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# VHF/UHF – An Expanding World

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David Smith VK3HZ

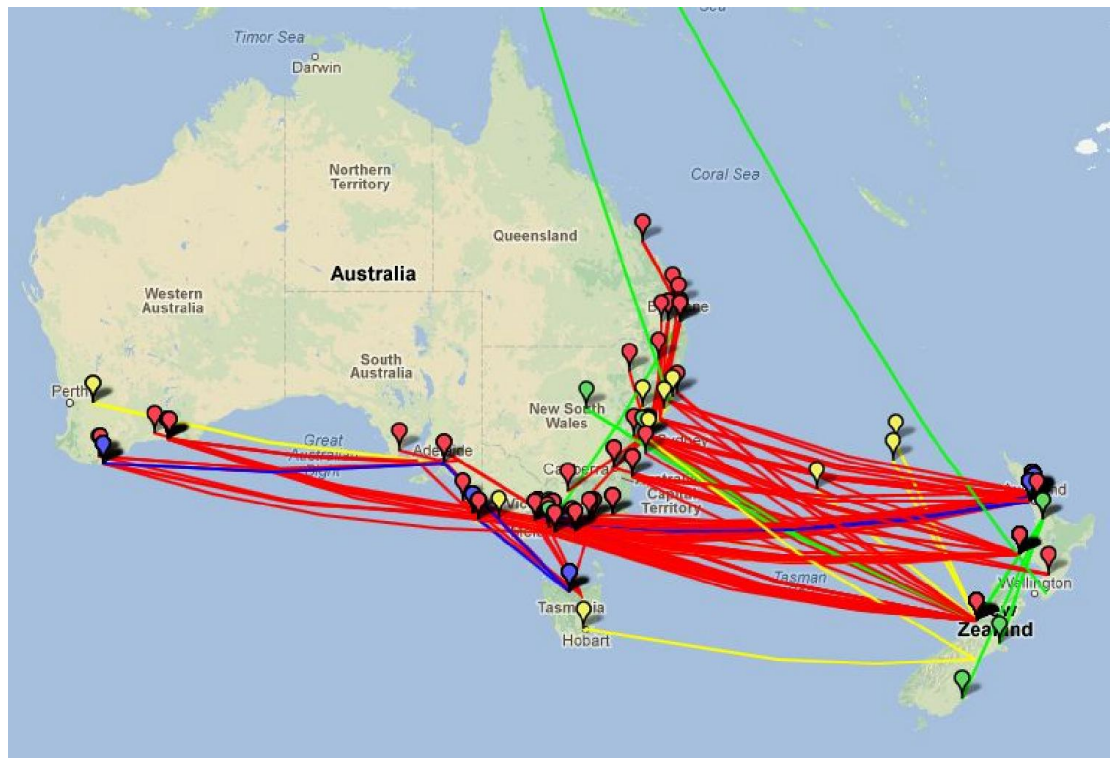
## Weak Signal

David Smith - VK3HZ

After the excitement of the New Year's day's openings across the country, January 2<sup>nd</sup> was somewhat quieter with contacts from VK2 across to ZL, and some intense propagation between VK3, 5 and 7.

After that, there was a lull for a few days. Then on January 6<sup>th</sup>, as I was writing the last column, the bands opened up to produce one of the best (if not THE best) days for many a year. For those in VK2 and VK3, there was a huge Tropo opening to the east to stations spread up and down New Zealand from Bob ZL3TY in the south to Steve ZL1TPH/P at his usual portable location in the north. Then the band opened from VK3 to the west to VK6.

Once again, rather than trying to detail the many contacts, below is a map of the Spots registered for the day, courtesy of the VK Logger:



Contacts for 6 January 2013

As we now have the marvel of colour printing, I should explain that the red lines represent 2 m contacts, blue for 70 cm, green for Digital modes (EME off the page) and yellow for spots of propagation indicators (FM stations, AIS ships etc.).

While some lines appear to travel from ZL all the way to VK6, there were no contacts of quite that distance. However, several stations in VK3 worked both ways to stations separated by over 5000 km. For example, Jim VK3II worked Bob VK6BE (2480 km) and a little while later worked Steve ZL1TPH/p (2580 km).

