

Spinifex and dust storms

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Introduction

Back in October 2008, I decided to take a drive to South Australia and, through the serendipitous assistance of a number of VK5 operators, found myself at the top of Mount Arden, near Quorn, in the southern Flinders Ranges.

I'd taken gear for 144, 432 and 1296 MHz, and the enjoyable experience of that trip was described in an article that appeared in the December 2008 edition of AR - but, as suggested in that article, I felt I had unfinished business back on Mount Arden...

This stemmed from a near contact with David Smith VK3HZ, on the 2 metre band. David had been able to observe an aircraft flying from Sydney to Adelaide, and as it crossed over the path between our two stations, David's signals rose up out of the noise floor - a clear case of Aircraft Enhanced Propagation (AEP). Whilst David was relatively easy to hear, he couldn't hear enough of me for a complete contact.

The Objective

I strongly felt it would be worthwhile having a second attempt at working via AEP back into the Melbourne area, considering I now had access to various aircraft-position monitoring aids and could take advantage of regular flights on an established route.

Aircraft Enhanced Propagation

Aircraft Enhanced Propagation is a well documented phenomenon. Seven articles discussing AEP, by several authors, appeared in AR between 1985 and 1989; David, VK3HZ, has collected together copies of all these articles and made them viewable in PDF form at <http://www.vk3hz.net/ae.htm>. Also stored there are copies of Rex Moncur's VK7MO GippsTech 2000 presentation, and Guy Fletcher's VK2KU explanatory note on the mechanism.



Photo 2: Adrienne's open air office.



Photo 1: Saturday morning - the author starting the generator.

mathematics that crops up in the earlier articles.

In short, VHF/UHF propagation can be expected over non-line-of-sight paths of (theoretically) up to 950 km, with aircraft flying above 37,000 feet. This assumes that the aircraft is mutually visible to both stations - a low, unobstructed horizon naturally helps here. Without mutual visibility, you have nothing!

The path between my site at Mount Arden and the QTH of VK3HZ, for example, comes in at 903 km, give or take a metre. I have made AEP contacts over this sort of distance before, as have others.

Proof of the theory

Further encouragement came when I worked Peter Whellum VK5ZPG, who lives just outside Quorn, from my home station not long after returning from Mount Arden. This was something we had been attempting for some time, but using flights from Melbourne to Singapore - these fly out along my beam heading from Kyneton to Quorn.

Frequently they would shift off course - and no contact was made. This time we used a flight from Sydney to Adelaide. I was able to watch the aircraft on my ADS-B Virtual Radar Receiver as it approached our signal path, and whilst I lost ADS-B contact a few nautical miles prior to the cross-over point, the enhancement on 144 MHz happened on time and the contact was completed comfortably. The path distance is 795 km.

Being Heard...

On my previous trip, I had 150 watts and a home-brew 10-element DL6WU Yagi for use on 144 MHz. David runs the full legal VK power permitted, 400 watts, and a 17 element Cushcraft 17B2 Yagi.

I figured that, to beat the local Melbourne noise floor, a glorious pea-soup of RF-nasties, I would have to run as close to the VK limit as I could manage, and increase the size of my Yagi. I already had a 14-element DL6WU Yagi that I had built a few years earlier, so that part was sorted. That just left generating more power. Whilst this line of thought coincided with Ron VK4DD unleashing his popular BLF248 600 watt amplifier,



Photo 3: Saturday morning - clear blue skies.

I wanted something that I could use in the car whilst mobile, though perhaps not at full steam... – so I had to limit myself to something that used 13.8 volts as a source voltage. I canvassed opinions, and from the three obvious candidates – the Tokyo Hi-Power HL-350V DX, the Mirage B-5030, and the TE Systems 1452 – it seemed that the HL-350V DX had the best reputation regarding quality and support. Quite some time was spent in shekel-saving mode, before shifting into spend mode; but eventually the big brown box arrived, and planning the trip could move into selecting a date.

Oh, and I also decided that, rather than running everything off the Land Rover's 120 Ah auxiliary battery, I had invest in a small generator. Again I asked about, and as a result I invested in a Honda EU20i. Along with that I needed a suitable 240 V/13.8 V power supply, and a Manson M8222 was added to the gear heap.

On paper, at least, I had added about 4 dB to my transmit side. I hoped that that would be just enough to lift my signal out of the noise to a 41 level – that is more than enough for a valid contact!!!

Diversions

As this was to be a single-band trip – 144 MHz only – I raised the idea of making it multi-mode. Normally I stick to SSB – and occasionally CW, if I can find the WD-40 for the key... This is to avoid the complications that multi-band multi-mode efforts bring to a solo operator. However, with only one band to operate on, I thought I would have a go at including the laptop and running the WSJT software. This would make the operation - and the grid locator, PF87 - accessible to stations not able to participate in the AEP experiment. Using FSK441 and Meteor Scatter, contacts would be possible to most of the east coast, whilst JT65 could fill the gap in between the AEP and MS footprints. Rex VK7MO assisted with a crash-refresher on the software.

