
Commercial Pilot (Balloon) Syllabus of Training

Civil Aviation Safety Authority

Commercial Pilot (Balloon) Syllabus of Training

Version 3.1

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Commercial Pilot (Balloon) Syllabus of Training

Structure of the Syllabus

Approved by Head, Operational and Flight Crew Licensing Standards Version No: 3.1 June 2003

Foreword

This syllabus of training is effective in conjunction with Civil Aviation Regulations and Civil Aviation Orders. The content is not significantly different from the 1991 version of the Commercial Pilot (Balloons) Licence [CP(B)L] syllabus, but the arrangement of that material has been revised, performance standards have been identified, and explanatory material has been added.

As the syllabus is primarily concerned with flying and ground training objectives and standards, only brief details covering administration, flying hours requirements and examinations of the new flight crew licensing system have been included.

Note: the 1991 syllabus is still in force as at October 1999

Greater detail may be found in CAR Part 5, which should be read in conjunction with this syllabus.

Copies of the syllabus are obtainable from the CASA website.

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1. Overview

1.1 Introduction

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This syllabus details the flying and ground training requirements for the commercial pilot (balloon) licence [CP(B)L].

While the syllabus is generally similar to the Australian Ballooning Federation Inc. (ABF) syllabus for the private pilot certificate (balloons) (PPC), a higher standard of both knowledge and skill is required. This will be assured by:

- Greater aeronautical experience requirements
- Broader knowledge requirements
- Higher skill standards
- Supervision and the structure of the training.



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1. Overview

1.1 Introduction

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1.1.1 Aeronautical Experience Requirements

Aeronautical experience requirements, as stipulated in *Civil Aviation Regulations*, should be viewed as the minimum requirements. Experience has shown that factors, such as ability and continuity of training, lead to marked differences in the flight time needed for individuals to reach the standard required. In particular the accumulation of only the minimum experience will not necessarily guarantee attainment of the required standard. In the majority of cases candidates will require hours in excess of the stated minimum.

An applicant for a commercial pilot (balloon) licence shall:

- Meet the medical requirements specified in CAR 5.04(3)(b)
- Be aged 18 years or over, hold a current PPC issued by the Australian Ballooning Federation, and have held a PPC or an overseas private licence for at least a year

Note: A PPC (balloons) is only valid whilst the holder remains a member of the Australian Ballooning Federation Inc.

- Meet the aeronautical experience requirements specified in CAR 5.145
- Complete the aeronautical knowledge training specified in [Section 3—Aeronautical Knowledge Training](#) of this syllabus and pass the written examination
- Complete the flight training specified in CAR 5.146 and the syllabus in [Section 2—Flying Training](#) of this document and pass the flight test specified in the CASA form Application for Commercial Pilot (Balloon) Licence.

Note: The application form is in the *Flight Crew Licensing Procedures Manual* which will be available on the Internet around mid-1999 at <http://www.casa.gov.au/manuals/htm/fcl/fcl.htm>.

Note: An applicant for a class endorsement must have the aeronautical experience and training specified in CAO 40.7 and pass a flight test in a balloon of the applicable class prior to having that class endorsed on their licence. Only a class 1 or class 5 (gas balloons) endorsement may be issued to a pilot who does not have previous experience in charter operations.

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1. Overview

1.2 Training Administration

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Theory Examination Results

When a candidate achieves a pass in a theory examination the result is to be entered in the candidate's logbook either by the conducting officer who supervised the examination or by the chief flying instructor of the organisation where the candidate is undertaking flying training. A chief flying instructor who makes the entry, but is not also the conducting officer, must do so only after sighting documentary evidence of the pass result.

Flight Test Forms

A flight test form (*form 192*) for the CP(B)L is to be found in CASA's *Flight Crew Licensing Procedures Manual*. Copies are held by CASA district offices and approved test officers. A flight test form must be completed for every flight test regardless of whether the candidate fails or passes the test. All items to be tested in a given flight test are listed on the form so that both the candidate and the testing officer are aware of the sequences to be covered. A copy of the completed form is to be filed on the student's flying training records.

Assessment and Recommendation for Flight Test

A training assessment should be carried out at the commencement of CP(B)L training. As a result, the instructor is to recommend, as appropriate, a tailored course of training designed to prepare the candidate for the flight test.

Prior to undertaking a CP(B)L flight test, a candidate must undertake an assessment flight with a flight instructor.

Flight Test Officer Responsibilities

Prior to administering a pilot licence flight test, a flight test officer must ensure that the candidate has satisfied all of the prerequisites as outlined in the CARs/CAOs. The flight test officer is to check the candidate's log book to ensure that the candidate has the required 75 hours in command and completed the required training.



Commercial Pilot (Balloon) Syllabus of Training

1. Overview

1.3 Flying Training

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The flying training syllabus is at [Section 2—Flying Training](#) of this document. It has been structured so as to:

- List mandatory flight sequences
- Provide guidance on the skill standard to be attained for each flight sequence.

Flying training for a licence must be conducted by a flight instructor who is employed by, or working under the control of, a flying school authorised by an *Air Operator's Certificate* which includes flying training.

The syllabus assumes that CP(B)L training will be conducted in class 1 balloons with at least some of the training flights to be carried out in larger balloons of that class.

Candidates who hold an overseas licence with privileges equivalent to the CP(B)L are not required to undergo the full course of flying training, but should be assessed during familiarisation flights before seeking a flight test.



Commercial Pilot (Balloon) Syllabus of Training

1. Overview

1.4 Aeronautical Knowledge

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The aeronautical knowledge syllabus is at [Section 3—Aeronautical Knowledge Training](#) of this document. It has been structured to:

- Integrate theoretical knowledge and flight training by identifying the knowledge areas appropriate to training
- Specify the knowledge standard required for each syllabus objective.

In undertaking study in accordance with the aeronautical knowledge syllabus, a student may:

- Proceed independently using a self study course
- Use a correspondence study package
- Attend a ground training institution which offers the appropriate course
- Complete the training at a flying training school which offers both flight and theory training to the level required.



Flying training has been divided into the following:

- Performance standards and flight tests
- Flying training syllabus
- Associated training syllabus
- Flight test forms.

As an adjunct to the overall flying training syllabus, training will include areas which are not specifically related to the manipulative tasks associated with flying but which nonetheless impinge upon flying operations as a whole. This is known as associated training and addresses aspects such as airmanship, authorisations, documents and so on.

Performance standards have been defined to assist instructional staff to train and test students to standards appropriate to the CP(B)L. Each sequence in the syllabus has been assigned a performance standard as a guide to the skill and knowledge level that a student should achieve in a given sequence before being allowed to progress to the flight test.



Note: For balloons, CP(B)L standard is 1 throughout the syllabus.

