
VHF/UHF – An Expanding World

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Digital DX Modes

Rex Moncur – VK7MO

Iceland on 2 metres EME

Ian, VK3AXH reports working Benni, TF3CY in Iceland on 2 metres on 6 August and later Phil, VK4CDI and Wayne, VK5APN also worked Benni in Iceland. Benni gave Ian -26 dB and Ian gave Benni -16 dB. This is believed to be the first VK to Iceland 2 metre contact.

Reduced Radiosonde data across the Great Australian Bight

Radiosonde data is extremely useful for understanding long distance VHF to Microwave propagation across the Bight. This data can be obtained from the University of Wyoming site (<http://weather.uwyo.edu/upperair/sounding.html>) and dropped into a spreadsheet to produce graphs of the radio refractive index to identify ducts (copy of spreadsheet at <http://www.vk3hz.net/Esperance.xls>). An example of a duct, as processed on this spreadsheet, that produced the 10 GHz World record between VK6DZ and VK7MO was shown in AR of March 2015 page 21. Unfortunately, the Bureau of Meteorology is closing some radiosonde stations and many do not now operate on a daily basis as in the past. The Bureau has provided the following information on the current program for the collection of radiosonde data across the Bight, but also advised that this program will vary according to staffing levels and program requirements. The Bureau also advised that Mt Gambier and Eucla no longer perform radiosonde flights.

		Sun	Mon	Tues	Wed	Thur	Fri	Sat
Albany	2315 Z	Yes		Yes		Yes		Yes
Esperance	2315 Z		Yes		Yes	Yes	Yes	
Ceduna	2315 Z			Yes				
Adelaide	2315 Z & 1115 Z	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Melbourne	2315 Z & 1115 Z	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Fig 1: Radiosonde program for stations across the Great Australian Bight

DL0SHF 10 GHz EME Beacon

This beacon normally runs 40 watts to a 8 metre dish (Fig 2) with JT4g on even minutes. It is located at JO54cg in Germany and operates on a nominal frequency of 10368.025 (although in recent tests it was 900 Hz low). It starts transmitting when the moon's elevation at JO54cg is clear above the horizon at about 6 degrees. When it first became operational about 2 years ago, signals were very weak in VK on VK7MO's 77 cm dish and while sync could be detected it was not possible to achieve a decode. There was at that time a problem with tracking. Recent tests (Fig 3) have shown that it can now be easily copied with a 77 cm dish with around 8 dB to spare. Thus it should be readily copied with small 40 to 60 cm dishes as are typically used for terrestrial work. One issue is that to receive it in VK we need to use vertical polarization so you might need to rotate your system 90 degrees using a right angle bracket (example of VK7MO's 77 cm dish rotated by 90 degrees at Fig 4).



Fig 2: DL0SHF beacon dish with Per, DL7LG

2238	-9	3.03	982	*	DL0SHF 38TON	*	A
2240	-9	3.03	984	*	DL0SHF 40KUR	*	A
2242	-8	3.03	984	*	DL0SHF 42JOC	*	A
2244	-8	3.03	984	*	DL0SHF 44PYN	*	A
2246	-8	3.03	984	*	DL0SHF 46TEN	*	A
2248	-8	3.03	984	*	DL0SHF 48WYM	*	A
2250	-8	3.03	984	*	DL0SHF 50BUZ	*	A
2252	-8	3.03	984	*	DL0SHF 52RAD	*	A
2254	-8	3.03	982	*	DL0SHF 54RON	*	A
2256	-8	3.03	982	*	DL0SHF 56TUC	*	A
2258	-8	3.03	984	*	DL0SHF 58ROM	*	A
2300	-8	3.03	987	*	DL0SHF 00HUF	*	A
2302	-8	3.03	987	*	DL0SHF 02FOD	*	A

Fig 3: Examples of beacon signals received on VK7MO's 77 cm dish

The typical signal level of -8 to -9 dB would allow around 8 dB to spare to achieve decodes on the Convolution Decoder and more than 12 dB in reserve to achieve sync. This would suggest that under good conditions the beacon could be copied with a dish of around half the size or about 40 cm. Note that there is a random 5 character group of letters and numbers after the callsign which can be used to confirm reports of reception of the beacon. The DT in this case was 3.03 seconds compared to a Moon delay of around 2.55 seconds so there might be an error in the timing on the beacon. In the above example the receiver was corrected for Doppler using WSJT-X r5604. This is available from G3WDG's web site at:

<https://drive.google.com/file/d/0B116lwQIUFNTV1NIRnpZeHY3a2s/view?usp=sharing>



Fig 4: VK7MO's 77 cm dish and system rotated to Vertical Polarization to receive DL0SHF beacon

Please send any Digital DX Modes reports to Rex VK7MO

Meteor Scatter

Dr Kevin Johnston – VK4UH

The Perseids Meteor Shower came and went on 13 August. This is a major Meteor Shower and produces some of the best MS activity of the year – but only if you live in the northern hemisphere.

