

# ABF Pilot Training Manual

## Part 9

### Radio Operator Certificate (ROC)

Version 1.2 – March 2006

#### **IMPORTANT**

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## Reading

*AIP GEN* or the *VFR Flight Guide (VFG)* – especially ‘Radio telephony procedures’ and ‘Phrases’.

*Flight Radio for Pilots – VFR Operations* published by Aviation Theory Centre (the most recent edition) – highly recommended for further study.

*Operations at Non-Towered Aerodromes* booklet, published by Dept of Transport and Regional Services, call 1800 007 024 or see [www.dotars.gov.au/airspacereform](http://www.dotars.gov.au/airspacereform).

## The ROC exams

### Written exam

20 written questions with multiple choice answers. Pass mark 80% (16 out of 20). Time allowed is one hour. No reference materials may be used.

### Practical test

20 questions given orally to test the student’s competency with radio controls and ability to transmit and receive radio messages efficiently in an operational setting. Pass mark 80% (16 out of 20). Time required approximately one hour. The student should make sure a serviceable VHF radio with which he/she is familiar is available for the test. No other reference materials may be used.

## About the ROC

### Privileges and limitations

The ABF Radio Operator Certificate (ROC) is:

- administered by the ABF
- may only be issued to ABF student pilots and private pilots
- **limited to private balloon flights**
- **limited to VHF airband radio.**

A pilot who uses VHF radio in balloon operations must hold either the ROC or the CASA Flight Radiotelephone Operator Licence (FROL).

The ROC is an approved alternative to the FROL. It requires a similar level of knowledge and skill to the FROL, but is more specifically related to balloon operations. Unlike the FROL, the ROC does not require an regular and expensive aviation medical examination.

**At present the ROC is highly recommended to all private balloon pilots.**

In future it will become a mandatory requirement for private ballooning.

The ROC is simply an authority to operate a radio in accordance with aviation requirements. It is not an approval or rating to conduct specific operations such as flight in controlled airspace or at night. The pilot must hold appropriate operational CASA approvals and ABF certificates or endorsements for the intended flight.

### Currency

Your ROC remains valid and current as long as your student or private pilot certificate is valid and current.

### Maintaining competence

Good radio procedures come from regular use. To maintain a reasonable standard of fluency and competence you are recommended to use VHF radio whenever you fly. It also helps to maintain a listening watch on the ground at other times; this will keep you familiar with radio language, and give you practice at understanding messages that are less than perfectly clear.

When using a VHF radio after a long break, consider reviewing these notes. Pause a moment before sending any message, to think about what you want to say and the order in which to say it. It may help to have a personal checklist of typical reports and broadcasts used in your flying area.

## Licensing

A licence is not required to own a VHF airband radio, however the operator must hold an appropriate qualification such as the ABF ROC.

Licences are not required to own or operate the 40-channel UHF radios often used for communicating between a balloon and its ground crew (see Crew Radios).

## Radio signals

Radio signals are electromagnetic waves that travel through the air at the speed of light. Radios are set to transmit and receive specific signal frequencies.

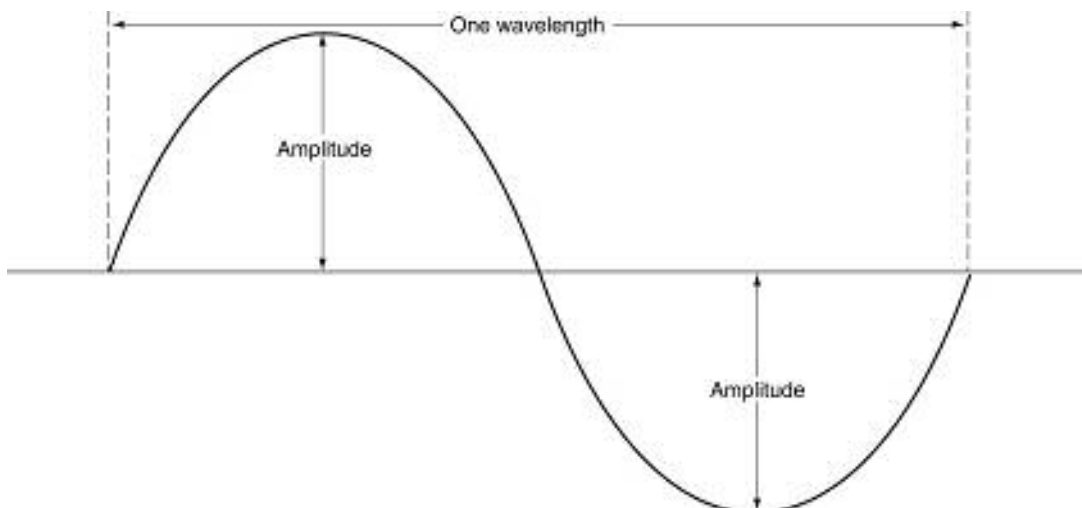


Fig. 1 Wave action

A **cycle** is one complete wave action. The **frequency, measured in Hertz**, is the number of cycles passing a given point in one second.

One cycle per second	= 1 Hertz (Hz)
1,000 Hz	= 1 kilohertz (KHz)
1,000 KHz	= 1 <b>megahertz (MHz)</b>
1,000 MHz	= 1 gigahertz (GHz)

The **wavelength** is the length of one cycle. The height of the peak or trough from the centreline is called the **amplitude**; the greater the amplitude, the stronger the signal. Signal strength reduces gradually with distance, or more quickly when the signal passes through a more solid barrier – this reduction is called **attenuation**.