2.2.1 Practical Flight Training

For the practical flying phases the following standards apply:

Standard	Description
1	Has demonstrated a high level of proficiency in conducting the exercise when under pressure.
2	Has consistently demonstrated proficiency in conducting the exercise. Is deemed fit to operate without supervision.
3	Has been trained in the exercise and demonstrated the ability to safely perform the exercise under conditions specified by the flight instructor supervising the flight.
4	Has had some training in the exercise but lacks sufficient skill or understanding of the techniques involved for solo operations.

2.2.2 Associated Training and Aeronautical Knowledge Training

For non-flying training, that is associated training and aeronautical knowledge training, the following performance standards apply:

Standard	Level	Description
A	Essential	Must be known completely—relates directly to the safety of the balloon and occupants.
B	Important	Must be known in considerable depth—relates to the efficient and practical operation of a hot air balloon.
C	Additional	Should be known in considerable depth.



2.2.3 Flight Tests

The flight test shall be conducted by a CASA examiner or by an approved test officer in accordance with the flight test report form *Application for Commercial Pilot (Balloon) Licence* and will comprise:

- A balloon flight
- An oral examination of the objectives listed in [Section 3—Aeronautical Knowledge Training \(Balloon General Knowledge\)](#).

During the flight test, the applicant for a CP(B)L shall:

- Demonstrate competency to act as a pilot-in-command of balloon in passenger charter operations both inside and outside controlled airspace
- Pass the oral examination specified in [Section 3—Aeronautical Knowledge Training](#).



On the ground

Conduct a base pre-departure check covering the following:

- Fuel in the inflator fan
- Fuel in the retrieve vehicle
- Required LPG cylinders are full
- All radios are charged
- Retrieve vehicle radio is checked
- Required maps and charts are available
- Compass and alternative ignition source are available and serviceable
- First aid kits are installed
- Fire extinguisher/s are available and serviceable
- Launch tie off and quick release are serviceable
- Passenger documentation is prepared
- Instrument batteries are checked
- Balloon gas and test balloons are available.

State the factors to be considered in the selection of a safe launch site. These shall include:

- Vehicular access
- Surface and size of field
- Shelter from wind
- Hazards to inflation, launch and take off
- Proximity to designated airspace (for example, restricted areas)
- Compliance with the ABF landowner relations code of conduct.

With reference to the aircraft log book, decide whether the balloon is airworthy for the type of flight to be conducted (that is, aerial work or charter).



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2. Flying Training

2.3 Flying Training Syllabus

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Demonstrate competence in:

- Unloading from the vehicle
- Load calculations using the load system as specified in the flight manual or operational manual
- Balloon layout—consideration of wind, hazards and the go/no go point
- Rigging the balloon and burner testing
- Assigning crew duties, crew briefing and supervision
- Conducting pre-flight inspections as specified in the manufacturer's manual
- Inflating
 - cold air—with the inflator fan
 - hot air—use of burner
- Safety precautions for cold air and hot air inflating

Note: Failure to use a launch restraint appropriately will be a cause for automatic failure.

- Passenger briefing
- Pre-take off checks.

Tethered Operations

Demonstrate competence in conducting tethered balloon operations including:

- Tying of knots, layout of tether ropes
- Correct attachment to the balloon
- Crowd control and safe exchange of passengers
- Recognition and understanding of potential hazards.

State the effect on a balloon and its tether system of:

- Wind gusts and turbulence
- Changes in ballast
- False lift.



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2. Flying Training

2.3 Flying Training Syllabus

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Flyaway promotions and passenger flights

Obtain mandatory meteorological and operational information applicable to the flight.

Plan the flight in accordance with the CAR 259, Permit and the *Aeronautical Information Publication (AIP)*, and predict/identify:

- Average track, or choice of tracks, and overall intentions
- Possible landing areas and evaluate suitability of these areas
- Endurance
- Estimated time intervals at selected en-route points
- Potential hazards and designated airspace.

Submit flight notification to the appropriate airways operations unit:

- By telephone or radio
- In writing (by fax).

Flight Operations

Demonstrate competence in:

- Launch, lift off, climb out (normal and fast), round off to level flight
- Level flight and contour flying
- Controlled ascents and descents including ascent and descent through windshear and inversions
- Assessing wind velocity and weather, observing weather developments, and determining appropriate action
- Flight in company with other balloons—considerations and communication
- In-flight navigation, including
 - Map reading
 - flight plan revision
 - communication to retrieve crew
- Routine safety checks
- In-flight management of passengers
- Use of radio communication equipment
- Fuel management, determination of approximate fuel flow and endurance



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2. Flying Training

2.3 Flying Training Syllabus

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- Intermediate landings including exchange of passengers and fuel tanks
- Handling of in-flight emergencies (simulated or actual) using the procedures specified in the flight manual
- Approach and landing, including
 - site selection—criteria, power line systems and other hazards
 - passenger briefing
 - pre-landing checks
 - appropriate use of deflation device(s) fitted.

Notes:

1. At least one “fast” landing in a wind exceeding 8 kt is to be demonstrated during the training or test.
2. Where a rapid (velcro rip panel, smart vent or similar) deflation device is fitted, this shall be used at least twice during training—at least one of these occasions shall be a “fast” landing.

The course of flying training specified in CAR 5.146 should be used to review the content of this syllabus with particular emphasis on emergency drills, flying techniques when carrying charter passengers, in-flight passenger management, fuel management, selection of appropriate landing sites and communication with air traffic services and with the retrieve crew.

Post Landing

Conduct post-landing actions, deflation and pack up.

Know the pilot's responsibilities in relation to the use of land and property.

Demonstrate the correct refuelling procedures and state the safety precautions to be observed during refuelling operations.

Demonstrate correct recording of flight details in the pilot and aircraft log books.

2.4.1 Associated Training Syllabus

- (Reserved)



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2. Flying Training

2.5 Flight Test Forms

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2.5.1 Flight Tests

There is one flight test relating to this syllabus, the CP(B)L flight test.

The CP(B)L application and flight test form is available on the CASA website at <http://www.casa.gov.au/manuals/regulate/fcl/form192.pdf>. The test form must be completed for every test conducted, whatever the result.

Application

The form consists of an application form on the front side and a record of the flight test on the reverse.

A candidate for a flight test must ensure that the application section is completed, including the Chief Flying Instructor's recommendation, prior to commencement of the test. The completed form should be provided to the testing officer.

Flight Test Form

The flight test form is divided into four sections:

- General requirements
- Ground
- Flying
- Airmanship.

The form is numbered for identification as:

Application for Commercial Pilot Licence - Balloons—form number 192.

General requirements

The general requirements section outlines the general requirements applicable to the conduct of the test including those relating to the planning of the flight.

Ground

The ground section consists of items which must be tested orally before flight and includes satisfactory knowledge of all the items listed on the candidate's *Knowledge Deficiency Report* (if applicable). The ground section of the test must be passed before the flying section may be attempted.



