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# VHF/UHF – An Expanding World

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David Smith VK3HZ

## Weak Signal

David Smith - VK3HZ

It's the season for some good inland tropo conditions via the slow-moving high-pressure cells. Phil VK5AKK, who is always a very good signal from his QTH in the Adelaide Hills, reports on his activities:

*I had some good contacts in the last month, the best being tropo into Sydney on 21/3 at 21:30 working VK2IDM and VK2IJM both 5x2 on 144.200. The last 2 m tropo into Sydney was back in the days of VK2ZAB.*

*The morning of 14/4 looked promising with easterly indicators looking good and I was having a day off. First worked was VK2EMA 5x2 then VK3II 5x7 on 144.100. About half an hour later, I heard a weak VK1 working VK3. After a logger request for VK1 to beam west I worked VK1BG and VK1CJ (945km) and then VK2FABV - all 5x1 on 144.200. Next was VK3KH 5x5, VK3XQ 5x3, VK3ZRT 5x2 and VK3DUT (875km) at 5x1 on 144.100. Into the new (Zulu) day, I worked VK1ZQR 4x1 on 144.200 at 0020Z.*

*Listening on the Mt William 2 m repeater later, I could hear another signal underneath. After finally getting the repeater to ident, I worked VK1KRF mobile on Mt Ginini (920km) using my Diamond white stick omni antenna. I worked VK3II again 5x2 on 144.100 then rested after a hard morning's work!*

Later in the month, on the evening of 28/4, the VK6REP beacon was heard at Phil's QTH. Unfortunately, no contacts resulted.

Then, on the morning of 29/4, Phil again worked through VK1RGI Mt Ginini – this time to VK2CMO. Later in the day, he again worked VK2FABV (5x2).

### VK9NA Planning

It looks like the VK9NA team will be heading out the Norfolk Island again in the first two weeks of January 2011. Expectations are high following the good results from the last trip. If last year is any indicator, stations along the east coast will have a good chance to work them on VHF/UHF and Microwave bands. So dust off the equipment and make sure it is in good operating condition so as not to miss out on this rare opportunity. Alan VK3XPD has assured me that he has booked excellent tropo conditions for the entire period!

Please send any Weak Signal reports to David VK3HZ at [vk3hz@wia.org.au](mailto:vk3hz@wia.org.au).

## Digital DX Modes

Rex Moncur – VK7MO

### 2 Metres FSK441

Welcome to John VK4TJ who is operational on 2 metres with FSK441. John's home location is obstructed to the South but by going portable to the top of a nearby hill he worked into Hobart.

