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# VHF/UHF – An Expanding World

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David Smith VK3HZ

## Weak Signal

David Smith - VK3HZ

### Mid-Winter VHF/UHF Field Day

The recent mid-winter field day saw a good level of activity despite the middling to awful weather conditions in some parts of the country (exactly what you would expect for mid-winter!) As of 4 days prior to the closing date, the Contest Manager had received 60 logs, which must be something of a record.

Following are some brief reports from a number of participants:

From Andy VK5LA:

*My first winter field day but won't be my last! The weather was good where I was, not too windy, but I feel a relatively poor turnout in VK5, but there were still a few stations around.*

*Only operated for the first 8 hours, then packed up and went home, only because of poor preparation on my behalf - It'll be 24 hours next year. There seemed to be a good number of stations around on 23cm, which is great! Alinco's new DJ-G7 23cm handheld probably has a bit to do with that, and I had some great contacts with 1 watt stations back in to Adelaide from PF85WF. I had 33 elements and 10 watts. Andrew, VK5AKH was S9+60 on occasions on 23cm.*

*The biggest lesson I learned this contest (I'm always learning) is you can have all the gear in the world, but if you're not comfortable and warm, you will soon lose interest!*

From Lou VK3ALB:

*We made our first attempt at a field day in Summer 2009 and the biggest lesson we learned was to protect ourselves from the elements be it the sun, wind or rain. I was lucky enough to find a run down A-frame van that has been our field day shack ever since. It's not perfect but it really does make our field day outing much more enjoyable. Even though it was cold and rainy at times over the weekend we still had a great time.*

From Nik VK3BA:

*I went out with VK3ALB and co. The most satisfying part of the FD experience was packing up on a dark and rainy Saturday night... the true test of an amateur!*

From Compton VK2HRX:

*I was happy with the number of stations in and around Sydney. Wasn't real busy but enough to make it worthwhile. We could however, always do with more!*

*Made a couple of 23 cm contacts down to Canberra from Carlingford in the North Shore of Sydney which were the highlights of my 8-hour stint. Had them S5 with no preamp at one point at I think around 70W. I was running 10W from the IC-910H with a 55-element loop yagi on a rotator. Didn't bother with the 23 cm linear and preamp as its always local stuff in winter, doh!*

*Made over 100 contacts across 6 m, 2 m, 70 cm and 23 cm. 52.150 was almost busy at one point. I also worked split to 50.150 as well for one contact so don't forget us 52 MHz operators in the next contest!*

*Weather brilliant, a little wind but mast was OK.*

*Got visited by the boys in blue (was set up in a public car park). I had bunged a WICEN magnetic badge on the side of the Cruiser, he had a look then drove off.*

*Interestingly I also had about 10 passers by who stopped to have a chat about what I was doing. Next time I'll take a few Foundation Manuals with me and hand them out!*

*I didn't forget anything, everything worked, nothing broke and I set up in 60 minutes and packed up in 30 minutes.*

From Rob VK2GOM / G0MOH:

*My second field day in VK... a summer one and a winter one so far. I'm not new to contesting though; I did quite a few VHF QRP contests in the UK where I entered, but here in VK it's only for fun - I don't enter the logs.*

*I managed to attract the attention of the Park Ranger where I was set up, who came over with a walking gait that suggested he wanted to clear me out of the place. Instead, I introduced myself with a handshake and told him more about it. Once he realised I wasn't a terrorist, or going to kill anyone with it, and it was a hobby and not conducted as a part of a business, he happily went on his way. It seems microwave dishes can scare the uninitiated! Fortunately I did not have to resort to my "So where does it say that?" line...*

*An enjoyable day out, not as many stations heard as the Summer field day, but good fun all the same.*

*I was only out a couple of hours and got a handful of points and 18 QSO's. I might have a more serious attempt in the Summer one.*

*My 10GHz rig for the contest was solar powered with a BP 20W solar panel. Any others operate for the Field Day on solar power? Should there be another 10x points multiplier for solar powered stations?!*

From Iain VK5ZD:

