

## Overview

This standard identifies the competences you need to carry out maintenance activities on aircraft landing gear, 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 covers the units and components which provide a means of supporting and steering the aircraft on the ground or water, and which make it possible to retract and store the landing gear in flight (including main gear and nose wheel, tail skid assemblies, brakes, wheels, floats, skids, skis, doors, shock struts, tyres, linkages and indicating and warning systems). The maintenance activities will include the removal, fitting and testing of a range of landing gear components. You will be expected to use the approved procedure for correctly isolating and, where appropriate, de-pressurising the system, before breaking into the system circuit. 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 landing gear. You will understand the removal, fitting and testing methods and procedures, and their application, along with the landing gear 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 landing gear is maintained to the

required standard.

You will understand the safety precautions required when working on aircraft landing gear, especially those for ensuring that the undercarriage locks are in place, and when isolating and depressurising 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 workplace.

**Notes:**

1. This standard is designed to cover the practical experience requirements of the Airline Transport Association (ATA) Chapter 32 Landing Gear.
2. To display competence in this standard, it is necessary to both remove and fit aircraft landing gear 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.

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## 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 landing gear 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 on aircraft landing gear systems (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the need to check that cabin/cockpit switches, selectors and circuit breakers are in the correct position before applying any form of external power (such as electrical, hydraulic, air or vacuum)
3. the importance of maintenance of aircraft landing gear, and impact upon Extended Range Twin-Engine Operations Procedures (ETOPS) systems, Electrical Wiring Interconnect Systems (EWIS), legislation and local procedures
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 hazards associated with carrying out maintenance activities on aircraft landing gear, and with the tools and equipment used (such as the safe release of pressurised systems, traps from moving parts, misuse of tools), and how to minimise them and reduce any risk
6. the protective equipment that you need to use for both personal protection (PPE) and protection of the aircraft
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. 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
10. how to extract and use information from aircraft manuals, log books, flight logs, charts, circuit and physical layouts, specifications, symbols used in aircraft landing gear systems, and other documents needed in the maintenance activities
11. how to carry out currency/issue checks on the specifications you are working

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with

12. terminology used in aircraft landing gear systems, and the use of system diagrams and associated symbols

13. the various types of pipe and component that make up the aircraft landing gear system (such as rigid pipes; hydraulic hoses; valves; struts, steering and braking mechanisms; extension and retraction mechanisms; mechanical and electrical control devices)

14.

the principles of operation of the landing gear being worked on and the function of the units that make up the system

15.

the techniques used to remove components from aircraft landing gear systems without damage to the components or surrounding structure (such as release of pressures/force, draining of fluids, removal of components and the need to protect the circuit integrity by fitting blanking plugs and labelling exposed circuits)

16. the various mechanical fasteners that will need to be removed and replaced, and their methods of removal and replacement (such as threaded fasteners, special securing devices)

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 importance of ensuring that the aircraft and work area is maintained free from dirt, debris and foreign objects, and of ensuring that any exposed components or pipe ends are correctly covered/protected

19. the need to label and store correctly components that require repair or overhaul, and to check that replacement components have the correct part/identification markings and accompanying release documentation

20. how to fit landing gear components safely and correctly (such as use of lifting and handling equipment; ensuring the correct tightness of connections; eliminating stress on pipework/connections; carrying out visual checks of all components)

21. how to make adjustments to components/assemblies to ensure that they function correctly (such as travel and working clearance)

22. why securing devices need to be tightened to the correct torque, locked and labelled, and the methods to be used

23. why electrical bonding is critical and why it must be both mechanically and electrically secure

24. the tools and equipment used in the maintenance activities, and their calibration/care and control procedures

25. 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
26. how to carry out routine checks and servicing of the aircraft landing gear (including checking tyres and braking systems)
27. the types of test to be carried out on the aircraft landing gear and the test equipment to be used
28. the methods and procedures to be used to carry out the various tests on the landing gear
29. the importance of carrying out the tests in the specified sequence, checking readings/movements at each stage
30. how to record the results of each individual test and the documentation that must be used
31. how to analyse the test results and how to make valid decisions about the acceptability of the aircraft landing gear
32. the procedures to be followed if the equipment or system fails to meet the test specification 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, scrap components and fluids
34. 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 landing gear:

