
VHF/UHF – An Expanding World

David Smith VK3HZ

Weak Signal

David Smith - VK3HZ

There has been some good tropo propagation in the south, lasting for several days due to the slow moving high-pressure cell.

Bob VK3ZRT in Gisborne reports:

A duct opened VK3 (just west of Melbourne) to VK5 around 5.30am AEDST on both the 22/3 and 23/3 and stayed open until early afternoon.

On the 22nd, a strong duct also VK5 to Sydney and Canberra - a rarer event apparently.

On the 23rd, a duct very strong VK3 to VK5 and to Leigh VK2KRR. Leigh is still S9+10 at 0100Z. The Adelaide beacon is there but weak at 0100Z

Typical signals S9+40 - 2, 70 and 23 all good

On 23rd, mid-morning, the Albany and Esperance beacons heard, but no one home.

FM repeaters in Adelaide and Canberra also in use for three-way DX, as well as mobile's VK5 and VK1.

Ian VK3AXH in Ballarat also enjoyed the conditions on the 23rd:

The VK5VF 2 m and 70 cm beacons were quite strong at my QTH being S9 and S7 respectively, which is quite unusual.

My initial contact into Adelaide on 2 m was with VK5BC on 144.1 SSB at 5x8. This was quickly followed with VK5AKK at 5x9. We then went to 70 cm where both stations were worked at 5x3/4 and 5x7. Phil VK5AKK suggested we try 1296 MHz which resulted in my first QSO's on that band into Adelaide at 5x4 followed by a contact with VK5PJ at 5x5. Needless to say there was a level of excitement to have contacts on this band having tried for many years without success. This was followed with contacts to VK3LY at Nhill on 2 m, 70 cm and our first 23cm QSO.

Other stations worked on 2m were VK5MWH 5x5, VK5BJE 5x9 VK5NZ 5x5 and perhaps the most interesting was VK5KAA using an FT817 with 5 watts to a vertical antenna at 5x1.

The conditions seemed to be mainly inland and extended from Adelaide to Eastern Victoria and up into NSW where VK2KRR was quite active. VK3DUT in eastern Victoria was heard by VK5BC but did not quite complete. I was able to work VK3DUT at 5x4 which hasn't been done for some years.

I also managed to work VK2KRR on 2 m, 70 cm and 23 cm along with lots of other stations. The Esperance 2 m beacon was also being heard over a wide area but unfortunately no one at the VK6 end.

2.4 GHz Impromptu Field Day

Mike VK3KH stirred up some microwave activity on Easter Monday. A group email and a posting to the VK Logger resulted in 7 people eventually appearing on air. Mike reports:

The weather was fine and the view spectacular from the side of Arthur's Seat. I arrived early and set up 2 metres for liaison and my 2.4GHz transverter and Gridpack

antenna.

Things started slowly with 2 metre contacts only for the first 45 mins. I had checked the VK3XPD beacon on 2403.530 MHz, which was 5/9, so I knew my receiver was working, but I was not having much joy.

Then Ross VK3MY in Boronia called me on 2403.150 and we worked 5/7 both ways.

Over the next 90 minutes I worked:

- Colin VK5DK (5/1 both ways) at The Bluff near Mt Gambier;
- Alan VK3XPD (5/9 both ways) in Camberwell;
- Rob VK3MQ (5/9 both ways) on Mt Dandenong;
- Tim VK3JTM (5/2 and 5/1) on Corn Hill near Ararat; and
- Barry VK3BJM (4/1 and 5/1) on Mt Franklin.

All stations were worked on 2 metres also, with VK3TPR and VK5LA/p in the Grampians both calling in on 2 metres.



Tim VK3JTM on Corn Hill near Ararat



Colin VK5DK and company at The Bluff near Mt Gambier

Barry VK3BJM writes:

My son and I left home perhaps a little earlier than the others, and we were up on Mount Franklin, near Daylesford, and ready to go by about 2140z (0740 AEST).

The flora on Mount Franklin has grown rather a lot since I was last up there. There was a spot halfway up the crater rim road that was in the clear a couple of years ago - but it isn't now! We continued up to the fire tower, at which point bits of horizon could be seen through the upper branches of the pinus and eucalyptus.