*I operated from the South Hummocks on Saturday and a local hilltop for an hour and a half on Sunday morning. As expected, the weather was cold and damp. In an effort to remain as comfortable as possible, I arranged things so that I could do all the operating from inside the car.*

*An FT-897 was for 6m, 2m and 70cm, and an FT-290R was the IF for the 23cm, 13cm, 9cm and 6cm transverters and an FT-60 H/T was for 3cm. Add one old laptop for logging and I could operate in relative comfort.*

From Doug VK4ADC:

*Up here in southern VK4, there was some activity but the number of stations around were not enough to keep you handing out numbers and staying focussed on the FD. My log shows 80 contacts across 6 m, 2 m, 70 cm and 23 cm - including 7 VK5 callsigns courtesy of some 6 m Es - for the first 8 hours. The few club stations were a big help as they were operating the same bands (some plus more) so were around for the 3 hour repeats.*

*Unfortunately VKCL did not process my log entries correctly - it created the log file as section E - 24 hour home station - instead of section B - 8 hour portable single operator. Beware that your log is correctly created before you email it in.*

*We need to get more operators, maybe some F calls, interested enough to participate and hand out some numbers, even if only on 2 m and 70 cm FM. They might get to like it and do even more the next time...*

*A report on my outing can be found at <http://www.vk4adc.com/2010wfd.php>.*

*Roll on November 20/21 for the Spring FD !*

From Andrew VK1DA / VK2UH:

*I arrived back from a Europe trip on Friday night before the contest and got back to Canberra the next day. I was unable to mount a decent portable operation so I just operated from the car.*

*Made 21 contacts, split more or less evenly between 144 and 432.*

*I was really pleased to hear several field stations on the air in Canberra so it seems the 3rd year of this event has been quite successful.*

*Well done to all those who operated in the cold and wet conditions, and enjoyed themselves in spite of conditions. Much better than staying inside and watching TV!*

From Gordon VK3EJ:

*On Sunday morning, I worked 18 stations on 2 m SSB only and heard at least three more. I don't think I ever worked that many on a "normal" propagation field day from my allegedly "good" location at Berowra Heights in 28 years there. Furthermore I then had up to 7.5 db more antenna gain and 6 db more power plus maybe a db and a half better receive noise figure. Longest distance was probably to Kerry VK2BXT - 500 km.*

From John VK4TJ:

*This was probably my best ever dead band contest result. I haven't moved, so I put it down to F calls being a bit keener than us old geezers to freeze their extremities off on a mountaintop under lacklustre band conditions.*

*I also note that virtually everyone (except me) is now packin' 2.4 GHz and 10 GHz gear. Even 23 cm is evidently considered DC these days...*

From Dave VK2TDN:

There wasn't one F call QSO in my log for the winter or summer FD's but I still had a much better day out than the summer one as far as QSO's went. The weather wasn't kind though howling freezing gale in the Blue Mountains made the day unpleasant trying to stay warm and keeping the antenna poles vertical!

### **Field Portable 23cm EME**

Bob VK2ABP has set up a substantial 23 cm portable EME station. He reports:

*When I think of EME I think of big dishes or other huge arrays pointing up to the moon, tracking it across the sky. When one starts to search for EME online it is immediately obvious that there can be a huge passion for it by some people. Most of what I found was HUGE, far too big for my place in suburbia, even if I am in a country town with a decent sized house block. Additionally, I am in the middle of lots of landscaping at home, but the final outcome of the work at home will mean I will finally be getting the Aussie Guy's mandatory backyard shed. Until such time that the landscaping and shed construction are complete, there is only one real option for me to pursue EME – going elsewhere.*

*The elsewhere I have been going is out to Dave's (VK2JDS) QTH. As most readers have probably seen in AR already, Dave VK2JDS is quite active with EME communications. He has been great with encouragement and assistance in my quest to experiment with EME. I have been out at his QTH, enjoying the benefits of being out of town many times. He has a great setup there with a decent sized dish (just shy of 5m diameter). Many times when out at Dave's we had joked about mobile EME, so on a recent trip there we sorted out a field portable setup for me to be able to use a bit more readily. The idea is that now I can drive somewhere suitable (there are*

plenty of great mountain tops in the local area), and then quickly setup and be operational EME.