- 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 the safe isolation and depressurisation of the hydraulic lines before breaking into the system
- 1.6 ensure that the relevant safety devices and mechanical/physical locks are in place (where appropriate)
- 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 three of the following parts of aircraft landing gear:

- 2.1 main gear
- 2.2 extension and retraction system
- 2.3 wheels and brakes
- 2.4 nose gear
- 2.5 landing gear door mechanism
- 2.6 nose wheel steering
- 2.7 tail gear
- 2.8 supplementary gear (such as skis, floats)
- 2.9 gear position, warning and ground safety devices

3.

Remove and fit four different aircraft landing gear components (at least two must be from group A):

### Group A

1. shock struts
2. nose gear actuators
3. gear selector valve

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4. bogie axles
5. main gear actuators
6. motors
7. drag struts
8. bogie trim
9. bearings
10. swivel glands
11. operating controls
12. anti-skid devices
13. brake master cylinder
14. de-boosters
15. skis/floats
16. brake units/components
17. shimmy damper
18. emergency landing devices

### Group B

19. linkages
20. nose/main gear locking mechanisms
21. relays
22. attachment bolts
23. cables
24. solenoids
25. bungees
26. pipes and hoses
27. wiring/switches/plugs
28. tyres
29. pressure indicators
30. indicators and warning devices
31. seals
32. pressure switch
33. wheel well fire loops
34. sensors
35. brake control valve
36. other specific components

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, de-pressurising, draining fluids)

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- 1.4 disconnecting electrical connections
- 1.5 refitting components in the correct position, orientation and alignment
- 1.6 removal of bonding
- 1.7 disconnecting/removing hoses and pipes
- 1.8 setting and adjusting replaced components (such as travel, working clearance)
- 1.9 removing securing devices and mechanical fasteners
- 1.10 supporting equipment to be removed
- 1.11 making mechanical connections
- 1.12 dismantling equipment to an appropriate level
- 1.13 making electrical connections
- 1.14 covering (protecting) exposed components, wires, pipework or vents
- 1.15 carrying out bonding
- 1.16 torque loading as required
- 1.17 checking components for serviceability
- 1.18 replacing fluids and bleeding the system
- 1.19 replacing damaged/defective components
- 1.20 re-pressurising the system
- 1.21 replacing single use items (such as seals, filters, gaskets)
- 1.22 carrying out system functional checks
- 1.23 ensuring that replacement components have the correct part numbers
- 1.24 fitting blanks, labelling (and storing in the correct location) components that require repair or overhaul
- 1.25 applying bolt locking methods (such as split pins, wire locking, lock nuts)
- 1.26 carrying out area inspections prior to task close down

## 2.

Service/check aircraft landing gear, to include carrying out eight of the following:

- 2.1 visually checking the system for leaks
- 2.2 rigging the steering
- 2.3 inspecting tyres for wear, impact damage and creep
- 2.4 adjusting micro switches
- 2.5 charging struts
- 2.6 replacing wheels
- 2.7 checking the indicating and warning systems
- 2.8 checking and cleaning the braking system
- 2.9 charging the braking accumulator
- 2.10 replacing brake units/components
- 2.11 checking the oleo extension
- 2.12 bleeding the braking system

## 3.

Carry out three of the following tests on the aircraft landing gear:

- 3.1 leak test
- 3.2 built in test equipment (BITE) test
- 3.3 pressure test
- 3.4 'special-to-type' tests
- 3.5 functional

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- 3.6 cable tension check
- 3.7 rigging check
- 3.8 safety interlock test
- 3.9 static friction check
- 3.10 freedom and range of movement
- 3.11 testing outbreak system
- 3.12 testing anti-skid unit
- 3.13 landing gear door functional testing

Using two of the following:

- 14. aircraft power source/pumps
- 15. ground test rig
- 16. measuring equipment
- 17. built in test equipment (BITE)

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 landing gear components 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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