CIVIL AVIATION AUTHORITY OF FIJI

GUIDANCE MATERIAL

Aircraft Maintenance Engineer Licence – Examination Module 18 – Lighter-Than-Air Aircraft

AMEL-EM18

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PREFACE

This Guidance Material (GM) is published by the Civil Aviation Authority of Fiji for purposes of promulgating supplementary material to that published in the Authority's Standards Documents.

This GM provides guidance to aircraft maintenance engineering personnel and CAAF staff on the acceptable means of compliance with the syllabus content in respect of written examinations for **Module 18 – Lighter-Than-Air Aircraft.**

This GM explains certain regulatory requirements by providing interpretive and explanatory material.

Chief Executive
Civil Aviation Authority of Fiji

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Eligibility Requirements

ANR 53(2) requires an applicant for an AMEL to have passed written examinations, that areacceptable to the Authority, relevant to the duties and responsibilities of an aircraft maintenance engineer in the category of licence sought.

The written examinations acceptable to the Authority for Module 18 (Lighter-Than-Air Aircraft) should comply with the syllabus contained in this GM. Each examination will cover all topics and may sample any of the sub-topics.

The new syllabus has been developed after extensive industry consultation and the objectives reflect the knowledge required of current technology and international best work practice.

Examination Overview: Module 18

The pass mark for Module 18 (Lighter-Than-Air Aircraft) is 70 %.

An application to sit an examination may be made directly to ASPEQ. Refer to https://caaf.aspeqexams.com/home for examination information.

General Examining Objective

The objective of the examination is to determine that the applicant for an AMEL has adequate knowledge of Module 18 – Lighter-Than-Air Aircraft to permit the proper performance, supervision and certification of aircraft maintenance at a level commensurate with the privileges of the various AMEL categories.

Knowledge Levels

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

Objectives: The applicant 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.
An ability to apply the knowledge.

Objectives: The applicant 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.
A capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner.

Objectives: The applicant 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.

Recommended Study Material

The publication list below provides guidance material for suitable study references for the overall syllabus content. However, applicants may have to conduct further research using other references or sources (including the internet) or attend a formal course in order to gain a comprehensive understanding of all sub-topics in the syllabus.

Publication List

Study Ref	Book Title	Author	ISBN
1	UK CAA CAP 562: Civil Aircraft Airworthiness Information and Procedures	UK CAA	N/A
2	FAA AC65-15A: A & P Mechanics Airframe Handbook	FAA	N/A

Syllabus Layout

Topic Numbering – left hand column

The syllabus is set out by topics, each of which is identified by a single-digit number. Each topic is divided into a number of sub-topics, which are identified by two-digit numbers: the first and second digits of whichrefer to the topic and the sub-topic respectively.

Each sub-topic is further sub-divided into one or more sub-sub-topics, which are identified by three-digit numbers. Where applicable, sub-sub-topics may be further subdivided into paragraphs that are identifiedby four/five-digit alphanumeric sequences.

The three-digit sub-sub-topic numbers shown in the left-hand column are used in the 'knowledge deficiency reports' to provide feedback on individual examinations.

Objective Description – middle column

The middle column objectively describes each sub-sub-topic by stating, in plain language, its subject matter and the type of performance or activity required. The objectives are intended to be simple, unambiguous, and clearly-focussed outcomes to aid learning.

Knowledge levels – right hand column

The right hand column specifies the knowledge level for each sub-topic heading. The three levels of knowledge used in this syllabus are described above. Note that the knowledge levels indicate the depth of knowledge required NOT its safety importance.

