THE WORLD BELOW 400 GHz

The Periodical Newsletter of the
WAIKATO VHF GROUP Inc.,
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December General Meeting 2007

A General Meeting of the Waikato VHF Group will be held on
Sunday, December 9th, 2007, at 1:30pm
at the Te Puke Amateur Radio Club rooms, State Highway 2, Te Puke.

The speaker will be Kevin Murphy, ZL1UJG, who will speak on
Equipment for the bands above 432 MHz.

GENERAL NEWS

Notes from last Committee meeting:-

1. The licenses for all repeaters, links and beacons operated by the Waikato VHF Group are in the process of being paid. It is costing the group approximately $630.00 to pay for all the licenses, so if anybody would like to make a donation to the cause, it will be gratefully received. Please send to "Repeater Fees", Waikato VHF Group, PO Box 606, Waikato Mail Centre, Hamilton, 3240.

2. The Raglan repeater appears to be non operational at the moment, so a visit to the site is planned for early in the New year.

3. The new tower for Kaimai has been built and galvanised, and is about to be delivered to the site.

4. The building at Kaimai still requires the piles to be replaced. We are still looking for somebody who can do this for us, with the Group paying the cost.

From the Archives:-

Some snippets from "The World Below 400GHz" for November, 1987.
The General Meeting will be held at The Telecom Corporation - Radio Module Repair Centre, located at 64 Colombo Street, Frankton, Hamilton, on Sunday November 15th at 1.30pm.

4th Coming Events

November 15th Waikato VHF Group General Meeting
November 28th Albany Hall Electronics Flea Market 9am to 12 noon
February 13 & 14th All Band VHF "DX" Contest (no distance limitation) Saturday 1700 - 2300 NZDT and Sunday 0700 - 1300 NZDT.

1988 VHF Convention

A keen event is being planned for the 1988 VHF Convention by the Hawkes Bay VHF Group at Napier at the usual time of the Easter weekend ..... Make a note in your diary now .....

Notes from FMTAG

Manawatu 695 to shift to 7125 - the trustees are still investigating this action.
Klondyke/Dannevirke 665 co-channel interference - still awaiting advice of outcome, but appears to be shifting Klondyke to 6625 and Whangarei digital to 665.
Waitomo 685 to be shifted to 7375. Christchurch digital repeater allocated the callsign ZL3CHC.

1296 MHz

A high number of stations have capability through to the 432 MHz band, with multiband transceivers. The next band up, that stations commonly use is the 23cm band. Narrow band activity (SSB, CW, NBFM simplex and beacons) is normally in the 1.296 to 1.298 GHz section. This narrowband section is also generally common overseas as well. Some multimode transceivers have options for the 1.24 to 1.30 GHz band, but these are typically quite costly.

The usual way of getting on the band is to use a transverter from 144 MHz to 1296 MHz. Transverters started appearing commercially around the mid 1970's with the Microwave Modules MMT1296-144 design being the most common. There is equipment also from Minikits, Downeast Microwave and DB6NT. These are available as kits or sometimes prebuilt. There are a number of variants in design depending on the age of this equipment. Some stations also construct their own. The Minikits 1296 MHz transverter is good value Sources www.minikits.com.au www.downeastmicrowave.com www.db6nt.com

The MMT1296-144 transverter is still available today on the secondhand market at a moderate price and seem well sort after. They should be checked for alignment. They are not the cleanest or most sensitive transverter on the block. They do have a very high receive gain of around 40 dB, as they were designed to be used with a 15 dB attenuator, so that 3/10 watt transceivers could be used.

Most transverters of earlier generations generate power from a few mW (earlier DEM transverters) up to 1 to 2 watts (Microwave Modules, DB6NT). More recent designs of transverters have additional amplifiers which take them into the high power bracket.

