



Chapter 11-2

ON AIR

ACMA Foundation Syllabus 8.5 - 8.8

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Signal Reports

The sending station has no idea what their signal is like at the receiving end. A signal report gives the sending station an indication of the signal. The sending station may be able to turn their antenna to focus the signal, or no action can be taken.

The signal report also gives the sender an indication of the atmospheric conditions. If for example, the signal is clear and then starts to fade, the sender has an idea on how long the conversation will hold.

A signal report informs the transmitting station on the readability and signal strength of their signal at your receiver.

There are three parts to a signal report. **RST**

- **R**eadability scaled 1 to 5 and judged by the operator.
- **S**ignal strength of the receivers meter.
- **T**one on a scale of 1 to 9. Used for morse code only and judged by the operator.



Readability

This is judged by the operator receiving the signal.

1. Unreadable
2. Barely readable, occasional words distinguishable.
3. Readable with considerable difficulty
4. Readable with practically no difficulty
5. Perfectly readable

Signal strength.

This reading is a voltage measurement at the receiver antenna. A midscale reading of S9 is triggered by 50 μ V at the antenna. Over S9, the meters indicate as follows:

- +20 means 20dB over S9 (10 times) or 500 μ V
- +40 means 40dB over S9 (100 times) or 5,000 μ V (5V)
- +60 means 60dB over S9 (1000 times) or 50,000 μ V (50V)

Tone

Not required for the Foundation licence. Tone relates to the quality of the morse code signal.

1. AC hum, very rough and broad.
2. Very rough AC, very harsh and broad.
3. Rough AC tone and rectified but not filtered.
4. Rough note and some trace of filtering.
5. Filtered rectified AC but strongly ripple-modulated.
6. Filtered tone and definite trace of ripple modulation.
7. Near pure tone and trace of ripple modulation.
8. Near perfect tone and slight trace of modulation.
9. Perfect tone and no trace of ripple or modulation of any kind.

Examples:

- A good strong signal would be “5 and 9”. The 5 comes from the readability and the 9 is read from the meter.
- A weaker noisy signal may be given a reading of “3 and 3”.

Repeaters

A radio repeater is an automated station that receives, amplifies, and simultaneously retransmits radio signals on a different frequency to extend communication range.

The repeater is usually sited at a high elevation which can allow two mobile stations, otherwise out of line-of-sight propagation range of each other, to communicate. Repeaters are found in professional, commercial, government mobile radio systems and in amateur radio.

Australian amateurs have access to many repeaters covering the 10, 6, 2 metre bands as well as the 70 and 23cm bands. There are also dedicated data and ATV repeaters.

Australian Repeater Directory

The purpose of the Australian Repeater Directory, often maintained by the Wireless Institute of Australia (WIA), is to provide a comprehensive, up-to-date listing of amateur radio repeaters across Australia. The directory is a guide to frequencies, locations, and technical details to assist operators in maximizing communication range and optimizing station setups.

The amateur repeater are listed in the Australian Repeater Directory which can be found [HERE](#).

An excerpt from the directory is shown below.

Output	Input	Call	Location	Service Area	S	ERP	HASL	T/O	Sp	Tone	Notes
147.050	147.650	VK3RWL	Mt Warrnambool	Warrnambool	O	40	-	0.5	3ATL	91.5	58
147.075	147.675	VK3RCR	Mt Dandenong	Melbourne 10/21	U	100	600	-	3VW	-	-
147.100	147.700	VK3RPB	Mt Porepunkah	Bright	O	5	-	2.5	3WI	-	36
147.100	147.700	VK3RSG	Bass Hill	South Gippsland	O	40	-	3	3WI	-	-
147.100	147.700	VK3RWA	Ben Nevis	Ararat	O	30	876	2.5	3WI	91.5	-
147.125	147.725	VK3RDG	Mt Delegate	Delegate	O	-	-	-	3WI	-	-
147.125	147.725	VK3RGC	Montpellier	Geelong	O	45	160	3	3ATL	91.5	-

Output – This is the output frequency of the repeater and the receiving frequency for the radio.

