CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

# Advisory Circular
# AC66–3.1

**Revision 0**

**Xx xxxx 2025**

## Aircraft Maintenance Approval — Examination Subject 180 Maintenance of Special Category Amateur Aircraft

**General**

Civil Aviation Authority (CAA) advisory circulars (ACs) contain information about standards, practices, and procedures that the Director has found to be an **Acceptable Means of Compliance** with the associated rule.

Consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

**Purpose**

This AC provides an acceptable means of compliance for the syllabus content in respect of written and oral examinations for the Special Category Amateur Aircraft. This AC also provides guidance for recommended study material in respect of the examination syllabi in this AC.

**Related Rules**

This AC relates specifically to Part 66, Subpart D, *Certificate of Maintenance Approval.*

**Change Notice**

This is the initial revision of this AC, but it is largely drawn from the syllabus for Subject 180, *Maintenance Certification of Experimental Category Aircraft*. This AC also includes updated information for study materials to sit an examination and aligning format to current AC standards.

**Version History**

The record of revisions to this AC are outlined below:

| AC Revision No. | Effective Date | Summary of Changes |
|---|---|---|
| AC66-3.1, Rev 0 | X xxx 2025 | Initial issue, but based on Subject 180 syllabus.<br><br>Provides updated information to the Subject 180 syllabus, with the addition of:<br><br>• Rule Structure<br>• Responsibilities of Owner and Maintainer<br>• Release Certificates<br>• IFR Flight<br>• Flight Manual and Placards,<br>• Fuelling of Aircraft<br>• Modification/Repair<br>• Use and care of calibrating equipment<br>• Service Bulletins<br>• Instructions, and<br>• Notices. |

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# Subject Overview

Subject 180, *Maintenance Certification of Experimental Category Aircraft*, may be an oral or written examination of approximately two hours duration. The participant will normally be permitted to use publications and reference material to answer questions.

This examination may be used for the two separate purposes as outlined below, depending on the scope of the maintenance approval the participant will seek from CAA.

1. Unlicensed persons seeking a maintenance approval to perform, supervise and certify release to service of maintenance on amateur-built aircraft with special category experimental airworthiness certificate or special category amateur airworthiness certificate.

2. Unlicensed persons seeking approval to maintain and release to service, aircraft components and equipment generally found on ex-military or historic aircraft with special category limited airworthiness certificates.

The oral examination will normally be conducted on site at the owner's aircraft or maintenance facility or by arrangement with ASPEQ.

During the course of the examination the participant's access to pertinent maintenance information and the availability of appropriate facilities, tooling and equipment will also be assessed.

Application to sit the examination should be made directly to ASPEQ. Refer to www.aviation.co.nz for examination information.

# General Examining Objective

The objective of this examination is to establish that an unlicensed person has the necessary knowledge and ability to satisfactorily perform the maintenance activities specified on a certificate of maintenance approval issued by the New Zealand CAA. The examination will be tailored to encompass the type of aircraft, category of airworthiness certificate and any specific operational requirements and limitations.

Participants can expect that most questions will have a practical focus requiring engineering decisions to be made using documents and data referenced in the syllabus.

## Knowledge Levels

This syllabus provides for the subject material covered for the Aircraft Maintenance Approval for Special Category Amateur Aircraft.

Each topic within the syllabi has a level number which provides an indication of the degree or level of knowledge required. There are three levels defined as follows:

***LEVEL 1 A familiarisation with the principal elements of the subject.***

Specifications The participant should be:

1. familiar with the basic elements of the subject.
2. able to give simple descriptions of the whole subject, using common words and examples.
3. able to use typical terms.

***LEVEL 2 A general knowledge of the theoretical and practical aspects of the subject and an ability to apply the knowledge.***

Specifications The participant should be able to:

1. understand the theoretical fundamentals of the subject.
2. give a general description of the subject using, as appropriate, typical examples.
3. use mathematical formulae in conjunction with physical laws describing the subject.
4. read and understand sketches, drawings and schematics describing the subject.
5. apply his/her knowledge in a practical manner using detailed procedures.

***LEVEL 3 A detailed knowledge of the theoretical and practical aspects of the subject and a capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner.***

Specifications The participant should:

1. know the theory of the subject and the interrelationships with other subjects.
2. be able to give a detailed description of the subject using theoretical fundamentals and specific examples.
3. understand and be able to use mathematical formulae related to the subject.
4. be able to read, understand and prepare sketches, simple drawings and schematics describing the subject.
5. be able to apply his/her knowledge in a practical manner using manufacturer’s instructions.
6. be able to interpret results and measurements from various sources and apply corrective action where appropriate.

## Scope of the Examination

The examination syllabus for subject 180 is designed to cover all of the common types of aircraft in New Zealand that have been issued with a special category amateur airworthiness certificate. The syllabus contains ‘compulsory’ modules that are general to all aircraft, and ‘discretionary choice’ modules that relate to the type of construction found on the participant’s aircraft.

The participant should therefore study all of the ‘compulsory’ modules in the syllabus and select the ‘discretionary choice’ modules where they are directly relevant to aircraft type.

The participant may choose not to have maintenance approval privileges for the powerplant. In which case the module pertaining to powerplant will be excluded from the examination and the maintenance approval endorsed accordingly. For subsequent aircraft built and obtained further ‘discretionary choice’ modules may be sat to satisfy minor differences with aircraft type. IE wood and fabric skin structure to metal stressed skin structure.

The syllabus is not intended to be exhaustive in its content and does not necessarily cover all of the activities an owner may undertake during maintenance of their aircraft. The syllabus should be regarded more as a learning guide for meeting a minimum standard, while at the same time providing encouragement and direction to go on and obtain a comprehensive understanding of the subject through further self-study and experience.

