
VHF/UHF – An Expanding World

David Smith VK3HZ

Weak Signal

David Smith - VK3HZ

On the morning of June 26th, a high-pressure zone over southern NSW produced some good propagation. Peter VK5PJ in the Barossa had several good contacts into VK1 and VK2. At 2050Z, he was hearing the VK2RSY beacon at 5x1 and had several contacts on 2 m, the best being 1206 km to Steve VK2ZT north of Newcastle with a 5x7 report. On 70 cm, they again worked, this time with a 5x1 report. On 23 cm, Peter managed to work Rob VK1KW in Canberra over a difficult 916 km path with rolling QSB and a best report of 4x1.

New World Records

The path from California to Hawaii is somewhat like the path across the Bight, although nearly twice as far at over 4000 km. When conditions are right and a high-pressure cell settles in just the right spot, good tropo contacts are possible. The path has been worked numerous times on the lower VHF bands but contacts in the microwave region have been very elusive.

On June 19th, Wayne N6NB and Gregory W6IT set new world distance records on the 2.3 and 3.4 GHz bands. Wayne, operating from a radio-equipped rental car in Hawaii, worked Gregory who was operating Wayne's home station near Orange, California - a distance of more than 4024 km. The contacts broke records that had stood for more than 20 years and more than doubled the previous distance record for a two-way SSB contact on those bands.

Wayne flew to Hawaii carrying 70 kg of gear for all bands from 144 MHz through 10 GHz. In Hawaii, he rented a small SUV and built a rover-style station that included a rotating roof platform using parts from a local hardware store.

Winter VHF/UHF Field Day

Despite the confusion of two different sets of rules, compounded by an error in the published start and end times (normally 12 noon), a number of hardy souls braved the conditions and went out for the Field Day, some even staying out for the full 24 hours.

A new innovation introduced is Contest Radar (www.contestradar.com) where stations participating in the contest can publish their location and see on Google Maps where other stations are.

The VK3KQ/p group (Damian VK3KQ, Ralph VK3LL and Mike VK3RZ) spent the weekend on McLaughlins Lookout near Blackwood. Temperatures on the Saturday ranged from a top of 5 degrees diving to 3 below zero overnight. A 1300 W heater was left running full time, necessitating a visit to the local town on Sunday morning for extra fuel for the generators.



Damian VK3KQ Assembling Antennas

They reported a good level of local activity in VK3 - and a few other portable stations. Overall, they worked stations in VK1, VK2, VK3, VK4, VK5 and VK7 (mostly on 6/2/70) and a number of stations on the higher bands as well.

Peter VK4EA had a warmer time of it. He reports:

I selected Moreton Island as it combines a few of my favourite things, camping, radio and good weather. For those outside of SE VK4, Moreton Is is a sand island with minimal infrastructure consisting largely of National Park. There are no formed roads accessible only by boat, 4WD essential. We normally camp on the Western shore of the island which has a good view to the west toward the Brisbane CBD and all of the high points _normally_ utilised by the local microwave fraternity. Unfortunately microwave activity was very light this time. Our local beacons were found and peaked soon after setting up on the Friday afternoon, although some ropes were needed as always in our part of the world at this time of the year, the westerly winds picked up cooling things down considerably. For note VK3's, it never got below 6 degrees at night, and warmed up nicely to about 20 degrees with clear skies throughout the weekend.

I went to considerable effort to have all bands, sacrificing a few things, except for beer (and wine for the second operator - XYL, VK4JNC). Doug, VK4OE, kindly lent me a 47 GHz transverter.

- 6 metres consisted of the FT817 with a horizontally mounted mobile whip
- 2 metres, 70cm, IC970 with an Elk log periodic
- 23 cm, IC970 with an 8 element yagi
- 13 cm, IC970 - grid pack
- 9 cm, VK3XDK and patch antenna
- 6 cm, DB6NT, 600mm dish
- 3 cm, DB6NT, 600mm dish
- 1.25 cm, DB6NT, 600mm dish (sharp!)