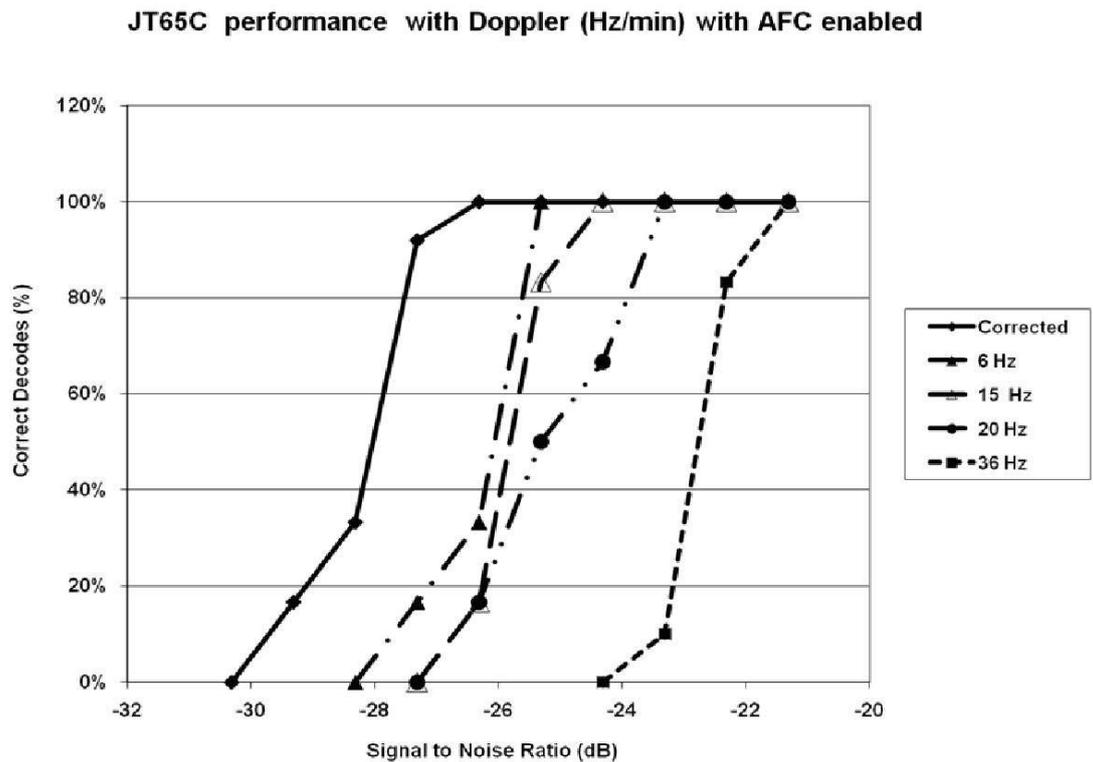
### 1296 MHz QRP EME ON JT65C

With the large 25 metre Dutch dish PI9CAM at Dwingeloo operational on 18 April, the opportunity was taken to work them QRP on 1296 MHz. Dave VK2JDS (4.6 metre

dish), Phil VK4CDI (3.7 metres) and Rex VK7MO (2.3 metres) all worked them on 1 watt both ways. The following week Rex used a program produced by Glen VK1XX which automatically corrects for Doppler to improve system performance and worked PI9CAM at 0.5 watts or QRPP.

### Improving JT65C performance with Doppler Correction

Figure 1 below, which was produced with a signal generator and the transceiver adjusted with Glen's program to simulate Doppler, shows the impact of Doppler on JT65c performance. At 1296 MHz, the change of Doppler can reach 12 Hz/min which means there is the potential to improve JT65C system performance by 3 or 4 dB by using Doppler correction.



**Figure 1: The performance of JT65c with rate of change of Doppler in Hz/min**

### Comparison of ROS and JT65

A series of tests have been undertaken by Jim VK3II (2 metres tropo-scatter), Dave VK2JDS (1296 MHz EME) and Ian VK3AXH (144 MHz EME) with Rex VK7MO. The conclusions from these tests are:

- ROS gives comparable weak signal performance to JT65a on 144 MHz tropo-scatter but takes longer to complete a QSO.
- ROS is 4 to 8 dB worse than JT65b for 144 MHz EME.
- ROS is not useful for 1296 MHz EME. While it can be made to work, by using Glen VK1XX's Doppler correction program to directly control the transceiver frequency via a hardware CI-V interface, the performance is still at least 7 to 11 dB worse than JT65c.

· Operational features of JT65 such as time sequencing and short-hand messages give it a significant advantage over ROS in completing a marginal QSO.

A source of misunderstanding is that ROS reports decoding down to -35 and -36 dB, but this is on a different scale to the JT65 reports and 9 dB should be added to ROS signal reports to make them comparable to JT65 reports.

### 10 GHz Aircraft Scatter using JT65C

Dave VK3HZ and Rex VK7MO have conducted initial tests of aircraft scatter on 10 GHz between Mt Wellington near Hobart and Sunbury north of Melbourne over a 624 km path. The path was chosen so that the direction of propagation lined up as closely as possible with the Melbourne to Hobart flight path so as to minimise Doppler variation and maximise the possibility of diffractive scattering (generally called aircraft enhancement or AE) as applies at VHF. The equipment comprised GPS-locked transverters and transceivers to minimise frequency drift, 45 and 65 cm dishes with 8 and 10 watts output. The initial tests were encouraging in that 4 or 5 decodes were received from each of two aircraft over ten minutes at the Mt Wellington end (see below) although no decodes were received at the Sunbury end.