**Bob VK2ABP and his portable EME setup**

*I am not sure how many people have done field portable EME in Australia but obviously once we figured out the logistics of how everything will mount and plug in, we had to give it a try. We did some quick tests including a listen to the 23cm Dural beacon and then shortly afterwards my first field portable EME 23cm contact. The contact was with Bruce PY2BS in Brazil using JT65c. Bruce has a similar setup to Dave equipment-wise, so it was great to know that I would be able to work stations that are a little more the norm rather than just the “real big guns” that you can find online.*



### **Bruce PY2BS QTH in Brazil**

*Do expect to see a bit more activity from me and my portable setup, and with the amount of fun it has been so far I will probably end up with the current setup and a separate permanent one at home once that is possible. The details of my portable setup are as follows; transceiver – Icom IC-910h, VLNA – g4ddk kit, PA – approx 40w at feed, 23cm feed – homebrew septum, feedline – currently LDF4-50, dish – 2.5m mesh with elevation actuator and arm strong rotation for azimuth, PC – 10” netbook with usb serial and audio for connection to the ic-910h, batteries for both 12v components (transceiver, actuator, tx/rx relays) and 24v for the PA.*

*I think that this sort of setup proves that no one really has an excuse for not being able to be EME active. I hope to bounce signals to you all soon.*

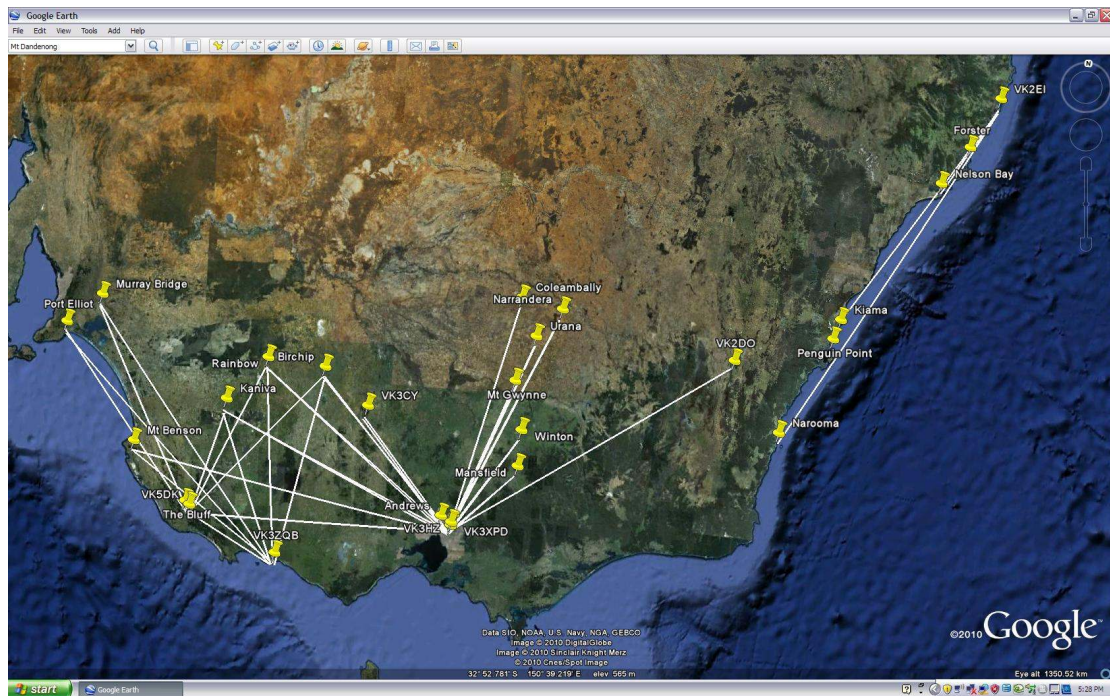
Please send any Weak Signal reports to David VK3HZ

