

THE WORLD BELOW 400 GHz

The Periodical Newsletter of the
WAIKATO VHF GROUP Inc.,
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NZART
BRANCH 81

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WAIKATO VHF GROUP EXECUTIVE

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General Meeting May 2008

A General Meeting of the Waikato VHF Group
will be held on

Sunday May 25th, 2008 at 1:30pm

at the Waihi Beach Coastguard Headquarters.

The Coastguard Headquarters is on Seaforth Rd., Waihi Beach, (Bowentown end). Turn left at Bowentown Beach Holiday Park and Coastguard is just on left. There will be two presentations. Firstly, Ian Brown (ZL1TAT) will show a 'Short Pictorial History of the Waikato VHF Group', and then Gavin Petrie (ZL1GWP) will show some images of the North Island, National System sites.

Notes from Committee meeting of Sunday 4th May, 2008

1. Raglan Repeater - Ian (ZL1TAT) advised that it has been repaired & is now operational
2. ZL1IS website update - Derek (ZL1CYK) offered his expertise to do the update. It will include a front page of general information about the club. Initially the front page will link to the following pages - IRLP, Branch Repeaters, Branch History & General meeting dates/times etc. once available.
3. Cheque account signatories are to be - President - ZL1AMW, Vice President - ZL1ANF, Secretary - ZL1GWP, Treasurer - ZL1TAT - with any two to sign.
4. Kaimai Tower and Building upgrade:- A project manager is required. Derek is to make an approach to a possible contender. If this approach is not successful, the President/Secretary/Treasurer will draft a note calling for expressions of interest, that will go out to all members.
5. A letter of appreciation is to be sent to Noel ZL3GR for his time as President.
6. A float of \$250.00 is to be lent to the Hamilton organising committee of the 2009 VHF Convention, as we have done on the past.
7. Noel Rowe, ZL3GR was appointed as our delegate to Conference in Dunedin. Those members affiliated to Branch 81 will be asked, via email, for their comments on the remits. This will give some guidance to Noel.
8. Charities Commission documents to hand were reviewed and it was agreed that no further action was required.
9. General meeting as per item in this newsletter.
10. Next Committee meeting - at home of Morris ZL1ANF, 12 Emerson Str., Te Aroha, on 27 July, 2008, at 1.30pm.

General

Welcome to any new members of the VHF Group, and also to the new committee members. Also a big thanks to those who have retired from the committee, especially to Noel ZL3GR, for his work over his many years as the President. I think I should also thank the other committee members who have spent many years supporting the group, which is one the premier VHF Groups in NZ.

After ~ 5 years of compiling the NZART's Break In "VHF Scene Column", I have decided to give my notice in. After some discussion with 2 of NZ's eminent VHFer's, they have taken the reins and will co-edit the column. The co-editors are Steve ZL1TPH and Simon ZL1SWW. I was fortunate to have growth in both the microwave and digital modes during my time compiling the column. The upcoming issue of Break In will have my last column, but I hope to have some articles in BI in the future.

Test Equipment on a small(ish) budget

One of the first items in the test equipment list is multimeter. With the large number of digital meters available, a choice could be made to suit any budget. When making adjustments, an analog meter is often useful to see variations in DC or AC voltage.

If one is looking at transmitters, then some sort of power meter at the frequency of interest. At low frequencies, a thru-line style power meter and 50 Ω load is very useful. At low Microwave frequencies a schottky RF diode adjacent to the track can give useful indications.

At low RF levels, (1mW to 1 watt) a simple detector such as a schottky RF diode connected to a 50 Ω load is useful. A logarithmic detector such as a AD8370 is very good from 1f thru \sim 500 MHz.

See www.downeastmicrowave.com/PDF/ABPM_pd.pdf

This detector could also be used with a signal generator to check filters, both LC and crystal. Another useful item is a receiver at the frequency of interest. If one is building oscillators then you could listen for a carrier on a scanner or transceiver which has wideband coverage. If one is building oscillators for microwave frequencies, the starting frequencies are in the region of the FM band, so a quick check could determine whether its oscillating correctly. If you are unsure whether your transceiver is working correctly, try to have a listen on a receiver. It does pay to have a pair of earphones as sometimes audio howlback occurs.

A simple frequency counter such as one from Featuretech is useful. The 10 Hz-2.6 GHz one is recommended as the frequency reference is a TCXO. Although it is rated to 2.6 GHz, the falloff in sensitivity above 1.8 GHz, makes it less useful in the 2.4 GHz band. It also has a level indicator which could be useful as well.