Best 2 m contact for the day was from Colin VK5DK in Mt Gambier to Steve ZL1TPH/p - a distance of 2995 km with 5x1/5x2 reports.

On 70 cm, Arie VK3AMZ near Geelong worked Steve ZL1AVS on the coast to the west of Auckland - 2652 km with 4x1 reports. Just to show that it wasn't a fluke, they repeated the contact later in the morning and then again in the evening with 5x1 reports. Several other Geelong-region stations also worked Steve on 70 cm including Ken VK3AKK, David VK3QM and Chas VK3PY - all distances within 2 km of Arie's effort. Overall, Steve ZL1AVS had 12 contacts into VK3 on 70 cm.

Also on 70 cm, Andrew VK3OE up on Mt Dandenong worked Steve ZL1TPH/p for a distance of 2595 km with 5x5 reports. Andrew ended the day with 3 ZL stations on 70 cm.

At the end of the day, Steve ZL1TPH/p reported:

*In the log for today:*

144 MHz; VK2DO, VK2NC, VK3DUT, Heard VK1BG, VK3KH, VK3AMZ, VK2AH, VK5DK, VK3EK, VK3BDL, VK3GHZ, VK2IJM, VK3II, VK2BCC, VK2ZT, VK3OE, VK3AKK, VK2DVZ, VK2ZT,

432 MHz; VK3OE,

*I'd like to thank the VK3 operators for going quiet (they must have been hearing both ends) while VK5DK and I persevered for the 3000 km contact on tropo. I thought that was so neat, and so a word of thanks to the VK3 operators.*

Gavin VK3HY writes:

*The weekend of 5th and 6th January started out in the usual way at my QTH. In the shack Saturday morning just before 2000 UTC for the FSK441 meteor scatter activity on 144.230 MHz. Within an hour, contacts were completed with VK4AMG, VK4JMC, VK4UH, VK2AMS and VK2XN. After that, I beamed out to the West hoping for a repeat contact of a few days earlier with VK6BE. This did not eventuate but good contacts were made with VK5DK and VK5PJ. On Sunday morning, meteor scatter activity was unusually quiet resulting in just one contact with VK4KSY. It seemed that with the Hepburn tropo index looking very promising between VK2/3 and ZL, most of the 144 MHz DX stations were concentrating on that path. The path to ZL from my QTH is obstructed by the Dandenong Ranges so I resigned myself to just listening to others enjoying VK3 to ZL contacts.*

*However, to my surprise and great pleasure, I eventually received JT65B signals from ZL3TY at -24dB and we completed a contact at 2220UTC. At 00:03 UTC I again worked ZL3TY RST 529 on CW. No other ZL stations were received at this location. My beam heading to ZL3TY is 111 degrees. To illustrate the degree of difficulty in making these contacts, my antenna is 220 m ASL and in the ZL3TY direction, fires straight into 244 m of dirt just over a kilometre away rising to a 488 metre ridge between Sassafras and Ferny Creek at about 2.8 km distance. I guess this proves that just about anything is possible. I've now had just four ZL contacts on 144 MHz in 47 years. Some of the less geographically challenged probably bettered that in a few hours on the 6th January, 2013.*

From the south island of ZL, Bob ZL3TY reports:

*The opening started on Saturday morning with JT65 QSOS with VK3GHZ (1945z), VK3AMZ and followed by VK3GHZ on 70 cm. I was out of the shack until 0335z when VK3GHZ was in again on 2 m and 70 cm. Then worked ten VK2 stations and four VK3, some of the Sydney stations were very strong. On 70 cm in the evening worked VK3GHZ, VK3EK, VK2BHO, VK2ARA.*

*On Sunday, initially open to VK2 and 3, worked five VK2s, then later in the day the opening shifted with good signals into VK3 as far west as Geelong vicinity. Worked 28 VK3s, at one time had a nice pileup into Melbourne. Tried JT65 and worked 9*

stations in total including VK2EMA, several were subsequently worked on SSB. On 70 cm worked VK3GHZ, VK3PY/P, VK3AKK/P, VK3QM/P, VK3EK, VK3DUT. Unfortunately the opening didn't extend as far as VK5 from here.

Beacons heard during the opening included VK3RGI, VK3RED, VK2RSY, VK3RGL. On Sunday evening VK3RGI was S9 for several hours.

