K – RADIO TELEPHONY (R/T)

INTRODUCTION

Increasingly, glider pilots need to talk to airfields who are not on the gliding frequencies, Pilots who routinely fly cross-country should get a FRTOL; if flying in busy airspace, such as a Military Aerodrome Traffic Zone (MATZ) this will allow them to give their position to the relevant Air Traffic Services Units (ATSU), thus enhancing everyone's situational awareness. Holding a FRTOL may also allow entry to ATZs and controlled airspace, which is sometimes helpful when looking for lift or wanting to land at a licensed aerodrome. The BGA provides online FRTOL training; see the BGA web site for details.

Judicious use of radio enhances flight safety, especially in the circuit. An instructor's radio calls will be heard, and potentially imitated, by many pilots, so it is important to set a good example, even when not formally instructing.

Basic radio use should be taught as part of the following exercises in the SFCL SPL Syllabus:

Ex 2: Emergency procedures

Ex12: Circuit, approach and landing

- Collision avoidance

Ex17: Flight Planning and In-flight navigation

- use of radio and phraseology
- procedures for transiting regulated airspace or ATC liaison
- uncertainty of position procedure
- lost procedure
- joining, arrival and circuit procedures at remote aerodromes.

LEGAL ASPECTS

A radio installed in a glider must have an Aircraft Radio Licence, which is straightforward to get from OfCom (for a small fee). This licence also covers any handheld radio used as an in-flight backup but does not allow that same handheld radio to be used for ground to air communication; that requires a different, Aeronautical Ground Station Licence.

A glider pilot does not need a FRTOL, or any other type of operator's licence, to communicate with other aircraft (whether glider or powered), or use the radio, on one of the gliding-specific channels, or the emergency channel, 121.5. Similarly, someone using an air-band radio on the ground at a gliding club does not require a ground station operator's licence, so long as they are using the channel assigned to that airfield and not providing an Air Traffic Service.

However, under section 139 of the Air Navigation Order 2016, a glider pilot must hold a FRTOL to communicate with 'any air traffic control unit, flight information unit or air/ground communications service unit', which is normally a prerequisite for entering ATZs.

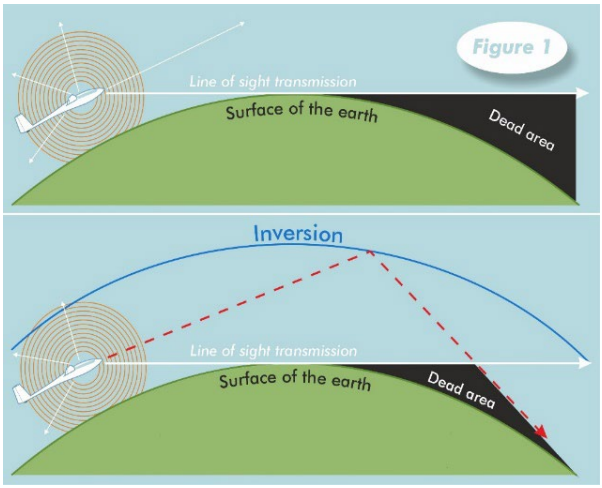
THEORY BRIEFING

Characteristics of VHF radio

Very High Frequency (VHF) radio signals do not penetrate water or solid ground, and travel in more-or-less straight lines.

The range of an aircraft radio is often limited by the distance to the horizon (at high altitudes, this distance in Nautical Miles is approximately the square root of the altitude in feet, so that at 5000 ft AMSL the horizon is about 70 NM away). If you call another glider or a distant ground station and get no reply, it could be because it is below your radio horizon. Climb higher before calling again. In certain atmospheric conditions (usually high-pressure systems with strong inversions), radio signals reflected off the inversion travel much further than normal. However, there can still be a 'Dead' area in the middle (figure 1).

If an air-band radio is not receiving a signal, a continuous, irritating hissing noise would normally be heard. The squelch control suppresses this by turning off the loudspeaker unless a strong voice transmission is being received. If the squelch is adjustable, use the lowest setting that eliminates the hiss between transmissions.



