New Zealand Hang Gliding and Paragliding Association Inc

TM01
Aviation Radio Operator (ARO) Rating
for
Paraglider & Hang Glider pilots
Technical Manual and Study Guide

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SECTION 1 Introduction

Aims:

To improve safety and good airmanship through clear and appropriate communication by Paraglider and Hang Glider pilots using airband radio.

This course and exam is to assure NZHGPA that you have understood the requirements to use an airband radio and will operate it correctly. It is also to provide you with practice and review, as correct use in flight can be complex without practice and when also having to fly at the same time.

Limitations:

This certificate is limited to airband radio use by pilots flying hang gliders, paragliders or powered versions of both **outside** Controlled Airspace (i.e in Class G only) and outside any transponder mandatory airspace (TM) unless prior arrangements have been made with ATC.

For airband radio use within any Controlled Airspace either the RAANZ FRTO or the Private Pilots License FRTO is required.

SECTION 2 Radio Theory

What is meant by “Radio”?

The transmission and reception of electromagnetic waves of radio frequency, especially those carrying sound messages.

A radio transceiver is a radio device that can both receive and transmit radio signal.

Advantages over other forms of communication:

- communication over distance
- no wires or other infrastructure (cell sites etc)
- can be portable
- no cost to use once you have the unit,
- can get units designed to be operated easily with gloves on (unlike a phone),
- can communicate with many people at once

Disadvantages:

- often limited by line of sight,
- batteries can go flat
- size / weight /regulations limit power = distance
- interference from other people / transmitters
- lack of privacy

When two people transmit at the same time on the same frequencies, the signals mix. In which case the receiving station hears an unintelligible mess but the two talking will not be aware of it. The person who talks longer won't be aware at all and if both people talk for similar time, neither may be aware.

If one person is a lot closer (and hence has a stronger signal) they may over ride the weaker signal.

Generally, be aware that when you are transmitting, no one else can talk. Do not clog up the airwaves!

The exception to formal radio procedures is when using the dedicated Hang Glider or Microlight channels, conversation is OK.

Frequencies

Radios operate at a wide range of frequencies. The frequency used depends on a number of factors.

Antenna size is one – the lower the frequency, the longer the wavelength = the longer the antenna.

Hand held radios are limited to short antennas, and to use a short antenna you need a short wavelength, which means a high frequency.

The frequencies are divided up into a number of “bands”:

HF

High frequency (HF) is the International Telecomunnication Union (ITU) designation for the range of radio frequency electromagnetic waves (radio waves) between 3 and 30 MHz. HF is actually the lowest of the frequencies commonly used, with the longest wavelength.

HF radio is used for first-line and backup communications over long distances - only HF is capable of communicating over distances of 3000 km or more due to skywave and ground wave propagation.

Not available as a “Walkie talkie” transceiver, so not useful for small aircraft or other mobile application.

VHF

Very high frequency (VHF) is the ITU designation for the range of radio frequency electromagnetic waves (radio waves) from 30 MHz to 300 MHz, with corresponding wavelengths of ten to one meters

Common uses for VHF are FM radio broadcasting, television broadcasting, two way land mobile radio systems (emergency, business, private use and military), long range data communication up to several tens of kilometres with radio modems, amateur radio, and marine communications. Air traffic control communications and air navigation systems (e.g. VOR, DME & ILS) work at distances of 100 kilometres or more to aircraft at cruising altitude.

TV use of VHF was phased out in NZ in 2013.

VHF transmission range is a function of transmitter power, receiver sensitivity, and distance to the horizon, since VHF signals propagate under normal conditions as a near line-of-sight phenomenon. The distance to the radio

horizon is slightly extended over the geometric line of sight to the horizon, as radio waves are weakly bent back toward the Earth by the atmosphere.

VHF is the first band at which wavelengths are small enough to make efficient transmitting antennas for vehicles and handheld devices, so the VHF and UHF wavelengths are used for two way radios in vehicles, aircraft, and handheld transceivers and walkie talkies. Portable radios usually use whips or rubber ducky antennas, while base stations usually use larger fiberglass whips or collinear arrays of vertical dipoles.

Altitude improves the communication distance as the line of site is greatly increased. Physical terrain features such as mountains can significantly reduce it.

World wide the following frequencies are allocated to:

108–118 MHz: Air navigation beacons VOR and Instrument Landing System localiser.

118–137 MHz: Airband for air traffic control, AM, 121.5 MHz is emergency frequency

144–146 MHz: Amateur radio. (Ham radio) In some countries 144–148 MHz.

Marine Radio is VHF FM

Marine VHF radio refers to the radio frequency range between 156.0 and 162.025 MHz, inclusive. In the official language of the International Telecommunication Union the band is called the VHF maritime mobile band

UHF

Ultra high frequency (UHF) is the ITU designation for radio frequencies in the range between 300 MHz and 3 GHz, also known as the decimetre band as the wavelengths range from one meter to one decimetre. UHF radio waves propagate mainly by line of sight; they are blocked by hills and large buildings although the transmission through building walls is high enough for indoor reception. They are used for television broadcasting, cell phones, satellite

communication including GPS, personal radio services including Wi-Fi and Bluetooth, walkie-talkies, cordless phones, and numerous other applications.

The main advantage of UHF transmission is the short wavelength that is produced by the high frequency which means that the UHF antenna is stubby and short.

The major disadvantage of UHF is its limited broadcast range, line-of-sight only. VHF does have a longer broadcast range.

UHF CB is a general user licensed (GURL) citizen's band radio service authorised by the governments of Australia, New Zealand, Vanuatu, and Malaysia in the UHF 477 MHz band. Also known as personal radio service (PRS). Handheld transceivers (walkie talkies) are permitted and can have transmit power from 500 mW to 5 W (full legal power) and are relatively cheap. Other countries such use different frequency alocations so don't assume you can use an imported PRS radio in New Zealand or a NZ radio overseas.

There is also a **SHF** (super high frequency) band and so it goes on.

Simplex versus duplex?

VHF mostly uses "simplex" transmission, where communication can only take place in one direction at a time. A transmit button on the set or microphone determines whether it is operating as a transmitter or a receiver. Some channels, however, are "duplex" transmission channels where communication can take place in both directions simultaneously when the equipment on both ends allow it (full duplex), otherwise "semi-duplex" is used where the transmit button must still be pressed to talk.

Repeaters

A radio repeater is a combination of a radio receiver and a radio transmitter that receives a weak or low-level signal and retransmits it at a higher level or higher power, so that the signal can cover longer distances without degradation.

Repeaters use “duplex” frequencies. The repeater receives on one radio frequency (the "input" frequency) and simultaneously re-transmits the information on its "output" frequency. All stations using the repeater transmit on the repeater's input frequency and receive on its output frequency. Since the repeater is usually located at an elevation higher than the other radios using it, their range is greatly extended. This also allows communication between two units without direct line of sight, as long as both units have line of site to the repeater.

Channels versus frequencies

Channels are dedicated frequencies that for ease of use have been given common channel numbers. Marine Radio & UHF radio frequencies are commonly referred to by their channel number, and many channels have a defined use.

Airband radio is referred to by frequency.

FM versus AM

AM (or Amplitude Modulation) and FM (or Frequency Modulation) are ways of broadcasting radio signals. Both transmit the information in the form of electromagnetic waves. AM works by modulating (varying) the amplitude of the signal or carrier transmitted according to the information being sent, while the frequency remains constant. This differs from FM technology in which information (sound) is encoded by varying the frequency of the wave and the amplitude is kept constant

The advantages of AM radio are that it is relatively easy to detect with simple equipment, even if the signal is not very strong. The other advantage is that it has a narrower bandwidth than FM, and wider coverage compared with FM radio. The major disadvantage of AM is that the signal is affected by electrical storms and other radio frequency interference. Also, although the radio transmitters can transmit sound waves of frequency up to 15 kHz, most receivers are able to reproduce frequencies only up to 5kHz or less. Wideband FM was invented to specifically overcome the interference disadvantage of AM radio.

A distinct advantage that FM has over AM is that FM radio has better sound quality than AM radio. The disadvantage of FM signal is that it is more local and cannot be transmitted over long distance. Thus, it may take more FM radio stations to cover a large area. Moreover, the presence of tall buildings or land masses may limit the coverage and quality of FM. Thirdly, FM requires a fairly more complicated receiver and transmitter than an AM signal does.

Most VHF radios are FM, however whilst Airband is VHF, it is **AM**

*Note that you can buy VHF radios that appear to operate in the Airband frequencies, however if it is FM, whilst you can receive, you will **not** be heard more than a few meters away when transmitting. It is difficult to build a transceiver that operates on both AM & FM as it would require two separate circuits. Important to check before you buy!*

Licensing

Use of the radio frequencies in NZ is administered by the Radio Spectrum Management unit under the Radiocommunications Act (1989). Within this, New Zealand aircraft are covered by a General User Radio Licence (GURL), and UHF CB is covered by a separate one. General User Licensing means that users do not have to apply for a license or pay a license fee however they must comply with the regulations of the licence. The GURL for airband radio requires that the operator hold an appropriate radio operator's qualification.

