

# A35JT DXPEDITION TO THE KINGDOM OF TONGA

By VK South Pacific IOTA Expeditions  
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## IN THE BEGINNING...

The idea for this DXpedition began after I returned home from Vanuatu as YJ0AG in April 2018. Up until this point, I had been trying to combine a family holiday with Amateur Radio, having also operated as E6AG on Niue in 2017 and as VK5GR/P on Kangaroo Island in 2016. The lure of the pileups and the resulting impact on family time meant it just wasn't working. A new formula was needed. It was time to "upgrade" to the next level!

At the end of 2018, after discussing it with my family, the decision was made. For the next expedition, I would ask some friends to come with me and share the operating, building it into a full DXpedition. I received early interest from within my local Amateur Radio club from Olgierd (Oly) VK5XDX and Andrew VK5AKH. From interstate, my friend David VK3BDX was also keen to join us, creating a 4 man team. We were then ready to take the next steps.

Unfortunately, early in the project, David learned he was unavailable due to a family wedding. Luck however shined when Steve VK5SFA also expressed interest, having just retired from work. With that, the team was settled and planning went into full swing.



Photo 1 – The A35JT Team

## WHERE TO GO?

We also had to decide where we wanted to go. The search began with a look at the rankings of the various Pacific DXCC and IOTA entities. Next I considered what suitable accommodation and airline access was available. Finally Tonga was picked due to ease of access (it was service by large A320/737 aircraft from Australia or New Zealand) and availability of suitable

venues, at prices we could afford. It was also highly sought after in Europe, where it was within the top 60 most wanted and was within the top 100 most wanted globally. Things then began to take shape.

## APPLYING FOR A LICENCE

After making some enquiries with the A35EU team from the previous year, I was able to contact the Ministry of Communications in Tonga which was responsible for issuing our licence. After being sent the required forms, I made our application for our desired callsign, A35AG.

I was informed that everything would be fine and that the call sign was available as things continued to progress, albeit on "Island Time". Then finally, after approximately 8 weeks of correspondence, we were issued with our licence. There was a little surprise however when the final callsign granted was A35JT. Oh Well! After discussing it with the team we decided it wasn't worth the extra effort to question it, so A35JT it was!



Photo 2 – A35JT Licence

## SELECTING A VENUE

Selecting a venue, when you have never been to the country before, is always difficult. Not having the means to conduct a scouting visit prior to the main



**Photo 3 – Teukava Beach Oasis ([www.teukava.com](http://www.teukava.com))**

expedition, you find yourself relying heavily on the internet and email. This is then made harder each time by having to explain to someone, who usually has never heard of Amateur Radio and for whom English may not be their first language, what it is you want to do when you arrive.

At the same time, you are searching for photos to confirm if there are enough beds, whether the facilities for cooking are adequate, if there is somewhere suitable to install the radios, get the feeders in and out of the room and most importantly enough room to install the antennas. Next are the complications around trying to secure dates with the accommodation while at the same time synchronizing them with available airline flights. All up it can be quite the puzzle.

Organising the trip to Tonga was no exception. Our initial plans revolved around using an AirBnB property on the south coast of the island. While not an ideal water take off to Europe, it at least the space needed. However, complications with timing and confusion over the room details meant that the original option became unavailable before we could confirm our flights. So, back to the drawing board we went.

Finally, after making some further telephone enquiries, the owners of Holty's Hideaway on the North West coast (one of the properties we contacted) suggested we consider Teukava Beach Oasis across the road from them. From the moment we contacted Fiona at Teukava, things were looking good. We obtained her agreement to use the facility for our radio activities and struck a deal to take exclusive use of the entire facility for the length of our stay.

Finally things seemed to be coming together and we were able to synchronize our airline bookings too. There was only one wrinkle in our intelligence data that we had to deal with upon arrival 12 months later. You just never quite know until you get there...

## **TRANSPORT TO TONGA**

The next major logistical hurdle was navigating how to book the necessary flights with enough baggage allowance to get the team and our equipment safely to our destination. We chose to fly Air New Zealand which served both Adelaide and Tonga direct from Auckland, New Zealand, which is a major air hub for the South Pacific.

The problem this brought was that excess baggage on the Auckland – Tonga flights is not guaranteed beyond 2 bags per person. Try as we might, we couldn't find a way around this that would ensure all of our gear landed the same day we did. So, the initial target weight for EVERYTHING in the expedition was set at 5x 23kg bags for gear plus 2x23kg bags for clothes and personal items for 4 people. Ambitious to say the least...

## **EARLY STATION DESIGN**

The next step was to start designing the station. Initially, the plan was to take one main station and a spare transmitter. This eventually became three transmitters, with the intention that all were able to be used simultaneously. That drove further requirements for antennas and filters plus extra computers, interfaces, power supplies and more. It is amazing how quick it mounts up!

As the design continued to grow, so did our battle with weight as we were still limited to 7x23kg cases for electronics and clothes. This was to be a continuous point of tension as the project developed, which ultimately required some expensive decisions.

## ANTENNA SELECTION

Having noted that Tonga was high up the most wanted list in Europe, we early on picked this as one of our primary targets. We knew that trying to work Europe would be hard. Antennas with some gain or at least directionality were required to meet our objectives. We also felt that the workhorse bands would be 40m and 20m, closely followed by 30m, given the period of the sunspot cycle we were in, so much of our focus was placed there.

It was also clear that there was a lot of interest in 160m from everywhere. While it wasn't intended as primary goal of the expedition, some effort was made to cater for 160m and 80m.

With this in mind, we nominated the 20-10m MW0JZE portable HexBeam I had used in Vanuatu as one of the antennas. For 40m, having seen one used to great effect on the 3B7A expedition, we chose to design and build a 4-square array. The team then added another 4-square for 30m for good measure. The last antenna selected was a multi-band 160m to 10m vertical.

## DESIGN AND CONSTRUCTION – THE 30/40M 4-SQUARES

The team split the responsibilities for delivering each antenna and work began on what would be a 9 month marathon design and testing program. In the beginning, weight was as much a critical factor in the antenna design process as was RF performance. This very quickly became a tall order to fill.

Olgierd took up this challenge first, working on the design of the 40m 4-square array. The first version was then tested in February 2019 during the CQ WPX SSB contest. It worked really well, but weighed in at over 18kg. This was before remote switching gear had been added. So, reluctantly, back to the drawing board we went.

Fortunately, the team was then able to source some 12m fiberglass fishing poles from a VK4 amateur. Using an elevated radial design, Olgierd then produced a new mechanical design which shaved ~4kg of weight in the process. He then added a remote relay switching system, so we could switch the array direction back in the radio shack. This was vital, greatly enhancing the array's usability.

Meanwhile, Steve VK5SFA set about building the 30m array. Its design also used an 8 elevated radial per antenna system, but was based on 10m fishing poles.

Lots of work then went into making the 30m and the 40m controller and phasing units capable of QRO.

Meticulous measurements were also made of the phase shifters to ensure the correct phase presentation and impedance matching to each antenna.



*Photo 4 - Tune & Test Day in Adelaide  
30 + 40m 4-square arrays*

Finally, the proof was to be found on air. A tune and test day was planned in a local park about 5 minutes from VK5GR's QTH. Both arrays were installed and with help from Paul VK5SL and his professional broadcasting experience, we were able to measure and verify the patterns the arrays produced.

It's worth noting that, throughout the project, testing and verification was always part of the plan. This, it turned out, was critical as the pattern tests revealed a problem with the 40m array. It had lost its directionality compared to the first trial in February and we didn't know why! After further investigation, Olgierd discovered a broken driven element conductor in one of the elements. It was much better to find and fix these sorts of things back in Australia than to not discover it until we were out in the Pacific.

Satisfied that all was now well, we were able to package up the 30m and 40m antennas ready for shipping.

## LOW BAND ANTENNAS – 80/160M + MULTIBAND

Focus then turned to the 80/160m Inverted L antenna. Our plan was to adapt part of an 80m CrankIR kit plus the 40-10m CrankIR antenna to a 12m Spiderbeam™ fiberglass pole. This gave us a tunable multi-band

antenna that took the original 40-10m design and extended it down to 160m.

The biggest challenge was to deal with the lack of rigidity the 12m Spiderbeam™ pole has over its top 2 segments. While holding up verticals it is fine, when it came to having the inverted L pulling off to the side of the pole, the horizontal mechanical loads were making it difficult to rig. Our solution was to add some additional box rigging, much like you find on yachts. We also replaced the top two Spiderbeam™ sections with 3 of the fiberglass tubes that came with the CrankIR 80m extension kit, but mounted at the bottom of the Spiderbeam™ pole instead. In this way, we were able to maintain 12m of height but on a much more rigid structure that was capable of taking the loads presented by the inverted L.



**Photo 5 – 160m Inverted L on a Spiderbeam™ 12m pole**

We then added 8 radials to the antenna plus an extendable counterpoise for 160m and away we went. Was it the most efficient antenna for 160m? Certainly not. Did it provide access to 160m? Absolutely! As the results from the expedition show, we were able to make over 600 contacts on 160m with this modest antenna.

The final addition to complete this antenna was to include a switchable impedance matching transformer at the feed point. Thanks must go to Neil VK5KA who helped teach us about RF transformer design during the development of this antenna!

## **HIGH BANDS – PORTABLE G3TXQ HEXBEAM 20-10M BY MWOJZE**

For the bands above 20m we planned two antennas. One was the tunable vertical intended mostly for 160-80m and the other was my trusty portable HexBeam.

I first used this antenna, produced by Ant MWOJZE, during my last expedition as YJ0AG on Efate in Vanuatu. This time, it would also serve us well. Weighing in at only ~6kg, it packs good performance and low weight, very important considerations for a fly in operation out in the South Pacific.



**Photo 6 – MWOJZE HexBeam & Spiderbeam™ Mast**



We then used a 10m SpiderBeam™ aluminum mast (one of two taken on this expedition) to mount the beam. These masts, weighing in at ~11kg, make great expedition towers. At a pinch I have erected the HexBeam and mast by myself in about 4hrs. With a build team of three we hoped to have the entire antenna in the air within an hour from un-packing it.

# 6M EME – INNOVANTENNAS™

## 6 ELEMENT LFA2 YAGI

The final station (and a story in itself) was the 6m Moon bounce system. The team was inspired to give 6m EME a try after being approached by Lance W7GJ in December 2018. He asked us to consider 6m EME in our plans.

Trying to find a suitable antenna design that could be built with materials available in Australia that met the weight and portability requirements was an instant challenge. In the end, a compromise solution was adopted which didn't quite have the desired gain, but at least was available and light enough to carry. The solution was an InnovAntennas™ 6 element LFA2 yagi, which was obtained second hand from Paul VK4MA.

The 6m EME first trials of the antenna only, were run back in February 2019 from Corny Point on the Yorke Peninsula in South Australia. This was our first time ever attempting 6m EME and we were complete novices to the mode. We were stunned and pleased to work 6 stations that day. We even saw our own echoes off the moon at one point!



**Photo 7 – 6m LFA2 & SpiderBeam™ Mast**

Progressing the system design further demanded we solve the support mast problem. Spiderbeam™ again helped us with another one of their 10m aluminum masts ([www.spiderbeam.com](http://www.spiderbeam.com)). We must thank Rick DJ0IP and the team at Spiderbeam™ for their support

with the project. Their products answered many of the expeditions needs.

Low loss Hyperflex-13 feed line then was sourced from Messi & Paoloni ([messi.it](http://messi.it)) via Carsten VK4OA at RF Solutions in Australia ([rfsolutions.com.au](http://rfsolutions.com.au)).