VHF CHANNELS

The current standard of radio equipment in the UK employs 8.333 kHz frequency spacing and is permitted to operate between 118 to 137 MHz. That means there are nominally 2,280 separate operating frequencies, of which six are allocated to gliding and another two shared. The result that is that the frequencies we do use are somewhat crowded on good days.

Channels are sometimes referred to as 'frequencies' and may be incorrectly given a 'MHz' suffix. When transmitting a channel number, say the digits individually, pronounce the decimal point as DECIMAL, and omit the word 'channel.' If a

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channel number ends in the digits 00, omit them, so that channel 121.500 would be said as ONE TWO ONE DECIMAL FIVE.

The table below outlines some of the shared frequencies available to glider pilots and their uses as determined by the BGA and agreed with the CAA & Ofcom. The frequencies should only be used in their secondary role when the primary frequency is exceptionally busy.

Frequency	Primary Use	Secondary Use
129.905	Ground Retrieve (Shared with Hang-gliding & Paragliding.)	Nil
129.980	Common glider field frequency within 10NM and up to 3,000 ft above certain approved airfields.	Nil
118.685	Common glider field frequency within 10NM and up to 3,000 ft above certain approved airfields.	Nil
130.105	In-flight situational awareness	Nil
130.130	In-flight situational awareness	Nil
130.535	Cloud flying	In flight situational awareness
129.890	Competition flying	Coaching
130.405	Competition flying	Coaching
121.500	Distress	Nil

The two Common Glider Field Frequencies (CGFFs) in the table above are shared by specific gliding airfields, where they are typically used for pre-landing radio calls and aerotowing. However, there can be overlap between the coverage of the airfields, and calls to one may be heard at another.

Other frequencies are assigned to (particularly the larger) airfields in such a way that there should not be overlap between airfields.

Airfields generally have a Designated Operating Coverage (DOC), and you should only call an airfield within that – generally within 10 NM and below 3000 ft AMSL for gliding airfields.

A gliding airfield may also have a ground station, which may simply be a handheld radio carried by the person running the launch point; if so, the BGA recommends addressing the ground station at (for instance) Borton Gliding Club as BORTON BASE. The call-sign BORTON RADIO must only be used by operators who hold a CAA Radio Operators Certificate of Competence (ROCC).

Someone at a gliding club launch point who does not hold an ROCC (or other CAA ground station operator's licence) can talk to aircraft on that airfield's frequency, but must not give air traffic control instructions, not even 'Take off at your discretion.' However, the standard aerotow signals of UP SLACK, ALL OUT and STOP are permitted.

Other gliding channels are assigned to competition start and finish lines. Contestants will be briefed on which frequencies to use, and how.

There are also frequencies assigned to in-flight situational awareness, which basically means communication between gliders in flight. However, they should not be used for chit-chat.

R/T VOICE PROCEDURE

The definitive reference for UK aviation radio phraseology is CAP 413: Radiotelephony Manual, available online. Whilst it covers R/T procedures that can only be used by licensed operators, it also covers basic procedures that every pilot should know and use.

Teaching students to use the radio properly from their early flights will give them a good foundation on which to build when they later study for a FRTOL. Some words and phrases used by aviators in other English-speaking countries, such as 'go ahead are not part of UK phraseology and should not be used. However, if there is no CAP 413 standard for what you want to say, or you have forgotten it, just use clear, concise English.

CAP 413 lists standard words and phrases used in radio calls some of whose meaning may not be obvious:

AFFIRM	Yes
GOING AROUND	I am abandoning my landing and will try again
NEGATIVE	No; Permission not granted; Incorrect; Not capable
PASS YOUR MESSAGE	Proceed with your message (do not say 'Go ahead')
READ	Radio-speak for 'receive' or 'hear'
ROGER	I received all your last transmission (Does not mean I will comply)
STAND BY	Wait and I will call you (No acknowledgement required)
STATION	A radio base or aircraft radio.
WILCO	I understand your message and will comply with it

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CALL-SIGNS AND THE PHONETIC ALPHABET

Transmit aircraft call-signs by spelling them using the ICAO phonetic alphabet. If a glider has CAA registration letters on its fuselage (e.g. G-CHSK), then this is its official call-sign. However, most glider pilots use their fin number as the callsign.