Because of examination time constraints it is probable that only one or two questions will be asked in each of the relevant sub-topics. In preparing for the examination the participant would be well advised to carefully scope the syllabus and determine what elements directly apply to their aircraft. Having done this, the topic should either be learned, or notes made of where the information may be readily accessed from the listed reference material or the participant’s own manufacturer’s maintenance publications.

## Recommended Study Material

The examination questions will normally be confined to information contained in the publications listed in this syllabus.

Publication references have been placed adjacent to many sub-topic headings in this syllabus. The references are simply to help participants make a start in studying the subject and should not be considered the only or most complete references available.

| | |
|---|---|
| 1. | AMT Handbook General - FAA-H-8083-30B<br>ww.faa.gov/regulations_policies/handbooks_manuals/aviation/amtg_handbook.pdf |
| 2. | AMT Handbook Airframe - FAA-H-8083-31B<br>https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/FAA-H-8083-31B_Aviation_Maintenance_Technician_Handbook.pdf |
| 3. | AMT Handbook Powerplant - FAA-H-8083-32B<br>https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/FAA-H-8083-31B_Aviation_Maintenance_Technician_Handbook.pdf |
| 4. | FAA AC43.13-1B Acceptable Methods, Techniques, and Practices- Aircraft Inspection and Repair<br>https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_43.13-1B_w-chg1.pdf |
| 5. | Maintenance manuals and service data pertaining to the aircraft or aircraft component. |
| 6. | CAA[1] Rule Part 1 - CAA Website |
| 7. | CAA Rule Part 12 and AC12s - CAA Website |
| 8. | CAA Rule Part 21 and AC21s - CAA Website |
| 9. | CAA Rule Part 39 and relevant AD schedules |
| 10. | CAA Rule Part 43 and AC43-1, -2, -3, -4, -5, -7, -10, -11, -12 and -14 - CAA Website |
| 11. | CAA Rule Part 66 and AC66-1 - CAA Website |
| 12. | CAA Rule Part 91 and AC91-6 - CAA Website |
| 13. | Standard Aviation Maintenance Handbook -<br>Jeppesen# JS312624 ISBN 0-89100-282-0 |

[1] Note that these references are to CAANZ.

