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# VHF/UHF – An Expanding World

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David Smith VK3HZ

## Weak Signal

David Smith - VK3HZ

There has been little of note reported this month regarding propagation on the bands. It's winter and a good time to stay inside in the warmth, or in the workshop fashioning some new device in preparation for the coming season.

## GippsTech 2007

The winter lull – a good time for a technical conference and get-together, and what better than GippsTech.

The 2007 conference was run once again in Churchill over the weekend of July 7-8 and attracted over 100 attendees. Peter VK3KAI, together with the organising team from the Eastern Zone Amateur Radio Club, ensured the event ran smoothly from start to finish. The venue, provided by Monash University, and the catering, provided by the local Lions Club, were, as usual, first class. Robbie VK3EK ably piloted the Courtesy Bus, transporting people to and from their motels and then, during the day, occupying the “other halves” with tours of the local district.

Of course, there would not be a conference without the generous contributions of those who gave presentations. The general theme on Saturday was Propagation with a number of other topics as varied as Bandpass Filters and the use of Automotive Alternators for Field Day Power. On Sunday, Microwave and EME were the main subjects. During the breaks, people migrated to another area where there were several stalls selling RF and microwave items, giveaway tables and displays of numerous construction projects. At the end of proceedings, there was a monster raffle, with major prizes being an SWR meter, 23cm Power Amplifier and a nice bottle of Port (thanks!).

The other aspect to such an event is the chance to get together with those you have spoken to many times, but perhaps never met (it is rare that image of someone in the “mind's eye” matches the reality). On Friday evening, an informal get-together at the local pub provided the first opportunity to catch up. Then the Saturday night dinner was the scene of many a story over a glass of your favourite – progressing well into the night for a few who were rather bleary-eyed on the Sunday. Then it was Sunday afternoon and everyone was on their way home again – over all too quickly.

So, get out your diary and mark the weekend of July 5-6, 2008 for GippsTech 2008 – not to be missed.

## Beacons

Recently, there was unfortunate news from Mark VK5AVQ that the VK5VF beacons in Adelaide have been taken off-air.

On Saturday 23 June, the VK5 VHF/UHF beacons VK5VF fell silent, after some 44 years of operation from their Mt Lofty broadcasting site. The 52.450 MHz, 144.450 MHz, 432.450 MHz and 145.650 MHz Morse transmitters were switched off at 0215UTC and the equipment removed at the request of the national owners of the site. The 1296.450 MHz beacon has not been on air recently.

The beacons have been a reliable signal source across southern Australia since their commissioning in June 1963. Many times, they provided early warning for both ends for contacts across the Bight from VK3 to VK6. The only significant down time was following the 1983 Ash Wednesday fires.

Hopefully another suitable site will be found soon, but the current one will be a hard act to follow. For sometime now, the people involved have been looking for a new location for the Microwave beacons as all the trees have now grown back after Ash Wednesday giving poor take off to the East and South East. One of the positives from all the publicity resulting from the shutdown is that a number of opportunities have surfaced for the relocation.

Thanks to VK5ACE, VK5KK and VK5KDK and the many others who have supported the project.

## **EME**

You will see in the Digital DX Modes section that Rex VK7MO has been recently dabbling with EME on the 2.3 GHz band. What modesty has prevented him from saying is that this is the first VK EME contact on 2.3/2.4 GHz. Congratulations Rex.

Doug VK3UM reports some entertaining times recently on EME:

*For the DUBUS 2007 432MHz CW Contest, I was unfortunately unable to stay for my North American window on Saturday 24th March due to extremely high winds (> 80 kph) that came with a cold front just after I commenced operating. I had a nervous 20 minutes or so attempting to raise the dish to the parked (bird bath) position as the wind was even too strong for the two 12 ton hydraulic rams to get it past the 30 degree mark. The noise of the wind roaring through the mesh was quite alarming but the dish survival was theoretically never in doubt as the construction is designed for 125 Mph, but one never wishes to prove the point!*

*The conditions were the worst I have experienced for a very long time. Polarity was changing rapidly and over a wide range, deep fading was evident for the whole period as well. On top of all that Libration was most significant as well. It required considerable patience with the smaller stations to wait until polarisation and QSB combined favourably. There always is a threshold where signals above 4 yagis and 1 kW, for me, are normally easy to work, even under such conditions but those below that EIRP pose a challenge with my installation. I learnt later from Peter SM2CEW that there was considerable Auroral activity ... that came as no surprise! I did not get the opportunity to measure Sun noise but I would expect it to have been quite elevated.*

