

VK9WWI

Willis Islets, North Cay

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DXpedition Notes and Observations

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This was intended to be a simple “personal” DXpedition that would be combined with diving and spear-fishing. Equipment was chosen as the minimum required for meaningful low band operation. The budget was also moderate, relatively speaking.

The Location

Willis Islets are located around 16.5 degrees S and 150 degrees E, off the East Coast of Australia, about 500 km east of Cairns. The group contains three islets: South Islet, Mid Islet and North Cay. There is a meteorological station on South Islet, which is manned by four weather observers.. This is by far the most easily accessible islet. Mid Islet is located 7 km north of South Islet and is about 300 meters across and is covered with low, scrubby vegetation. North Cay, which is a low sand cay about 1.5 km long and 300 m wide, is located 8 kilometers further to the north of Mid Islet.

We decided to locate the station on North Cay. As far as we know, nobody has operated from North Cay before and the cay appeared large enough for a sizable Beverage with an east-west orientation.

Access to North Cay is difficult because of the surrounding coral reefs, which at low tide uncover. We were able to find a wide enough channel in the coral (about 1.5 m wide and winding!) for the dingy at the west end of the cay. Through this channel we ferried the gear ashore, which was off loaded on a narrow sand spit at the western end of the cay. This is where we set up the station: on the western tip of the cay, just where the sand spit joins it.

Willis – especially the North Cay – is a tough place to operate from. There is nothing on the island, except birds. No hotels, no water, no power, not even a tree! You can not keep a boat on station nearby because of the rough conditions. You are on your own.

The Equipment

Our equipment consisted of an Icom IC-746 PRO, an SG-500 solid state 500W amplifier, an SG-235 auto tuner, and an MFJ manual tuner. All equipment was powered from four 12V car batteries which were charged by two 30 A chargers powered by a 1.5 kW Honda generator. Logging was done on a lap-top, which was also connected to the rig. (A must for efficient DXpedition operation and subsequent QSL-ing!) We also had an Icom IC-706 with an AH-4 tuner as a back-up. Not a “big-gun” expedition set up!

We had a single tent with a tarp for awning, under which we placed the operating table with all the gear piled on it, and under it. We had minimal amenities. (We did not have hordes of hired laborers to set up a tent city, and antenna farm.) Fuel for the generator was carefully calculated at 100 liters, although Tomi was constantly worried about us running out of fuel, we have finished up with about 20 liters left – enough for a day’s of operation. We did not have internet access, although we had a satellite phone, which worked about 5% of the time. For communications we had Amateur Radio!

We operated under some difficult conditions: the tent was cramped and was constantly flapping in the brisk breeze that never seemed to let up. This caused serious QRN! We had difficulty copying weak stations on 160 even with noise cancelling head-phones on. For an entire day and night we’ve endured a storm that almost flattened the tent: we used driftwood to shore it up. Making regular trips to the generator – which was sited about 150 meters away for reasons of noise – was no fun either in the blowing rain. It appeared that we had technical problems, but really we were just very busy; the two of us had to keep things going and operating at the same time.

There was one technical problem that hampered our operation. Our PA, a 10 year old SG-500, had a slow T/R switch, which cut off the first dot of a call off when operating high speed CW, causing many repeats and the need to reduce sending speed.

The Antennas

For antennas we had one 12 and one 20 meter SpiderBeam fiber-glass pole, with home made galvanized-steel bases. We set up the 20 meter pole on the sand spit, with an inverted L that was cut for 1.825 MHz., with the “horizontal” wire being held by the 12 meter pole which was set up on the island about 100 meters to the east. The wire could be lowered for 80 m operation. We added 12 elevated radials of between 10 and 30 meters long and about 0.7 meters above the sand, with some extending into the water. We have also added a 2 meter long ground rod; the sand appeared to be wet here at all times, so it may have done some good. At high tide the entire sand spit, including the base of the antenna, was under water. We believe that the location of this antenna was about as good as it could get: surrounded on all sides by sea water, or standing in sea water at high tide. Looking at the EZNEC model of this antenna one would think that on the higher bands the antenna would perform poorly, with too much high angle radiation, but the log proved

otherwise. Sea water seems to make vertical antennas work very well – or at least does not make them work poorly.

We set up a second vertical on the 12 meter pole for the higher bands, but as it turned out, we kept using the larger antenna on the other bands out of convenience. This pole, however, turned out to be very useful for the Pennant receiving antenna we have erected later.

Receiving Antennas

One goal of the operation was to activate VK9W on 160 meters. During the short planning phase we sought the advice of experienced 160 m operators and previous DXpedition members regarding receiving antennas for the low bands. Interestingly, the advice fell into two distinct categories, almost evenly divided. One group stated that on a remote location like Willis there would be no need for separate receiving antennas because of the absence of man made noise. The other group stated that receiving antennas are a must because of likely noise from tropical thunderstorms and the Chinese “Dragon” HF over-the-horizon radar, which has one of its operating frequencies in the 160 m band. As it turned out, both groups were right. On some nights the TX antenna worked fine, on other nights the lightning crashes made listening on the TX antenna painful. More on this later in the Operation section.