|        |   |     |      |      |      |       |       |      |   |   |    |
|--------|---|-----|------|------|------|-------|-------|------|---|---|----|
| 023500 | 0 | -33 | 3.6  | -3   | 21   |       |       |      |   |   |    |
| 023700 | 1 | -27 | 2.8  | 11   | 4 *  | VK7MO | VK3HZ | QF22 |   | 0 | 10 |
| 023900 | 2 | -24 | 2.8  | 8    | 5 *  | VK7MO | VK3HZ | QF22 |   | 0 | 8  |
| 024100 | 1 | -22 | 2.9  | 8    | 5 *  | VK7MO | VK3HZ | QF22 |   | 0 | 10 |
| 024300 | 0 | -23 | 3.7  | 5    | 5 *  |       |       |      |   |   |    |
| 024500 | 0 | -27 | 2.6  | 62   | 21 * | VK7MO | VK3HZ | QF22 |   | 0 | 10 |
| 024700 | 0 | -33 | 5.5  | -482 | 3    |       |       |      |   |   |    |
| 024900 | 0 | -33 | -0.8 | -83  | 28   |       |       |      |   |   |    |
| 025100 | 0 | -33 | -1.7 | -436 | 26   |       |       |      |   |   |    |
| 025300 | 0 | -33 | 5.3  | -479 | 12   |       |       |      |   |   |    |
| 025500 | 0 | -33 | -0.8 | -207 | 31   |       |       |      |   |   |    |
| 025700 | 0 | -33 | 2.7  | -277 | 4    |       |       |      |   |   |    |
| 025900 | 2 | -28 | 2.5  | 24   | 4 *  | VK7MO | VK3HZ | QF22 | ? | 0 | 3  |
| 030100 | 3 | -22 | 2.7  | 19   | 4 *  | VK7MO | VK3HZ | QF22 |   | 0 | 10 |
| 030300 | 2 | -23 | 2.8  | 11   | 4 *  | VK7MO | VK3HZ | QF22 |   | 0 | 10 |
| 030500 | 2 | -25 | 2.7  | 46   | 4 *  | VK7MO | VK3HZ | QF22 |   | 0 | 10 |
| 030700 | 1 | -25 | 2.7  | 48   | 6 *  | VK7MO | VK3HZ | QF22 |   | 0 | 10 |
| 030900 | 2 | -26 | 2.7  | 43   | 4 *  |       |       |      |   |   |    |

Inspection of the JTSpec waterfall trace showed that the signal generally came in bursts of a few seconds somewhat like meteor scatter. This could well be due to specular reflection from parts of the aircraft rather than diffractive scattering that supports AE at VHF. It is also noted that all of the decodes above required the Deep Search decoder (0 in the second last column) despite that fact that reported signal levels were -22 and -23 dB which would normally decode on WSJT's Koetter-Vardy decoder. It is likely this is a result of the fact that the signals tend to come in short bursts and insufficient bits are received for the Koetter-Vardy decoder.

More details of these tests including pictures showing the signal bursts on the waterfall are available on the web at: [http://www.vk3hz.net/aep/AEP\\_on\\_10GHz.pdf](http://www.vk3hz.net/aep/AEP_on_10GHz.pdf)

Please send any Digital DX Modes reports to Rex VK7MO

## The Magic Band – 6 m DX

Brian Cleland – VK5BC

*(Owing to a production oversight, last month's 6 m notes did not appear in the magazine. Both months are included here.)*

March showed marked improvement in TEP conditions particularly from VK4 to JA with almost daily openings as well as contacts into China and Korea. Some of the significant reports received follow.

5th March Wade VK4WM Harvey Bay reported working over a 21 minute period beginning at 0520UTC JR2HCB, JI1CUL, JH7XRZ, JA1RJU, JF3RDG, JA7IC, JH7UPW, JA2JXH, JR1UBR, JR0EQQ, JA9SJI, and JL1VFZ. Then on the 6th March Wade reported working 49 JA stations most at 5/9+ over a 1 hour period beginning 0500UTC.

11th March proved to be an interesting day with again a good TEP from Japan to VK4 (Townsville to Brisbane) with many VK4's working JA's. This opening was interesting in that it extended down from JA to FK8 and ZL2. Mark ZL2WHO in Palmerston North worked several JA's up to S7 and Pascal FK8IA in Noumea was reported by JR2HCB. Among the many JA's that Kevin VK4BKP in Mackay worked, Kevin worked DS2KGJ in South Korea and John VK4FNQ in Charters Towers worked Willem DU7/PA0HIP. Also on the same day Victor E51CG in Rorotonga reported hearing the KH6HI beacon.