My AIS receiver logged ships in mid-Tasman throughout the opening, at one time on Saturday two ships off SE VK3 were logged. It appears that my AIS antenna's main lobe favours VK2/4, as I would have expected more ships in Bass Strait given the strength of the VK3s at times. As a propagation indicator it did show ships in the Tasman preceding the first VK signals.

A big thanks to all stations worked, this opening was up there with the best experienced here.

On January 7<sup>th</sup>, the VK2/3 to ZL opening continued at a somewhat diminished level with the two Steves (ZL1TPH/p and ZL1AVS) featuring heavily and nearly all contacts on 2 m. Conditions between VK3, 5 and 7 were also well up. Norm VK7AC near Launceston worked Brian VK5BC/p holidaying at Corny Point on 23 cm - 1130 km with 5x1 reports.

From there, things dropped off and the rest of the month produced only a few high spots. On January 9<sup>th</sup>, it was the turn of the VK4's to work ZL, all contacts on 2 m. On January 13<sup>th</sup>, the conditions were repeated together with some good propagation from the Brisbane area up to FNQ which continued into the 14th.

On the morning of January 16<sup>th</sup>, an intense tropo patch across western Victoria allowed Ralph VK3WRE to work Colin VK5DK on 10 GHz with 5x2 reports. Of note is that both are home stations.

Finally, after the frenetic start to the month, nothing really of note occurred for the last half of January.

### **National 23 cm ATV Record**

Rod VK3BQJ in Gippsland reports on his ATV efforts:

*While there has been much attention recently to the excellent tropo conditions to ZL, there was superb tropo across Bass Strait from Sunday through Tuesday, 6 - 8th January, at least from the Lakes Entrance area in VK3 to Penquin in VK7.*

*The 2 m repeaters VK7RMD on Mt Duncan and VK7RAA on Mt Barrow were received in East Gippsland at unprecedented signal levels for many hours. On the 8th in particular 70cm repeaters, particularly VK7RMD, were received at unprecedented signal strengths for unprecedented periods of time. Also noted were VK7RBH and VK7RAB.*

*On the 7th, Winston VK7EM and I had a 23 cm analogue ATV contact from 1310 to 1500 hrs local, basically P5 throughout with fast deep QSB appearing particularly from 1430 hrs. Frequencies of 1283MHz - VK7 and 1250MHz - VK3 were used, just convenient frequencies.*

*Prior to the ATV QSO VK7EM ran an unmodulated video carrier for circuit adjustment; this was received on a conventional SSB receiver at VK3BQJ. A simulation of the signal on the 8th using Spectrum Lab, a handful of attenuators and a signal generator suggested that the signal from Winston was at least 80 db above noise. As the contact progressed it was quite evident that the signal level went much higher from readings on a signal meter on the tunable dedicated video Rx, the latter readings have not been quantified.*

*It later became evident that some / most of the troubling QSB was caused by the 2 m dish at the VK3 end having been lined up 15° off the true Az for the entire QSO - map reading error; a ever stronger gusty wind as the QSO progressed caused the 2 m dish to rock sideways.*

*An application for a new 23 cm ATV national record will be made in due course. If accepted the new distance will be about 400 km - the existing record is 216.5 km.*

[The new record distance of 399.2 km has since been accepted by the WIA]

### **VK5DK 144 MHz and Up Activity**

Colin VK5DK in Mt Gambier submitted the following report about his activity for December and January:

*Although all the antennas were repaired or replaced, I have been subjected to severe power line noise from the 11 kV line that runs down the street that I live in, but most mornings the noise has been low enough to be able to work any DX that has been about.*

*This DX season there has been very little Sporadic E on 144 MHz with only one brief opening that I encountered with contacts to VK2ZT and VK2MAX on the 18th of December 2012.*

*On the 30th December, conditions improved with several contacts being made with Brian VK5BC/P at Corny Point on the Yorke Peninsula through to Ralph VK3WRE in Traralgon, Norm VK7AC and Joe VK7JG in Launceston. During this time the VK6REP beacon in Esperance was heard in Mt Gambier, but no contacts into WA were made.*