All of this finally came together as a working system during the second field test conducted in July 2019 back in Australia, much to the team's delight. This trial was conducted from a farm on Point Sturt on the shores of Lake Alexandrina 90 minutes SE of Adelaide. This time we tested the full system we intended to take to Tonga - end to end. It was a day of mixed results. Contact was made with one station, before the SPE 1.5-kFA linear amplifier failed (with the dreaded blue smoke escaping from the box). The antenna was working, but now we had other problems.

Our test everything strategy at least was working and at least it failed while we were still in Australia. However, the failure also threatened to disrupt all of our plans for 6m EME from Tonga. We were wondering where to from here?

## STATION EQUIPMENT DESIGN

To drive the antenna array, the team assembled three stations. Station one comprised an Elecraft K3S, MicroHam Keyer II, Codan 3020 power supply and an Elecraft KPA500 500W linear amplifier. Station one also was connected to a M<sup>2</sup> Systems™ M6-1K2 6m linear amplifier dedicated to EME.

Station two was very similar, with an Elecraft K3 (upgraded to the equivalent of a K3S), a MicroHam Keyer II, Codan 3020 power supply and a second Elecraft KPA500 loaned to the expedition by Matthew VK5ZM.

Station three, initially intended as a backup but quite often used in parallel in the end, was an ICOM IC-7300 loaned to the expedition by Mark VK5QI & Arnie VK5NEX. This radio was the little radio that could. Even with only 100W we managed contacts to Europe on it at times. Needless to say we were impressed for what it was, although it is fair to say its receiver did

complain at times in the high level RF environment with all three stations running.

We also included a set of W3NQN designed filters obtained from Array Solutions in the USA to help reduce the 'close combat' interference issues we expected. The rest of the feed lines comprised over 200m of Messi & Paoloni Hyperflex-7 – which gave us RG213 performance at substantially less weight.

It should be said that this wasn't the station design we initially considered. The original plan for station one was as to use the SPE 1.5-KFA Linear Amplifier, which failed during the EME trials. Unfortunately, that amplifier did not make it back from repairs prior to departure. Arrangements to try and replace the amplifier in time couldn't be finalized (due to insurance complications) so we had to make do with what we had. Needless to say the team was disappointed that we couldn't bring you a louder signal.

## SUPPLYING POWER TO THE STATION

A critical consideration in our station design was how to protect the gear from AC Mains voltage fluctuations. Recent publicity of failures on other expeditions due to mains voltage spikes had us worried. To combat this, the team managed to source three ferro-resonant MOV based mains filter protection units. This first line of defense was then backed up through 8 way SB80 Cabac power-boards which included further high energy MOV and spike protection.



Finally, we ran the low voltage side of the station through our Codan 3020 power supplies. These units (supplied to us by Ivan VK5HS at HF Radio Solutions - [hfradiosolutions.com.au](http://hfradiosolutions.com.au)) can manage large voltage excursions on their inputs while maintaining a steady output to the transceivers. Designed by Codan Communications ([codancomms.com](http://codancomms.com)), a global commercial HF communications manufacturer based in our home city of Adelaide, these supplies are specifically designed to withstand unreliable mains power systems. They just kept on running despite some of the bumps and kicks we saw in the mains while we were there.

## IT NETWORK & CLOCKS

On the "IT" side of the equation, all three stations were driven by Windows 10 based laptops networked on

WiFi. Each one ran the N1MM logging software as well as the necessary digital modes applications. The central logging machine also ran the Clublog livestream daemon and provided the Internet firewall connectivity through the resort's Wifi/ADSL service.

One of the critical functions of a modern expedition station is the need to maintain clock synchronization, not just for logging but more importantly to support the WSJT-X suite of software. To achieve this, the central machine also was attached to a Ublox7 USB GPS which used that as a clock reference. This was then distributed via the inbuilt NTP server found in Windows 10 Professional (which one of the machines fortunately had a licence for) to the rest of the machines on the network. They then used the BKTTimeSync software written by IZ2BKT to maintain their clocks from the local NTP server on station one. This proved very effective, once Andrew VK5AKH resolved some networking and firewall issues.

(Visit [www.maniaradio.it/en/bkttimesync.html](http://www.maniaradio.it/en/bkttimesync.html) for details about the time synchronization software).

## TRANSPORT – IT WON'T FIT!

By the end of April, it rapidly became clear we were in trouble with weight. There was no way we could fit everything into cases and stay under our 5x23kg limit. The antennas alone now weighed in at 4x32kg. Alternative shipping arrangements had to be considered.

Through the generous sponsorship support we received, we were able to consider freighting the antennas ahead of time. After weighing the options, I approached a local freight forwarder I had use before in Australia and obtained some quotes. I also approached Pacific Forum Line in Tonga to handle the freight at the other end of the journey.

Eventually we decided that airfreight was the best compromise for reliability, traceability and speed for surprisingly not that much more cost than sea freight. With that decision behind us, arrangements were made to ship the antennas and most of the feed lines to Tonga at the end of August.

The next problem was how to package the antennas. With airfreight our chosen mode of transport, packaging weight was just dead money. We had to find something strong and durable to withstand the rigours of international travel. This is where we had a stroke of luck. We discovered ski case manufacturer 'Sportube' who made adjustable length PVC cases that were light but strong. We were then able to track down an Australian distributor and placed an order.

We couldn't be more impressed with the result and the cases passed through the entire trip unscathed. We would happily recommend these to anyone looking to transport antennas by air in the future.

## MURPHY STRIKES AGAIN!

Now that we were committed to freighting the antennas the pressure was on to complete all of the testing and validation work. Fortunately the rest of the testing proceeded smoothly and we submitted the freight on time at the end of August. We then began the nervous wait to confirm the antennas had arrived and were available for collection.

The actual journey for the antennas took less than a week, using Air New Zealand's freight service. However, once they arrived in Tonga, we again had to adjust our perspectives while things progressed at a methodical and steady pace according to "Island time". All the while, the deadline for the team's arrival drew closer. My inexperience at dealing with international freight also complicated matters when I realized that Tonga customs needed the keys to the cases. It hadn't

occurred to me to arrange to courier them to the freight handlers ahead of the shipment, which hampered efforts to get customs and quarantine clearances for the antennas. Fortunately "universal keys" (bolt cutters) were available and I duly authorized their use.

Then a near disaster struck. The long serving Tongan Prime Minister, Mr Akillsi Pohiva, passed away while in office, placing the country into mourning. A string of additional public holidays were declared and government services mostly shut down for over a week. It clearly was a difficult time for the people of Tonga. It was also a critical stage for us, threatening to derail the start of the expedition by potentially leaving us without the bulk of our antennas.

After many phone calls to Tonga, our contact at Pacific Forum Line, Mary Mahe, worked some magic. With 5 days to go before our arrival, news finally came through that the freight had passed quarantine and had been granted temporary duty free import status. We must absolutely thank the good people in PFL Tonga for their help here – they saved the day!



PHOTO 8 – THE TEAM READY TO DEPART ADELAIDE (L-R VK5DX, VK5GR, VK5SFA, VK5AKH)

## DEPARTURE DAY – SEPTEMBER 22<sup>ND</sup> 2019

After nearly 12 months of planning, numerous setbacks and much testing, we were finally ready for departure. The team assembled in Adelaide Airport at 9.30am Sunday September 22<sup>nd</sup> and checked in all of our luggage. After a last meal with family we cleared customs and headed for the gate. We boarded our Air New Zealand 787 flight bound for Auckland, New Zealand settled back and relaxed before the flurry of activity we would face on arrival in Tonga.

That night, on arrival in Auckland, we slept at the airport hotel, ready for the next morning and the final leg of our journey to Tonga.

## DAY 2 – NEW ZEALAND TO TONGA

After a good night's sleep we boarded the plane for our final leg. The flight was again uneventful and the service first rate. Finally after nearly 3 hours in the air we caught our first glimpse of Tongatapu Island and our home for the next 2 weeks in the Kingdom of Tonga!



*Photo 9 – Tonga in sight*



*Photo 10 – The capital - Nuku'alofa, Tonga*

Finally, with everything going smoothly, we landed, collected all of our bags and cleared customs. We then met local amateur Christian A35CS, who helped us with the logistics of transferring the team and all of our gear 50 minutes across the island to our accommodation. We are greatly indebted to Christian who had patiently helped answer many questions we had in the preceding 6 months.

The team then split up, with Steve VK5SFA headed directly to the resort to meet with the owner, Andrew VK5AKH headed with Christian A35CS to find food for the first couple of days and I headed to the freight depot with Oly VK5XDX to collect the antennas.

At the freight depot Mary from PFL had everything waiting for us. With our antennas loaded we then headed to the accommodation, happy that all of the equipment and antennas had arrived.

## NOT QUITE AS PLANNED

You will also recall I mentioned there was one more wrinkle with the venue earlier. Well, the moment you finally arrive on site is usually one of nervous anticipation for me. Despite all of the research and discussions beforehand, you never quite know what you are going to find. This was true again here.

I had been working in part from Google Earth satellite photos as well as with photos from the resort owners. I had a hint of a problem, just before leaving Australia, when the Google imagery was updated. Since the original photos taken back in 2016, the scrub around the resort had grown substantially and part had returned to being jungle. This meant we lost the originally planned location for the 30m 4-square. This would need some creative thinking....

## FIRST ANTENNA ERECTED

The first antenna to be unpacked was the multiband vertical. This allowed us to activate A35JT for the first time that evening. This presented the next hurdle. The sand pegs we brought with us proved to be completely ineffective in the shell grit based soil on site. We were forced to improvise with what we had. The solution was to hammer 4 foot long pieces of drift wood into the ground and use those as guy anchors. That job completed, we tuned the antenna to 40m before heading inside to set up the first station.

By the end of the day we actually found ourselves ahead of schedule which gave us time to catch our breath and enjoy dinner at Holty's Hideaway across the road. Run by ex-pat Australians, Holty's served great meals and hospitality – a great welcome to the island.



*Photo 11 – Multi-Band Vertical by the beach*

After dinner, we returned to the station and were ready to call CQ. At 0644z on Monday September 23<sup>rd</sup> 2019, after more than 12 months of planning, we were ready to call CQ as A35JT!



**Photo 12 – VK5AKH operating A35JT – Day 2**

Alex VK2PRC answered with good reports being received back in Australia. A further 340+ contacts were made on SSB and FT8 that night before we retired early to bed to be wide awake and ready to start the big build the following day.

## DAY 3 – THE BIG BUILD

Today was a very important day for the expedition as we erected all of the antennas. We split into groups to tackle each project.

Oly VK5XDX started work on the 40m 4-square array. The first challenge there was threading it through the palm trees while managing the elevated radial fields. Each antenna had 8 sloping radials plus two sets of guy ropes to hold it in place. You can picture the end result looking like a laser field in a Hollywood movie. We again faced issues with pegs that wouldn't hold in the very coarse soil, which was in part addressed by using trees as guy anchors in several cases.

We also had problems with the 12m fiberglass fishing poles splitting. They are not made to take great lateral twisting loads it turns out. Fortunately Oly was able to make repairs, plus we have a spare pole with us just in case.

The 4-square antenna is not quick to erect either, and even with help it took most of the day into the early evening to complete the installation.

Meanwhile, I started work assembling the 6m beam. This was one of the key projects for the day, as it needed to be ready for the first moon bounce attempt at 3am local time the following morning.

While the beam was bolted together, Andrew and Steve worked on preparing the SpiderBeam™ 10m mast. Having given up on the pegs, the tower was now located where three suitable natural guy anchors could be found. In the case of 6m, two trees and a verandah post were perfectly located.

Raising the 6m antenna was a tense affair too. The beam and tower combined are heavy and stability was an issue if it got caught in the wind. So, with the whole team in attendance, the mast was slowly pushed up to full height. Fortunately luck was with us and we were able to cross another project off the list

The next antenna to be tackled was the 20-10m G3TXQ HexBeam. Andrew led the charge assisted by Steve. This beam, designed and supplied by Ant MW0JZE is very light weight for its size (~6kg) and is a dream to assemble and mount on the portable tower. Again we used trees and other fixed objects instead of pegs to rig the tower.