## Broadcast Authorities and Band Allocation

To give consistency across all countries the International Telecommunications Union controls broadcasting in various frequency ranges or **bands**. These include:

<u>Frequency Band</u>	<u>Abbreviation</u>	<u>Frequencies</u>
High Frequency	HF	3 – 30 MHz
<b>Very High Frequency</b>	<b>VHF</b>	<b>30 – 300 MHz</b>
Ultra High Frequency	UHF	300 – 3,000 MHz

Aeronautical radio services exist in these three bands. VHF is the band most used. These study notes also briefly cover two other non-aviation radio services of use to balloons:

- 40 channel UHF (see Crew Radios), and
- ‘Flying Doctor’ HF service (see Ballooning in Remote Areas).

Radio communications in Australia are controlled by the Australian Communications Authority (see [www.aca.gov.au](http://www.aca.gov.au)). Control of aviation frequencies is delegated to Airservices Australia ([www.airserviceaustralia.com.au](http://www.airserviceaustralia.com.au)).

Within the VHF band, aviation is assigned **118.00 to 135.95 MHz** for voice communication.

## VHF effective range

VHF gives good clear communication with very little distortion. It operates by ‘line of sight’, ie a straight line path through the atmosphere between sender and receiver (even if they can’t actually see each other). Due to the curvature of the earth’s surface and objects such as buildings and hills, the higher you are in the atmosphere, the further you can transmit. The table below gives fairly conservative range. When operating a balloon at low level (eg, during take-off and landing), terrain and buildings may obstruct the line of sight and reduce VHF signal quality and range.

Balloon altitude (feet)	VHF range (balloon to ground)
<b>1,000 FT</b>	<b>40 NM</b>
<b>5,000 FT</b>	<b>90 NM</b>
10,000 FT	120 NM

**Calls and broadcasts**

A **call** is a message sent to a single station, such as another aircraft or a control tower. A **broadcast** is a message intended for any station within range, for which an acknowledgement is not expected. A broadcast in the vicinity of an aerodrome starts with the location (aerodrome name), followed by the word ‘traffic’, and ends by repeating the location.

A **report** is a call or broadcast used to provide specific information (see Position Reports).

**Radio language**

Unauthorised transmissions

VHF transmissions must be:

- related to aircraft operational needs
- in English (the international language for aviation)

and must NOT:

- be profane or obscene
- be false or intended to deceive
- involve improper use of callsigns, or
- involve social communication.

Phonetic alphabet and numerals

Letters are spoken using the phonetic alphabet, eg PON is ***‘Papa Oscar November’***. Numerals are slightly altered to improve clarity; they need not be exaggerated, just spoken clearly as shown below. If radio reception is poor, a word can be spelled out letter by letter using the phonetic alphabet.

Learn these thoroughly. You can practice by reading car number plates aloud.

A Alpha	H Hotel	O Oscar	V Victor
B Bravo	I India	P Papa	W Whisky
C Charlie	J Juliett	Q Quebec	X X-ray
D Delta	K Kilo	R Romeo	Y Yankee
E Echo	L Lima	S Sierra	Z Zulu
F Foxtrot	M Mike	T Tango	
G Golf	N November	U Uniform	

0	Ze-ro	5	Fife	Decimal	Day-see-mal
1	Wun	6	Six	Hundred	Hun-dred
2	Too	7	Sev-en	Thousand	Tou-sand
3	Tree	8	Ait		
4	Fow-er	9	Nin-er		

### Transmission of numbers

All numbers used to transmit altitude, cloud height or visibility which contain whole hundreds and thousands are said using the words *hundred* or *thousand*, eg:

Altitudes (ft)	800	<b><i>'Eight hundred'</i></b>
	1,500	<b><i>'One thousand five hundred'</i></b>
	6,715	<b><i>'Six seven one five'</i></b>
Cloud height (ft)	4,300	<b><i>'Four thousand three hundred'</i></b>
Visibility (m)	3,000	<b><i>'Three thousand'</i></b>

For all other numbers say each digit separately, eg:

Headings (towards)	180	<b><i>'One eight zero'</i></b>
	(always 3 figures) 300	<b><i>'Three zero zero'</i></b>
Wind direction (from)	100°	<b><i>'One zero zero degrees'</i></b>
	(always 3 figures) 020°	<b><i>'Zero two zero degrees'</i></b>
Wind speed (knots)	18KT, gusting 30	<b><i>'One eight knots, gusting three zero'</i></b>
Altimeter setting (or QNH)	1000	<b><i>'One zero zero zero'</i></b>
	1027	<b><i>'One zero two seven'</i></b>
Frequency	118.7	<b><i>'One one eight decimal seven'</i></b>

Time is given in UTC (universal co-ordinated time – see the NAV section of this manual). Say each figure separately, eg 55 minutes past the hour is ***'time five five'*** not *'fifty-five'*, 1400 is said ***'time one four zero zero'***. Say the minutes only, unless you are referring to a time more than an hour ahead; eg, if the time is now 0830, you would refer to 0850 as ***'time five zero'*** but 1050 as ***'time one zero five zero'***.

### Standard words and phrases

These are used to avoid misunderstanding and reduce communication time. Greetings like 'good morning' are used sparingly, and best avoided if the channel is busy.

If unsure of standard phrases use brief plain English. Never be afraid to speak just because you are not sure how to say something. Ask others to explain or ***'say again'*** if you did not understand.

You should know the phrases in the table below.