- 6.5 mm, VK4OE, 300mm dish

Activity all during the contest was slow, and I recognise my antenna department was quite compromised so I may not have heard anybody. Having said that I was pleasantly surprised who I could work on low power and small antennas. Best excitement was a small opening on 6 m - who would have thought 5 W into a mobile whip would work into VK5 and VK3? an exceptional moment with very strong signals heard from VK5BC and VK3PP.

A couple of nice 10 GHz contacts with Geoff, VK4KJJ/P, located at Clear Mountain confirmed the 10 GHz gear was working well.

My contacts to VK4WS/P on 23 cm and to VK4IF (Eden's Landing) on 5.7 and 10 GHz made the effort worthwhile.

Keeping the best for last, Sunday morning the 24GHz gear gets a workout to Kevin, VK4UH at home, extending our best to 54 km. Similar good results with Rex, VK4REX at Howell's Knob. Rex and I tried 47GHz next, and while I was able to copy him S9+, I was unable to work out the VK4OE gizmos to TX, not completing the contact.



Rex VK4REX's setup at Howells Knob

I'm not sure if I will go to the effort of going to Moreton Island for a contest again, unless I am sure more people will be out and about next time. Not that I was too stressed, wonderful weather VK3's listening ??

Andrew VK1DA used the opportunity for both the Field Day and SOTA. He reports:

This operation was intended to give me more contacts for the 6/10 m challenge while qualifying as an entry in the VHF/UHF field day.

Unfortunately I did not pack the 3 el beam for 2 m and a third length of coaxial cable. This limited my 2 m antenna options and the range I could achieve.

Radio wise I was in a good position at the "Katoomba" Lookout on Mt Alexandra, just north of Mittagong, south west of Sydney. I could hear and work anyone others were working in the Sydney basin and also could work Geoff VK2UL in Yass and Gerard VK2IO who was on various summits in the Blue Mountains north of me. One north Sydney station could be worked easily on 2 m and 70 cm but while I could hear him

well on 6 m, he was unable to hear me and gave the (SSB) contact away.

In a surprise Es contact on 6 m, I did work VK5KV who was s9 on peaks.

Another station called CQ frequently on 6 m and was replied to by several others closer to him, but he appeared to receive only very strong signals. He called CQ many times on 6 m but never seemed to understand something was wrong. I wondered whether his receiver was faulty or perhaps his antenna system had high losses.

After making about 20 contacts I moved to Mt Gibraltar. Another operator, VK2VOM, had been working there but had generator problems and was closing down. I was on the air at Mt Gibraltar by 4:30 pm but by then all the other portable stations except for Gerard VK2IO had closed down. After spending 2 hours there and working Gerard on 6 and 2 m and making very marginal contacts with Geoff VK2UL on 6 and 2, I was too cold to continue as it was around 2C and I decided to leave even though I had not made enough contacts to qualify the summit for SOTA purposes.

Very disappointed in the low level of activity for the VHF contest.

My gear was an FT817 at 5 W running on a Lipo 3s and a LiFePO4 4s battery. At Mt Gibraltar, I added a HL66v amplifier for 6 m which should have raised my output power to about 30 W. Antennas used were a wire dipole for 6 m and a quarter wave vertical for 2 m. Most of the 2 m contacts were actually made using the 6 m dipole.



VK1DA Operating Position

The operating position using a picnic table kindly provided by council. FT817 radio, iphone, ATU (not used), log book, morse paddle, boxes used to carry the bits in my backpack. No car access here, so you carry the lot.

Please send any Weak Signal reports to David VK3HZ

Digital DX Modes

Rex Moncur – VK7MO

Further Up-date on WSJT-X

Since last month's report most of the JT4 bugs have been fixed and a major addition has been an EME echo mode which uses automatic Doppler correction. It is still a struggle with a small 77 cm dish on 10 GHz to get you own echoes as compared to a dish double the diameter (around 1.5 metres) you lose 6 dB both ways and are thus 12 dB down. Nevertheless when spreading was low (around 20 to 30 Hz) I was able to use the new version to average over around 165 echoes and see my own echoes as in fig 1.

