



CB/PRS Radio

BEST PRACTICE IN NEW ZEALAND

Introduction

- ▶ Who am I?



- ▶ Outcomes/Goals of this training session
 - ▶ What channels NOT to use
 - ▶ What are, and how to use repeaters

Legal / Laws

- ▶ You must not operate in a way that causes interference to other radio services
- ▶ Your equipment must comply with the relevant radio standards and relevant technical parameters for the Citizen Band Radio GURL
 - ▶ Don't import from China, buy compliant equipment from NZ based reputable sellers
- ▶ You must hold a relevant license to transmit outside of the CB bands
- ▶ In a "LIFE-THREATENING EMERGENCY", if you have access to a radio you are not licensed to use, you are allowed to use it to get help

“CB” frequencies/bands in NZ

- ▶ There are two bands in use in New Zealand
 - ▶ High Frequency (HF) 26/27MHz
 - ▶ Ultra High frequency (UHF) 476-477 MHz PRS
- ▶ When using these frequencies;
 - ▶ Equipment is designed for one band or the other (can't be used on both)
 - ▶ can be used by ANYONE in New Zealand
- ▶ We won't be talking about the HF band
 - ▶ Equipment is less commonly available, not handheld and has a bad signal quality.

Ultra High Frequency Band

- ▶ Known as PRS “Personal Radio Service” or UHF CB
- ▶ 476.3125-477.41875MHz
 - ▶ 8.3W maximum transmit power
 - ▶ Generally 0.25-5W radios
- ▶ 5-10km range
 - ▶ Line of sight required
 - ▶ 25+ km possible between high points with clear line of sight
- ▶ Repeaters nationwide to increase range
- ▶ Lots of choices, radios (transceivers) start from \$35

Example UHF transceivers

Transceiver = Transmitter + Receiver



Estimated range (Handheld)

- ▶ 0.5w 1Km
 - ▶ 1w 1.5Km
 - ▶ 2w 4Km
 - ▶ 5w 10km+
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- ▶ A good rule of thumb is that $\text{Watts} * 2 = \text{Range in Km}$
 - ▶ If your radio is low power, you may receive a signal, but may not be able to transmit a signal to reply back
 - ▶ These ranges are for direct (*Simplex*) communication with clear *Line of Sight*.

Line of sight

- ▶ Radio waves only ever travel in a direct visual path from the source to the receiver without obstacles.
- ▶ They can be refracted and reflected which may allow transmission beyond obstacles, but this cannot be relied upon



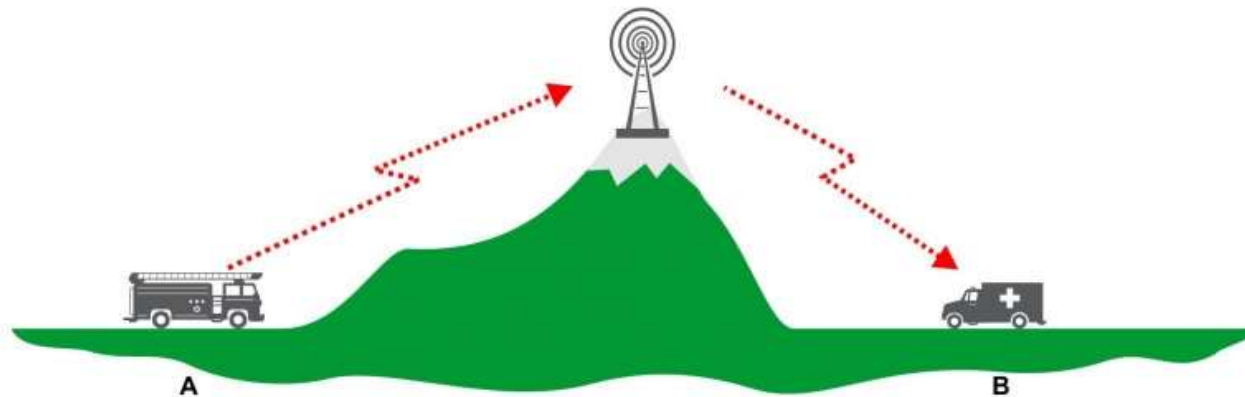
No Line of sight

- ▶ A radio wave may “bend” around a small obstacle, but it will be stopped by a large obstacle
- ▶ It's not just hills and buildings that are an issue. Communicating from the bottom of a valley up to flat ground is also not possible.