*On the 31st of December the VK6REP beacon was quite strong and a contact was made with Ron VK6VOX in Katanning at 1113 UTC with a 5 x 8 signal being received followed by a contact with Bob VK6BE in Albany with 5 x 9 signals at 1348 UTC. Both stations were again worked the following morning at 2155 UTC for VK6VOX and VK6BE at 2230 UTC.*

*Conditions on the 3rd of January were still extremely good (as suggested by the Hepburn Tropospheric charts) with contacts to VK7XX on 144 MHz and 432 MHz, but with power line noise problems at this QTH no other contacts were made. Again on the 5th January the propagation to VK3 and VK7 was extremely strong and the following stations were worked, (some on 144 MHz and 432 MHz), VK7AC, VK3XDX, VK3WN, VK7PD, VK3BY, VK3GHZ, VK3BBB, VK3WRE, VK3AXH, VK3AMZ, VK3AXH (2.4 GHz), VK3HY, VK3ALB, VK3MQ and VK3II.*

*The Hepburn Tropospheric charts were indicating a very good duct from VK6 right through to ZL for the morning of the 6th January so an early start on 144 MHz with a contact with Norm VK7AC (who was beaming ZL) at 1852 UTC 5th Jan) with 5 x 9 signals both ways followed by a contact with Mike VK3BDL at 1933 UTC 5th Jan. At this stage ZL1TPH/P (RF73HM) was making several contacts into VK3 on 144 MHz and 432 MHz but was not audible here in Mt Gambier.*

*At around 2015 UTC I was able to start hearing Steve ZL1TPHJ's "K" at the end of each of his transmissions. Thanks to all the VK3 stations for standing by to allow Steve and I to finally make the Tropo contact of 3000 km on 144MHz. I received Steve at 5 x 1 and Steve received my signals at 5 x 2. Unfortunately, the power line noise was increasing and no more contacts were had from this QTH. ZL2ADU was heard by both Trevor VK5NC and Gary VK5JR/P, but no contacts were made.*

*Again on the evening of the 6th January, conditions were still good with the following stations worked, VK3GHZ (144 and 432), VK3FASW, VK5BC/P, VK3XDK and*

VK3HZ, on the 7th January VK3BDL, VK7AC, VK5BC/P (144, 432 and 1296) VK3AUU, VK5NEX, VK3II, VK3ZQB and VK5TH. Conditions have not been all that good since, apart from the morning of the 16 January when on checking the Beacons I was able to hear all of the VK3RGI beacons (144, 432, 1296 and 10GHz) all at good strength. At 2321 UTC 15th January(16th January) I was able to contact Ralph VK3WRE and our first two way SSB contact made on 10GHz from Home Station to Home Station with Ralph's signal at my QTH peaking to S7 and received a 5 x 2 report from Ralph, this is a distance of 506km.

At present my noise problem from the power line is running on average S9+ most days. Although the Power Company has located the offending insulator, to date it has not been replaced.

### **VK3ER Field Day Microwave Additions**

Peter VK3QI reports that the VK3ER Field Day station is now capable of contacts on all bands to 47 GHz:

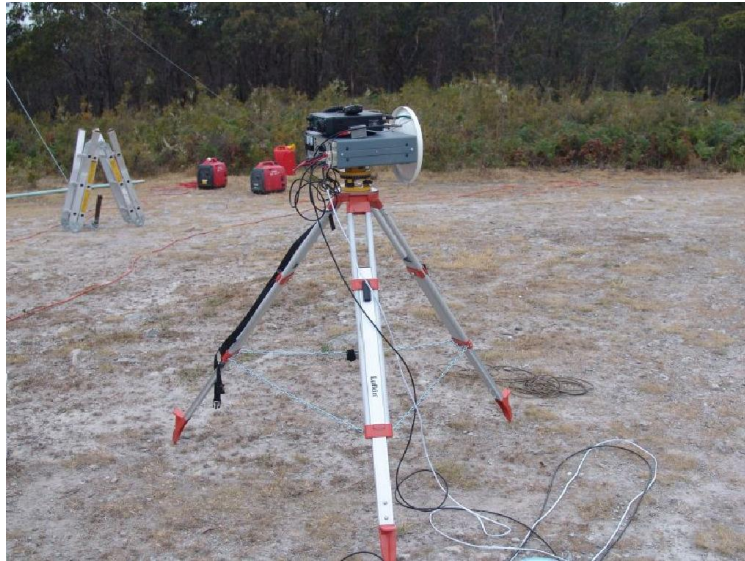
*I have the 24 GHz and 47 GHz setups running - 3 watts and 150 mW respectively. Had a couple of 24 GHz contacts in the Summer VHF/UHF Field Day but I have a problem with FM-ing of the doubler (even though it is GPS-locked) – it seems that the amplifier which draws about 4 amps is causing the voltage to drop somewhat on modulation. I need to upgrade the power cable feeds. We solved the problem in the FD – just went to FM and had full quieting QSOs!*

