THE WORLD BELOW 400 GHz

The Periodical Newsletter of the
WAIKATO VHF GROUP Inc.,
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PO BOX 606,
Hamilton 2015, New Zealand.

NZART BRANCH 81

MAY 2005 ISSUE

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GENERAL MEETING MAY 2005

The next General Meeting of the Waikato VHF Group will be at the Hamilton Radio Club clubrooms, Seddon Road, Hamilton at 1.30pm on Sunday May 29th.

Ian, ZL1TAT will give a presentation on " Radio Site Lightning Protection and Earthing"

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NEW FREQUENCIES FOR NATIONAL SYSTEM REPEATERS IN WAIKATO & BAY OF PLENTY

Ian ZL1TAT

Frequency changes on the National System which commenced over ANZAC weekend 2005, will extend further into the Waikato and Bay of Plenty later this year (planned for October).

Changing all the repeaters and associated links involves site trustees or their volunteer helpers in fitting new crystals or reprogramming EPROMS plus re-tuning receivers and transmitters along with duplexers and supplemental filters to the new frequencies. If you are to operate on them, users will also need to reprogram their radios. Following is a list of new frequencies for National System repeaters accessible in the Waikato and Bay of Plenty:

STATION name	Repeater Transmit (user receives on)	Repeater Receive (user transmits on)	Changeover due
Auckland 9875 (Kiondyke)	439.8750 MHz	434.8750 MHz	25 April 2005
Kaimai 485	434.8500 MHz	439.8500 MHz	October 2005
Hamilton 9975	439.9750 MHz	434.9750 MHz	October 2005
Waitomo 9925	439.9250 MHz	434.9250 MHz	October 2005
Rotorua 9925	439.9250 MHz	434.9250 MHz	October 2005
Edgecumbe 9975	439.9750 MHz	434.9750 MHz	October 2005

Because the clear spectrum remaining in 70cm restricts this new band-plan to only seven frequency pairs (compared to fifteen in the old plan), there has to be more re-use of frequencies. A substantial amount of careful engineering work went into planning these new assignments, which provide for 73 stations (existing and future) throughout New Zealand. Assignments to major coverage stations surrounding our area leave only two interference-free frequency pairs for the last four stations in the list above. Therefore, when working the National System on these new frequencies, users will need to be careful to access the system via the most appropriate local site. Using excessive power and large antenna arrays to try and work more distant sites will only risk causing unnecessary interference.

Operation will continue on existing frequencies until each station changes to this new plan. There is likely to be periods (a week or so) while some stations become separated from the remainder of the National System, because the small group of volunteers giving up their time to carry these repeater change-overs simply can't be everywhere at once. When the complete National System comes back together, we should no longer be affected by interference from Short Range Devices which have been permitted to encroach into the bottom end of the 70cm amateur band, - necessitating this change.

IRLP
(Internet Radio Linking Project)

Gavin, ZL1GWP

The Waikato VHF Group has just installed an IRLP system onto Waikato 695 (146.950 MHz) repeater. The node will be linked to the 695 repeater on Mt. Te Aroha via a 70cm radio link. Its continued operation on this repeater will be reviewed 12 months after becoming operational.

To give you some idea of what to do, I have set out some websites to look at that contain operational details and all the other pieces of information you will need to know. If you do not have access to the internet please make contact with Gavin, ZL1GWP and he will arrange for some printouts, where possible.

Check out page 4 - 7 of the 2004 NZART Callbook. If you do not have a Callbook join NZART!
Go to the IRLP website at:- www.irlp.net and read all about it.

For a set of operating guide lines see:- http://www.irlp.net/guidelines.html
For the latest list of IRLP nodes and frequencies have a look at:- http://status.irlp.net/statuspage.html
For information and the operational status of Node 6549 (Waikato 695) go to the ZL1IS, IRLP website at:- http://www.zlis.info
For a map of the expected coverage see:- http://www.wallace.net.nz/zlis/zlis_map.htm
For a list of NZ nodes and their operational status see:- http://www.zlis.info and click on "For a list of all New Zealand Nodes".

Some of the "Special Codes" used on Node 6549 and most other NZ Nodes:

To connect to another Node	Dial the 4 digit Node No.
To read a detailed 'help' file	00
Last 'Node' connected	44
To get the current ZL time	55
To get the current UTC time	66
To disconnect	73
To check current connect status	77
To hear the ZL1IS news & info	81 or 11
Read the local time at a remote Node	## node number

The main piece of equipment that you will need is a 2m transceiver that has a DTMF keypad. However, if you do not have DTMF on your transceiver, all is not lost. The repeater can be monitored, as usual, and if somebody comes up via the IRLP Node, you can have a QSO with them, then. It is also possible to feed DTMF tones into your microphone from an external audio source. The 695 repeater can still be used as normal as the IRLP system does not affect its normal operation.

If 695 is required for an AREC exercise or for a civil emergency, the IRLP node will be disconnected. It will also be disconnected if any problems occur. Therefore, if you do not get a response from any of the "Special Codes" above, you can assume that the node has been disconnected.