**Photo 13 – 20-10m MW0JZE Portable HexBeam & SpiderBeam™ 10m Aluminium Mast**



**Photo 14 – VK5DXD erecting the 40m 4-square**

The only real catch was that the antenna was almost in the canopy of a coconut tree. When it was dry this wasn't a problem, however when it rained, issues appeared particularly on 17m. The VSWR would climb to nearly 2:1 until the water dried off the leaves. This caused some consternation the first time it happened, until we worked out the cause.

As the last of the antennas for day 3 were being completed, work began on setting up station 2 and 3 in the radio room. The only antenna left for the following day was the 30m 4-square. We would head scratch on where to put it in the morning.

## **DAY 3 – ON THE AIR**

After a day of hard work, the last thing to do was to retune the multi-band vertical to 80m. That completed, the team retired back to the radio shack and got down to business on air.

We selected 80m as the first band to open and started calling CQ using FT8 standard mode on 3573 kHz at 0636z – just to let people know we were around. Very quickly we had an enormous pileup, so we switched to 3567kHz and Fox Mode. We managed contact with stations in North America, Japan, the Pacific Rim and Australia, as well as the occasional South American.

It should be said that for our team, working South America was always novel, because they are so hard to work from home in VK5 (where most of that continent is only accessible via trans-polar paths). As a result, we always made sure we replied to any South American call we could hear.

While 80m was running, I set about configuring the 6m EME station for action early the next morning. Then it was placed on 40m ready for Olgierd to test the 40m 4-square. He had completed the final touches on the 40m 4-square antenna in the dark and was itching to fire it up and see how it would run (it had been a 12 hour marathon setting it up).

At the same time, we saw the noise floor rise across the board as the sun set. This started a hunt for the source across the



**Photo 15 – VK5GR assembling the 6m beam**



**Photo 16 – Erecting the 6m beam – a team effort**



**Photo 17 – 6m EME station – M2 Systems M6-1K2 Linear, Elecraft K3S, Elecraft W2 Watt Meter  
Eltek 2kW 50V Power Supply, Microham Keyer II and MacBook Pro**

resort. We discovered that the main culprit was the LED bulbs used in most of the light fittings around the site. After throwing many circuit breakers, we were able to quiet the site back down and get back to radio. At that instant, the decision to book the entire resort out paid dividends. The level of control that brought is what saved the expedition from being plagued with high noise floors for the rest of the trip.

With the noise problem solved, Olgierd took the chair and warmed up the (F) key on station 1, calling CQ on 7033kHz CW at 0829z. After many North American and Japanese stations the band started to open towards Europe around 1330z. The first stations from that region were mostly Eastern Europeans As the opening progressed, more and more countries became audible. The most westerly station worked the first night was from GW land. Unfortunately 40m had to be cut short at 1430z, due to the commitments to the 6m EME community, and the pending moon rise at ~3AM.

## 6M MOON BOUNCE SUCCESS

I arrived back in the shack about 30 minutes before moon rise. Earlier in the evening a band survey had been completed, and the nominated frequency had been changed due to local birdies in our receiver. Everything else had checked out and we thought we were ready to go.

It seemed however that Mr Murphy would not leave us alone. He wanted one last game with us. Just as we were about to start on 6m, a new noise source appeared that took the noise floor up to S5-6 on 6m. It wasn't there when we set the station up, and given the work around the site to remove other noise sources we had control over (LED lights being a principle source) we were suddenly panicking that everything to this point was about to come to naught!

After a scramble to turn off anything we could find, we tracked this last problem down to one of our laptop power supplies which had failed spectacularly during the evening. It was no longer charging the machine, and instead had started radiating spurious broadband noise everywhere (including HF). We were relieved when we pulled the plug and the noise floor fell back to near zero.

## FIRST EME CONTACT

Our first successful EME QSO was logged at 1508z with OH6MIK, followed 10 minutes later by G8BCG. Over the next hour, we also made contact with KG7H, GM3POI, W7JW and K4PI. After all the dramas back in Australia it was a relief to finally be out there delivering what we promised to the EME community.



**Photo 18 – VK5GR driving the 6m EME Station**

There was one major problem that the 6m EME station brought to the expedition however.. We found we couldn't run EME and most HF bands concurrently (we had suspected this might be the case). So, we had

to curtail HF operations during the EME windows (which wasn't popular with the rest of the crew towards the end of the moon bounce activity). I shortened some of the EME in later days to combat this in order to maintain crew morale. As it became clear we didn't have enough antenna gain without the additional boost provided by ground gain, this was no real loss to the EME activity either.

## **DAY 4 – A35JT HITS ITS STRIDE**

By day 4, with all of the travel and most of the antenna construction out of the way we were ready to hit the radios. As soon as the EME activity closed, we were back on HF. 40m sprung to life with 40m FT8 contacts into Europe. After an hour as our morning gray line approached we switched to 80m on 3567 and were rewarded with some of our first EU contacts on the band to R4, SV, OM, YT, I, HB9, TA, OE, EA and F.

The next band slot opened was 17m SSB, targeting North America with the occasional EA8 thrown in for good measure. HF then went QRT again for the first moon-set EME pass targeting Europe. Three more stations, UR0MC, S57RR and ON4GG were worked on 6m before moon set at 0120z.

## **MORE ANTENNAS!**

It was during the mornings 80m activity that we decided to erect a dedicated 80m antenna as well. This would enable us to switch between 160m and 80m without having to retune the multi-band vertical. Fortunately, Oly was a very good throw, rigging a rope over a 14m high coconut tree just outside the radio shack. With the spare coax and balun we had with us, an Inverted V antenna was rigged. It proved to be the workhorse antenna on 80m for the rest of the trip!



*Photo 19 – 40m 4-Square installed among the Coconut trees*



*Photo 20 – 30m 4-Square installed across the drive-way (telephone lines running through the middle)*

Next, Steve started work on the final antenna to be erected, the 30m 4-square. After wandering around and puzzling over the site with a tape measure for what seemed like ages, Steve and myself finally agreed on a compromise and decided to install it across the driveway. It meant some tricky maneuvers to park the car without driving through the radial field, but that was a small price to pay. Steve with help from the team then completed the 30m 4-square installation.

The final antenna project for the day was to tune the multi-band vertical down to 160m. This proved much harder than expected. The ground conductivity was different compared to all of the places we had tested it back in Australia. Try as we might, we couldn't get the base impedance high enough to match the transmitter. Finally, after some experimentation, the right combination of radial length and antenna elements was found and we were ready to go on top band.

## 160M OPERATION BEGINS

The plan today was to activate 160m at sunset gray line and work it though most of the night. At 6.30pm local time Steve started calling on 160m FT8. It was still daylight in VK but we managed to work VK3GA as well as ZL3RJ and 3D2TS.



**Photo 21 – Steve VK5SFA operating A35JT**

By 0830z we were starting to work NA on 160m as well as more VKs once darkness fell across Australia.

We also started up 20m CW. Oly VK5XDX pointed the beam north and started calling CQ. This was the main EU opening we expected and we weren't disappointed, quickly logging contacts with DL, ON, IK, HA, SM, OH, OE, SP, EI, OL, F and of course plenty of JAs.



**Photo 22 – Olgierd (Oly) VK5XDX our crack CW Op!**

At 0900z we fired up our third station on the IC-7300 and commenced running 100W of FT8 on 40m. We were rewarded with contacts to PY while we provided a good opportunity for Japan to work A35JT.

160m then really began to shine also. Around 0900z we started seeing South America. We hit the jackpot with a contact to CX shortly afterwards. A little later we also reached the Falklands with a contact to VP8EME.

20m finally started to slow down to Europe, and with problems being experienced with the stations fighting each other, it was decided to give 30m a try. Oly QSYed the CW station and started calling CQ on the 30m 4-square array. Signals on 30m were mostly from the Pacific rim with JA and VK dominating initially. Shortly afterwards North and South America were being copied including contacts to PY and Bob VP8LP in the Falklands.

Meanwhile 40m to the US started to pick up and by 1000z stations on the east coast were being worked on FT8.

At 1100z 160m switched to CW with Oly at the key again with immediate results into North America, Japan and Australia. 40m and 160m then ran through most of the night up to 1430z (3.30am) with a mix of CW and FT8.

## DAY 5 – ABOVE AND BEYOND!

The station started the day at 4am activating 6m EME for moon rise. We also experimented with running 160m at the same time as EME and found that the two bands were in fact compatible. As a result, we were able to operate 160m through our sunrise gray line window with great results.

During this session, we worked K2ZD, G4WBP, K5DU and eventually K5NA via the moon.



**Photo 23 – 6m EME Yagi on its Spiderbeam™ Mast**

Meanwhile, on 160m, we had our first European openings. Countries worked included UT, OH, S5, SV, DL, I and A4 in the Middle East.

At the conclusion of the EME session we switched to, 20m CW at 1800z. A mix of EU and NA stations was worked including down into the Caribbean. 20m then switched to SSB at 2100z for a solid run into Japan.

As the 20m opening faded we moved to 17m SSB, bringing a new rush of callers. We were conscious of criticism of past expeditions that focused too much on FT8, so we made the effort to mix up the modes and bands as best as we could.

The EME moonset window then began at 0100z. Over the next 90 minutes a further 5 stations were worked including OH2BC, I4YRW, SP4MPB, ON4IQ and ES6RQ. This completed day 2 of EME operations.

From 0310z (around 4pm) HF operations resumed. We activated three simultaneous stations, on 40, 30 and 17m respectively. Again, finding band combinations that would work together was a challenge. This was one area where FT8 proved useful as we operated FT8 with synchronized transmitters on both 40 and 30m simultaneously.

We also used FT8 as a propagation indicator, providing us clues to when the paths might support SSB. Estimating when SSB would actually work was harder than we thought, however, as the reported signal strengths could have very good SNR in our low noise receive environment, but the actual signal levels

could still be quite low. None the less, it did alert us to when areas of the world potentially became accessible. It was using this principle that led us to switching the 40m FT8 station to SSB at 0435z. We then operated 40m through our evening gray line picking up quite a few European contacts along the way.

By 0830z (9pm) we had eaten dinner in shifts, and the whole team was active in the radio shack. Oly commenced some 80m CW operations while Andrew activated 20m FT8. I then chimed in with some 30m CW as well.

At 1100z, 80m activity switched to 160m with Steve at the helm running FT8. This was done to deliberately target the North American 160m morning gray line at their end of the path – an opening we would try to exploit several more times over the course of the expedition. This is also where Steve went above and beyond being an expeditioner.

Clearly some people were not skilled in operating FT8. To help them out, Steve and later Andrew started emailing people who were calling and failing to make contact, offering them suggestions for how to solve their problems. PC clock issues were a common theme. Calling below 1000Hz was another when using FT8 Fox Mode. This sort of coaching contact was warmly received by those contacted, and was the hallmark of the way the team conducted itself on air throughout the expedition.

## **DAY 6 – CHANGING CONDITIONS**

Dawn on day 6 delivered more successful 6m EME contacts with NJ6P, W6UC and N7IP during moonrise. It also brought further contacts with Europe on 160m FT8. Steve who had been up all night then retired as Oly took the controls. He again worked 20m CW to Europe over the now familiar 1800z opening. This time we kept the EME running while HF was active to see if there were any chances for contacts as the US moonset window passed. We were rewarded at 1900z with a 6m EME contact to Charles N8RR.

20m by then was slowing down, so Oly moved up to 17m CW to “follow the sun” as the morning wore on, able to run at 3-4 contacts a minute to North America and Japan, with the occasional VK thrown in for good measure.