**STANDARD WORDS AND PHRASES**

ACKNOWLEDGE	Let me know you have received and understood the message
AFFIRM	Yes
APPROVED	Permission granted for the proposed action
BREAK	I hereby indicate separation between parts of a message (used where there is no clear distinction)
BREAK BREAK	I hereby indicate separation between messages to different aircraft in a very busy environment
CANCEL	Cancel the previous clearance
CHECK	Examine a system or procedure (no answer normally expected)
CLEARED	Authorised to proceed under the conditions specified
CONFIRM	Have you correctly received the following...? <i>or</i> Did you correctly receive this message?
CONTACT	Establish radio contact with
CORRECT	That is correct
CORRECTION	An error has been made in this message. The correct version is...
DISREGARD	Consider that transmission as not sent
GO AHEAD	Proceed with your message
HOW DO YOU READ?	What is the readability of my transmission?
I SAY AGAIN	I repeat for clarity or emphasis
MONITOR	Listen out on (frequency)
NEGATIVE	“No” or “Permission is not granted” or “That is not correct”
OVER	} <i>not normally used in</i>
OUT	} <i>VHF transmissions</i>
READ BACK	Repeat all or the specified part of a message back exactly as received
RECLEARED	A change has been made to your last clearance and this new clearance supersedes your previous clearance or part of it
REPORT	Give me the following information
REQUEST	I would like to know or I wish to obtain
ROGER	I have received all of your last transmission (NOT to be used as readback or in place of AFFIRM)
SAY AGAIN	Repeat all or the following part of your last transmission
SPEAK SLOWER	Reduce your rate of speech
STANDBY	Wait and I will call you
VERIFY	Check and confirm with originator
WILCO	I understand your message and will comply with it
WORDS TWICE	Please send every word or group of words twice as communication is difficult, <i>or</i> Since communication is difficult I will send every word or group of words twice.

## Callsigns

An individual **callsign** identifies each ground station or aircraft using airband radio. A callsign will be a ground station name, a flight number or aircraft registration.

Callsigns of Australian registered (VH) aircraft operating within Australia are the last three letters of the aircraft registration, preceded by the aircraft type, eg the callsign for the balloon VH-BAG is ***'Balloon Bravo Alpha Golf'***.

**Tip:** To remember your balloon registration, write it on your instrument pack.

A radio **call** begins with the callsign of the station being called followed by your aircraft type, your callsign and then the message, eg ***'Canberra Tower, balloon Bravo Alpha Golf...'***

A **broadcast** in the vicinity of an aerodrome begins with the aerodrome name followed by the word 'traffic', then your aircraft type and callsign, eg ***'Mildura traffic, balloon Bravo Alpha Golf...'***

A broadcast on an area frequency begins with 'all stations' followed by your aircraft type and callsign.

When reading back information to ATC, give the readback information first and finish with your callsign.

To confirm you have received and understood a message, just give your callsign.

### Group callsigns

In controlled airspace, Air Traffic Control (ATC) may assign the callsign ***'balloon group'*** or ***'balloon section'*** to a group of balloons operating together, and one pilot may be designated to make calls for the group.

Outside controlled airspace one pilot can choose to make calls for a number of balloons by saying eg, ***'Balloon Juliet Kilo Foxtrot for group of 4 balloons'***.

Unless specifically authorised otherwise by CASA, each balloon in a group must carry VHF radio, and be prepared to make its own radio calls if necessary.

## Operating the controls

*This section is important for the practical exam. It is recommended to practise with a VHF radio handset. You can switch on, select a frequency and listen, but you must not transmit until you have an ROC and are in a balloon.*

The radio you use should be a **transceiver**, ie able to transmit as well as receive signals. A **scanner**, which is only able to receive a range of frequencies but cannot transmit, is sometimes used by a balloon crew to listen to the pilot's VHF broadcasts. Before starting to use any VHF transceiver you should locate and be familiar with the:

**Aerial** –should be fitted before transmitting or the set may be severely damaged. A ‘higher gain’ aerial gives more transmitting power. The set will operate best in an upright position with the aerial clear of significant metal objects. If signals are unclear try transmitting from a different position.

**ON/OFF switch** – When ON, the radio is normally in **standby** mode, ie will receive incoming signals. Power use on standby is quite low compared with transmitting.

**PTT (push to talk) or talk switch** – Radios cannot receive and transmit at the same time, so this switch must be held down while transmitting a message and then released as soon as you finish speaking so that the set returns to standby (receive) mode. Be careful to avoid holding the talk switch down by mistake, for example by stuffing the radio in a tight pocket. If the switch is held down, the set will transmit a signal even if you are not speaking. **While you are transmitting, no-one else can use the frequency - and it is impossible to contact you. This potentially dangerous situation is known as ‘open mike’.**

**Microphone** – Locate the ‘mike’ and hold it close in front of your mouth. Some handheld radios may be supplied with a separate mike that plugs into the set.

**Squelch** (switch or knob) – To remove unwanted background noise known as static or ‘hash’, switch on the squelch switch. If there is a squelch knob, turn it *until the hash just disappears*, but not too far or it may also cut out the signal. If the signal is weak, it may be easier to understand without using squelch. Note: if you leave a radio on standby with hash noise, it will flatten the battery quicker.

**Frequency control** – This may be a rotating switch, a set of separate switches for each digit, or a keypad. Some sets have options such as **preset** frequencies, frequency **lock** and **scan** facilities. Make sure you know how to use these, especially how to unlock! Be able to change frequencies accurately and quickly when needed.

**Power source** – **Balloon pilots are required to carry spare batteries or other power source for handheld VHF radios** (refer AIP GEN 1.5). Know how to change them if a low battery indicator shows or signals become weak. The **output** of a radio is a measure of the signal strength, usually expressed in watts (W).

**Fuses** – Know their location and how to change them if fitted (not usual in handset).

## Getting started

### Pre-take-off radio check

Carry out points 1 to 4 below. If you hear another station transmitting this confirms that you are receiving. Do not carry out points 5 to 8 until you are required to make a call or broadcast.

1. Power on
2. Select frequency
3. Adjust the volume and squelch controls.
4. **Before transmitting, listen for a moment.** You may only interrupt if you have a distress or urgency call.

5. Hold the talk switch down, then wait a fraction of a second before speaking to avoid ‘clipping’ the start of the first word.
6. Pronounce each word separately and clearly, especially the end of each word.
7. Speak at a steady rate, if anything a little slower than usual.
8. Maintain a constant volume, do not shout or whisper.

