
VHF/UHF – An Expanding World

David Smith VK3HZ

Weak Signal

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It's great to see our newest arrivals to amateur radio taking a keen interest in weak signal VHF/UHF operation. One such person is 14-year-old Tom VK4FTDX located at Glendon, about 180 km west of McKay. Tom is running an IC-706 to a 12-element homebrew wide-spaced yagi up about 13 m.

On the morning of July 31st, conditions were very good in his area and at around 6.30am he heard the Toowoomba beacon (716 km) on 144.440 MHz at S9+30 dB. On 2 m, he managed to work VK4TZL (5/5, 688 km), VK4JMC (5/9+, 827 km), VK4AFL (5/9, 854 km), VK4KDD (5/3, 845 km) and VK4ARN (5/6, 871 km). Well done Tom, and keep up the good work.

On August 10th, favourable weather conditions produced some good propagation across the southern part of the country. Ron VK3AFW in Melbourne reports:

Usually we associate mid winter troppo with inland DX, but this morning we had summer-like conditions in the SE. I noted that I could work the Mt William 2 m repeater in central-west Victoria, something that occurs reasonably regularly, but then Jim, VK3II, reported that Phil, VK5AKK, was calling CQ on 144.200 a few minutes before 9:00 am local. I swung the beam and asked Phil to QSY to 144.180. Phil peaked 5x9 but there was noticeable QSB. He gave me 5x7. John, VK3ACA, also worked Phil and Ken, VK3ALA, in Jindivik, Gippsland was copying Phil but wasn't able to get a clear channel and complete the QSO. I announced I was going to 144.1 where I worked Brian, VK5UBC in Gawler at 4x1 - he gave me 5x1. Gary, VK5ZK, in Goolwa then called me and his signal was easy copy although not getting above S2. I didn't hear any one else. Fred, VK3AZG copied Phil with his beam NE but had no copy of Brian or Gary with his beam West North West. That's not his best direction. A check of the beacons showed the 2 m VK5VF beacon at a steady 5x1 with little QSB. Channel 5A sound from Mt Dundas very strong. A high of 1031 mB and Hepburn says fair to moderate across the path.

Thanks for that, Ron. Brian VK5UBC also had some good contacts that morning:

I managed to work the following on 2m SSB: VK2KRR (5/7, 760km), VK2EMA (5/1, 840 km), VK3II (5/5, 730 km), VK3ATS (5/9, 300 km), VK3LY (5/7, 328 km), VK5DK (5/9, 400 km) and VK3AFW (5/1, 660 km). On 70 cm, I worked VK3ATS (5/7, 300 km) and VK5DK (5/7, 400 km). Also was able to work several interstate repeaters with good contacts on Mt Macedon and Albury/Wondonga 2 m repeaters.

New Microwave ATV Records

On Saturday August 5, Nick VK2ZTY and Jack VK2TRF completed a record 195.2 km 2415 MHz ATV QSO. Nick was located on Mt Nardi, north of Lismore and Jack, with Dan VK2GG, were at a point about 40 km west of Dorrigo near Ebor. Nick used 25 W into a 22 dB gridpack antenna while Jack had 18 W into an identical antenna. Picture quality at both ends was P5++ meaning no noise or interference at all.

Two days later, Jack travelled to Mt Nardi with his 10 GHz gear and Dan was joined by Gary VK2UNI. After waiting most of the day for rain to clear along the path (10GHz doesn't like getting wet on a direct path), contact was made just before 4pm. A two-way QSO was completed with P4 signals at the Mt Nardi end and P3 signals at the Dorrigo end. Dan used a 1.2m dish for receive while Jack used a 1 W transmitter

into a 17 dB horn about 7.5 cm across. Dan then fired up his 200 mW transmitter into his 60 cm dish and Jack received the signals on another 17 dB horn. Both systems were on 10236MHz. The path was 194.4 Km as Jack had to descend the mountain to avoid some trees which are impervious to 10GHz.

Both of these contacts are, as yet, unofficial VK records.

EME

Hot on the heels of the news in July's column of Alan VK3XPD completing the first VK EME contact on 5.7 GHz, another VK3 has now become active on 5.7 GHz EME after a lot of work. Charlie VK3NX reports:

