2011 Winter VHF-UHF Field Day

19 June 2011

Part of the preparation for this outing was the creation of a transverter for 2.4 GHz, an addition to the existing line-up for field day use. An article (/~vk4adc/web/index.php/vhfuhf-projects?task=view&id=123) elsewhere on the web site deals with most of that topic but it was virtually a last minute effort to get the transverter board into a box. That occurred on Thursday, just 2 days beforehand. The 1 watt PA was not incorporated because it was not producing the expected / normal output level, and the transmit side was running at +18dBm, or about 60 milliwatts, directly out of the W1GHZ transverter board. The IF transceiver was an old IC-706 with the transmit power set at L (low) thus producing about 1 watt at 145 MHz.

The mounting of the box on the back of the grid-pack antenna, and the direction indicator for that mast tube, well, that was the effort early on Friday afternoon !!

A late change was made to the 23cm / 1296 MHz transverter on the Wednesday (yes, just 3 days before!). That was the installation of a different frequency synthesiser based on a Melexis TH71221 in the form of one of my X-Locker3 boards. The frequency it generated was at about 384 MHz, tripled to 1152 MHz for a 145 IF.

The above paragraphs show up a planning anomaly - the 23cm transverter and the 13cm transverter use two different radios but on the same "IF" frequency eg 145.150 afor operation on 1296.150 and 2403.150. That turned out to be a big "whoops" as I had to continuously remember to turn down the volume on the other IF transceiver - otherwise a howl of feedback reminded me very quickly. Note to self - set up the synthesiser alternate IF frequency as something else again eg 146.150 for SSB. I don't do much on 2m FM during these events and then it is usually on 146.500 simplex so it won't cause too much of an issue. Of course, my long term plan is to use just one IF transceiver for all transverters (1296, 2403, 3400..) so it won't be a future issue - maybe.

If you have gained the picture that in the lead-up to the event, I concentrated on very little else other than equipment and set-up then you would be correct. Fortunately I was in the good books and was able to get away with it. How that situation changed will be evident shortly !!

The normal line-up was used on 6m, 2m & 70cm in the form of the Icom IC-706Mk2G plus the usual setup of yagis and verticals connected via the automatic antenna switch box (described elsewhere on this site).

In the lead-up to the Field Day, I was unsure of my portable destination. My choices were either Beechmont (QG61OU) or Mt French (QG62HA) and the only reason I chose Beechmont this time around was because we had been having some intermittent electrical issues with the car in the previous few weeks so I thought at least Beechmont was easier to get assistance at, a thought that ultimately came true.

I departed home about 8.45AM, arrived at Beechmont just after 10AM, starting with the normal VHF and UHF antenna masting etc..., and had them all assembled, feeders on and up in the air by about 11AM . The assembly of the grid pack for 2403 onto a separate mast tube was all going to plan until the bit of 3 ply being used to mount the transverter box to the antenna-mounting flange cracked (but didn't break) at a join line in the material. That meant a slight time delay while I grabbed a few screws, flat washers and nuts, popped a few holes through the material and made an overlapping joint. That piece of ply was going to be temporary for this outing and definitely won't be around next time. Even so, the transverter was mounted, the cables attached and it was up in the air by about 11.25AM. I still had half an hour to get the radios in place and powered up before the start time was upon me. Time to get a move on.

The blue nylon RV shelter was quickly erected and attached to the top of the car, the folding table put into place and the battery bank placed in behind on the ground.

The two radios for 6m, 2m, 70cm and 23cm, complete with all accessories (eg antenna switching and transverter), travel in a wooden "box" to make setup easier and quicker. All of the interconnections exist except for the C-IV cable to the computer, the TCXO feed to the 23cm transverter (BNC), the two 12V power feeds to be connected to the battery bank and the incoming coaxes. The remainder of the wiring is already in place. The new 2.4 GHz transverter just requires the lead to be plugged into the 13 pin accessories socket of the IC-706 (+13.8, PTT and ground), the 2m antenna jack (via a PL259 to BNC female adapter) for the IF and a connection to the 10.000 MHz frequency reference - again, my Isotemp 134-10 TCXO. The IC-706 power lead to the battery bank completes it all.

The notebook this time was a Dell Latitude 620 bought via eBay after a video fault in the older FD Compaq rendered it a big question mark. The Dell was an unknown quantity (in terms of generated noise) going into this event and, at least in the short term, I couldn't tell how noisy it was. It was pre-loaded with VKCL and OmniRig software and use was made of the COM1: port on the back to connect the C-IV line to the IC-706MK2G.

The first thing obvious with the antennas connected and the power on the radios was that the high tension power line noise was S6-S7 on 6m, around S4-S5 on 2m but not evident on 70cm or above. Oh, yes, always remember to connect all coax feeders when in a hurry. My tests on 1296 showed up an issue - which turned out to be that the N connector was still lying on the grass instead of screwed into the transverter. No I don't mean it was loose from the cable, I just had neglected to attach it (plus cable) and here I was wondering why 1296 didn't work !