A ‘squeal’ during transmission indicates that two stations are transmitting together. You may lose part of a message and need to request the message again.

### When radio is required in a balloon – and which frequency to use

Balloons in private operations must carry and use radio as below:

Situation	Frequency	What you must do
<u>Outside controlled airspace</u>  Within 10NM of: <ul style="list-style-type: none"> <li>• an aerodrome with a published instrument approach procedure</li> <li>• a non-towered aerodrome shown as ‘CTAF (R)’ on charts or in ERSA</li> </ul> Away from aerodromes: <ul style="list-style-type: none"> <li>• Near cloud (see note below)</li> <li>• At or above 5,000FT AMSL</li> <li>• At night</li> </ul>	) CTAF (on charts or ) in ERSA) ) ) <i>or</i> ) 126.7MHz if no ) CTAF is published  ) Area Frequency ) (on chart) )	) Maintain a listening ) watch, broadcast on ) entering at 10NM and ) then as necessary for ) operational safety and ) to avoid conflict  ) Listen, and broadcast ) as appropriate )
<u>In controlled airspace</u>	Control Tower or other frequency as advised or as appropriate to the airspace sector	As required by ATC (see examples later in these notes)
<u>Flying in a group of balloons</u>	One pilot may be permitted to make calls on behalf of the group on the appropriate frequency	Unless authorised by CASA, each balloon must carry radio and be prepared to make its own calls if necessary.

Notes:

- Use ERSA and the most detailed chart available to find the appropriate frequency for any given location.
- CTAF (common traffic advisory frequency) is the frequency to be used within 10NM of a non-towered aerodrome.

- An aerodrome has a published instrument approach procedure if it is listed in DAP (Departure and Approach Procedures) available on [www.airservicesaustralia.com](http://www.airservicesaustralia.com). ERSA is **not** a reliable source for this.
- Balloons are required to remain at least 1,000FT vertically or 1,500m horizontally away from cloud at any height above 500FT AGL. However, carrying radio allows a balloon to fly ‘clear of cloud’ without the restriction of a minimum distance, up to a limit of 3,000FT AMSL or 1,500FT AGL, whichever is higher.

Revision

- VMC, airspace classification, and aerodromes with a published instrument approach procedure (see FRP section of this manual)
- charts and ERSA (see NAV section of this manual).

**Getting the message clearly**

<p><u>Unclear messages</u> When you hear a transmission but cannot understand it clearly (eg, due to burner noise)</p>	<p>Balloon</p>	<p><b><i>‘Station calling Balloon Bravo Alpha Golf Say again’</i></b> or <b><i>‘Canberra Tower Balloon Bravo Alpha Golf Say again clearance details’</i></b></p>
<p><u>Radio check for readability</u> Readability scale (learn it): 1. Unreadable 2. Readable now and then 3. Readable but with difficulty 4. Readable 5. Perfectly readable</p>	<p>Balloon  Tower  Balloon</p>	<p><b><i>‘Canberra Tower Balloon Bravo Alpha Golf Radio check’</i></b>  <b><i>‘Bravo Alpha Golf Canberra Tower Reading you five’</i></b>  <b><i>‘Bravo Alpha Golf’</i></b></p>
<p><u>Standby</u> If unable to respond immediately (eg you need to control the balloon first) say this, then respond again as soon as you can.</p>	<p>Balloon</p>	<p><b><i>‘Standby, Bravo Alpha Golf’</i></b></p>
<p><u>Correction</u> After an error, use the word ‘correction’ before giving the right information</p>	<p>Balloon</p>	<p><b><i>‘Balloon Bravo Alpha Golf Climb to two thousand Correction three thousand’</i></b></p>

## Frequency management

Outside controlled airspace, change between Area frequency and CTAF as needed. There is no requirement to advise the change. In controlled airspace as below:

<u>Changing frequency</u> In controlled airspace as requested by ATC	Tower	<b><i>'Balloon Bravo Alpha Golf Adelaide Tower contact Adelaide Approach on &lt;frequency&gt;'</i></b>
<i>If you fail to establish contact on the new frequency, you must return to the previous frequency and advise ATC.</i>	Balloon	<b><i>'Bravo Alpha Golf changing to &lt;frequency&gt;'</i></b>

## Position reports

A position report is a common form of radio message used to indicate your present position and intentions.

<u>Position report includes</u> location and 'traffic' your aircraft and callsign your position your altitude your heading your intentions <u>repeat</u> your location	<b><i>'Forbes traffic Balloon Juliet Sierra Delta 2 miles west at one thousand five hundred heading northwest for local flight Forbes'</i></b>
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To avoid confusion, say the location twice in the message. Remember the location refers to the **aerodrome**, not the town which may have the same name. Your distance and direction are always given **from the aerodrome** unless you specify otherwise. Distance is said as **'miles'**, meaning nautical miles.

## Readback

The following items of information and instructions from Air Traffic Services must be read back exactly as you receive them:

READBACK ITEM	EXAMPLE
altitude	<b><i>'three thousand'</i></b>
altitude limit	<b><i>'not above four thousand five hundred'</i></b>
clearance limits	<b><i>'remain west of the operating line'</i></b>
clearance expiry time	<b><i>'clearance void at time two two three zero'</i></b>
QNH	<b><i>'QNH one zero two four'</i></b>
Transponder setting	<b><i>'Squawk code one two zero zero'</i></b>

## Operations outside controlled airspace (away from aerodromes)

Maintain a listening watch on the **area frequency** (shown on charts). Broadcast a position report if you see or hear another aircraft nearby, and respond to calls by other aircraft as appropriate to maintain operational safety.

## Operations in the vicinity of non-towered aerodromes

New procedures for operating near aerodromes were introduced in November 2005.

