

# ABF Pilot Training Manual

## Part 3

### Syllabus (SYLL)

### for Theory Exams and Practical Flight Exercises

VERSION 1 – MAY 2006

#### **IMPORTANT**

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# ABF PRIVATE PILOT CERTIFICATE TRAINING SYLLABUS

## A. THEORY (FOR WRITTEN AND ORAL EXAMS)

*This part of the syllabus was significantly updated in May 2006.*

*There is no detailed syllabus for the ABF Code of Conduct*

### **1 AEROSTATICS AND AIRMANSHIP**

#### **1.1 Airmanship**

- (a) Identify typical actions and personal attributes which contribute to good airmanship

#### **1.2 Principles of Flight**

- (a) Names and function of balloon components - envelope, basket, fuel systems, and accessories.
- (b) Definitions of: buoyancy, false lift, terminal descent, ballast, overheat, vent, differential temperature, kinetic energy, momentum, inertia.
- (c) Relationship between buoyancy and atmospheric factors: ambient temperature, altitude, humidity.
- (d) Importance of atmospheric stability to balloon flight: safety considerations in relation to atmospheric instability.

#### **1.3 Balloon Operation**

- (a) Be familiar with typical flight limitations, including damage limits to preclude flight, as found in a manufacturer's flight manual.
- (b) Be familiar with emergency procedures detailed in a typical manufacturer's flight manual, and emergencies in general.
- (c) Given a typical load chart, launch field elevation and ambient temperature, calculate the load limit for a specific balloon size at a particular altitude, (or the maximum safe altitude given the balloon size and all up weight). Understand the limitation of maximum all up weight.
- (d) Recognise elements of a typical fuel system in a schematic drawing.
- (e) Principles of fuel management, including fixed and variable fuel reserves
- (f) Refuelling: correct procedures and safety requirements.
- (g) Properties and hazards of liquefied petroleum gas (LPG), and emergency procedures.

- (h) Typical balloon controls, control reaction time (delay) and the importance of anticipating this.
- (i) False lift and how to counteract it.
- (j) Tethered balloon operations: safety procedures and use of ropes.
- (k) Launch rope and quick release: requirements for use, and safety procedures.
- (l) Inflation fan safety procedures.
- (m) Relationship of burner output to fuel pressure, and importance of the fuel pressure gauge.
- (n) Minimum checklists and briefings which must be carried out before take-off, during flight, before and after landing.
- (o) Procedures for landing with higher than normal wind speed and/or descent rate.
- (p) Positive deflation systems: advantages and safety considerations.

#### **1.4 Balloon Performance**

- (a) Use of instruments to measure flight parameters: altimeter, variometer (rate of climb indicator), temperature gauge (ambient and envelope), pressure gauge, fuel contents gauge, clock.
- (b) Variation in control reaction time in relation to burner power, total mass or inertia of the system, and other factors.
- (c) Differing kinetic energy levels with fast and slow landings and with different size balloons and loads.
- (d) Rates of climb and descent in reference to obstacle clearance.
- (e) Factors affecting flight duration: high envelope temperature, altitude and load; heat loss from venting, climbs, rain, fabric porosity; solar heat input; radiant, conductive and convective heat output.

## **2 NAVIGATION**

### **2.1 General**

- (a) Know the units of measurement used in air navigation for speed, distance, direction, height, wind velocity.
- (b) Understand the terms: magnetic deviation, magnetic variation, isogonal.
- (c) Be familiar with: World Aeronautical Charts, En Route Charts, Visual Terminal Charts, Visual Navigation Charts, Planning Chart Australia, and Topographic Survey Maps.
- (d) Know conventional signs on Visual Terminal Charts, Visual Navigation Charts and Topographic Survey Maps.
- (e) On a Visual Terminal Chart or Topographic Survey Map, know how to measure a nominated position to an accuracy of one minute of arc of latitude and longitude. Be able to mark a position whose latitude and longitude is given.