Signals on the liaison frequency (144.150 MHz) were all very loud, but not quite so on 2403 MHz. I couldn't hear the VK3XPD beacon, and the first attempt with Michael VK3KH was unsuccessful. Peter VK5PJ popped up on 144.15, and we exchanged 41 and 51 reports; my 2 m set-up was the halo and 100w or so, incidentally. About then, Tim VK3JTM and Alan VK3XPD joined us on the liaison frequency; Tim and I then went to 2403.1, whilst Michael and Alan shot off to 2403.15.

Tim and I soon had a contact completed, with signals varying between 52 and 55, with quite a lot of flutter present.

VK5LA/p3 (at the Baroka Lookout in the Grampians) popped up on 144.15, and after a chat on 144.13 I ran my keyer to his 2.4 GHz receiver - sadly, nothing heard; but Andy only had a modified PayTV feed, sans dish, so we weren't worried by the lack of a signal.

I then tried with Colin and the VK5DK crew - they were not terribly loud on 2 m, and nothing was heard on 2.4.

I pointed the dish back round to Melbourne, and after a few attempts at listening for keyers, Michael and I completed successfully with 41/51 reports. I heard Alan a couple of times, but didn't complete - again, fast QSB was present, but with signals low to start with, readable stuff was in and out of the noise floor. I believe Rob VK3MQ heard me in and out of the noise as well, from his site on Mt Dandenong. Rob ran our path through Radio Mobile, which suggests it wasn't the easiest at 2.4

GHz!

All in all, a good time was had - this despite the rock thrown up by the cattle truck I was behind as we neared home, which smashed my windscreen! AAMI, pick up the phone!



Cameron - Barry VK3BJM's son - on Mt Franklin

VK3NX EME Activities

Charlie VK3NX has been busy working the world on the microwave bands via EME during the recent DUBUS EME contest in March. He writes:

It was great to have both moon-passes on the first weekend for the DUBUS contest. Conditions on the 20th were poor for some reason. My echoes were OK but everyone seemed a little down than usual. My moon noise was the same so I figured my receiver was OK. On the 21st, conditions were excellent. Signals heard were very loud. At my end I had the same weather for both days with almost clear blue skies so I can't see why there was such a difference. My echoes seemed much louder on the 21st and I saw my highest moon noise ever on 3.4 GHz - 0.58dB.

Running a "lonely outpost" on 3.4 GHz from VK, many people's windows to VK are out of the "peak activity times" by several hours. Thankfully, many took the time to come on and work me during my windows. Unfortunately I didn't get to operate much into the North America window because of family commitments but on the 22nd, out of the contest period, I was able to be around for my moonrise and work a few stations in NA with excellent conditions as well.

Here is my report of stations worked:

20th - OK1KIR, OK1CA, OH2DG, OZ6OL, G3LTF

21st - DL4MEA, PA0BAT

22nd (out of contest) - WD5AGO, K5GW (CW and SSB), WW2R

Unfortunately I missed (not heard or not complete) OK1DFC, DL1YMK, LX1DB, HB9JAW and VE6TA

Of particular interest, while trying to pull out a call through the QSB, I sent QRZ

several times and was having a lot of difficulty when I finally heard: DDDDD LLLLL 4444 MMMM EEEE AAAA ... This technique has been spoken about before and I thought I would just comment that Gunter's technique of responding in this manner helped immensely and I got his call immediately. I know that this may actually be confusing with some call signs but if each character is repeated enough it becomes self-evident. I'm sure that those with callsigns that may be an issue with this method already know who they are and would refrain, but I doubt that there would be many. Gunter and I completed very quickly after this.

VK3UM Program Updates

Doug VK3UM has been at work again, updating his excellent set of programs.

The VK3UM EME Calculator Ver 7.02 has been further enhanced with a number of changes. It now also includes a data file for the Arecibo facility for all to wonder – very appropriate given the recent very loud EME signals from there!

The VK3UM EMR Calculator Ver 6.44 has had some minor bug fixes.

Finally regarding the VK3UM Planner 2009 has also been updated.

