VHF/UHF – An Expanding World

David Smith VK3HZ

Weak Signal

David Smith - VK3HZ

In late July, good propagation resulted from a high-pressure area moving slowly across the south-east of the country. Colin VK5DK submitted a timely report on some of the activity that occurred:

With the winter upon us, there is not much incentive to operate on the VHF bands, but there are regular contacts to be made for the Amateurs who are prepared to run regular scheds, mainly of a morning.

Robin VK5TN started running regular scheds at 2230 UTC with Gordon VK3EJ in Cobram on the River Murray, 480 km from Mt Gambier and was surprised at how good signals were on a regular basis. It would appear that there is a flight path which helps to enhance signals over this distance, although we are not sure whether it is a Sydney to Melbourne flight or a Melbourne to Adelaide flight, but the signals usually peak to a S9 for a short period. I have also joined in of recent times along with Owen VK5HOS and occasionally John VK5DJ joins in as well.

On Wednesday morning 24th July 2013 (23rd UTC), as predicted by the Hepburn Propagation Charts, there was a good 144 MHz band opening between stations from Gawler (VK5BC) to stations in the Launceston area (VK7XX and VK7AC), a distance of over 1000 km. Signals from both VK5BC, VK7XX and VK7AC were 5 x 9 here in Mt Gambier. During the opening VK3EJ, VK3AXH, VK5BC (144MHz and 432MHz), VK5AKK, VK5ZK, VK7XX and VK7AC were worked in Mt Gambier with all signals at 5 x 9. Later in the afternoon, Leigh VK2KRR was worked from this QTH on 144 MHz, 432 MHz and 1296 MHz, a distance of around 650 km.

The following morning Thursday 25th July (24th UTC), conditions were still very good. On the regular 2230 UTC sched with Gordon VK3EJ, signals into Mt Gambier were 5 x 9+ for the entire duration of the contacts with Robin VK5TN and I on 144.1 MHz, followed by excellent signals from Ian VK3AXH Ballarat and Rob VK3XQ in Yea. Following these contacts, Mark VK2EMA called in from Tottenham in Western NSW and had contacts with both Robin VK5TN and I on 144.1 MHz and I was able to also work Mark on 432.1 MHz although signals were dropping by the time we completed. The distance to VK2EMA from Mt Gambier is 860 km which is an excellent contact in the cold winter conditions.

Conditions are now back to the normal winter signals although regular contacts with Gordon VK3EJ are still being made at 2230 UTC each morning, including weekends.

VK5RSE 144.550, 432.550 and 1296.550 Beacons

Colin VK5DK and John VK5DJ submitted the following report on the status of the Mt Gambier beacons:

After many years of reliable operations, the three VK5RSE beacons are being retired. They have been used by many operators as a guide to propagation to the South East of South Australia and as an indicator of home station performance for others.

The old VK5RSE 144.550 beacon was reliable but its frequency did wander as a result of changing temperature inside the poorly ventilated concrete communications tank. On reaching 30deg C it was programmed to send dits to reduce the TX cycle and minimise further heating. Dits were a frequent occurrence in summer.

The 432.550MHz and 1296.550MHz beacons were added later to complement the existing 144.550MHz beacon. Russell VK3ZQB was instrumental in building these some 10 years ago and although offering better stability still relied on a crystal without an oven.

Following discussions at a South East Radio Group meeting, it was agreed to upgrade the beacons and GPS lock each. This move now enables operators to accurately calibrate their receivers on these three bands and equally importantly know where to listen when monitoring the beacon frequency.

Discussions were held with Graham VK3XDK as to whether PLLs capable of GPS locking were available for the required frequencies. Graham advised there were and that David VK3HZ would be able to write the software for the beacons to CW identify once per minute. It was possible to run the three beacons using just two boards with one being shared by 144.550 MHz (RF1) and 1296.550 MHz (RF2). Two PLL units were purchased from Graham and programmed by David with the correct data written into the PICAXE chips on the PLL PCBs. The identification for each beacon includes callsign (VK5RSE) and Grid Locator (QF02). For reference the beacon location is 140.4467E, 37.5249S or locator QF02fl just north of the small town of Mt Burr.