All else was working well - and just as well - I had about 5 minutes left before start time and I still hadn't connected and fired up the generator. Fortunately having run it up the previous day paid dividends as it fired up straight away and the load once the 12V lead was attached meant that it was pouring current into the batteries. Looking good.

The operations during the Field day / contest were fairly normal. I worked Gavin VK3HY/3 on 6m SSB as my only logged 'DX' exchange although I nearly managed another VK3 - and would have if the HT noise hadn't been there.

I heard Adrian VK4OX on 2403.150 after he pointed his array at me (153 KM) but he was not able to detect my "flea power". Likewise I heard Roy VK4ZQ (about 65KM) and Adrian again later on but was not able to be heard. Lesson learned : more transmit power ! Given that the transverter was newly built and previously not connected to an antenna, I was still pretty happy with that outcome. I plan to have more power on 2.4 as well as having 3.4 GHz running for the Spring FD.

POST NOTE : Phone call from Roy to advise that he actually heard my 60mW of signal down in the noise when listening intently through headphones. Another few dBm more and I might have made it !

Interesting note : the HT noises on 6m & 2m died down as the sun went lower in the sky late in the afternoon. Maybe the fresh dew on the insulators was providing a better leakage path ??

If you are a FD event operator (or might be one in the future), please make the effort to calibrate your radios to frequency in the leadup to the event. It is amazing how many radios are off the true / correct frequency !!

My original intention had been to stay operating for the full 8 hours, Midday to 8PM, but the previous car issues made me pack up early. Maybe my intuition was working well. The pack-up went well but the car wouldn't start. I tried all I could think of to get it going but to no avail. Just before 7PM, I phoned for breakdown assistance and told them where to find me (and just as well I hadn't gone to Mt French !). The short story is that the car traveled down the mountain on a tilt-tray towtruck and is currently residing at an auto repair place in Canungra pending diagnosis of a fault in the engine management system... I should be advised tomorrow (Monday, 20th June) what is wrong and the methodology of the repair !! (or should that just be the $$ required ??)

The late night phone call to the XYL to collect me from Canungra did not go down well so who knows what she will require of me as a form of retribution ! No, blood wasn't spilt - yet !!. (Post note - it's nominally "her car" and since I "broke it" I was in trouble. If she had been driving it at the time, who would have been in trouble then?)

The following images show the progress of how it all went together....

Scroll over each image to see in more detail...

Ready to go 8.40AM Saturday morning..

10.15 AM : antenna part laid out for assembly

10.54AM : main antenna system assembled and feeds on

10.57AM : up in the air.

10.57 AM : attachment at the roof level

10.57 AM : base view

11.18AM : the 2.4 GHz transverter box attached at the back of the 24dBi grid pack. The flylead from the Conifer feed is shown terminated on an SMA male plug and screwed onto the box. The two BNC's are LO (top RHS), IF (bottom RHS) and the 5 pin DIN is used for +12V power, PTT and earth return.

11.18AM : the 2.4 GHz physical assembly, cable form yet to be connected.

11.25AM : The 2.4 grid-pack up in the air

11.25AM : the view from the front

12.03PM : a quick snap of the "gear". IC-706 IF for 2.4 on the very top, the TR-751A + 23cm transverter in the middle, the IC-706MK2G for 6m, 2m, 70cm plus it's auto antenna switch at the bottom. TCXO on 10.000 MHz for both transverters (1.2 & 2.4) visible just to LHS on the table top.

12.17PM : the external view to the closest public access

2.56PM : a view of the compass and pointer used for the grid-pack. The compass image was scanned some time ago, printed on A4, trimmed to shape and laminated onto some stiff cardboard. The wooden base is rotated until the red pointer lines up with TN then a couple of tent pegs go through the front holes to fold it in position. Rough and ready but effective.

2.56PM : afternoon in-the-sun shot of the new transverter assembly.

More details, including inside views, can be found on my 2.4 GHz W1GHZ project page (/~vk4adc/web/index.php/vhfuhf-projects?task=view&id=123).

2.56PM : The modified "Conifer" feed is in use this time around. The feed should be replaced with the dual band feed for next time if the 3.4 is up and running too.

5.30PM : All else has been repacked. Just the radios plus notebook and antennas left at this point. They were packed up shortly afterward.

VKCL Summary Results :

Band	Locators Activated	Locators Worked	QSOs Made	Total	Band Mult	Band Total
50	10	40	14	64	1	64
144	10	30	16	56	3	168
420	10	30	13	53	5	265
1.2G	10	20	9	39	8	312

Total : 809 points in 52 contacts..