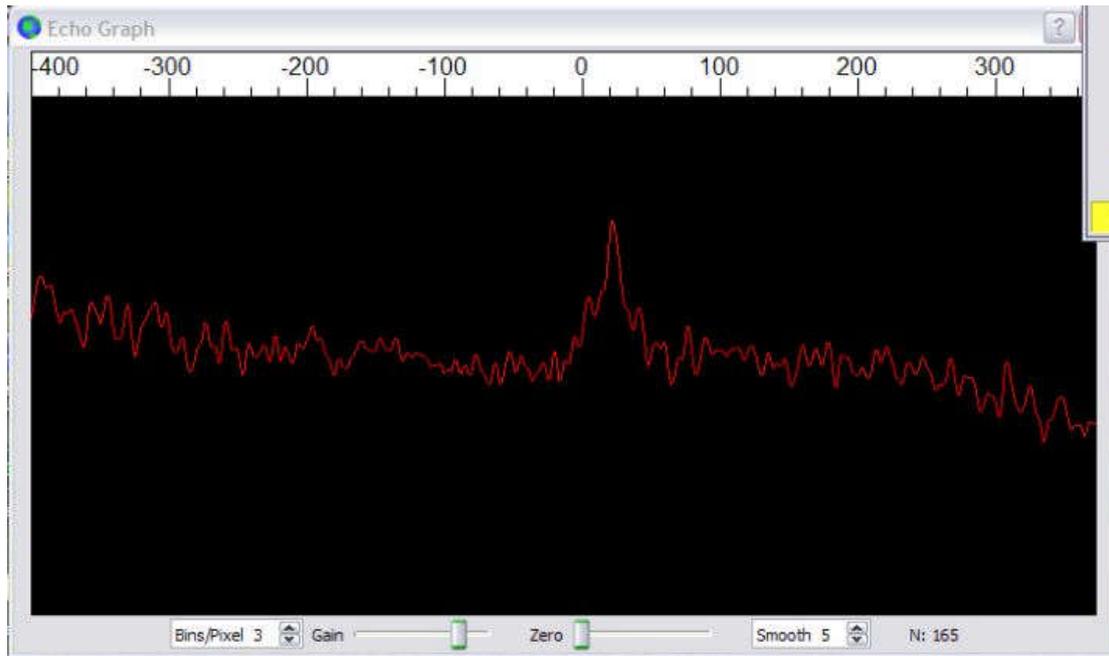


Fig 1: Echoes received by VK7MO on 10 GHz with a 77 cm dish and 50 watts averaged of 165 echoes

The bugs have been resolved with JT4 and r5604 can be downloaded below that includes JT4, echo mode and WSPR as well as JT9 and JT65a for HF.

<http://www.sucklingfamily.free-online.co.uk/wsjsx5604.exe>

While JT65b and JT65c are included in the above version, these still need more work as these sub-modes are well down on performance. There are a number of enhancements we have submitted to Joe, K1JT, to improve microwave operation including variable bin-width decoding for JT65 with sub-modes up to JT65d (22 Hz tone spacing) that is expected to improve performance over JT4 on tropo-ducting as well as the lower microwave bands for EME. The JT65d (and possibly JT65e for those with wide passband SDR transceivers) sub-modes should also give a useful improvement over JT4 on 10 GHz for small station to small station EME at times of low spreading.

The WSPR specialists are experimenting with a two pass version that goes back and repeats the decoding with the original decoded tones deleted. This is showing promise for finding signals buried below others.

ISCAT in WSJT10

A correction has been made to the ISCAT mode in WSJT10 which tended to produce errors when receiving RRR (such as RRT or RRS). This program is primarily

designed for 6 metre meteor scatter but we have used it very successfully on 10 and 24 GHz for aircraft scatter. The new version, r5634, now displays all decoded information in each burst and leaves it to the operator to select the decoded message while in previous versions the program made the decision – and not always correctly. At this stage it is necessary to build this version yourself from the source codes but hopefully I will be able to provide a URL to download it by next month.

