VHF/UHF – An Expanding World

David Smith VK3HZ

Weak Signal

David Smith - VK3HZ

Barry VK3BJM at Redesdale Junction (near Kyneton) sent in a belated report on some good contacts he achieved in February.

Others will have noted the fine troppo conditions present on the morning of Saturday 3/2/07. I hadn't turned on any radios the night before, so I was unaware of how things had been building up. I got into the shack just after 2000z, and found that with the 144 MHz array pointed at Adelaide I was receiving VK7RAE at 539. With the array pointing at VK7, the beacon was 579. This is the strongest I've seen VK7RAE since moving inland (and the beacon being returned to service, of course).

VK7AC was on 144.1, and we worked each other at 59 at 2010z. 70 cm wasn't so strong; Norm was 51, while I received a very generous 55. Norm also had 23 cm, and I was very pleased at the signals there; Norm was 54, and he gave me a 57. This was a new grid locator for me - my first VK7 on 23 cm, too.

Also worked on 2 m were Paul VK7BBW (again 59 both ways) and Karl VK7HDX (56 - 57).

All very nice, considering that I'm now on the northern side of the Great Divide, and Mt Macedon threatens the view towards VK7. VK7AC is a bit over 500 km from my QTH (which is 5 km WNW of Kyneton).

JMFD

The recent John Moyle Field Day saw plenty of activity from field stations on the VHF/UHF bands. Andrew VK1DA operated portable near Canberra and reports:

A general thanks to all the operators who I made contacts with over the weekend of the national field day contest.

The log has 115 contacts on VHF/UHF. About half of those are on 2 metres. Best DX was from Mt Ginini QF44JL to VK3LY/p QF03SV - according to GCGC this is 647 km. A good contact on 2 m and I was delighted to get through on 432 as well. Some other contacts were over 500 km, which is also gratifying (because you get more points for those contacts).

On a previous event I had big troubles erecting the mast with two large VHF antennas on it, so this time I decided to keep it simple and I took only a short 8-element antenna for 2 m and only a short mast (about 4 m). For 50 MHz, I had a half wave vertical (the type sold in DSE a few years back, purchased second hand, I suspect unused). On 432 it was a 22-el yagi.

In the odd-contacts-made category, I include a contact with the Wagga boys on Mt Flakeney south of Wagga, on six metres, using my 40 m dipole fed through a RAK balun by 15 m of old RG58 coax. Their signal was stronger on this antenna than on my "real" 6 m antenna.

Power used on all bands was about 100 watts output. Cable runs on 144 and 432 were about 8 m of RG213 or RG214. Power supply was a 950 W GMC alternator that audibly sagged when transmitting on 432 through the TE systems amp, with the compression turned on.

The weather generally cooperated with a sunny, still afternoon on Saturday, and thick

fog on Sunday until around 1:30pm.

The signal from the VK3RGL 2 m beacon on Sunday morning was up to s5 on the 271 meter - this is a substantial signal. More operational beacons would provide extra assistance and indicate band conditions. Beacon operators - your beacons are missed.

New VK1 Records

Colin VK5DK writes that he, Russell VK3ZQB and Neil VK2EI have established some new VK1 distance records on 2.4 GHz, 5.7 GHz & 10 GHz.

On the morning of 27 March, Russell and I set up on Mt Canobolas near Orange and Neil on Mt Ginini near Canberra - a distance of 249.3 km.

The first contact was on 10.3681 GHz at 2234 UTC with 5/9 reports being exchanged both ways on SSB. Then an attempt was made on 24 GHz, but conditions had deteriorated on 10 GHz meaning that the possibility of a success on 24 GHz was remote. When moving the 24 GHz equipment, a malfunction occurred causing a relay to fail, which resulted in a blown receive mixer on my 24 GHz unit. So, any hopes of a contact between Neil and ourselves on that band were dashed.

We then set up our 5.760 GHz unit and successfully had a contact on SSB. We were running 15 watts to a 600 mm prime-focus dish using a can feed. Neil was only running 100 mW to a 600 mm dish, but signals were very strong even with such low power. Neil's report to us was 5/8 and our report to Neil was 5/9.

2.4031 GHz was then set up and a 5/9 SSB contact was made both ways. I was running approx 5 watts to a 25-element Yagi antenna and Neil was running 1.5 watts.

Colin VK5DK and Russell VK3ZQB

23cm in "G" Land

Doug VK4OE has recently been operating portable in the UK on 23 cm. After an initial hiccup when a wire became detached in a connector, requiring a visit to a friendly local, Doug set up on a local hilltop to see who he could work.