In simple terms, persons operating an airband radio must hold a certificate of competency and only use the radio for aeronautical purposes except in an emergency.

The following frequencies have been allocated for specific purposes on a national basis, and communications must conform to these provisions.

Frequency (MHz) Service Allocations

119.100 Unattended airfields

128.950 Aircraft to aircraft only

133.350 Hang-gliders (includes paragliders)

133.375 Microlights (recommended for Powered paragliders and hang-gliders)

133.400 Balloons

133.450 Parachutists

133.500 Radio reporter

133.525 Radio reporter

133.550 Gliders (aka sail planes)

133.575 Radio Reporter

133.600 Radio reporter

133.625 Parachutists

134.000 General air-to-ground and air-to-air

134.350 Forest fire fighting

134.450 Gliders

134.475 Gliders

134.500 Unattended airfields

134.550 Forest fire fighting

134.600 Forest fire fighting

134.750 Forest fire fighting

134.850 Gliders

134.875 Gliders

134.900 Fish spotting

134.950 Air patrol

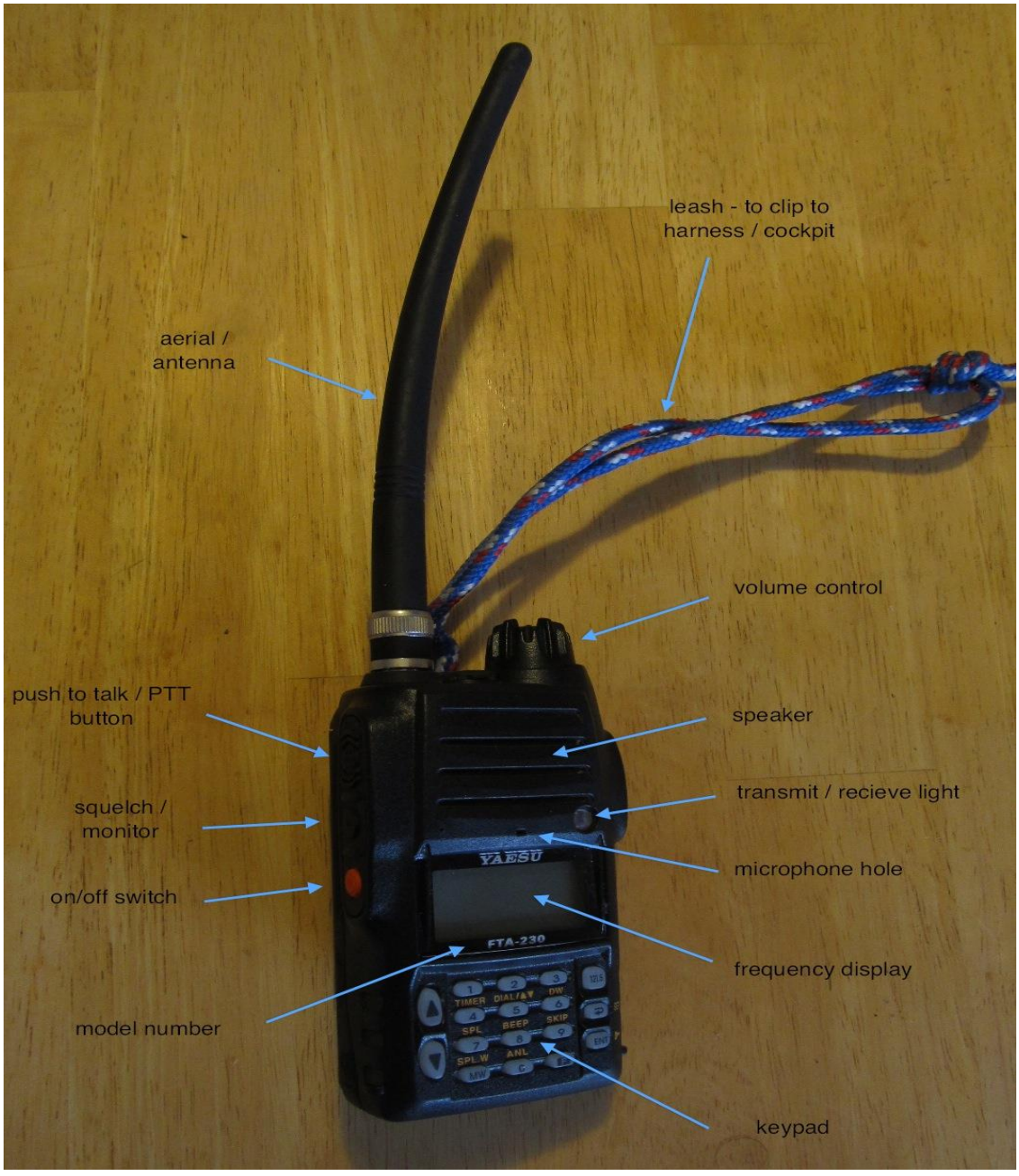
Note: Except for 128.950 MHz, land mobile and maritime mobile transmitters may also use these frequencies to communicate with aircraft for the purpose specified.

In accordance with International Civil Aviation Organisation (ICAO) Standards and Recommended Practices, aircraft are required to continuously guard the international emergency frequency 121.5 MHz. This requirement does not apply when aircraft are carrying out communications on other VHF channels, or when airborne equipment limitations or cockpit duties do not permit simultaneous guarding of two channels.

Hence Hang-glider & Paraglider pilots are exempt from this rule as limited space and multiple duties make this very difficult.

SECTION 3 Equipment

Airband radios come as both cockpit /desk mounted units and as hand held transceivers. Hang Gliders & Paraglider pilots use hand held units for obvious reasons.



All radios should have:

On / Off switch – turns the unit on and off

Volume control (which may incorporate the ON/OFF switch) – adjusts the speaker volume, too loud and it is too distracting, and may distort. Too quiet and you can't hear it over the wind noise.

Squelch control (this may be automatic, or within a menu setting) - this removes "noise" from the signal. If it is set too high it may remove faint signals completely. If it is set too low you get a lot of white noise as well as the main signal.

Frequency selector - this may be a keypad or a knob. You may also be able to save frequencies as channels and this is a channel selector. Make sure it can be locked whilst in flight so you don't change frequency accidentally.

A visual indicator that the unit is transmitting or receiving – this is normally a light on the unit, or the display becomes backlit.

Microphone – a group of small holes on the front of the unit, or in the headset. You may find it improves clarity if you cover this with foam or neoprene.

Speaker – on front of the unit, or part of the headset

Push To Talk (PTT) button / transmit button – on the side of the unit, or part of the head set. Some people set up a button that they can hold in their hand in conjuction with a headset.

Some have a headset with the microphone and speaker separate from the main unit. Some headsets appear to reduce the pickup from the microphone, or add noise to the signal – test how loud and how close you need to talk to it to be heard clearly before you fly.

Make sure you are familiar with the controls before you fly and know how the PTT button feels when it is pressed.

Factors that affect the effectiveness of your radio:

- Transmitter power - smaller is generally less powerful, not an issue if you are flying locally as line of sight is very good in the air.
- Aerial size / type – a good antenna makes a big difference, but longer ones are more fragile

- Battery life – radio specific Lithium rechargeables last longer than AA, but harder to get spares and have to be more prepared to have them charged and ready for when you need them.
- Robustness – maybe take the antenna and battery off when packed, keep it dry (not many airbands are waterproof), pack it within your cockpit or a protective pouch

Specific issues for paragliders and hang glider pilots:

- Wind noise – use foam / neoprene covers
- Weight – technology keeps improving though!
- Access to radio in flight – get a proper pouch for it, Velcro to flight deck, remote speaker / microphone / handsfree kit. Test if you can change channel in flight easily. Test if you can accidentally change too.
- Dangers of VOX – wind noise and instruments can activate it, as can you swearing or gasping, or talking to yourself when nervous. That in not only embarrasing but it locks out the channel for other users. A pox on vox – don't use it.
- If you fly with a full face helmet with a visor, then a head set as part of your helmet is required for you to be audible and hear responses
- If you fly with a UHF radio as well and use a headset, you will need a suitable switch or electronics to switch your head set between radios. If you do not have this, then do not use the UHF radio during flights where you are required to use Air Band radio

Note: Powered paraglider and hang glider pilots have the issue of engine noise to consider, so often use headsets =]

and noise cancelling microphones to reduce this.

SECTION 4 Aviation radio

Aircraft Identification - Callsigns

Aeronautical identifications for most aircraft are allocated directly by the Civil Aviation Authority (CAA). All New Zealand registered aircraft are in the ZK range with three alpha characters. i.e. ZK-PDM.

In New Zealand Aircraft Registration Marks are allocated in alphabetical sequence according to the class of aircraft as follows:

ZK-A**, ZK-B**, ZK-GA*, and ZK-HA* are historical marks. Since 1987 these marks have been reserved for historical aircraft including helicopters and gliders. This is to enable the original aircraft to regain its original mark upon restoration.

ZK-FA* and ZK-FB* marks are reserved for balloons (they may also use a fixed wing mark upon request).

ZK-G** marks are reserved for gliders.

ZK-H** and ZK-I** marks are reserved for helicopters.

ZK-RA*, ZK-RB*, ZK-RC*, and ZK-RD* marks are reserved for gyrocopters.

