
VHF/UHF – An Expanding World

David Smith VK3HZ

Weak Signal

David Smith - VK3HZ

There was a bit of action in September with the first opening for the season from VK4 across to the south island of New Zealand.

With the demise of Newcastle Channel 5A as a beacon, Bob ZL3TY in Greymouth has been monitoring shipping traffic using an AIS receiver on 162 MHz. On the evening of September 26th, his receiver picked up a ship at a range of over 1000 km towards Australia.

At 1008Z, he worked Adrian VK4OX on 2 m CW with reports of 539/559. Scott VK4CZ was hearing Bob's CW at 519 on QSB peaks, but his reply could not be heard. He switched to JT65 and was joined by Kevin VK4UH. Signals from both stations were successfully copied by ZL3TY and exchanges made with signals peaking up to -07 dB at one point. At 1124Z, Adrian worked Bob on SSB with 52 reports each way, over a distance of 2400 km.

Later that evening, NRJ FM on 93.5 MHz in New Caledonia was reportedly received in Brisbane over a distance of 1520 km.

Microwave Activities

November looks like being a busy month for Microwave enthusiasts. Detailed below are the planned events. For the latest information, check the VK Logger Forums area.

Nov 2 – VK3/VK5 Microwave Activity Day

At this stage, no times have been organised. A number of stations are planning to set up on hilltops in VK5 and western/central VK3 to work each other on various Microwave bands.

Nov 3 – VK4 5.7 GHz Shootout and BBQ

Starting at 11 am at the Redcliffe & Districts Radio Club premises, the Microwave Activity Day will focus on 5.7 GHz equipment. However, even if you don't have a 5.7 GHz system and have a fleeting interest in microwave operating, please drop in for a look and to enjoy a sausage from the BBQ.

Nov 10 – VK3 Microwave Test & Tune Day

Commencing at 10 am at the Eastern & Mountain Districts Radio Club premises, the Microwave Test & Tune Day will have a similar format to last year's event with a test range set up for 10 GHz and 24 GHz equipment. Further details of testing are yet to be finalised. The EMDRC will be running a BBQ with sausages and bread provided, and drinks available. Even if you don't have equipment to test, come along for a look and chat. More information on the EMDRC web site: http://emdrc.com.au/microwave_day.html

Nov 23/24 – Spring VHF/UHF Field Day

Of course, all of these Microwave Activity days have allowed people to tune their microwave equipment to peak performance in preparation for the Spring VHF/UHF Field Day. More information: <http://www.wia.org.au/members/contests/vhfuhf/>

Please send any Weak Signal reports to David VK3HZ

Digital DX Modes

Rex Moncur – VK7MO

Meteor Scatter by Kevin VK4UH

I am very grateful for the positive feedback about the Meteor Scatter (MS) Reports and for a number of interesting questions e-mailed to me regarding this mode of operating. I thought it might be useful to cover a number of the topics raised, each month, through this column.

Over the last few months, reference has been made here to the various digital modes being tried for MS in VK and ZL. These include FSK441 and JTMS, from the WSJT suite of digital modes written by Joe Taylor K1JT, and PSK2K written by Klaus Heide DJ5HG. The hobby is very fortunate to have free access to these software packages written by two amateurs who are both eminent University professors.

The mainstay of VK and ZL meteor operation, at this time, is using FSK441 mode. As we have discussed before, in this mode each minute is divided into two exact 30 second periods. Stations alternately transmit and receive in the first or second period depending on their call area and an agreed protocol. During normal operation, the Graphical User Interface in WSJT has two windows showing, "Main" and "SpecJT". A third "black" window showing the audio configuration and error codes also runs in the background but is usually placed behind the user panels.

SpecJT provides a horizontal waterfall display and a "green" signal strength trace which sweeps left to right across the screen over the 30 second receive period. Any meteor returns (pings or burns) received are displayed as a "splash of colour" image on the window with a corresponding deflection of the green signal strength trace. At the end of each 30 second receive period, the program itself does a number of things. Firstly the entire 30 second sweep is transferred to the Main window and the software automatically attempts to decode any received signals which are recognised as FSK441. Output from the decoder is displayed on the main window with additional information on timing "T", duration "width", signal strength "dB", frequency offset "DF", and report "Rpt". Secondly the last 30 sec sweep is also transferred to the lower half of the SpecJT window until the next cycle and thirdly the entire 30 seconds of audio is saved as a .wav file on the hard drive, if this option is selected.

It is possible therefore to just sit back and watch even with the audio turned down. This is however not the optimum way to operate in FSK441 mode. With experience, audio from even the shortest ping becomes easy to recognise in the speaker. It is then possible to move the mouse cursor onto the corresponding image on the SpecJT waterfall display and "click" with either mouse button. This forces a decode on-the-fly while the system is still receiving. Bear in mind that the automatic decoder will only look at the strongest ping on the sweep when there may in fact be several from the same or different stations spread across the display. Further, a ping extending more than a few hundred milliseconds may contain data from more than one station. It is not uncommon here in Brisbane for example to decode Arie VK3AMZ at one end and Gavin VK3HY at the other end of a single ping just by repeatedly clicking across the image.

This interactive trawling method of operating yields far more results than relying on automatic decoding alone. It is also possible to have multiple attempts with different settings of the "S" sensitivity parameter of the decoder to trawl through each ping while still receiving. During the next transmit period it is still possible to attempt to decode by clicking on the sweep now on the lower portion of the SpecJT screen, or

by clicking directly on the corresponding sweep on the main WSJT window. In effect therefore each ping is on the screen, to decode on-the-fly for up to 120 seconds. (i.e. up to two receive periods and two complete transmit periods). In short, to get the most from this mode you need to watch and listen carefully while receiving, with the audio gain up and the AGC turned off, and force decodes on-the-fly as each ping comes in. This is particularly important when there are several stations operating and when meteor rates are high.