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2. Flying Training

2.5 Flight Test Forms

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Flying

The flying section lists the units and elements of the *Day VFR Balloon Syllabus* which must be examined in the flight test. In the CP(B)L test form, flying is subdivided into general and operational flying. The flight test form will be amended to use the same units, elements and numbering as the *Day VFR Balloon Syllabus* to enable candidates and testing officers to easily refer back to the syllabus. The standard required to achieve a pass in an element in the flight test is the standard specified in the syllabus.

Candidates should understand that perfection of performance is not the essential requirement to achieve a pass in the flight test. The aim of the test is to demonstrate the candidate's ability to operate the balloon safely and to make all the operational decisions necessary for the conduct of the flight. To achieve a pass in the flight test a candidate should demonstrate the following standard:

- Correct techniques and procedures were used
- Errors in height were not sustained
- The balloon was operated within published limitations
- All operations complied with regulatory and airspace requirements
- Sound airmanship was displayed throughout the flight.

Latitude is not allowed in the performance of a manoeuvre. At the CP(B)L level the successful outcome of any manoeuvre should not be in doubt.

Failure in any item listed on the flight test form will result in an overall fail assessment for the flight test, however at the discretion of the testing officer a candidate may be credited with passes in those items successfully completed and those items will not have to be repeated in a subsequent test.

Airmanship

The airmanship section includes aspects of airmanship which can be used to assess the overall performance of the candidate in the flight test. The assessment guide in the *FCC Industry Delegate's Handbook* will give detailed information on those aspects of airmanship relating to specific elements and these should be used as guidance in forming the overall assessment.

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3. Aeronautical Knowledge Training

3.1 Examination Requirements

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3.1.1 Introduction

This syllabus defines the aeronautical knowledge objectives which shall be met prior to attempting the written examination specified in CAR 5.138(1)(d) and the oral examination specified in this chapter in sub-section [5—Balloon Type Knowledge](#).

The pass standard for the written examination is 75% with a minimum of 65% to be achieved in each of the three sections.

Candidates are to provide the following documents and equipment for the examination:

- *Aeronautical Information Publication* (AIP)
- *Civil Aviation Regulations* (CARs)
- *Civil Aviation Orders* (CAOs)
- *En route Supplement Australia* (ERSA)
- CAAP 41-1 (0), CAAP 92-3 (1) and CAAP 157-1 (0)
- Non- programmable, quiet, electronic calculator.

The examination contains between 60 and 70 multiple choice questions. There is an Air Legislation section, a Meteorology section and a Navigation section. A Human Performance Limitations section may be added at a future date.

The navigation section requires the use of 1:100,000 topographical maps and various aeronautical charts. Candidates are advised to bring the necessary scale rulers with them to the examination.

A knowledge of examination technique will assist candidates to read the questions very carefully to ensure that they correctly answer the question which has been posed. Distractors (incorrect optional answers) are included and selected to correspond with known common faults in knowledge or technique.



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3. Aeronautical Knowledge Training

3.2 Balloon General Knowledge

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The oral examination will be based on the knowledge areas specified in this section. The pass standard is:

- 100% for items marked with an asterisk (*)
- 70% for all other items (on first response—to be corrected to 100% after discussion with the testing officer).

3.2.1 Propane

Explain the properties of propane:

- Specific gravity in liquid and gaseous form
- Effect of altitude on burner pressure
- Effect of temperature on tank pressure and burner pressure.

Describe fuel quantity measurement with reference to a percentage fuel gauge.

State the reason for, and the correct method of, heating or pressurising tanks

- * List the precautions to be observed for the prevention of fire.
- * Recall the action required in the event of a propane fire.

3.2.2 Balloon Performance and Operations

* Relate burner output to fuel pressure and ambient temperature.

List and explain the factors which may affect fuel consumption.

Explain the terms equilibrium, inertia, momentum, false lift, terminal descent rate (TDR).

List and explain the factors to be considered in preparation for, and the execution of, a landing:

- In light winds (a normal landing)
 - Using a handling line
 - * In a wind exceeding 8 kt
 - * With a high vertical speed
 - In thermic conditions
 - In conditions where descent must be made through a low-level windshear.
- * State considerations in the recognition and avoidance of power line systems and the actions to be taken in the event of probable power line contact.
- * Be able to calculate the fuel and passenger loading of a hot air balloon.



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3. Aeronautical Knowledge Training

3.2 Balloon General Knowledge

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3.2.3 Parts of a Hot Air Balloon

- * Name the parts and components of a hot air balloon and describe the function of each part.
- * Demonstrate an ability to assemble, rig and disassemble a hot air balloon.
- * Demonstrate a detailed knowledge of the possible problems or malfunctions that can occur with each hot air balloon component.



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3. Aeronautical Knowledge Training

3.2 Balloon General Knowledge

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3.2.4 Refuelling Safety

- * List the procedures and safety precautions for refuelling a hot air balloon.



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3. Aeronautical Knowledge Training

3.3 Flight Rules and Air Law

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The knowledge in *Flight Rules and Air Law* must be met to the specified standard **before** the CP(B)L flight test.

3.3.1 Documentation

Subject area	Standard
Recall the requirements for recording flight details in a pilot's personal log book (CAR 5.51 to 5.53)	A
Describe the method of obtaining publications and know why it is important to update these documents: (AIP) <ul style="list-style-type: none">• CARs• CAOs• AIP• CAAP• NOTAM.	B
Given an item of operational significance: <ul style="list-style-type: none">• Select from the list in the previous subject area (the box above) the appropriate reference document• Extract and decode relevant and current information from these documents.	B
Understand the terms and abbreviations in AIP GEN which are relevant to balloon flight in accordance with the visual flight rules.	A

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3. Aeronautical Knowledge Training

3.3 Flight Rules and Air Law

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3.3.2 Pilot Licences and Ratings, Privileges and Limitations

Subject area	Standard
State the requirements for a pilot to be eligible to hold: <ul style="list-style-type: none">• A commercial pilot (balloon) licence• The balloon class endorsements• A balloon grade of night V.F.R. rating (CAR 5:48, CAO 40.7, CAO 40.2.2).	A
State the requirements for holding a medical certificate by a commercial (balloon) pilot (CAR 6.06–6.21).	B
As applicable to a commercial (balloon) pilot, decide whether a flight can be conducted in accordance with the rules relating to: <ul style="list-style-type: none">• Privileges and limitations of the licence• Recent experience requirements• The classification of operations.	A
Extract and apply the rules relating to flight and duty time limitations for commercial (balloon) pilots (CAO 48 or an approved alternative schedule).	A



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3. Aeronautical Knowledge Training

3.3 Flight Rules and Air Law

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3.3.3 Flight Rules and Conditions of Flight