To help other airspace users understand the capabilities of their aircraft, when on other than gliding channels, glider pilots should prefix their own call-sign with the word GLIDER (e.g. GLIDER SIERRA KILO. The phonetic alphabet can also be used to spell out other groups of letters, but some aviation acronyms (such as QNH and QFE) as 'part of aviation terminology' which should be spoken using their constituent letters, not the phonetic alphabet.

TRANSMISSION TECHNIQUE

When transmitting, speak clearly and distinctly in a normal conversational tone and at a constant volume. If the microphone position is adjustable, speak directly into it from 10 – 30 cm away. Speak at a constant rate of no more than 100 words per minute (which is somewhat slower than normal conversation). To avoid pauses and hesitations, plan what to say before pressing the Push To Talk (PTT) switch. Avoid courtesies like 'Good afternoon,' 'Goodbye' or 'Thank you,' which take up valuable airtime.

MAKING CONTACT

Before using the radio, check the following:

- Is it switched on and on the correct frequency?
- Are the volume and squelch adjusted?
- Who do you wish to contact and do you know their call-sign?
- What do you want to say? Press the transmit button just before speaking, otherwise the first syllable of your message may not be transmitted. (Clipping.)

Then:

- Listen for a few seconds to make sure no one else is talking at the same time.
- Transmit the other station's call sign, followed by your own and wait at least 10 secs for a reply.

They should reply with your call sign and '*pass your message'*

You can then ask for, or pass the appropriate information, e.g. *Booker, 925, what is the wind direction?*, or *Booker base, 925 landing near Aylesbury*.

If your initial message is very short, you can give it immediately at the end of the initial call. In subsequent transmissions, if you are sure that the other station is listening, transmit messages immediately. This prevents the frequency from being cluttered up with unnecessary calls.

If you transmit but do not get a response, wait at least 10 seconds before transmitting again.

The words OVER ('I've said my bit, now you can say something') and OUT ('That's it, nothing more to say') are still part of R/T phraseology but have fallen into disuse because of the vast improvements in radiotechnology. As in normal conversation, it is usually obvious when a transmission has finished.

There can be several reasons for not receiving a reply to your initial call:

- You could be out of range.
- You have not switched the radio on.
- The volume and squelch are incorrectly adjusted.
- You are on the wrong frequency.
- The person you are calling is not listening, or their transmitter is not working.

If you can hear the other station talking to other gliders then you should assume that your radio is not transmitting properly. Check once with another glider that you can be heard clearly.

There may be occasions where it appropriate to make a blind call, simply assuming that you are being heard, even though you are not receiving a response.

If no transmissions have been heard for a while, check that the PTT is not accidentally being held down, thereby broadcasting the sound of your vario to half the country. This is known as a 'stuck mic Most radios have a transmit indicator – if the channel is quiet, check it occasionally. Having the volume set too low or the squelch too high would also stop you hearing anything.

Always remember that radio time is a limited resource, and that no-one else can transmit at the same time as you. Transmissions should be **CONCISE, PRECISE** and **INFORMATIVE.**

PRE-LANDING RADIO CALLS

The BGA recommends that gliding clubs encourage pilots to broadcast pre-landing radio calls, to aid everyone's situational awareness. Clubs may have a specific landing call radio procedure.

At airfields with a shared frequency in which transmissions might be heard elsewhere the standard procedure is:

- Begin a pre-landing call by identifying the airfield. You are addressing other traffic, not a ground station, so if in-circuit at (for instance) Borton Gliding Club, use the call-sign BORTON TRAFFIC.
- Next, give your own call-sign, using the GLIDER prefix if appropriate.
- Then say where you are in the circuit, for instance: DOWNWIND, LEFT-HAND, RUNWAY TWO TWO.
- Finish by naming the airfield again.