*The 47 GHz setup is going – I just need to find some active stations – Peter VK3APW, David VK3QM and Charlie VK3NX seem to be the only ones around!*

*Pictures of the microwave setups are below.*



VK3ER Microwave Tower with 13 cm to 24 GHz



VK3ER 47 GHz System

Please send any Weak Signal reports to David VK3HZ

## Digital DX Modes

Rex Moncur – VK7MO

### JT65b - Tropo opening 5th and 6th January 2013

Bob ZL3TY reports:

*Before commencing the regular Saturday morning meteor scatter session I logged the VK3RGI and VK3RED beacons. During the session I could see traces of tropo signal on the SpecJT screen and it appeared to be Rhett VK3GHZ. We tried JT65B and completed an easy QSO, followed by Arie VK3AMZ. I was away from the radio until later in the day and after 0400z worked into VK2 and VK3 on SSB and CW. On Sunday morning, after working into VK2 and eastern VK3 on SSB and CW, I changed to JT65B and worked VK3II, VK3AMZ, VK3HZ, VK2EMA, VK3HY, VK3KH, VK2KOL, the VK2EMA QSO was the best of the opening at 2385 km.*

### Initial Tests on 24 GHz EME with small portable dish

Following the success in using JT65c with Doppler correction on 10 GHz, Rex, VK7MO has started experimenting with WSJT on 24 GHz using his 47 cm plastic offset dish. Everything gets more difficult on 24 GHz with water vapour absorption, libration spreading increasing in proportion to frequency, difficulty in aiming, increased losses requiring waveguide, in getting low noise pre-amps and generating power. The tests were run one way with AI, W5LUA who has a 2.7 metre dish and 100 watt TWT. The first attempt was encouraging with evidence of a single tone on the waterfall. After some work on the feed alignment, the single tone became clearly evident and an attempt was made with JT65c. Two syncs were achieved but no decodes even though signal levels were around -29 dB where 10 GHz would normally decode at similar spreading. While JT65c works well on 10 GHz with just 10.8 Hz tone spacing, with libration spreading of up to 150 Hz, this seems to occur because the bulk of the signal is reflected as a specular peak from the centre of the moon. Looking at the single tones on 24 GHz, it was evident that the signal is spread more evenly and thus the close tone spacing of JT65c works against decoding. Looking at the literature it is seen that as one goes up in frequency the reflection

moves from almost completely specular at VHF to part specular and part diffuse around 1296 and is largely diffuse by 24 GHz. Accordingly, it seemed that it would be necessary to use a wide binwidth mode such as JT4E and accept its lower sensitivity of around -19 dB. Tests with JT4E showed that it could detect something because the DT was consistent with the distance to the moon. And while two syncs were achieved, again nothing was decoded. The results were forward to Joe Taylor, K1JT, who was challenged to see if he could decode the wave files. His initial work on some 10 GHz wave files showed that he could by averaging achieve decoding of weak JT4G signals but with only two files on 24 GHz the averaging was insufficient. Joe then implemented his Deep Search algorithm on JT4 and was able to decode the 24 GHz signals as below.

```
174459 2 -23 3.1 22 46 *   VK7MO W5LUA EM13      0 26 E
175259 0 -25 3.1 22 44 *   VK7MO W5LUA EM13      0 10 E
```

While these decodes were not achieved until over two weeks after the actual test, they do demonstrate that it should be possible to use JT4 with just a small dish to undertake 24 GHz EME. Getting a two way QSO is still a long way off as this was done with 100 watts at the other end.

Please send any Digital DX Modes reports to Rex VK7MO