Please send any Digital DX Modes reports to Rex VK7MO

Meteor Scatter

Dr Kevin Johnston – VK4UH

June has been a very interesting month with a number of new experiments being tried during a predictably quiet period.

As has been discussed in several previous articles both the intensity and duration of meteor returns normally increases as we move down the frequency bands towards longer wave-lengths. On 50 MHz for example meteor scatter burns lasting for tens of seconds, sufficient to complete an SSB contact, may have corresponding 144 MHz pings, from the same meteor and along the same path, of only a few a few tens of msec. Likewise large meteors producing massive burns on 144 MHz may support propagation right up to 432 MHz if only for very brief pings. But what happens on frequencies below 50 MHz? At what point does this relationship stop holding true? There are commercial data retrieval systems utilising Meteor Scatter propagation from distant unmanned radio sites using low powered transmitters in spectrum around 40MHz, where there is no amateur allocation. From my reading this is probably close to the optimum. The propagation mode does not however stop there.

On 16th June, a day when there was a typical winter level of random meteor returns on 144 MHz, Waldis VK1WJ (QF44mt) and I VK4UH (QG62kp) conducted a short series of early morning tests looking for evidence of Meteor Scatter propagation at 28 MHz. Running only modest power and a variety of omnidirectional (zero gain) antennas (dipoles and verticals) while running FSK441 mode contacts were attempted over the 943 km path. Only one decodable ping was detected at the Brisbane end during the entire one hour test. Nothing was received at the Canberra end.

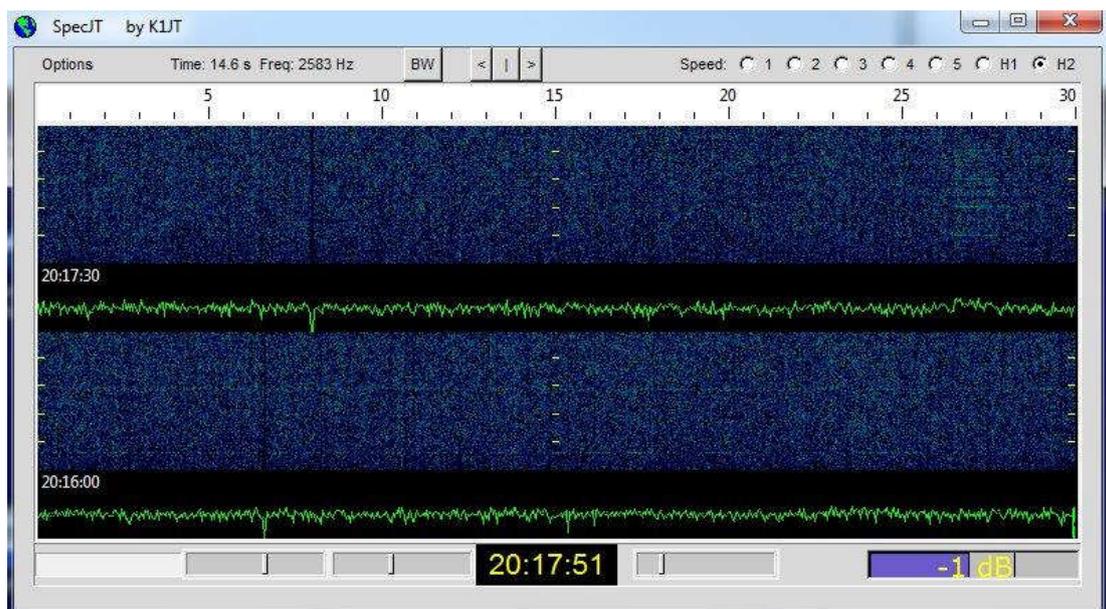


Fig 1. - Single 28MHz meteor ping June 2015 received from VK1WJ by VK4UH

The single ping shown above was of 2 sec duration occurring at 26.5 seconds into the upper 30 second period and was barely 1 dB above noise floor. With the eye of faith, the four tone lines can just be seen in the recording Fig 1. with the smallest of rises in the green signal strength line. This is however evidence that meteor scatter propagation does occur at 28 MHz, even though the contact was not completed during the test period. More tests are planned for the future, using gain antennas and also, if successful, on the next amateur band down, that being at 24MHz.