*I regretfully have to make mention about the lack of activity from NA (in my single window) was the worst I have seen in > 20 years. Two USA stations was a little disappointing.*

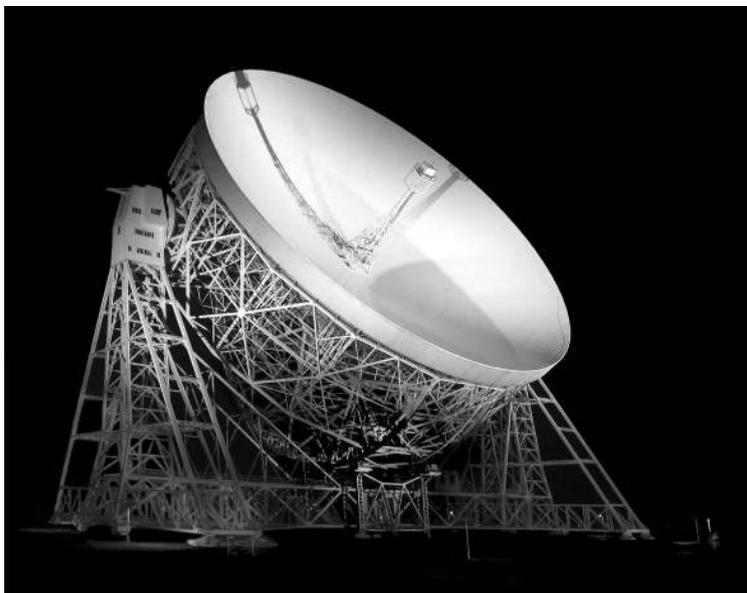
*As usual the operating procedure and patience shown by all the operators I worked was just exemplary. And thats what I enjoy most about this mode of EME, the total random nature of all QSO's, and the technical challenge of physically making the QSO's under adverse conditions with no outside electronic help. There was only one caller I failed to drag from the noise despite their persistence.*

*Final result was 30 QSO's with 27 multipliers 27 - Claimed Total Score 81,000*

*Conclusion: still very strong but US active stations diminished significantly.*

## **Lovell Telescope Festivities**

This year, the University of Manchester's Lovell Telescope is celebrating its 50th anniversary with a number of weekend festivals at the times of significant events in 1957. Details of some of the activities can be found at [www.jb.man.ac.uk/public/im/eme.html](http://www.jb.man.ac.uk/public/im/eme.html)



### **EME to the Lovell Telescope**

Over the weekend of June 16th/17th - to celebrate the first move of the telescope - the festival organisers decided to have a literary theme, sending poems to the Moon and back. However, the Observatory's policy is to be totally radio quiet, so it could only be used for the reception. Even with a 76 m antenna, it would take a fairly substantial station at the other end to allow SSB transmissions at a frequency at which the telescope could be easily equipped.

There was already a good feed system at 408 MHz which it was felt could be tuned up to 432 MHz. As 432 MHz seemed to be quite widely used by EME enthusiasts this seemed the obvious band to choose.

Doug VK3UM was one of the stations involved in the activities. The following was reported by Ian G0DMU onsite at the radio telescope:

*I was at Jodrell early on the 17th June to receive the call from Doug McArthur (VK3UM), who is celebrating his 50th year as a radio amateur, located 10 km north of Glenburn, Victoria, Australia. I believe that the Moon as seen from there was only 3 or so degrees above the horizon. Doug was using a 8.3 m Dish with 1500 watts TX power, so it was not surprising that his CW was strong and I had no difficulty in resolving his SSB signals when his Australian accent became obvious! He sent messages of congratulations several times - not all identical but this is a meld of them:*

*CQ CQ GB50EME Lovell Telescope Manchester de VK3UM Victoria Australia. This is Australia calling.*

*Congratulations on the 50th anniversary of the Lovell Telescope. We wish you many more years of further operation. 73's Doug VK3UM*