During the course of our ten day operation, we have erected two receiving antennas. A pair of Pennant Antennas were loaned by W8UVZ. One of these, aimed at North America, was installed on the second day. For supports it used the 12 meter SpiderBeam pole and a newly erected driftwood bamboo pole. The center of the antenna was about 5 meters above ground. It worked fine for the NA direction, drastically cutting noise of lightning crashes. Still, the antenna produced very weak signals, even with a K9AY pre-amplifier (which was loaned by Gary, K9AY). On the fourth day we have built a 140 m long Beverage antenna, laying in a 80 degree direction (EENE); not perfect for North America, but that was the best we could do given the shape of the island the desire to say far from the salt-water. The Beverage worked so well that a couple of days later we cannibalized wire from the short vertical and extended the Beverage to 220 meters. A strange thing occurred at that time. The antenna, which in its shorter form did not pick up noise from the our generator, which was about 60 meters to its side, now was picking up generator noise. (Beware of these new generators with “inverters”!) The generator was located about 100 meters from the operating position and about 200 meters from the main antenna. Its power cord was curled into chokes at several points and it was grounded. This configuration eliminated some early noise pickup. The extended Beverage, however, was now picking up generator noise, but it also produced much better signals, especially on 160 m, and the noise was easily removed by the receiver’s noise blanker, so we decided to stay with this new configuration. The Beverage worked very well for us for the rest of the operation. It was very good on 160 meters and it was superb on 80 meters. Its directivity was so sharp that on 160 meters we could switch between working Japanese and North American stations just by switching antennas and doing away with the need to listen up 5 kHz to get away from the large number of Japanese stations

calling! The Beverage just simply cut them off, except for the very loud ones. (I've missed KL7FG calling several times, until I switched to the vertical, on which he was S9!) For Europe, which started coming in the early morning hours, we removed the loading resistor, turning the Beverage into a bi-directional Beverage, which, despite its poor orientation, was still much better than the Pennant or the main antenna. An interesting point to make here: Beverage antennas rely on poor ground and are reputed not to work on small islands or close to the sea. Our Beverage was running parallel to the shore about 30 meters from the high tide water line and over sand that was about 3 meters above the high tide sea level (5 m at low tide). The sand was dry in that area and very likely a poor conductor.

Operations

This being a "private" DXpedition, we did not start out with any major goals, except to work on 160 meters and to make as many QSO-s as possible. Tomi, HA7RY, did most of the high band operation, and I, AA7JV, did most of the low band operations.

It became quickly apparent that our main antenna was working very well. We were often able to work with only 100 watts and still remain in control of the pile-ups. North American stations, especially on 80 meters, were also strong, well into the early morning hours.

It did not take long to find out that we were being sought after. The pile-ups, especially on 40, 30 and 17 meters, were big. Being close to Japan, the Japanese stations were numerous and loud. Fortunately, they were also well disciplined, which allowed for a reasonable QSO rate. The same can not be said for the rest. While the US stations were relatively well behaved, many European stations were unruly. It is worth pointing out that the QSO rates were much higher when propagation was mostly to Japan. This was largely due to the more disciplined operators, who instead of causing QRM waited their turn and timed their calls correctly.

Worse than undisciplined operators were those who could not hear us at all, but kept calling regardless. The DX station can quickly tell when somebody can not hear him and is just calling based on DX Cluster data. Such an operator not only makes a fool of himself but also causes substantial QRM to the detriment of everybody. Essentially he denies the DX to others while he is unable to get it for himself! This is one area where national organizations could do a lot more to educate operators.

Although it is important to call a DX persistently, it is important to time the calls well and to listen between calls. In fact listening is the most important part of getting a rare DX station. To know when the DX is listening, it is important to discern his operating pattern. Calling him when he is transmitting, or when working somebody else, will not get you anywhere. We could instantly identify the experienced operators who were often able to get through on their first call, which was well timed and on a well chosen frequency. You can do that only by listening for a while and learning the pattern of the DX! Big antennas and multiple kilowatts will not do that (although they help).

Dead Bands?

When we have arrived on Willis our first impression was that the bands were dead. North American or European stations can not imagine how dead the bands be so far from civilization. One could have easily thought that there was no propagation. Once we have sent a few CQ-s, however, first a few stations would appear, and then when we were spotted on one of the DX clusters, all hell would break loose, and suddenly a previously dead band would be boiling with calls from many areas. Suddenly, propagation would go from zero to excellent (despite the bottom of the sunspot cycle).

The First Night

We have arrived at North Cay during the early afternoon of September 22. After we have ferried the gear ashore, we set up the tent and one antenna mast. We were planning to complete setting up next day, to be ready by the evening of Sep 23 for Top Band. Tomi, keen to get going, spent the first night on the island, operating with a temporary set-up. (I believe that he was also keen to get off the boat which was rocking and rolling widely in the large unprotected waters south of North Cay.) Tomi was using a piece of sloping wire tied to the tip of the 12 meter SpiderBeam pole, fed via a manual tuner, running 100 watts off a 12 V car battery. Logging by hand on pieces of cardboard (he has left his computer on board), he was able to make 450 QSO-s, working through the night, mainly on 40 meters. As it turned out, this was a much welcomed part of the operation, as later we were concentrating on 160 and 80 meters at night.