Although having a ZHR often exceeding 100 / hour, the shower only just “peeks” over the northern horizon even here in VK4. At this QTH (QG62kp), there was some brief enhancement of pings from the two northern VK 6 m repeaters during the peak but no QSO eventuated. Currently there are few regularly active MS stations on from FNQ.

This month I intend to focus 6 m Meteor Scatter, an area of activity where there seems to be rapidly increasing interest. With meteor scatter propagation at its annual minimum for the year, 2 m MS contacts have been difficult to complete even during the pre-dawn peak. I suspect many operators have elected to stay in bed rather than brave the cold shack for the normal weekend activity sessions. At the

same time “more traditional” propagation modes on 6 m have also been suffering the “winter blues”. Over the last month or so there has been an upsurge in 6 m digital MS activity on Saturday and Sunday mornings as a number of established stations have moved down from 2 m. See Fig 1 below. At the same time a number of new (to MS) calls have been appearing with stations taking advantage of the only propagation mode still giving QSOs on the otherwise dead band.

As has been discussed here previously, as frequency gets lower and wavelengths longer then meteor pings tend to become both “longer” in duration and “louder” in signal strength. On mornings when meteor pings on 2 m are infrequent, brief and faint, making contacts very hard to achieve, the corresponding returns on 6 m may still be very usable and QSOs easy even with modest equipment, power levels and antenna systems. Further the “usable” peak of meteor returns, which in generally deteriorates rapidly after dawn on 2 m, appears to extend well into daylight on 6 m.



Fig 1. 6 m MS completions August 8, 2015

Last month I reported on attempts to cross the Tasman on 6 m MS between stations in VK4 and VK2 across to ZL. Scott VK4CZ (QG62lp) reported partial success between his QTH and Bob ZL1RS (RF64vs) at 2170 Km and with Mark ZL2WHO (RE79tp) at 2541Km. My understanding though is that although pings have been decoded in both directions, successful completion to VK4 is still awaited.

From further south however the gap has been bridged. The following report was received from Norm VK3DUT (QF32vf) at Johnsonville near Lake Entrance:

I completed a 6 m MS contact with Bob ZL3TY on 13/08/15 @ 2035 UTC, 2050 km and with Peter ZL4LV on 22/08/15 @ 2008 UTC, 2076 km. I have also decoded CQ's from Roger ZL3RC, 2165 km and Rod ZL3NW, 2180 km but they have yet to see me, Peter and I have had decodes previously but had not completed. Bob also had decoded me during the previous week but was not tx'ing at that time. I think we're already stretching the limit and this needs patience and dedication but the end result can be very satisfying! I guess the next challenge would be to make it to ZL1 and ZL2 where the distances are even greater.

At his station Norm says he runs an old FT690R Mk1 with 120 watts to a bay of 4 x 7-element home-brew quads at about 50'.

Thanks also to Cliff VK2NP (ex VK2CJJ) QF56ma in Sydney who sent in a receive-only report of multiple successful decodes of my 6 m signals, at good signal strengths, using only a quarter-wave vertical antenna at his QTH. Being cross-polarised to me and at the relatively short distance of only 756 km, this is a great result and shows how simple 6 m MS can be.

Also demonstrating the rising interest in 6 m MS, a thread appeared in July on the VK Logger Discussion Forum under the Meteor Scatter heading entitled "6 m Meteor Scatter for Standard Calls" originated by Col VK4MIL in Brisbane. Under the current frequency allocations, the recent general release of frequencies between 50 and 52 MHz was only extended to Advanced Licence holders. Standard Calls at the present time are restricted to frequencies above 52 MHz. Whilst Standard calls are licensed for digital operation, including FSK441, until the much anticipated relaxation of the 52 MHz restriction is lifted then they are unable to join the activity on 50.230, the main focus frequency for VK 6 m MS. There is nothing of course to stop Standard Calls using digital MS higher in the band. The main theme of the Forum thread was therefore to promote activity on 52.230 FSK441 as an alternative to the standard focus frequency at 50.230 MHz. The thread stirred up significant interest amongst standard and advanced calls alike and much discussion has occurred about how to get antennas to work effectively across both parts of 6 m. Col VK4MIL also reported successful completion of MS contacts with Darrell VK2BLS on the higher frequency using a simple home-brewed 2-element Moxon antenna scaled to 52 MHz. I would encourage everyone to have a look at Col's thread on the Forum under Meteor Scatter.