Subject area	Standard
Recall and apply the following rules and/or requirements: <ul style="list-style-type: none">• Rules of the air (CAR 160–174D)• Visual flight rules and visual meteorological conditions for balloon operations below 10 000 ft AMSL (AIP)• Flight in prohibited, danger and restricted areas (AIP)• Carriage and discharge of firearms (CAR 259, Permit)• Fuel requirements (CAR 234, Permit)• Smoking in balloons (CAR 259, Permit).	A A B A A A
State the rules relating to the use of drugs and alcohol, and recall the minimum period between alcohol consumption and flight departure (CAR 256 (1) to (4)).	A
Select the documents which must be carried during flight by a balloon in Australian airspace (CAR 139).	B
Recall the requirements relating to the minimum heights for balloon flights in commercial operations (CAR 157, Permit; CAAP 157-1(0)): <ul style="list-style-type: none">• Over populated areas• Over aerodromes (where landing is not intended)• Over other areas, by day• By night.	A A A B
State the limitations imposed on flights over public gatherings (CAR 156).	A
Time of landing: <ul style="list-style-type: none">• Recall the requirement for landing before the end of daylight (AIP)• State the conditions on landings before first light during a commercial night balloon flight (CAO 40.2.2).	A B

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3. Aeronautical Knowledge Training

3.3 Flight Rules and Air Law

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3.3.4 Air Service Operations

Subject area	Standard
In respect of the need to hold an AOC for commercial balloon operations and the responsibilities of the chief pilot, state and apply (CAO 82.7): <ul style="list-style-type: none">• The requirements applicable to the holder• The responsibilities of the chief pilot.	B
Extract and apply the rules relating to: <ul style="list-style-type: none">• A pilot's responsibilities before and during flight (CAR 224, 225, 228, 233)• The duties and powers of a pilot-in-command (CAR 146 and 309)• Determination of aircraft load (CAO 20.16.1)• Compilation of passenger lists (Permit).	A
Extract and apply the rules relating to: <ul style="list-style-type: none">• Carriage of passengers (CAO 20.16.3, Permit)<ul style="list-style-type: none">◦ infants and children◦ sick and handicapped persons• Parachutists (OM)• Training flights (CAR 249, 206)• Carriage of animals (CAR 256A, Permit)• Carriage of dangerous goods (CAR Part 15)• Dropping articles (CAR 150; CAO 29.5).	B
Recall the rules for the operation of tethered (fixed) balloons (CAR 260, Permit).	A
State the requirements for the carriage and use of radio in commercial balloon operations (AIP GEN 1.5 & ENR 1.1).	A

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3. Aeronautical Knowledge Training

3.3 Flight Rules and Air Law

Approved by Head, Operational and Flight Crew Licensing Standards Version No: 3.1 June 2003

3.3.5 Aerodromes

Subject area	Standard
<p>With reference to a diagram of an aerodrome, identify the areas and markings associated with:</p> <ul style="list-style-type: none">• Runways and runway strips• Taxiways• Movement areas• Wind direction indicators• Signals area (including signals displayed)• Helipads.	B
<p>Identify the following positions in the traffic circuit applicable to other classes of aircraft:</p> <ul style="list-style-type: none">• Upwind leg• Crosswind leg• Downwind leg• Base leg• Final leg• The dead side of the circuit.	A
<p>State the meaning of the following light signals directed at an aircraft in flight, or on the ground, from the tower at a controlled aerodrome:</p> <ul style="list-style-type: none">• Steady red• Steady green• Flashing red• Flashing green• Flashing white.	B
<p>State a commercial (balloon) pilot's responsibilities with regard to the use of aerodromes (CAR 166, Permit) and:</p> <ul style="list-style-type: none">• Traffic priorities and right of way• Avoidance of traffic conflicts in the circuit area and on the manoeuvring area• Overflight where landing not intended.	A

3.3 Flight Rules and Air Law

Approved by Head, Operational and Flight Crew Licensing Standards Version No: 3.1 June 2003

3.3.6 Airspace and Air Traffic Services

Subject area	Standard
Differentiate between the various classifications of airspace (A,B,C,D,E,G and GAAP).	B
<p>With respect to the terms listed in (a) to (g) explain each term and, if applicable:</p> <ul style="list-style-type: none"> Identify airspace boundaries on appropriate charts Extract vertical limits of designated airspace from charts or ERSA <ul style="list-style-type: none"> division of airspace: FIR; FIA; CTA; CTR; MBZ; CTAF area air traffic services: FIS; RAS; ATC; controlled airspace VFR routes, visual approach points, lanes of entry Prohibited, restricted and danger areas CTAF & MBZ procedures in areas where CTAF and MBZ procedures apply GAAP aerodromes, primary controlled aerodromes ADIZ. 	A
Differentiate between radio reports and broadcasts.	B
<p>State the requirements and procedures relating to the use of radio communications and transponders for VFR operations:</p> <ul style="list-style-type: none"> In controlled airspace class C, D and GAAP Close to controlled airspace At licensed aerodromes where CTAF or MBZ procedures apply At unlicensed aerodromes In class G airspace In ADIZ. 	<p>A</p> <p>C</p>



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3. Aeronautical Knowledge Training

3.3 Flight Rules and Air Law

Approved by Head, Operational and Flight Crew Licensing Standards Version No: 3.1 June 2003

Altimetry

Subject area	Standard
<ul style="list-style-type: none">• State the datum from which an altimeter indicates height when the following are set on the subscale:<ul style="list-style-type: none">◦ Area QNH◦ Local QNH◦ QFE◦ Standard Pressure Setting• State and apply the altimetry procedures appropriate to flight below 10,000 ft AMSL.	A

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3. Aeronautical Knowledge Training

3.3 Flight Rules and Air Law

Approved by Head, Operational and Flight Crew Licensing Standards Version No: 3.1 June 2003

3.3.7 Emergencies, Accidents, Incidents

Subject area	Standard
Differentiate between an accident and an incident.	B
Extract from the AIP the responsibility of a pilot regarding notification of accidents and incidents.	B
Explain the terms: <ul style="list-style-type: none">• Flight note• Sartime• ALERFA, INCERFA and DETRESFA.	C
Explain the responsibility of the retrieve crew holding a flight note for a balloon in commercial operations with respect to initiating SAR procedures.	B
Extract from ERSA emergency procedures relating to: <ul style="list-style-type: none">• Action following emergency landing or where the pilot is not in contact with their retrieve crew• Radio failure in controlled airspace or where MBZ procedures apply.	A



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3. Aeronautical Knowledge Training

3.4 Radio Telephony

Approved by Head, Operational and Flight Crew Licensing Standards Version No: 3.1 June 2003

The knowledge in *Radio Telephony* must be met to the specified standard **before** the CP(B)L flight test.