All ZK-Q** marks are not available for use – prohibited by ICAO.

All other marks are available for fixed wing aircraft.

You also get flight number based callsigns for the larger commercial aircraft. This is where a pilot will lodge a flight plan using the airline operator's ICAO code with the flight number appended. For example, an Air New Zealand flight from Auckland to Wellington would be shown on the airline schedules and in the terminal as NZ419.

For Paragliders and Hang Gliders your callsign is allocated in Part 106 as your PIN. Eg 2027

When first communicating, pilots flying high-performance aircraft (or very slow aircraft – that's us) should state their aircraft type – using its common name, not the ICAO aircraft designator. For instance, "Navajo" or "Chieftain" should

be used instead of “PA-31”, as few pilots would know what a PA-31 was, and therefore may not adjust their flight spacing accordingly. You can get a full list of the ICAO aircraft types online if interested.

Hence use “paraglider” or “hang glider” or “paramotor” before the PIN in your first communication. The word “glider” is recognised by most other aircraft pilots as being unpowered. Once communication is established then just the PIN is sufficient.

Ground Station Callsigns

Ground stations are identified by the name of the location followed by the service available as follows:

CONTROL	Area and approach control, including area and approach radar
APPROACH	Approach control where provided as a separate function
ARRIVAL	Approach control radar arrivals
DEPARTURE	Approach control radar departures
TOWER	Aerodrome control or aerodrome and approach/area control where these services are provided from an aerodrome control tower
GROUND	Surface movement control including clearance delivery
RADAR	Area or approach control radar on a discrete frequency
FLIGHT SERVICE	Aerodrome flight information service (AFIS)
INFORMATION	Area flight information service
DELIVERY	Clearance delivery
RADIO	Air–ground service

The name of the location or the service may be omitted once satisfactory communication has been established.

More useful aviation abbreviations & terms:

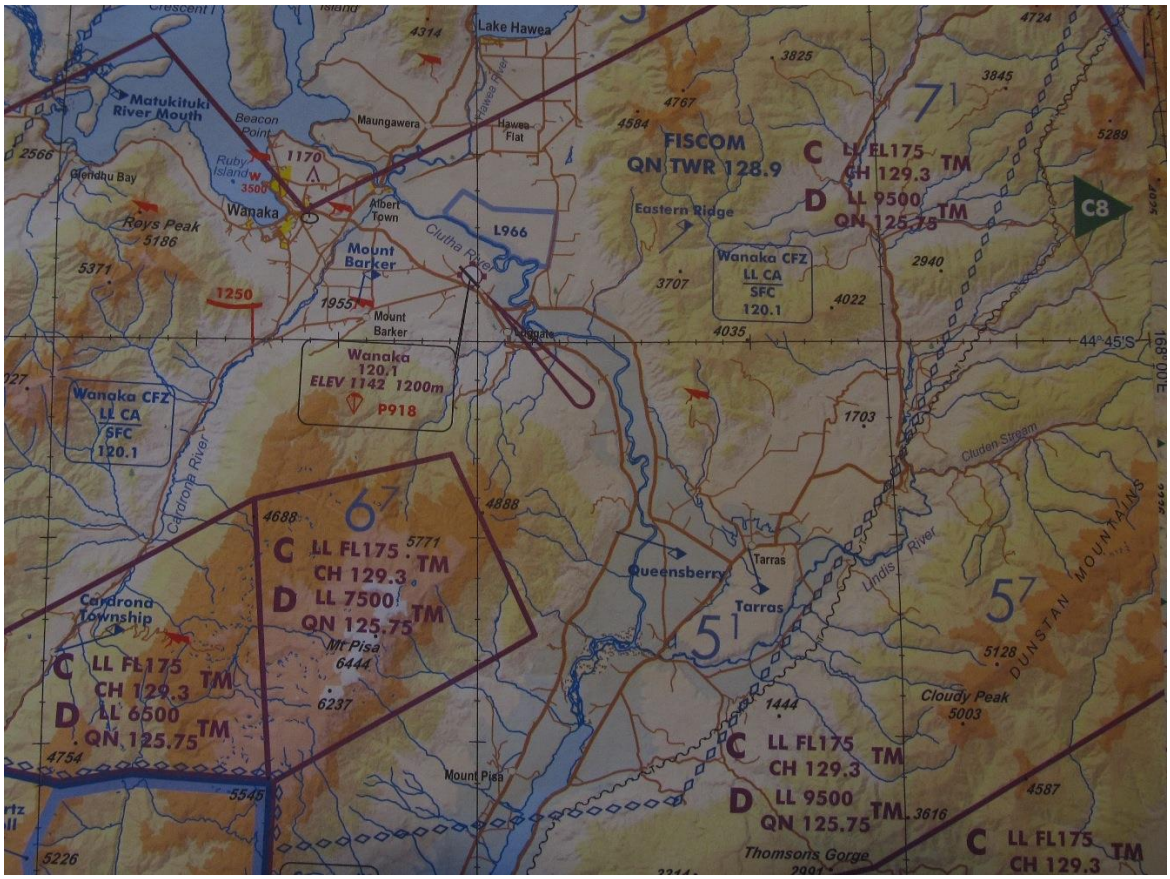
ACAS	Airborne Collision Avoidance System
AIP	Aeronautical Information Publication
AMSL	all altitudes are above mean sea level
ATC	Air Traffic Control
ATS	Air Traffic Services
ATIS	Automatic Terminal Information Service
AWIB	Aerodrome and Weather Information Broadcast
CFZ	Common Frequency Zone
CTA	Control Area
CTR	Control Zone
DI	Direction Indicator
FISB	Flight Information Service Broadcast
FISCOM	Flight Information Service Communications
FL	Flight Level (hundreds of feet)
GAA	General Aviation Area
IFR	Instrument Flight Rules
LFZ	Low Flying Zone
MBZ	Mandatory Broadcast Zone
MOA	Military Operating Area
NORDO	Non-radio equipped
RTF	Radio telephone
TLOF	Touchdown and Lift-Off Area
TM	Transponder Mandatory
UNICOM	Universal Communication Service
VFR	Visual Flight Rules
VNC	Visual Navigation Chart
VRP	Visual Reporting Point

Aeronautical charts / VNC

Remember your VFR exam?

First get the right charts. Not all information for flight below 9500ft is shown on the 1:500 000 charts so make sure you get the 1:250 000 charts. These have a prefix letter C and a number relating to the area it covers. E.g. The GA at Moirs Hill (G152) will be found on C3 Auckland 1:250 000 but not on the B chart 1: 500 000. Go to https://shop.aeropath.aero/ to view and purchase charts.

On an aeronautical chart, each airspace area will have a frequency assigned to it. Note sometimes different frequencies may apply at different altitudes.



You can find the relevant frequency under the area label, with a prefix designating the control authority if applicable.

Eg:

C LL FL175

CH 129.3

Or

Wanaka CFZ

LL CA

SFC

120.1

The radio frequency is always a number in the format **1xx.x**

Control Zones / Areas (Class A, C or D airspace)

- If you are the holder of this NZHGPA Aviation Radio Operator (ARO) rating you are not permitted to enter controlled airspace.
- If you are the holder of a flight radio telephone operator (FRTO) rating issued by microlight or general aviation organisation under Part 61 you may only enter controlled airspace with prior approval from the appropriate ATC.

As a PG or HG pilot, entry to controlled airspace can only be gained by prior approval, usually in the form of a written Memorandum of Understanding (MOU). Do not call up on the radio at the boundary of controlled airspace and expect clearance to enter without such prior approval.

Transponder Mandatory (TM).

All class A, C or D airspace is Transponder Mandatory. You must have **specific authorisation** from ATC before you can enter any TM airspace without a transponder. Clearance is at the discretion of ATC and it is very unlikely to be granted to HG or PG unless there are special circumstances (e.g a written MOU).

Note: Some MBZs are also transponder mandatory (TM) and as there is no ATC unit controlling these areas you **cannot** get clearance to enter without a working transponder.

Hence this study guide does not cover the radio procedures within Class A, C or D airspace or any other TM airspace unless it is done under a specific MOU that allows such flights. If you are expecting to fly in controlled or TM

airspace that is not under an MOU you will need to obtain a Private Pilots Licence FRTO rating (Flight Radio Telephone Operator).

Mandatory Broadcast Zones

A Mandatory Broadcast Zone (MBZ) is an area designated within uncontrolled airspace with high density air traffic movements; for example at a busy uncontrolled aerodrome or in an area of intensive tourist operations. Separation of aircraft is maintained through visual flight rules and a heightened situational awareness requiring pilots to broadcast their position, altitude and intentions on a specific frequency and at intervals shown on the Visual navigation Chart (VNC).

This is the most common type of airspace that Hang Gliders and Paragliders may use that requires the use of an airband radio.