Syllabus: Module 18 – Lighter Than Air Aircraft

1. Principles of Lift	
• Bodies immersed in fluids • Gases: free to expand, constant volume, constanttemperature, constant pressure • Mixture of gases in a containing vessel.	1
• Centre of gravity, centre of buoyancy, static heaviness,static lightness, static trim • Ballonet ceiling, pressure height • Superpressure, superheat • Porosity • Equilibrium • Ballast - shot, water.	2

2. Theory of Flight & Control	
• Aerodynamic lift, aerodynamic stability and control • Free ballooning • Fins, rudders, elevators • Tabs: balance, servo, trim, spring • Powered flying controls.	1

3. Envelope	
• Materials: fabrics, Kevlar.	2
• Ultra-violet light effects • Gas-tight membranes • Ballonets, gases, load curtains, shear curtains, supportcables, gas valves, air valves, entry ports, inspection domes, charge adapters, load patches, handling lines,nose-cone • Charging, purging, porosity checks • Lightning protection • Air systems: ram air scoops, ballonet fans, dampers,transfer fans.	1

4. Gondola	
• Materials: Kevlar laminate, Fiberlam sandwich panels.	2
• Moulding & bonding techniques • Support cables, support cable attachment, bulkheads, equipment attachment • Furnishings • Doors, windows and hatches • Fire protection – skinning • Lightning protection.	1

5. Systems	
(1) Flight Control	
• Fins, rudders, elevators • Operating systems and surfaces – manual & power-operated • Trim operating systems – manual and electric.	1
(2) Ice and Rain Protection	
• Windscreen wipers • Airframe de-icing systems	1
(3) Heating and Ventilation	
• Exhaust heat exchangers • Ventilation system.	1
(4) Vacuum &Pressure	
• Supply and associated system.	1
(5) Toilets, Water System	
• Toilets • Potable water systems • Potable water – health protection.	1
(6) Landing Gear	
• Geometric arrangement • Structural arrangements • Castoring, pivoting & locking • Shock absorbers • Weight sensing & measurement.	1

6. Fuel Systems	
• Properties of fuels • Fuel system components • Fuel system operation and maintenance.	2

7. Ground Handling	
• Attaching to & releasing from mast • Ground power • Fuelling • Ballasting • Helium: charging, purifying, leak, testing • Pressure watch techniques • Mooring – mobile & portable • Engine running • Hangering • Adverse weather.	1

8. General Engineering Knowledge	
• Types of corrosion and corrosion treatments • Common drawing practice, including: lines, sectioning, working drawings, projections, symbols sketching, drawing compilation and numbering systems.	1
• Interpretation of drawings relating to aircraft manufacture, modification and repair • Use and care of micrometers, vernier gauges and callipers, DTIs, thread gauges, clinometers, hole gauges, protractors, common marking out and measuring equipment. Comparitor gauges.	2
• Surface plates and tables, V-blocks, squares. • Types, selection and use of common hand tools.	1
• Selection, use and testing of torque wrenches.	3
• Sheet metal development including: marking out, setback, bend allowance, forming operations. Dollies and stakes. • Forming and holding devices. Guillotines, folding machines, shears, presses, rollers, nibblers and power saws.	2
• Selection, care, cutting speeds and lubricants for drill bits, portable hand power drills. Drill presses. • Bench and machine grinding • Selecting of wheels and wheel characteristics • Rivet types • Rivet layout • Rivet removal and installation including the selections and use of common riveting tools • Common riveting defects • Selection, use and care of deburring tools, trepanning tools, counter bores, broaches, and spot facers • Reamer types • Selection and care of reamers • Reaming procedures • Thread forming tools and threading procedures.	2

• Rivets • Aircraft bolts • Special purpose bolts • Aircraft nuts • Aircraft washers • Aircraft screws • Panel and quick release fasteners including structural and non-structural fasteners • Control cables and fittings • Pins • Seals and gaskets • Sealing compounds • Hydraulic pipes, hoses and associated hardware.	1
• Methods of locking hardware.	2
• Common cleaning methods • Solvent cleaners • Emulsion cleaners • Soaps and detergents • Mechanical cleaning materials.	1

9. Airship Electrics	
• Simple electrical circuits • DC theory including calculations • DC generation • Wires, cables and connectors.	2
• Fuses • Electrical soldering.	1
• Battery care and maintenance.	2
• DC to AC inversion.	1