## **OCEANIA, SOUTH AMERICA, AFRICA – CALL ANYTIME!**

One of the early decisions was to implement the team rule that *“if you are an Oceania, South America or African based station you can call us at any time”*. Spending time calling for those specific regions wasn't profitable normally. However, accepting a VK/ZL call in the middle of a CQ NA or CQ EU run made sense, as we found that it wasn't disruptive to the main QSO flow. We also considered it polite to work our local neighbours when we heard them.

Why did we do this you might ask? Too often expeditions come to “our patch of the world” and will not take calls from “the locals”. We did not want to be seen doing that. We understand that countries like Tonga are often considered as semi rare DX, even to VK / ZL operators, given the lack of local activity from the Pacific Islands. Having experienced being ignored from our own back yard in the past, we felt it was a worthy statement to make that if you are operating in our part of the world, that it doesn't take much to support the small local DX community here while you are at it. I hope other expeditions in the future take some note of this and consider it in their expedition plans too.

## WE NEED MORE ANTENNAS!

By midday 17m was slowing down and was time for an operator change. We were also trying to determine the best way to get a second station on the air above 20m without retuning the multi-band vertical given how touchy it had been to tune on 160m. This is where Andrew had a stroke of genius.



**Photo 24 – 40m Vertical in 15m mode**

Looking at the antennas we already had installed, he surmised that there was a good chance that one element of the 40m 4-square, if unplugged from the array, might actually tune on 15m. It was worth a try! So, out to the yard we went and quickly bypassed the 40m 4-square controller. We then checked it out with the antenna analyser which showed a lot of promise! It

at least matched fairly well at 1.6:1 VSWR across most of 15m – close enough that the amplifiers were happy.

This unlocked some serious QSO making potential, with Andrew able to fire up 15m FT8 at the same time Oly resumed on 17m CW.

The next EME attempt was then due. At 0300z Andrew took the reins of the 6m EME station solo for the first time to work through the MoonSet window looking for Europe. The conditions unfortunately were not very good this pass. A geomagnetic storm was brewing, disrupting EME communications. Stations in Europe were being heard at A35JT but there were no successful QSOs. Andrew did manage a successful QSO with JA7KVI at least, which marked a new continent for the EME operation.

At 0400z 20m was selected and it was time for more SSB, this time with myself, VK5GR, on the microphone. Contact was made working mostly Japan and USA with a smattering of Europeans as well. Conditions to Europe began to improve by 0600z and we finally managed multiple contacts into the region.



**Photo 25 – VK5GR operating A35JT on HF**

With a full complement of operators on board and sunset approaching we added 160m FT8 to the mix as well as 30m CW. We were rewarded with contacts again into North America on FT8. Meanwhile, the European 20m SSB opening kept creeping westward with stations from France now making it into the log as well. At the same time, Olgierd was having success on 30m CW into the same region. Finally by 0700z we were hearing G stations on 20m SSB, one of the hardest areas to reach, and managed a QSO with G0YCE.

Andrew then took over 20m and continued to successfully work Europe. Finally at 0930z the 20m SSB opening slowed to a trickle and the decision was made for Andrew to switch to FT8 on both 20 and 30m, while the Oly moved to 80m CW. This is where Andrew started getting inventive.

By now it was midnight in Tonga. To keep as many stations going for as many hours as possible, Andrew took advantage of the timed nature of FT8

transmissions. He networked the screens of two stations together using VNC and started operating two bands with one operator. This also eliminated interference between the bands as their transmit cycles were synchronized. This was a technique he would further develop over the next few days to maximize the QSO rate with the minimum number of operators.

Meanwhile Olgierd continued having success on 80m, working South America, North America and Japan late into the evening.

## 160M ACTIVITY CONTINUES

Andrew then moved the FT8 station down to 160m and again started working North America through their gray line. This operating pattern brought great success on 160m for a band that antenna wise we had not tried all that hard to support. Across the whole expedition we managed to work over 600 stations on 160m across 4 modes and 29 DXCC. Andrew fell in love with the band in particular. I'm sure this will drive his desire for further 160m activity in the future!

## 3 STATIONS, ONE OPERATOR!

Once Oly called it a night, Andrew took over the 80m station and also opened 40m all on FT8. Normally 40m was unusable with both 80 and 160m running, however Andrew had a final party trick to try. He then set up all three stations to be workable from the central logging machine simultaneously. In this way, A35JT was able to maintain a presence on three bands at once with only a single operator remaining awake! The station ran in this configuration for nearly 6 hours that night – a tremendous effort!

## DAY 7 – BEST LAID PLANS & HIGH BAND MAYHEM!

Day 7 opened with another EME attempt at moon-rise. 6m conditions failed us however this time with no successful contacts made. It did alert us to keep watch on the higher HF bands however.

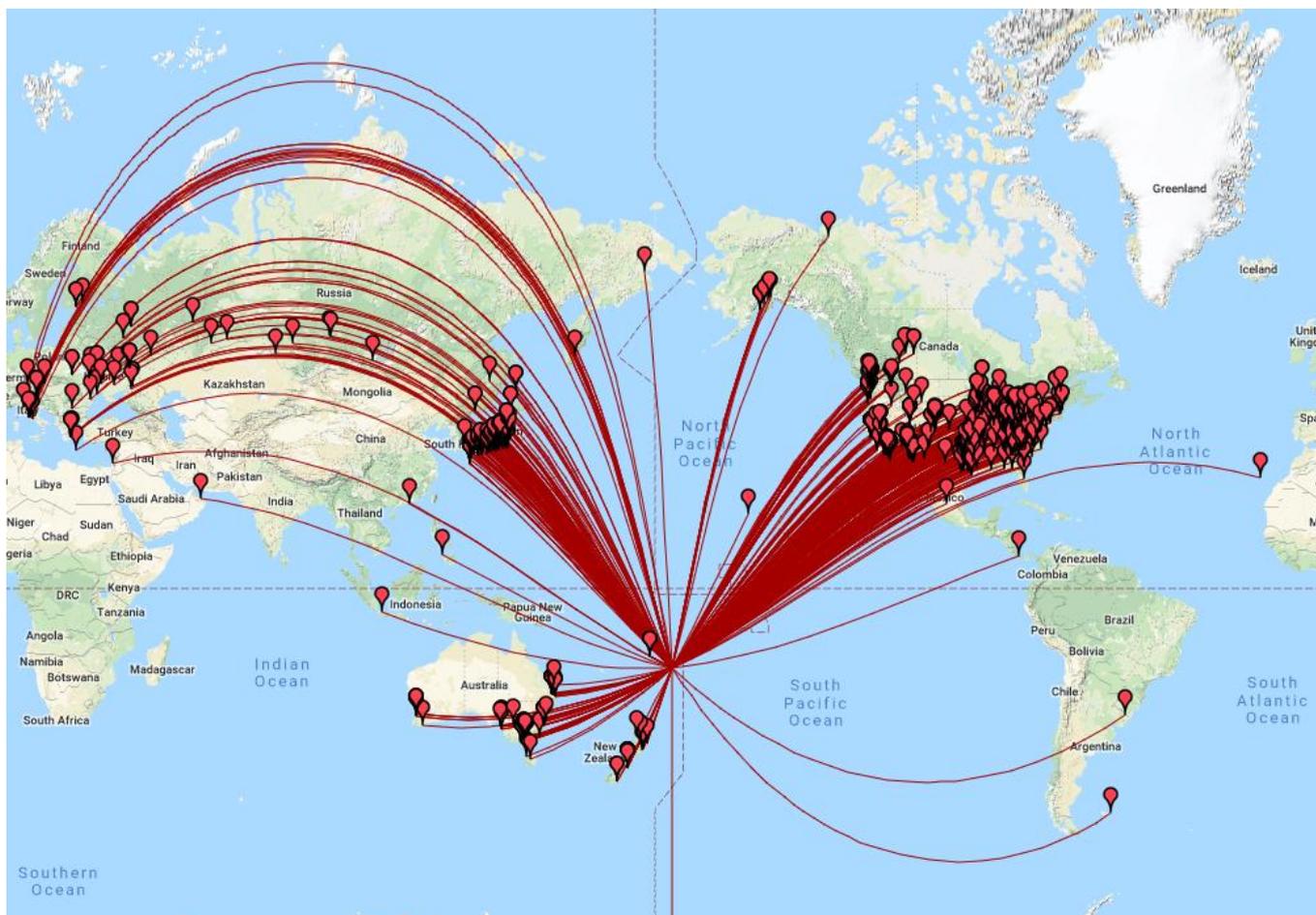
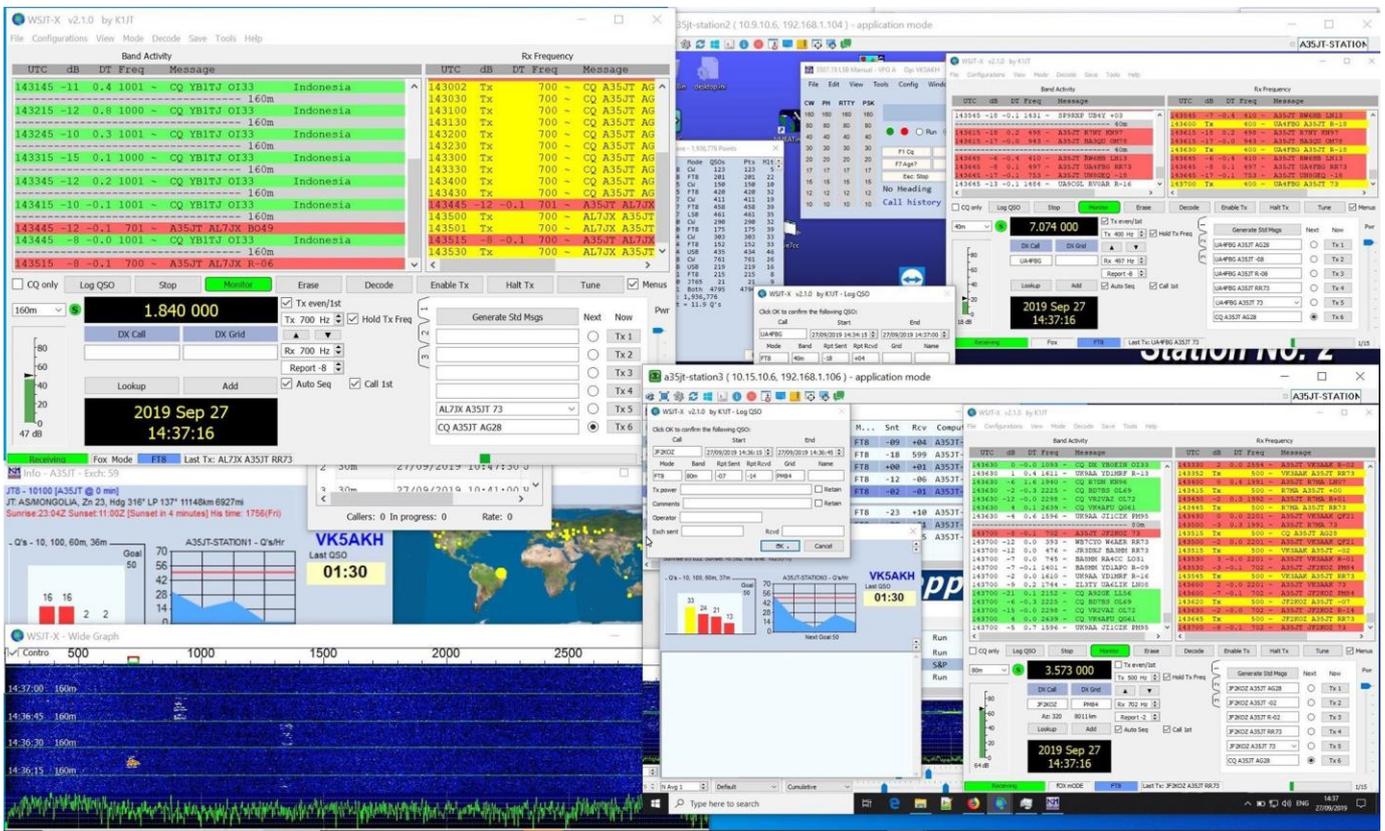


Photo 25 – Map of 160m Contacts from A35JT (courtesy [tools.adventureradio.de/analyzer/](https://tools.adventureradio.de/analyzer/))



**Photo 26 – 160, 80 and 40m Simultaneous FT8 with one operator – The QSO Machine!**

With the EME window closed, Olgierd resumed the 20m operation, this time on CW to the USA. I then joined in with CW on 15m (albeit much slower).

contest were shelved, and the contest start time came and went as we continued on CW instead.