<https://secure.featuretech.co.nz>

In early times Lecherlines were used to verify wavelength. http://en.wikipedia.org/wiki/Lecher_lines

They were especially useful for moderate UHF frequencies although they could be a bit unweildy at 500 kHz.

A simple noise generator for use at low frequencies such as 0 to 500 MHz, could be a zener diode feeding into a MMIC, which will give a good level of noise. An attenuator on the output will set the output to 50 Ω whether the source is turned on or off. A simple generator using this technique is at www.elecraft.com/manual/N-gen%20man%20rev%20C.pdf

MMICs such as the MAR (Minicircuits) and MSA (Agilent) series are useful in the HF thru low Microwave frequency range. As the frequency increases the zener becomes less effective, as capacitance effects come into play. Special noise diodes covering low HF range through into the Microwave are costly. (Especially when built into calibrated noise heads). However for uncalibrated measurements, reverse biased microwave transistors, or even IN21, IN23 diodes can be used. Another option could be to use a ERA type MMIC, which produces noise. (Most components produce noise anyway). Again, an output attenuator (SMD) this time makes the output look like 50 Ω when the unit is switched off. An advantage of this technique, is that the MMIC could also be used as an amplifier, if the input load (50 Ω) is removed.

The noise can be listened for on a SSB/ CW Receiver, (not FM!) and one hear whether a preamp is making any difference, or whether that coax is really that lossy. If one can measure the noise via the speaker, using a DVM (on AC) or AF millivoltmeter (homebrew or commercial) then one can take some relative readings. The Elecraft K2 Transceivers use noise sources as an aid in crystal filter alignment, so sources could be also be used to check other transceivers.

Checking FM (and SSB) VHF receivers may require a signal source. Ideally a signal generator, however a marker from a PC clock oscillator (eg 48 MHz) could be used if the level was attenuated sufficiently. Note the difference between a very sensitive RX and one that is middle of the pack is especially noticable on FM, due to a threshold effect, where the AF S/N can change faster than the rate a RF signal changes. Example A 4 dB difference in RF level may exhibit a 10 dB change in AF S/N. This effect does flatten out of course. In fact there are some recommendations to tune preamplifiers (with the RX in FM) due to this effect.

At HF frequencies a DDS VFO is useful as a signal source, although I have seen a few unclear examples at the top end of their range.

www.minikits.com.au has a useful DDS Oscillator and detector in their range.

A few issues ago in Break In, there was a circuit of a VCO mixed with a crystal oscillator to produce coverage at HF frequencies. VCO's cover many frequencies and the Wellington VHF Group has a selection. See www.vhf.org.nz/TradingTable. They also have a VSWR detector in their catalogue.

Attenuators are also useful. I have purchased both fixed and variable ones. The variable ones usually cover up to at least 144 MHz. I have purchased some even off Trademe. At HF frequencies, they could be built with toggle switches and resistors, and could even work adequately up to 144 MHz if care is taken. www.elecrafft.com have an attenuator kit, as well some other useful Minimodule kits. At UHF, extra care is required, as stray effects can change attenuation markedly. Ex commercial attenuators appear from different sources, and are sometimes fairly reasonable. New attenuators can cost from the \$100's to several \$1000's. I have picked up fixed attenuators from Ebay, and also from Australian sources.

Audio indicators are useful and AF power meters, and AC voltmeters can be used. Simple AF detectors can be built as well. A useful test aid is a SINAD meter, which notches out the 1 kHz tone which is often used with commercial test equipment.

A nice little aid is the AADE Electronics L/C meter IIB, which measures very low Inductances and Capacitances very accurately. The maximum values top out around 150 mHy / 1.5 uF, which is well within the capability of conventional LC meters.

A useful test aid is a GDO, which is used to check resonance of tuned circuits. These sometimes appear on Trademe as well.

Some test equipment appears at Junksales and on Trademe. Usually this is picked up pretty quickly from those in the know. Sometimes even old surplus/ faulty test gear has useful parts. The old Marconi valve Signal generators have good attenuators.

Some people have collected test equipment over many years in the hobby and this can outnumber radios, however the use of test equipment can make the hobby much more enjoyable during construction or repair, or optimising one's existing setup.

This is just a small selection of what could be useful. If one is willing to spend more money, then used test equipment is available from a number of sources, and this can be used to provide further information on whatever unit one is looking at.

I hope this article is useful and has provided a taste of what test equipment could be useful in the radio shack.