Rule 91.135 *Mandatory broadcast zones*

(a) Except as provided in paragraphs (b) and (c), a pilot must not operate an aircraft within a mandatory broadcast zone designated under Part 71 unless that pilot—

(1) makes the following broadcasts on the radio frequency assigned to the mandatory broadcast zone:

(i) at entry – **the aircraft callsign, position and altitude, and the pilot's intentions** for flight within the mandatory broadcast zone,

(ii) when joining the aerodrome traffic circuit of an aerodrome within the mandatory broadcast zone – the aircraft callsign, position and altitude, and the pilot's intentions,

(iii) before entering a runway for take-off from an aerodrome within the mandatory broadcast zone – the aircraft callsign, the runway to be used for take-off, and the pilot's intentions for flight within the mandatory broadcast zone after take-off; and

(iv) at any other time and at least at the intervals prescribed for the mandatory broadcast zone – **the aircraft callsign, position and altitude, and the pilot's intentions for flight within the mandatory broadcast zone**; and

(2) maintains a listening watch on the radio frequency assigned to the mandatory broadcast zone; and

(3) activates, if equipped, the aircraft's landing lights or anticollision lights.

(b) Pilots of aircraft in formation may operate within a mandatory broadcast zone without complying with paragraphs (a)(1) and (a)(2), but only if—

(1) all the pilots of the aircraft in formation comply with paragraph (a)(3); and

(2) the pilot of the lead aircraft complies with paragraphs (a)(1) and (a)(2).

Note: "Formation" means within 1nm horizontally and 100ft vertically of the formation leader.

(c) A pilot-in-command of an aircraft without an operable radio may operate within a mandatory broadcast zone for the purpose of enabling repairs to be made to that radio, but only if—

(1) the pilot-in command complies with paragraph (a)(3); and

(2) if practicable, the pilot-in-command arranges for another person to make the broadcasts required in paragraph (a)(1) on the pilot's behalf.

The reporting frequency for a MBZ is found on the relevant airspace map, in the Visual Flight Guide (VFG) or the Good Air Practice (GAP) for that area.

Example Position Report: "PARAGLIDER TWO ZERO TWO SEVEN, WAKEFIELD RIDGE, SIX THOUSAND FEET, MAINTAINING"

Translated:

PARAGLIDER 2027: Paraglider, pin number 2027

WAKEFIELD RIDGE: current position is above Wakefield ridge (near Mt Cook),

6000 feet: at 6000 feet AMSL

MAINTAINING: intentions are to remain in this area for a while, eg thermalling.

Example Position Report: "PARAGLIDER FOUR ZERO TWO, MUELLER HUT, EIGHT THOUSAND FEET, HEADING WAKEFIELD"

PARAGLIDER 402: Paraglider, pin number 402

MUELLER HUT: above Mueller hut (behind the hermitage at Mt cook)

8000 FEET: at 8000 feet AMSL

HEADING WAKEFIELD: going on glide towards Wakefield ridge.

Common Frequency zones.

Designated “CFZ” on aeronautical charts.

Self explanatory really – a common frequency so that you can communicate with other aircraft in the area. No legal requirement to broadcast, but if you do have a radio you should be listening on this frequency. And if you call on the frequency, you should be using standard terminology. NOT A CHAT CHANNEL.

Avoid verbose accounts of your intentions as these will only cause frequency congestion. In many parts of the country there may be several adjacent areas and aerodromes using the same frequency.

Position Reports Recommended

The pilot of an aircraft operating under VFR is *recommended* to report position at regular intervals:

(a) when on a cross country flight; *and*

(b) to the TWR when on a local flight

As Paragliders and hang gliders may not have been seen by pilots of faster aircraft NZHGPA also recommends that you broadcast a position report on a CFZ, or in a MBZ, when you see, or hear a position report from a nearby aircraft that may not be aware of you.

If you are responding to a radio position report, it is also recommended that you further respond to them when you make visual contact, acknowledging that you have them in sight.

Acknowledgement of Traffic Information

Traffic information from an ATS or ATC is to be acknowledged by the phrase "COPIED THE TRAFFIC <callsign>" (when you haven't seen the reported traffic) or "TRAFFIC IN SIGHT <callsign>" (when you can see the reported traffic) as appropriate.

Traffic information passed to an IFR aircraft about another IFR aircraft in Class G airspace is to be acknowledged as follows:

(a) where NO REPORTED TRAFFIC information is passed the reply is "NIL TRAFFIC (callsign)"; *and*

(b) where traffic information is passed the reply is "COPIED THE TRAFFIC (callsign)"

To keep things simple, this format is also used with an AIS and in general flight communications for VFR traffic.

A**ir information services, Aerodrome Flight Information Service**

These are different from control zones – they provide information only, they do not control aircraft movement. An AFIS will provide Met conditions, runway in use, and traffic information in response to a request from an aircraft.

Note: they will also give QNH to assist aircraft in accurately setting their altimeter.

Relevant frequencies are designated "AFIS, FIS or FISCOM" on aeronautical charts.

Hang gliders and Paragliders do not normally use an aerodrome or enter the circuit, and if you don't have an airband radio, communication is not mandatory as long as you stay clear of the circuit. **However** if you are flying in the vicinity and do have an airband radio, it is!

Remember if you are flying in the vicinity of an aerodrome you must either stay clear of or comply with the circuit. Check the aerodrome charts here http://www.aip.net.nz/NavWalk.aspx?section=CHARTS .

Position Reporting at AFIS Aerodromes

Pilots of all aircraft operating outside controlled airspace below 3000 ft AGL within a radius of 10 NM of an AFIS attended aerodrome are required to maintain a continuous listening watch on the frequency listed in the COM box on the aerodrome chart and make the inbound, in circuit, taking off, and in transit calls listed below.

(a) Inbound:

(i) overhead the navigation aid serving the aerodrome, or commencing instrument approach, or when established on a DME arc; *and*

(ii) when established on final approach; *and*

(iii) at the termination of the instrument procedure, i.e. when breaking off from the procedure to proceed in VMC to the aerodrome; *and*

(iv) immediately before joining the aerodrome traffic circuit.

(b) In circuit: downwind when abeam the upwind end of the RWY.

(c) Taking off:

(i) when about to taxi to the take-off position; *and*

(ii) immediately before take-off. If leaving the aerodrome traffic circuit, the direction of flight should be indicated.

(d) In transit: between 5–10 NM from the aerodrome.

The first aircraft call to a FIS is to be preceded by the name of the aerodrome followed by the words “FLIGHT SERVICE”

Example: “MILFORD FLIGHT SERVICE CHIEFTAIN PAPA KILO CHARLIE DOWNWIND ONE THOUSAND FEET LANDING RUNWAY TWO NINE”.

Translated –

MILFORD FLIGHT SERVICE – flight information service based at Milford aerodrome

CHIEFTAIN aircraft type PAPA KILO CHARLIE callsign PKC

DOWNWIND ONE THOUSAND FEET joining downwind circuit at 1000 feet AMSL

LANDING RUNWAY TWO NINE – intending to land on runway identified as 29

Note, runway identifiers are based on their long axis in degrees, so recognising which runway is in use can be useful. It helps you with wind direction as aircraft typically land into wind.

Position Reporting at Unattended Aerodromes

Note: unattended aerodromes include controlled or AFIS aerodromes outside the hours of attendance.

Pilots of all aircraft operating outside controlled airspace below 3000 ft AGL within a radius of 10 NM of an unattended aerodrome should maintain a continuous listening watch on the frequency listed in the COM box on the aerodrome chart, or on 119.1 MHz if there is no such chart.

For the benefit of other traffic, pilots should broadcast their position, altitude and intentions as listed below:

(a) Inbound:

(i) overhead the radio aid serving the aerodrome, *or*

commencing instrument approach, or when established on a DME arc; *and*

(ii) when established on final approach; *and*

(iii) at the termination of the instrument procedure, i.e. when breaking off from the procedure to proceed in VMC to the aerodrome; *and*

(iv) immediately before joining the aerodrome traffic circuit.

(b) In circuit: downwind when abeam the upwind end of the RWY.

(c) Taking off:

(i) when about to taxi to the take-off position; *and*

(ii) immediately before take-off; if leaving the aerodrome traffic circuit, the direction of flight should be indicated.

(d) In transit: between 5–10 NM from the aerodrome.

For aircraft not using the aerodrome, it is (d) that applies.

Each aircraft transmission is to be preceded by the name of the aerodrome, followed by the word: “TRAFFIC”.

Example: “TIMARU TRAFFIC CESSNA FOUR ZERO TWO ALFA BRAVO CHARLIE DOWNWIND ONE THOUSAND FEET LANDING RUNWAY TWO ZERO”.

Translated –

TIMARU TRAFFIC – air traffic around Timaru aerodrome

CESSNA FOUR ZERO TWO (aircraft type) ALFA BRAVO CHARLIE – ABC call sign

DOWNWIND ONE THOUSAND FEET – joining downwind circuit at 1000 feet AMSL

LANDING RUNWAY TWO ZERO – intending to land on the runway identified as 20

SECTION 5 Operation

Effective communication. The radio is an important tool and must be used properly to be effective. All communications must be of a high quality.

An effective radio call has four key elements, the four “C”s:

Clear

Concise

Consistent

Correct

Clear – others must be able to hear clearly what you are saying. Speak into the microphone, speak at a slightly slower rate than normal, use standard phraseology. Standard phraseology helps others predict what you are saying when reception is patchy.