# Syllabus Content

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **1. CIVIL AVIATION MAINTENANCE LEGISLATION (Compulsory)** | | | |
| **Specific Examining Objectives**<br>To determine that the participant understands the legal requirements relating to the performance, supervision and certification of maintenance. | | | |
| **1.1** | **Important Maintenance Definitions**<br><br>*Ref. 6* | Understand the following maintenance definitions as they would be applied to the aircraft or aircraft components the participant wishes to maintain:<br>a. Aircraft component<br>b. Aircraft radio station<br>c. Airworthiness certificate<br>d. Airworthiness data<br>e. Airworthiness directive<br>f. Airworthy condition<br>g. Amateur built aircraft<br>h. Component<br>i. Design change<br>j. Detailed inspection<br>k. Empty weight<br>l. Flight manual<br>m. Flight time<br>n. Maintenance<br>o. Maintenance manual<br>p. Maintenance programme<br>q. Major modification<br>r. Major repair<br>s. Manufacturer's maintenance programme<br>t. Modification<br>u. Overhaul<br>v. Owner<br>w. Repair<br>x. Required inspection<br>y. Routine inspection<br>z. Standard part<br>aa. Technical data<br>bb. Time in service<br>cc. Time since overhaul<br>dd. Type | 1 |
| **1.2** | **Rules Overview/ Structure (Bubble chart)** | Understand the inter-relation of the rules affecting the Special Category Amateur Aircraft | 1 |
| **1.3** | **Responsibilities of the Owner, Maintainer and CAA** | Describe the responsibilities, the inter-relationship and expectations from each and between each of the Owner with Maintainer and CAA. | 3 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **1.4** | **Reporting of Defects**<br><br>*Ref 7* | In terms of the mandatory reporting requirements for defects, describe the following:<br>a. A defect incident (provide examples)<br>b. The CAA form used for defect reporting<br>c. Responsibility for reporting<br>d. Requirements for the retention of defective products or components.<br>e. Investigation of a defect | 2 |
| **1.5** | **Modification/ Repair**<br>*Ref 8 Rule 21.505(c) flowchart*<br>*Ref 10* - **AC43-14** | For aircraft operated in the Standard and Special Category airworthiness certificate, describe the following:<br>a. Major repair requirements<br>b. Major modification requirements<br>c. Acceptable technical data<br>d. Approval of data<br>e. Conformity inspection requirements<br>f. Persons to perform conformity inspection<br>g. Use of form 337 and CAA04301 | 2 |
| **1.6** | *Supplementary Reference AC00-1*<br><br>AC21-3<br>AC21-4 | Describe the requirements associated with design changes for Special Category Amateur aircraft including the following:<br>a. The requirement to comply with ADs<br>b. Maintenance of type certificated engines and propellers to type certificate standard<br>c. Action to be taken relating to the data plate if engines are modified without using acceptable technical data and performance of a conformity inspection.<br>d. Evaluation and approval of design changes. | 3 |
| **1.7** | **Certification of Products and Parts** | Describe the airworthiness certificate issue requirements for aircraft operated in the Special Category Amateur. | 2 |
| **1.8** | *Ref 8, Form 2* | Know how to determine that a part is acceptable for installation on an aircraft. Includes identification of bogus parts. Know the different types of release certificates. | 2 |
| **1.9** | *Ref AC21-6* | Know how to properly mark aircraft and aircraft components for identification purposes. | 2 |
| **1.10** | **Airworthiness Directives**<br><br>*Ref 9* | In regard to airworthiness directives, describe the following:<br>a. How emergency ADs are received and actioned by the aircraft owner<br>b. How normal ADs are promulgated by CAA and accessed for use during the performance of aircraft maintenance<br>c. Interpretation of data contained in an AD<br>d. The sections that make up an AD schedule<br>e. Recording of AD compliance in the aircraft logbook. | 3 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| | | f. Management of repetitive ADs in the logbook<br>g. Deferment limits for compliance with ADs<br>h. Responsibility for AD compliance | |
| **1.11** | **General Maintenance Rules**<br><br>*Ref 10* | Describe:<br>a. who can perform and supervise maintenance on an aircraft.<br>b. the details to be recorded when maintenance has been performed. | 3 |
| **1.12** | | Describe the facility and equipment requirements for performing maintenance on an aircraft. | 1 |
| **1.13** | | State the activities that are not permitted to be performed in a Part 43 maintenance environment with a Special Category Amateur certificated aircraft. | 3 |
| **1.14** | | Describe the requirements for recording overhaul of aircraft components. | 2 |
| **1.15** | | Describe the requirements for carrying out inspections and tests on the following components or systems:<br>a. Radio stations<br>b. Altimeter systems<br>c. SSR Transponder<br>d. Emergency locator transmitter | 3 |
| **1.16** | | Describe the requirements for carrying out annual or 100 hour inspections, including permissible extensions under Rule Part 91. | 2 |
| **1.17** | | Describe who can perform and certify NDT inspections. | 2 |
| **1.18** | AC43-3 | In regard to release to service, describe the following:<br>a. Who can certify<br>b. The wording of the release to service statement<br>c. What must be completed before certifying release to service<br>d. How inoperative equipment is recorded in the technical log<br>e. How discrepancies are recorded in maintenance documentation<br>f. Certification of components not installed on an aircraft. (Use of a CAA Form 2) | 3 |
| **1.19** | *AC43-1 Rule 43.51* | Describe what is meant by direct supervision and how this should be carried out during aircraft maintenance. | 3 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **1.20** | **Duplicate Inspection of Controls**<br><br>*Ref 10 Para 43.113 and AC43-1 Page 12*<br><br>*Vector articles* | Know the requirements for the performance of duplicate inspections on flying controls including the following:<br>a. What constitutes a flying control<br>b. When duplicate inspections are required<br>c. How the scope of the inspection is established<br>d. What must be checked during the inspection<br>e. Who may sign the first inspection<br>f. Who may sign the second inspection<br>g. Establishing competence of the person performing the second inspection<br>h. Correct wording of the inspection certification<br>i. Logbook entry requirements. | 3 |
| **1.21** | **Ground Running of Piston Engines After a Periodic Inspection**<br><br>*Ref 10- Rule 43.115* | State the items to be checked during an engine ground run post a 100 hr periodic inspection.<br><br>Describe the data that must be recorded at the completion of a ground-run. | 2<br><br>2 |
| **1.22** | **Bi-annual Review of Airworthiness**<br><br>*Ref 10-Rule Sub-Part D (Review of Airworthiness)* | In regard to the bi-annual review of airworthiness, state following:<br>a. Who may perform and certify the inspection<br>b. What is normally inspected<br>c. Conditions relating to experimental aircraft<br>d. How and where the review is certified<br>e. How discrepancies are handled | 1 |