Repeaters

- ▶ A repeater can be used to allow communication around obstacles and longer distances
- ▶ The repeater simply receives transmissions on one frequency and simultaneously transmits it on a different frequency.



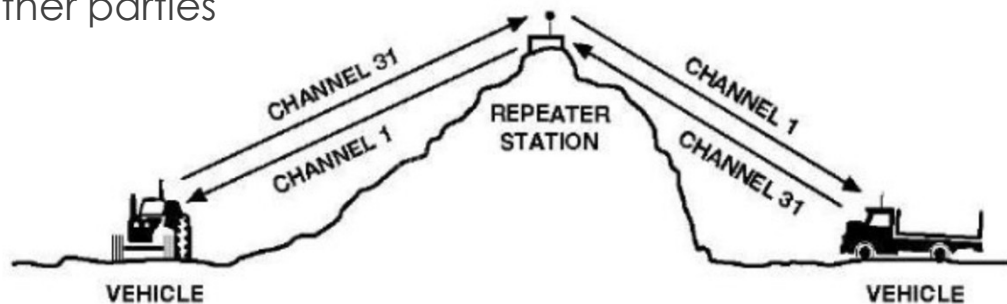
Simplex

- ▶ Direct radio to radio
- ▶ Same Transmit and Receive frequency
- ▶ Signals are Line of Sight – Stronger signals will get over a small obstacle, but do not rely on it
- ▶ Works without a repeater (subject to battery power and range restrictions)



Duplex

- ▶ Via a repeater (Radio > Repeater > Radio)
- ▶ Uses separate Transmit and Receive frequencies
 - ▶ Transceiver does this automatically when the transmit button is pressed
- ▶ Repeaters have a professionally tuned antenna and have a higher transmit power
- ▶ Repeater may be in use by other parties

