Destination - Vanuatu

When the travel bug bites again, I clean the dust from my rather new 100w radio. I use it seldom as a proper QRP radio rests on the bench (IC-703 and partly assembled Small Wonder Labs DSW-II, not mentioning multiple unfinished constructions in the junk box). Each time I consider getting rid of the 100w rig by placing it on Ebay, I stop myself by saying "I may need it for the next operation". The degree of satisfaction when running 100w contacts on 160m is lower (than running QRP), but remoteness of YJ0CCC to the rest of the world promises to compensate. This time I am taking heaps of radial wire and coax to "compensate" for not having a PA.

When the "check-in" baggage comes to the 60kg mark (charged at $10 AUD/kg for each extra kg), the check-in lady runs for assistance to her supervisor. Why Vanuatu? Firstly, I haven't been there yet, secondly, when I became an SWL at approx. 13 yrs of age (licensed as UP2-038-2500), one of my first DX SWLs was YJ0 on 160m and since then I always wanted to go there. There is no better feeling than knowing you could give a new one to others.

"…the PWR here is… eh …"

A typical expedition setup for 160m usually consists of a decent PA and a choice of vertical or semi-vertical antennas for transmit side – be it an Inverted L, a vertical or a half square. Dedicated RX antenna(s) is a must for low band operation (or at least it is thought so).

Is PA really needed on 160m or was it invented by those who did not have a central heating system in their shacks? According to a well known convention, each S unit represents a power ratio of 4. By not using a PA, I am determined to lose those precious S2. In other words if YJ0CCC signal with a kilowatt PA would have an RST of 569, then running 100w the RST would be circa 549 – could be still workable as long as the signal is above the noise and QRM floor. What is often missed is that by selecting antenna location in the open space, close to the salt water, and having 'direct visibility' to the target areas (this is not dissimilar to VHF – if you want to work 'em you have to see 'em) those 'lost' S2 or even more will be gained back. A bit of operating previously done in the Mediterranean sea in 2004-2007 (5B/SV5/SV9 and various SV8 islands) has shown that on approach to an island signals would noticeably fall down by S2-S3 (even those that still maintained a direct 'line of sight' path to the target areas), and would go up when antenna would be back in the open sea. I did not work on 160m then, but while this was noticeable on 40m/ 30m bands, should not be very dissimilar for 80m/160m.

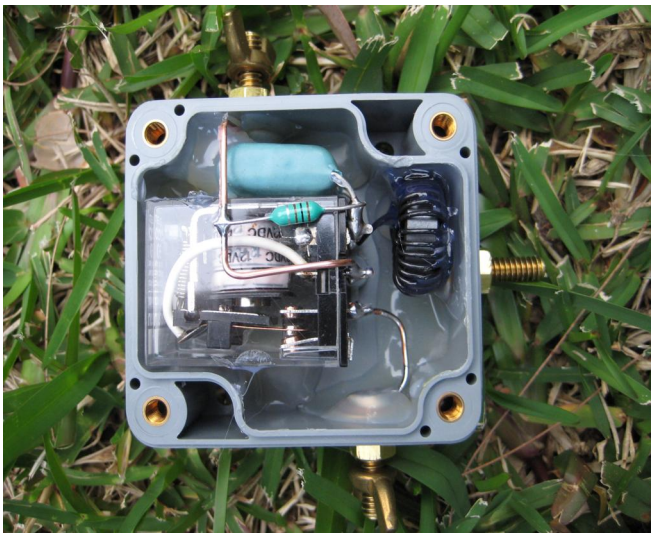
K2KW (http://www.k2kw.com/6y0aqrp/) and multiple others have proved that QRP and Top Band can be a winning combination. The length of the log usually depends on the operation geography (how close you are to the nearest pool of contacts and how wanted the country is), and also how much you believe in the 'power' of QRP!

TX Antenna

The main band was going to be 80m, with some 160m operation in mind. Permission to operate on the new 5Mhz amateur band was obtained as well (a single fixed freq – 5,403.5Khz). I have taken a telescopic 18m Spidermast with an aluminum extension tube to carry the main 80m vertical (can you see it in the photo on he left?). It can always live in a tree, becoming a natural extension to antenna height. Before arriving on site I did not have a clue about the local circumstances and was prepared to deploy kilograms of ground radials to have a non-resonant ground system shared between different band verticals.

I thought of using the same vertical with an ATU for higher band operation (should there be no propagation on 160m/80m), or separate verticals sharing the same ground system. For radials I have been using zinc coated fence wire with a loop connector soldered on one end (I can see some of the readers calculating the decibels lost because of not using 'proper' copper radials). The plan for 160m antenna was Inv L, supported by the same mast. In the past I have tried an option of coax traps (i.e. A35MT, see antenna photos and dimensions here) and LC traps, but was not much impressed (the real reason must have been rather modest ground system, not the trap loss hi-hi). Some calculations demonstrate that properly designed and constructed traps would have insignificant losses (i.e. W8JI, please see here). However I wanted to avoid using any traps this time.