## **Digital DX Modes**

Rex Moncur – VK7MO

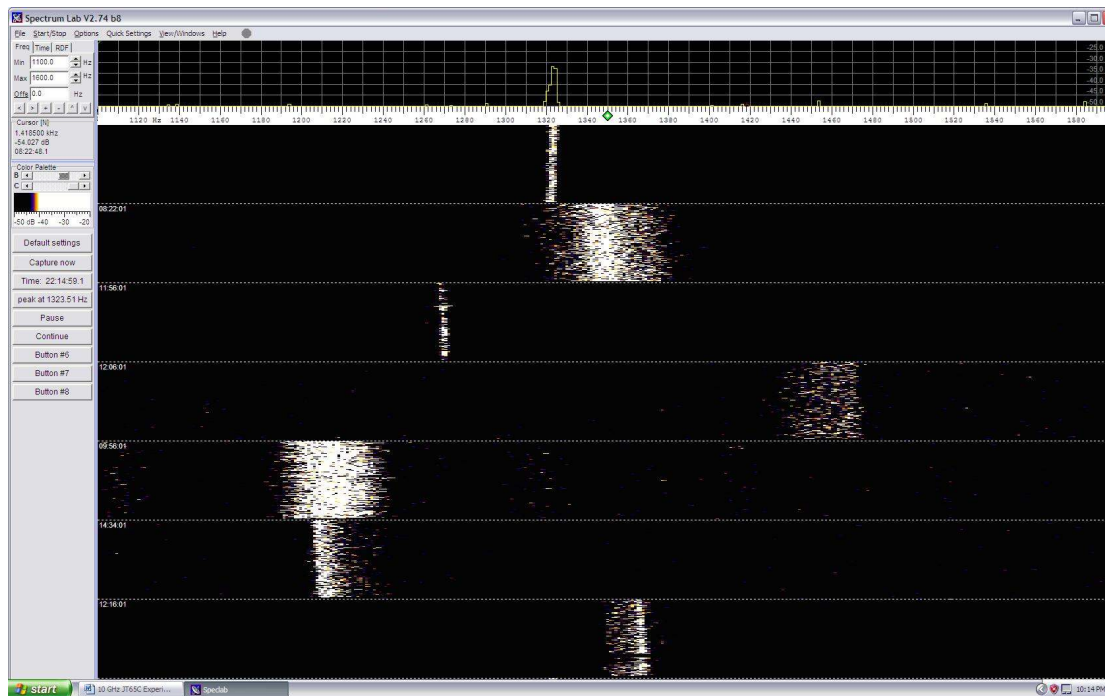
During June and July, Rex VK7MO travelled around VK1, 2, 3 and 5 opening up grid squares and conducting tests on 10 GHz digital with Neil VK2EI, David VK3HZ, Alan VK3XPD, Russell VK3ZQB and Colin VK5NY. As expected during winter, conditions were flat with no lift from ducting and rain often attenuated the signals – nevertheless 49 contacts were made from 19 different grid squares over distances of up to 585 km. Generally operations were from flat ground or near sea level with few opportunities to work from hilltops. All stations were GPS-locked allowing the use of narrow binwidth digital modes. Stations used small dishes of 45 to 65 cm diameter. Power levels varied from one watts to 10 watts with many of the contacts being made with only one or two watts at one end. The map at Figure 1 shows contacts completed.





In summary it was concluded that:

- Using JT65c, tropo-scatter works effectively up to around 450 km in dry weather but the range was reduced to around 350 km in wet weather – presumably due to rain absorption. As an example VK3ZQB was worked over 453 km at -15 dB on a dry day and the following day over the same path, when it was raining, there was no evidence of his signal down to -30 dB, so at least 15 dB reduction with rain.
- While 10 GHz tropo-scatter requires a good take-off, preferably close to zero degrees, it works well over the flat ground such as the “Hay plains” with the antenna just a metre or so above the surrounding ground. It seems this is because in terms of wavelengths a one metre high antenna at 10 GHz is equivalent to a 72 metre high antenna at 144 MHz.
- Tropo-scatter signals were seen to be spread up to 40 Hz but this spreading varied considerably down to as low as 3 Hz. Wide tropo-scatter spreading was sometimes seen on dry days so cannot be put down to rain scatter. The visual effect of spreading on the waterfall display shows up much more when signals are strong. It seems that the spreading has a peak like a mountain shape or perhaps a bell curve and the stronger the signal the further down the sides one sees the spreading. Figure 2 shows examples of tropo-scatter spreading on VK5DKs signal at various locations. It is seen that in some cases the tropo-scatter signal spreads more to the left and in other cases more to the right and in other cases it is more symmetrical. These features may tell something about the propagation.