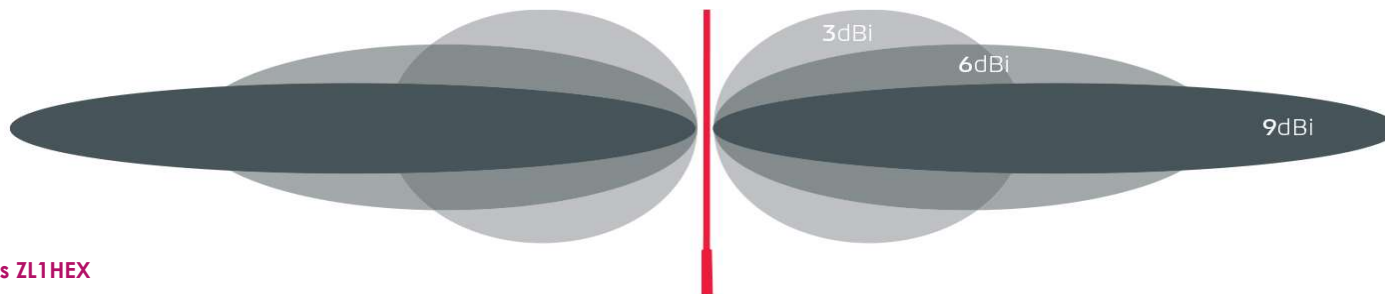


Duplex for handheld CB radios

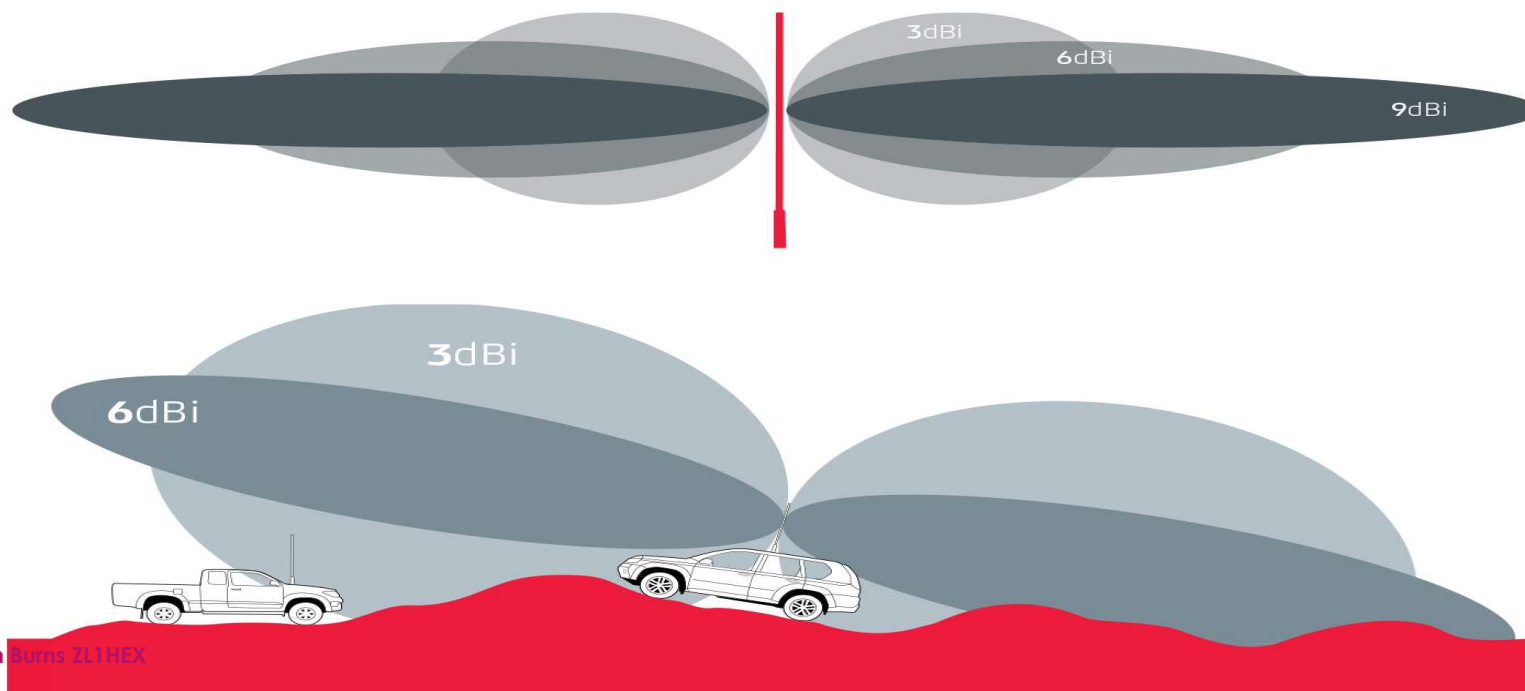
- ▶ Repeaters on this UHF band operate on Channels 1-8 and 41-48
- ▶ **When your radio is set to Duplex/Repeater mode, your radio will automatically TRANSMIT on the selected channel +30**
 - ▶ If Receiving on channel 3, your radio will Transmit on channel 33
 - ▶ If Receiving on channel 7, your radio will Transmit on channel 37
 - ▶ When duplex/repeater mode is enabled, your radio (transceiver) will do this automatically when the transmit button is pressed!
- ▶ Dependent on a working (and available) repeater
 - ▶ Nationally repeaters may not work in a power outage or emergency situation but the Wairamarama repeater is designed to be off grid with 7 days power backup

Antennas

- ▶ Most UHF CB/PRS antennas are omnidirectional and transmit the signal in a doughnut shape.
- ▶ Antennas come in various specifications which controls the direction of the signal to increase their **effective** power. They are NOT increasing the total power output, just simply focusing it in a specific direction – This is called the gain of an antenna.
- ▶ As the gain increases, the doughnut is squished – More signal is directed outwards, but this may be a disadvantage



Antennas



Antennas

- ▶ The legal transmit limit in NZ is 8.3 Watts EIRP (Effective Isotropic Radiated Power).
 - ▶ EIRP refers to the power you would be transmitting if you had a perfect spherical transmit pattern.
 - ▶ It is easy to exceed this on a 5W radio with a moderate gain antenna
- ▶ **Stick with the supplied antenna that came with your gear unless you know what you are doing.**
- ▶ Keep it vertical!
- ▶ When using a handheld radio, be aware that your body will block the signal – Face the direction you want to transmit.