**Photo 27 – Olgierd (Oly) VK5XDX on CW**

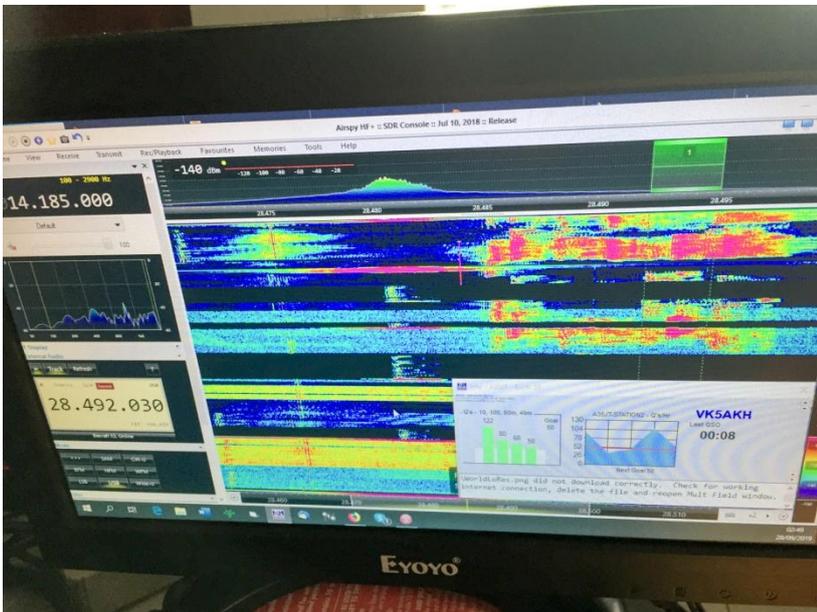
Around 0030z Olgierd changed places with Andrew and 20m moved to SSB, providing a great opportunity for North America while Steve VK5SFA tinkered with 30m to see if there was any sign of that band being open during the day. Steve did manage a call into VK and later into ZL but not much more.

It was around 0200z, after occasional checking all morning, that an opening on 10m was detected. Andrew QSY'ed to 28485 kHz at 0215z and called CQ. Just how open the band was simply had to be seen to be believed. The pile up to Japan was enormous and very quickly Andrew was calling UP 5 to 20kHz and still having problems separating call signs.

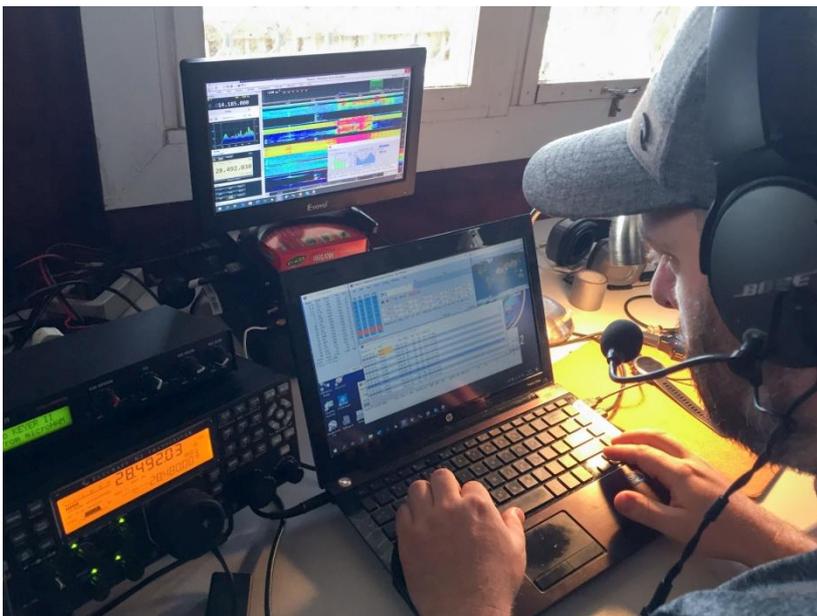
The problem actually started to slow down the QSO rate. If we had let it the pile probably could have grown to over 40kHz given how strong the signals became as the Es opening only intensified.

It had also been planned to run in the CQ WW RTTY contest from A35JT. However, the only team member who was enthusiastic was myself (as I have loved RTTY for over 30 years, since high school). As a result, the plans to running a Multi-One entry in the

While this continued, Steve jumped onto 15m CW and kept that running finding many callers from Japan on that band as well before ultimately switching also to SSB. This truly was the day of the high bands.



**Photo 28 – 10m Pileup to Japan**



**Photo 29 – 10m Pileup to Japan – VK5AKH operating**



**Photo 30 – 15m CW Pileup to Japan – VK5SFA**

At 0315z 15m switched to SSB also, which brought renewed vigor to the pile from Japan while 10m continued to power along. Then, almost as abruptly as it began 10m closed, leaving Steve to continue activity on 15m SSB into the afternoon.

## **BACK TO 6M EME FOR AFRICA!**

HF activity started to slow around 0345z which was perfect timing as we set up for first EME attempt targeting Africa.

We were concerned with the HF band conditions we were seeing that the ionosphere might not let our 6m EME signals through. Fortunately that wasn't the case as today was the first window to South Africa on EME. Bernie ZS4TX confirmed 2 way contact with us via the moon, adding a fourth continent to our EME tally.. We also heard a number of other stations but were unsuccessful at working them.

## **BACK ON HF**

After moon set we returned to HF and commenced operations on 17m FT8 from 0530z. I then took command of the station and started watching for the anticipated 17m EU opening. Initially many JA stations were worked as we ran through until 0720z. But other than a few eastern Europeans the opening didn't extend any farther west.

Andrew then opened 40m SSB also looking for Europe, and was met with greater success with contacts into YU, F, and EA.

We then broke for dinner before returning to air around 0900z on 30m FT8.

## RTTY CONTESTING AFTER ALL!

Finally around 0930z I couldn't resist any longer. I reconfigured one of the stations for independent logging, set up the RTTY software and started in the CQ WW RTTY contest with some search and pounce activity to get everything dialed in. Contacts with LZ, I, UA, SP, OM, HA, OL, DL, ER, UN, 9A, OE and EW were completed on 20m. You couldn't wipe the grin off my face.

Meanwhile, the rest of the team manned 30m and 160m using either CW or FT8. At 0930z, Oly started operating 160m CW, in order to completely capture the North American gray line through their sunrise. We weren't completely sure when the opening would start. Perseverance paid off when at 1034z the first NA station was worked followed by several more. Finally at 1100z (around midnight local time) we ran out of operators after the previous couple of nights of heavy activity and everyone retired to catch up on some much needed sleep.

## DAY 8 – 10/12M ROUND 2 + MORE RTTY CONTESTING...

I returned to the radio at ~1700z and QSYed the RTTY station to 40m for a look. I was rewarded with the first RTTY QSOs on 40m into Europe for the expedition before it faded. Andrew then tried SSB while I returned to EME. Conditions weren't great on the low bands however and the openings were short lived.

Our last attempt at EME on moon rise wasn't successful with no confirmed 2 way contacts. Probably the most unlucky station of all, however, was NN7J who I had copied for several days now still but still couldn't complete a QSO with. I gave him an A+ for perseverance however.

At the end of the EME session, the team returned to 20m SSB and 15m CW. Andrew was rewarded on 20m with contacts into the Caribbean while I worked North America and Japan on 15m, also picking up contacts with Central and South America (PJ4, YV, HP).

On 20m we were then able to put a rare country in the logs. Christian A35CS, who was our local support in Tonga called in to Andrew from across the island on 20m SSB. It was great to get Christian in the log for another worked DXCC!

The bands were behaving very strangely today as well – a product of the solar storm. Conditions to North

America on 20m showed very rapid and deep QSB on all signals. Perseverance and patience was the key to making progress.

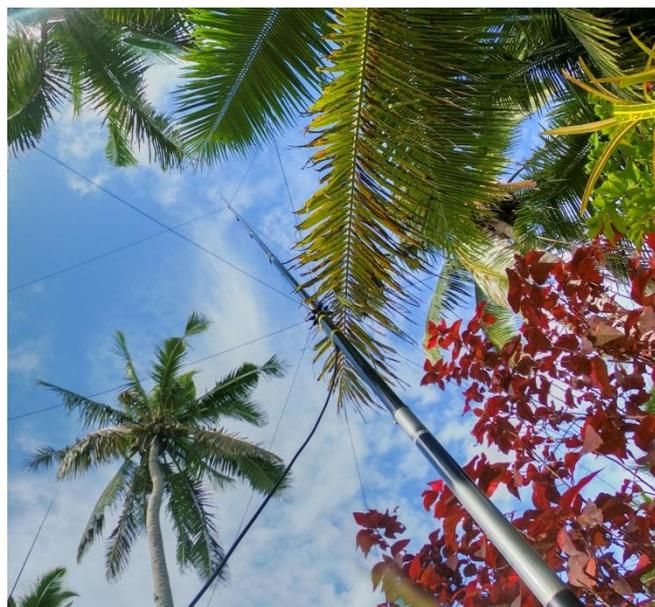
## 12M OPENS WITH A BANG!

With 20m becoming more unstable, we took the opportunity to listen around to see what else might be open. As a test call, we decided to try some 12m FT8, just to see where we could be heard on PSK Reporter. It didn't take long for the Japanese to find us.

Very quickly the opening showed its strength and the caller queue filled to capacity. We opened up the number of slots to 5 and away we went. For a 15 minute period we had over 300 contacts an hour being logged, and over the following 3 hours we were often running 12m at over 200 contacts an hour for sustained periods.

We then decided that if 12m was this open then perhaps it was worth a look on 10m as well. However this led us to a conundrum. At this point, we only had 1 antenna that could operate on both 10m and 12m – the HexBeam. What to do was the question?

## 10M? YET MORE ANTENNAS!



*Photo 31 – 30m 4-square element on 10m*

We then pondered, could we do the same trick to the 30m 4-square that we did with 40m and operate it on its 3<sup>rd</sup> harmonic. Andrew and Steve quickly headed outside with the antenna analyser in tow to find out. After adding a length of wire to the antenna they had their answer – it worked! So, now we could run 10m and keep 12m on the air at the same time.

Since we didn't have filters for 12m and 10m, the best way to exploit the opportunity was to use FT8 on both

bands this time. Andrew took the controls of 10m while I continued on 12m. Immediately 10m sprang to life to Japan as 12m propagation began to diversity out to the US West Coast in one direction and Hong Kong in another.

At 0400z we then decided to see if we could run both bands on SSB simultaneously as well. We were lucky that, with a combination of physical separation and polarization diversity, these two bands could operate at the same time without filters. We then had a very intense run on 12m SSB to Japan while continuing to make 10m SSB contacts. The sun may have disturbed 6m EME conditions but it more than made up for it with contacts on the higher HF bands. There is nothing like the rush you get when working stations at very high rates.