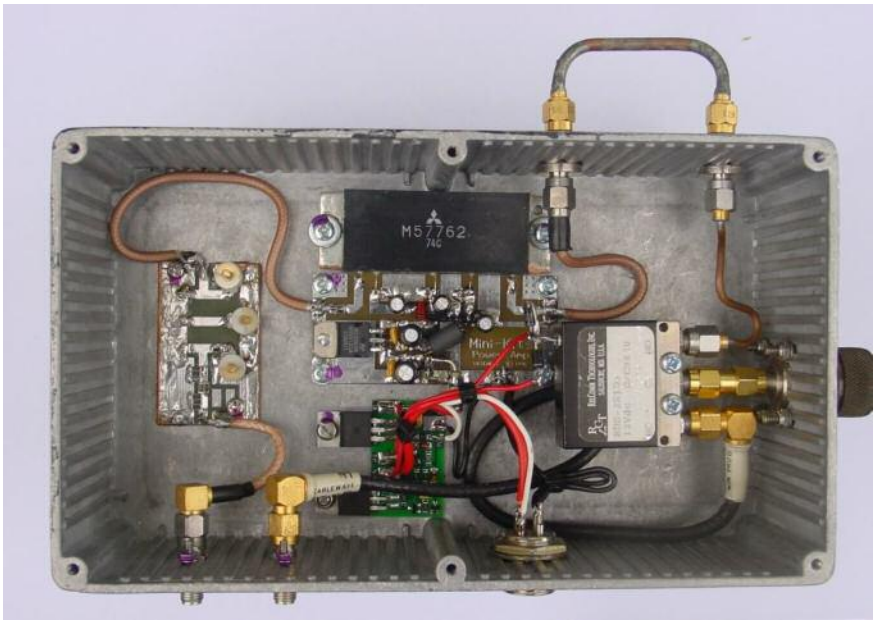
For a long time, Mitsubishi had the M57762 1.24 to 1.30 GHz RF power module available (Bipolar Transistor) and this was a good way to get additional power in the range of 15 watts. This has become obsolete, although still available if you look around. The new kid on the block is the Mitsubishi RA18H1213G which uses FET's. This has higher gain, but appears to be less efficient, however there is evidence that this can be improved. The increase of power of RF power from 1 watt to 15 watts is close to 12 dB or 2 to 3 "S" points on your Receiver

Minikits has PCB's for both 1.3 GHz RF modules and has full kits (including modules) for the the more recent device. He also has economical priced relay kits for powers of that range.

The scribe has recently rebuilt his 1.3 GHz PA, using the earlier M57762 module, into a diecast box, with suitable heatsink. A DB6NT sequencer is used to control relay switching and delay PA turn-on.

The typical loss of 10m of RG213 at 1.296 GHz is of the order of 3dB. This will drop the RF power by about 3 dB (or about ½ an "S" point)

The coax loss, will also deterioate the system sensitivity. The noise figure (NF) of the RX side of an older transverter may be up to 5 dB, plus an additional 3 dB loss for the coax making 8 dB. If a masthead preamp is added, this may drop the NF down to around 1 dB. If this is coupled to a typical antenna, which sees some ground noise and some sky noise, then an improvement in RX sensitivity of up to 8 dB can be achieved. (This is 1.5 to 2 "S"points on your meter).



If one includes a preamp near the transverter, then less improvement will be gained, as the coax loss is still ahead of the preamp. You can see that up to 17 dB improvement in performance can be obtained.
This is obviously split between RX and TX. Additional improvements can be gained by reducing coax loss, increasing antenna gain, increasing TX power, improved DX transmission modes, RF Speech processing, better site, and so on. It is rumoured that some stations use RF clipping in the PA, that is they overdrive their equipment.

Please ensure your transmission is clean at all times.

The image shows the rebuilt PA, and will include switching for a Masthead preamplifier at a later date. The 1 watt from the MMT1296-144 transverter is dropped to ~ 250 mW, with a 3 dB attenuator and bandpass filter (BPF). This level is ideal for driving the older PA module. The BPF improves the rejection of unwanted spurious in the transmitted signal. These are typically from the local oscillator, either as result of insufficient rejection of the 1152 MHz injection oscillator, of from harmonics of the original crystal frequency (1248 and 1344 MHz). Other designs of transverter may show similar spurious levels and frequencies. I have added an additional coax link so that a higher power PA (~60 watts) can also be used, hence the use of a superior coax relay.

5.76 GHz

Club member Steve ZL1TPH (Orewa) came down to Hamilton a few weekends ago, to check his 5.76 GHz equipment. All the hardware is placed behind a dish feed to minimise losses. He wanted to check the RX sensitivity of his equipment. This was first done by putting the output of the RX Converter into a Spectrum Analyser and pointing the Dish feed towards the sky, then to the ground (This is harder than it sounds as the unit weighs ~ 20 kg!).

This resulted in a 4.5 dB noise increase pointing to ground. Not a bad figure. The second instrument I got from my collection was a Noise Figure meter and noise source. We measured relative noise figure levels from antenna, through coax, relays, preamps, etc. A coax on the the preamp input was inferior, and after replacing it with 4 other apparently good pieces, found a coax that was virtually lossless. The loss between preamp and antenna is only 0.35 dB or about 8%, and this includes a protection relay. (3 dB loss is 50%)

Unfortunately we were unable to recheck the sky/ ground noise as the sun was now high up in the sky, but expected ~ 1 dB improvement. Image below shows Steve refitting coax, before rechecking Noise Figure