Pilots at other airfields may also be able to hear your call; repeating the name of the airfield at the end of the transmission reduces the risk of confusion. So in this example the whole call is:

BORTON TRAFFIC, GLIDER SIERRA KILO, DOWNWIND, LEFT-HAND, RUNWAY TWO TWO, BORTON

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At airfields with their own (protected) frequency, a much cut-down procedure is used, for example:

GLIDER SIERRA KILO, DOWNWIND, LEFT-HAND, RUNWAY TWO TWO

Downwind calls are commonly made at gliding sites, and base and/or final calls at some, but pilots landing at small GA airfields typically also make a call when about to take off (using the phrases LINING UP FOR DEPARTURE and TAKING OFF), and when on final approach. The word JOINING signifies that the pilot intends to land but is not yet in the circuit.

If landing out at an unattended airfield (such as a farm strip), where there is no radio operator whose job is to coordinate traffic, if there is no channel assigned for use at an airfield, use the national SAFETYCOM channel, 135.480, to make pre-landing calls when within 10NM and 2,000 ft AAL.

Remember - making circuit radio calls aids safety but flying the aeroplane accurately is always the highest priority.

EMERGENCIES

If someone is in serious or imminent danger and requires immediate assistance, you should make a Distress call, beginning with the words MAYDAY MAYDAY MAYDAY. Do so regardless of whether it is your own emergency or someone else's; for instance, seeing a road traffic accident, a crashed aircraft, or an isolated building on fire all merit a MAYDAY call.

A MAYDAY call (or a PAN-PAN call which indicates a lesser emergency) has priority over all other R/T use.

A MAYDAY call can be made on any channel, but channel 121.5 (sometimes called the 'Guard Frequency') is reserved for emergency use. It has monitored 24/7 by the Distress and Diversion (D&D) Section at RAF Swanwick, callsign LONDON CENTRE, and by airliners at high altitude. No FRTOL is required to transmit on 121.5 in an emergency or if lost and using it in preference to another channel will maximise your chances of getting help.

If you **cannot** use 121.5, make your emergency call on whatever channel you can, including simply pressing the PTT and calling on the channel to which your radio is already tuned.

If you have made a MAYDAY call but no longer require assistance, call CANCEL MAYDAY. If you have established contact with any other station during an emergency, do not change channels unless you let them know.

If you land safely and cannot raise London Centre on 121.5 to cancel, you can also 'phone them on 01489 612406; you might want to put this number on your phone now, so it is there if you ever need it.

While any radio call prefixed with the words MAYDAY MAYDAY MAYDAY will summon help, ideally you should use this format:

- MAYDAY, MAYDAY, MAYDAY
- The station being called, if appropriate
- Your own call-sign
- The nature of the emergency
- Your intentions
- Your position and altitude
- Any other useful information

An example MAYDAY call directed to D&D on 121.5:

MAYDAY, MAYDAY, MAYDAY,

LONDON CENTRE,

GLIDER GOLF CHARLIE HOTEL SIERRA KILO,

HAVE SIGHTED GLIDER UPSIDE DOWN IN A FIELD,

WILL REMAIN IN THE AREA,

SIX MILES SOUTH BICESTER, THREE THOUSAND SIX HUNDRED FEET QNH ONE ZERO TWO ZERO

You should announce any less serious emergency as a PAN call on the same frequency i.e. 121.5mhz, such as being lost above cloud in a mountainous area close to the sea. A PAN call (*PAN-PAN, PAN-PAN, PAN-PAN*) has a lower priority.

If you hear a MAYDAY or PAN PAN call, stop transmitting on that channel until the emergency is cancelled or the emergency traffic transfers to another channel. However, try to note down the details, and stay on channel to see if anyone responds. If you do not hear an acknowledgement, relay the details, as you heard them, to a suitable ground station. If you can offer relevant assistance, do so. However, wait for a short while before transmitting it to avoid conflicting with other transmissions. Otherwise, keep quiet until the emergency is over.

UNCERTAIN OF POSITION, OR LOST

If 'unsure of your position,' call D&D on 121.5 and ask them to use their direction-finding facility to fix the position of your radio transmission. Before doing so, listen for half a minute to ensure that there is not an emergency in progress.