## FINAL 6M EME CALLS

At the end of week 1, we conducted what would be our final EME session. This was the last moon set where we would see Europe before the planets no longer aligned (literally). We were lucky enough to work OH7KM and heard a number of others. Unfortunately

due to the very short window, we weren't able to work more stations.

Over the 30 hours and 14mins of EME time, we worked a total of 25 stations, and heard a total of 28 more. For EME rookies we were pretty happy with that achievement. Thanks to all of the stations who came looking for us. You helped bring a bucket list dream alive!

Some questioned why we dedicated so much time to making 25 contacts. Others realized the difficulty level involved. From my perspective, the challenge of being able to undertake moon bounce on 6m at all was reason enough. Doing it from a South Pacific island just added that something extra to the experience.

## 6M EME: SPECIAL THANKS

6m EME wouldn't have been possible at all without input from a number of key people. Firstly we must say thanks to Lance W7GJ who provided the inspiration and remote help to make the attempt. It nearly stretched our resources to breaking point, but without your spark we would never have tried in the first place.



*Photo 32 – 6m EME Array by Star Light*

We must also thank Peter VK5PJ who coached us through our first attempt at 6m EME back in February 2019 and who subsequently supported the expedition with the donated elevation tilt bracket and the Eltek 50V power supply for the linear amplifier. Thanks also to Dennis VK5FDEN who helped with some of the bracketry used to mount the antenna and a special thank you to Matt VK5ZM who helped greatly with many aspects of the trials in Australia.

On the sponsors side, the 6m EME community was fantastic, helping us raise the funds needed to get the antennas freighted to Tonga. We couldn't have done it without our corporate sponsors either. The support from Spiderbeam™ with the tower and the help from RF Solutions and Carsten VK4OA plus Christian at Messi & Paoloni with the feedlines was paramount in getting the station on the air.

Thank you to all involved!

## BACK TO HF

After the end of the last moon bounce pass, Steve VK5SFA then took up the challenge on 20m SSB.. Again, it opened to Europe and with patience and persistence; Steve worked both Japanese and European stations.

I then operated some 22wpm CW on 30m before Oly stepped up the pace once the pile up grew! (I have a lot of practice to do to match Oly on CW. I'm glad we included such a competent CW op on the team.

Steve then moved to 40m SSB and was rewarded with working Alberto P29LL and a large JA pile, while Oly continued worked Europe on 30m.

## RTTY CONTESTING RESUMES

Finally at 0930z, more to provide multipliers than anything else, I then returned to operating RTTY in the contest, this time on 40m. After a short time in search and pounce mode, I settled the station on a run frequency and started calling CQ TEST. Stations were worked from South America, North America and Japan. It was, unfortunately, about to become very frustrating.

Initially the QSO rate wasn't too bad. Someone however decided that we were having too much fun and commenced DQRMining us. Try as we might, despite QSYing several times and using the antenna pattern control of the 4-square, within a few calls the carrier dropper would return. This completely destroyed any rhythm in the pile and the channel descended into anarchy.

The problem was then compounded when I would reply to a particular call sign (having waited for a break so I could transmit again as I was running simplex in the contest) only to have other callers continue calling over the top of the station who was replying to me. This would go on sometimes for 7-8 repeat calls – often breaking QSOs that I couldn't complete and receive my report from. This was a very disappointing outcome. I persisted for nearly an hour, hoping the DQRM and the unruly callers would calm down, but to no avail. Frustrated I shut down RTTY and walked away. It wasn't just my own contacts that were being broken but other people's contest multipliers as well. It really wasn't fair on anyone under those conditions.

I then returned at 1250z to give it another try. This time I had more success, managing to run for another hour before finally giving up when the DQRM returned. The callers were no better behaved either. In the end, I made the decision to abandon any serious attempt at a worthwhile score in the contest, disheartened and disappointed. I vowed to come back later in the week when I could run RTTY in split mode and also use the cluster more effectively to advertise my activity.

It's worth noting that the only way I managed to persist with the interference for as long as we did was through the benefits of the 4-square array. Often I was able to put the DQRM into the null and work stations off the side of the pattern to the north and east. Having the ability to switch beam direction almost instantaneously (with the exception of the TX interlocks) brought amazing flexibility to the 40m contesting station. As a result, I will absolutely be looking to install and use the 4-square for other contests from back home in the future.

## 160M CW WITH STEVE VK5SFA

One of Steve's objectives during the trip was to operate 160-m CW. A keen 160m operator back home, Steve was looking forward to testing his CW skills in a noisy tropical environment. To his credit, he ran CW through the NA gray line opening again starting around 1030z. He stuck at it until 1330z (2am) before heading for some sleep, working a good number of stations in the process.

It was then time to hand the station over to Andrew and Oly who started up 30m FT8 and 40m CW once more, adding contacts to the log in Oly's case throughout the night. This was a marathon effort, which rewarded us with many more contacts across Europe.

## DAY 9 - PANDEMONIUM BREAKS OUT!

Andrew returned to the station at 1800z and opened the 20m FT8 transmitter for business while Oly continued his fantastic run into Europe on 40m. At 1900z I returned also to make one last effort at RTTY on 20m.

I had some surprises with calls from Madeira Islands on as well as some South Americans. I settled on a run frequency and fortunately this time the pileup behaved and the source of DQRM also stayed away.

We finally closed the RTTY contest operation at 2200z and reconfigured the logging machines back into their networked configuration. The live log was switched back on and normal operation resumed.

Oly then returned and it was time to open another new band slot for the expedition chasers. After the spectacular openings the previous 2 days on 12m SSB and FT8 it was time to try CW. He rose to the challenge and was immediately greeted by callers.

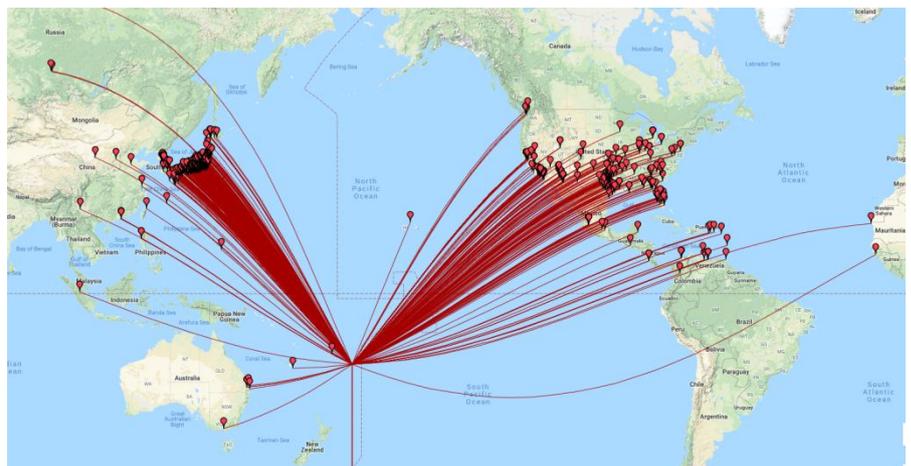
Andrew then switched to 10m and gave some calls on SSB, working USA and Mexico as well as Japan. It was great to see North and Central America on 10m for the first time.

The team continued to follow the variable propagation throughout the day seeking out contacts from the fickle conditions.

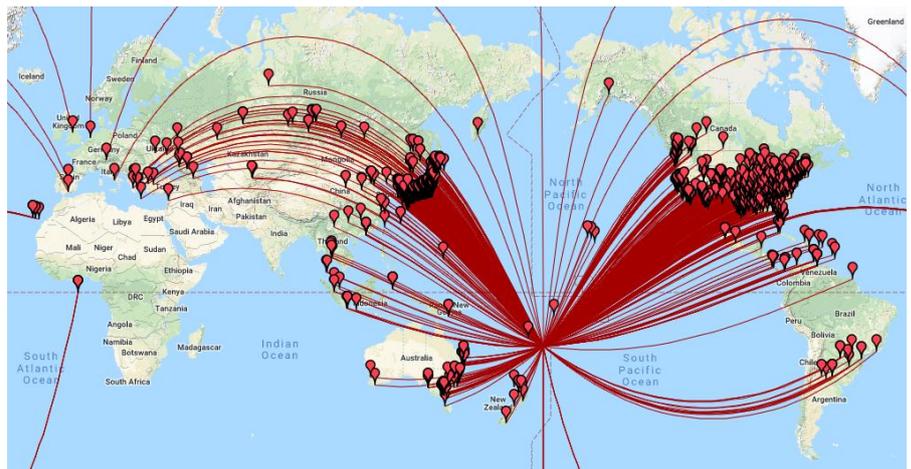
Today marked a change in the team dynamics. My operating time was going to be reduced with the arrival of my family. I left the site at 11am to head back to the airport to collect them – unaware of what was about to unfold.



*Photo 33 – 10m Contacts from Tonga – A35JT*



*Photo 34 – 12m Contacts from Tonga – A35JT*



*Photo 35 – 15m Contacts from Tonga – A35JT*

## WHERE THERE IS SMOKE THERE IS FIRE!

It all began with Olgierd smelling smoke around the site. Now this hadn't been uncommon during our stay, as the local population often burn excess leaf rubbish in the fields, so initially the team didn't think much of it. That all changed when his next observation was "can you hear a crackling sound?".

Everyone removed their headphones, and with looks of concern headed outside.



**Photo 36 – Antennas down and the Fire Brigade in Attendance**

What greeted them was a large plume of smoke, rising from the scrub just north of the site. By the sound it, it was a fairly large grass fire. Not knowing the potential severity, the team immediately sprung into action, firstly contacting the owners (who knew how to call the fire brigade) and then scrambling to take down antennas and clear a path for the fire appliances.

The 6m beam and the HexBeam were both quickly lowered, as there were concerns that if the fire broke through the scrub the guy ropes would quickly burn through, felling both towers uncontrollably. The team then split up searching for water containers that could be used in case of ember attack. The 30m 4-square antenna was quickly lowered and the radials were pulled in to clear a path down the driveway.

By this time ash was starting to rain down over the site and the team was getting really worried.

The fire brigade then turned up, and seemed remarkably casual about the whole affair. They climbed into the bush and looked over the fire, which by now was only about 15-20m away from the radio station (not that we could see the flames through the tropical foliage).

The team was somewhat perplexed, and kept closely watching in case smoldering ash settled on something it shouldn't and start a secondary fire. When the firemen came back they said there was nothing to do. They were water poor (as is the case across the island – no high pressure water mains here) and the most expedient course of action was to let it burn itself out when it reached the thick scrub. They were absolutely correct, knowing their home environment very well. Our team members were still on edge however, coming from Australia, a land where bushfires are an all together much more dangerous affair. It was still unnerving to say the least.

In the middle of the mayhem, I returned with my wife and daughter, finding gates wide open, smoke in the air, a fire truck in the drive way, no antennas to be seen and people running everywhere. It took a few minutes to work out what was going on. Fearing the worst, I decided to quickly take my family away and leave the situation in the capable hands of the rest of the team.

After another hour, the all clear was given and we returned to site. Order returned, the antennas were re-established and slowly things returned to normal. It was a hell of a way to welcome my family to Tonga however.

## 75M SSB ON AIR

This evening was Steve's last night on the island, so we planned to try a new band/mode. The 80m inverted V was re-tuned up to 75m and we opened with SSB on 3775kHz.

For the curious, the choice of 3775kHz might have seemed strange at first. However there was method in our madness. Firstly, the VK 80m SSB DX window extends from 3776-3800kHz and secondly, the JA SSB window finishes at 3775kHz. Our plan was a simple one, operate UP 5 for VK and North America and operate DOWN 5 for Japan. Easy!