- Aircraft scatter is useful up to around 600 km but the aircraft must be closely aligned with the path of propagation to keep the change of Doppler small. Note that compared to two metres, Doppler variations are magnified 72 times.
- JT65c was found to be the most useful mode in that with its 10.8 Hz bins it copes well with tropo-scatter spreading – the explanation for why it copes with spreading of up to 40 Hz probably relates to the fact that the peak signal can still be separated into separate 10.8 Hz bins. JT4d also performed well on tropo-scatter requiring just 2 or 3 dB more signal than JT65c and without the Deep Search facility. Tests by VK5DK and VK3ZQB concluded that JT4f and JT4g are to be preferred on rain scatter. JT65c is preferred for aircraft scatter providing the variation of Doppler shift is relatively small – no more than 20 Hz per TX period. For more rapid Doppler shifts the new WSJT8 mode ISCAT proved useful although more testing is required.
- Antenna alignment was the most difficult issue in looking for either very weak tropo-scatter or aircraft scatter with an error of just one degree making the difference between detecting a marginal signal or not. An inclinometer was used for elevation giving better than one degree accuracy. The plan was to walk a hand held GPS to define azimuth but the accuracy is no better than plus/minus 3 degrees and then only if one has a clear view of the sky for at least 50 metres. In practice it was found that the best method was to align on a stronger nearby station and then change the azimuth to the weaker station against a protractor. In some situations a sun shot was useful but accuracy is difficult if the sun is high above the horizon unless the elevation mechanism is exactly perpendicular. Alignment on a feature at a known GPS position can be helpful but this was rarely possible. The problem of alignment is still the most difficult issue and some innovative solution is still required for portable weak signal operations.
- One useful technique for alignment was that VK3XPD set up a TWT with 10 watts to the feed which produced a carrier which could more readily be detected. It should be noted that a carrier produces 3 to 4 dB improvement in reported S/N than a standard JT65c transmission. This is because a standard JT65c transmission spends only around half its energy transmitting the sync tone which is used to measure the S/N and is seen when looking for a weak signal. One can produce the same 3 to 4

db improvement on JT65c by using the message "@1270" which produces a single continuous tone on 1270 Hz.

Please send any Digital DX Modes reports to Rex VK7MO

## The Magic Band – 6 m DX

Brian Cleland – VK5BC

The first 3 weeks of June produced some good winter Sporadic 'E' openings mainly down the east coast and from ZL to the east coast. VK5 also didn't miss out with some good openings to VK2 and VK4.

Brian VK4DDC reported working Bob ZL1RS 13 out of 15 days in the first 3 weeks of June. Bob worked several other VK4's and VK2's, good days being the 10th and 13th June to VK4, 15th June to VK2 when Bob worked VK2's HN, BHO and BZE. Bob also worked Brian VK5BC on the 15th.

2nd June Norm VK3DUT worked VK5's APA, RO and BC as well as Brian VK4EK. Around the same time Rob VK1ZQR worked Brian VK4EK, Wayne VK4WTN and Col VK5RO. Andrew VK3OE also worked several VK4's.

On the 6th June Frank VK7DX worked Brian VK4DDC, Brian VK4EK and Kerry ZL2TPY. Norm VK3DUT worked ZI4LV and David VK3AUU worked Glen VK4BG.

7th June good opening from ZL to VK2 and 3.

10th June Brian VK5BC worked Brian VK4QB and Brian VK4EK.