It was a beautiful morning, ending several days of cold wind, and I had a heap of fun, working six stations on 1296.2 MHz in about forty minutes operating on a weekday morning. I must admit that posting to the ukmicrowaves e-mail list did help!

Calls worked were GW8AWM (he was using a 2 m beam for a 23 cm antenna), G0UPU, G4DDK, G3VKV, G4BEL and M0ELS. Signals across the country were good for distances of around 300 km but I'm sure that the altitude of Blorenge was to my advantage. There was a well-defined temperature inversion visible at about the same altitude as I was (smog coloured - urk!) and I was wondering if I might even have been too high for propagation further than line-of-sight. The results demonstrate that it wasn't. 23 cm is a great band, isn't it?!

Beacons

Several months ago, it was reported that Alan VK3XPD had established a new beacon – VK3RXX – on 2.4 GHz in the Melbourne area. Alan now reports that it has been heard from afar:

With today's somewhat unexpected lift in propagation, the VK3RXX Melbourne Beacon on 2403.530 MHz has been heard by Colin VK5DK in Mt Gambier – a distance of 380 km.

Colin gave the following info: 11 April at 2300UTC, signal 5x5, clean signal initially then it went raspy, estimated to be about 1 KHz low.

Colin's station is a VK5EME Transverter with a 25-Element yagi.

I'm probably just as pleased as he obviously was about this event! Oh, and I now owe Colin the "promisary" bribe of 5 low-noise HEMPT FET's.

Please send any Weak Signal reports to David VK3HZ

Digital DX Modes

Rex Moncur – VK7MO

For a change, this month's report covers the optical application of WSJT.

On 9 April 2007, Justin VK7TW, and Rex VK7MO extended the 474 THz national digital record to 51.3 km using WSJT and the JT65a mode with 3 watt input red Light Emitting Diodes (LEDs) and large 400 x 400 mm narrow beamwidth (approx 0.5 degree) Fresnel lenses. These lenses produce around 50 dB gain. While the signal levels one way were only around -20 dB, due to a transmitter problem, they were saturation in the other direction indicating there is plenty of system performance to spare.

Justin and Rex have also been experimenting with optical cloud-bounce. Because of the difficulty of aligning two narrow beams on a non-descript moving cloud, it is necessary to use a relatively wide beamwidth of around 10 degrees and use higher power to compensate for the wider beamwidth. They first tried a 250 watt projection lamp which was mechanically chopped by an 8 hole aluminium disc, driven by a synchronous motor, to produce an audio tone. The intention was to use this system

to transmit slow speed VFSKCW. This system produced signals up to 35 dB above the noise in 0.1 Hz bandwidth. While this system demonstrated that cloud-bounce is possible, it was found that the slip on a synchronous motor is too great to achieve adequate frequency stability and thus they moved to an 18 x 1 watt Luxeon Flood LED unit through a Fresnel lens. While this overcame the problem of frequency stability, and allowed the detection of tones in 0.05 Hz bandwidth, the signal levels were too low to allow the exchange of information with WSJT. A problem with this approach is that it produces 18 narrow beamwidth spots over a beamwidth of 10 degrees rather than a uniform radiation pattern. It was thought that the process of scattering from the clouds would fill in the gaps and produce a uniform radiation pattern at the receiver. However, this seems not to be the case as later tests with a single LED with high gain Fresnel lenses for both TX and RX showed the beamwidth, even after scattering from clouds, was maintained at the same order of the beamwidth of the lenses; with perhaps an increase of only a factor of two.

In order to produce a uniform radiation pattern with relatively high power, a 30 x 3 watt input LED array was constructed with the individual LEDs working through small plastic lenses of the type used for LED torches (Jaycar Part No HP-1290). Each torch-type lens should produce a beamwidth of around 10 degrees so that the total adds together to maintain a reasonably uniform radiation pattern. While it was found that the array produced a reasonably uniform radiation pattern, the beamwidth was not symmetrical and was spread over an oval or 10x20 degrees. It was found that the reason for the non-symmetrical beamwidth is that cheaper 3 watt Star LEDs (Jaycar Part No ZD-0520) achieve the 3 watt power level with two separate chips which produce two spots when used with a lens. Thus the more expensive single chip Luxeon Star LEDs (Jaycar Part No ZD-0432) would have achieved a tighter beam and a 3 dB improvement. Still the cheaper units produced good results over a short non-line of sight path of 1.2 km, with clouds at around 1200 meters altitude. On the first attempt the clouds were rather patchy resulting in rapid QSB with signals varying from undetectable to -5 dB on the WSJT scale. A second attempt with more extensive cloud cover produced continuous signals and perfect decodes although the peak signal level was still no more than the -5 dB achieved earlier. For this second test, the number of LEDs was reduced to see how far down it was possible to go and still decode JT65a signals. It was found that occasional copy could be achieved with just two LEDs. After careful alignment with six LEDs, 50% copy was achieved with a single LED at signal levels around -28 dB.