| **1.23** | **Aircraft Weight and Balance**<br><br>*Ref AC43-2* | In respect of aircraft weight and balance, describe the following:<br>a. Occasions when the aircraft should be weighed<br>b. Where the empty weight of an aircraft is recorded<br>c. When re calculation of a change in empty weight is required | 3 |
| **1.24** | **Certificate of Maintenance Approval**<br><br>*Ref 11 Subpart D and Para 66.11*<br>*AC66-1 Para 66.153* | In respect of maintenance approvals, describe the following:<br>a. Validity period relevant to the type of approval sought.<br>b. Privileges of an approval holder<br>c. Issue requirements and procedures<br>d. Experience and examination requirements<br>e. Conditions and limitations | 2 |
| **1.25** | **On-Condition Maintenance**<br><br>*Ref AC43-5* | Describe the conditions, limitations, checks and servicing requirements associated with maintaining an aircraft component, such as the engine or propeller, on- condition. | 2 |
| **1.26** | **Emergency Equipment**<br><br>*Ref AC43-6* | Describe the inspection and test requirements relating to the emergency equipment fitted to the participant's aircraft. | 3 |
| **1.27** | **Calibration of Compasses**<br>*Ref AC43-7* | State the purpose of a compass calibration and the re calibration period appropriate to the participant's aircraft. | 3 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **1.28** | **Aircraft Radio Station**<br><br>*Ref AC43-10* | In respect of aircraft radio stations, describe the process for compiling a CAA form 2129 and identify the radio equipment specific to the approval holder's aircraft that would be listed on the form. | 2 |
| **1.29** | **Minimum Equipment Required for VFR and IFR Flight** *Ref 12, Rule 91.509* | Identify the minimum equipment required for operating an aircraft on VFR flight.<br>Identify the minimum equipment required for operating an aircraft on IFR flight | 2 |
| **1.30** | **Operator Maintenance Requirements**<br><br>*Ref 12* | In respect of the participant's aircraft, understand the general maintenance responsibilities of the aircraft owner relating to the following:<br>a. Airworthiness directives<br>b. Mandatory replacement times<br>c. Rectification of discrepancies<br>d. Inoperative equipment<br>e. Required inspections<br>f. Permissible extension of inspection intervals<br>g. Operation after maintenance<br>h. Annual review of airworthiness<br>i. Documents to be carried on an aircraft | 2 |
| **1.31** | **Maintenance Programme**<br><br>*Ref 12 Rule Subpart G Para 91.621* | In respect of maintenance programmes for Special Category Amateur airworthiness certificate aircraft, describe the following:<br>a. Content of the programme<br>b. Approval of the programme<br>c. How changes are made to the programme | 1 |
| **1.32** | **Maintenance Records – Aircraft Logbooks**<br><br>*Ref 12 Rule Subpart G Para 91.627*<br>*"Instructions for use" on the inside cover of each logbook* | In regard to logbooks pertaining to the participant's aircraft, describe the following:<br>a. Control of periodic inspections<br>b. Control of maintenance and the updating of hours<br>c. Recording and certification of major repairs<br>d. Control of out of phase maintenance<br>e. Lifed component control<br>f. Recording of empty weight changes<br>g. Recording and control of airworthiness directives<br>h. Control of repetitive ADs<br>i. Recording of engine and propeller maintenance<br>j. Retention of maintenance records | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **1.33** | **Aircraft Technical Log**<br><br>*Ref 12 Rule Subpart G AC91-6* | In respect of tech logs, describe the following:<br>a. Who is responsible for completing the log<br>b. Control of Inspections due<br>c. Control of maintenance due prior to next routine inspection<br>d. Logging of hours<br>e. Recording of discrepancies<br>f. Recording of inoperative equipment<br>g. Period a tech log may remain in use<br>h. Retention of a tech log<br>i. Transferring information to the aircraft logbook | 2 |
| **1.34** | **Retention of Maintenance Records**<br><br>*Ref 12 Rule Para 91.631* | State the retention period for the following aircraft maintenance documentation:<br>a. Records of 100 hours inspections<br>b. Bi-annual reviews of airworthiness<br>c. Discrepancy lists<br>d. Conformity inspections<br>e. Logbooks for aircraft, powerplant, propeller and airworthiness directives | 2 |
| **1.35** | **Flight Manual and Placards** | Describe the contents of a Flight Manual and supplements.<br><br>Relate the operator's responsibility with regard the Flight Manual and supplements.<br><br>State the requirements of the Flight Manual Placard section. | 2 |
| **1.36** | **Service Bulletins, Instructions and Notices**<br><br>*Ref CAN 05-002* | Describe the obligations of operators with regard to Manufacturer (OEM) Service Information.<br><br>Explain when compliance with Manufacturer's Service information is mandatory. | 2 |
| **1.37** | **Use and Care of Calibrated Equipment** | Describe the features, types, uses, maintenance, calibration, storage and operating precautions relating to calibrated equipment and precision measuring devices. | 2 |
| **1.38** | **Fueling of Aircraft** | State the common types of fuels and their colour identification.<br><br>State the common fuel contaminants and the precautions which can be taken to avoid them.<br><br>State the process for grounding aircraft for refueling.<br><br>State the general rules for fueling of aircraft, including the special precautions for the use of drum stock, and plastic containers. | 1 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **2. GENERAL MAINTENANCE PRACTICES (Compulsory)** | | | |
| **Specific Examining Objective**<br>To ensure that the participant understands the general maintenance requirements pertaining to aircraft and avionics systems. | | | |
| **2.1**<br><br><br><br><br>**2.2**<br><br><br>**2.3** | **Aircraft Hardware**<br><br>*Ref 1 Chapter 7*<br><br>*Ref 4 Chapter 7* | From the head markings, identify the following AN bolts:<br>a. Standard steel<br>b. Close tolerance<br>c. Corrosion resistant<br>d. Aluminium alloy<br><br>Describe how AN bolts are classified, using as an example, a bolt with code AN4-7.<br><br>Describe how AN nuts are classified, using as an example, a castle nut with code AN310-6 | 1<br><br><br><br><br>1<br><br><br>1 |
| **2.4** | **Installation of Hardware**<br><br>*Ref 1 Chapter 7* | Describe the correct installation practices for the following hardware:<br>a. Nut, washer and bolt<br>b. Spring washers on light alloy surfaces<br>c. Bolts in rotating assemblies<br>d. Fibre and metal self locking nuts<br>e. Fasteners around exhaust systems<br>f. Taper pins<br>g. Clevis pins<br>h. Dzus and Turnlock or cam lock fasteners<br>i. Anchor nuts | 2 |
| **2.5** | **Locking of Hardware**<br><br>*Ref 1 Chapter 7* | Describe the following locking methods and important factors to consider prior to making a certification:<br>a. Lockwire (safety wire) techniques for nuts, bolts and plugs<br>b. Split (cotter) pinning of nuts<br>c. Lock washers<br>d. Tab washers | 3 |
| **2.6** | **Airframe Symmetry**<br><br>*Ref 2 Chapter 2* | Specify the methods used to make the following alignment and symmetry checks:<br>a. Complete airframe for symmetry<br>b. Fuselage for twist and bending<br>c. Vertical stabiliser for alignment<br>d. Wings and horizontal stabilisers for dihedral and incidence. | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **2.7** | **Control Systems**<br>*Ref 2 Chapter 2* | State why control surface balancing is required. | 2 |