12th March things were quiet down south but again VK4's worked JA's and then finally on the 13th March the band opened to VK5 between 0530UTC to 0800UTC with several contacts being completed between VK5 & JA. Brian VK5BC reported working 17 JA's with Garry VK5ZK and Peter VK5PJ also working several JA stations. There were also a few contacts from JA into VK2, 3 & 7 completed with JR6EXN reporting contacts with VK3OT VK3VG VK3DUT VK5ZK VK5PJ VK5ZW VK3AMK VK3OE VK3FZ VK3BDL VK3AUU VK4ZJB VK4AHW VK7AC VK4DDC VK4WTN VK4FI & VK5BC.

16th March was a quite day but late in the afternoon both the VK6RBU & VK6RPH beacons were audible in VK5 and the VK5RBV in VK6. Contacts then followed between the VK6's OX, JJ, ADI & AKT and VK5's ZK, BC and AYD at Cooper Pedy. A little later Steve VK3OT near Hamilton also worked several VK6's. Around the same time Victor E51CG was hearing the KH6 beacons and worked Fred KH6Y.

17th March again good opening from most areas of VK4 to JA. Gary VK4ABW near Townsville worked several JA's as well as DS4, 5 & 7 stations. Garry also worked Willem DU7/PA0HIP. Also same day an 'E' opening from northern VK4 with Gordon VK5KAA working John VK4FNQ and Brian VK5BC working VK4ABW, busy day for Gary.

20th March saw Ray VK4BLK at Yeppoon work several JA's and a little later John VK4FNQ working several.

22nd March, another opening to VK4, this time David VK5AYD at Cooper Pedy was in the action working JA3EGE. That evening Willem DU7/PA0HIP worked several stations in the Brisbane area including Adam VK4CP, another new one for Adam.

30th March, Harvey VK4AHW & Wayne VK4WTN from the Hervey Bay area worked many JA's.

From the Tablelands in far northern Queensland Dale VK4SIX reports that he John VK4TL have been working JA, DU7,VR2, BA4 & BX4 during the month.

Also on many evenings throughout the month the stations in northern VK including Mark VK8MS in Darwin and Gary VK4ABW Townsville area have been working DU7/PA0HIP and other northern stations in Japan & Korea.

Received a message from Willem DU7/PA0HIP summarising his summer season. Willem reports:-

*First I have to get something off my chest - When propagation happens, I noticed*

many times that many people are calling that can't even hear me, many times ruining QSO's with people that CAN. The frustration is not only on the VK/ZL side, but certainly also at my end. It ruined QSO's with ZL2TPY, ZL1RS and ZL3AAU. I thought that only Europeans were like that (you should hear the mess when something special shows up on 6m in EU, hi). It really is a shame....I can understand their eagerness to get a "new one ", but in this way they only ruin their own chances. (and mine). A kW linear (my own PA0 linear) has been shipped to me and will hopefully arrive soon. Also I am planning to build a better antenna. So maybe next season the ZL/VK's will have a better copy of my signals and problems like that will belong to the past.....sure let's hope so.

OK having said that, below is a summary of my VK/ZL summer season contacts.

13 Dec 2009: I worked VK6KXW (first VK6), and we made some tests during the next couple of weeks. It turned out that on most days (12 out of 14 days) I could detect his signals (keyer), like a pipeline.

15 Dec 2009: 04.40 - 08.00 UTC, spotty openings to VK3, 5 and 7. I worked 7 stations (including VK5BC/P, new grid!!) (3x VK3, 1x VK7 and 3x VK5)

17 Dec 2009: 08.15 - 10.30 good conditions to VK2, 3, 5 and 7, but not much activity from VK. I worked 1x VK2, 8x VK3, 7x VK5 and 3x VK7. Could have worked many more.

18 Dec 2009: short opening 05.00-05.45UTC to VK3 (2x) and VK5 (2x), signals were very strong though (s8-9)

22 Dec 2009: 05.20 - 07.15UTC very spotty opening to VK6, worked VK6JJ, KXW, JJ (SSB) , ZKO, and heard VK6RO who faded out before completing QSO.