Good opening from VK4 to VK5 on 14th June with many contacts completed and then on the 16th and 18th good VK5 to VK2 winter openings with very strong signals.

On the 19th June the band did the right thing for the winter field day operators with good openings from VK4 to VK2, 3 and 5. Several VK4 portable stations were active and making the most of the good conditions.

Brad VK2QO also reports the following:

*2nd: Brian VK4EK 5/1, Kevin VK4BKP 5/7, Col VK5RO 5/7;*

*10th: Kevin VK4BKP 5/5, Brian VK4EK 5/5;*

*14th: Brian VK4EK 5/7, Harvey VK4AHW 5/7, Wayne VK4WTN 5/3, Bob ZL1RS 5/3, Glen VK4BG 5/4;*

*16th: Brian VK5BC 5/7;*

*18th: Rod ZL3NW 5/9, Kerry ZL2TPY 5/2, Brian VK5BC 5/5 then later at 5/9, Garry VK5ZK 5/7.*

Received a note from Michael VK6BHY with details of the re-activation of the Dampier VK6RSX Beacons.

*After a 9 month search for a new location, the VK6RSX beacons situated in Dampier are once again transmitting on 50.304 MHz and 144.576 MHz.*

*These beacons originally came from Exmouth, to the old Hamersley Iron open air cinema site in Dampier in March 2001. The Amateur Radio Society of North West Australia monitored them for the next 8 years until notified by Rio Tinto Iron Ore that they need to be relocated (along with 20+ years of AR gear stored in the rooms, much of which was donated to other AR groups in VK6). The beacons were taken off air in August 2009.*

*I then started negotiations to house the beacons at another site and gained*



*permission to locate them in an old office building (now only used for storage) near the iron ore loading area of East Intercourse Island in the Dampier Archipelago.*

*While the beacons were down, I took the opportunity to clean them up, built a new rack frame and then erected the horizontal U-dipole antennae with new RG213 co-ax. On testing, a SWR of 1.1 was noted and the power out from both beacons was measured at approximately 50W (depending on which meter I used).*

*The beacons were turned back on, Monday 14th June and reports of them being heard were posted within 24 hours.*

*The West Australian VHF Group Inc continues to maintain the VK6RSX license and equipment with help from the remaining members of the Amateur Radio Society of North West Australia.*

*Rio Tinto are to be thanked for their support.*

Repeater equipment and antennas pictured below:



144.576 MHz transmitter based on a modified PHILIPS FM814 "A" Band transmitter with inbuilt power supply and VHF GROUP standard keyer.

50.304 MHz transmitter based on a modified PHILIPS FM814 "E" band transmitter with inbuilt power supply and VHF GROUP standard keyer



50 MHz "U" dipole omnidirectional antenna.

144 MHz "U" dipole omnidirectional antenna.

Thanks for your efforts Michael and also Peter VK6KXW and Phil VK6ADF who have been assisting in the background. I'm sure all 6m operators appreciate your efforts in re-establishing these beacons.

Meanwhile Brad VK2QO continues to coordinate the early morning meteor scatter activity and reports the following contacts:

1st: Wayne VK4WTN at 1049km 5/3, Brian VK5BC at 1103km 5/2;

4th: Brian VK5BC/P Corny Point at 1258km 5/1;

9th: David VK3AUU at 597km 5/3;

11th: Scott VK4CZ at 826km 5/5, Frank VK7DX at 896 km 5/2, Brian VK5BC at 1103km 5/7;

14th: Wayne VK4WTN at 1049km 5/1, frank VK7DX at 896km 5/1;

15th: Wayne VK4WTN at 1049km 5/1;

16th: Wayne VK4WTN at 1049km 5/1, Brian VK5BC at 1103km 5/5;

17th: Wayne VK4WTN at 1049km 5/1, Frank VK7DX at 896km 5/1;

18th: Scott VK4CZ at 826km 5/7, Frank VK7DX at 896km 5/5;

19th: Frank VK7DX at 896km 5/5, Brian VK4EK at 1264km 5/1, Peter VK5PJ at

1077km 5/5.

Please send any 6 m information to Brian VK5BC