Having spent the better part of 18 months trying to perfect my "QRP " setup on 5.7 GHz along with a QTH move etc., I finally had the very encouraging result in the first week of August of hearing my own echoes on 5.7 GHz EME. Hot on the heels of Alan VK3XPD, who became the first VK to establish a 5.7 GHz QSO on the EME path, on the 10th August I had the very rewarding experience of completing a QSO with the OK1KIR team. Signal reports were a very "easy" O report both ways. The QSO took 15 minutes to complete and it was a challenge tracking the moon, doppler shift, and conducting a CW contact all at once with very little margin for error! Nonetheless, after many trials and tribulations, I was pleased to make the QSO with my first attempt at the new QTH and with the new setup. The circular feed on this band made all the difference, compared with previously failed attempts running linear polarisation, as the European stations on this band are all running CP. (Fading seemed to be non-existent, however a 15 min QSO is no real indicator). Equipment at VK3NX consists of all homebrew equipment: using an N1BWT-design transverter, numerous PA stages to arrive at 20 W at the feed point, approx 0.7 dB NF 30 dB gain LNA followed by another LNA prior to mixer. Dish is 3.7 m. Feed is VE4MA with "circular polarising screws" with actuator drive for both azimuth and elevation. Control is via PICAXE-based software. Moon tracking is via a logarithmic detector (operating on a sub receiver channel on 144 MHz) to track moon noise. 2 m IF driver is an IC746. I hope to continue on 5.7 GHz EME with a number of "improvements", until all possible QSO partners have been exhausted.



Charlie VK3NX's 3.7 m EME Dish looking towards the moon

Birthday Greetings

Finally, one of our most well respected VHF DX operators celebrated his 95th birthday on August 11th. Wally Green VK6WG in Albany is one of the most active VHF DX operators on the VK6 south coast and is usually worked at least once during the summer months by stations in the eastern states.

Wally still holds the Australian records for 1296 MHz (2455 km), 2.4 GHz (1885 km) and 3.3 GHz (1885 km).

Everyone in the east hopes to hear Wally's signals again soon.

(Thanks to Leigh VK2KRR and Wally VK6KZ for that information).

Please send any Weak Signal reports to David VK3HZ.

Digital DX Modes

Rex Moncur – VK7MO

Joe Taylor K1JT has released a new version of WSJT - version 5.9.5 - which is available from his web site at <http://pulsar.princeton.edu/~joe/K1JT/>. He has also released a new "User's Guide and Reference Manual" which is available from the same site. The most important features of the new version are a dramatic reduction in false decodes and an improved AFC and Sync system for JT65c, that allows the program to cope better with frequency drift and libration effects on 1296 MHz. VK4AFL (3.7 meter dish) and VK7MO (2.3 meter dish) have found that through the use of the new version they have been able to complete 1296 MHz EME contacts at

10 watts whereas they previously required 20 watts. Decodes have also been achieved both ways at 5 watts.

There has been one important operational change. With previous versions, it was general practice in VK use the second TX line and replace the grid square with a dB level report such as in the following format:

VK7MO VK4AFL -27 OOO

It appears that overseas practice was to send either the -27 report or OOO report but not both. Unlike the old version, the new version does not respond to messages with both systems of reporting which has trapped a number of us in VK. With new version you can use either reporting system but not both – thus the options are:

VK7MO VK4AFL -27

VK7MO VK4AFL QG62 OOO

Trevor VK4AFL reports, “With the new version I have not received one false decode in a few hours of operating QRP EME but when I once reverted to the previous version I immediately encountered false decodes”. The improvement in false decodes is very impressive. But it is first useful to explain that there are two types of false decodes as follows:

1. False Positives: These occur when you receive a message (eg callsign or signal report) from the station you are working in error and thus you might believe you have completed a QSO but it would be invalid.
2. False Negatives: These are when you see an odd callsign which is easy to recognise as being false. These do not lead to invalid QSOs because if you call them they will not respond and if you see them later in a QSO you just reject them.

In practice it is the False Negatives that dominate and, while these can be annoying, one needs to be aware that they do not lead to invalid QSOs. We are faced with the conundrum that it is the False Negatives that you see – but these don't matter – but it is the False Positives that you are not aware of – that do matter. The way to get a handle on the False Positives is to do simulation tests by looking for a particular callsign, that is not being transmitted, as an indicator of the rate of False Positive Errors. For example, I look for the callsign VK3AYH (which I include in the call.txt file) as indicator of False Positives when the message being transmitted is to VK3AXH.

I have done simulation tests under worst case conditions designed to stimulate the maximum number of false decodes. These worst case conditions are with the signal at -29 dB, and the program set to “aggressive”, “exhaustive”, “sync” = 0 and “freeze/tolerance” disabled and with the Deep Search decoder using the full call.txt list of 4720 callsigns. With the Version, 5.9.4, I found the rate of false decodes was almost 50% under these extreme settings, but of these only 0.01% were False Positives that could lead to an invalid QSO. The False Positive error rates increase by a factor of about 10 to around 0.1% when “Sked” was enabled.