3.4.1 Radio

Subject area	Standard
State the basic principles of radio wave propagation and recall the appropriate frequency bands for UHF, VHF, MF and HF.	C
State the limitations of UHF/VHF and HF in terms of quality of reception and range (for both communication and navigation).	B
List factors which may affect VHF and HF reception.	B
Use appropriate charts/documents to: <ul style="list-style-type: none">• Extract VHF, HF and MF frequencies• Determine communication and navaid coverage• Identify the service provider and services provided.	A

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3. Aeronautical Knowledge Training

3.4 Radio Telephony

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3.4.2 Voice Technique

Subject area	Standard
State the phonetic alphabet and the method of transmitting numbers	A
State and apply pertinent procedures and phraseology applicable to balloon operations.	A
State the purpose and operation of radio set controls: <ul style="list-style-type: none">• On/off switch• Frequency selection• Squelch and mute controls• Transmit button.	A

Radio

Subject area	Standard
Describe and apply standard “trouble checks” in the event of communication difficulties Extract radio failure procedures from ERSA.	A

Emergency radio procedures

Subject area	Standard
Differentiate between distress, urgency and safety messages Give examples of situations where each of the above should be used. State each of the above message prefixes and extract the elements of each message from ERSA.	A



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3.4 Radio Telephony

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3.4.3 Transponders

Subject area	Standard
State the precautions to be observed when selecting transponder codes and extract from ERSA codes for: <ul style="list-style-type: none">• Radio failure• Emergency.	A
Given an area of operations, decide whether it is necessary to use a transponder.	A
State the meaning of the terms: <ul style="list-style-type: none">• SQUAWK• CODE• IDENT.	B
Describe the information that is transmitted (if any) when a pilot selects: <ul style="list-style-type: none">• STBY• ON• ALT• IDENT.	B
Identify indications of normal and abnormal transponder operations and list factors which affect transponder reception.	B

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3. Aeronautical Knowledge Training

3.5 Balloon Type Knowledge

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Note: Candidates for a CP(B)L must know the information listed below for the particular balloon which they are to fly. The data for the actual balloon used for the flight test will be used as the basis of the flight test oral test.

An **A** standard is required throughout.

3.5.1 Flight Manual

State emergency procedures.

List limitations.

Explain the reasons for imposing the flight manual limitations.

Demonstrate use of the load system specified in the flight manual and determine the maximum payload for a given pressure height and outside air temperature (OAT).

3.5.2 Systems

For the fuel systems and burners:

- nominate main components, describing the purpose of each component
- describe the safety features of the system
- state the principles of operating the system
- explain the care and maintenance of the system
- explain burner rating
- state the symptoms of fuel exhaustion and describe the use of an emergency (or back up) system, if fitted.

Explain the deflation system and list the main advantages and disadvantages of that system compared with other common deflation systems in use in commercial balloons.



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3. Aeronautical Knowledge Training

3.6 Reserved

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Reserved

Commercial Pilot (Balloon) Syllabus of Training

3. Aeronautical Knowledge Training

3.7 Navigation

Approved by Head, Operational and Flight Crew Licensing Standards Version No: 3.1 June 2003

The knowledge in *Navigation* must be met to the specified standard **before** the CP(B)L flight test.

3.7.1 Fundamentals

Subject area	Standard
Recall the method of expressing the following quantities and match them against appropriate definitions: <ul style="list-style-type: none">• Direction in degrees true (T), magnetic (M), compass (C)• Distance in nautical miles (NM), kilometres (km)• Speed in knots (kt), kilometres per hour (km/h)• Wind velocity (w/v)• Time as a four, six and eight figure group• Latitude and longitude in degrees and minutes (for example, S 41.03, E 147.52)• Height and elevation in feet(ft) and metres(m).	B
Use the AIP to: <ul style="list-style-type: none">• Extract the beginning and end of daylight for a given location• Convert the time extracted from the graphs to UTC or to the appropriate Australian Standard Time• Carry out conversions between UTC, LMT, and Australian Standard Times.	A
Carry out conversions between the following units: <ul style="list-style-type: none">• Feet (ft) and metres (m)• Nautical miles (NM) and kilometres (km)• Degrees Fahrenheit (°F) and degrees Celsius (°C)• Pounds (lb) and kilograms (kg)• Gallons (gal)—US or Imperial (IMP)—and litres (l)• Volumetric units and lb or kg given specific gravity	A A C C C B

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3. Aeronautical Knowledge Training

3.7 Navigation

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3.7.2 Charts and Publications

Subject area	Standard
<p>From the list below, select the appropriate publication(s) which will provide information relating to a given item of navigational significance:</p> <ul style="list-style-type: none">• ERC• WAC• VNC• VTC• NATMAP 1:100,000 topographical map.	A
<p>List the three methods of representing the scale of a chart (as a ratio, by the scale equivalence or by graduated scale) and determine the distance between two points using these methods or from the latitude graduations on the chart.</p>	B
<p>Be able to explain and apply the relationship between latitude and distance in nautical miles.</p>	B



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3.7.3 Use of Maps and Charts

Subject area	Standard
Interpret topographical detail and decode symbols displayed on ERC, WAC, VNC, VTC and 1:100,000 topographical map.	A
Express position in latitude and longitude, as a bearing and distance from a given position, or as a six-figure grid reference.	A
Transfer the following information from ERC, VNC or VTC, or from grid references, to a 1:100,000 topographical map: <ul style="list-style-type: none">• CTR, CTA, and airspace classification boundaries• Prohibited, restricted and danger areas• Sensitive areas (SZs).	A
Measure track (M) and distance (NM) from a VTC, and from a 1:100,000 topographical map.	A
Extract and interpret data which is applicable to a balloon flight under VFR from: <ul style="list-style-type: none">• The <i>AIP</i> book• The <i>En Route Supplement Australia</i> (ERSA)	A
Select the charts required to plan a VFR flight inside or outside controlled airspace.	A

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3.7 Navigation

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3.7.4 Altimetry

Subject area	Standard
Recall the values of mean sea level pressure and temperature, and the temperature and pressure lapse rate in the International Standard Atmosphere.	C
Match the following terms against appropriate definitions/ statements: <ul style="list-style-type: none">• QNH• QFE• Standard pressure setting• Altitude• Transition altitude• Transition level• Transition layer• Elevation• Height• Pressure height• Density height.	A C B A B C C B C B A
State the altimeter sub-scale settings to be used when operating below 10,000ft and when above the transition level.	B
Recall the tables of cruising levels under 10,000 ft given in the AIP, for flight under the visual flight rules .	B
With reference to a topographical map, determine: <ul style="list-style-type: none">• Altitude, given height AGL• Height AGL, given altitude.	A
Use an altimeter to determine elevation and pressure height.	B
Given ambient temperature and QNH, convert elevation to pressure height to density height, by the following methods: <ul style="list-style-type: none">• Using a computer• Mathematically using 1 hPa deviation = 30 ft and 1°C deviation = 120 ft.	A

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3.7 Navigation

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3.7.5 Navigation Instruments

