out pre-disconnection leak checks
1.15 labelling (and storing in the correct location) components that require repair or overhaul
1.16 setting, and adjusting replaced components (such as zero, range, travel, clearance)
1.17 applying bolt locking methods (such as split pins, wire locking, lock nuts)

2.

Remove and replace aircraft pitot static system components in compliance with one of the following:

2.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
2.2 extended twin operations procedures (ETOpS) (where appropriate)
2.3 Ministry of Defence (MoD)
2.4 Military Aviation Authority (MAA)
2.5 Aerospace Quality Management Standards (AS)
2.6 Federal Aviation Authority (FAA)
2.7 BS, ISO or BSEN standards and procedures
2.8 customer standards and requirements
2.9 company standards and procedures
2.10 aircraft manufacturer's requirements

3.

Complete the relevant paperwork, to include one from the following and pass it to the appropriate people:

3.1 job cards
3.2 computer records
3.3 aircraft service/flight log
3.4 aircraft log
3.5 permit to work/formal risk assessment

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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