With the new version, the rate of false decodes dropped to 0.3% and the error rate for False Positives is so small that I could not find one. From tests on the earlier version it was found that the rate of False Positives could be derived from the false decodes divided by the random chance that the expected message would be found on the list. If this also applies to the new version, as one would expect, the error rate for False Positives would drop to around 0.0001%. As for the earlier version I would expect this error rate to increase by a factor of about 10 if “Sked” is enabled.

Now I qualify this by saying that all the above tests were with white noise and the rates will increase under “on-air” conditions with birdies and interfering signals. While

it is early days and I have completed only about 15 hours on air testing I have not seen one false decode with the new version.

In an attempt to stimulate the rate of False Decodes in the “Real World” situation I have left the program running for almost two days on 144 MHz with the antenna beaming over the CBD of Hobart to produce lots of birdies and rubbish. I again used the extreme settings with sync set to 0 so it gains sync almost every time from the Hobart “rubbish” and attempts a decode from this “rubbish”. I used two receiving computers, one set to Sked and the other using the full call.txt list of 4720 callsigns. The one set to Sked gave no False Positives in some 40 hours of testing. The one set to the full list gave an increased False Positive Error Rate of 0.0006%. While I would need a lot more data it seems reasonable to assume the rate for Sked would again be around 10 times higher at around 0.006%.

As the error rates measured above are for individual decodes and at least four messages must be exchanged the actual error rate could be four times higher if these worst-case conditions pertained for every message of the QSO. However, with typical QSB this is extremely unlikely and a doubling of the error rates is a more reasonable, but still conservative, figure in practice for a complete QSO. Based on doubling of the individual error rates the Table below gives an indicative percentage level of confidence one can have with JT65 QSOs in marginal conditions where all extreme setting are used.

Version	Country Environment on 144 MHz or City on 1296 MHz, No birdies	City Environment on 144 MHz With birdies and “Rubbish”
5.9.4 Sked enabled	99.8 %	98 %
5.9.4 Full call.txt file	99.98 %	99.8 %
5.9.5 Sked enabled	99.998 %	99.98 %
5.9.6 Full call.txt file	99.9998 %	99.998 %

The figures in this table are based on extreme settings designed to “stress test” the program to its limit and are thus very conservative. Error rates will be much lower if one, for example, sets sync to 1 as recommended by the program’s Author or if the signal is slightly stronger than -29 dB.

I suspect most people would consider that even 98% confidence, with the old version in a noisy environment with sked enabled was acceptable. However, some have had a concern when they saw False decodes of the False Negative type even though these were readily rejected. The substantial improvement with the new version should allay any lingering fears.

Please send any Digital DX Modes reports to Rex VK7MO

The Magic Band – 6 m DX

Brian Cleland – VK5UBC

Not a lot of activity on 6m during the July period with only a few sporadic E openings.

On 18th July, Wayne VK4WS worked VK3’s VG, DUT, WN, XQ and VK5UBC.

The afternoon of 1st August, the band was open for several hours covering a large area of the eastern states and SA with John VK4FNQ Charters Towers in Northern Queensland having several contacts into VK2, 3 & 5 and Brian VK5UBC into VK2 & 4.

On 2nd August, an opening occurred between VK4 (Sunshine Coast area) and VK5 with VK5AKM and VK5UBC working VK4's ID, AHW, ADM & CWJ.

Noel VK3FI (VK3FGN) advises that the Mildura 6 m beacon is still operational using the callsign VK3FGN on 52.438Mhz, however it is only running low power of about 3 watts into a J pole at about 15 feet on top of a communications building in Mildura. It is hoped that the Mildura site will be a temporary situation if the antenna at the old location on the Merbein water tower can be repaired.

There should be some big signals out of the Launceston area this summer. Joe VK7JG advised that, because the rotator could not handle the wind loading, he has replaced his 9-element 2WL 6 m beam with a 7-element M2JHV which is about 8 feet shorter for only a loss of 1 dB and half the wind loading. Since erecting the aerial, Joe has worked VK4BT and VK4ADM on 3/7/06 and VK4CZ and VK4DMI on 23/7/06. Norm VK7AC is now the owner of Joe's old antenna. Meanwhile Karl VK7HDX is building a 6 m Moxon antenna. It will be interesting to see how it performs.



**Joe's VK7JG's Antennas - from top, 2m 12 el, 28 el 70cm, 2m 12 el, 7el M2JHV
6m**



Norm VK7AC's Antennas - from top, 18el 2m, 9el 6m, 3el StepIR

Peter VK5ZLX in the Barossa Valley is gradually erecting his antennas on a newly erected tower. To date Peter has got his 2m & 70cm antennas up and shortly will be erecting his 9el M2 6m beam which he used with great success in Alice Springs.

Please remember to send any 6 m information to Brian VK5UBC