Concise – transmit only for the time required. Don’t add extra information beyond the “need to know”. Consider what you would like to hear from other aircraft when composing your radio calls

Consistent – not only by using standard phraseology, but also the order you give information.

Correct – the situational awareness of others is affected by the accuracy of your radio call. A precise description such as “one mile north of Mt Iron” is better than “abeam Mt Iron” as “abeam” is relative to you, not the observer / other aircraft. Are you west, north or east of Mt Iron?

Transmission

To ensure that your message is received clearly it is essential that you use the following transmitting techniques:

»» Before transmitting, check that the receiver volume is set at the optimum level and listen out on the frequency to be used to ensure that

your transmission will not interfere with a transmission from another station.

»» Be familiar with microphone operating techniques and do not turn your head away from the microphone while talking, or vary the distance between it and your mouth. Severe distortion of speech may arise from talking too close to the microphone (1-2 cm from your mouth is recommended), or holding on to the microphone or boom (of a combined headset/microphone system).

»» Use a normal conversation tone, speaking clearly and distinctly.

»» Maintain an even rate of speech (cadence) not exceeding 100 words per minute. When it is known that elements of the message will be written down by the recipient, speak at a slightly slower rate.

»»Maintain the speaking volume at a constant level.

»» A slight pause before and after numbers will assist in making them easier to understand.

»» Avoid using hesitation sounds such as “um” or “er”.

»» Press the transmit switch fully before speaking, pause briefly, and release it after a short pause when the message is complete. This will ensure that the entire message is transmitted. It can be useful to say the first word of their message twice to ensure it is not cut off. As this is normally the person / people you are calling it helps to gain their attention too. The pause at the beginning allows the radio time to stablise in transmit mode and for the receiving station to unsquelch.

One of the most irritating, and potentially dangerous, situations in radiotelephony is a ‘stuck’ microphone button. Always ensure the button is released after a transmission and the microphone is placed in an appropriate place to ensure it cannot inadvertently be activated.

The 4 Whiskeys

The ‘Four-Ws’ is a good guide to keeping your radio calls structured and intelligible. Others expect to hear your calls in the right order:

»» **Who you are calling** – what is the name of the station you are calling, for example “Milford Information”, Feilding Traffic”, or “New Plymouth Tower”.

For MBZ – if you are close to an aerodrome then “Wanaka Traffic” “Mt Cook Traffic”

»» **Who you are** – your callsign, eg “Para 2027”

Prefixing the registration with aircraft type on first contact can assist others in recognition and expected performance, ie using full phrase “paraglider” rather than “para”.

»» **Where you are** – give an accurate position report, including your location (or the time you were over a significant landmark or reporting point), and altitude in feet (rounded to the nearest 100 feet)

Eg “Wakefield, 6 thousand 1 hundred feet”

If using a bearing and distance remember distances are in miles.

»» **What you want** – either what you are requesting or what your **intentions** are. For example, “gliding to Sebastapol and descending” or “maintaining in this area” In an MBZ this component may not always be used.

It is a good idea to compose your message in your head, and then say it out loud once before transmitting it.

Standard phraseology

In aeronautical radio communications, a number of set phrases are used to avoid ambiguity and to minimise transmission time. You will see from the table that, in many cases, one word can replace a lengthy phrase or sentence.

ABOVE	directly above a known point
ACKNOWLEDGE	Let me know that you have received and understood this message
AFFIRM	Yes
APPROVED	Permission for proposed action granted

BREAK	I hereby indicate the separation between portions of the message **(to be used where there is no clear distinction between the text and other portions of the message)**
BREAK BREAK	I hereby indicate separation between messages transmitted to different aircraft in a very busy environment
CANCEL	Annul the previously transmitted clearance
CHECK	Examine a system or procedure **(not to be used in any other context – no answer is normally expected)**
CLEARED	Authorised to proceed under the conditions specified
CONFIRM	I request verification of: **(clearance, instruction, action, information)**
CONTACT	Establish communications with …
CORRECT	True or Accurate
CORRECTION	An error has been made in this transmission **(or message indicated)** the correct version is …
DISREGARD	Ignore
HOW DO YOU READ	What is the readability of my transmission?
I SAY AGAIN	I repeat for clarity or emphasis
IMMEDIATELY	when immediate action is required for safety reasons
MAINTAIN	Continue in accordance with the condition(s) specified, or in its literal sense, eg, “Maintain VFR”
MONITOR	Listen out on **(frequency)**
NEGATIVE	No or Permission is not granted or That is not correct or Not capable
OVER	My transmission is ended and I expect a response from you (not normally used in VHF communication)
OUT	My transmission is ended and I expect no response from you (not normally used in VHF communication)
READ BACK	Repeat all, or the specified part, of this message back to me exactly as received
RECLEARED	A change has been made to your last clearance and this new clearance supersedes your previous clearance or part thereof
REPORT	Pass me the following information
REQUEST	I should like to know or I wish to obtain

ROGER	I have received all of your last transmission (under NO circumstances to be used in reply to a question requiring READBACK or a direct answer in the affirmative (AFFIRM) or negative (NEGATIVE))
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
UNABLE	I cannot comply with your request, instruction or clearance (normally followed by a reason)
WILCO	I understand your message and will comply with it
WORDS TWICE	(a) as a request Communication is difficult. Please send every word or group of words twice (b) as information Since communication is difficult every word, or group of words, in this message will be sent twice

Standard letters and numbers.

Most transmissions use the International phonetic alphabet to avoid confusion between similar sounding letters.

A	Alpha	AL fah
B	Bravo	BRAH voh
C	Charlie	CHAR lee or SHAR lee
D	Delta	DELL tah
E	Echo	ECK oh
F	Foxtrot	FOKS trot
G	Golf	GOLF
H	Hotel	ho TELL
I	India	IN dee ah
J	Juliette	JEW lee ETT
K	Kilo	KEE loh
M	Mike	MIKE
N	November	no VEM ber

O	Oscar	OSS cah
P	Papa	pah PAH
Q	Quebec	keh BECK
R	Romeo	ROW mee oh
S	Sierra	see AIR rah
T	Tango	TANG oh
U	Uniform	YOU nee form
V	Victor	VIK tah
W	Whiskey	WISS kee
X	X-ray	ECKS ray
Y	Yankee	YANG kee
Z	Zulu	Zoo loo

As in every rule though, there are exceptions. Some abbreviations are transmitted without using the phonetic alphabet, and common examples are:

DME, ETA, ETD, FIR, GPS, IFR, ILS, MBZ, NDB, QNH, RVR, VFR, VHF, and VOR.

Some other common abbreviations are transmitted as spoken words, for example:

ACAS (A-cas), ATIS, METAR, SIGMET, SPECI, STAR, and T-VASIS (TEE-va-zee).

Similarly, the transmission of numerals has its own pronunciation rules to avoid confusion. The ones you are likely to hear most are ‘fife’ and ‘niner’ for 5 and 9 respectively, these being the two most likely to be mistaken for the other.

In reality, given the fidelity associated with modern VHF radio equipment, you will seldom hear ‘4’ pronounced ‘FOW-er’, except perhaps on ATIS broadcasts, or when reception is known to be difficult.

Where a decimal point appears in a number sequence, it is spoken as ‘decimal’, rather than ‘point’ (although you will hear ‘point’ used in America)

0	ZE-RO
1	WUN
2	TOO
3	TREE
4	FOW-er
5	FIFE
6	SIX
7	SEV-en
8	AIT
9	NIN-er
hundred	HUN-dred
decimal	DAY-SEE-MAL
thousand	TOU-SAND

In practice (practice saying these and listening for them):

Note, we have included some non PG / HG relevant calls as you may hear them on the radio, it is useful to know what they mean so you can assess whether they are relevant to where you are flying.

Aircraft callsign	QFA 355	Qantas three five five
	RLK 8582	Link eight five eight two
	XYZ	X-ray Yankee Zulu
Altitude (and cloud height)		
	300 ft	three hundred feet
	1500 ft	one thousand five hundred feet
	10,500 ft	one zero thousand five hundred feet
	13,000 ft	one three thousand feet
Flight levels	FL 180	flight level one eight zero

	FL 200	flight level two zero zero
Headings	150	heading one five zero
	080	heading zero eight zero
	300	heading three zero zero
Wind direction and speed		
	080/25	wind zero eight zero degrees two five knots
	100/18	wind one zero zero degrees one eight knots
	210/25G40	wind two one zero degrees two five knots gusting four zero knots
Runway designator		
	19	runway one nine
	06	runway zero six
	23L	runway two three left

Note - runway designation is the direction of the runway in true degrees rounded to the nearest 10, so give you an idea of which way the aircraft is heading and potentially the wind direction on the ground at the aerodrome. E.g. runway 19 is approximately 190 degrees and will have an opposite runway 01.