| **2.8** | | Identify and describe the correction of typical flying defects brought about by an incorrectly rigged wing, incorrectly rigged controls or defective flying control systems. | 2 |
| **2.9** | *Ref 2 Chapter 2*<br><br>*Ref 4 Chapter 7* | Understand the correct assembly and rigging of all flight control surfaces on the aircraft including the following:<br>a. Use of rigging pins or holding fixtures<br>b. Positioning of an aircraft in the rigging position<br>c. Establishing and adjusting angular travel of control surfaces<br>d. Rigging of tabs and trim operating devices<br>e. Setting and adjustment of primary and secondary control stops | 3 |
| **2.10** | *Ref 2 Chapter 1* | Describe the sense of operation of all control surfaces. | 3 |
| **2.11** | *Ref 10 - Rule 43.113* | Detail the requirements for a duplicate inspection of flying controls with particular respect to the following:<br>a. By definition, know what constitutes a control system that would require a duplicate inspection<br>b. Selection and training of persons to perform second inspections<br>c. Determining the extent of the inspection<br>d. Determining correct assembly, functioning, sense, freedom of operation and locking of all control systems on an aeroplane. | 2 |
| **2.12** | *Ref 2 Chapter 2*<br><br>*Ref 4 Chapter 7* | Describe the correct installation and rigging of engine controls including the following:<br>a. Range of movement<br>b. Setting, adjustment and locking of control stops | 3 |
| **2.13** | | Describe the following:<br>a. Mass balancing of controls and how this is checked and adjusted<br>b. Cable tension checking and adjustment<br>c. Wire locking of turnbuckles and the appropriate “in safety” checks<br>d. Locking methods for all control components including the correct installation of cotter pins<br>e. Correct installation of pulleys, fairleads and cable guards<br>f. Serviceability checks for pulleys<br>g. Cable clearances from electrical looms, aircraft structure and fluid pipes | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| | | h. Determining the correct installation and serviceability of cable end fittings | |
| **2.14** | | Describe how control cables are inspected and the likely defects that could exist. | 3 |
| **2.15** | **Undercarriage**<br><br>*Ref 2 Chapter 13*<br><br>*Ref 4 Chapter 9* | Describe the following undercarriage maintenance activities, where they are applicable to the participant's own aircraft:<br>a. Oleo servicing<br>b. Toe-in/toe-out and camber limits<br>c. Wheel bearing servicing<br>d. Tyre/tube maintenance or replacement<br>e. Brake wear checks<br>f. Bleeding brakes<br>g. Retraction tests and associated adjustments | 1 |
| **2.16** | **Fuel System**<br><br>*Ref 2 Chapter 14*<br><br>*Ref 4 Chapter 8*<br><br>*Ref 5* | Describe the aircraft fuel system with particular regard to the location of the following components:<br>a. Fuel tank vents<br>b. Drain cocks<br>c. Filters and strainers<br>d. Cocks and valves<br>e. Auxiliary pumps | 1 |
| **2.17** | **Fuel System Maintenance**<br><br>*Ref 2 Chapter 14*<br><br>*Ref 5* | Describe how the following maintenance activities are performed:<br>a. Fuel flow check<br>b. Calibration of a dip stick or fuel gauge<br>c. Fuel tank replacement<br>d. Cleaning of fuel filters and strainers<br>e. Fuel pressure adjustment<br>f. Detection and rectification of fuel leaks | 2 |
| **2.18**<br><br><br>**2.19** | **Special Structural Inspections**<br>*Ref 2 Chapter 1*<br><br>*Ref 1 Chapter 10*<br><br>*Ref 5* | During abnormal flight conditions of an aeroplane, identify areas of high structural stress concentration and the adverse effects such loads could have on structural integrity.<br><br>Describe how the following special inspections would be performed with special emphasis on test procedures, special equipment, acceptable limits and common defects:<br>a. Heavy landing inspection<br>b. Heavy turbulence inspection<br>c. Lightning strike<br>d. Airframe symmetry inspection<br>e. Propeller strike<br>f. Solid object contact with the airframe | 2<br><br><br>2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **2.20** | **Corrosion**<br><br>*Ref 1 Chapter 8*<br><br>*Ref 4 Chapter 6* | Be able to identify the following types of corrosion and state common prevention methods:<br>a. Uniform surface corrosion<br>b. Pitting corrosion<br>c. Galvanic corrosion<br>d. Fretting corrosion | 2 |
| **2.21** | | Describe the following principles and practices associated with the corrosion of aircraft:<br>a. Identification, removal, and treatment of corrosion on ferrous materials.<br>b. Identification, removal and treatment of corrosion on aluminium alloys<br>c. Removal of corrosion from control cables | 1 |
| **2.22** | **Avionics Maintenance**<br><br>*Ref 5*<br><br>*Ref 2 Chapter 9*<br><br>*Ref 2 Chapter 10* | Describe how the following avionics maintenance is performed:<br>a. Pitot static leak check<br>b. Suction checks and adjustment<br>c. Checking instruments for serviceability<br>d. Placarding of instruments<br>e. Instrument decals and range markings<br>f. Radio inspections<br>g. Battery maintenance<br>h. Charging system maintenance<br>i. Starting system maintenance<br>j. Maintenance of internal and external lights<br>k. Checking of circuit breakers and adjustment of micro-switches | 2 |
| **2.23** | *Ref 2 Chapter 11* | Describe the types and sources of radio interference associated with VHF systems and describe methods of eliminating interference. | 1 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **3. POWERPLANT AND RELATED SYSTEMS (Compulsory)** | | | |
| **Specific Examining Objectives**<br>To determine that the participant has sufficient understanding of the operation and maintenance of the powerplant and its associated systems, fitted to their aircraft. | | | |
| **3.1** | **Basic Powerplant Theory**<br><br>*Ref 3 Chapter 1*<br><br>*Ref 3 Chapter 2*<br><br>*Ref 3 Chapter 4*<br><br>*Ref 5* | In regard to the participant's own aircraft, explain the following:<br>a. Why the spark is retarded for starting and how this is achieved<br>b. Why the spark is advanced during normal engine operation<br>c. What is meant by the E gap position when timing a magneto<br>d. The four stroke cycle (or if appropriate, the two stroke cycle)<br>e. Why a mag drop occurs when operating on one bank of spark plugs<br>f. Why rpm normally reduces when hot air is applied to the carburetor<br>g. The cause of engine ice formation<br>h. The effects on engine performance of a blocked air filter<br>i. Why rpm rises when the mixture control is placed in idle cut-off<br>j. The effects of altitude on engine performance<br>k. How a basic carburetor meters fuel to the engine | 1 |
| **3.2** | **Powerplant Maintenance Information**<br><br>*Ref 5* | In respect of the participant's own aircraft, identify the following:<br>a. CAA approved maintenance programme for the engine<br>b. Manufacturer's service information<br>c. Engine data plate<br>d. Location of number 1 cylinder<br>e. Location of components and accessories<br>f. Tapping points for cockpit gauges and warning devices including cylinder temperature probe or thermocouple gasket<br>g. Engine lifting points<br>h. Drain plugs<br>i. Timing or reference marks<br>j. Torque loading figures for nuts and bolts associated with the retention of, cylinders, spark plugs, magnetos, propeller, engine mounts and engine driven accessories | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
