

# THE WORLD BELOW 400 GHz

The Periodical Newsletter of the  
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NZART  
BRANCH 81

[www.zl1is.info](http://www.zl1is.info)

## December 2011 Issue

### WAIKATO VHF GROUP EXECUTIVE

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## General Meeting December 2011

A General Meeting of the Waikato VHF Group will be held on  
Sunday, 11th December, 2011 at 1:30pm.

The venue will be the premises of Mighty River Power, 160 Peachgrove Road, Hamilton. Enter the MRP premises via the gate beside the large turbine runner and park in the car park to the right. The meeting will be held in the building with orange roof facing the car park.

See website - [www.zl1is.info/meetings.html](http://www.zl1is.info/meetings.html) - for details and location map  
The meeting will start with a brief business meeting and then we will have a presentation by Mighty River Power on the operation of the hydro generation scheme, followed by a visit to the Control Room.

## Notes from last Committee Meeting of 30 Oct 2011

**Site Reconstruction:** A site is still being investigated for the extension of the 2m "WaiPlenty Network" to the Waihi/Whangamata area.

**National System:** New node installed by Mercury Bay, Branch 85, operational at Opito Bay.

**Funding:** We are waiting on the outcome of an application to the WEL Trust for funds to complete the extension of the 2m "WaiPlenty Network" to Maungakawa, north east of Huntly. (We still require funding to complete a new site between Waihi and Whangamata, with linking to Te Weraiti. Any ideas on where we can obtain funds would be appreciated?)

**Old Group Records:** These are to be offered to the Hamilton Public Library, in the first instance, for archiving.

**Beacons:** The 2m and 23cm beacon's are operational again from the Hamilton telephone exchange. A new site is being investigated for the 70cm beacon. Signal reports are welcome.

**Meetings:** Numerous meeting ideas were put forward.

### General

While scanning the 2m repeaters the scribe notices that the Mercury Bay repeater puts a signal into Hamilton on 147.075 MHz. Tom ZL1THG also mentioned that it is audible in the car while driving around Hamilton, although its coverage is a little patchy.

2M conditions have been somewhat variable with some repeaters well outside the Waikato popping up, and Stephen ZL1TPH also mentioning that the Wellington and Waikato 2m Beacons having significant signal level enhancements. The new crystals in the 2m and 23cm ZL1VHW beacons seem to be working well with minimal aging.

As the weather improves there will more "lifts" and overseas openings. A few of these have already occurred in the second half of this year with a number of VK's being worked by those closely monitoring 2m. Six meters has also been favorable with Pacific Island stations being heard.

6m should be interesting in the next few years with the Analogue Broadcast TV soon being a thing of the past.

The scribe gave a talk on beacons to the Hamilton Amateur Radio Club during November. On show was the elderly 70cm beacon, which has changed ownership. The beacon ran FSK, which one can listen to with a SSB receiver. Listening on a FM receiver is possible, but no modulation will be discerned.

The new beacon which will use devices and technology that is decades more modern.

It is a credit to the original designer and builder that the original unit needed very little work, other than a change of PSU filter capacitors in recent years. I am sure there is much life still left in the unit. Keep your ears posted to where it ends up...

Ensure that the modulation on your transceiver isn't excessive. Some transceivers have microphone gain on the front panels, while the more recent equipment tends to have it in software.

The microphone gain should just be enough, to set correct performance. Excessive microphone gain will let everyone else hear the kids playing in the street, while the operator is in the shack.

The FM deviation should also be checked as some repeater equipment can cut reception if ones modulation is excessive.

Readability is normally degraded if settings aren't optimum...

The grapevine also said that the Amateur 500w Power limit, has now being increased to 1000w (1kW) See the NZART website ([www.nzart.org.nz](http://www.nzart.org.nz)) for more details

The scribe has had some older VHF equipment starting to show its age with failures of electrolytic capacitors and even an intermittent microphone.

Finding the dynamic insert for a long obsolete Yaesu microphone would be pretty hard. Since DC is fed up the cable, then it easy to place an electret insert inside. Funnily enough there is even a moulding for the electret insert, so it seems they considered the possibility. The scribe would have thrown the microphone away if it wasn't for a few extra facilities it had...

Some older transceivers also have some brown "goop" inside over portions of the circuit, and this over time has degraded and can cause issues especially in the VCO/synthesizer area of some amateur transceivers.

The scribe has been running an inline 2m preamp or LNA (RF switched) as per the image below. This makes about 4 or 5 dB improvement in sensitivity. At weak signal levels, on FM, this improvement can be dramatic. The gain of this particular preamp is only about 13 dB, which is sufficient. Anything more is excessive.

The Mutek preamp (1980's design ) has excellent Bandpass filtering, which means signals away from 2m don't pound the frontend of the transceiver. For example, the telepaging signals used for pocket pager receivers, are seen at a fairly high level off air, to work with the small antennas fitted to the pagers. Many current amateur preamps have gain over a very wide band of frequencies.



Modern 2m equipment often provides out of band RX coverage, while older equipment had bandpass filters purely for 2m. While frontend signal handling has improved in new amateur equipment, activity on adjacent commercial frequencies has also increased over time as well.

Signal reports at one of NZ's VHF/UHF DXers appeared to be down in recent months. Subsequent checks on the feeder showed it to be water cooled (NOT !) and enough was poured from the feeder to make a cuppa. Replacement of the coax, retermination of the connectors and waterproofing of all joints brought reports back to normal. Motto:- Check waterproofing of all coax joints...

Did you know that 400 GHz is 0.4 THz?



The scribe picked up a small Elecraft XG3 signal generator which uses a PLL IC and attenuation to give set levels (1  $\mu$ V, 50  $\mu$ V, 5mV and 223mV (0 dBm) for most amateur bands to 144 MHz. Runs on a PP3 9V battery and fits with my other portable kit.

Access to a programming port allows change of frequency parameters as well as programming of an RF sweep.

A very useful tool for checking sensitivity of a wide range of equipment. On some elderly HF transceivers tested by the scribe, there was significant RX sensitivity differences even in units of the same model.

This was traced to the use of lossy capacitors in RF and IF filters.

This is certainly very much lighter than my other signal generators which seem to get heavier with age... 😊

With modern technology it is possible to miniaturize a lot of test equipment so that almost a whole workshop can be carried in a laptop bag, along with the laptop...

Waiting for a 10 MHz signal reference to warm up, when using a signal generator or a frequency counter, can be a chore. If you don't wait long enough then measurements may be inaccurate.

In some budget equipment a plain old crystal oscillator is used, so results could be quite variable depending on ambient temperature

In some equipment a Temperature compensated Crystal oscillator is used (TCXO) which offers good warm-up characteristics although the frequency stability might not be the best on the block. This is typically used in cellphones and some test equipment where quick warmup is required.

In some test equipment a Oven controlled Crystal oscillator (OCXO) is used, but warmup is typically much longer, however temperature stability is better as its above ambient temperature.

Another surplus frequency source, commonly available on the Internet is a Rubidium standard, which uses a Rubidium physics package to discipline a crystal reference. In some cases this gives out 10MHz, which is very useful. (LPRO101) In other units the frequency reference is used to control a DDS with which can set frequencies over a wide range.

Warmup to very,very good accuracy is only a few minutes. These typically need a supply around 20W DC and are quite small.

Other accurate frequency references, available surplus are the GPSDO which have to acquire quite a number of satellites to discipline the crystal oscillator, and they improve their accuracy over time. If one moves location, then the unit has to reacquire satellites again to maintain accuracy, which takes time. A small unit, about the same size as the Rubidium package. Used a lot commercially.