POST FIELD DAY NOTE : 30 June (12 days later) : The 4WD was initially diagnosed by the auto service crowd's mechanics as having an engine management fault and the ECM was removed by the mechanics, sent to someone on the Gold Coast who then sent it on to Melbourne. Some days later, the Melbourne-based crowd wanted the car key as the ECM is "immobilised" unless the matching key is used. My original comment to them was that it was a "loose wire syndrome" so this was all a bit much. They retrieved the untested ECM from Melbourne, placed it back in the car, gave me a bill to pay and said "it's all yours".

The vehicle was transported back to my home on a tilt-tray yesterday and I systematically worked through the schematic tracing through why the "main relay" was not being operated. It had supply on the top end of it and the control end came from the ECM, the signal into the ECM that controlled whether the relay was to be operated came from the ignition switch. The voltage from the ignition switch was present but the relay output wasn't. If I put a ground on the relay output terminal of the ECM, the relay operated and the car would start. It didn't help that the diagram said things like pin 8 when it was actually pin 9 and only the wire colour was correct. The relay itself was tested and found to operate normally and even swapped for the fuel pump relay.

I removed the ECM from the car, opened it up - 2 screwdrivers to open the plastic slots and it came out of the black plastic case - and started to trace the PCB tracks for the ouput pin in the strong light of the workshop bench. I found the series diode and the relay switching transistor on the layout, and all measured ok (so far) with a DMM. I put the bare board back in the car, connected the 4 multi-pin cables and powered it up. No start. There was +12 on the anode of the series diode, +12 on the cathode so +12 on the collector of the NPN transistor. The base also measured +12 and the emitter was earth. Problem - you can't have more than about 0.8V across base to emitter of a good transistor - so I guessed that the transistor was o/c emitter.

I took the board back into the workshop, unsoldered the transistor using my SMD workstation hot air tool and tried to measure it on the transistor tester - no sign of life. I selected a BD139 NPN (1.5A, 80V VCEO, TO225 case instead of the original SMD SOT-89 style), trimmed the leads back in size and soldered it to the pads on the PCB. I took the board back to the car, plugged it in, reconnected the car battery, turned on the ignition, heard the main relay pull in and the car started. Each time since (even though that has only been a few times) , the relay has been heard to pull in and the engine has started.

Was it worthwhile opening the ECM up ? For the cost of a $1 transistor, it was made to work.

After several hours work, compacted into just a few paragraphs above, my effort was definitely a $$$-saver in terms of the total repair bill.

Did I get it wrong with the loose-wire diagnosis ? Time will tell if it is the only electrical fault.

2nd July : Well, I won't say it too often but I was wrong about the fault in the ECU. I went to put the original car battery back into place after having left it on charge for a few days and when I went to re-start the motor - same symptoms - no MIL and the motor would crank but not fire. Given the knowledge about the circuit gained from working on the problem earlier in the week, I was quick to check the relay driver output with both the ignition switch off and on : +11.1V when off, 0V when on. That 11 volts should surely have been 12-13 volts, the 0V should have been around +0.5V for a saturated switching transistor collector-emitter voltage.

I took the DMM around and checked the battery terminal voltage directly : 13.2V, and that same voltage was present on the output side of the 15A blade fuse that feeds this circuit. I went back around and removed the "main relay" from it's socket : still +11.1 volts, so somewhere there was a high enough resistance (well, leakage) such that even a 10Megohm meter was reading low voltage.... Thinking back to what I had been doing beforehand - changing the battery - the high resistance joint was probably somewhere near it and maybe I had bumped/knocked it in that battery changeover process. The schematic showed a red/black wire going from the 15A fuse to the "main relay" so there shouldn't be any voltage drop across a single length of wire - surely !

I left the meter on the "main relay" voltage input point and went and "wiggled" the harness near the battery - the DMM jumped to 13.1V. I tried the ignition then and the MIL lit. I unwrapped the black forming-tape from around the wire harness and was amazed to find that Suzuki had used a splice-joiner on that red/black wire feed. One wire was loose and was easily pulled free - and that was the incoming feed wire from the 15A fuse. Maybe this was my "loose wire" syndrome after all.

I stripped the ends of the wires, placed some heatshink tubing over one and then soldered them all together in an overlapping joint, placed the heatshrink over the joint and re-tested. The MIL came on initially, went off (the normal sequence) & the engine started when cranked. I re-bound the form with black insulation tape knowing that that "joint" is no

longer a question mark. I re-jiggled the form in several places in the engine bay, the voltage staying normal this time around.

I feel a lot more confident that this time I have found the real fault. It was behaving exactly like a loose wire and that is what I have found this time around. The ECM transistor may have been a furphy (and, in which case, I can't explain why the voltages I measured earlier were wrong) but I have no intention of changing that relay driver transistor back over... Did the car actually have two problems ??

Again, time will tell....

{ MIL : Malfunction Indicator Light, also called CEL or Check Engine Light in Suzukis }