All software is available from:

<http://www.sm2cew.com/> or <http://www.ve1alq.com/downloads/software/vk3um.htm>

Please send any Weak Signal reports to David VK3HZ

Digital DX Modes

Rex Moncur – VK7MO

2 Metres FSK441

Welcome to Darrell VK2BLS and Mark VK2AMS who have been joining in the weekend Activity Sessions. Also to Col VK4CC who is setting up to use WSJT.

1296 EME JT65c

There is an active group of three VK amateurs on 1296 EME using JT65c most times when the moon is up – Dave VK2JDS, Phil VK4CDI and Rex VK7MO. Skeds can be arranged on the HB9Q logger at <http://hb9q.ch/joomla/index.php> . 50 watts and a 2 to 3 metre dish is sufficient to work similar stations. Ian VK3AXH is close to being operational so we should soon have a strong VK presence.

Comparison of ROS and Weak Signal Communicator (WSC) with WSJT modes

With the advent of ROS and WSC[#] it is useful to explore their performance in relation to the WSJT modes of JT65a and WSPR. Figure 1 below compares the various modes in a steady signal test using a signal generator with reference to the noise in the WSJT reference bandwidth of 2.5 kHz.

[#] WSC is an experimental mode and it is not intended for public release at this stage

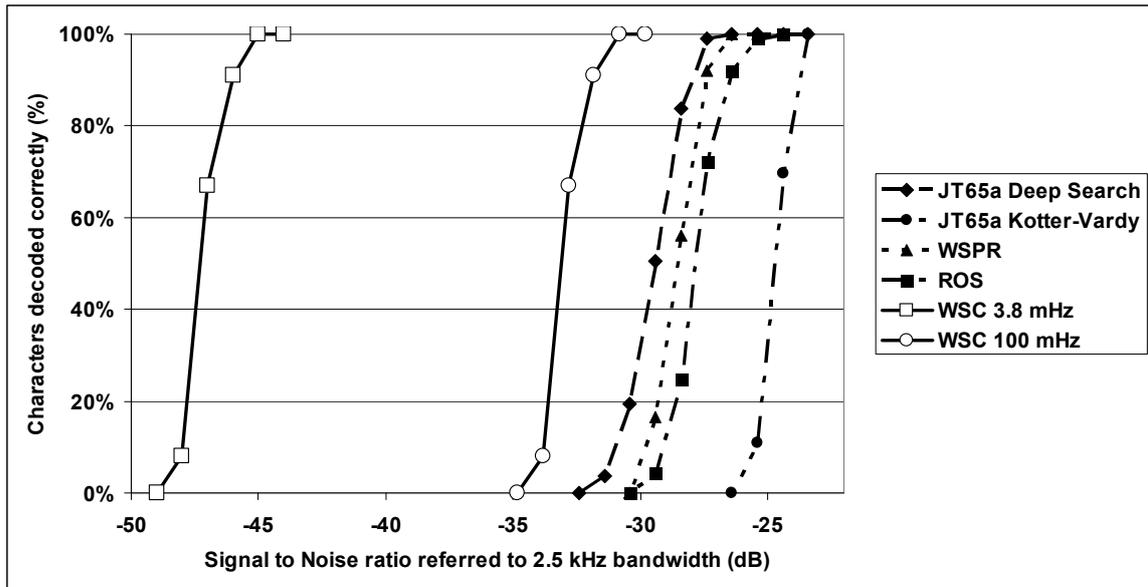


Figure 1: Performance of Various Weak Signal modes

It is seen that both ROS and WSPR have a 3 to 4 dB advantage over JT65a's standard or Kotter-Vardy decoder which is consistent with the fact that they take around twice as long to transmit a typical message of two callsigns and a report. The JT65a Deep Search decoder gains 4 to 5 dB over the Kotter-Vardy decoder by limiting decoding to a restricted set of callsigns in the same way that prior knowledge of a callsign using traditional modes produces an advantage.