An alternative strategy to “manual trawling” is by the use of another software package under development called MSRX (Meteor Scatter Receiver) - also written by Klaus DJ5HG. I am grateful to Colin VK4MIL for his advice on this platform. MSRX is a receive-only system at this stage. With even modest computer power however it can be run simultaneously with WSJT and can share the same audio feed from the rig interface. The decoder effectively makes multiple decodes on every ping equivalent to automatic WSJT decodes with multiple “S” settings. It is also capable of decoding both FSK441 and PSK2K signals, which are normally considered incompatible. Decoding is not possible, nor indeed necessary, on-the-fly in MSRX, and occurs once after the end of each receive period. There is a comprehensive description of MSRX, written by the creator, in DUBUS 4/4 2012 edition. A working guide is also available on Col VK4MIL’s blogspot. (vk4mil@blogspot.com.au). Advice on installation is given including the requirement to install MATLAB as is required for PSK2K.

My actual report on MS activity this month is fairly bleak but typical for the end of the winter doldrums. Without any significant meteor showers, this month activity has been low and contacts have been hard work. Random Meteor return rates have been low, but again typical for the time of year, with the majority being weak and very brief. As always, the occasional hyper-dense meteor burn has produced returns lasting many tens of seconds on 144 MHz with signals strong enough to kick the S meter hard. Roll on summer and don’t forget the Orionid shower on or about October 21st.

I am always happy to receive reports, questions or enquiries about meteor Scatter in general or the digital modes used.

Detecting very Weak Signals

With the tropo season upon us, it is often useful to detect the presence of very weak signals and then watch to see if they improve to allow a QSO. While digital modes such as WSPR and JT65a will work to around -28 dB, the two tone messages in JT65a such as RO, RRR and 73 can be seen down to around -32 dB. Better still, one can see single tones down to around -35 dB. Single tones at any audio frequency can be generated by inserting @XXXX in any TX box in JT65 or JT4, where the XXXX represents the audio frequency to be transmitted. There is a benefit in choosing @1270 as 1270 Hz is the sync tone for JT65 so if one moves to JT65 the sync tone should show up at the same place on the waterfall. On JT4, the four tones are spaced equally around 1270 Hz.

The JT4 mode on the current version of WSJT does even better with a facility to integrate the single tones over the full minute transmission period and then display this as a graph. To implement this graph, go to the JT4 mode and then to “set-up” and then “plot average JT4 spectrum”. Fig 1 is an example of the JT4 spectrum plot with a single tone detected as the peak in the centre by the Yellow graph. If you move the cursor vertically around the peak a small Yellow indicator is invoked which shows the error in frequency of the peak compared to a tone at 1270 Hz. Using this facility one can detect the presence of a single tone down around -38 dB. If there is

some uncertainty this can usually be resolved by one station TXing single tone only and then the receiving station can see a consistent Yellow peak during each transmission period which is not present in the alternate period. In cases where the signal is even weaker, one can watch the peak over a number of periods to see if there is some consistency and then one can detect the presence of a signal down to around -40 dB.

The technique of using single tones has proved to be useful on 10 GHz tropo-scatter where VK3GHZ is normally able to see a single tone from VK7MO over a 560 km path over the mountains in central Tasmania.

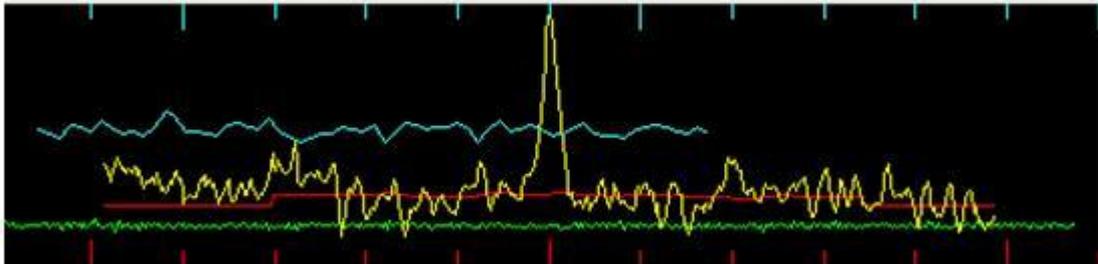


Fig 1: Example of peak on the Yellow graph from a single tone

Please send any Digital DX Modes reports to Rex VK7MO

The Magic Band – 6 m DX

John McRae - VK5PO

September has been another reasonably quiet month.

The band has been open into JA from mostly the northern tropics region again, perhaps on more occasions than previous months. The equinox has not really sparked up any spectacular openings.

The scientific consensus is that the “peak” of #24 sunspot cycle is the “lowest” in some one hundred years! The observation is reflected on the rather poor and lack of propagation on the six metre band. Hopefully a few “surprises” spring up from time to time, as they do. Hence the term “MAGIC” band for six metres.

On September 21st, VK8AW work A92IO on CW. This was around 13:45z

VK3XDX has a brief CW contact with Hiyo san, JR2HCB at 10:30 z on the 22nd. A surprise for them both!

25th September saw Frank, VK7DX snare JR2HCB at around 06:31z

VK4's BG,WM and WTN had propagation into China and Japan from the Hervey Bay region. VK4WTN worked BA4SI on CW at 09:51z. The band was open to Hervey bay on the 25th. Some of the signals were well over S9.

A short column this month, indicative of poor SFI figures! They have been hovering around the 110 mark, but went as low as 96 earlier in September.

Please submit reports, logs or other info you may consider useful to John VK5PO