Input – This is the receiving frequency of the repeater and the transmitting frequency of the radio.

Offset – Is the difference between the Output frequency and input frequency. On the 2-meter repeaters, this is 600kHz.

Call – The call sign for the repeater. All call signs with the suffix starting with R are reserved for repeaters. So, VK3RGC can be instantly recognized as a repeater call sign.

Location – Repeater site position.

Service area – General area of repeater coverage.

S – Status of the repeater. Operational or unserviceable.

ERP – Repeater’s Effective Radiated Power in watts.

HASL – Repeater’s Height Above Sea Level.

T/O – The time the repeater will operate before dropping out.

Sp – Sponsor responsible for maintenance of the repeater.

Tone – Access tone (CTCSS) A dash represents no CTCSS tone required. (CTCSS covered later)

Notes – Provide additional information in relation to the repeater.

Repeater Operations

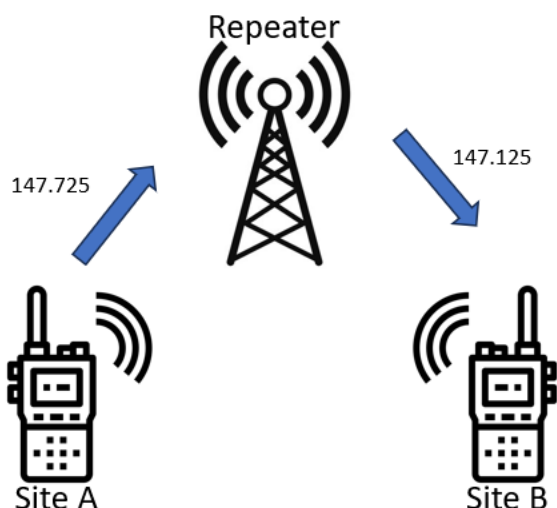
A repeater has a receive and a transmit frequency. These frequencies are separated by and offset. For Australian 2 metre repeaters, the **offset** is 600KHz.

Example: You are VK3JFP and want to access the Mount Delegate repeater (VK3RDG) covering Delegate River in eastern Victoria. This repeater is operational.

From the directory sample above, the repeater transmit frequency is 147.125 MHz and the repeater input frequency is 147.725 MHz. The difference is positive 600KHz.

Any frequency above 147 MHz as a positive 600KHz offset and any frequency below 147MHz has a negative 600 kHz offset.

The radio now listens to 147.125 MHz and when VK3JFP presses the transmit button the transmit frequency jumps to 147.725 MHz.



When both radios stop transmitting, they revert to the listening frequency of 147.125MHz.

You can use the repeater.