Both PLL boards were fitted into a shielded box to provide outputs for the three beacon frequencies. The 10 MHz input to the boards is provided by a Trimble Thunderbolt GPS. PLL outputs are around 8 to 10 dBm and are fed to separate amplifiers to increase output on all frequencies to just over 20 W.

On 144 MHz, a P.A. stage from a Philips FM828 was used to increase the output from the PLL board to around 22 W. This unit was chosen for its availability and it reliability in commercial service.

After some discussions it was decided to purchase a Mitsubishi RA30H4047M1 RF Module from Mini Kits in Adelaide for the 432 MHz amplifier. It was felt that this was the simplest way to obtain the required 25 W output required. When this module was installed, there wasn't enough RF drive to deliver 25 W so a low power module (CA4800C) was added and easily provided the necessary drive for the Mitsubishi amplifier. The CA4800C normally produces 400 mW from 10 MHz to 1000 MHz when used with a 28 V supply but when supplied with a 13.8 V supply produced around 80 mW which easily drove the final amplifier to 25 W. A low pass filter has been added to the output as specifications stated that without a filter the 2nd harmonic was only 25 dB down. The LPF ensures the 2nd harmonic is now greater than 45 dB down on the fundamental signal.

The 1296 MHz unit used is the existing P.A. from Alan VK3XPD and has been in service for some years. It was not known if there would be enough RF drive from the PLL unit (9 mW) to obtain the required 25 W output, but when tested produced just slightly more than 25 W on the Bird Thruline Wattmeter.

The 144 MHz/432 MHz beacons and the PLL units are mounted on a large heatsink obtained from a Larcan CH1 TV P.A. unit. A 12 V muffin fan running on 6 v is supplying cooling for both these P.A. units while the 1296 MHz unit is a separate unit with a cooling fan enclosed on the chassis.

Following tests at the beacon site it was discovered that the original switch mode supply powering the 1296 MHz Beacon would work only if switched on without load. A replacement power supply has been pressed into service and all tests so far indicate it will operate well with plenty of reserve capacity.

One of our main aims when the beacons were upgraded was to enable them to be remotely switched on or off. Chris VK5MC at Hatherleigh lives only 16 km from the

site on Mt Graham. Chris is a 1296 MHz EME operator and on moon rise his 10 metre dish is often pointed directly at the beacon site resulting in significant receiver overload. John VK5DJ has developed a remote control unit making use of a receiver scrounged from a WeathAlert unit and a modified VK5DJ repeater controller board using a PIC16F1827 and a MC145436 tone decoder to provide password and codes to switch any combination of the beacons. While using EME or terrestrial modes Chris will now be able to switch off a beacon if necessary.

SERG hopes that our VHF/UHF neighbours will find the new beacons even more useful than in the past. Reception reports are always appreciated and should be sent to Colin VK5DK (VK5DK@bigpond.com). With the 10GHz beacon soon to be installed at Mt Graham this will complete the beacon set in the SE of SA and provide propagation indicators and test signals on a range of frequencies.

47GHz – Finally Digital!

Dan VK2GG send in this report of his latest exploits on 47 GHz:

After many months of planning and testing, I finally got my FT-817 with XRef, my 47GHz Kuhne transverter with Kuhne PA and a half decent path to play with digital.

The Rubidiums now have LED lock indicator lights and multi-outlets, and Les VK2APE and I have been experimenting with various digital modes on both FM and USB.

The path was one I have been interested in for years – Heaton's Lookout in the Watagan State Forest to Gan Gan at Nelson Bay, north east of Newcastle. [70 odd km]

Weather was looking good, after several days of fine and sunny skies with light westerly (dry) winds; temperature on the day was 15 – 17 degrees, 55% RH with a dewpoint of 2.9.

FM voice 5 X 9, and spot-on frequency! Decoding of Olivier 8-500 was no problem; we also successfully tried BPSK-31.

Thumbs up to David VK3HZ and VK3XDK for the XRef, and thumbs up to the Kuhne PA/Preamp.

Also thanks to Peter VK2YGM and Les VK2APE/LP for their assistance.