I also contacted Guy Fletcher VK2KU to see if EME via JT65 might be workable. By some enormous fluke, the weekend I picked seemed likely to be very favourable; the waning moon would be in a quiet part of the sky, and coincided with the first weekend of the ARRL EME

contest. So my first attempt at EME was added to the schedule! Guy also ran a couple of tests with me (direct, not EME) just so I could iron out any bugs in the system.

On site

My partner, Adrienne, and I departed Kyneton on the morning of Thursday 8 October. We arrived at Peter VK5ZPG's place mid-afternoon on Friday, having spent the night at Clare, in SA. By this stage we were

falling behind schedule; so we dashed in, dashed out, and headed up the road to Argadells Station, the property on which Mount Arden is located.

The property owners, Malcolm and Judy Juett, had again kindly granted us access to the mount, and we stopped briefly to chat with Malcolm before setting up the hill. He mentioned that there were a couple of large groups from 4WD clubs roaming the property, and to be on the lookout for them on the ridge road. This was not good news, as space alongside the ridge track is at a premium, and mostly covered with spinifex.

On arrival on the ridge, the de-sensing caused by the Mt Arden SAGRS installation seemed worse than last time, but that may have been due to the monitoring being done with a vertical antenna, rather than the horizontally-polarised Big Wheel that I usually use. We drove the length of the ridge, but could not find anywhere better than the spot I had been last time. By this time it was 1630 ACDT, or later, so we attempted to 'shoe-horn' ourselves into the old spot. Adrienne had packed some high visibility vests, and collapsible traffic cones, and these came in very handy for marking the border between the track and the campsite.

As it turned out, they had magical properties, too; not one vehicle came along the track all weekend!

Photo 4: Sunday morning, before sunrise, with the Yagi pointing to where the moon rose.



We had not finished setting everything up before the sun set; the mast went up in the dark, and only then did we stop to cook and eat dinner – at 2100 ACDT. We still had to set up the generator and power cabling, the HF antenna, and all the laptop/interface cabling/mobile phone broadband modem. I did not want to stumble about the ridge top, in the dark, in the Spinifex, setting up generators and cables; and my brain was starting to make that special frying noise, so we called it quits and collapsed into the sleeping bags.

Day 1: Saturday

Perhaps not surprisingly, the alarm failed to wake me the next morning – or perhaps in the dark and the cold I had messed up setting it – I was woken by a phone call from Rex VK7MO asking how things were. I slurred something about setting the generator up, and being on air as soon as we could, and dragged myself outside. It was windy and very cold; but the sunrise colours were beautiful, once the sleep was wiped from my eyes. Setting up the remainder of the gear took 45 minutes, and then we were on air! Breakfast had to wait...

I think there were over thirty operators logged into the VK Logger when I came up – oh, boy..! The first contact, with Rex VK7MO, was completed via FSK441 by 2126 Z. Following Rex, Jim VK3II, David VK3HZ and Michael VK3KH were completed using the same mode. Gavin VK3HY was noted in the log, but as incomplete. I paused for breakfast at about 2230 Z (I think...). Brian, VK5BC was operating portable from Melrose; after a chat with him, David VK3HZ and Leigh VK2KRR were worked using JT65 – an attempt was also made to work Colin VK2KOL using FSK441, due to the number of pings that were being heard during the JT65 contacts, but this attempt was unsuccessful.

Later in the day voice contacts with Peter VK5PJ, Bill VK5ACY, David VK5AYD, Nora VK5NYD, Phil VK5AKK, Geoff VK5GF and Andrew VK5DL were completed. The contacts with VK5AYD and VK5NYD, who are located at Coober Pedy, were their first 2 metre contacts within VK5. VK5DL was a new call in my log book, as well, which was nice.

AEP



Photo 6: Sunday afternoon – the approaching dust storm, viewed from Mount Arden.



Photo 5: The camp on the ridge.

Sadly, the attempt to work via AEP into Melbourne was a one-sided affair again. Amazingly, only one aircraft positioned itself suitably at a time when I was both free, watching the ADS-B screen, and David VK3HZ was available. An Etihad flight to Sydney from Abu Dhabi (ETD454 – arrives in Sydney at 1930 AEDT each Saturday) came in over Adelaide at 39,000 feet and was visible on my ADS-B receiver prior to the point where enhancement to Melbourne would take place. Perfect!