CTCSS

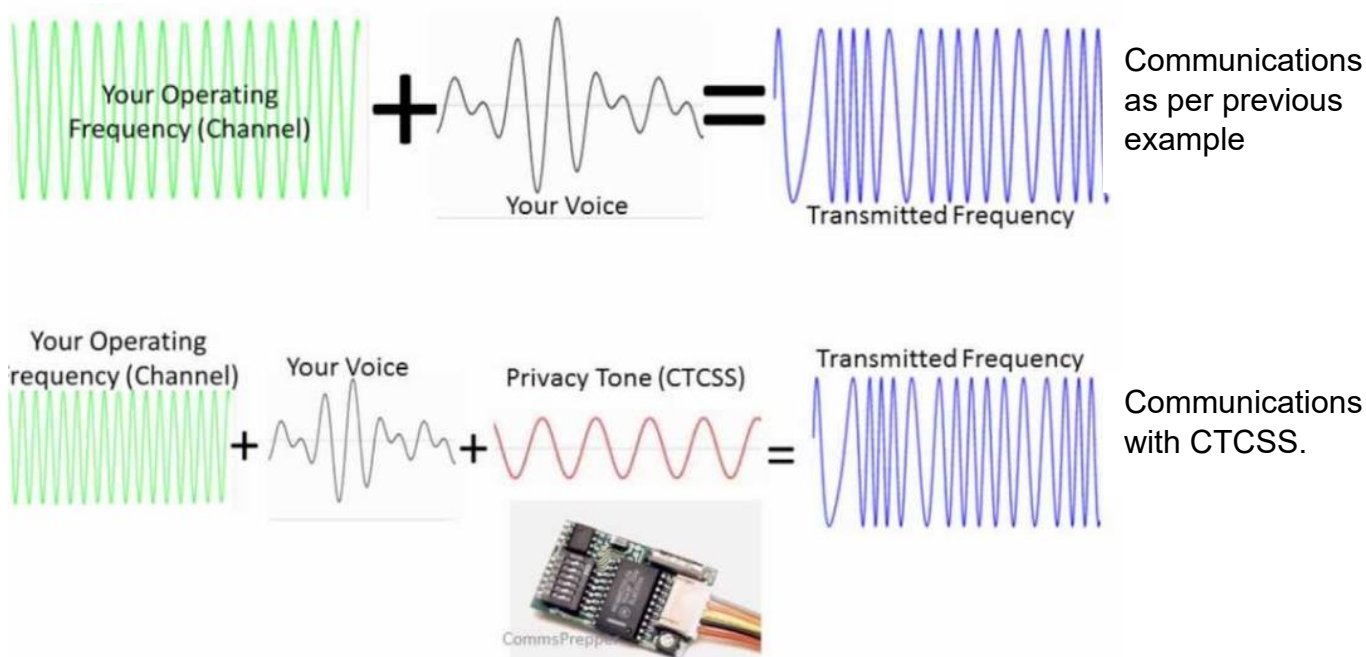
Looking at the directory, there are two repeaters on the same frequencies, VK3RDG and VK3RGC.

These repeaters are separated geographically but still to prevent and cross over, there is a tool call (Continuous Tone Coded Squelch System (CTCSS)).

CTCSS adds a sub audible tone to the transmitted signal from the radio. In the directory this is listed as tone access. For VK3RGC the access tone is 91.5 Hz.

If the repeater has an access tone, only transmissions on that frequency with the tone will access the repeater. No tone no access.

Now the privacy tones



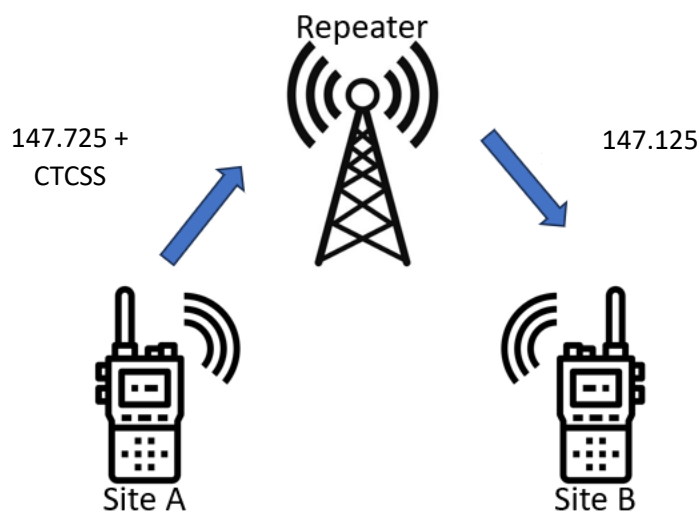
Example: You are VK3JFP and want to access the Montpellier repeater covering Geelong (VK3RGC). You checked the directory and this repeater is operational.

From the directory sample above, the repeater transmit frequency is 147.125 MHz and the repeater input frequency is 147.725 MHz. The difference is positive 600KHz.