If you have any questions or wish to offer some information etc, join the Waikato VHF Group net on a Sunday evening at 8:30pm and sign in for the IRLP section and put your question etc. and hopefully it will be answered. You can also email the node operators on: zlis@wpra.net.nz

VHF/UHF SSB

Kevin ZL1UJG

The VHF Field day, held in December was dampened by the weather. The conditions were flat, however some stations were able to punch through and this resulted in some excellent DX contacts. Notably there were some contacts between the Auckland area and Wellington area on 2m SSB. The path is approximately 550 km. This path would be tropospather, and would be available sometimes for those with high power (in excess of 100 watts) and low noise RX preamplifiers. Tropospather relies on random variations in the atmosphere around the mid path area. This is usable on most VHF to microwave frequencies. Paths of similar length are worked in the UK on the 10368 MHz band. During VHF Field day, there also was some 1296 and 2424 MHz Microwave contacts in the region of 300 km, done with TX power in the region of 2W

Most activity on the bottom end of the VHF/UHF bands uses SSB/CW and digital modes. The use of these modes is because of their advantage at weak signal levels. FM has a threshold effect, below which the clarity of weak signals degrades faster. Weak SSB and CW signals are readable down to, and even below the noise threshold. This is due to ones ears acting as tunable filters. Using narrow bandwidth CW filters or Digital Signal Processing extends the ability to read weak signals even further.

There are a number of 2m EME contacts made with a long Yagi and Power amplifiers of the order of 100 to 250 watts. Bob ZL3TY has made numerous 2M EME contacts without the aid of a masthead preamp.

Recent generations of HF - 2m/70cm multimode CW/SSB/FM transceivers have the ability to have narrow CW filters installed, whereas earlier generations had only SSB filters.

However most VHF/UHF transceivers still have problems with composite noise. *(Note that this may not show as a problem on FM transceivers due to channel spacing).* The VHF/UHF VCO's used in the synthesizers generate noise close to the carrier. When one is trying to copy a weak CW/SSB/Digital signal close to a very strong signal, then the noise that is transferred to the strong signal, (by the mixing process) may mask the weaker signal. This may mask the ability to read weaker signals in this case. High grade EME/DX stations often use a VHF/UHF transverter in front of a HF transceiver. The VHF/UHF VCO is not present in the transverter and is replaced with a low noise crystal oscillator, thereby improving readability. The performance of VCO's used in HF transceivers is generally better. Some stations still use HF transceivers with VFO's.

An often sort after VHF SSB/CW transceiver of the mid 70's generation is a Icom IC202. This is used by numerous station here and overseas due to the reason that the Oscillator is a VXO (variable crystal oscillator) with superior close in noise characteristics. A few simple mods increase the RX sensitivity and it easily passes muster with more recent 2M transceivers.

Earlier use of transverters had a bad name. The design of earlier transverters was often mediocre and this together with bad performing HF transceivers, gave severely limited performance. The HF transceivers would have low sensitivity and dynamic range limitations. Adding a high gain rx converter in front of the transceiver would degrade signal handling to the point where it was unusable from good sites.

Fortunately RF design has improved since those earlier times. The Intermodulation Distortion (IMD) performance is a good measure of dynamic range. Newer HF transceivers have IMD performance that is ~ 40 dB better than early generation equipment such as early FT101 transceivers. Transverters of that generation had also very high gain figures, even as high as 40 dB.

The design of modern transverters is such that the noise output of the transverter, with the antenna connected, should only override the noise of the HF transceiver by 6-10 dB. This should provide adequate sensitivity in almost all conditions. The gain of the transverter may be of the order of 15 to 25 dB. (A far cry from 40 dB!). EME stations often run antenna preamps to reduce coax losses and increase sensitivity further.

Although I am talking about HF transceivers and VHF converters, the same applies to VHF transceivers and UHF/ Microwave converters. Just run enough to gain to set the sensitivity. A small preset resistor (~ 100 ohms) in the RX IF out of the transverter may be used to adjust gain.

The overload performance of the transverters wasn't that great in the earlier designs. (The motto appeared to be more gain!) Fortunately superior parts and superior design have improved the overload performance by figures in the range of 30 to 35 dB. The use of modern transverters with modern HF rigs can give outstanding performance. Even with more modest HF transceivers, performance may be excellent.

VHF/UHF transceivers often have sensitivity degradation due to design limitations. The sensitivity of HF transceiver/ transverter combinations may be up to 6 to 8 dB greater than VHF/UHF transceivers. Stations most often use purpose made transceivers for the VHF/UHF bands due to their operating ease, however if one is prepared to put up with some extra cabling, then using transverters may be worthwhile.

MICROWAVE ACTIVITY Dave ZL1AKW Tauranga is operational on 1296 MHz and is looking for contacts. He has 15w and a 44 element Yagi. He hears the Waitoke 1296.256 MHz beacon at good strength (579). He can be contacted via email:- dave-tt@clear.net.nz