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| **3.3** | **Powerplant Maintenance Activities**<br><br>*Ref 3 Chapter 8*<br><br>*Ref 3 Chapter 10*<br><br>*Ref 3 Chapter 11*<br><br>*Ref 5* | In respect of the participant's own aircraft, describe from relevant maintenance information how the following activities would be performed:<br>a. Remove and refit a powerplant<br>b. Replace a piston and cylinder assembly<br>c. Replace and time a magneto or other alternative ignition device<br>d. Remove, clean, gap and refit a spark plug<br>e. Identify the wear characteristics and limits for a spark plug<br>f. Replace an ignition harness<br>g. Drain and replenish the engine oil<br>h. Remove and replace induction and exhaust manifolds<br>i. Adjust tappets (if applicable)<br>j. Replace and tension drive belts and chains<br>k. Perform a cylinder compression or leak-down check<br>l. Inspect and test flexible hoses<br>m. Remove, flush and pressure test the oil cooler<br>n. Place and adjust cooling baffles, cowls or fins<br>o. Perform carbon monoxide testing of cabin heating devices<br>p. Clean grease or carbon tracks from magnetos, distributors and spark plug insulations | 2 |
| **3.4** | **Powerplant Running Adjustments**<br><br>*Ref 3 Chapter 10*<br><br>*Ref 3 Chapter 11*<br><br>*Ref 5* | In respect of the approval holder's aircraft, describe from relevant maintenance information how and where the following adjustments are made:<br>a. Slow running RPM<br>b. Slow running mixture<br>c. Take off RPM<br>d. Fuel pressure<br>e. Oil pressure<br>f. Generator voltage | 2 |
| **3.5** | | Determine the symptoms and causes of the following conditions:<br>a. After firing<br>b. Back firing<br>c. Detonation<br>d. Pre-ignition | 3 |
| **3.6** | | Explain how rich and lean mixture burn rates affect engine performance. | 3 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
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| **3.7** | **Powerplant Defect Analysis and Rectification**<br><br>*Ref 3 Chapter 10*<br><br>*Ref 3 Chapter 11*<br><br>*Ref.5* | In respect of the approval holder's aircraft, describe from relevant service information how the following defects are identified, analysed and rectified. State the effects each defect will have on engine performance and safety:<br>a. Induction manifold leak<br>b. Exhaust manifold leak<br>c. Crankshaft seal leak<br>d. Accessory drive leak<br>e. Head gasket leak<br>f. Abnormal engine vibrations<br>g. Unserviceable engine mounts<br>h. Mag drop<br>i. Fouled spark plug<br>j. Burnt exhaust valve<br>k. Broken valve spring<br>l. Cracked cylinder head<br>m. Broken piston ring<br>n. Incorrect tappet clearance<br>o. Low take off RPM<br>p. Low idle RPM<br>q. Cylinder head overheating<br>r. Oil leaks | 2 |
| **3.8** | *Ref 3 Chapter 8* | From relevant service information describe the likely source of iron, copper, bronze, aluminium particles found in an oil filter. | 1 |
| **3.9** | **Powerplant Performance**<br><br>*Ref.5* | State the following engine performance parameters:<br>a. Take off RPM<br>b. Idle RPM<br>c. Maximum and minimum oil pressure<br>d. Maximum and minimum fuel pressure<br>e. Maximum allowable mag drop and the maximum difference allowed between magnetos.<br>f. Static spark advance<br>g. Cylinder temperature range<br>h. Manufacturer's overhaul life, if applicable | 2 |
| **3.10** | | Specify the engine ground-run checks to be carried out following a 100-hour/annual inspection. | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **3.11** | **Engine Cooling**<br><br>*Ref 3 Chapter 6* | Describe how cooling is affected in both a typical air and liquid -cooled engine. Special consideration should be given to the following:<br>a. Arrangement and purpose of cylinder fins, baffles and deflectors<br>b. Air seals<br>c. Exhaust augmenters<br>d. Cowls, cowl flaps and gills<br>e. Panels<br>f. Cooling properties of lubricating oil<br>g. Liquid coolants including types, characteristics and hazards<br>h. Water jackets<br>i. Radiators, pipes and connections. | 2 |
| **3.12** | | Specify typical maintenance and rectification procedures for broken or damaged cylinder cooling fins. | 2 |
| **3.13** | **Exhaust Systems**<br><br>*Ref 3 Chapter 3* | State why the length of an exhaust system is important to engine operation. | 2 |
| **3.14** | | Determine safety issues associated with defective or damaged exhaust systems. | 3 |
| **3.15** | **Propeller**<br><br>*Ref 3 Chapter 7*<br><br>*Ref.5*<br><br>*AC43-5, Engine and propeller overhaul and testing* | Describe where appropriate, the following propeller maintenance activities:<br>a. Removal and replacement<br>b. Pitch adjustment and blade angle limits<br>c. Dressing out blade damage<br>d. Areas prone to cracking<br>e. Manufacturer' s overhaul or replacement life<br>f. Replacement and adjustment of a propeller governor<br>g. Spinner installation<br>h. Blade tracking limits and checking procedure | 2 |
| **3.16** | | State the probable cause of grease streaking on a propeller blade after greasing. | 1 |
| **3.17** | | Describe engine and propeller inspections that would normally be carried out on the occurrence of a propeller strike or sudden stoppage. | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
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| **4. METAL STRESSED SKIN STRUCTURE (Discretionary Choice)** | | | |
| **Specific Examining Objective**<br>To determine that the participant understands the maintenance requirements pertaining specifically to metal stressed skin aircraft. | | | |
| **4.1** | **Maintenance Practices**<br>*Ref 1 Chapter 7*<br>*Ref 1 Chapter 8*<br>*Ref 2 Chapter 4*<br>*Ref 5* | Describe the following maintenance practices specific to the participant's metal stressed skin aircraft:<br>a. Identification of rivets<br>b. Sheet metal identification and handling<br>c. Removal and installation of rivets<br>d. Fabrication of a simple flat insertion repair<br>e. Inspection of metal structure<br>f. Anti corrosion treatment | 2 |
| **4.2** | Rivet Defect Identification<br>*Ref 2 Chapter 4* | In regard to riveted joints, explain the following conditions and criteria:<br>a. Inspection requirements and techniques<br>b. Shank joggling<br>c. Shear failure<br>d. Bearing failure<br>e. Head failure. | 3 |
| **4.3** | Inspection of Damage<br>*Ref 2 Chapter 4* | Describe the symptoms of structural damage resulting from:<br>a. Heavy landing<br>b. Lightning strike<br>c. Impact with objects or service vehicles<br>d. Excursion off a runway<br>e. Over stressing<br>f. Turbulence. | 2 |
| **4.4** | *Ref 5* | Describe how damage may be assessed and identify acceptable sheet metal repair schemes from reference material or manufacturer's service information. | 3 |