Now you need to include the CTCSS tone of 91.5 Hz.

The radio still listens to 147.125 MHz and when VK3JFP presses the transmit button the transmit frequency jumps to 147.725 MHz and sends the CTCSS tone with your voice.

Notice the Montpellier and Delegate repeaters are using the same frequencies. What sets the apart is the CTCSS tone.

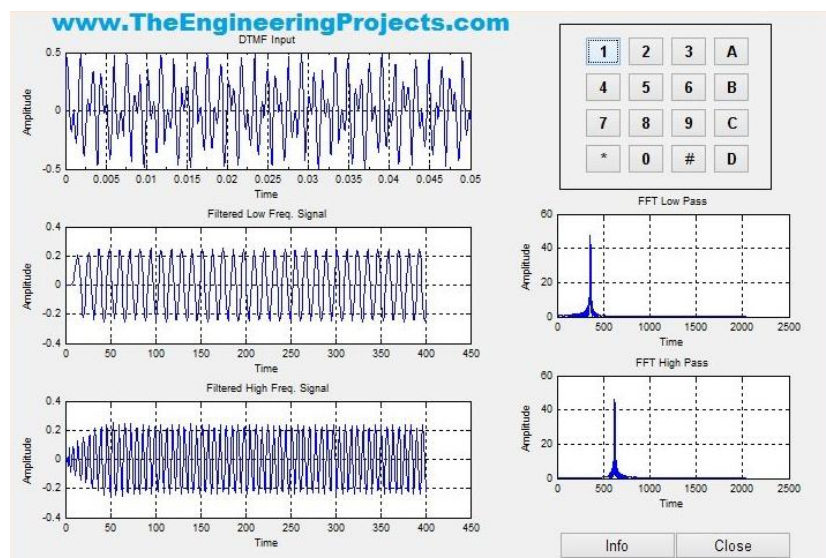


DTMF

DTMF is Dual Tone Multi Frequency. This is the tone you hear when dialing numbers on a phone. A dual combination of audible frequencies allows the radio to transmit numbers. See the table below.

Identify your station before sending DTMF tones.

DTMF keypad frequencies				
	1209 Hz	1336 Hz	1477 Hz	1633 Hz
697 Hz	1	2	3	A
770 Hz	4	5	6	B
852 Hz	7	8	9	C
941 Hz	*	0	#	D



Example: You wish to transmit number 6 over the radio. When you press the number 6 button, the two tones 770 Hz and 1477 Hz are sent. The receiver has a matrix of filters to analyse the tones and confirm the number as 6.