Mach number	0.84 Mach	decimal eight four
Altimeter setting	984 hPa	QNH nine eight four
	1027 hPa	QNH one zero two seven
Time (UTC)	1634	three four or one six three four
	0803	zero three or zero eight zero three
	1300	one three zero zero
Visibility	200 m	two hundred metres
	1500 m	one thousand five hundred metres
	3000 m	three thousand metres

10 km one zero kilometers

Runway visual range

	700 m RVR	seven hundred metres
	1600 m RVR	one thousand six hundred metres
Frequencies	128.3 MHz	one two eight decimal three
	135.75 MHz	one three five decimal seven five

All numbers used in the transmission of altitude, visibility, cloud height, and runway visual range (RVR) information must be transmitted by pronouncing each digit separately, except that those numbers which contain whole hundreds and/or whole thousands only must be transmitted by pronouncing each digit of the hundreds or thousands followed by the word HUNDRED or THOUSAND as appropriate.

Combinations of whole hundreds and thousands must be transmitted by pronouncing each digit in the number of thousands followed by the word THOUSAND followed by the number of hundreds followed by the word HUNDRED.

When transmitting time, each digit should be pronounced separately. Only the minutes of the hour are normally required. However, the hour should be included if there is any possibility of confusion. *Note: Co-ordinated universal time (UTC) must be used, fortunately PG & HG don't often have to communicate time!*

VFR in controlled airspace

Difficult, even with a radio, and assuming you have the FRTO rating and can get clearance.

Writing down clearances and reading it back are often required and are not generally practical for a paraglider or hang glider pilot. Many ATC communications require this to be done, so this ARO rating does not cover flight in controlled airspace other than giving some background knowledge.

Uncontrolled airspace – what frequency to use?

119.1 MHz – it is not a lot of use listening on 119.1 everywhere, as this is no longer the 'universal' unattended aerodrome frequency. Aerodromes with their details published in AIP New Zealand will always have a designated unattended' frequency (except where there is a 24-hour ATC service). In some cases, this frequency will be 119.1, as it will with most 'unpublished' aerodromes.

If any of the latter are located in an MBZ or CFZ, expect the 'unattended' frequency to correspond with that of the airspace.

FISCOM frequency – this could be your best option. You will hear traffic broadcasting in your FISCOM area, and this can help keep you up to date with any relevant information that the FIO broadcasts. However, to get clear reception on a FISCOM frequency you may need to be above 4000 feet, depending on your location and the terrain. In some areas in the Southern Alps there are communication 'shadows', where you will need to be a lot higher in order to make radio contact. Refer to AIP New Zealand, Figures GEN 3.4-2 and 3.4-3 for more information.

MBZ – in an MBZ you must use the published frequency, as will all the other traffic in the MBZ

CFZ – in a CFZ, all traffic in the area should be on the published frequency, however it is not mandatory to have a radio so there may be NORDO traffic.

Special use airspace – be aware of any special use airspace and associated frequency requirements on your route. This includes permanent and temporary danger or restricted areas. Temporary special use airspace is often active around events, check the current NOTAMs and AIP Supplements before your flight. AIP supplements can be downloaded from www.aip.net.nz

NOTAMs can be found, along with weather briefings, at www.ifis.airways.co.nz

Unattended aerodromes – these may be within CFZ, MBZ

The key to flying at uncontrolled aerodromes is to show as much courtesy to others as you would like them to show you.

Making sure you don't hit anything, is entirely up to you. The best way to do this is to build, and then maintain, good situational awareness.

Use your eyes and ears.

Don't just rely on hearing the traffic, either on the radio or engine noise, as there are still plenty of NORDO aircraft out there (paragliders and hang gliders!), or others that aren't on the frequency for some reason. You must always be vigilant.

Give your position relative to published reporting points, prominent geographical features, or the aerodrome. Avoid using 'local knowledge' names, which could be meaningless to a non-local pilot.

It is also very useful to know where the waypoints are, in general, on the approaches at your home aerodrome, or areas you visit frequently. You can find this information on the approach charts in AIP New Zealand Vols 2 and 3, or you can ask your local instructors. Be prepared when you go somewhere new!

It is also good airmanship to repeat the name of the aerodrome somewhere in your broadcasts, especially where there are other nearby aerodromes using the same frequency. Often the aerodrome name at the beginning of the transmission is not heard clearly by other pilots.

If you become concerned that another pilot has not seen you, a small banking manoeuvre may expose a more visible view of your aircraft.

Overall, be predictable.

When to change frequencies as you cross between areas? Plan ahead – some areas have multiple frequencies in short distances, eg around Auckland.

Common IFR calls

Again, we have included some non HG/PG calls as you may hear them on the

radio, it is useful to know what they mean so you can assess whether they are relevant to you.

OVERHEAD The aircraft is overhead the radio navigation aid (beacon) – as shown on the aerodrome chart.

COMMENCING BASE TURN The aircraft is at the end of the outbound leg of the teardrop and is now turning back towards the aerodrome.

10 DME The aircraft is approximately 10 NM away from the beacon.

CIRCLING The aircraft has established visual reference and is positioning for another runway – usually the one that is into wind. This is still an IFR procedure.

ESTABLISHED IN THE HOLDING PATTERN The aircraft is following a racetrack pattern generally above the beacon but can be up to 15 NM from the aerodrome.

BEACON OUTBOUND The aircraft passed over the beacon (which may not be on the aerodrome) and is following the outbound leg of a teardrop approach, (normally) away from the aerodrome.

INBOUND The aircraft is established on the final track of the instrument approach and is (usually) descending towards the runway.

ESTABLISHED ON THE ARC Some instrument approaches follow a flight path that keeps them up to 15 NM from the beacon until they intercept the final approach path. This position puts the aircraft at a 10 – 15 NM radius tracking towards the final approach path.

MISSED APPROACH The aircraft has abandoned the approach and is climbing and following the missed approach procedure (which usually turns it back towards the beacon).

VISUAL The pilot has the runway in sight and may now manoeuvre to intercept final to land. This may be a continuation of the final approach path, or may require the aircraft to circle for another runway.

Distress and Urgency Messages

Distress is defined as a condition of being threatened by serious and/or imminent danger and requiring immediate assistance. The keyword associated with a distress situation is MAYDAY.

Urgency is defined as a condition concerning the safety of an aircraft, or of some person on board or within sight, but which does not require immediate

assistance. The key phrase associated with an urgency situation is PAN PAN. (Pronounce it as written.)

MAYDAY Message (AIP New Zealand ENR 1.15)

The pilot of an aircraft in distress must transmit on the air-ground frequency in use at the time of the distress, the distress signal MAYDAY (spoken three times), followed by the distress message.

If on an unattended frequency, and it is considered that better assistance can be provided by transferring to another frequency, the pilot should do so, *after* broadcasting this intention on the original frequency.

If no response is received then broadcasting on the emergency frequency 121.5MHz, again after broadcasting this intention before changing.

The distress message should consist of as many of the following elements spoken distinctly and if possible, in the following order:

- **»»** name of station addressed (time and circumstances permitting);
- **»»** identification of the aircraft;
- **»»** nature of the distress condition;
- **»»** intention of the pilot; and
- **»»** present position, level (flight level or altitude), and heading.

The transmission of an accurate aircraft position may be critical to any subsequent search and/or rescue action.

PAN PAN Message (AIP New Zealand ENR 1.15)

The pilot of an aircraft reporting an urgency condition must transmit on the air-ground frequency in use at the time, the urgency signal PAN PAN (spoken three times), followed by the urgency message.

The urgency message should consist of as many of the following elements spoken distinctly and if possible, in the following order:

- **»»** name of station addressed;
- **»»** identification of the aircraft;
- **»»** nature of the urgency condition;

»» intention of the pilot;

»» present position, level (flight level or altitude), and heading; and

»» any other useful information.

In Either Case

The importance of saying “PAN PAN” or “MAYDAY” three times cannot be over-emphasised. In past events, where the relevant expression was spoken only once, a great deal of valuable time was lost in the ‘was that what I thought it was?’ reaction, and subsequent replays of the ATS recordings to make sure.

Do not be afraid to speak up!

It is best to alert somebody early in an emergency, and have help being organised, rather than leaving it to the last possible minute – when you could find that you have your hands full with ‘aviating and navigating’, with no spare capacity for communicating. Also, getting an early call in may ensure that you are still high enough to maximize the chances of your transmission being received.

SECTION 6 Pre flight check & trouble shooting

You should include your radio as part of your pre-flight check.

Check that it is:

- Clipped in – with a leash, not just a belt clip. Don't drop it in the air!!
- Turned on – and has a charged battery
- Set to the right frequency. If expecting to fly through multiple areas, check that you know the appropriate frequencies - have them programmed in your radio or written on your flight deck

It is acceptable to do a brief test transmission / radio check, but be considerate if radio traffic is heavy:

Test transmissions should take the following form:

a) The identification of the station being called;

b) The aircraft callsign;

c) The words RADIO CHECK;

d) The frequency being used.

Replies to test transmissions should be as follows:

a) The identification of the station calling;

b) The identification of the station replying;

c) Information regarding the readability of the transmission.

The readability of the transmission should be classified in accordance with the following readability scale:

1 = Unreadable

2 = Readable now and then

3 = Readable but with difficulty

4 = Readable

5 = Perfectly readable

If radio traffic is heavy, then listening for a while to make sure you are receiving before you do a test transmission is a good idea. If you have someone else on take off with you who is also on airband, then you can warn them before doing the test to make it faster.