- (f) On a Topographic Survey Map, know how to give a six or eight figure grid reference for a nominated position. Be able to mark a position for which a grid reference is given.
- (g) Convert a true bearing to a magnetic bearing and understand the terms: heading, course, track, fix, dead reckoning position.
- (h) Be able to express time and date as a six, eight or ten figure group
- (i) Convert Australian Standard Times to UTC and UTC to Australian Standard Times
- (j) Given latitude and longitude, determine the beginning and end of daylight for a location in Australian, and know local factors which can cause daylight to end sooner than determined.
- (k) Be able to calculate ground speed, fuel used, fuel required, and fuel remaining.
- (l) Given conversion factors, convert:
  - IMP Gallons/US Gallons/Litres
  - Pound/Kilograms
  - Nautical miles/Kilometres, Statute miles
  - Degree F/Degree C
  - Feet/Metres
- (m) Calculate rate of descent given total descent and either estimated time interval or distance to run and ground speed.
- (n) Match the terms QNH, Area QNH, AGL, AMSL, standard pressure, height, elevation, altitude, transition altitude, transition layer, and transition height with their definitions. Select appropriate altimeter subscale settings for specified operational conditions.

## 2.2 Flight Planning Pre-flight

- (a) With forecast wind at various flight levels and specified flight altitude plan, predict average tracks and position after specified periods (ignore time taken to change levels).
- (b) With forecast wind and specified maximum distance, specify maximum flight duration.
- (c) Given usable fuel, consumption in litres or kilograms per hour, and wind velocity, plot probable landing position and, from maps, state if projected area is suitable. Give reason and fuel reserve.

## 2.3 Flight Planning In-flight

- (a) Use protractor to calculate course, given take-off position and present position.
- (b) Calculate ground speed from present position, take-off position and flight time, and predict position after further specified flight time.

**YOUR FEEDBACK PLEASE!**

*If you have any corrections or suggested improvements to these study notes please advise the ABF Operations Manager.*

### 3 METEOROLOGY

#### 3.1 General

- (a) Be familiar with the different ways to obtain public and aviation forecasts and reports: telephone, fax and internet.
- (b) Given the AIP and details of a particular operational situation, identify the types of aviation weather forecasts and weather reports that are available for the flight. Be able to decode/understand a written Area Forecast, TAF, TTF, METAR and SPECI.
- (c) Match the terms isobar, inversion, lapse rate, dew point, pressure gradient, air temperature, relative humidity, fog and geostrophic wind with their appropriate definitions.
- (d) On a mean sea level synoptic chart of Australia showing typical synoptic situations for given seasons, identify and match each of these features with a description of the associated general weather characteristics:
  - High and low pressure systems
  - Warm and cold fronts
  - A ridge of high pressure
  - A trough of low pressure
  - A tropical revolving storm
  - Wind directions associated with the pressure systems.
- (e) Recognise from a series of photographs the various cloud types. Describe the flying conditions associated with each type and the levels at which they may be found.

#### 3.2 Forecast weather conditions

Identify the conditions under which the following weather phenomena may occur, and the actions required to avoid or counteract the related effects and hazards on ballooning operations:

- (a) Thunderstorms
- (b) Low level temperature inversions and fog
- (c) Mountain waves (standing waves and rotors)
- (d) Low level wind shear, especially in relation to balloons landing and taking off
- (e) Sea breezes and vertical thermal convection currents.

#### 3.3 Micro Meteorology

Identify the conditions under which the following micro meteorological weather phenomena may occur, and the actions required to avoid or counteract the related effects and hazards on ballooning operations:

- (a) Anabatic and katabatic winds, and drainage flow
- (b) Strengthening of winds up slopes and over ridges
- (c) Curl-over in lee of ridges and escarpments
- (d) Down drafts and rotors on lee slopes in lee wave conditions
- (e) Curl-over and wind shelter in the lee of tree belts and woods
- (f) Cool air down drafts and microbursts (from showers and beneath virga associated with convection clouds)
- (g) Thermals and dust devils.

## 4 FLIGHT RULES AND PROCEDURES (AIR LEGISLATION)

### 4.1 Private Pilot Certificate

- (a) Determine whether a balloon flight can be legally conducted in accordance with the privileges and limitations of a private pilot certificate (balloons), given various operational situations.

### 4.2 Aviation Documents

- (a) List the documents that must be carried in a balloon in Australia. Know that the aircraft logbook must not be carried in the balloon.
- (b) Be familiar with the use of:
  - Civil Aviation Regulations and Orders
  - Civil Aviation Safety Regulations
  - Civil Aviation Advisory Publications
  - Aeronautical Information Publication (AIP Book) including SUP, AIC, NOTAMs and charts
  - En Route Supplement Australia (ERSA)
  - ABF Operations Manual
  - Manufacturer's Flight and Maintenance Manuals
  - Aircraft (Balloon) Log Book
  - Pilot Log Book
- (c) Understand which document/s take precedence in a given situation. Know the procedure to follow in the case of conflict or ambiguity between applicable documents.