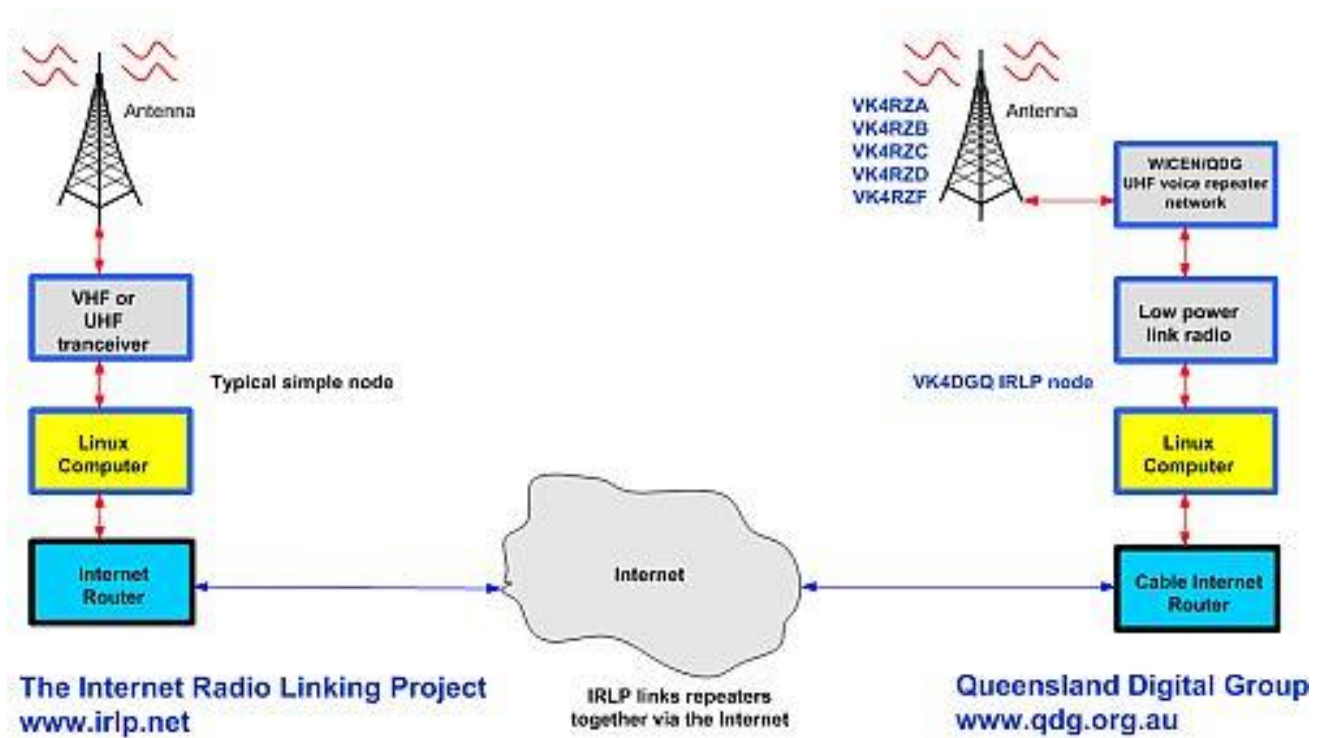
Repeater Breaks

- Don't overload repeaters. They are fitted with time out to prevent continuous use.
- Courtesy - Lets others access the frequency if needed. You may be working a remote station that others may want to access e.g. satellite.
- Listen for others. Some weaker signals of importance may be blocked by your occupation on frequency.
- Safety. In marine radio, the frequencies are quite during the period 3 minutes after the hour and three minutes after the half hour to allow any messages to be read.

IRLP - Internet Radio Linking Project

The **Internet Radio Linking Project**, also called **IRLP**, links amateur radio stations around the world by using Voice over IP (VoIP). Each gateway consists of a dedicated computer running custom software that is connected to both a radio and the Internet. Amateur radio (or *ham*) operators within radio range of a local node can use DTMF tone generators to initiate a node-to-node connection with any other available node in the world. Each node has a unique 4-digit node number in the range of 1000-8999. A real-time searchable list of all nodes worldwide (including their status) is available anytime by viewing the IRLP Network at a Glance.

As of 2019, there are over 15,000 nodes worldwide.



