

Revision 4

2 October 2023

### Aircraft Maintenance Engineer Licence— Examination Subject 18 Lighter-Than-Air Aircraft

#### General

Civil Aviation Authority 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 describes an acceptable means of compliance with the syllabus content in respect of written examinations for Subject 18 (Lighter-Than-Air Aircraft).

This AC also provides guidance material for recommended study material in respect of the examination syllabus in this AC.

#### Related Rules

This AC relates specifically to Civil Aviation Rule Part 66 Subpart B — ‘Aircraft Maintenance Engineer Licence’.

#### Change Notice

Revision 4 adds a note on the online application process and updates the ASPEQ email address in the section **Examination Overview: Subject 18**. It also updates the format to current AC standards and adds a version history.

#### Version History

The main changes are outlined below:

AC Revision No	Effective Date	Summary of changes
AC66-2.18, Rev 0	1 Dec 2008	Initial issue.
AC66-2.18, Rev 1	29 June 2009	Removed the wording ‘multi choice’ (in respect of questions) from the Examination Overview Section.

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AC66-2.18, Rev 2	30 May 2012	Deleted the introductory sentence pertaining to examination size, type and duration, as part of the examination process managed by ASL.
AC66-2.18, Rev 3	10 March 2015	Updated the web address for Aviation Services Limited (ASL).
AC66-2.18, Rev 4	2 Oct 2023	<p>Adds a note on the online application process.</p> <p>Updates the ASPEQ email address in the section <b>Examination Overview: Subject 18</b>.</p> <p>Updates the format to current AC standards.</p> <p>Adds a version history.</p>

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## **Rule 66.53 Eligibility Requirements**

Rule 66.53(a)(2) requires an applicant for an AMEL to have passed written examinations that are acceptable to the Director, and relevant to the duties and responsibilities of an aircraft maintenance engineer in the category of licence sought.

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

## Examination Overview: Subject 18

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

An application to sit an examination may be made directly to ASPEQ. Refer to <https://caanz.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 Subject 18 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.

**Note:** From October 2023, to add a new rating to your LAME licence, you can apply online for this through **MyAviation**, CAA's online portal for licensing requests, instead of filling in paper forms. Click the 'Online services' button on the CAA home page to get started.

## 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

### **Sub-topic description – left hand column**

The syllabus is set out into nine topics, each of which is identified by a single-digit number.

The left-hand column of the syllabus table states the broad subject matter of each sub-topic.

### **Knowledge levels – right hand column**

The right hand column specifies the knowledge level for each sub-topic. 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: Subject 18 (Lighter-Than-Air Aircraft)

1.	Principles of Lift	
	<ul style="list-style-type: none"> <li>Bodies immersed in fluids</li> <li>Gases: free to expand, constant volume, constant temperature, constant pressure</li> <li>Mixture of gases in a containing vessel.</li> </ul>	1
	<ul style="list-style-type: none"> <li>Centre of gravity, centre of buoyancy, static heaviness, static lightness, static trim</li> <li>Ballonet ceiling, pressure height</li> <li>Superpressure, superheat</li> <li>Porosity</li> <li>Equilibrium</li> <li>Ballast - shot, water.</li> </ul>	2

2.	Theory of Flight & Control	
	<ul style="list-style-type: none"> <li>Aerodynamic lift, aerodynamic stability and control</li> <li>Free ballooning</li> <li>Fins, rudders, elevators</li> <li>Tabs: balance, servo, trim, spring</li> <li>Powered flying controls.</li> </ul>	1

3.	Envelope	
	<ul style="list-style-type: none"> <li>Materials: fabrics, Kevlar.</li> </ul>	2
	<ul style="list-style-type: none"> <li>Ultra-violet light effects</li> <li>Gas-tight membranes</li> <li>Ballonets, gases, load curtains, shear curtains, support cables, gas valves, air valves, entry ports, inspection domes, charge adapters, load patches, handling lines, nose-cone</li> <li>Charging, purging, porosity checks</li> <li>Lightning protection</li> <li>Air systems: ram air scoops, ballonet fans, dampers, transfer fans.</li> </ul>	1

4.	Gondola	
	<ul style="list-style-type: none"> <li>Materials: Kevlar laminate, Fiberlam sandwich panels.</li> </ul>	2
	<ul style="list-style-type: none"> <li>Moulding &amp; bonding techniques</li> <li>Support cables, support cable attachment, bulkheads, equipment attachment</li> <li>Furnishings</li> <li>Doors, windows and hatches</li> <li>Fire protection – skinning</li> <li>Lightning protection.</li> </ul>	1