The appearance of many new callsigns on 6 m Meteor Scatter is very welcome. Over that last few months there appears to be a "de facto" parallel activity session running on 50.230 MHz alongside the well-established 144.230 MHz activity. Many operators are clearly switching between the two focus frequencies, as conditions change, some appear to be operational on both simultaneously.

Like any new mode there is a learning curve to negotiate when starting out with digital MS in terms of driving the software, formatting the reports and exchanges etc. and with following the expected operating protocols. Earlier this year I published a short article in AR entitled "Surviving your first Meteor Scatter Contact". Intended for newcomers to MS it laid out the normal operating practices used here in VK and ZL including exchange and report structure, operating frequencies and times and transmissions times etc. The why, when, where and how to get going on MS. I would encourage anyone starting out or thinking of doing so to have a look at this guide. One common area of confusion is around which transmission "period" should be used. In FSK441 mode, each minute is divided into two transmitting periods. The first period runs from the top of the minute (0 seconds) to 30 seconds. The second period then runs from 30 seconds back up to 60 seconds. Each station transmits in one period and receives during the other. Obviously stations at alternate ends of a path must be operating in opposite periods otherwise contacts are impossible. Bear in mind however that during the activity sessions there will be many stations all sharing the same frequency, half transmitting and half receiving, all at the same time. If one station transmits out of order then that station will obliterate reception to all other stations who are in direct range. To make it all work therefore there is an established protocol in VK for selecting the correct transmission period. This is intended to maximise the chances of everyone making QSOs and minimising the possibility of causing QRM to others. Obviously as a licensed operator we can transmit where and when we choose. We could all legally have a simplex QSO on the input of a repeater, could transmit on a satellite downlink or use SSB in a CW

section of the band. But generally we wouldn't do that. We have agreed band-plans to guide our operating so as to maximise everyone's enjoyment of the hobby. Period selection is like a band plan. I would encourage all operators, new and not-so-new to review and follow these protocols to make sure we all remain "on the same page".

So in essence, during the Saturday and Sunday morning VK MS activity sessions on 144.230 MHz and 50.230 MHz, there is an established practice for selecting the transmitting period in FSK441 mode:

- Stations in the southern call areas VK3, VK7 and VK5 ALWAYS run 1st period and beam North
- Stations in the northern call areas VK4 and VK8 ALWAYS run 2nd period and beam South

- Stations in the middle call areas VK1 VK2 CHANGE periods depending on the day.
 - During the Saturday sessions they run 2nd period and beam South
 - During the Sunday sessions they run 1st period and beam North

This allows most stations to work most paths.

So if it's Saturday and you are in Canberra and want to work a station you know is on-air in Brisbane how do you do it. The answer is you can't. At least you shouldn't during that activity session, on that calling frequency. You have to wait till the Sunday. Were you to try and use 1st period on the Saturday then you would probably cause QRM to most other Canberra and Sydney stations on air with you, and would be unlikely to hear VK4 anyway as you would be drowned out by direct continuous signals from your own area.

How would you work from VK7 to VK3 or VK2 to VK1? Again you can never realistically try to do this during a normal weekend activity session without risking interfering with all your neighbours. At that distance you are likely to be able to make direct contact anyway. Bear in mind, if anyone wants to set up a sked to try such paths then this can be done outside of the activity session times, which only run for a few hours each week, or on another frequency e.g. 144.330 and 50.330 which are used as secondary MS focus frequencies.

The protocols are fairly well adhered to on the 2 m MS nets and I would encourage, indeed plead with all stations to follow the same practices on 6 m now that the activity levels are increasing on that band.

The next significant meteor showers on the calendar are the Orionids expected to peak around the 22nd October (ZHR 25/hr) followed by the Leonids (ZHR 20/hr) expected to peak around 18th November.

Finally this month. I have an ad-hoc e-mail list running where I can rapidly distribute notifications of expected activities or meteor showers and other news around the group of regular MS operators in VK and ZL. If you would like to be included on that mailing list please drop me an e-mail to the address below and I will add your address to the list.

Please send any reports, questions or enquiries about Meteor Scatter in general or the digital modes used to Kevin VK4UH