VK4 Gone MAD

On Sunday July 28th, the Queensland group of microwave enthusiasts held another Microwave Activity Day which, despite some doubt about the weather, had a good turnout. Rex VK7MO, over on the mainland for GippsTech and other microwave missions, was a "guest participant" giving people the opportunity to work a state-of-the-art portable microwave station on 10 GHz and 24 GHz.

Doug VK4OE was one of the microwave stations involved. Last month's column covered his trials and tribulations with the Winter VHF/UHF Field Day, and the MAD effort followed similar lines:

My report from the MAD is successes and failures tantalisingly mixed together!

Some readers may recall my description of an intention back in the Winter VHF-UHF FD to go to an excellent microwave site in the Border Ranges NP, only to be confronted by a 'Road Closed' gate - most frustrating! Well, it has happened again with the next best microwave site, Springbrook, near the carpark for the "Best of All Lookout".

The locked gate/bar visible in the picture has only recently been installed preventing vehicle access to the clear North-looking place just beyond the trees. This forced my use of the 'normal' carpark which, as you'll see has many trees and shrubs around it.

I parked strategically in order to take advantage as much as possible of a small gap in the foliage, but it meant abandoning the roof-mounted 2.4 GHz array and associated M/H box. The mast with 1296, 5760 and 10368 MHz antennas was looking over some of the immediate vegetation, but the 24 GHz antenna (on tripod under the plastic rain cover) was mostly blocked.

I recorded 8 QSOs on 1296 MHz, 3 on 5760 MHz, 6 on 10368 MHz including best DX (232 km) to VK4JMC/P located at Mt Wolvi near Gympie, and 2 QSOs on 2403 MHz after I installed a tiny WiFi antenna on the branch of a shrub just outside the van window - connected only to the 1 W driver transverter.

On 3.4 GHz I had overlooked the loading of the necessary FT-817 IF transceiver (that's a different long-ish story!) and a failure of a recent modification of my 24 GHz equipment combined with the blocking foliage to 'put paid' to any thought of QSOs on that band.

It rained heavily as I was driving towards Springbrook and after I departed, but in all the time I was operating there was only one light shower of drizzle, which is different from what others were reporting.

Another interesting observation was the inability to establish 2 metres FM liaison with the team (VK4WS, VK4JMC and VK7MO/4) on Mt Wolvi. After initiating things by mobile 'phone, we ended up using 1296 MHz SSB as the gain antennas at each end on this band made up for the losses over the path, whereas the Mt Wolvi crew were out of range of the RBN repeater and 146.5 MHz just didn't make it.

I do acknowledge the need for a more organised approach to managing when folk use each band - that's the way we've done it for several earlier Microwave Activity Days, and I think it was a more thorough way of getting in touch with everyone who is 'on', compared to a 'free-for-all' approach. Nevertheless, I still had a lot of fun yesterday!

Fortunately, all may not be lost as a later update from Doug explains:

Regarding my access to the excellent sites that I have referred to, the Springbrook one may well be permanently 'lost' (sad to see after about twenty years of going there) but just yesterday I received an e-mail from the Parks Ranger for the Border

Ranges NP and he explained that they are just now waiting for a few weeks of dry weather in order to be able to bring earth moving equipment in, fix the water-damaged road, and then to open it up again. I just have to be patient ... but I wanted to go there in the low humidity months of this winter, didn't I?

Please send any Weak Signal reports to David VK3HZ

Digital DX Modes

Rex Moncur – VK7MO

6 Metre Meteor Scatter by Darrell vk2bls

June has been a good month for 6M MS on 50.230 between vk2bls, vk4wtn and vk5rm, usually starting with FSK441, then ISCAT-B and JTMS modes for 1/2 hour or so before leaving for the Saltmine.

My log has daily FSK441 qso's for almost all June with Wayne vk4wtn and Phil vk5rm. The N-S path to vk4wtn seems to be more favourable and we sometimes have FSK441 contacts in the evenings.

On 27.6.13 6M was nicely open from about 0440 to 0540 with vk4wtn 59+ on SSB for most of the time, during which we also worked RTTY and PSK31 modes for the first time on 6M.