Squelch

- ▶ Squelch is the noise gate on a receiver to filter between background white noise and a transmission.
- ▶ If set too high, you will not hear weak signals
- ▶ If set too low, you will hear white noise
- ▶ Some transceivers will not allow you to adjust it
 - ▶ And some will let you toggle between a preset value and OFF
- ▶ Found out how to bypass or turn off squelch on your radio
 - ▶ In an emergency you may need to hear a weak signal
- ▶ There are other types of squelch

Coded Squelch

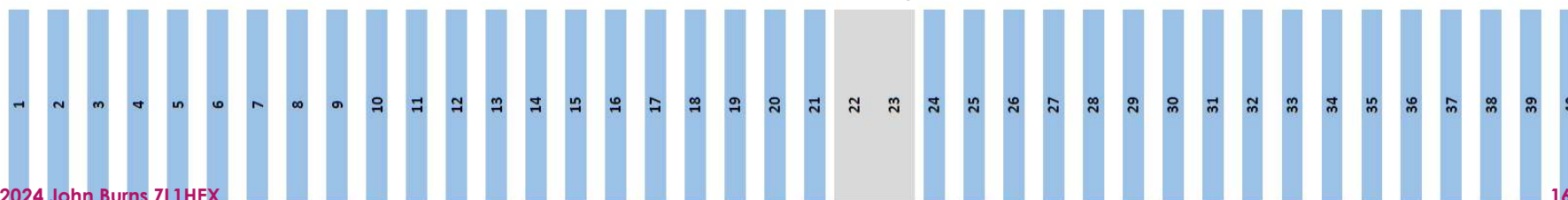
- ▶ CTCSS - Continuous Tone-Coded Squelch System
 - ▶ TRANSMITTING radio can send a specific “Sub Audible” tone with the transmission – It’s a low frequency and barely noticeable.
 - ▶ RECEIVING radio can optionally “listen” out for the tone and only receives transmissions when the tone is received.
 - ▶ There are 38 tones to select from.
 - ▶ If this is accidentally switched on, you will only hear transmissions with the selected tone (if the other party is not transmitting the tone then you won’t hear them).
 - ▶ **Receiving radios not using CTCSS will “hear” everything**
- ▶ There is also a squelch called DCS or CDCSS. This was meant to be the successor to CTCSS but has compatibility issues between brands of equipment. It’s generally a good idea to **NOT** use DCS

Channels

- ▶ It is possible for your radio to transmit radio to radio (simplex) on any of the 80 channels but you may affect other citizens' use of the band.
- ▶ Certain channels are allocated for specific uses.
- ▶ It is easy to unintentionally interfere with a repeater
 - ▶ If you transmit on a repeater input channel, your "short range" conversations are tying up a repeater and being broadcast far and wide.
 - ▶ If you use a repeater output channel you will hear people using the repeater but unable to talk back to them.
- ▶ The effects of interference are worse the more elevated you are as transmit and receive range increases due to the increased Line of Sight