| **4.5** | Structural Sealing<br>*Ref 1 Chapter 7*<br>*Ref 2 Chapter 4*<br>*Ref 5* | Describe common methods and applications for structural sealing schemes from reference material or manufacturer's service information:<br>a. Rubber sealing of joints, seams, doors and access panels<br>b. Wires, cables, tubing and mechanical linkages passing through structure | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
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| **5. WOOD AND FABRIC STRUCTURE (Discretionary Choice)** | | | |
| **Specific Examining Objective**<br>To determine that the participant understands the maintenance requirements pertaining specifically to aircraft of wood and fabric construction. | | | |
| **5.1** | **Assessment of Wood**<br><br>*Ref 2 Chapter 6*<br><br>*Ref 4 Chapter 1* | Describe how wood is properly assessed for quality and condition prior to use in a repair, with particular emphasis placed on the following:<br>a. Determination of original strength<br>b. Selection of substitute woods<br>c. Strength comparison with the wood standard<br>d. Wood cut<br>e. Grain slope<br>f. Grain count<br>g. Growth rings per inch<br>h. Control of shrinkage | 1 |
| **5.2** | **Defects Found in Wood**<br><br>*Ref 2 Chapter 6*<br><br>*Ref 4 Chapter 1* | Describe the following defects found in wood used for aircraft construction:<br>a. Brown rot<br>b. Check<br>c. Compression failure<br>d. Compression wood<br>e. Cross grain<br>f. Decay<br>g. Dry rot<br>h. Hard knots<br>i. Knots<br>j. Mineral streaks<br>k. Pitch pockets<br>l. Shakes<br>m. Split<br>n. Wavy grain | 2 |
| **5.3** | | From the above list of defects found in wood, identify acceptable and non-acceptable defects and any parameters or conditions relating to their acceptance or rejection. | 2 |
| **5.4** | **Aircraft Adhesives and Glues**<br>*Ref 2 Chapter 6*<br>*Ref 4 Chapter 1*<br>*Ref 5* | Describe the advantages and disadvantages of epoxy resins used in wooden structural repairs. | 1 |
| **5.5** | | Describe the three important requirements for a strong, durable structural bond. | 1 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **5.6** | *Ref 2 Chapter 6*<br><br>*Ref 4 Chapter 1*<br><br>*Ref 5* | Describe the following requirements and procedures relating to the creation of a glued joint:<br>a. Surface cleanliness<br>b. Surface preparation<br>c. Reasons for not using sandpaper for surface preparation<br>d. Moisture equalisation<br>e. Grain matching of wood scarf joints | 2 |
| **5.7** | | Using manufacturer's information, explain and determine the time periods associated with the bonding process such as: pot life, open-assembly time, closed- assembly time and pressing time. | 1 |
| **5.8** | | Describe acceptable clamping techniques. | 1 |
| **5.9** | **Inspection of Wooden Structure**<br><br>*Ref 2 Chapter 6* | Describe how wooden structures are inspected for deterioration and give the signs and causes of the following defects:<br>a. Wood decay<br>b. Splitting or cracking<br>c. Bond failure<br>d. Finish failure<br>e. Stress damage | 2 |
| **5.10** | **Repair Schemes for Wooden Structure**<br>*Ref 2 Chapter 6*<br>*Ref 4 Chapter 1*<br>*Ref 5* | Be able to interpret acceptable repair schemes for wooden structural components as formulated in the reference material or manufacturer's service information. | 2 |
| **5.11** | **Bolt & Bushing Holes**<br><br>*Ref 2 Chapter 6* | Explain how a bolt or bush hole is used in wooden aircraft structures. | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
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| **5.12** | **Aircraft Fabric Covering**<br><br>*Ref 2 Chapter 3*<br><br>*Ref 4 Chapter 2*<br><br>*Ref 5* | Describe the following fabric covering products, as they are applicable to the participant's aircraft:<br>a. Organic fabric materials (eg Irish linen)<br>b. Inorganic fabric Dacron materials (eg Ceconite, Polyfibre or Superflite)<br>c. Reinforcing tape<br>d. Surface tape<br>e. Rib lacing cord<br>f. Machine sewing thread<br>g. Hand sewing thread | 1 |
| **5.13** | | Describe doping or heat shrinking procedures where applicable. | 1 |
| **5.14** | | Describe applicable Dacron coating systems and their application. | 1 |
| **5.15** | | Describe acceptable finishing products and techniques as applicable, including the requirement for UV protection. | 1 |
| **5.16** | **Fabric Inspection and Repair**<br><br>*Ref 2 Chapter 6* | Describe the in-service inspection and testing procedure for determining the condition of fabric coverings, stating acceptable deterioration limits. | 2 |
| **5.17** | *Ref 4 Chapter 2* | Describe the identification and causes of the following fabric defects:<br>a. Wear around orifices<br>b. Deterioration caused by the sun<br>c. Water damage<br>d. Rot or decay | 2 |
| **5.18** | | Describe the procedures for carrying out a simple doped-on and a sewn-on "L" shaped patch repair between two ribs on the participant's aircraft. | 1 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **6. COMPOSITE STRUCTURES (Discretionary Choice)** | | | |
| **Specific Examining Objective**<br>To determine that the participant understands the maintenance requirements pertaining specifically to aircraft of composite structure. | | | |
| **6.1** | **Composite Elements**<br><br>*Ref 2 Chapter 3*<br><br>*Ref 2 Chapter 7*<br><br>*Ref 2 Glossary*<br><br>*Ref 5* | Describe the following terms and products relating to composite materials where applicable to the participant's aircraft:<br>a. S-glass<br>b. E-glass<br>c. Warp<br>d. Weft<br>e. Fill<br>f. Selvage edge<br>g. Bias<br>h. Fabric weaves<br>i. Resin<br>j. Resin matrix systems<br>k. Polyester resin<br>l. Epoxy resin<br>m. Pot life<br>n. Pre-impregnated materials<br>o. Fillers<br>p. Foam cores including Styrofoam | 1 |
| **6.2** | **Maintenance of Composite Structures**<br><br>*Ref 2 Chapter 7*<br><br>*Ref 2 Chapter 8*<br><br>*Ref 5* | Describe the following maintenance practices as they are directly related to the participant's aircraft:<br>a. Working with resins<br>b. Resin shelf-life control<br>c. Resin mixing<br>d. Resin rich and resin starved materials<br>e. Curing of resins<br>f. Use of MEK and acetone solvents<br>g. Safety precautions in the use of composite materials and their associated products<br>h. Cutting fabrics<br>i. Drilling composites<br>j. Sanding<br>k. Finishing of composite structure | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **6.3** | **Inspection of Composite Structure**<br><br>*Ref 2 Chapter 7*<br><br>*Ref 5* | Describe visual inspection methods, with particular attention on identifying and rectifying the following defects:<br>a. Edge delamination<br>b. Fibre Breakage<br>c. Cracks<br>d. Blistering<br>e. Entrapped water<br>f. Impact damage<br>g. Cosmetic defects<br>h. Hole damage including tension failure, bearing failure, mixed mode failure, fastener pull through and shear-out failure<br>i. Erosion<br>j. Environmental degradation | 2 |
| **6.4** | | Describe the "tap test" and identify defects that may be identified by this method of acoustic testing. | 2 |
| **6.5** | | Describe the six steps in damage assessment. | 1 |
| **6.6** | **Repair of Damage**<br><br>*Ref 2 Chapter 7*<br><br>*Ref 5* | Describe a simple wing leading edge repair on the participant's aircraft with particular emphasis on the following facets:<br>a. Materials preparation<br>b. Surface preparation<br>c. Damage removal<br>d. Scarfing<br>e. Overlap<br>f. Step cutting<br>g. Cleaning<br>h. Water removal | 2 |