WSC was written by David, VK3HZ, for optical communications. The 3.8 mHz version uses 3.8 mHz bins and was used by Rex, VK7MO, and Joe, VK7JG, to cross Bass Strait using cloudbounce in 474 THz. This version gains over 20 dB compared to WSJT's Kotter-Vardy decoder but takes some 20 minutes to send two callsigns. While it has not been tested it is likely that a 100 mHz version could be useful for VHF tropo-scatter and would allow two callsigns to be transferred in less than a minute and gain around 4 dB over WSJT's Deep Search Decoder. It is also possible to use WSC in a Deep Search mode to gain a further 3 to 4 dB. One of the reasons for WSC's performance is that it does not, like all other modes, spend around half the time sending information to synchronise with the time and frequency of the transmitter but instead relies on precise time and frequency deriving from GPS. The use of 100 mHz bins at 144 MHz requires a stability of better than one part in 10 to the 10th which would require high quality double oven GPS disciplined oscillators at both ends. It also requires the energy due to propagation to be constrained to within 100 mHz which is generally the case for 144 MHz tropo-scatter. The mode is unlikely to be useful on EME due to libration spreading which can be several hundred mHz on two metres and the need to accurately correct for Doppler shift.

Another way of comparing the various modes is to take account of the actual information content and the time taken to transfer this information and compare this to the Shannon limit. Figure 2 shows the Shannon limit for each mode and how close to this limit each mode gets when achieving 90% error free decoding.

Mode	Bin-width (Hz)	Time to send Message (seconds)	Information content bits	Shannon Limit (dB)	Sensitivity at 90% correct decoding	Close to Shannon Limit (dB)

					(dB)	
JT65a Kotter- Vardy	2.9	48	72	-33.8	-24.2	9.6
JT65b Deep Search	2.9	48	14	-40.9	-28.3	12.6
ROS	1	90*	94	-35.4	-27.0	8.4
WSPR	1.5	110	50	-39.0	-27.7	11.3
WSC 3.8 mHz	0.0038	1200	56	-48.9	-46.4	2.5
WSC 100 mHz	0.1	48	56	-34.9	-32.4	2.5

Figure 2: Shows how close the various modes get to the Shannon limit

* Assumes that no stop frame is required

ROS gets a little closer to the Shannon limit than WSJT, primarily because it sends the message only once per TX cycle compared to WSJT that repeats the message 5 times to help cope with QSB and rapid fading such as due to libration on EME. WSC gains by not spending time sending synchronisation information over the air and using a very high number of FSK tones to increase the information content per tone (around 18000) compared to 64 for JT65a.

The above discussion is aimed providing background about these modes for weak signal work and opportunities that might be explored but does not take account of the affects of propagation. While JT65a seems close to the optimum bin-width for 2 meters EME there appears to be some scope for a narrower bin-width mode for 6 metres EME and tropo-scatter. There is also the potential to gain around 3 dB over JT65a if the requirement to transmit a synchronisation signal can be avoided.

Please send any Digital DX Modes reports to Rex VK7MO

The Magic Band – 6 m DX

Brian Cleland – VK5BC

March showed marked improvement in TEP conditions particularly from VK4 to JA with almost daily openings as well as contacts into China and Korea. Some of the significant reports received follow.

5th March Wade VK4WM Harvey Bay reported working over a 21 minute period beginning at 0520UTC JR2HCB, JI1CUL, JH7XRZ, JA1RJU, JF3RDG, JA7IC, JH7UPW, JA2JXH, JR1UBR, JR0EQQ, JA9SJI, and JL1VFZ. Then on the 6th March Wade reported working 49 JA stations most at 5/9+ over a 1 hour period beginning 0500UTC.

11th March proved to be an interesting day with again a good TEP from Japan to VK4 (Townsville to Brisbane) with many VK4's working JA's. This opening was interesting in that it extended down from JA to FK8 and ZL2. Mark ZL2WHO in Palmerston North worked several JA's up to S7 and Pascal FK8IA in Noumea was reported by JR2HCB. Among the many JA's that Kevin VK4BKP in Mackay worked, Kevin worked DS2KGJ in South Korea and John VK4FNQ in Charters Towers worked Willem DU7/PA0HIP. Also on the same day Victor E51CG in Rorotonga reported hearing the KH6HI beacon.