Things that can break:

»»Connections between the elements

»»The elements themselves – eg microphone, speaker, circuit board, battery, switches – PTT, power, volume, frequency selector

The most common issue is battery charge, so carry a spare battery if possible.

Trouble shooting during operations

If another station has a stuck microphone you will hear continuous back ground noise and / or conversation. Unless you can contact them via some other method, this is difficult to fix.

Two indicators that it is you that has a communications failure:

1 – nothing heard on the radio for an extended period of time

2 – you are hearing other's transmissions but have not had responses to your transmissions when you expected to.

Some simple checks may resolve the problem. If your microphone is stuck, then you will not hear anything for an extended period of time, and your transmit indicator on your radio will be active.

Check these basic items:

»» PTT button – fully released after transmitting; try pressing and releasing once to feel the button release.

»» Volume – set to audible level;

»» Squelch – set correctly;

»» Radio – correct radio selected, if there are two radios;

»» Frequency – correct frequency set and active. Some hand held radios allow you to scan two frequencies, but lock onto one of them if something is heard on that frequency.

If these don't solve the problem, check the following:

»» Headset jack (if used) in the correct socket and are fully inserted; you can also try talking direct into the radio for a handheld transceiver.

»» Master switch is ON

»» battery indicator shows charged

»» Turn the aircraft 90° to try and get a better signal;

»» Is the terrain in the way? VHF radio waves work on 'line of sight'.

If you still can't make contact, you could try the 'speechless technique' detailed in AIP New Zealand ENR 1.15. This applies when the transmit and receive functions are serviceable, but the microphone input is unserviceable:

When an unmodulated transmission is heard, the ATS operator will request the pilot to activate the transmitter (that is, press the PTT button) three times; and if the pilot complies, the operator will ask questions requiring YES or NO answers to determine if the aircraft can continue visually. This and any other information required will be obtained by requiring the pilot to transmit:

»» once for YES or ROGER;

»» twice for NO;

»» three times for SAY AGAIN;

»» four times for AT NOMINATED POSITION.

Improving reception

If a remote station is patchy but otherwise readable you can try the following:

»» reducing your squelch level. This will increase the white noise but also increase the main signal.

»»Turn the volume up

»»Change the orientation of the radio or antenna. Check that your body is not shielding the radio. Change the direction of your flight.

Note that other electronic equipment – other radios, your GPS, your vario, may interfere with the airband radio if they are too close. Try to keep these items separate as it is not practical to turn them on and off in flight.

Double transmissions

If you hear a transmission that starts, but then becomes unintelligible due to another station transmitting over the top, you may need to communicate this to them. They may not realize that it has happened if their transmissions ended at the same time.

If the transmission was directed to you, you can ask the particular station to repeat their call by saying " <their Callsign>, please repeat, two stations at once".

Total Communications Failure – Aircraft

If the troubleshooting checks are unsuccessful, assume that you have a communications failure. The procedures are listed in AIP New Zealand ENR 1.15, and are reproduced here for VFR aircraft, adapted for HG/PG, as follows:

»» Maintain terrain clearance throughout all procedures.

»» Try alternate then secondary published ATS frequencies for the sector or unit you should be in communication with.

»» Transmit position reports and intentions, assuming the transmitter is operating, and prefixing all transmissions with "TRANSMITTING BLIND".

»» If the destination is within an MBZ, proceed to an alternate

aerodrome *unless* the risk in proceeding safely to an alternate aerodrome is clearly greater than continuing, without communications, to the planned destination.

»» If a mobile phone is available and safe to use attempt to establish telephone communications with Christchurch Control or Christchurch Information on 0900 62 675 or (03) 358 1509, or the ATC unit you should be communicating with. *Note you are not permitted to enter controlled airspace using the NZHGPA ARO rating.*

IE for PG & HG - Land if safe to do so

Flying "In Formation"

Note that within an MBZ, if you have secondary communication with another PG / HG pilot (a UHF radio?) you may be able to get them to do your broadcasts for you and comply with the MBZ that way. You must be flying "in formation" (i.e. within 100ft vertical and 1 nm horizontal).

The pilot of an aircraft operating under VFR without radio communications should not enter controlled airspace.

References:

Good Air Practice (GAP) – Plane Talking, A guide to good radio use

CAA Advisory Circular AC91-9 & AC172-1 Revision 10, June 2013 – Radiotelephony Manual

www.aip.net.nz - in particular AIP ENR 1-1

CAA Rules available at www.caa.govt.nz/rules/rules.htm especially Rule 91

GAP – In, Out and Around <Mt Cook> - note you should use **your local area** for the students

SECTION 7 UHF radio – side topic (not examined)

Many paraglider pilots in NZ and Australia use UHF radios in the CB band for communication. Generally the channels and procedures are the same in Australia as in NZ. Other countries use different frequency alocations for CB and PRS radio channels and some radios do not cover the range.

There are some requirements in the GURL for the types of transceivers that can be used, but the only real operator requirement is “All persons engaging in radiocommunications under this licence must, during transmission, clearly identify themselves”.

By convention, a radio call on a general channel also includes the person you are talking to. So the transmission starts with the person you are calling’s name, then your own before continuing with the rest of the transmission.

The reason you say their name first is that on a general channel, you don’t tend to pay attention until you hear your name. So saying theirs first, and repeating it, means they hear the whole of your transmission as they start listening at the beginning. Repeating their name at the beginning allows for people who don’t pause after pressing the PTT button before talking. This pause is especially important if you are using CTCC or tone squelch (see later in this section for what this is).

The use of the word “over” to signify you have finished talking is optional. As in airband radio use, if you have established communication and it is a continuous conversation then we generally drop the identifiers to speed things up.

EXAMPLE TRANSMISSION:

Kat - “MARTIN, MARTIN, THIS IS KAT. HOW HIGH DID YOU LEAVE END PEAK CROSSING TO ROY?”

Martin - “THIS IS MARTIN. LEFT AT 8000, ARRIVED AT 4000. EASY CROSSING”

Kat - “THANKS, LEAVING AT 7500 NOW”

If they were to restart the conversation 10 minutes later, they would need to re-use the identifiers to begin.

AUSTRALIA UHF Channels

The GURL for UHF CB in NZ has been expanded up to 80 channels now, the same as in Australia, however note that NZ doesn’t have any reserved channels for clubs or caravanners and the like. They are reserved by consensus in Australia.

Channel 1	476.4250	Repeater Channel	12.5 kHz
Channel 2	476.4500	Repeater Channel	12.5 kHz
Channel 3	476.4750	Repeater Channel	12.5 kHz
Channel 4	476.5000	Repeater Channel	12.5 kHz
Channel 5	476.5250	**Emergency Repeater Output**	12.5 kHz
Channel 6	476.5500	Repeater Channel	12.5 kHz
Channel 7	476.5750	Repeater Channel	12.5 kHz
Channel 8	476.6000	Repeater Channel	12.5 kHz
Channel 9	476.6250	General Chat Channel	12.5 kHz
Channel 10	476.6500	4WD Clubs or Convoys and National Parks.	12.5 kHz
Channel 11	476.6750	Call Channel	12.5 kHz
Channel 12	476.7000	General Chat Channel	12.5 kHz
Channel 13	476.7250	General Chat Channel	12.5 kHz
Channel 14	476.7500	General Chat Channel	12.5 kHz
Channel 15	476.7750	General Chat Channel	12.5 kHz
Channel 16	476.8000	General Chat Channel	12.5 kHz
Channel 17	476.8250	General Chat Channel	12.5 kHz
Channel 18	476.8500	Caravanners and Campers Convoy Channel	12.5 kHz

Channel 19	476.8750	General Chat Channel	12.5 kHz
Channel 20	476.9000	General Chat Channel	12.5 kHz
Channel 21	476.9250	General Chat Channel	12.5 kHz
Channel 22	476.9500	Telemetry & Telecommand Only (No Voice & Data)	25 kHz
Channel 23	476.9750	Telemetry & Telecommand Only (No Voice & Data)	25 kHz
Channel 24	477.0000	General Chat Channel	12.5 kHz
Channel 25	477.0250	General Chat Channel	12.5 kHz
Channel 26	477.0500	General Chat Channel	12.5 kHz
Channel 27	477.0750	General Chat Channel	12.5 kHz
Channel 28	477.1000	General Chat Channel	12.5 kHz
Channel 29	477.1250	Road safety channel Pacific Hwy/Mwy[8] between Brisbane (QLD) and Sydney (NSW)	12.5 kHz
Channel 30	477.1500	General Chat Channel	12.5 kHz
Channel 31	477.1750	Repeater Input	12.5 kHz
Channel 32	477.2000	Repeater Input	12.5 kHz
Channel 33	477.2250	Repeater Input	12.5 kHz
Channel 34	477.2500	Repeater Input	12.5 kHz
Channel 35	477.2750	**Emergency repeater input**	12.5 kHz
Channel 36	477.3000	Repeater Input	12.5 kHz
Channel 37	477.3250	Repeater Input	12.5 kHz
Channel 38	477.3500	Repeater Input	12.5 kHz
Channel 39	477.3750	General Chat Channel	12.5 kHz
Channel 40	477.4000	Road safety channel Australia Wide	12.5 kHz
Channel 41	476.4375	Repeater Channel	12.5 kHz
Channel 42	476.4625	Repeater Channel	12.5 kHz
Channel 43	476.4875	Repeater Channel	12.5 kHz
Channel 44	476.5125	Repeater Channel	12.5 kHz
Channel 45	476.5375	Repeater Channel	12.5 kHz
Channel 46	476.5625	Repeater Channel	12.5 kHz
Channel 47	476.5875	Repeater Channel	12.5 kHz
Channel 48	476.6125	Repeater Channel	12.5 kHz