| Topic Code | Sub-Topic and Publication Reference | Sub-Topic Description | Level |
|---|---|---|---|
| **7. TUBULAR STEEL STRUCTURE (Discretionary Choice)** | | | |
| **Specific Examining Objective**<br>To determine that the participant understands the maintenance requirements pertaining specifically to aircraft of tubular steel construction. | | | |
| **7.1** | **Identification of Steel Tubing** | Describe how steel tubing is classified using the numerical system for steel identification. | 1 |
| **7.2** | *Ref 4 Chapter 4* | Identify the type of steel tubing used on the participant's aircraft. | 2 |
| **7.3** | | Be able to select steel tubing that is an approved alternative from interchangeability data in the reference material. | 2 |
| **7.4** | **Inspection of Steel Tubular Members**<br><br>*Ref 2 Chapter 5*<br><br>*Ref 4 Chapter 4*<br><br>*Ref 5* | Using information applicable to the participant's aircraft, describe how the following activities are performed.<br>a. Identification of critical structure<br>b. Assessment of damage including identification of negligible damage<br>c. Inspection for cracking at welded cluster joints<br>d. Inspection and classification of dents and bows in tubular structure.<br>e. Inspection for corrosion on internal tubular surfaces.<br>f. Inspection after welding has been performed and identification of common weld defects | 2 |
| **7.5** | **Repair Processes**<br><br>*Ref 2 Chapter 5*<br><br>*Ref 4 Chapter 4*<br><br>*Ref 5* | Using information applicable to the participant's aircraft, describe how the following weld repair processes are performed on a tubular steel component.<br>a. Identification of repair prohibitions<br>b. Use of structural supports and jigs during repair<br>c. Removal of damage<br>d. Fabrication of reinforcement tubes or patch-plates using approved repair schemes<br>e. Preparation of weld surfaces<br>f. Rosette Welds<br>g. Acceptable methods, techniques and materials used<br>h. Avoiding distortion<br>i. Re heat-treatment requirements<br>j. Application of protective treatments<br>k. Bolted or riveted repair schemes<br>l. Cold-straightening bent tubes | 2 |