If not, make a call in this form:

- *LONDON CENTRE, GLIDER GOLF CHARLIE HOTEL SIERRA KILO,*
- *UNSURE OF POSITION,*
- *REQUEST POSITION FIX*

Assuming you are high enough and they can get two or more bearings on your transmission; D&D should come back within a few seconds to give you a position relative to a prominent 1:500,000 chart feature and offer further help if required.

Dialling up 121.5 on your radio and transmitting puts you in touch with people who want to help. In most parts of the UK, once you press the transmit button on the radio, the distress and diversion people also know your location. So, if you need help, are lost and think you might be close to controlled airspace, or any other situation which is or could lead to an emergency, do not hesitate to call. You can also initiate a practice on this frequency.

RADIO TELEPHONY

SUGGESTED EXERCISES

There are no specific standalone SPL exercises for the use of the radio, but it is important that trainees become comfortable using the radio enough to use it as required (even if not fluent).

Unlike many aspects of flying, radio calls can easily be practised on the ground. Rehearsing pre-landing calls will reduce the stress when they come to do it in the air for the

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first time. Encourage the trainees to listen to other aircraft making downwind calls etc and emphasise that to get the full safety benefit, it is important to assimilate pre-landing calls from other aircraft, visually acquire those aircraft if possible, and adapt the circuit flown if necessary.

PRE-LANDING RADIO CALL - Practice call

Emphasise the importance of using the correct phraseology, including, if on a shared frequency:

- Beginning the call with the airfield name, followed by the word TRAFFIC
- Using the GLIDER prefix and aircraft call-sign
- Ending the call by repeating the airfield name

The circuit is a busy phase of the flight, when a pre-solo trainee may be task saturated. If necessary, take control and fly the glider while the student makes their first attempts at a pre-landing radio call. Ask the student to recite their intended call to you before actually transmitting, and correct it as required. Prompt the student to make the pre-landing call as early on the downwind leg as possible.

If the call made is incorrect, transmit the correct version. including the phrase CORRECTION I SAY AGAIN and make the correct call.

UNCERTAIN OF POSITION, OR LOST - Practice call

D&D staff welcome the occasional practice calls from pilots who are not actually lost. Brief the trainee to change to channel 121.5, listen for 30 seconds to ensure that no emergency is in progress, then make a call in this form:

- *TRAINING FIX, TRAINING FIX, TRAINING FIX*
- *GLIDER GOLF CHARLIE HOTEL SIERRA KILO, TRAINING FIX*

When D&D responds, they may ask how accurate their fix was. Afterwards, be very sure to sign off with D&D before changing back to the appropriate gliding channel.

To maximise the chances of success, make a call for a training fix when the glider is as high as possible, for example at the top of the winch launch, or shortly after releasing from aerotow.

EMERGENCIES

There are **no practice MAYDAY calls**; everyone hearing that word on a radio channel should assume there is a genuine emergency. Hence MAYDAY calls can be practiced in the briefing room or simulator, but not over the radio.

COMMON DIFFICULTIES

Call-signs in the wrong order in an initial call. Always begin by identifying the station being called, then give your own call sign (and then optionally a short message).

Clipping the start or end of the transmission. To avoid this, consciously pause very briefly between pressing the PTT and start speaking; one way to do this is to breathe in, briefly. At the end of the transmission, consciously pause for a fraction of a second before releasing the PTT.

Imitating incorrect or outdated procedures used by others. R/T procedure has evolved over the years, and 'old hands' are not always kept up to date, so students hear a variety of non-standard radio calls and call-signs.

Not knowing what to say before pressing the PTT, leading to stumbles and long hesitations. If this is a problem, tell the student to rehearse the transmission beforehand.

Stuck mic that transmits cockpit conversations and the vario's beeping to half the country, blocking all other transmissions on that channel. If the PTT is on top of the stick, this can be caused by the student holding the stick with their thumb pressing down on the top.

Using filler words like 'this is' or 'and,' or unnecessary pleasantries like 'Good Day' or 'Please.'

Long, rambling transmissions. Plan what to say before transmitting.

Transmitting, but not listening.