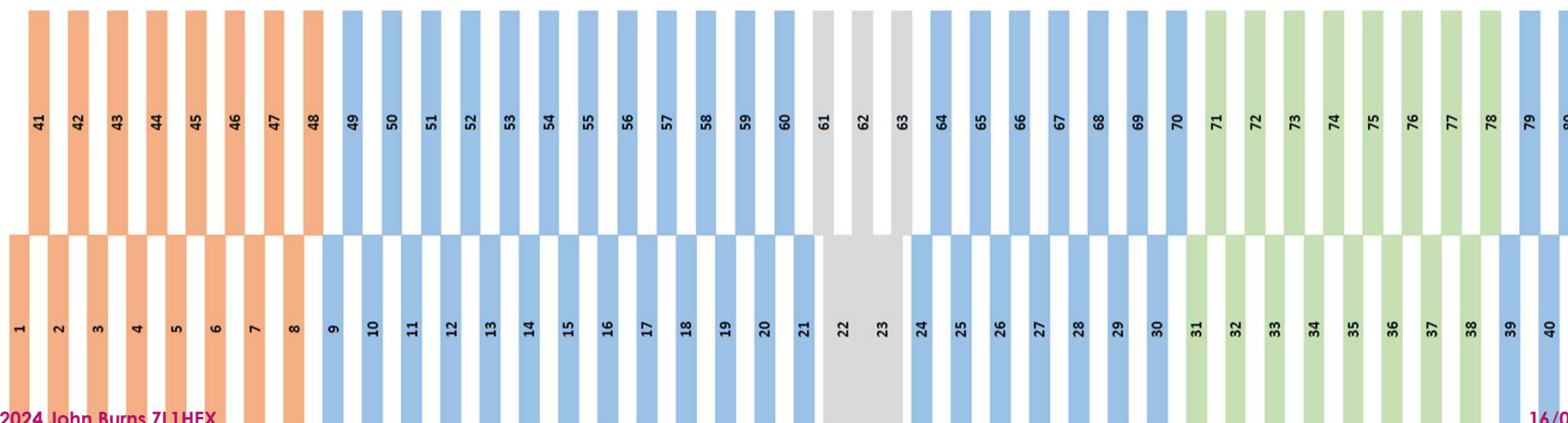
Channels

- ▶ Initially there were 40 channels....
- ▶ Note these two channels (22 & 23)
 - ▶ They're wider than usual, and were intended for telemetry/data use
 - ▶ Some transceivers won't let you select them



Channel usage

- ▶ Duplex/Repeater mode listens on channels 1-8 and 41-48 (Orange)
- ▶ Duplex/Repeater mode Transmits on channels 31-38 and 71-78 (Green)
- ▶ The grey channels were intended for data use



Channel usage

- ▶ Any of the blue channels are safe to use for radio to radio (simplex) use
- ▶ It's easy to remember that all the Tens (10-20) and all the Fifties (50-60) are safe to use



Radio use

- ▶ You should be able to fit a fist between your microphone and your mouth
- ▶ Handhelds;
 - ▶ Your body **WILL** block/absorb the signal.
 - ▶ Being inside a vehicle or near metal **WILL** block/absorb the signal.
 - ▶ Do not touch the antenna when receiving or transmitting
- ▶ Speak clearly
- ▶ We wary of speaking fast, or reducing your volume towards the end of your message
- ▶ Best habit is: To, From, Message
- ▶ Have fun and get comfortable using it

Repeater use

- ▶ All radios are different, but you will need to turn on the repeater feature
 - ▶ You will need to check your manual
 - ▶ Normally only available for Channels 1-8 and 41-48
- ▶ Almost all repeaters will have a short transmit “Tail” enabled. If you are triggering the repeater, it will transmit for half a second or so after you finish your transmission.
- ▶ You can't test a repeater with two radios “across the room”.

Dup

DUP



r

Rpt

Finding Repeaters

- ▶ As of April 2024, radio licenses have only been issued for channels 1-8.
 - ▶ Don't bother trying on channels 41-48
- ▶ Enable repeater mode on all repeater channels (1-8)
 - ▶ Take advantage of the transmit tail
 - ▶ If the transmit tail is crackly, repeater transmissions will crackle too!
 - ▶ Some radios have a receive signal strength indicator

Nearby Repeaters

- ▶ Wairamarama: Channel 3
- ▶ Klondyke: Channel 6
- ▶ Waiaatarua (West Auckland): Channel 5

- ▶ Grab a postcard
 - ▶ Shows all licensed repeaters in the North Island
 - ▶ Green dots are known working repeaters

Key points / Too Long, Didn't Listen

- ▶ Brien Road repeater
 - ▶ Channel **3**
 - ▶ 100% off grid solar – should work during an emergency
- ▶ Channel choice for radio to radio (Simplex) use
 - ▶ The “Tens” and “Fifties” are safe channels to use
 - ▶ Don't use repeater channels
- ▶ Radio etiquette
 - ▶ To, From, Message, Over
 - ▶ Children may be listening!
- ▶ Grab a postcard