

THE WORLD BELOW 400 GHz

The Periodical Newsletter of the
WAIKATO VHF GROUP Inc.,
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NZART
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November General Meeting 2009

A General Meeting of the Waikato VHF Group will be held on
Sunday, 22nd November, 2009 at 1:30pm.

The venue will be St. Stephen's Church Hall, Cnr Ohaupo Rd & Mahoe St, Hamilton.

The speaker for this meeting will be Ian Brown, ZL1TAT, who will be speaking on CTCSS (Continuous Tone Coded Squelch System) as a possible solution to the interference on '840, Te Aroha. See item in newsletter.

Interference to '840 Te Aroha Repeater

For some time, 840 has suffered intermittent interference from various "Short Range Devices" accessing it. Early afternoon on Sunday 27 September, it was being triggered for periods by a data modulated continuous signal fading in and out of our repeater. Given this interference is not always there, and on this occasion was fading in and out, this interference is likely to be from a transmitter some considerable distance from Te Aroha.

Under RFS29 (Exemptions From Licensing For Restricted Radiation Radio Apparatus), the spectrum 433.05 to 434.79 MHz may be used by Telemetry / Telecommand transmitters running up to 25mW eirp. Assuming the interfering transmitter is complying with that power limit, then it could be operating anywhere within a 250 km radius of Mt. Te Aroha! While the Radiocommunications Regulations (General User Radio Licence For Short Range Devices) Notice 2007 states "(4) Should interference occur to services licensed pursuant to a radio licence or spectrum licence, the chief executive reserves the right to require and ensure that any transmission pursuant to this General User Radio Licence change frequency, reduce power or cease operation", it could take a huge amount of effort to locate the source of this occasional interference. 840 is a licensed radio installation (MED licence No. 121455) for which we pay an annual fee, but we have no influence over who shares our repeater input frequency, so risk this type of interference at any time. Even if that particular transmitter was located, and changes made to prevent it from interfering with our Te Aroha repeater, another transmitter could pop up on the same frequency the very next day, and we'd be no better off.

So how then do we address this situation?

1. Turn '840 off (and deny rightful amateur radio users this facility)?
2. Fit a Continuous Tone Coded Squelch System (CTCSS) decoder to the repeater receiver, so only Station's transmitting the correct frequency sub-audible tone can access our repeater?

Of these two options, the second is a practical way of preventing this and similar interfering signals from triggering our repeater (telemetry stations don't use CTCSS), BUT if implemented, it will require everyone wishing to access Te Aroha '840 to use CTCSS on their transmissions. Most transceivers now have CTCSS capability, but some may use older equipment without that capability and will need to fit a suitable encoder to their radio (we'd use CTCSS only to access the repeater receiver, and not modify the repeater transmitter so users wouldn't need to set up a CTCSS decoder in their radio to continue to receive '840).

If CTCSS is implemented on Te Aroha '840's receiver, what tone would we use? Users of older radios to which they've retrofitted a CTCSS encoder may not have the luxury of being able to transmit a different tone on each channel selected, or to readily reprogram that tone via the radio's keypad. Therefore, using a tone common to other amateur repeaters will be an advantage. According to the NZART call book, one 2m and three 70cm repeaters presently use CTCSS. They are:

- | | |
|------|---|
| 2m | Napier '725 uses 71.9Hz |
| 70cm | Hawkes Bay 9175 uses 123.0Hz, and
Christchurch '840 uses 88.5Hz, and
Cass Peak '850 also uses 88.5Hz. |

Four IRLP nodes use CTCSS, two on 2m with 88.5Hz, and one each on 70cm with 123Hz and 192.8Hz. Others may not be listed in the call book.

Bring your thoughts along and join in the discussion at our next meeting. The time has arrived where open (carrier access only) access to some repeaters will have to change.

VHF Oscillator

By Kevin Murphy ZL1UJG

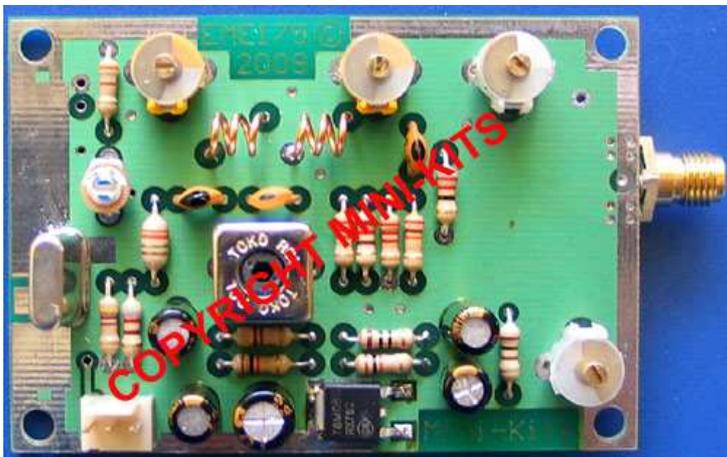
Over the last year, I have had many emails back and forth with Mark VK5EME at Minikits (www.minikits.com.au). The topic was primarily VHF Oscillators.