160 m Operation

We have spent Sep 23'rd setting up the station. The inverted L went up, we have installed radials, got the generator going (and moved it to get rid of its noise) and set up the logging computer, alongside a myriad of other small things. We were ready by 6:30 PM local time and tuned the radio for 160 meters. It was going to be one of those magic nights that probably occur once in a life-time.

Our first CQ was answered by JA7FUJ at 0838. A long string of JA and North American stations followed. At one point we had to listen 5 and 6 kHz up to hear the North American stations. The first European station was UA4DX, two hours ahead of any other European. (I have repeatedly copied him as VA4DX – not wanting to believe that the band would already be open to Europe.) The North American stations started to fade out after their sunrise at 1400 and European stations started to come in long strings. Altogether we made 430 QSO-s on top band that night.

Signals from both North America and Europe were strong and clear, with little QRN. We did not have a receiving antenna up yet; we were using the inverted L for receiving. The Dragon was also quiet. Indeed, 160 meters had the feel of 80 meters on a very good night. At that point I was convinced that those who suggested that there was no need for a separate receiving antenna were right and thing will be easy. The next night proved the

need for separate receiving antennas: in the early evening hours lightning crashes were so strong that they were painful through the headphones. Eventually we gave up on top band for a while and QSY-ed onto 40 meters for a couple of hours. A couple of hours later top band quieted down (the thunderstorms must have dissipated) and we had a decent night of operation. Next day, we installed the Pennant, which then proved its value during the next two nights, after which the Beverage took over and we rarely used the Pennant any more.

Altogether we made 1200 QSO-s on top band.

A couple observations are due. When calling a DX on 160 meters, unless you are very confident of your full size array and kilowatts, you should send your call-sign two or three times. Due to noise, weak signals and QRM it is common that the operator picks up only part of a call-sign each time it is sent. A lot of time was wasted by repeatedly asking stations to resend their call-signs. Sending speed should be between 12 and 25 WPM, neither faster, nor slower! The problem with slow speed is, in this part of the Pacific anyway, that there are a number of beacons that can be heard across the 160 m band and these beacons transmit at about 5 WPM. I believe them to be long-line fishing beacons, as they constantly change, drifting with the currents and are removed at intervals. They are easy to separate from calls provided the calls are at higher speeds. Speeds faster than 25 WPM are difficult to copy due to lightning noise or the Chinese “Dragon” triggering the noise blanker, which in turn can obliterate high speed dots.

Again, if you can not hear the DX don't call! This is especially true for 160 meters, where the above mentioned problems are compounded by the QRM of out-of-synch calls launched at random.

One misconception about 160 meters is that a station should focus on its ability to receive. This is only partially true: You must be able to hear the DX, but one station's TX signal is the other station's RX signal and when you start out with a weak TX signal, you will simply not be heard. If you want to do DX on low band, you have to have a decent TX set-up, in addition to the ability to hear. It is simply a matter of signal-to-noise ratio and the noise is a given.

Operations on Other Bands

80 meters was a strong and reliable band for us. Both North American and European stations were loud, and of course, so were the Asian stations. The Beverage proved to be very useful on 80 meters, as this band was also effected by lightning noise.

40 meters was dominated by the Japanese, as well as the European stations most of the time. The Chinese “Dragon”, however, seems to be centered over the CW portion of the band and creates very substantial interference. A good noise blanker seems to be able to deal with it, but signals get degraded.

30 and 20 meters performed as expected.

17 meters was the most reliable day-time band! It was often open to Japan, Europe and North America at the same time.

15 meters opened at times to Japan, with a few Europeans mixed in.

12 meters had a few surprise openings to Asia, when station were very strong.

10 meters: no QSO-s. Hey, you can only do so much with a single station.

Final QSO Count:

Band	CW	PH
160	1211	0
80	1556	49
40	1478	7
30	1139	-
20	1174	733
17	1767	556
15	703	142
12	221	97

Total: 10834

Note that the totals do NOT include duplicate QSO-s, of which we had a lot of!

The Dragon

The Chinese HF Over-The-Horizon (OTH) radar, called Dragon, is a real menace to HF amateur radio! It degrades the 160 and 40 meters substantially. It also appears that its main transmission frequencies are intentionally centered on amateur bands; perhaps these bands are seen as the least important and poorly defended. Hopefully, they are still in a testing phase and once they are operational they will use it less frequently. We also hope that the practice does not spread to other under-developed military hopefuls, who may see HF OTH radar as a cheap alternative to AWACS!

Summary

We would like to thank all those who've contacted us. We also appreciate the efforts of those who tried but did not make it into the log. We know that a lot of people wanted more 40 operation, digital modes, etc. Please understand that we tried to be even handed, but with a single station, and two people doing everything, you can not make everybody happy.

Overall we are content with our operations. We are especially happy with our 160 m results. They show that when receiving conditions are good, and the interest is there, a relatively modest station can do a lot on Top Band.