<b>5.</b>	<b>Systems</b>	
<b>(1) Flight Control</b>		
	<ul style="list-style-type: none"> <li>Fins, rudders, elevators</li> <li>Operating systems and surfaces – manual &amp; power-operated</li> <li>Trim operating systems – manual and electric.</li> </ul>	1
<b>(2) Ice and Rain Protection</b>		
	<ul style="list-style-type: none"> <li>Windscreen wipers</li> <li>Airframe de-icing systems</li> </ul>	1
<b>(3) Heating and Ventilation</b>		
	<ul style="list-style-type: none"> <li>Exhaust heat exchangers</li> <li>Ventilation system.</li> </ul>	1
<b>(4) Vacuum &amp; Pressure</b>		
	<ul style="list-style-type: none"> <li>Supply and associated system.</li> </ul>	1
<b>(5) Toilets, Water System</b>		
	<ul style="list-style-type: none"> <li>Toilets</li> <li>Potable water systems</li> <li>Potable water – health protection.</li> </ul>	1
<b>(6) Landing Gear</b>		
	<ul style="list-style-type: none"> <li>Geometric arrangement</li> <li>Structural arrangements</li> <li>Castoring, pivoting &amp; locking</li> <li>Shock absorbers</li> <li>Weight sensing &amp; measurement.</li> </ul>	1

<b>6.</b>	<b>Fuel Systems</b>	
	<ul style="list-style-type: none"> <li>Properties of fuels</li> <li>Fuel system components</li> <li>Fuel system operation and maintenance.</li> </ul>	2

<b>7.</b>	<b>Ground Handling</b>	
	<ul style="list-style-type: none"> <li>Attaching to &amp; releasing from mast</li> <li>Ground power</li> <li>Fuelling</li> <li>Ballasting</li> <li>Helium: charging, purifying, leak, testing</li> <li>Pressure watch techniques</li> <li>Mooring – mobile &amp; portable</li> <li>Engine running</li> <li>Hanging</li> <li>Adverse weather.</li> </ul>	1

8.	General Engineering Knowledge	
	<ul style="list-style-type: none"> <li>• Types of corrosion and corrosion treatments</li> <li>• Common drawing practice, including: lines, sectioning, working drawings, projections, symbols sketching, drawing compilation and numbering systems.</li> </ul>	1
	<ul style="list-style-type: none"> <li>• Interpretation of drawings relating to aircraft manufacture, modification and repair</li> <li>• Use and care of micrometers, vernier gauges and callipers, DTIs, thread gauges, clinometers, hole gauges, protractors, common marking out and measuring equipment. Comparitor gauges.</li> </ul>	2
	<ul style="list-style-type: none"> <li>• Surface plates and tables, V-blocks, squares.</li> <li>• Types, selection and use of common hand tools.</li> </ul>	1
	<ul style="list-style-type: none"> <li>• Selection, use and testing of torque wrenches.</li> </ul>	3
	<ul style="list-style-type: none"> <li>• Sheet metal development including: marking out, setback, bend allowance, forming operations. Dollies and stakes.</li> <li>• Forming and holding devices. Guillotines, folding machines, shears, presses, rollers, nibblers and power saws.</li> </ul>	2
	<ul style="list-style-type: none"> <li>• Selection, care, cutting speeds and lubricants for drill bits, portable hand power drills. Drill presses.</li> <li>• Bench and machine grinding</li> <li>• Selecting of wheels and wheel characteristics</li> <li>• Rivet types</li> <li>• Rivet layout</li> <li>• Rivet removal and installation including the selections and use of common riveting tools</li> <li>• Common riveting defects</li> <li>• Selection, use and care of deburring tools, trepanning tools, counter bores, broaches, and spot facers</li> <li>• Reamer types</li> <li>• Selection and care of reamers</li> <li>• Reaming procedures</li> <li>• Thread forming tools and threading procedures.</li> </ul>	2
	<ul style="list-style-type: none"> <li>• Rivets</li> <li>• Aircraft bolts</li> <li>• Special purpose bolts</li> <li>• Aircraft nuts</li> <li>• Aircraft washers</li> <li>• Aircraft screws</li> <li>• Panel and quick release fasteners including structural and non-structural fasteners</li> <li>• Control cables and fittings</li> <li>• Pins</li> <li>• Seals and gaskets</li> <li>• Sealing compounds</li> <li>• Hydraulic pipes, hoses and associated hardware.</li> </ul>	1
	<ul style="list-style-type: none"> <li>• Methods of locking hardware.</li> </ul>	2
	<ul style="list-style-type: none"> <li>• Common cleaning methods</li> <li>• Solvent cleaners</li> <li>• Emulsion cleaners</li> <li>• Soaps and detergents</li> <li>• Mechanical cleaning materials.</li> </ul>	1

9.	Airship Electrics	
	<ul style="list-style-type: none"><li>• Simple electrical circuits</li><li>• DC theory including calculations</li><li>• DC generation</li><li>• Wires, cables and connectors.</li></ul>	2
	<ul style="list-style-type: none"><li>• Fuses</li><li>• Electrical soldering.</li></ul>	1
	<ul style="list-style-type: none"><li>• Battery care and maintenance.</li></ul>	2
	<ul style="list-style-type: none"><li>• DC to AC inversion.</li></ul>	1