### 4.3 Flight Rules

- (a) Know the rules for the prevention of collision between a balloon and other balloons and aircraft in the air and on the ground, including the requirement to give way to balloons below.
- (b) Know the visual meteorological conditions (VMC) for balloons:
  - Using VHF radio
  - Not using VHF radio
- (c) Know the minimum heights at which, under normal circumstances, a balloon may be flown:
  - Over a city, town or populous area
  - Over any other area.
- (d) Match prohibited area, danger area and restricted area with their appropriate definitions.

### 4.4 Airways Operations Organisation

- (a) Understand the role and responsibility of aviation authorities: Civil Aviation Safety Authority, Airservices Australia, and the Australian Transport Safety Bureau.
- (b) Understand the functional difference between Flight Information Services and Air Traffic Control services.

**4.5 Airspace classification**

- (a) Understand the terms controlled airspace, control area, control zone, military airspace, non-towered aerodrome, flight information area and flight information region. Be familiar with airspace classes.

**4.6 Aircraft Equipment**

- (a) Know the altitude above which it is mandatory for the pilot of a balloon to use oxygen.
- (b) Know the flight level above which it is mandatory for oxygen to be available to all passengers in a balloon.
- (c) Know the situations in which VHF airband radio must be carried and used in a balloon, and the minimum required qualification to operate the radio.

**4.7 Carriage of Passengers and Cargo**

- (a) Know the minimum information which must be included in a passenger pre-flight briefing in respect of:
  - Passenger safety and comfort during flight and landing
  - Stowage of equipment

**4.8 Reportable Matters (Accidents and Incidents)**

- (a) Know the responsibilities of aircraft owners, operators and pilots, regarding the notification of reportable matters (accidents and incidents) to ATSB and the ABF.

**4.9 Consumption of alcohol or drugs**

- (a) Know the rules relating to the consumption of alcoholic liquor or drugs by operating crew and other persons on board a balloon.

**4.10 Maintenance**

- (a) Know the responsibilities of a the registered operator and pilot of a balloon with respect to:
  - Reporting unserviceabilities
  - Ensuring required maintenance is carried out by an appropriate person
  - Maintaining balloon maintenance records
- (b) Know how to determine whether a maintenance item may be carried out by:
  - A balloon pilot
  - A balloon Maintenance Authority holder
  - A Certificate of Approval holder
- (c) Match the terms Airworthiness Directive and Service Bulletin with the appropriate definitions.
- (d) Know how to determine flight time and enter it in a pilot or balloon logbook.

## 5 RADIO OPERATOR CERTIFICATE

### 5.1 Practical Operations (VHF airband transceiver)

- (a) Be familiar with functions and controls:
  - Power supply including master switches where fitted
  - Replacement of batteries or fuses, resetting of circuit breakers
  - Visual indicators of battery level and other functions
  - Function selectors, microphone/headphone/speaker selection.
  - Antennas and antenna systems
  - Placement of transceiver for most effective operation
- (b) Prepare the transceiver for use:
  - Identify and select appropriate frequency
  - Volume and squelch adjustment
  - Establishment of listening watch prior to transmitting
  - Routine pre-flight test procedure
  - Fault finding procedures and correction of faults
  - Voice procedures and communications check
- (c) Show practical knowledge of radio operations and procedure:
  - Ability to transmit and receive correctly
  - Microphone technique.
  - International phonetic alphabet.
  - Transmission of numerals.
  - Procedural words and phrases.
- (d) Know the propagation properties of VHF signals, the importance of effective line of sight, and typical reception range at various altitudes.

### 5.2 Regulations and Organisation

- (a) Understand regulations of the International Telecommunications Union regarding:
  - Safety of life, and priority of emergency transmissions.
  - Requirement to assist persons in distress.
  - Distress frequencies.
  - Prohibited transmissions.
- (b) Know the VHF aeronautical communication band, and the qualifications which permit operations on this band.
- (c) Know the privileges and limitations of the ABF Radio Operator Certificate.
- (d) Know pilot responsibilities to limit transmissions to:
  - Aircraft operational needs.
  - English languageand to avoid:
  - Unauthorised, false or deceptive transmissions
  - Improper use of call signs
  - Profane or obscene language



### 5.3 Operational Situations

Know the operational requirements, appropriate frequency type and standard phrases to be used in the following situations. Demonstrate examples of the appropriate calls in practice.