12th March things were quiet down south but again VK4's worked JA's and then

finally on the 13th March the band opened to VK5 between 0530UTC to 0800UTC with several contacts being completed between VK5 & JA. Brian VK5BC reported working 17 JA's with Garry VK5ZK and Peter VK5PJ also working several JA stations. There were also a few contacts from JA into VK2, 3 & 7 completed with JR6EXN reporting contacts with VK3OT VK3VG VK3DUT VK5ZK VK5PJ VK5ZW VK3AMK VK3OE VK3FZ VK3BDL VK3AUU VK4ZJB VK4AHW VK7AC VK4DDC VK4WTN VK4FI & VK5BC.

16th march was a quite day but late in the afternoon both the VK6RBU & VK6RPH beacons were audible in VK5 and the VK5RBV in VK6. Contacts then followed between the VK6's OX, JJ, ADI & AKT and VK5's ZK, BC and AYD at Cooper Pedy. A little later Steve VK3OT near Hamilton also worked several VK6's. Around the same time Victor E51CG was hearing the KH6 beacons and worked Fred KH6Y.

17th March again good opening from most areas of VK4 to JA. Gary VK4ABW near Townsville worked several JA's as well as DS4, 5 & 7 stations. Garry also worked Willem DU7/PA0HIP. Also same day an 'E' opening from northern VK4 with Gordon VK5KAA working John VK4FNQ and Brian VK5BC working VK4ABW, busy day for Gary.

20th march saw Ray VK4BLK at Yeppoon work several JA's and a little later John VK4FNQ working several.

22nd March, another opening to VK4, this time David VK5AYD at Cooper Pedy was in the action working JA3EGE. That evening Willem DU7/PA0HIP worked several stations in the Brisbane area including Adam VK4CP, another new one for Adam.

30th March, Harvey VK4AHW & Wayne VK4WTN from the Hervey Bay area worked many JA's.

From the Tablelands in far northern Queensland Dale VK4SIX reports that he John VK4TL have been working JA, DU7,VR2, BA4 & BX4 during the month.

Also on many evenings throughout the month the stations in northern VK including Mark VK8MS in Darwin and Gary VK4ABW Townsville area have been working DU7/PA0HIP and other northern stations in Japan & Korea.

Received a message from Willem DU7/PA0HIP summarising his summer season. Willem reports:-

First I have to get something off my chest - When propagation happens, I noticed many times that many people are calling that can't even hear me, many times ruining QSO's with people that CAN. The frustration is not only on the VK/ZL side, but certainly also at my end. It ruined QSO's with ZL2TPY, ZL1RS and ZL3AAU. I thought that only Europeans were like that (you should hear the mess when something special shows up on 6m in EU, hi). It really is a shame....I can understand their eagerness to get a "new one ", but in this way they only ruin their own chances. (and mine). A kW linear (my own PA0 linear) has been shipped to me and will hopefully arrive soon. Also I am planning to build a better antenna. So maybe next season the ZL/VK's will have a better copy of my signals and problems like that will belong to the past.....sure let's hope so.

OK having said that, below is a summary of my VK/ZL summer season contacts.

13 Dec 2009: I worked VK6KXW (first VK6), and we made some tests during the next couple of weeks. It turned out that on most days (12 out of 14 days) I could detect his signals (keyer), like a pipeline.

15 Dec 2009: 04.40 - 08.00 UTC, spotty openings to VK3, 5 and 7. I worked 7 stations (including VK5BC/P, new grid!!) (3x VK3, 1x VK7 and 3x VK5)

17 Dec 2009: 08.15 - 10.30 good conditions to VK2, 3, 5 and 7, but not much activity

from VK. I worked 1x VK2, 8x VK3, 7x VK5 and 3x VK7. Could have worked many more.

18 Dec 2009: short opening 05.00-05.45UTC to VK3 (2x) and VK5 (2x), signals were very strong though (s8-9)

22 Dec 2009: 05.20 - 07.15UTC very spotty opening to VK6, worked VK6JJ, KXW, JJ (SSB) , ZKO, and heard VK6RO who faded out before completing QSO.