A **non-towered aerodrome** is any aerodrome at which air traffic control is not operating, including:

- In controlled airspace outside tower operating hours, or
  - In class G (non-controlled) airspace, where ATC is not normally provided.
- New operating rules apply to both these situations since November 2005.

An aircraft is **in the vicinity of** a non-towered aerodrome if it is within a horizontal distance of 10NM and within a height that could result in conflict with operations at the aerodrome.

Within 10NM of a non-towered aerodrome use the **CTAF (common traffic advisory frequency)** shown for the aerodrome in ERSA and on charts. **If no CTAF is shown, use Multicom 126.7MHz.** You must give a position report when taking off or entering within 10NM. After the initial report you do *not* automatically respond to other aircraft nearby (as used to be the rule) but **only respond as appropriate to maintain operational safety and avoid conflict.** To be able to decide when it is appropriate to respond, you need to understand typical aircraft movements and the radio phrases used to describe them, to identify where other aircraft are and where they wish to go next

Note:

- 'CTAF' no longer refers to airspace boundaries, so no lines are shown on charts. Former MBZ (mandatory broadcast zones) no longer exist – CTAF procedures apply at these aerodromes.
- Remember that within 3NM of an aerodrome a balloon is required to give way to other aircraft in the traffic pattern. On the ground it should avoid taking off; in flight it should climb or descend to avoid other aircraft.)

### Aerodrome traffic patterns

The traffic pattern near an aerodrome is described as a **circuit**. This is **normally a left hand circuit** for the runway in use (a series of left turns, or anticlockwise when viewed from above) **unless ERSA specifies a right hand circuit.**

Aircraft fly at a **circuit height** based on their performance:

- 1,500ft AGL (typically jets or turboprop with airspeed >120 kt)
- 1,000ft AGL (other twin prop and all single prop aircraft)
- 500ft AGL (helicopters and ultralights <55 kt).

Be aware that other passing traffic may use the aerodrome as a waypoint and overfly at altitudes as low as 3000ft.

The **active runway** is the one which allows take off and landing into the wind as nearly as possible. The orientation of the circuit follows from the wind direction and the active runway – ‘final’ is the upwind leg of the circuit which is used for landing, and the other legs are in relation to it. (Note: in light to moderate wind conditions, however, a preferred runway may be chosen because it is sealed or longer, even though it means a crosswind landing.)

The **runway number** is the first two figures of the compass bearing an aircraft is facing when it is lined up on that runway ready for take off or landing. Eg ‘**runway two seven**’ means you are facing compass direction 270°, while the same runway from the opposite direction is facing 090° and so is called ‘**runway zero nine**’. These numbers are shown in the aerodrome diagrams in ERSA, and may be painted on the end of the runway if it has a sealed surface.

The circuit diagram on the following page shows the **legs** or stages of a left hand circuit for runway 27 – **upwind** (immediately after take off), **crosswind**, **downwind**, **base** and **final** (before landing) – and the radio calls which would be made by aircraft in different stages of the circuit. The windsock shows the surface wind direction is from the west, which means aircraft will take off and land facing as near to west as possible. Runway 27 is therefore in use, which determines the orientation of the circuit, with aircraft on the **final** leg flying towards the west. When the wind is from the east, the whole circuit is rotated through 180°.

The non-active side of the circuit (in this case the right hand side) is referred to as the ‘dead side’ for two seven.

In the diagram, aircraft Alpha Alpha Lima (AAL) is reporting **taxiing** (moving on the ground) and will line up **ready for take off** at the downwind end of the runway. Once airborne it will make a series of left turns until it is facing the intended direction of flight and will then **depart the circuit**. Or as shown here it may call ‘**for circuits**’ to indicate it intends to stay in the circuit and practise landings.

Aircraft Echo Lima Romeo (ELR) is joining the circuit at a convenient point depending on the direction it is arriving from. It will normally **join crosswind** by approaching from the north (right side of diagram) across the centre of the runway and making a left turn into the downwind leg, or **join downwind** by approaching from the southwest (upper left of diagram) to join the downwind leg at an angle of about 45°. It will then report as it enters each of the next legs in turn.

Aircraft Delta Lima Mike (DLM) is **turning base** (beginning the base leg) as it prepares to land. It will announce **turning final** or **final** or even **short final** depending on its position in the final approach leg when it makes the call.

This diagram shows some typical broadcasts by aircraft in the circuit of a non-towered aerodrome. From the text of each message you should be able to identify where the aircraft is and where it is heading – and therefore whether you need to respond and take avoiding action. See text on the previous page.

## POSITIONAL BROADCASTS FOR CIRCUIT OPERATIONS AT NON-TOWERED AERODROMES

Watch and listen for other aircraft in the circuit

Fly with transponder on, ALT, 1200

**1 TURNING DOWNWIND BASE AND FINAL**

**Pilot of VH-DLM:**  
*Bacchus Traffic  
 Cessna one seven two  
 Delta Lima Mike  
 turning base \*  
 runway two seven  
 Bacchus*

\* Making your base call when you are turning base makes you more visible to other traffic in the vicinity. If you are unable to make the call while turning, then exclude the word "turning" and make your call as soon as possible when on downwind base and final. Intentions are stated in final call.

**2 INTERCEPTING A "JOINING CIRCUIT" CALL**

(Usually transmitted when established on the first leg after joining the circuit, i.e. crosswind or downwind)

**VH-ELR:**  
*Bacchus traffic  
 Cessna one seven two  
 Echo Lima Romeo  
 joining crosswind  
 runway two seven  
 for circuits*

Having intercepted the "joining circuit" call from VH-ELR, you should sight the aircraft and advise your position if a risk of collision exists. In this scenario, as we have just turned base, we are well clear but call anyway - just to be sure.