Following the above results, Rex and Justin did a check with a carefully aligned single LED focussed with a 400 x 400 mm Fresnel lens and measured signal levels at around -16 dB. However, it was only possible to align this system after the signal had been found on the broader beamwidth 30x 3 watt array which means it is not all that practical for cloud-bounce. Thus in summary the results in terms of signal levels were as follows:

30 x 3 watt “cheap” LED array with 10x20 degree beamwidth: – 5 dB

1x 3 watt Luxeon with 400 x 400 mm Fresnel Lens around 0.5 deg beamwidth: -16 dB

1 x 3 watt “cheap” LED through torch type Lens beamwidth 10 x 20 deg: -28 dB

Options to improve performance appear to be to go for narrower 5 degree beamwidth torch lenses (available from the USA) and use Luxeons in the array, which should provide a 6 to 9 dB improvement in performance. It is expected that a 6 LED array of Luxeons with 5 degree beamwidth would provide a very effective transmitter at the expense of a small increase in the difficulty of alignment.

The present 30 x 3 watt LED array is pulse modulated with square waves using MOSFET switches. Little is to be gained by going to linear modulation and sine

waves as the LEDs would then have to be restricted to a narrow pseudo-linear range with a significant reduction in effective power.

Advice has been received from a French ham that it should be practical to work cloud-bounce over longer paths with the array transmitter that Justin and Rex are using, as scattering efficiency from clouds increases with distance and this tends to compensate for the increased attenuation over longer paths. Thus plans are underway to explore optical cloud bounce over longer distances. While the feasibility of optical cloud-bounce has been demonstrated, at this stage only one of the new LED array transmitters has been constructed and thus a two way contact is still to be achieved.

For more information on Optical activity in Australia, join the Optical DX group at groups.yahoo.com/group/Optical_DX/

Please send any Digital DX Modes reports to Rex VK7MO

The Magic Band – 6 m DX

Brian Cleland – VK5BC

After a very good summer sporadic E season, the band was very quiet during March. I have not received any reports of contacts being made with only the odd report of a beacon or TV signal being heard. There have been a few openings from northern Queensland to JA.

I received a note from Kevin VK4BKP in Mackay who reports the following:-

I've only been active on 6 m for a few months after a 20 year break. I'm using a rotatable horizontal dipole at 30 feet, IC-706 and 100 watts. I haven't worked any JA pileups - just one or so each opening. From my log: -

March 06 2007 0620UT worked JR6EXN Hide 59/59 50.140 (100 watts dipole)
March 06 2007 0640UT partially worked JH4BTI 5x7 50.150.
March 13 2007 0500UT JG3LEB Hiro (often on the logger) 57/55 50.110
March 14 2007 0510UT JH7XRZ Norifumi Takahashi 58/59 50.110
March 14 2007 JA2IGY (Beacon) 50.010
March 14 2007 JA6YBR (Beacon) 50.017
March 14 2007 JA1ZYK (Beacon) 50.023
March 28 2007 0505UT JR0ETA 57/57 50.110

I have also heard some JA's working other VK4's etc.

I've heard 49.750 just about every second day but have noticed it has to be S9+ to work into Japan.

From the 6 m loggers, on the 29th March Ray VK4BLK at Yeppoon worked several JA's including JL8GFB, JF2LFG & JR2HCB. On the same day, Kevin VK4BKP at Mackay also worked JA7WSZ and JA7WSW reported hearing VK8RAS, VK4RTL and FK8SIX beacons.

In some late news the band has opened between VK6 & VK5 late in the afternoon on the 9, 10th & 11th April. On the 9th, Peter VK6KXW reported hearing the VK5VF & VK5RBV beacons and worked Brian VK5BC. Peter has now moved to the country 120 km east of Perth (grid OF87jr). On the 10th & 11th Geoff VK6HOG reported hearing both the VK5 beacons as well as the VK6RSX Dampier beacon very strongly but unfortunately no contacts were made.

Please remember to send any 6 m information to Brian VK5BC