Subject area	Standard
Describe the effects of lag and barometric error on the reading of a sensitive altimeter.	C
Identify items which may induce errors in a simple magnetic compass.	C



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3.7 Navigation

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3.7.6 Pre-flight Planning

Subject area	Standard
Given an area of operation: <ul style="list-style-type: none">• List the weather services and flight planning information available to a pilot• Nominate the sources and method of obtaining this information• Nominate the applicable area forecasts and TAFs.	A
Given an area of operation, suitable charts, weather and operational information: <ul style="list-style-type: none">• Plan a flight in accordance with the CAR 259 Permit and AIP and predict<ul style="list-style-type: none">◦ route (that is, track, intermediate landing points and destination)◦ approximate positions at specified time intervals along the route• Nominate<ul style="list-style-type: none">◦ cruising levels appropriate to other types of aircraft◦ the appropriate ATS unit(s) responsible for a given area• Evaluate whether a flight will, or is likely to<ul style="list-style-type: none">◦ enter controlled airspace, an MBZ or CTAF◦ enter prohibited, restricted or danger areas◦ pass within a specified distance of an aerodrome, MBZ, CTAF or controlled airspace.	A A A
Compile a domestic flight notification form and nominate the airways operations unit to which flight notification must be submitted.	B



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3.7 Navigation

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3.7.7 In Flight Navigation

Subject area	Standard
Determine position by use of: <ul style="list-style-type: none">• Position lines• Topographical pin-points.	A
Determine the Track Made Good (TMG) between two given fixes.	A
Estimate or calculate Ground Speed (GS) using time and distance flown between two fixes.	B
Use TMG and GS to predict the: <ul style="list-style-type: none">• Time of arrival over a nominated position• Position of the balloon at a nominated time.	B



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3.8 Operation, Performance and Flight Planning

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The knowledge in *Operation, Performance and Flight Planning* must be met to the specified standard **before** the CP(B)L flight test.

3.8.1 Fundamentals

Subject area	Standard
State the purpose of airworthiness certificates and certificates of registration.	B
With reference to the balloon log book, decide whether a balloon is serviceable for a flight.	A
State the responsibilities of a pilot-in-command with regard to: <ul style="list-style-type: none">• Daily and post-assembly inspections• Recording/reporting balloon defects• Making log-book entries after a flight.	A
Determine the maintenance functions which may be performed by the pilot-in-command of a balloon	B
Explain the terms "major repair" and "time-in-service" with respect to a balloon.	B
Given a commercial flight scenario, extract from CAOs, AIP and the Operator's CAR 259 Permit, the items of equipment (including communications and emergency equipment) required to be on board a balloon (CAO 20.11, 20.18, Permit; AIP).	A
State the rules with respect to the display of lights at night by a balloon in tethered and free-flight operations (CAR 201).	B

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3.8 Operation, Performance and Flight Planning

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3.8.2 Operating Requirements

Subject area	Standard
Extract from AIP, ERSA and the Operator's CAR 259 Permit, all items of information relevant to commercial balloon operations.	A
Apply fuel requirements for a commercial balloon flight in accordance with a sample fuel policy which meets the requirements of CAR 220 and 234.	A
Determine whether a particular area is suitable for the launching and landing of a balloon in accordance with the guidance to CAR 92 given in CAAP 92-3.	B



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3.8.3 Pressure Height and Density Height

Subject area	Standard
Recall and apply the characteristics of the International Standard Atmosphere below 10,000 ft.	B
State the relationship between elevation, QNH, pressure height, temperature and density height, and recall the relationship of these to the lift capacity of a balloon.	A
Describe how to use an altimeter to obtain: <ul style="list-style-type: none">• Elevation of a location, given QNH• Local QNH at a site whose elevation is known• Pressure height of a location.	B
Calculate: <ul style="list-style-type: none">• The pressure height of a location, knowing the QNH and its elevation• The density height at a location whose QNH, elevation and temperature are known.	B



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3.8.4 Balloon Performance

Subject area	Standard
Use manufacturers' charts to determine the lift capacity, and hence permissible loading, for a balloon under various conditions of temperature and height.	A
State the likely results of exceeding a balloon's flight manual limits of load, climb and descent rates, and duration of valve operation.	B
Relate burner power and effectiveness to load, fuel composition (propane/butane ratio), fuel temperature and envelope porosity.	A
State the effect on balloon fuel consumption of windshear, surface wind, load, fuel pressure, flight profile and rain—in free and tethered operations.	A



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3.8.5 Flight Preparation and Planning

Subject area	Standard
State the kinds of pre-flight information available to a pilot for flight planning, and describe how to obtain each type of information.	A
State the operations for which it is necessary to obtain weather and pre-flight briefing (CAR 120, 239, AIP, Permit).	A
State the means for submitting flight details by: <ul style="list-style-type: none">• A flight note held by the retrieve crew• An <i>Airservices Australia flight notification</i> form.	A

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3.9 Meteorology

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3.9.1 Aviation Weather Services

Subject area	Standard
List the types of weather services available to a pilot for flight below 10,000 ft and state the: <ul style="list-style-type: none">• Purpose and ingredients of each service• Method by which it is provided to a pilot.	B
State the operations for which it is necessary to obtain weather and pre-flight briefing (CAR 120, 239, AIP, Permit).	A
Decode information contained in a TAF, METAR and SPECI and understand the contents of an ARFOR.	A
Analyse weather information applicable to a flight and: <ul style="list-style-type: none">• Assess likely changes in weather during the flight• List any phenomena which may adversely affect the flight.	A

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3.9 Meteorology

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3.9.2 Aviation Meteorology

Subject area	Standard
<p>Describe the following terms:</p> <ul style="list-style-type: none">• Isobar, isotherm, pressure gradient• Temperature inversion, lapse rates• Atmospheric stability/instability• Relative humidity, dewpoint• Surface and gradient winds• Cold, warm and occluded fronts• Wind shear• Microburst	A
<p>On a mean sea level synoptic chart, as supplied by the Australian Bureau of Meteorology, identify:</p> <ol style="list-style-type: none">a. High and low pressure systemsb. Warm and cold frontsc. A trough, a ridge, a cold. A tropical revolving storme. Wind speed and direction. <p>Describe weather characteristics associated with items (a) to (d) above.</p>	A
<p>For clouds:</p> <ul style="list-style-type: none">• Identify and classify cloud types;• State the standard abbreviation for each type• Describe the weather conditions associated with each type.	B
<p>With respect to the phenomena listed in (a) to (j) below:</p> <ol style="list-style-type: none">a. thermals, turbulence and dust devilsb. wind gradient and wind shearc. anabatic, katabatic, mountain and valley winds, drainage flowd. orographic lift, curl over, mountain wavese. land and sea breezesf. inversion and fog <p><i>continued on next page</i></p>	A