The overtone crystal oscillator design that Mark uses in the EME65(B) is similar to a Plessey design from a few decades ago, and can be seen (virtually unchanged) in circuits from G4DDK, DB6NT, and others. The circuit is essentially two transistors, the 1st a grounded base amplifier with the collector tuned to the wanted overtone. This feeds a second transistor, where the output is extracted from the collector normally. The crystal is then placed between the emitters. This design is often used as the 2nd transistor can produce harmonics from its collector, and so it is quite economical in components.

Overtone oscillators typically use the crystal in series mode (low impedance mode). To maximize the crystal Q, which can be near 100,000 (crystal alone), the source and load impedances seen by the crystal should be as low as possible. (It's a compromise)

The earlier designs relied on the transistors self limiting. This has the effect that the transistors are partially cutoff during the RF cycle. Not a good move, as this raises the impedance seen by the crystal, and hence degrades Q. If one looks at an oscillator and measures the Vbe as less than ~ 0.7v DC then the transistor is being switched off. A simple remedy is use diodes as limiters, and this works successfully in most designs.

Another issue is extra noise from other sources, such as regulator noise, resistor noise. By additional filtering and replacement of some resistors with inductors, then the noise can be reduced further. Fine tuning of some other components, has reduced power consumption and reduced spurious levels. The new design allows the addition of a varicap diode to enable phaselocking or VCXO control. Some further work is being done on a crystal heater to have improved stability over normal temperature variations.



The changes can be seen with the new product being the EME175 oscillator. The price is quite reasonable in comparison to other similar units overseas.

One could use the unit as a low power signal source, or a beacon for antenna alignment. It could be used a simple TX with a scanner RX, or a Local Oscillator.

NZART Branch 12
Presents
National System Award 2010
in association with
New Zealand Historic Places Trust

National System Award 2010 - Historic Places, is presented by The Hamilton Amateur Radio Club, Branch 12 NZART in association with the New Zealand Historic Places Trust. Based upon the original idea of the Wellington VHF Group. This is a FUN award available to all amateurs to demonstrate the coverage and use of the National System, to promote our history and category 1 Historic places. Detailed documentation is available from:- <http://zl1ux.tripod.com/nsaward.htm>

The award will run from 1 January 2010 to 7 February 2010.

Points will be allocated for:

- Contact any Amateur in each NZART Branch area (excluding Branches in recess) via the National System. Only Branches on the provided list, available from:- (<http://zl1ux.tripod.com/nsaward.htm>) are valid. **1 point**
- Contact ZL1UX, official station of Branch 12 via the National System. **3 bonus points**
- Contact any Amateur operating from a Category 1 Historic Place (as listed in the Historic Places Trust Register, available on (www.historic.org.nz) via the National System. **1 point**
- Contact any Amateur whilst operating from a Category 1 Historic Place (as listed in the Historic Places Trust Register, available on (www.historic.org.nz) via the National System. **1 point**

Points are cumulative and each site may only be listed once. Only one branch or historic site may be logged per contact. The log must record the registry number of the site, available from the Historic Places Trust Website at (www.historic.org.nz).

Participants are requested to note the following key points:

1. A number of the Historic Places are private property; therefore participants **MUST** respect the private property. ***It is not necessary to enter any private property to log the contact.*** Participants are expected to be in near proximity to the Historic Place, not on the site.
2. There are no definitive boundaries between branches, so participants need to determine which branch they are in, to log the point. This distance will vary for different parts of the country. Only one branch can be logged per contact. Branch's in recess **DO NOT** count.
3. Participants are encouraged to learn about the NZART branches and the places that define our history through visiting the Category 1 Historic Places.

Send a log of contacts with; date, time, callsign and first name of contacted person, NZART Branch name or Historic Places Trust Register Number of the site, for each contact, and preferred award format (electronic or hard copy) to:

The Award Custodian
Hamilton Amateur Radio Club
PO Box 606
HAMILTON 3240

Email to: branch.12@nzart.org.nz - with NS2010 in the subject line

Applications close: 7 March 2010