All up we made 167 contacts on 80m SSB from Tonga including contacts with VR2, UN, W, JA, VK, ZL, P29, XE, KH6, KL7, UA0, VE, HC, HP, 3D2, FK and EA8. What's more, we had a lot of fun opening another unusual slot.

In fact, operating unusual slots became the theme across the second week. We kept opening more and more unusual slots, providing entertainment for our operators and the Amateur Radio community in general, a diversion perhaps from the regular diet of CW, SSB and FT8, but one worth taking in the end.

## 40M CW GOING STRONG

All while 80m was operating 40m CW was going gang busters too with a solid run of contacts from across North America and Japan. The opening then extended into South America with PY and FY both making contact with A35JT.

We all were somewhat envious of the contact with French Guiana in fact. While the path to A35 from FY isn't too monstrous, from VK this path is very rare indeed. In fact my only ever contact with FY has been long path over the NORTH pole. It was great to see the Kourou Amateur Radio club station on the air and to be able to work them from A35JT at least..

## CALLING CQ JA 160M FT8 – OPERATING SPLIT 1840/1908KHZ

Later that night we set the radio up for an attempt at Japan on 160m FT8. Running split (more due to antenna tuning ranges than anything else) we transmitted on 1840 and received on 1908kHz working quite a number of JA amateurs in the process. This required some trickery with the WSJT-X software as we found we had to run it without rig CAT control (Radio = NONE in the settings) so prevent the software from overwriting the wider split in the radio than it was expecting

## DAY 10 – FAREWELL VK5SFA



*Photo 37 – Steve VK5SFA operating as A35JT*

Steve was unfortunately never able to stay with us for the entire expedition and today was his last day. After packing up his gear he sat down for one last turn at the controls.

He began operating 12m SSB to North America and Japan including the occasional contact into the Caribbean. Contacts slowed, so he moved to 15m following the propagation. He was immediately rewarded with an intense Japanese pile up which lasted nearly an hour before he following the propagation again up to 12m.

Again he was met by another stampede. I'm pretty sure he is now hooked on DXpeditioning! Hopefully we will see Steve join us on future adventures as a result.

Finally, exhausted, Steve said fare well and we packed his gear into the car. I then drove him to the airport for his flight home to Australia

## ....AND THEN THERE WERE THREE!

That evening, Andrew started searching for different openings and paths on 15m. We had not operated 15m after 0400z until now, so we were interested to see what would appear particularly from Europe. Around 0830z we were rewarded with multiple calls from SV, plus contacts with S5, UY, SV9, TA, OD and R6 using FT8 before 15m closed around 0930z. While that was going on, Olgierd made full use of the 20m European opening again working many countries on CW.

I was then able to return to the shack around 1000z having made the 2 hour round trip to the airport and spent some time with the family. He kicked off 30m and was rewarded with a contact to Bob VP8LP. Bob is another hard to work station from VK5, so it was great to see him taking an interest in our operation out on A35. He was a regular among the slot chasers as we hopped around the bands and modes.



**Photo 38 – Andrew VK5AKH and Olgierd (Oly) VK5DX**

Around 1120z as 20m was closing, Oly then switched down to 160m – to be met with much quieter conditions this evening. It paid dividends immediately with a run of contacts into North America again, before switching to 30m at 1400z and continuing the same.

Andrew, who had gone to bed early, then woke at 1430z with the aim of giving 40m SSB another run. It paid off, with plenty of contacts into Europe. This time he used the IC7300 through one of the KPA500 linear amplifiers to great success.



**Photo 39 – Andrew on the IC7300+KPA500 driving 40m SSB**

## DAY 11 – FT8 MUTINY?

As dawn broke on Day 11 the seed for our own internal operator mutiny against FT8 began. Our team certainly understood the weak signal value of the mode and the ability to operate through the pile ups at high rate. However we are not robots, and the mode lacked any sort of tactile feel for the expedition operators.

One particular complaint was that in Fox and Hound mode you can't even see the stations calling on the channel as there is no monitor window in this mode. The software only presents a list of call signs the computer has picked out as being people who are calling you under the right conditions. Fox mode was efficient at working stations – for sure – fun for the operators to use and drive – not so much.

There was general agreement that for 160m when operating in FT8 standard mode that it absolutely had its place. Indeed on that band, where you have to nurse QSOs through the static crashes, it was challenging to operate and rewarding for the operator. It was engaging for the participants on both ends of the circuit. A lot of that interaction is removed on the Fox side when running Fox and Hound mode however leaving you little control over the pileup behavior and throughput, and indeed little perceived connection with the people you were working. It was very hard to sense the progression of a QSO and so you were left helpless to intervene to help to a successful RR73. Something had to change.

## RTTY & PSK ON THE AIR

What was our solution? A return to the traditional digital modes! It also became a slot chaser's paradise. We made it an in house game when we opened a new slot to predict how fast the "regulars" would find and work us. I am sure it was as much fun for them as it was for us.

Andrew and I led the charge, with me operating RTTY and Andrew running PSK31, (after finally figuring out how to get FL-Digi to transmit through a MicroHam Keyer II). Andrew's first digital mode love over 10 years ago was in fact PSK31. His face lit up when he once again was able to work stations on PSK.

After the mayhem in the RTTY contest, it was nice to be able to operate split again. I opened RTTY on 7044kHz at 1750z and immediately attracted callers from Europe and Japan. Then, at 1900z, I QSYed to the 20m band where my first caller was Bob VP8LP. He was followed by a steady stream of North and South American stations, with some Japanese stations in between.

Olgierd then took command and switched the RTTY station to 17m for some more CW targeting the Americas.

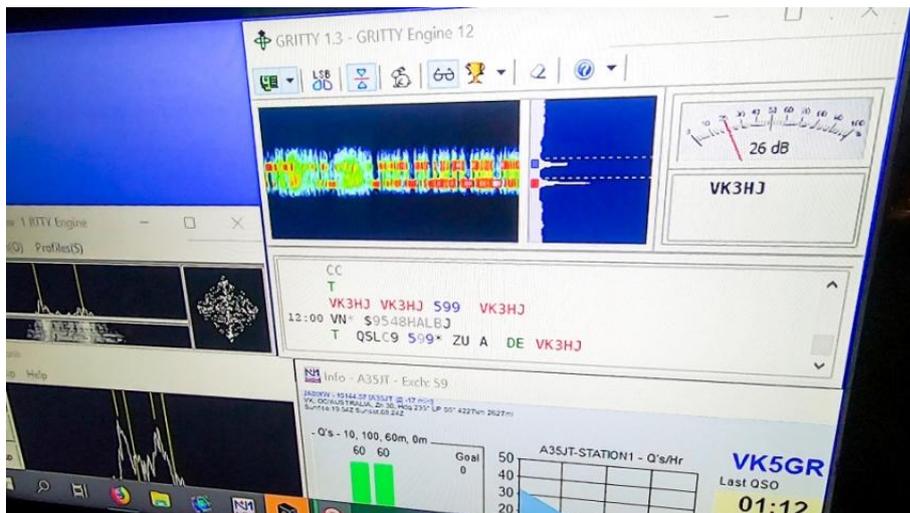
Andrew meanwhile started calling CQ on PSK. Initially callers on were slow, but the more he called the more activity it produced. It seemed lots of people had perhaps forgotten how to use the mode. It actually reached the stage where he needed to start operating PSK on split frequencies – this time using the phase UP 200Hz. Most people quickly got the idea and the result was a steady stream of PSK contacts making it into our logs.

I then returned to the shack at ~0400z for a pre-dinner run on 30m RTTY. 30m was very open – with contacts coming from around the globe! It was one of those times where you could work every continent at once on the band with successful calls to UT, PY, JA, R7, KH6 and K

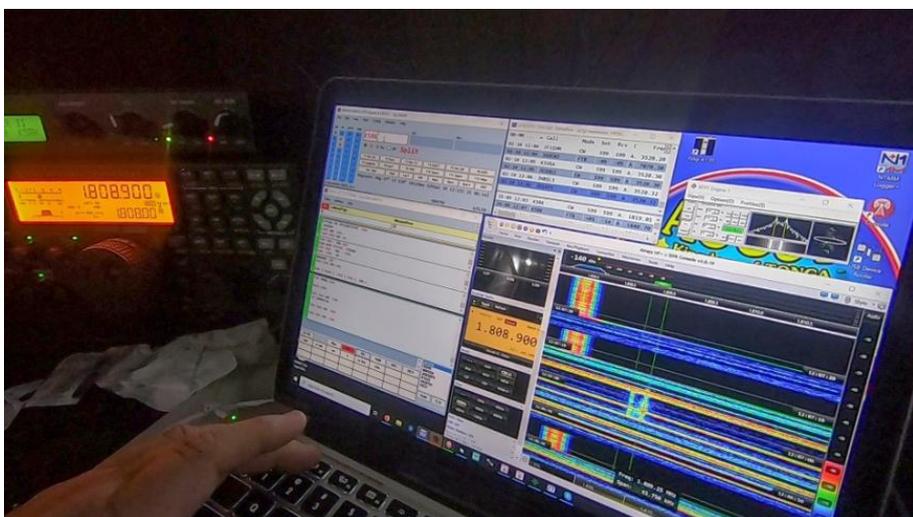
It was this night, after midnight as it turns out, when one of the rarest slots of all made an appearance. For some fun, myself and Andrew decided to activate some RTTY on 160m. Down to the digital modes segment we went on 1808kHz where I started calling CQ. Low and behold, after a cluster spot or two, we were at least heard in Australia. Luke VK3HJ was our first customer. Shortly afterwards we worked K5RK, VK3BDX and N6TI. Not a long run but fun none the less!



**Photo 40 – VK5GR driving 160m RTTY**



**Photo 41 – Working VK3HJ 160m RTTY**



**Photo 42 – Working K5RK 160m RTTY**

## DAY 12 – SLOT AND DXCC CHASING

As the team closed in on 15,000 QSOs we relaxed a little more and had some fun on the bands. It became a game to open even more unusual slots and see who would work us. No one made a clean sweep as by the end of the expedition we had worked 36 HF slots + 6m EME. Three Japanese amateurs took out the honors however for top slot chasers with it being shared between JA4DND, JA0FSB and JA2VMU.

In the DXCC stakes, building our DXCC totals saw us initiating some calls and chasing other stations ourselves over the last few days, including saying hello a number of times to our neighbours on ZK3A. By the close we had managed contacts with 133 DXCC in 12 days within our 15,000+ QSOs.

Day 12 also saw us continue with our legacy digital modes operation, starting with a run on 17m RTTY to Japan and North America. I must admit, finding a frequency to run these modes on 17m was hard. Band planning within the digital segment on 17m is something IARU needs to take another look at.

We found that the 15kHz allocated on 17m simply wasn't enough when you had other DXpeditions on 18095 running FT8 Fox mode, the main FT8 channel now on 18100, and now FT4 trying to lay claim to 18104. With the continuing popularity of digital modes, perhaps it is time the CW users gave up some of their excessive 30kHz on the WARC bands and let digital expand down to 18090?

In the end, we just ran RTTY over the top of what appeared to be a near empty channel on 18106 in the absence of any other viable alternative. We ran PSK on both 18100 and 18106 also in amongst the FT8. It really wasn't a great situation, but there were few alternatives given the number of expedition stations about.

Meanwhile I activated RTTY on 21084kHz, eager to see a real JA RTTY pile again. I was rewarded almost immediately with the pile spreading up the band, actually getting close to over-running ZK3A on 21090 at one point who was running FT8 Fox mode. The QSO rate was over 140 too, which was pretty good for RTTY.



Photo 43 – 17m RTTY Pileup

## MORE PSK – 17 AND 12M

After RTTY, Andrew switched to 17m PSK and continued the fun. JA0DAI won the first in slot chase this time, with JH0INP and VP8LP coming 2<sup>nd</sup> and third respectively. The band slot contest became even rarer when he switched to 12m, running PSK on 24924kHz.