- (a) General:
  - Difference between reports and broadcasts
  - Format for a position report
  - Requirements for maintaining a listening watch
  - Frequency change procedures
- (b) Uncontrolled airspace:
  - Awareness of aerodrome traffic patterns and typical calls
  - CTAF procedures at non-towered aerodromes
  - Instrument Approach aerodromes
  - Operations above 5000ft AMSL
- (c) Controlled airspace:
  - Obtain ATIS broadcast
  - Request or amend airways clearance
  - Read back requirements
  - Advise operations complete
  - CTAF procedures when tower is not operating
- (d) Emergency procedures:
  - Difference between distress and urgency situations
  - Distress message format
  - Urgency message format
  - Procedure on intercepting a distress or urgency message
  - Procedure for relaying a distress or urgency message
  - Communication failure procedures
  - Reporting of others in emergency
- (e) Remote area operations:
  - Use of emergency beacons
- (f) Mode C Transponder operations:
  - Requirement to use transponder in controlled airspace unless specifically exempted
  - Controls and settings
  - Procedure to set and squawk IDENT
  - Emergency codes

**ARE YOU UP TO DATE?**

*New regulations and procedures may apply from time to time.  
Check on the ABF website that you have the latest version of these study notes.*

## **B PRACTICAL (FLIGHT EXERCISES)**

*Optional exercise 6(f) – landing in moderate wind – was added in May 2006.*

### **1 PRELIMINARY**

- (a) Familiarisation with balloon equipment, controls and terminology.
- (b) Farmer/landowner relations (see Code of Conduct).
- (c) Familiarisation with refuelling techniques, procedures and safety measures.

### **2 PRE-FLIGHT**

- (a) Obtaining meteorological forecast and appreciation of conditions.
- (b) Appreciation of downwind airspace, terrain and power line systems.
- (c) Passenger and crew briefings.
- (d) Choice of suitable launch site.
- (e) Rigging the balloon for flight, and pre-flight inspection.
- (f) Inflation.
- (g) Pre-take-off checks.
- (h) Use of launch rope also hands on/hands off the basket exercise.

### **3 FLIGHT OPERATIONS (NORMAL CONDITIONS)**

- (a) Take-off. Slow climb out in light wind condition.
- (b) Level flight - effect of burner.
- (c) Climb and descent, effect of burner and vent.
- (d) Approach and overshoot from low level, awareness of powerlines.
- (e) Intermediate landing using vent.
- (f) Final landing using rip panel.
- (g) Flight to 4,000 feet AGL.
- (h) Experience terminal velocity descent.
- (i) Tethered flight - appreciation of hazards and precautions.  
Note: 1 hour may be logged in total 15 hours required for Certificate issue.
- (j) Appreciation of the effect of variations in loading on balloon operations.
- (k) First solo flight.
- (l) Reserved.

### **4 IN-FLIGHT PROCEDURES**

- (a) Use of maps and instruments. Appreciation of position and movement of balloon.
- (b) Fuel management.
- (c) Considerations when operating in company with other balloons.
- (d) Observation of weather developments.
- (e) Detection of power line system.

## 5 EMERGENCIES

Note: These situations are to be simulated where they cannot be put into practice safely. The student pilot to demonstrate reactions in theory as required.

- (a) Pilot light failure and fuel supply problems.
- (b) Power lines, use of handling line.
- (c) Considerations of landing in difficult conditions: trees, water, confined space.
- (d) Emergency landing procedures and briefing for passengers.
- (e) Considerations of fuel leaks and fire in air and on ground.

## 6 OPTIONAL FLIGHT OPERATIONS (ADVANCED CONDITIONS – NOT MANDATORY)

- (a) Take-off, fast climb-out from shelter in moderate wind.
- (b) Fast (or running) take-off in moderate wind, fast climb-out and descent.
- (c) Approach and overshoot from high level.
- (d) Landing at high descent rates.
- (e) Flight in mild thermal conditions.
- (f) Landing in moderate wind.

## 7 ENDORSEMENT FOR CAPACITY GREATER THAN 120,000 CU FT (3,400 CU.M)

- (a) Accelerations due to increased mass and momentum.
- (b) Deflation systems.
- (c) Basket orientation: use of rotation vents, divided basket, passenger control
- (d) Burner: multiple burners, cross flow valves, manifolded and non-manifolded fuel systems.

## 8 NIGHT FLIGHTS

- (a) Regulatory requirements
- (b) Flight planning.

**YOUR FEEDBACK PLEASE!**

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