**3 TAXIING**

**VH-AAL:**  
*Bacchus traffic  
 Cessna one five zero  
 Alfa Alfa Lima  
 taxiing runway two seven  
 for circuits  
 Bacchus*

You should make additional circuit calls when necessary for traffic purposes. In this situation, VH-AAL may be unaware of your proximity. If in doubt, broadcast your position.

**4 STANDARD POSITIONAL BROADCASTS**

**Pilot of VH-DLM:**  
*Bacchus traffic  
 Cessna one seven two  
 Delta Lima Mike  
 turning final  
 runway two seven  
 Full stop, Bacchus*

He may respond with ...

**VH-AAL:**  
*Alfa Alfa Lima  
 roger  
 I will hold clear of runway two seven*

After landing ...

**VH-DLM:**  
*Bacchus traffic  
 Delta Lima Mike  
 landed and clear  
 Bacchus*

Balloon pilot responsibilities

- Familiarise yourself in advance with the runway layout and circuit direction by reading ERSA.
- As you approach, be aware of the surface wind and which runway is in use. Picture the circuit in relation to that runway.
- If practicable remain above 2,000FT AGL within 3NM of the aerodrome, even if you have approval to operate within these limits.
- When entering within 10NM of any non-towered aerodrome **broadcast a position report** on the CTAF.
- In the vicinity of the aerodrome listen for broadcasts by other aircraft. When required for operational safety **respond with a position report** indicating clearly your altitude and track and how you intend to stay clear of the other aircraft (eg 'not below two thousand').

Faster aircraft such as small public transport jets may make a first radio call from as far away as 30NM rather than the required 10NM. Any aircraft with radio may make a **straight in approach** to landing, without making a circuit. This is advised using the words '**join final**' instead of 'make straight in approach' as previously said. Respond promptly if appropriate, and stay well clear. Remember they may be travelling at 100 to 120 nautical miles an hour (two miles a minute) and may arrive in the circuit area by the time you burn and respond.

Examples of broadcasts on the CTAF (common traffic advisory frequency) in the vicinity of an aerodrome:

<u>Entering within 10NM of the aerodrome</u>	Balloon	<i>'Loxton traffic Balloon Papa Delta Bravo five miles southwest tracking northeasterly climbing to two thousand five hundred to overfly Loxton'</i>
<u>Before taking off within 10NM</u>  (Call again soon after take-off to advise 'airborne' in case the take-off call was not heard)	Balloon	<i>'Loxton traffic Balloon Papa Delta Bravo ready for take-off four miles north tracking northeasterly not above five hundred Loxton'</i>
<u>While within 10NM</u> Respond to other traffic, if appropriate to maintain operational safety and avoid conflict.	Balloon	<i>'Loxton traffic Balloon Papa Delta Bravo overhead Loxton tracking easterly not below two thousand Loxton'</i>

<p><u>Launching from the aerodrome</u> If approved. Note the balloon pilot has chosen to take off away from, rather than across, runway 26 to minimise any effect on other traffic.</p>	<p>Balloon</p>	<p><b><i>‘Benalla traffic Balloon Papa Delta Bravo’ ready for take-off north of runway two six expected track northerly not above one thousand Benalla’</i></b></p>
<p><u>Landing at the aerodrome</u> If approved. Advise intention to land – again avoiding low flight across a runway if there is other traffic.</p>	<p>Balloon</p>	<p><b><i>‘Kimba traffic Balloon Papa Delta Bravo 1 mile east at two thousand heading westerly expect to land east of runway three five Kimba’</i></b></p>
<p>Report landed</p>	<p>Balloon</p>	<p><b><i>‘Forbes traffic Balloon Papa Delta Bravo Landed three miles south Forbes’</i></b></p>

Responses to your broadcasts

Normally a broadcast in the vicinity of an aerodrome will only get a response from another aircraft if that pilot considers it is necessary in order to maintain operational safety. A lack of response does not mean the pilot has not heard the broadcast.

At aerodromes a broadcast may sometimes get a response from the ground. This may be a recorded automatic response giving the aerodrome name to show you are on the correct frequency. Or it may be a live ground-based CA/GRS or UNICOM advisory service (callsign eg ‘Ayers Rock Radio’ or ‘Mildura unicom’), which provides enhanced aerodrome information but does not take responsibility for aircraft separation.

Revision

- Give way rules at aerodromes (see FRP section of this manual), and
- Cruising levels, so you are aware of the directions in which other aircraft are likely to be travelling at different altitudes (see VFG).

## Operations in controlled airspace

Before a proposed flight in controlled airspace a balloon pilot must:

- hold written approval from CASA to operate in that airspace
- prior to inflating the balloon, contact ATC by telephone or radio to advise the planned launch site and likely direction or area of flight, and
- call ATC to obtain a clearance when ready to become airborne.

Unless specifically exempted by CASA, a balloon must carry a **transponder** when operating in controlled airspace within radar coverage (see Using a Transponder later in these notes).

In practice the first contact is typically half an hour or more before take-off, usually by telephone unless the launch site is within line of sight of the control tower. Like other aircraft you should obtain the latest **ATIS** (automatic terminal information service) before contacting the tower, and give the letter indicating which update you have received. You will usually receive an **airways clearance** from ATC in this first call and an ATIS if you do not already have it.

You must then be given **clearance** before you may take off, eg *'Papa Delta Bravo clear for take-off'* or *'Balloon Section become airborne from Weston Park'*. This activates the airways clearance previously received, and can be done by phone if radio contact is not possible on the ground at the launch site.

In airspace such as Canberra where balloons fly regularly, clearance may be given in the first phone call to *'operate and become airborne'*. If this is granted, a second phone call is not required and instead the next contact is for the balloon to **advise by radio when airborne**.

While in controlled airspace you must maintain a **continuous listening watch** and **report flight progress** as required by ATC.