Wayne admits being bitten by the 'Digi bug' and is also keen on HF digi modes. He is currently upgrading his tower and beam systems.

Peter vk5pj and John vk5po sometimes catch up with us on 6M FSK.

2 Metre and 70 cm Meteor Scatter by Kevin VK4UH

The month of July for Meteor Scatter operators started the slow rise out of the winter “doldrums”. The hourly rate of returns from random meteors remained low but 28-29th July brought the peak of the Southern Delta Aquarids (SDA) shower, one of the best for each year. The SDA is a slow rising shower appearing from mid-July to mid-August as the Earth passes through the clouds of debris remaining from the Marsden and Kracht comet. The “radiant” of the shower, the position in the sky where the meteors appear to originate, coincides with the star constellation of Aquarius, Delta being the closest and brightest star to the radiant. Unlike random meteor returns, which peak just before dawn, shower meteors peak with the “zenith” or highest point in the sky of the naming constellation. The Zenith Hourly Rate (ZHR), the number of visual meteors seen by an individual observer on the ground, from SDA may reach 30-60 per hour. Each meteor can be expected to provide a loud and prolonged signal return or “burn” sometimes exceeding 30 seconds on 144 MHz.

This was reflected in the excellent MS conditions reported over the weekend activity periods 26th and 27th July UTC. Still no returns from ZL at the VK4UH QTH unfortunately. The remainder of the activity periods were spent here in attempts to achieve a MS contact in JTMS with Arie VK3AMZ on 432.230 MHz.

As frequency increases the duration of received pings decreases in proportion to the square of frequency. On 70 cm therefore (3 x frequency on 144 MHz) the pings are only 1/9th duration on 2 m. The energy scattered also decreases in proportion the cube of frequency i.e. only 1/27th the signal strength or 15dB down on 2m.

Over the two days the experiments were partially successful. Two solid pings were

received and decoded here in VK4 in JTMS, which is arguably better for short duration pings than FSK441 mode. Arie VK3AMZ received a number of ultra-short pings but was only able to decode his callsign and not his reports. Although a contact was not completed, there was sufficient success to know that a QSO will be possible to achieve with more persistence in the future.

Please send any Digital DX Modes reports to Rex VK7MO

The Magic Band – 6 m DX

John McRae - VK5PO

July has been a reasonably quiet month.

On the 2nd of July, Oly, VK3XDX heard the ZL3SIX beacon with fairly low signals.

Some openings on the 10th between south east VK4 and VK7, Scott, VK4CZ heard 59+ signals from VK7DX and VK7AC.

VK8RR worked JA7PRV on CW with 559 reports on the 5th of July.

Six metres was lively on the 14th July, with many Trans-Tasman QSOs taking place.VK3GHZ had nice signals from ZL4LV, whilst VK7DX and VK3DUT made a few contacts with several ZL3 and 4 stations.

On the 16th, a few VK3 stations heard the far north Queensland beacons VK4RTL and VK4RHT.

VK3XDX worked VK4APE. VK4FP in Townsville worked JR2HCB on CW with strong signals prevalent.

Hopefully the band conditions will start to improve soon, VK2EFM had a reasonable signal from the FK8SIX/B at Noumea on the 30th of July

Alan VK4WR and Graeme VK4FI are off into the Pacific again for another go at six metres from Niue with the callsign E6RQ. Their visit is planned around the southern hemisphere E season, arriving on the island 7th December for ten days.

Equipment will be an IC-7000 and IC-706MK2 plus a solid state amplifier. Antenna is 4 elements on a 12 foot boom which will be up about 25 ft.

Operating from Niue in April 2013 produced good contacts into Japan, China, Philippines, Hawaii and Australia. Only one contact into central America was made, which was disappointing as they'd expected more in that direction.This time around they'll will be looking towards South America for the long haul plus of course VK and ZL. QSL via VK4FI

ZL2WHO six metre beacon is now back on the air, and using the original frequency of 50.024Mhz.

VK5VF is VERY low in output, it is just audible beaming direct.

Please submit reports, logs or other info you may consider useful to John VK5PO