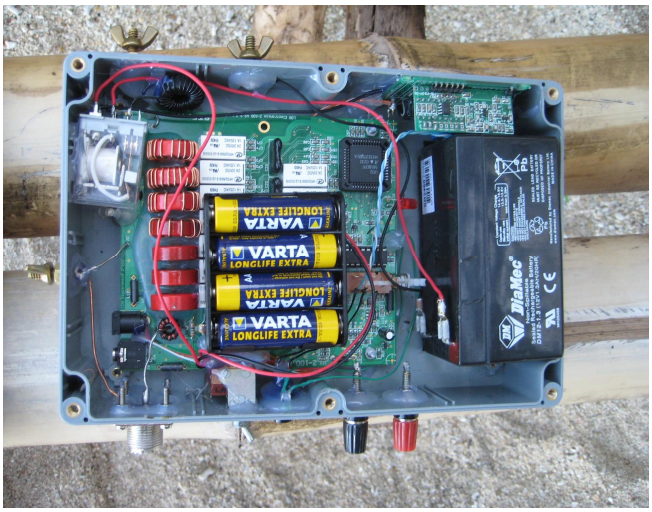
Instead of using an 80m trap, a relay ($2.5 AUD) located some 2 meters below the top of antenna (position is selected purely from mechanical considerations) is used to switch in a horizontal section of wire when working on 160m. When working on 80m the antenna is ¼ wavelength vertical (almost). The contacts of the relay are rated for 8A at 24V DC. Despite of the views expressed on the Top Band reflector, I have been using automotive and similar garden variety of cheap relays for switching RF with a great success (in fact never felt like needing a proper RF (vacuum?) relay). Well I haven't tried DC relays with a kilowatt but as long as the moisture is kept out of the relay enclosure, it used to work very well with anything up to 100w.



A twin loudspeaker line was used as a vertical radiating element, also carrying 12V DC voltage to switch the remote relay to connect the horizontal section of wire to form an Inv L for 160m operation (some of the photos in YJ0CCC photo gallery explain the arrangement). There is a belief that the gap between the contacts should be similar to what the air variable capacitor spacing for that particular power level is. You can always disassemble the cover of the relay and move the unused contacts to form a bigger gap.

Antenna tuners

The DC supply to remote relay was supplied by remotely controlled ATU, located at the bottom of antenna (feedpoint). The ATU allows remote relay switching and does the standard ATU function – should there be no propagation on 160m/80m, the 80m vertical can be tuned to work on higher bands. Over the last 2 decades ham radio equipment manufacturers convinced the masses that remote ATU control requires wires. *It doesn't.* Use wireless instead. A small wireless control board was installed inside the ATU. The total current consumption of the wireless board is circa 6 mA when no relays are energized. No need to carry long control wires, and no issues associated with RF induced on control wires.



There is one battery (8 x AA) for the ATU supply, and rechargeable SLA battery (1300 mA) for remote relay supply, both living in the waterproof ATU enclosure. Rechargeable battery is wired to banana terminals to allow recharging the battery during the day time without the need to remove it from the ATU unit. The ATU unit during the day time is disconnected from the ground system and the twin line by quickly releasing wing nuts. One of the failure mode scenarios that I missed was when both banana terminals touched the radials, shortcircuiting the SLA battery! The wires inside the ATU nicely melted.

Plan B - should the automatic ATU fail (or be lost in transportation), a manual tuner was built (photo on the left). By the help of two multi-position switches it can be converted to a switchable parallel LC circuit tuner, Base Loading Coil or Base Loading Capacitor or a Feed-through circuit. The LC circuit works very well in scenarios where a half wave vertical (or Inv L) needs to be resonated – i.e. should remote relay that switches the horizontal wire for 160m operation get stuck in the ON position, the LC circuit would implement voltage feed for 80m operation. The LC circuit would be by-passed for 160m operation.

RX antennas

For RX I have taken two 200m beverages with remote switching box, which has been originally built for 3D2MT operation. Refer to 3D2MT photos. Remote box is capable of switching 3 beverages by supplying +DC, -DC or no DC voltage through the coax cable. The relays used inside the switching box are cheap garden variety of 12V DC relays. After (multiple times) falling asleep during 3D2MT operation, the termination resistors have been blown and the beverages now essentially are bi-directional. For beverage wire a thin 0.5mm enameled copper wire is used which is very lightweight but sufficiently strong. I do not carry any support poles as usually the wire is wrapped around the trunk of trees or bushes.