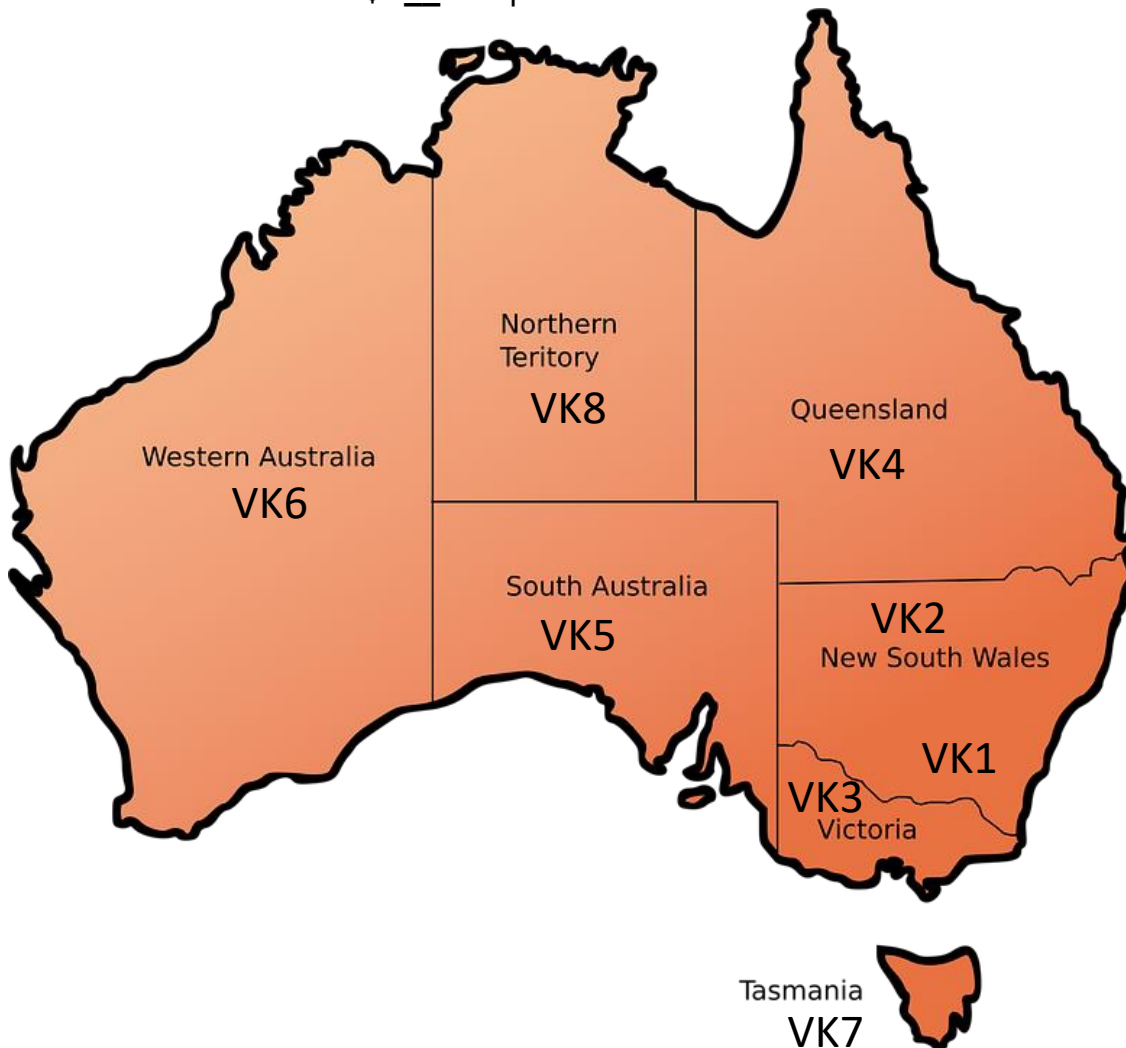
WIA web site

To make a call on IRLP, use the following sequence.

- Listen on the radio frequency you use to call the node.
- If not occupied, enter the DTMF numbers.
- Listen to the distant node.
- If occupied, don't break in.
- If clear make a call, "This is VK**** calling CQ from Canberra, Australia."
- Wait for a response.
- Have the QSO

Call Signs

- VK0 – Antarctica
- VK1 – ACT
- VK2 – New South Wales
- VK3 – Victoria
- VK4 – Queensland
- VK5 – South Australia
- VK6 – Western Australia
- VK7 – Tasmania
- VK8 – Northern Territory
- VK9 – Australian External Territory
- AX\$ - National Events \$= State number
- VI\$ - Club or local events
- VK\$R__ - Repeater station



Go to Chapter 11-2 Questions.

Have fun and stay safe.