Please send any Weak Signal reports to David VK3HZ

# Digital DX Modes

Rex Moncur – VK7MO

As the digital mode JT65 relies on bandwidths or bins of 2.9 Hz, it has generally suffered if stations are not stable. The view has been that, at microwave frequencies, the frequency spreading due to libration and Doppler from the moon would rule it out for EME. Joe Taylor has included an AFC system that copes with around 20 Hz of frequency shift, providing it is reasonably consistent and the signal is a few dB above the minimum level. The JT65C version has twice the tone spacing of the JT65B version, which allows it to cope somewhat better with libration frequency spreading. All versions of JT65 still use 2.9 Hz bins, but the JT65B and C versions use algorithms to assess the likely frequency of tones using either two (JT65B) or four (JT65C) bins. This arrangement does increase the effective noise bandwidth and reduce performance by about 1 dB for JT65B and 2 dB for JT65C. The advantage of this approach is that tones can be shifted up to two bins or 6 Hz either way on JT65C and still be identified in their correct bin. JT65 also uses a heavily redundant forward error correcting code such that if a number of tones go outside their correct group of bins, it can still recover a message accurately.

Despite these advances, the prevailing view was initially that JT65 started to fall off in performance at 432 MHz and was unlikely to be useful at much higher frequencies. Over the last two years it has been found that, in most cases, the limitation is not libration or Doppler shift from the moon but the stability of amateur rigs. As stability has been improved, it has been found that JT65 works very well on 432 MHz and in the last 12 months QRP (5 watt) contacts (VK7MO to VK4AFL) have been achieved on 1296 MHz. Recently, the first 2300 MHz JT65 QSO was reported between W5LUA and WW2R. Following this Rex VK7MO (2.3 metre dish) conducted one-way experiments with Sergei RW3BP (3 metre dish) who copied his 2301.965 MHz JT65C signal in Moscow at 3 watts. The key to this improvement is that both stations were GPS locked. At 100 watts, Sergei could not copy CW confirming that JT65 maintains around 13 to 14 dB advantage over CW – something that applies from VHF up at least to 2300 MHz. At 2300 MHz Doppler shifts can be 10 Hz or more during a JT65 transmission, which means it is starting to be at the limit of AFC. Thus future extensions of JT65 to even higher frequencies are likely to depend on some means of automatic correction for Doppler Shift. Also, libration frequency spreading will undoubtedly become the limiting factor at some stage but it seems, because of the forward error correction code, this will be well above 2300 MHz. Thus there is still plenty of potential to extend the use of JT65 to even higher frequencies.

Following the tests reported above, a two-way QSO was completed with Jan and Vladimir, OK1KIR, who uses a 4.5 metre dish and VK7MO with a 2.3 metre dish. Due to frequency instability at OK1KIR's end, it was generally not possible to achieve JT65 decodes, but by waiting long enough for his rig to by chance give less than 25 Hz drift in a transmission, a single decode was obtained. Then a QSO was completed using the shorthand messages, which even with drift can be readily read from a waterfall display. Encouraged by this, Jan borrowed a high stability HP signal generator and a QSO was easily completed with perfect copy for more than an hour, thus confirming that the secret to using JT65 at the microwave bands is frequency stability.

Now that small station EME is possible at 2300 MHz, some consideration needs to be given to frequency allocations. The USA operate on 2304 MHz, Europe on 2320 MHz with Japan up on 2424 MHz. While we have access to 2424 MHz in VK it has become almost useless in city areas due to computer wireless links and other uses. However, we still have a 2 MHz segment between 2300 and 2302 MHz. While it is

not in accordance with their bandplans, the USA and many European countries can operate down to 2300 MHz. However, as international stations will have to tune away from 2304 MHz it is best to use the highest part of our 2 MHz segment. Until practice shows otherwise, suggested arrangements are:

- 2301.900 to 2301.950 CW,
- 2301.950 to 2302.000 JT65 with 2301.965 being the JT65 focus frequency

This arrangement is consistent with practice on 1296 MHz where arrangements are:

- 1296.000 to 1296.050 CW,
- 1296.050 to 1296.100 JT65 with 1296.065 being the JT65 focus frequency

Please send any Digital DX Modes reports to Rex VK7MO

## The Magic Band – 6 m DX

Brian Cleland – VK5BC

The expected winter Sporadic E season proved to be a fizzer with very few openings in June. The openings that did occur were in general not of long duration with poor signal strengths and QSB.