At 0647 Z David's signal came up out of the noise, to the point where he was 51 for several transmissions. Perfect! Brilliant!!! However, even with the extra power I was running, David could not hear me. This was NOT perfect. A bit later, David disconnected his Yagi from the input to his pre-amp, and found that his 'natural' noise floor dropped 10 dB or so. This was definitely not perfect, or brilliant. There seemed to be little point in persisting; between the absence of further suitable aircraft, the inherent high noise floor in Melbourne, and there being more stations wanting to use the digital modes, there were no further attempts at voice contacts into Melbourne.

EME

Unfortunately, the first of the two EME attempts, very early Sunday morning, proved fruitless. I was out of the sleeping bag at 1400 Z, well before moonrise at 1520 Z, in order to have plenty of time to get the generator, laptop and software going – and with time to sort out any problems if they occurred. Of course, when you do this, everything works perfectly – Murphy only joins you when you become complacent!

As a novice, and being in a shack with a window giving a view of where the moon should appear, it was a little disconcerting watching the software telling me that the moon was appearing over the horizon – yet not seeing it, as the waning half moon was rising dark side up! Sadly, not a trace of a signal was received in the hour we had before the moon was too high, above 10° elevation, for my fixed Yagi. Later, Guy VK2KU advised having received very poor ping levels from the moon, indicating that conditions were simply against us on the night.

The second EME attempt, scheduled to take place between 1610 Z and 1710 Z the next day, that is, early

Monday morning, was affected by what happened on Sunday...

Day 2: Sunday

The weather turned ugly on Sunday morning, with the winds increasing in speed, and storms forecast. Peter VK5ZPG drove up to visit us, and after discussing the conditions with him, we reluctantly closed operations and pulled down the station just before midday.

Peter had travelled up in his 4WD ute, and he kindly assisted by allowing us to toss half of our stuff in the back of it, rather than trying to completely repack the Land Rover. This saved us a lot of time - we completed repacking the Land Rover at Peter's place, in a more relaxed manner. We could see the line of brown from the dust storm, approaching over the plain to the west, as we broke camp.

Choosing not to be on a 740 m ASL ridge-line in such weather was the right thing, much as it pained me to give up on the exercise. I extend my apologies to those who missed out on a contact, due to this reduction in operating time.

In the four hours prior to this decision being acted upon, Colin VK2KOL, Steve VK2ZT, Rex VK7MO, Jim VK3II, John VK4JMC, and Peter VK3PF were all worked using FSK441; Jim VK3II and Michael VK3KH were worked using JT65, and Peter VK5PJ was worked on USB. Gavin VK3HY was again logged as 'seen' but not completed.

Conclusion

During the Saturday and part of Sunday that we were on air, 23 contacts were logged. Of these, eight were voice (USB); four were made using JT65 and eleven were via Meteor Scatter using FSK441. The Meteor Scatter contacts, naturally enough, covered the widest range of call areas; stations in VK2, VK3, VK4 and VK7 were worked using this mode. JT65 provided contacts into VK3 and VK2. All the voice contacts were to stations in VK5. Five incomplete contacts were also logged.

Personally I am very pleased with 23 contacts in a period of about 30 hours, considering the distances involved and the use of a single band.

Despite a lack of success, I very much enjoyed the EME attempt using JT65 and look forward to trying more of this challenge.

I did find the FSK441 mode a little frustrating. More than once a station appeared with a full decode, and I would start transmitting to them with a report, only to receive nothing else from them - but find another station from the same area appearing with a full decode. This happened to Gavin VK3HY several times; I also recall Andrew VK3OE appearing for a couple of transmissions, before being replaced by another station. I did not see any example of simultaneous decodes



Photo 7: The operating position; VK Logger on the laptop.

from multiple stations, which was something I'd heard could occur.

With regards to AEP, the issue of high ambient noise levels in cities like Melbourne may be insurmountable. If a way around this problem can't be found, there seems little point in attempting AEP contacts over these extreme distances - the signals will simply be blanketed in filth. And no-one likes a filthy blanket... Is there an answer to this?

Once again, having (relatively) high-speed broadband access, via the mobile phone network, was a boon. This not only applied to me, but also to Adrienne, who was able to work on assignments using her laptop and the Internet whilst sitting in a comfy chair under an awning - while I messed around on the radio. The broadband gave me full access to the VK Logger, plus email and other useful websites.

Dare I mention the Bureau of Meteorology site?!

This was also the first time I had DXpeditioned (no, that is not really a word) with a partner, and the good news is that, despite the trying conditions and everything else, she claims this is not the last time she will do this with me! She even suggested returning to Mt Arden for a third time!! Not sure about that myself, though - I might be all Ardened-out...

Finally, I would like to thank everyone who participated, either in working or attempting to work us on this trip. Your support is appreciated.

All photos were taken by Adrienne Walker and the author.



Photo 8: Sunday afternoon - the Mount Arden summit RF installation, and bad weather.