Setting up

A quick survey on arrival confirmed what I was not particularly looking forward – the dry part of the coastal strip was too narrow for deploying any antennas (unless it would be a vertical with 2 elevated radials – often the choice of many expeditions). The water level difference at a low and a high tide did not allow setting antennas directly in the water, and on the other hand I did not have any gear to drill into the coral mass (alternatively you need to have a BIG hammer). Decision was made to install antennas in the bush, with the radials where possible installed above the sea water. The bush was less dense than what it was on A35MT site, but deploying the radials was still a pain due to the multiple natural obstacles (mainly papaw trees and smaller bushes).

The good thing about running the radials in the bush is that when you do the work you can also pick up some papaws for the breakfast. At one moment I almost lost the telescopic mast in a heavy wind when an unidentified beast has eaten one of the guying ropes… had to replace guying ropes with zinc coated wire segments.

I was not prepared for an elevated radial system either (instead of insulators I was carrying a heavy bag of wire spikes for nailing ground radials to the ground). Plastic cable ties have been used as insulators. There was no sparking or burning when operating with 100w. I reckon as per Ohm law, for higher voltage insulation, two ties could be 'connected in serial'…

For the first night operation I had some 20 elevated radials installed. Each day I was adding few more radials until at the count of 44 decision was made 'enough is enough'.

Beverages were installed, however one end of the beverage ended up a few meters away from a pump/generator site and was picking up the noise, while the other beverage did not produce desired directivity. I am definitely looking towards trying a Flag or larger loop type RX antennas.

On the bands

YJ0CCC operation was 'opened' with the first QSO made on 160m. Tnx goes to W0FLS. Hordes of other W/K followed after. The first night JA frequencies were purposefully neglected to allow more W/K into the log (W/K direction was disadvantaged due to the mountain range (circa 800m), compared to JA and EU, not even mentioning that the Eastern Coast is much further than JA).The approaching hurricane season represented significant static noise on 160m, but it was very easy to work W/K due to a very good discipline demonstrated in pile-ups. Tnx, very much appreciated. Running 100w on 160m was somewhat similar to Top Band QRP operation from Europe. An average pace on 160m was about 60 QSO /hr. Whenever the pace of the pile up allows, I always try to give out real RST, as I am very much interested in

receiving a real RST for me. The lowest real RST given to JAs and UA0s on 160m was 559. The lowest RST received (across all 160m contacts) was 339, if I remember correctly, and it was not Europe – it was Asia in fact. The first European contact on 160m was quite early at 12:03 UTC - R1FJM – I've got a 559 report.

The most memorable 160m QSOs were logged on 3 Nov 2009 night when the rain storm has washed a tree holding the far end of the horizontal Inv L wire – I found the end of antenna wire touching the ground next morning! When operating I thought that the propagation on 160m was 'pretty poor' that night, while 80m was OK. Many thanks to ON4UN, SP4Z and OM3KFO and multiple JA/W for QSOs that night.

160m however was not the main band; rather episodic operation on 160m during those 6 nights resulted in the following countries worked: W1,2,3,4,5,6,7,8,9,0, KL7, JA, VE, KH2, UA2, UA1,3,4,6,9,0, R1JFM, VK, ZL, BU, KH7, S5, YL, LY, UR, I, OH, OM, OK, OE, SV, OZ, EY8, HL, SP, DL, SM, GM, PA, E74, 9A, YT, ON, DU, and perhaps some others that I have missed to pick from the log. Although signal reports and the QSOs in the log indicate that the Inv L worked well on 160m, but still I believe it was a bit inadequate antenna – the vertical part was rather short (some 16.6m or so), and most of the radials may have been a bit too short for 160m. Obviously adding a PA would have helped.. The beverages were dismantled soon after I realized they provide limited benefits over the TX antenna.

A different picture was on 80m. An average JA pile up speed was about 110-130 QSOs/hr and the feeling was as if operating on 20m with a good stack of yagis. Most JAs had 579 to 599++ signals. European pileup on 80m was a bit lower. I am glad that operators on 80m were continuously asking for 160m and I was QSY-ing often to make the 'new one' to happen. I was very pleased to log multiple European QRP stations on 80m – most of them with 539-559 signals. At the age of DX Clusters and Twitters no one seems to be listening anymore to what is happening on the bands. Although I am convinced that one day DX Clusters and the like will kill amateur radio (no more charm and excitement left associated with uncertainty in waiting for unknown DX), today this represents fantastic opportunities for QRP stations – the task is to find DX before someone advertises DX freq on the cluster. In no competition environment QRP QSO is very easy, as the hearing capability at DX end is usually very good.

The world on 5Mhz

Yes, there is life there on 5,403.5Khz (USB). Although calling CQ a couple of times did not produced any pile-up (and I must confess I was calling too early for W/K morning tea time) , I've got into the log KH7, K9 and A3. Having rather limited time available for ham activities, I tried to stay on 160m/80m instead, where pile ups could keep me awake.

What's next

When the travel bug bites again, I will be browsing Google Earth in search for a perfect piece of bush to operate from…