John VK4FNQ in Charters Towers reported conditions were very poor in June with very few openings logging only the following contacts:-

19th June; Rod VK3TG (Kyneton) & Kevin VK3WN (Ballarat) both with heavy QSB  
25th June; Rob VK3XQ, Alex VK5ALX (Whyalla) & Col VK5RO (Adelaide).

John also reports hearing the following beacons:-

19th June VK5RBV (Barossa) 559, VK5VF (Adelaide) 419  
20th June VK5RBV 419  
25th June VK3RMV (Wannon) 519, VK5RBV 519, VK2RHV (Hunter Valley) 529 & VK2RSY (Sydney) 419.

Kevin VK4BPK in Mackay faired a little better, using an IC-706MK IIG, 100 watts & a 3 element home brew yagi reports working the following:-

24th June Rob VK3XQ 4/3,  
25th June Rob VK3XQ 5/7, John VK2BHO 5/4 & Rod VK3TG 4/1,  
30th June Brian VK5BC 5/7,  
2nd July Rob VK3XQ 5/3, John VK2BHO 5/8  
4th July Rob VK1ZQR 5/1, Rob VK3XQ 5/2,  
8th July Paul VK2YVG 5/5, Norm VK3DUT 5/6, Brian VK5BC 5/9+ & Rob VK3XQ 5/7.

Andru VK4KAY also in Mackay reports that they had their coldest and wettest June on record. Andru says “Band conditions reflected the misery of the weather with no openings recorded from 1/6/07 through to 23/06/07, all very quiet. There seemed to be a pattern to 6 m openings up to the beginning of June. Andru at work – 6 m opens, Andru at home – 6 m closed.

However the weather patterns changed around this 23rd June and I have recorded the following in my log.”

24th June – 6 m opening late in the afternoon! Around 5 pm. Could hear the 10 m VK3 beacon mobile. I could hear VK2 and VK3 stations talking on 50.110 while mobile in the truck - however couldn't get signals strong enough to make any contacts. The opening lasted about 1 hour.

30th June - could hear the VK3 and VK5 beacons on 10 m sometime after lunchtime.

Was mobile at the time in the truck. Called 50.110 for about 0.5 hours with no answer, however later in the afternoon Kevin VK4BKP did make some contacts.

8th July. Around 1.15pm could hear VK TV carrier 46.240 around S1 and VK TV carrier 57.250 also around S1. Picked up the VK5RBV beacon on 50.315 within 5 minutes or so at 5/0, but disappeared within 20 minutes, 2 pm 50.130 VK5BC up to 5/5 - easy contact with QSB but signal audible at all times, 2.15 pm 50.110 VK3XQ up to 5/0 - signal marginal using phone. Heard Rob on CW around 50.1095 coming through 5/2, good solid signal and gave him a call to let him know that I could hear his CW. 2.20 pm VKTV Ch1 57.260 came up to about S3 and soon after VKTV CH2 62.250 up to S1, Signals stayed around for about 30 mins and then faded out, unfortunately no other stations heard.

On 23rd June Dave VK5/SWL reported hearing Norm VK3DUT 5/5 with QSB working Bob VK3AJN as well as the Sydney VK2RSY beacon. Norm VK3DUT also reported the VK5RBV Barossa beacon at 559.

The best opening for June occurred on the 24th June with the band open from VK4 (Brisbane to Mackay) to VK2, VK3 & VK5. Wayne VK4WS & Adam VK4CP were in the thick of the action working many stations including VK5's ZLX, ADO, KBR, VK2's ADB & FHN, and VK3's XQ & DUT. Peter VK5ZLX also worked Trevor VK4AFL, Rob VK4TWR Gladstone & VK4CRO.

Rod ZL3NW near Christchurch reported hearing the VK2RHV Hunter Valley, VK2RSY Sydney & VK7RST Hobart beacons on the 28th June. At the same time the Hunter Valley beacon was audible in VK5.

30th June Brian VK5BC found both the Townsville VK4RTL & Alice Springs VK8RAS beacons were audible and on calling north worked Jeff VK8GF Alice Springs & Kevin VK4BPK Mackay.

On the 5th July both the Sydney VK2RSY & Hunter Valley VK2RHV beacons were audible in VK5 and on the 8th July Scott VK4CZ Brisbane reported hearing both VK7RST & VK7RAE beacons and working Rob VK3XQ 5/4.

Please send any 6 m information to Brian VK5BC