SEMAE3340

Maintaining ignition systems on aircraft

Overview

This standard identifies the competences you need to carry out maintenance activities on aircraft ignition systems, in accordance with the approved aircraft maintenance manual, approved change documentation (service bulletin) and airworthiness requirements. It covers both fixed wing and rotary winged aircraft, and includes units and components which generate the electrical power, control and provide or distribute high and low voltage electrical current to ignite the fuel air mixture in the cylinders of reciprocating engines or in the combustion chambers or thrust augmentation of turbine engines. The maintenance activities will include the removal, fitting and testing of a range of ignition system components. You will be required to select the correct tools and equipment to use, based on the operations to be performed and the components to be removed or replaced. The aircraft ignition components will include items such as induction vibrators, magnetos, distributors, exciters, booster coils, transformers, storage capacitors, spark plugs, igniters, ignition harness and other associated wiring and switches. You will remove the required components and fit approved replacements, as appropriate. You will then need to test and adjust the completed system to meet the aircraft maintenance manual, change documentation (service bulletin) and airworthiness requirements.

Your responsibilities will require you to comply with the specific practices and procedures identified in the aircraft manual, change/service bulletin documentation and airworthiness requirements for the maintenance activities undertaken, and to report any problems with these requirements 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 thoroughly, 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 maintenance techniques and procedures to aircraft ignition systems. You will understand the removal, fitting and testing methods and procedures, and their application, along with the system maintenance requirements. You will know how the 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 maintenance activities, correcting faults and for ensuring that the ignition system is maintained to the required standard

You will understand the safety precautions required when working on the aircraft ignition systems, and when using the associated tools and 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 workplace.

Notes:

1. This standard is designed to cover the practical experience requirements of the Airline Transport Association (ATA) Chapter 74 Ignition.
2. To display competence in this standard, it is necessary to both remove and fit aircraft ignition system components. You must remove components; however, you may fit a replacement component where the original was previously removed by another person. You should also be aware of how to leave a system in a safe condition if maintenance tasks cannot be completed. This covers both the physical systems and the job documentation.

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 maintenance schedules to carry out the required work
3. carry out the maintenance activities within the limits of your personal authority
4. carry out the maintenance activities, and replace components in the specified sequence and in an agreed timescale
5. report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule
6. complete relevant documentation in accordance with organisational requirements
7. dispose of waste materials in accordance with safe working practices and approved procedures
8. leave the aircraft and 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 ignition systems (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the importance of maintenance on aircraft ignition systems, and impact upon Extended Range Twin-Engine Operations Procedures (ETOPS) systems, Electrical Wiring Interconnect Systems (EWIS), legislation and local procedures
3. the hazards associated with removing, fitting and testing aircraft ignition system components, and with the tools and equipment used, and how to minimise them and reduce any risk
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. what constitutes a hazardous voltage and how to recognise victims of electric shock
7. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
8. the importance of aircraft husbandry and of ensuring that, throughout the maintenance activity, the aircraft and work area are maintained free from foreign objects, and the implications of FOD to the safety of the aircraft
9. how to extract and use information from aircraft manuals, log books, flight logs, charts, circuit and physical layouts, specifications, symbols used in aircraft ignition systems, and other documents needed in the maintenance process
10. how to carry out currency/issue checks on the specifications you are working with
11. terminology used in aircraft ignition systems, and the use of system diagrams and associated symbols
12. the principles of operation of the ignition system being worked on, and the

function of the various units within the system
13. the various mechanical fasteners that are used, and their methods of removal and replacement (such as threaded fasteners, special securing devices)
14. the importance of using the specified fasteners for the installation and why you must not substitute others
15. why securing devices need to be locked and labelled, and the different methods that are used to remove and install them
16. the torque loading requirements on the fasteners and what to do if these loadings are exceeded or not achieved
17. the various types of electrical connector that are used, methods of unlocking, orientation indicators and locating and locking-in of the connections
18. the techniques used to remove components from aircraft ignition systems without damage to the components or surrounding structure
19. the importance of applying electrostatic discharge (ESD) avoidance procedures when working on sensitive equipment or devices
20. the need to label and store correctly components that require repair or overhaul, and to check that replaced components have the correct part/identification markings and accompanying release documentation
21. the techniques used to position, align, adjust and secure the replaced components without damage to the components or surrounding structure
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 maintenance activities
24. why electrical bonding is critical, and why it must be both mechanically and electrically secure
25. the tools and equipment used in the maintenance activities, and their calibration/care and control procedures
26. 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
27. the problems that can occur with the maintenance operations, and how these can be overcome
28. how to recognise defects (such as incorrectly seated plugs and sockets, ineffective fasteners, foreign object damage or contamination)
29. how to carry out routine checks and servicing of the aircraft ignition system (including adjusting plug gaps and checking ignition timing)
30. the need to check that cabin/cockpit switches, selectors and circuit breakers