I had heard ZL3NW before very weakly but on 25 Jan 2010 it finally happened:

25 Jan 2010: 04.20 07.40 on/off conditions to ZL1, 2, 3 (worked ZL3NW (539/539 at 04.26UTC) for new one (amazingly good signals, 7721 KM), QSO's with ZL1RS, ZL2TPY and ZL3AAU were ruined by weak VK2, 3 stations, who were heard both in ZL and by me. (calling me)

Also conditions to VK2, 3, 4 and 5, I worked with 9 x VK2, 4 x VK3, 1 x VK4(EK), 5x VK5. (signals were not very strong but activity was good)

29 Jan 2010: 06.30 -07.35UTC weak opening to ZL3 and VK7, Heard ZL3NW (Rod had bad line noise, so no QSO), ZL3TY and ZL3AAU, but no QSO's. Did manage to work VK7AC, but was only VK heard here.

6 Feb 2010: around 09.16UTC strong propagation to VK8 (reckon, must have been Spread F or so) Worked VK8RR and VK8MS, both 59++ on SSB.

Well Brian, that's it. For me, this season was much better than last year's (only 2 openings) Now have worked 31 grids in VK (1 in ZL).

Thanks Willem, it's great that there is a station in the Philippines who spends considerable time looking for contacts into VK/ZL and hopefully all operators are appreciative of your efforts and call at the appropriate time.

Received a very interesting message from Stuie VK8NSB in Darwin, Stuie writes:

Two years ago I decided to venture onto 6 m and put a quarter-wave vertical up in the air around November 8th ready for what the 6 m Guys were calling the Magic Band time of the year. I was already aware of the VK LOGGER on the Internet, using it for HF and had seen the 6 m page but had never ventured onto it thinking it was for Advanced operators only. I actually thought I would be ignored or told to leave if I went on the page because I was a Standard operator. I decided to jump on the 6 m page and was amazed to find the 6 m guys were quite willing to help out with

answers to my questions and willing to have QSO's with me on 52.100 SSB or split because of the Advanced guys antenna's cut for the bottom part of the 6 m band (50-51) only. In the Xmas season of 2008, I worked 23 VK's & 2 ZL's on 6 m. When the band closed off around Feb/Mar 2008, I didn't bother with it for most of 2009 and found that the Magic Band was very poor over Xmas 2009. I just happened to come upon a 3 ele Yagi for 6 m on VKHAM classifieds and started working on putting it up on one of the towers I have here, finally getting it up around the end of January 2010. One evening on the Dxcluster, I saw Marks (VK8MS) callsign spotted by JA and thought wow 6 m is open so I rushed up to 6 m to listen and could hear the JA quite clearly on the yagi. I was able to talk to Mark later that night and he explained to me about TEP, I had never heard of it before but was interested in learning more about this TEP. Over the next 2 weeks I was lucky to have worked KH2, VR2, JA, DU & BV on both SSB & CW on 52100 and some QSO's using split 50 – 52. Both Mark VK8MS & John VK8JM helped me with some of the QSO's, asking the operators to go split for myself so that I could make the QSO. I have noticed that on the VK LOGGER that there doesn't seem to be too many VK Standard Operators active on 6 m. Why not? For the guys down in VK 1 to 7, 6 m looks fun with openings all around Australia, and as well as some good international DX openings. With only 100w and a 3 element yagi I have had some real great evenings on 6 m over the last couple of weeks thanks to TEP. I would say to those Standard Operators out there give 6 m a go, its easy to put up a vertical, dipole or even a beam for this band as it does not need massive space to do so. Get on VK LOGGER and say g'day to the guys. They won't bite and you might find you actually enjoy this Magic Band. I had always said that 6 m was not really for me as I was a HF DXER and I was not going to get too serious about it, but over the last couple of weeks I have actually enjoyed this truly Magic Band. Give it a go, Yes as a standard operator you might be limited to the frequencies you can use on 6 m but you will be amazed how many guys will work you split or even come up on 52.100 to say g'day. I now keep my eyes on the 6 m chatter in VK LOGGER and the 6 m spots on the clusters I monitor.

*Take it easy and catch you on 6 m from Darwin De Stuiie VK8NSB*

Great to hear you are enjoying some great conditions on 6 m Stuiie. I'm sure it will only get better in the next couple of years as the sunspot cycle improves and of course it is always great to work VK8 stations from any where in VK. Also good that many stations are keeping an ear out for the standard licensees above 52 MHz.