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3.9 Meteorology

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Subject area	Standard																		
<i>Continued from previous page</i> g. thunderstorms h. downdrafts associated with terrain/cloud i. diurnal variation of temperature and surface wind j. atmospheric stability and instability <ul style="list-style-type: none">• State the conditions favourable for their development• Recognise signs which may indicate their presence• Describe their effect on balloon flight characteristics• If applicable, state the action required to minimise their effect on a balloon.	A																		
Match the following wind speed descriptions with appropriate recognition signs: <table><tr><td>Calm</td><td>0</td><td>kt</td></tr><tr><td>Light air</td><td>1-3</td><td>kt</td></tr><tr><td>Light breeze</td><td>4-6</td><td>kt</td></tr><tr><td>Gentle breeze</td><td>7-10</td><td>kt</td></tr><tr><td>Moderate breeze</td><td>11-16</td><td>kt</td></tr><tr><td>Fresh breeze</td><td>17-21</td><td>kt</td></tr></table> (Reference <i>Manual of Meteorology Part 1</i>)	Calm	0	kt	Light air	1-3	kt	Light breeze	4-6	kt	Gentle breeze	7-10	kt	Moderate breeze	11-16	kt	Fresh breeze	17-21	kt	B
Calm	0	kt																	
Light air	1-3	kt																	
Light breeze	4-6	kt																	
Gentle breeze	7-10	kt																	
Moderate breeze	11-16	kt																	
Fresh breeze	17-21	kt																	

3.10.1 Background

Knowledge of mathematics is necessary to meet the aeronautical knowledge objectives in this syllabus. The subjects are not examined independently, but applicants below standard in mathematics and physics are advised to seek tuition until they are able to meet the laid down objectives. Failure to do so may make the aeronautical knowledge objectives difficult to achieve.

Mathematics

The requirement is to solve problems using:

- Basic arithmetic
 - vulgar fractions
 - decimal fractions
 - percentages
 - averages
 - squares
- Ratio and proportion
 - direct and inverse proportion
 - representative fractions
- Circular slide rule
 - multiplication and division
 - conversion problems between the following units
 - nautical miles, statute miles and kilometres
 - elevation in metres and feet
 - litres, imperial gallons and US gallons
 - squares and square roots
- Basic trigonometry
 - sine, cosine, and tangent
 - simple problems involving solution of right-angled triangles.



Physics

The requirement is to:

- Solve problems relating to time, speed (velocity) and distance
- Define velocity, acceleration, weight, mass, force, momentum, work, energy, power, static equilibrium, density, specific gravity, and pressure
- Solve graphically the wind triangle
- Solve problems relating to the principle of moments and centre of gravity
- Given the specific gravity and fuel quantity calculate fuel weight.



3.10.2 Study Material for CP(B)L

Civil Aviation Regulations

CARs especially:

- CAR 2—definitions: especially 2(7) and 2(7A) def. private etc flights
- CARs 41, 42A, 42E, 42ZC, 43A & 43B (aircraft log book), 50A
- Part 5 Div 1, 2 and 11
- Part 6
- CAR 92
- CARs 99, 99AA, 99A
- CARs 139, 140, 143, 144, 145, 146, 150, 156, 159, 159A, 159B
- Part 12
- Part 13
- Part 14 especially 206, 210, 215, 216, 219, 220, 233, 234, 239, 243, 248, 255, 256, 259, 260
- CARs 298 to 298E, 299, 302, 309
- Schedule 7 Part 5 and Schedule 8
- plus Parts 21, 31, 39 of the CASRs



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3.10 Recommended Pre-study

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Civil Aviation Orders

CAOs especially:

- CAO 20.16.1 and 20.16.3
- CAO 20.18 especially Appendix X
- CAO 40.0
- CAO 40.2.2 relating to balloons
- CAO 40.7
- CAO 48.0 and 48.1
- CAO 82.7
- CAO 95.53 and 95.54.

The current CAR 259, Permit issued to balloon AOC holders

Civil Aviation Advisory Publications (CAAP)

CAAPs especially:

- CAAP 41-1 Balloon Maintenance
- CAAP 92-3 Balloon launch and landing areas
- CAAP 157-1 Balloon flight over populous areas
- CAAP 234-1 Guidelines for aircraft fuel requirements
- CAAP 235-1 Standard passenger and baggage weights.

Note: standard weights are not useful with <7 POB

Aeronautical Information Publication

AIPs especially sections GEN 1, 2 and 3 and ENR 1 and 5.

Any standard aviation meteorology text (southern hemisphere version)

Navigation texts relating to mapping, scale, symbology, contours, magnetic and true direction, distance speed and time, use of UTC, daylight and darkness graphs, and particularly the overprint of aeronautical features and airspace information.

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3.11 Human Performance and Limitations

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3.11.1 Basic Health

Subject area	Standard
<p>Explain the effects and importance on pilot performance of the following factors:</p> <ul style="list-style-type: none">• Diet, exercise• Coronary risk factors—smoking, cholesterol, obesity, hereditary factors• Upper respiratory tract infection, for example, colds, hay fever, congestion of air passages and sinuses• Food poisoning and other digestive problems• Headaches and migraines• Pregnancy<ul style="list-style-type: none">◦ when to stop flying◦ impact on ergonomics• Injuries• Ageing• Alcohol and smoking• Dehydration• Emotional anxiety, depression and fear.	A
<p>Recall that a pilot is not to fly when on any medication unless a medical clearance from a Designated Aviation Medical Examiner (DAME) has been obtained.</p>	A
<p>Explain the responsibilities of pilots with regard to being medically fit for flight.</p>	A

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3.11 Human Performance and Limitations

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3.11.2 Reserved



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3.11.3 Health and Fitness

Subject area	Standard
<p>Explain the:</p> <ul style="list-style-type: none">• Reasons for, and the frequency of, physical examinations and state that a CASA network of Designated Aviation Medical Examiners exists• Process of obtaining a medical examination• Role of CASA with regard to medical fitness and that only those conditions which present a flight safety hazard are disqualifying.	A

Alcohol

Subject area	Standard
<p>Explain how alcohol is absorbed and excreted.</p> <p>State the factors that affect the elimination of alcohol from the body and describe the effects of illicit drugs and alcohol on proficiency, for example:</p> <ul style="list-style-type: none">• Judgement, comprehension, attention to detail• The senses, co-ordination and reaction times.	A

Drugs

Subject area	Standard
<p>Identify the undesirable effects of over the counter and prescription drugs. In particular the side effects of:</p> <ul style="list-style-type: none">• Aspirin, antihistamines, nasal decongestants• Amphetamines, tranquillisers, sedatives, antibiotics.	A

Blood donations

Subject area	Standard
<p>State the effects on flying after giving a blood donation.</p> <p>State the recommended period between giving blood and the next flight and know that this period can vary between individuals.</p>	A



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Hyperventilation

Subject area	Standard
Identify and manage hyperventilation. State what hyperventilation is and its causes.	A