are in the correct position before working on the ignition system
31. the types of test to be carried out on the aircraft ignition system and the test equipment to be used
32. the methods and procedures to be used to carry out the various tests on the ignition system
33. how to record the results of each individual test and the documentation that must be used
34. how to analyse the test results and how to make valid decisions about the acceptability of the ignition system
35. the procedures to be followed if the equipment or system fails to meet the test specification
36. 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
37. the procedure for the safe disposal of waste materials and scrap components
38. 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 maintenance of the aircraft ignition system:

1.1 ensure that appropriate authorisation to work on the aircraft is obtained, and observe all relevant isolation and safety procedures
1.2 obtain and use the correct documentation (such as job instructions, technical instructions, aircraft manuals and maintenance documentation)
1.3 obtain the correct tools and equipment for the activity, and check that they are in a safe, tested and usable condition and within current calibration dates
1.4 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
1.5 ensure that the relevant safety devices and mechanical/physical locks are in place (where appropriate)
1.6 where appropriate, apply electrostatic discharge (ESD) avoidance procedures
1.7 use approved removal, fitting and testing techniques and procedures at all times
1.8 return tools and equipment to the correct storage location on completion of the activities
1.9 ensure that work carried out is correctly documented and recorded
1.10 ensure that any outstanding tests are correctly documented

2.

Carry out maintenance on two of the following parts of the aircraft ignition system:

2.1 generation of high and low voltage electrical power supply
2.2 distribution of the power supply (ignition harness)
2.3 ignition switching/isolation

3.

Remove and fit six different ignition system components (at least two must be from group A):

Group A

1. magneto
2. high energy ignition units
3. exciters
4. ignition switches
5. distributor
6. low tension coil
7. transformers
8. capacitors
9. ignition/induction vibrator
10. ignition relays

11. ignition harness
12. booster coils

Group B

13. spark plugs
14. low tension leads
15. transducers/sensors
16. glow plugs
17. electrical plugs/sockets
18. wires/cables
19. high tension leads
20. igniters

1.

Carry out fifteen of the following maintenance activities:

1.1 removing access panels and covers to expose components to be removed
1.2 carrying out fault diagnosis and system checks
1.3 preparing the system for maintenance (such as isolating)
1.4 disconnecting electrical connections
1.5 making mechanical connections
1.6 removal of bonding
1.7 making electrical connections
1.8 removing cable securing devices
1.9 carrying out bonding
1.10 removing securing devices and mechanical fasteners
1.11 installing cable securing devices
1.12 supporting equipment to be removed
1.13 torque loading as required
1.14 dismantling equipment to an appropriate level
1.15 setting and adjusting replaced components (such as spark plug gap, distributor settings, ignition timing, igniter plug immersion depth)
1.16 covering (protecting) exposed components, wires, pipework or vents
1.17 checking components for serviceability
1.18 replacing all damaged/defective components
1.19 refitting components in the correct position, orientation and alignment
1.20 ensuring that replacement components have the correct part numbers
1.21 carrying out functional checks of the system
1.22 labelling (and storing in the correct location) components that require repair or overhaul
1.23 applying bolt locking methods (such as split pins, wire locking, lock nuts)
1.24 carrying out area inspections prior to task close down

2.

Carry out two of the following types of check/test on the aircraft ignition system:

2.1 test spark plugs
2.2 check HT leads
2.3 built in test equipment BITE test
2.4 test glow plugs
2.5 ignition timing
2.6 'special-to-type' tests
2.7 check ignition unit
2.8 test igniters

Using one of the following:

9. stroboscope
10. aircraft power source
11. `special-to-type' test sets
12. measuring equipment (such as gap gauges)

1.

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

1.1 job cards/work sheets
1.2 computer records
1.3 aircraft technical log
1.4 aircraft cabin log
1.5 aircraft log book

2.

Carry out maintenance on aircraft ignition systems in compliance with one of the following:

2.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
2.2 Extended Range Twin-Engine 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 aircraft maintenance manual/approved change documentation (service bulletin)
2.8 manufacturers standards and procedures

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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