AIP ENR requires that you report any change in the direction of drift which will cause the balloon to diverge from its nominated track or area of operations, as soon as possible and in any case before the track error exceeds 1NM. In practice ATC will not usually expect a precise track, especially in areas where balloons fly frequently.

To cancel SARWATCH (search and rescue procedures) ATC must be notified when you **terminate a flight** in controlled airspace either by landing or by flying out of controlled airspace. If radio contact is not possible this must be done promptly by telephone.

The following examples are given for Canberra control zone. Before a private balloon pilot can be approved to fly in a specific controlled airspace such as Canberra zone, you must receive training and a flight test from an instructor approved by the ABF for this purpose. This includes radio procedures for the zone. Like other aircraft you should obtain the latest ATIS (automatic terminal information service) before contacting the tower, and give the letter indicating which update you have received.

<p><u>Request airways clearance</u> The relevant ATIS should be obtained first by listening on 127.45 MHz. Then telephone the tower or call on 118.7 MHz. For the first contact use their full name 'Canberra Tower'.</p>	<p>Balloon</p>	<p><i>'Canberra Tower Balloon Papa Delta Bravo request airways clearance for flight over the city from Kingston not above three thousand received information Charlie'</i></p>
	<p>Tower</p>	<p><i>'Papa Delta Bravo clearance operate in the zone not above three thousand QNH one zero one eight report airborne'</i></p>
<p>You read back (callsign goes last)</p>	<p>Balloon</p>	<p><i>'In the zone not above three thousand QNH one zero one eight Papa Delta Bravo'</i></p>

<p><u>Report airborne</u></p>	<p>Balloon</p>	<p><i>'Tower Papa Delta Bravo Airborne'</i></p>
<p>Tower acknowledges</p>	<p>Tower</p>	<p><i>'Papa Delta Bravo'</i></p>

<p><u>Request clearance change</u> eg you want to climb to 4,000FT due to lack of wind</p>	<p>Balloon</p>	<p><i>'Tower Papa Delta Bravo request climb four thousand'</i></p>
<p>Tower may then issue an amended clearance</p>	<p>Tower</p>	<p><i>'Papa Delta Bravo operate as required not above four thousand'</i></p>
<p>You read back</p>	<p>Balloon</p>	<p><i>'Not above four thousand Papa Delta Bravo'</i></p>

<u>Other ATC instructions</u> Eg, Tower may require the pilot to sight other traffic prior to descent or climb	Tower	<b><i>'Papa Delta Bravo report sighting a Cessna one seven two 2 miles to your north tracking east at three thousand'</i></b>
	Balloon	<b><i>'Traffic sighted' (or 'traffic copied' if not yet sighted) Papa Delta Bravo'</i></b>

<u>Position Report</u> Tower may request this from time to time	Tower	<b><i>'Papa Delta Bravo report present position'</i></b>
	Balloon	<b><i>'Black Mountain Peninsula tracking west at two thousand five hundred Papa Delta Bravo'</i></b>
Tower acknowledges	Tower	<b><i>'Papa Delta Bravo'</i></b>

<u>Landing report</u> Because a balloon flight is subject to SARWATCH (search and rescue procedures) while in controlled airspace, the pilot must be sure to report promptly at the completion of operations (by radio or phone)	Balloon	<b><i>'Tower Papa Delta Bravo operations completed'</i></b>
Tower will acknowledge And may add	Tower	<b><i>'Papa Delta Bravo' 'SARWATCH terminated'</i></b>
In which case you acknowledge	Balloon	<b><i>'Papa Delta Bravo'</i></b>

<u>Flying out of the zone</u> (instead of landing in it)  This advice also cancels SAR	Balloon	<b><i>'Tower Papa Delta Bravo seven miles northwest tracking west leaving the zone'</i></b>
Tower acknowledges	Tower	<b><i>'Papa Delta Bravo'</i></b>

**Flying into controlled airspace**

If you expect to fly **into** controlled airspace, you should obtain airways clearance before launching. However, a clearance may be requested in flight provided there is still plenty of opportunity to land **outside** controlled airspace in case the clearance is not given. As above you should obtain the latest ATIS (automatic terminal information service) before contacting the tower, and give the letter indicating which update you have received.

<u>Request airways clearance during flight</u>	Balloon	<i>‘Canberra Tower Balloon Papa Delta Bravo airborne Hawker tracking southeasterly request airways clearance to operate in the zone not above three thousand Received information Charlie’</i>
Clearance given	Tower	<i>‘Papa Delta Bravo clearance operate in the zone not above three thousand remain west of the operating line QNH one zero two seven’</i>
You read back	Balloon	<i>‘Not above three thousand remain west of the operating line QNH one zero two seven Papa Delta Bravo’</i>

**Using a transponder**

Unless specifically exempted by CASA, a balloon must carry a **mode C transponder** when operating in controlled airspace within radar coverage. A transponder is an instrument that sends a specific coded signal or **squawk** in response to secondary surveillance radar (**SSR**) units that are installed at major aerodromes and other locations to provide radar coverage of the east coast from Cairns to Adelaide. The mode C feature gives ATC your current altitude in addition to your horizontal location, to assist them in separating you from other aircraft.

Transponder controls

The **code setting** is a four figure number given in the airways clearance and is selected similar to a radio frequency. When changing codes always set the main switch to **SBY** (standby).

Always remain on **ALT** during flight operations as the ON position does not send the altitude information.

Press the **IDT (ident)** button briefly when asked to ‘squawk ident’.

<u>Receiving a transponder code</u> This information will be included in the airways clearance, and must be included in your readback	Tower	<i>'...Squawk code two three three four'</i>
	Balloon	<i>'...Squawk code two three three four Papa Delta Bravo'</i>
<u>When ATC checks your signal on their radar screen</u>  You reply with callsign last – and then promptly press the IDT button on your transponder	Tower	<i>'Papa Delta Bravo squawk ident'</i>
	Balloon	<i>'Squawking ident Papa Delta Bravo'</i>

#### Emergency transponder codes

7500 hijacking

**7600 radio failure**

7700 distress situation

remembered as '75 taken alive'

“ ‘76 transmit nix’

“ ‘77 gone to heaven’.