Also in June was a prolonged period of enhanced meteor scatter propagation related to the Arietids Meteor Shower. This shower, named after the constellation of Aires, is unusual in that it is a daytime shower. The source of the meteors, the parent body, has never been properly identified. The Zenith Hourly Rate may exceed 60/hr. and the peak of activity can be very wide but probably peaking around the 7th June. I have to admit that the Arietids shower was not even on my "radar" - in truth I have not previously heard anything about it. It will be on my watch list for next year however.

Meteor Scatter contacts between VK and ZL are neither unusual nor uncommon. Indeed, there is a regular activity session devoted to this activity running on Saturday mornings on 144.330 MHz, the secondary MS frequency, usually finishing before the normal weekend MS activity session on 144.230 MHz. MS contacts are common between VK1, VK2, VK3, and ZL stations on 2 m on most weekends. MS contacts between VK4 and ZL are, however, very uncommon as the distances involved even from the S.E. of VK4 to the main population centres on the ZL North Island are approaching the theoretical limit for Meteor Scatter propagation, that being around 2300 km. Meteor Scatter contacts on 50 MHz between the two countries, even though theoretically easier, have been even rarer as historically there has been very little FSK441 activity on that band on the ZL side of the Tasman. I did report back in January 2014 a series of successful 2 m MS tests conducted with Steve ZL1TPH/p at Cape Reinga (RF65jm) on the very northern most tip of North Island to this QTH in Brisbane. Several MS QSO's were completed over a distance of 2110 km. On all occasions however, even though Meteor Scatter was clearly the propagation mode involved, there was strong evidence from the Hepburn charts of the likelihood of tropo enhancement at one or both ends of the path. For the last few months a thread has been running on the VK-Logger/ Forum attempting to stimulate interest in running a similar series of 50 MHz MS tests between VK4 and ZL. This came to fruition on 27 June with some partial success between Scott VK4CZ (Brisbane - QG62lp) and Bob ZL1RS (Bay of Islands - RF64vs) on 50.230 FSK441 over a distance of 2169 km, on a day with minimal possibility of any tropo enhancement.

Four pings were received and three successfully decoded by Bob ZL1RS who unfortunately was receive only, unable to transmit due to a faulty feeder on that day. No completion was possible, however clear evidence that the path is possible. Mark ZL2WHO (Palmerston North-RE79tp) and Peter ZL4LV (Dunedin-RE54ec) also took part in the tests, both at just over 2500 km but neither received any signals on that day. More tests are planned.

Finally this month, in the March MS report I mentioned the release of MSHV, a new software application for meteor Scatter operation, developed by Christo LZ2HV (MSHV Beta Ver. 0.86) available at <http://www.lz2hv.host.sk>. Ron VK4CRO has also tried out the program and reported: " I tried the program briefly this weekend and on Saturday I very quickly contacted VK3 but then had to go QRT. For the initial use of a program and setup I give it 10/10. I need to do a save and a few more touches but looks good. On Sunday I copied VK5PJ and completed in 4 periods, so thumbs up

for MSHV from me.” As I wrote earlier: “My first impressions of MSHV are favourable. The software is easy to use and the User Screen is appealing. The pre-populated Tx windows are however set up for European / US operating formats but can be easily changed to the usual VK/ZL format without trouble. The ST (Short text) format is not however supported in this beta version.”

As I mentioned at the time this is only a B-release and the author Christo LZ2HV is very amenable to suggested changes and feedback.

The next Major Meteor showers for the diary are the Delta Aquarids around 31st July, a Class 1 Major shower but with a predicted ZHR of only 16/hr generally not a big event and then the Perseids around 13th August with a predicted ZHR of up to 100/hr.

Please send any reports, questions or enquiries about Meteor Scatter in general or the digital modes used to Kevin VK4UH