Atmospheric Pressure Change

Subject area	Standard
Trapped gases: <ul style="list-style-type: none">• Know the effect of changes in pressure on gases trapped in the body cavities• Describe the effect on normal bodily function• State the measures for prevention and treatment. Explain the effects of flying after a period of underwater diving and state the precautions to be taken if intending to fly after underwater diving.	A

Basic Knowledge of the Anatomy of the Ear

Subject area	Standard
Explain the ears' function in receiving sound transmissions.	B
Explain the purpose of the Eustachian tube and effects of atmospheric or cabin pressure changes.	A
State the effect of noise exposure on: <ul style="list-style-type: none">• Hearing loss—long and short term• Speech intelligibility• Fatigue.	B
State the recommended methods of hearing protection.	B



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Vision, Spatial Disorientation, Illusions

Subject area	Standard
Have a basic knowledge of the anatomy of the eye and its function during the day and at night.	B
List the factors which affect night vision and identify methods of “dark adaptation”.	A
Describe the limitations of the eye in discerning objects at night and the “off-centre” method of identifying objects at night.	A
Explain the limitations of the eye with respect to: <ul style="list-style-type: none">• The ability to discern objects during flight, for example, other aircraft, transmission lines• Empty field myopia• Glare• Colour vision in aviation• Common visual problems, such as, myopia, hyperopia, astigmatism, presbyopia.	A
Explain of the importance of: <ul style="list-style-type: none">• Seeking experienced professional advice for spectacles prescription• Selecting suitable sunglasses.	C
Explain the factors which are conducive to mid-air collisions. Describe and practice techniques for visual “scanning”.	A
Explain the term “disorientation”.	A
Explain the sensory systems involved in maintaining body equilibrium, for example, that equilibrium is normally maintained by use of the eyes, inner ear and proprioceptive system (“seat of the pants”).	A
Explain that these mechanisms were developed for use by land based mammals and do not provide reliable information under all conditions of flight.	A
Describe illusions that may be associated with the factors listed below: <ul style="list-style-type: none">• “Leans”• Linear and angular acceleration• Autokinetic illusions.	A



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Subject area	Standard
Explain: <ul style="list-style-type: none">• When sensory illusions usually occur—external visual clues are poor or ambiguous and that they are predictable• The importance of an artificial visual reference system and a pilot's ability to use the system• The factors that may make a person susceptible to disorientation• How to overcome sensory illusions.	B A B A
List which illusions may result from the following flight factors: <ul style="list-style-type: none">• False horizontal clues, for example, sloping cloud formations and sloping terrain• Depth perception, for example<ul style="list-style-type: none">◦ flying over water, snow, desert and other featureless terrain◦ effects of fog, haze, dust• Optical characteristics of windscreens• Landing illusions<ul style="list-style-type: none">◦ approach angles—steep, shallow◦ width and slope of runway◦ slope of terrain under approach path◦ when approaching over water• Relative motion between objects.	A

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3.11.4 Motion Sickness

Subject area	Standard
State the basic cause of motion sickness. List factors which may aggravate motion sickness. List methods of combating motion sickness in flight.	B



3.11.5 Acceleration “g” Effects

Subject area	Standard
<p>Explain the effects of positive and negative accelerations on the human body including on:</p> <ul style="list-style-type: none">• The cardiovascular systems• Vision• Consciousness.	B



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3.11.6 Toxic Hazards

Subject area	Standard
State the sources, symptoms, effects and treatment of carbon monoxide poisoning. State the effects of breathing air contaminated by fuel and other noxious or toxic aviation products.	A



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3.11.7 The Atmosphere and Associated Problems

Subject area	Standard
Explain the variation of temperature and pressure with altitude. Explain the basic concepts of the circulatory and respiratory systems in terms of the distribution of oxygen and the excretion of carbon dioxide. Describe what is meant by the partial pressure of oxygen.	A



3.11.8 Hypoxia

Subject area	Standard
<p>List the causes of hypoxia and recognise the symptoms of hypoxia particularly:</p> <ul style="list-style-type: none">• Its effect on night vision• The dangers of behavioural changes, for example, lack of self criticism, over-confidence and a false sense of security. <p>State that the symptoms are difficult to detect in healthy individuals and can develop much faster at higher altitudes—at 14,000ft.</p> <p>List factors which may increase a person's susceptibility to hypoxia.</p> <p>State the approximate time of useful consciousness (Effective Performance Time EPT) at 20,000, 25,000 and 30,000 feet and list factors which affect EPT.</p> <p>List methods of combating various forms of hypoxia.</p>	A



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3.11.9 Human Factors Considerations

Subject area	Standard
<p>Explain the basic concepts of information processing and decision making including:</p> <ul style="list-style-type: none">• How sensory information is used to form mental images• The influence of the following on the decision making process:<ul style="list-style-type: none">◦ personality traits, for example, introvert or extrovert◦ pride, peer pressure, employer pressure◦ the desire to get the task done◦ anxiety, over-confidence, boredom, complacency◦ types of memory—long and short term◦ memory limitations◦ aides memoire, rules of thumb◦ work load/overload◦ skill experience, currency.	B
<p>Discuss the general concepts behind decision making and the methods of enhancing decision making skills.</p>	B

Concepts of Stress

Subject area	Standard
<p>Explain:</p> <ul style="list-style-type: none">• The interaction between stress and arousal and the effects of short and long term stress on pilot performance and health• The symptoms, causes and effects of environmental stress• working in an excessively hot, cold, vibrating or noisy environment• The symptoms and effects of domestic and work related stress• The effects of stress on performance• The principles of stress management, for example:<ul style="list-style-type: none">◦ cognitive/behavioural techniques◦ relaxation◦ time management.	B



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Concepts of Fatigue

Subject area	Standard
Identify causes of fatigue and describe its effect on pilot performance. Differentiate between acute and chronic fatigue. Discuss coping strategies, for example: <ul style="list-style-type: none">• Sleep management• Relaxation• Fitness and diet.	B

Basic Ergonomics

Subject area	Standard
Discuss principles of control design and the design features of traditional and modern displays. Discuss problems associated with: <ul style="list-style-type: none">• Poorly designed controls/positioning of controls• Interpreting instrument presentations.	C

Basic Principles of Crew Co-ordination

Subject area	Standard
Discuss factors which influence verbal and non-verbal communication between crew, such as: <ul style="list-style-type: none">• Barriers to communication• Listening skills• Assertion skills. Discuss factors which affect the decision making process, such as: <ul style="list-style-type: none">• Communication attitude• Personality• Judgement• Leadership style. Discuss ideal leadership qualities. Review ballooning accidents which resulted from poor crew co-ordination.	C

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3.11.10 Principles of First Aid and Survival

Subject area	Standard
The student should be aware of the first aid and survival information contained in ERSa and preferably be exposed to practical instruction in the terms of first aid given in this document.	B