*(And on to this month ...)*

After many good TEP openings in March the band quietened down in April with only a few TEP openings and the odd 'E' contact. Indicators from the China, Japan etc where heard in VK on several occasions in April but few contacts were reported, most from northern VK4 to JA.

2nd April, the VK4RHT Atherton beacon was reported from Japan and Lloyd VK4FP worked JR2HCB. The Atherton beacon was again reported from Japan on the 5th April along with the VK8VF Darwin Beacon. On this occasion Gary VK4ABW Townsville worked JR2HCB and John VK4TL Tolga worked JO3UGX. Norm VK3DUT and VK4SSB/2 reported hearing the FK8 beacon.

On the 5th April, John VK4FNQ Charters Towers reported hearing both the KH6HI and KH6HME Hawaii beacons between 0300 & 0400 UTC. John also heard both these beacons again on the 6th & 8th April but despite calling no contacts eventuated.

The 6th April saw some local 'E's' with David VK4ZDP Innesfail work Wade VK4WM and Wayne VK4WTN both in the Hervey Bay as well as Denis VK4ACE Brisbane and short skip to Brian VK4EK Sapphire. A little later in the day Brian VK4EK worked

JA6AZU.

With the help of some 'E' extension on the 7th April Norm VK3DUT worked JJ6WZS and Garry VK5ZK worked JE6AZU. Around the time of the contacts Garry was hearing the Alice Springs VK8RAS beacon and worked John VK4FNQ.

The morning of the 8th April, the band opened VK5 to northern VK4 with John VK4FNQ working Brian VK5BC and later in the afternoon a weak TEP opening Brian VK4EK worked JA1RJU.

The 9th April was interesting in that during the afternoon, multiple 49.750MHz TV carriers from the China area were up to S9+ in southern VK4, VK3 & VK5. The JA2IGY beacon was also heard in VK5 but unfortunately no contacts were reported. At the time these signals were being heard the Atherton VK4RHT and Townsville VK4RTL beacons were audible in VK5 and Russell VK4BEG worked VK5ZK & VK5BC. Meanwhile a little further north Wade VK4WM Hervey Bay reported working 10 x JA's and Brian VK4EK Sapphire also working several JA's.

Garry VK5ZK had good day on the 10th April working JG3GNU, JA5FFJ, JF1LXO & JM1IGJ all on CW while several northern VK4's including Ray VK4BLK Yeppoon, Gary VK4ABW Townsville & John VK4FNQ Charters Towers were in the action on both the 10th & 11th working several JA's on both days.

Not much action then until the 17th April when a good opening late in the afternoon from VK5 to northern VK2 & VK4 occurred. Brian VK5BC worked VK2BTS, VK4's QM & VN. John VK4FNQ worked Mark VK8MS in Darwin.

Some good 'E's' again on the 20th April. David VK3AUU worked several VK4's including FIL, CRC, DD EK, WM & WTN. Ron VK4DD worked Joe VK7JG's, Garry VK5ZK and VK3's ALZ, AUU & OW & FZ while Brian VK4EK & Andy VK6OX reported hearing the Alice Springs beacon. Garry VK5ZK also worked Wayne VK2XN. Later in the day a good TEP opening to Japan with Wade VK4WM reporting having worked 11 x JA's and Brian VK4EK also working several JA's.

22nd April - again good opening from JA to northern VK4. During this opening John VK4FNQ, Dale VK4SIX worked Li BA4SI Wujiang City, China. Adam VK4CP Brisbane also reported hearing Li.

The 24th April, VK4ZFC in Cairns worked several JA's.

On the 25th April, a good opening from ZL to VK with Bob ZL1RS working several VK2 & 4 stations and Peter VK5PJ.

Stuie VK8NSB Darwin reports that on 27th April @1129UTC working Hide JR6EXN SSB 5/9 both ways and that TEP conditions were very strong to Darwin but only Hide on the band.

Good early morning opening on the 28th April from VK4 (Brisbane/Hervey Bay area) to VK5 with several contacts taking place and Brad VK2QO worked John VK4FNQ.

If you're up early in the morning Brad VK2QO coordinates Meteor Scatter contacts on 50.200MHz from 2100 – 2200UTC every morning. Several stations participate in this form of propagation with many good contacts completed on most days. Watch VK LOGGER to see the activity.

Please send any 6 m information to Brian VK5BC