Channel 49	476.6375	General Chat Channel	12.5 kHz
Channel 50	476.6625	General Chat Channel	12.5 kHz
Channel 51	476.6875	General Chat Channel	12.5 kHz
Channel 52	476.7125	General Chat Channel	12.5 kHz
Channel 53	476.7375	General Chat Channel	12.5 kHz
Channel 54	476.7625	General Chat Channel	12.5 kHz
Channel 55	476.7875	General Chat Channel	12.5 kHz
Channel 56	476.8125	General Chat Channel	12.5 kHz
Channel 57	476.8375	General Chat Channel	12.5 kHz
Channel 58	476.8625	General Chat Channel	12.5 kHz
Channel 59	476.8875	General Chat Channel	12.5 kHz
Channel 60	476.9125	General Chat Channel	12.5 kHz
Channel 61	476.9375	Reserved for Future Expansion	-
Channel 62	476.9625	Reserved for Future Expansion	-
Channel 63	476.9875	Reserved for Future Expansion	-
Channel 64	477.0125	General Chat Channel	12.5 kHz
Channel 65	477.0375	General Chat Channel	12.5 kHz
Channel 66	477.0625	General Chat Channel	12.5 kHz
Channel 67	477.0875	General Chat Channel	12.5 kHz
Channel 68	477.1125	General Chat Channel	12.5 kHz
Channel 69	477.1375	General Chat Channel	12.5 kHz
Channel 70	477.1625	General Chat Channel	12.5 kHz
Channel 71	477.1875	Repeater Input	12.5 kHz
Channel 72	477.2125	Repeater Input	12.5 kHz
Channel 73	477.2375	Repeater Input	12.5 kHz
Channel 74	477.2625	Repeater Input	12.5 kHz
Channel 75	477.2875	Repeater Input	12.5 kHz
Channel 76	477.3125	Repeater Input	12.5 kHz
Channel 77	477.3375	Repeater Input	12.5 kHz
Channel 78	477.3625	Repeater Input	12.5 kHz
Channel 79	477.3875	General Chat Channel	12.5 kHz

Channel 80	477.4125	General Chat Channel	12.5 kHz

Channels 1 to 8, 41 - 48 - Repeater Channels Press the DUPLEX button on your radio to use any available repeaters

Channels 31 to 38, 71-78 - Repeater inputs - Do not use these channels for simplex transmissions as you may interfere with conversations on channels 1 to 8. In all cases, listen before you use!

If you interfere with another persons conversation that started before you, just select another channel. As this can be difficult whilst flying (practice it!), it is worth listening for a while whilst still on the ground, ie before take off, so you can be sure the channel is clear.

Do not provoke troublemakers that may deliberately search out other people provoke a reaction, just ignore them remember DON'T FEED THE TROLLS

Some useful UHF radio functions and what they mean:

Scan Many UHF CB radios allow the user to scan channels to find a conversation. Several different scan modes may be provided:

Open Scan scans all channels to find an active conversation. Some radios allow skipping selected channels when scanning.

Group Scan scans a small number of selected channels. For example, a caravanner travelling around the country may choose to group scan Channel 40 (Road Channel), 18 (Caravan Channel) and 5 (Emergency Channel) so they will hear any conversations relating to their travels.

Priority Scan allows selection of a "Priority" channel whilst scanning a handful of selected channels. This could be useful in a convoy of cars where vehicles can set their own convoy channel as a priority channel whilst scanning the designated road channel for traffic updates, if a member from

their convoy speaks, the radio will always switch back to the priority channel even if someone is speaking on another channel.

Selcall Selective calling (Selcall) allows a radio to call another radio using a sequence of tones, usually presented to the user as a series of 5 numbers. UHF CB radios can be set to be completely silent until they receive a series of tones matching a pre-programmed sequence. Radios which have this feature usually indicate that a call has been received by emitting a number of beeps and by opening the squelch. The popularity of selcall has dropped since the introduction of CTCSS.

CTCSS Continuous Tone Coded Squelch System (CTCSS) allows a group of radios set with the same tone to converse on a channel without hearing other radios using that channel. CTCSS can be used to silence a radio until another radio with the same tone transmits. This allows monitoring of a channel for transmissions from radios set with the same tone without hearing other conversations that use different or even no tone.

The use of CTCSS is not permitted on UHF CB repeaters or the designated emergency channels.

CDCSS or **Digital Code Squelch** (DCS) is a further development of the continuous tone-coded squelch system or CTCSS that uses a slow-speed, binary data stream passed as sub-audible data along with the transmission. Motorola calls this *Digital Private Line* or *DPL*. It consists of a 23-bit telegram sent repeatedly on the channel at 134 bits per second along with the voice transmission. This allows for over 100 possible fleet codes to be used. This gives it an advantage over the CTCSS tones in that there are more possible codes to use; however, it does use more bandwidth.

Repeaters As dicussed earlier, repeaters extend the range of transmission by receiving and automatically rebroadcasting a transmission using an antenna located in a high location, normally the top of a mountain, tall building or radio tower. Sometimes a transmission range of over 100 kilometres (60 miles) can be achieved through the use of a repeater. Repeaters use duplex, so the duplex button should be pressed to access the repeater. The NZ Association of Radio Transmitters has a map of repeater locations in NZ at http://www.nzart.org.nz/info/repeaters/

Signage It is common practice to install signs at the rear of campervans & caravans, worksites, roadworks, some regional highways & National Parks and Heavy Vehicle Checking Stations to advertise a UHF channel to communicate on. For example, during the widening of the M1 Pacific Motorway between Sydney and Newcastle contractors installed "UHF 29" signs at the entry point to each worksite.

Channel use - Australia:

The following channels are **legislated** as a part of the ACMA UHF CB Class Licence.

Channel 5 and 35 are the designated emergency channels, and are not to be used except in an emergency. To make an emergency call, switch your radio to Channel 5 with duplex on, if there is no response, try again with duplex off.

Channel 11 is the 'call channel' and is only to be used for initiating calls with another person, who should quickly organise another vacant channel to continue their discussion on.

Channel 22 and 23 are only to be used for telemetry and telecommand, packet data and voice transmission are not allowed.

Channel 61, 62 and 63 are reserved for future allocation and transmission on these channels is not allowed.

Channels used by consensus in Australia

The following channels **are not** legislated as a part of the class licence however are used for the following purposes by consensus.

Channel 10 is typically used by 4WD clubs when in a convoy & in national parks. This channel is used to avoid interfering with road safety communications on channel 29 or 40. If you are not in a convoy it is recommended you use 29 or 40 depending on the road you are using.

Channel 18 is the campers and caravan convoy channel, typically used by travellers.

Channel 29 is the road safety channel on the M1 Pacific Motorway and Highway between Brisbane (QLD) and Sydney (NSW). It is used so that users of these roads only hear conversations related to the highway and not

unrelated conversations in built up areas. Once leaving the highway, trucks switch to channel 40. It is recommended to avoid using this channel on the east coast unless your conversations relates to road safety communications on these roads.

Channel 40 is the primary Road safety channel Australia-wide, most commonly used by trucks including pilot/escort vehicles for oversized loads.

The HGFA has also purchased rights to use the UHF frequency 472.125 MHz. This frequency can be used “open” or be used as 4 different channels with squech tones (CTCSS, see table below for values). These are not part of the UHF CB, so you need a radio where you can set the frequency to use them.

CHANNEL	FREQUENCY (Tx & Rx)	POWER	BANDWIDTH	CTCSS (Tx & Rx)	BUSY CHANNEL LOCKOUT
HGFA1	472.125MHz	5 watts	25kHz	192.8Hz	Y*
HGFA2	472.125MHz	5 watts	25kHz	82.5Hz	Y*
HGFA3	472.125MHz	5 watts	25kHz	110.9Hz	Y*
HGFA4	472.125MHz	5 watts	25kHz	151.4Hz	Y*

Practical test

The following tasks need to be done whilst observed by an approved AR practical examiner.

Using an Airband radio:

Turn an airband radio on

Check volume

Adjust squelch

Set a frequency

Use UHF radios or Airband radios on the Hang-gliding frequency (check first that the channel is clear) for the following practice calls:

Perform a radio check call

Reply to a radio check call

Compose and transmit a typical MBZ call
The instructor should give a description of the situation that the call is to report, eg you are a paraglider thermalling at 6000 feet near Mt Sefton, intending to glide down and land at the campground near White Horse Hill. It would be useful to have the aeronautical chart for a local MBZ available so you can discuss the reporting positions and the alternatives if not close to a reporting position.

Respond to an aircraft in your vicinity in an MBZ
the instructor should make a pretend aircraft position report for the student to respond to, that follows on from the students position report above.