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DEFINITION OF TERMS

Radio Telephony is a technical subject, and its discussion invariably includes some terms and phrases not in day-to-day use. The list below covers some of the common ones, but it is ~~certainly~~ not exhaustive.

Carrier wave This is transmitted when the transmit button is pressed. If no message is passed the receiving station will hear a mushy - hissing 'shhhhh' noise.

Clipping This is the practice of pressing the transmit button at the same instant as speaking. Typically, this results in the first syllable of the message being lost and often results in the need to repeat the message.

Distress A term used to describe an aircraft or vessel in imminent danger and requiring immediate assistance.

Ducting VHF radio waves travel in straight lines and normally travel only slightly beyond the line of sight. However, in certain atmospheric conditions (usually high-pressure systems with strong inversions), radio signals can reflect off the inversion and travel much further than normal

FRTOL Flight Radio Telephony Operators License.

Modulation This is what happens to the carrier wave when you speak into the microphone. It is converted back to speech at the receiver. If the circuit which modulates the carrier fails, information can sometimes be passed by 'blipping' the transmit button in response to questions.

Squelch This is a function of the receiver that suppresses the hissing noise, between received messages. If it is manually adjustable it can be used to filter out electrical noise, either from the local environment or a turn and slip, for instance. However, care should be taken that it is not set to suppress the messages that you want to hear as well as the noise.

LEGISLATION RELEVANT TO RADIO REQUIREMENTS

1. Wireless Telegraphy Act 2006

Under the Wireless Telegraphy (WT) Act 2006 it is an offence to install or use radio transmission equipment without a licence. Ofcom is responsible for **administering and issuing all UK Aeronautical Radio Licences**, which cover radio equipment for aircraft and ground stations for voice and navigation purposes. Their responsibilities include managing applications, collecting fees, and maintaining license details, though the CAA retains responsibility for assigning frequencies and issuing safety approval.

All radio transmitting equipment fitted or carried in a glider or used on the ground to transmit messages to equipment fitted to or carried in a glider, is required to be issued with a WT Act radio licence. However, only one licence is needed per aircraft even if more than one radio is fitted.

An Aeronautical Ground Station licence is required for any radio equipment used on the ground. A handheld or portable radio used on the ground to communicate with equipment in a glider, even when it has been issued with an aircraft transportable licence for when the radio is carried in a glider, is required to be issued with an Aeronautical (Ground) Station Licence.

It is not necessary to licence the GPS equipment used in gliders for navigation or as an aid to collision avoidance.

Contact information is available via their website on:

www.ofcom.org.uk/about-ofcom/contact-us

CAA email : frequency.approval@caa.co.uk

2. Airborne VHF Radio Equipment Approval

The CAA website contains detailed information about aircraft equipment approvals. The database of aircraft equipment approved under the British Civil Airworthiness Requirements (BCARs) can be searched directly from the same page.

The CAA Directorate of Airspace Policy, Radio Licensing Section staff will check whether the radio equipment declared on application forms for an aircraft (WT Act) radio licence is approved.

3. Ground VHF Radio Equipment Approval

The radio equipment used in Aeronautical Ground Radio Stations is required to comply with the Radio and Telecommunications Terminal Equipment Directive (R&TTED) 1999/5/EC from the 20th of October 2005.

The CAA, Air Traffic Services Standards Department, CNS/ATM Standards Section, Communications Systems Specialists will check whether the radio equipment declared on application forms for an aeronautical (ground) station (WT Act) radio licence is acceptable

4. Flight Telephony Operator Without a Licence

The ANO notes how a person may act as a flight radiotelephony operator within the UK without being the holder of an appropriate licence, if the following conditions apply;

(a) the pilot of a glider on a private flight and does not communicate by radiotelephony with any air traffic control unit, flight information unit or air/ground communications service unit; or

(b) being trained in an aircraft registered in the United Kingdom to perform duties as a member of the flight crew of an aircraft and is authorised to operate the radiotelephony station by the holder of the licence granted for that station.

Note: An 'appropriate licence' in this context means a Flight Radiotelephony Operator's Licence which may be issued as a stand-alone licence, or in conjunction with a flight crew licence.

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