I had heard ZL3NW before very weakly but on 25 Jan 2010 it finally happened:

25 Jan 2010: 04.20 07.40 on/off conditions to ZL1, 2, 3 (worked ZL3NW (539/539 at 04.26UTC) for new one (amazingly good signals, 7721 KM), QSO's with ZL1RS, ZL2TPY and ZL3AAU were ruined by weak VK2, 3 stations, who were heard both in ZL and by me. (calling me)

Also conditions to VK2, 3, 4 and 5, I worked with 9 x VK2, 4 x VK3, 1 x VK4(EK), 5x VK5. (signals were not very strong but activity was good)

29 Jan 2010: 06.30 -07.35UTC weak opening to ZL3 and VK7, Heard ZL3NW (Rod had bad line noise, so no QSO), ZL3TY and ZL3AAU, but no QSO's. Did manage to work VK7AC, but was only VK heard here.

6 Feb 2010: around 09.16UTC strong propagation to VK8 (reckon, must have been Spread F or so) Worked VK8RR and VK8MS, both 59++ on SSB.

Well Brian, that's it. For me, this season was much better than last year's (only 2 openings) Now have worked 31 grids in VK (1 in ZL).

Thanks Willem, it's great that there is a station in the Philippines who spends considerable time looking for contacts into VK/ZL and hopefully all operators are appreciative of your efforts and call at the appropriate time.

Received a very interesting message from Stuie VK8NSB in Darwin, Stuie writes:

Two years ago I decided to venture onto 6 m and put a quarter-wave vertical up in the air around November 8th ready for what the 6 m Guys were calling the Magic Band time of the year. I was already aware of the VK LOGGER on the Internet, using it for HF and had seen the 6 m page but had never ventured onto it thinking it was for Advanced operators only. I actually thought I would be ignored or told to leave if I went on the page because I was a Standard operator. I decided to jump on the 6 m page and was amazed to find the 6 m guys were quite willing to help out with answers to my questions and willing to have QSO's with me on 52.100 SSB or split because of the Advanced guys antenna's cut for the bottom part of the 6 m band (50-51) only. In the Xmas season of 2008, I worked 23 VK's & 2 ZL's on 6 m. When the band closed off around Feb/Mar 2008, I didn't bother with it for most of 2009 and found that the Magic Band was very poor over Xmas 2009. I just happened to come upon a 3 ele Yagi for 6 m on VKHAM classifieds and started working on putting it up on one of the towers I have here, finally getting it up around the end of January 2010. One evening on the Dxcluster, I saw Marks (VK8MS) callsign spotted by JA and thought wow 6 m is open so I rushed up to 6 m to listen and could hear the JA quite clearly on the yagi. I was able to talk to Mark later that night and he explained to me about TEP, I had never heard of it before but was interested in learning more about this TEP. Over the next 2 weeks I was lucky to have worked KH2, VR2, JA, DU & BV on both SSB & CW on 52100 and some QSO's using split 50 – 52. Both Mark VK8MS & John VK8JM helped me with some of the QSO's, asking the operators to go split for myself so that I could make the QSO. I have noticed that on the VK LOGGER that there doesn't seem to be to many VK Standard Operators active on 6 m. Why not? For the guys down in VK 1 to 7, 6 m looks fun with openings all around Australia, and as well as some good international DX openings. With only 100w and

a 3 element yagi I have had some real great evenings on 6 m over the last couple of weeks thanks to TEP. I would say to those Standard Operators out there give 6 m a go, its easy to put up a vertical, dipole or even a beam for this band as it does not need massive space to do so. Get on VK LOGGER and say g'day to the guys. They won't bite and you might find you actually enjoy this Magic Band. I had always said that 6 m was not really for me as I was a HF DXER and I was not going to get too serious about it, but over the last couple of weeks I have actually enjoyed this truly Magic Band. Give it a go, Yes as a standard operator you might be limited to the frequencies you can use on 6 m but you will be amazed how many guys will work you split or even come up on 52.100 to say g'day. I now keep my eyes on the 6 m chatter in VK LOGGER and the 6 m spots on the clusters I monitor.

Take it easy and catch you on 6 m from Darwin De Stuiie VK8NSB

Great to hear you are enjoying some great conditions on 6 m Stuiie. I'm sure it will only get better in the next couple of years as the sunspot cycle improves and of course it is always great to work VK8 stations from any where in VK. Also good that many stations are keeping an ear out for the standard licensees above 52 MHz.

Please send any 6 m information to Brian VK5BC