### **Communication failure**

If you are unable to establish or maintain VHF contact you should:

- check your radio has power, then check the control settings and any connections.
- if still no contact, assume your transmitter is OK and prefix calls with 'transmitting blind' to indicate you are not receiving incoming signals.
- in controlled airspace squawk 7600 if you are carrying a transponder.
- continue to transmit your position and intentions as appropriate to keep ATC or other aircraft informed.
- make a safe landing as soon as practicable if you are flying in an area where radio is required.
- if another balloon or your retrieve crew can receive VHF, use your CB radio to check that your VHF transmitter is operating correctly and, in particular, is not "open mike".

<u>Communication failure</u>	Balloon	<i>'<b>Canberra Tower</b> (or All stations Mildura) <b>Balloon Romeo Tango Foxtrot transmitting blind</b> &lt;position and intentions&gt;'</i>
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If you are instructed to change frequency and fail to establish contact on the new frequency, you must return to the previous frequency and advise ATC.

**Emergencies**

Under international regulations for the use of aircraft radio, you must:

- assist persons in distress, and
- maintain radio silence on intercepting distress or urgency messages ('Mayday' or 'Pan') unless you are required to relay the message.

Distress or urgency calls are first made on the frequency in use at the time. If this is unsuccessful use the **VHF distress frequency 121.5 MHz** which is monitored by most airlines.

<p><u>Distress call</u></p> <p>If no answer to a distress or urgency call, advise frequency change and then repeat your broadcast on 121.5 Mhz.</p>	<p>Balloon</p>	<p><i>'Mayday Mayday Mayday &lt;station being called&gt; &lt;your callsign&gt; &lt;nature of distress&gt; &lt;intentions&gt; &lt;position, altitude, heading&gt; &lt;other useful information&gt;'</i></p>
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<p><u>Urgency call</u></p>	<p>Balloon</p>	<p><i>'Pan Pan Pan Pan Pan Pan &lt;station being called&gt; &lt;your callsign&gt; &lt;nature of urgency&gt; &lt;intentions&gt; &lt;position, altitude, heading&gt; &lt;other useful information&gt;'</i></p>
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<p><u>Relaying emergency calls</u></p> <p>On hearing an emergency call, stop transmitting and maintain radio silence. If a call is not answered, you should relay the call, i.e. pass on the details to someone who can assist further.</p> <p>If a call is addressed to 'all stations' you should be ready to respond and assist.</p>	<p>Balloon</p>	<p><i>'Mayday relay Mayday relay Mayday relay Canberra Tower Balloon Romeo Tango Foxtrot Cessna Kilo Alpha Papa reports engine failure making emergency landing 2 miles north Hall township I have Cessna in sight will relay and report progress'</i></p>
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## Crew Radios

VHF airband radio is not suitable or permitted for communicating between a balloon and its ground crew. Although there is a VHF 'chat' frequency (123.45 MHz), it is limited for use between aircraft by licensed operators.

**40 channel UHF** is the usual way for balloon pilots in Australia to communicate with each other and with their ground crew. Also known as 'CB' (citizens band 476.425 – 477.400 MHz), it is a cheap, short distance, line of sight system which may be used by anyone and does not require an operating licence. It is popular with 4WD owners, truckies, farmers and other rural users.

Transmissions are very informal, but profane or obscene language is not allowed and common sense and courtesy should be used when sharing channels with other users. If you find a channel is busy, you can simply change to another. You should be aware that:

- **channels 5 and 35 are for emergency use only**, monitored by volunteers who will contact emergency services if needed
- channel 11 is reserved for initial contact before switching to another channel
- channels 1-8 are repeater station output channels, and 31-38 are the corresponding input channels.

**Repeater stations** are placed on hilltops or high points to significantly extend the UHF operating range. A repeater receives on a specific channel and then transmits on a channel thirty places down the list (eg, receives channel 31, transmits channel 1), a system known as duplex. To use a repeater you and the person you are talking to must each switch your UHF radio to **duplex** mode. Farmers and other UHF users will tell you the local repeater frequencies. It is preferable to avoid using a repeater channel unless you are in duplex mode.

## Ballooning in remote areas

Long distance flights over remote areas, such as record attempts, will require special planning outside the scope of this manual.

For a local flight in a remote area you should ensure you have adequate communication with your ground crew, both in flight and after landing. A satellite telephone is an alternative to UHF radio for remote area communications. It can also be used to connect a laptop computer to the internet to obtain weather forecasts and NOTAM.

Designated remote areas are shown and discussed in the VFG. Aircraft flying in a remote area must carry either HF radio or a form of emergency beacon (refer CAO 20.11). It may be acceptable to do without these if you have reliable communication with a nearby ground retrieve crew.

### Emergency beacons

The most practical form of emergency beacon for ballooning is probably an **ELT** (emergency location transmitter) or an **EPIRB** (emergency position indicating radio

beacon). It is typically pocket sized, battery powered and manually operated. When switched on it sends a coded emergency radio signal via satellite to alert emergency services and indicate your position for rescue. An EPIRB may use 2 or 3 frequencies (usually 121.5Mhz and 243Mhz are included), and should last for 2 or more days continuous use. EPIRBs are available from most aviation and marine suppliers. Note that digital beacons operating on 406 MHz will be the only type of beacon that will be detected by the satellite system from February 2009.

High Frequency (HF) aircraft radio

Aeronautical band HF radio may be effective when outside VHF range (as shown on Planning Chart Australia). The ABF ROC is limited to VHF radio only.