Later in the day, Andrew QSYed back to 20m PSK to work North America. What was the attraction you might ask to run this old mode? It was the ability to have an actual QSO where you could type in messages and get an intelligent reply. It wasn't just pre-canned messages, something our operators very much appreciated.



Photo 44 – Andrew working 20m PSK

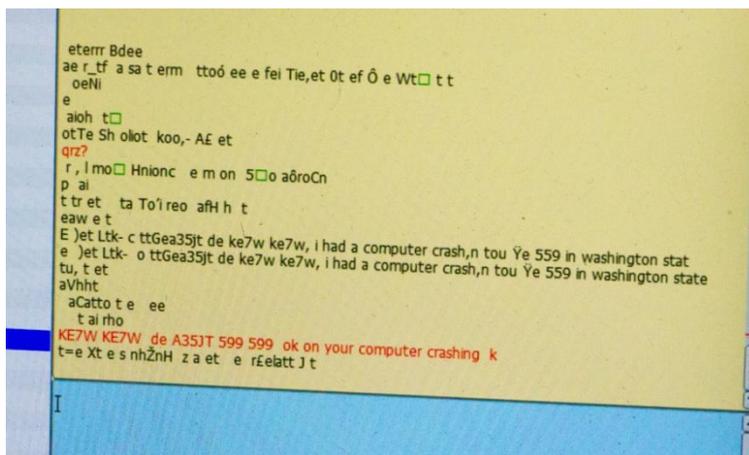


Photo 45 – 20m PSK QSO with KE7W

## DAY 13 – WE FINALLY TOUR TONGATAPU!

This was our second Friday on the island and our thoughts were now turning towards packing up and heading home. At the same time, we hadn't really seen much of this island paradise until now. It was agreed we would head out for a few hours and tour the highlights. Our stops included the Three Headed Coconut tree, Anahulu Cave, The Blow Holes and Tsunami Rock.



*Photo 47 - The Blow Holes*



*Photo 46 - Three Headed Coconut*



*Photo 48 - Anahulu Cave*



*Photo 49 - Ha'Atafu Beach*



*Photo 50 - Tsunami Rock*

## DAY 13 – ON AIR

In the last 48hrs on air, we focused more on bands and slots that we hadn't spent a lot of time on. 20m FT8, 80m FT8 and 30m CW were given priority during the evening. Europe was particularly for FT8 this time to give more of the smaller stations their chance.

Olgierd also made one last effort on 40m CW using the 4-square array from around midnight to dawn on Saturday.

This was also the last night we would have a full complement of three transmitters available. We had a time crunch problem looming. We wanted to participate in the Oceania DX Contest, however it finished late on Sunday night, with the team flying out Monday morning. This meant much of the pack up needed to occur Saturday and Sunday during the contest.

## DAY 14 – TEARDOWN BEGINS ALONG WITH THE OCEANIA DX CONTEST

The first antenna to be packed for shipping was the 6m beam and tower. It had been torn down and partly dismantled in a hurry the previous weekend with the fire, but today saw it put back into its travel case. We also packed up station 3 and rearranged the radio room so that the furniture could be returned to "near" normal, saving us a major task during final tear-down.

Meanwhile, on the air, the activity continued and our DXCC count steadily climbed. We spent today trying to work more first time stations (ATNOs in particular) rather than the slot chasers, so we focused on consolidating activity on the primary bands and modes.

Running 20 and 30m together on FT8 at sunset netted another great run of European contacts. 30m then moved to CW and 20m moved to SSB for the start of the contest.

Unfortunately for us, the contest start time of 0800z was too late for SSB into Europe which was closing as the contest started, so we moved to 40m instead, which was a struggle. It may be a DX contest, but we found the band full of Oceania stations swapping contacts between themselves. It was extremely difficult to find a run frequency, and search and pounce was hard work when people were called by an unexpected callsign with an Australian accent. We were also surprised by the lack of North American stations as well. It seems many were asleep? That or the band wasn't open.

Realizing 40m was futile; we started looking for other opportunities. For fun, we gave 160m SSB a try and at least made contacts into Australia, handing out contest multipliers in the process. When that short run of activity dried up we moved to 80m, managing to work the west coast USA as well as VK.

We decided to then give 40m another try, hoping to work North America across its sunrise gray line. If they were there we couldn't hear them unfortunately as we were over-powered by stations in our region instead.

Meanwhile outside of the contest, Olgierd had been very productive on 30m CW up until 1300z. Then our contest ended for us competitively when we lost power. This was the first lengthy failure we experienced during our stay, and effectively ended our Oceania DX Contest participation. Power wasn't restored until daybreak, losing us 5 hours of prime 40m openings to try to exploit to Europe.

## DAY 15 – WE ARE A MULTIPLIER WHILE WE PACK



*Photo 51 – VK5XDX and VK5AKH – Last Day*

After the frustrations the previous evening and the loss of power, we decided we would only intermittently work the contest and return to being just a DXpedition instead. This freed up operators to start the antenna teardown in earnest. The plan was to drop the 30 and 40m antennas first, then the 160m antenna would be lowered and packed followed by the 80m dipole.

The lucky last antenna would be the 20-10m HexBeam which would give us one last chance to Europe that night before shutdown.

We spent some more time on the WARC bands today as a result of the decision not to continue in the contest. This paid off with more contacts on 12m to Japan, USA, Mexico and Caribbean.

15m CW then had a turn on the beam again facing North America. Oly then also moved down to 17m and was rewarded with contacts into the Caribbean and Mexico as well.



**Photo 52 – 15m CW Station**

The station then went QRT for a few hours in the afternoon as the pack up continued in earnest. The 30 and 40m 4-square antennas were dismantled and we started cleaning up and bundling the bulk of the gear into its cases. We couldn't have hoped for a better result with these antennas given the months of work that went into creating them and felt that they had definitely been worth the effort to design and build them.

We then progressed around the site tidying up and returning everything to where it came from. By then it was dinner time, so headed across the road for an early dinner at Holty's before returning for one last run on air.

## FINAL CALL – 17M SSB

After a couple of quick contacts on our 80m gray line to North America, we settled down on 17m SSB with me on the microphone. 17m SSB to Europe was one band we had not spent a lot of time on during this time window, as the available antennas were usually taken up with the 20m station, so it was fitting to at least spend a few hours on 17m before final tear down..

At 0620z I began our final call on 18130kHz SSB. Almost immediately it was clear the band was open to Europe so I asked Japan to stand by. Contacts flowed thick and fast, greatly aided by the patience from the Japanese stations who sat their listening.

In periods where it slowed down, I stopped calling for EU and specifically

called Japan to give them a turn. It was notable that unlike at the start of the expedition, the patience of the Japanese had returned. We can only guess at why. Perhaps it was because we made sure we did give them a turn throughout the expedition. Maybe our sense of Aussie fairness had shone through, who knows. It is fair to say that without their patience this last run on 17m would have disintegrated into anarchy. To all the JA stations on the channel that night I say thank you for waiting and for your patience.



**Photo 53 – Grant VK5GR - last calls of the expedition**

Finally at 0816z the last contact was made with RC2A and A35JT went QRT. It was time to pack the last station and get everything ready for the start of our trip home in the morning. Andrew and Olgierd headed out into the dark to pull down the beam while I packed the station into its cases inside.

## THE JOURNEY HOME

The next morning we woke to rain and showers. Given how good the weather had been during most of our stay we counted ourselves lucky. After a final clean up we loaded everything into the cars, and with Christian A35CS's help again we travelled in convoy, via Nuku'alofa to drop the freight off, to the airport. We couldn't have easily done this without Christian whom we owe a major debt of gratitude. Thank you for all your help Christian!



**Photo 54 – Christian A35CS**



**Photo 55 – Packing the car**



**Photo 56 – Antennas in their cases**

We then boarded the plane to Auckland and said a final farewell to Tonga.

## ARRIVAL IN AUCKLAND, NZ

On arrival in New Zealand, we were met by Jean-Phillippe ZL1RPL. He kindly offered to help us transport the team and gear to our accommodation. We then headed out for dinner. It was a great night meeting him in New Zealand, and you never know, we might have found a new team member for future expeditions (ZL7 perhaps?)

Thanks Jean-Phillippe for all your help!



**Photo 57 – Layover in Auckland meeting Jean-Phillippe (L-R) VK5DXD, VK5GR, VK5AKH, ZL1RPL**

Due to airline schedules, we actually ended up staying in Auckland 2 nights. The next day was a quiet one, with some late exploration of the city in the afternoon, not to mention a round of mini-golf with the team and my daughter Amelia.

The next morning, Day 16, was the last day of our journey. We had an early start, reaching the airport at 6am, in order to provide enough time for the customs processes around clearing our carnet for all of the radio equipment. Our Air New Zealand flight then lifted off on time, bound for Adelaide – Australia and home. It was the end of our Tongan odyssey.

## THE STATISTICS

At the end of the journey, it is time to take a look at what was actually achieved. From the team's perspective we are happy with the outcome. The feedback we received when we were out in Tonga was humbling with many words of appreciation being received from people across the globe. Looking through the statistics, here are some highlights

<b>TOTAL QSOs:</b>	<b>15,288</b>
<b>TOTAL UNIQUE CALLS:</b>	<b>5,859 (38.3%)</b>
<b>TOTAL DXCC Worked:</b>	<b>133</b>

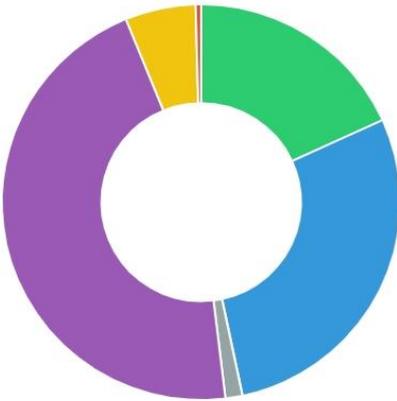
Looking at our targeted region, we are pleased with 18% of all contacts coming from Europe. Given that most of those contacts involved 15,000+ km paths and that many were over the North Pole, we felt that the effort to target Europe has paid off. Naturally Asia is the leader as it is impossible not to work stations in that region from the Pacific. Ultimately, we hope we were able to bring quite a few ATNOs and band fills to amateurs right across Europe and the world with this expedition.

In the mode stakes, we feel the results vindicate the position we took, to try and balance the activities across all disciplines. When you have limited resources it is a real challenge to not be tempted by the speed of FT8 Fox mode. In the end, our band and mode choices reflected the balance we hoped for.

Breakdown by Continent

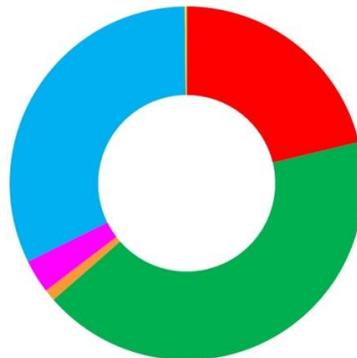
Continent	Total QSOs	%
Africa	69	0.5
Asia	6999	45.8
Europe	2781	18.2
North America	4354	28.5
Oceania	873	5.7
South America	212	1.4
Totals	15288	100.0

EU NA SA AS OC AF

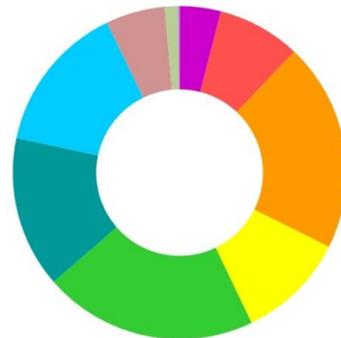


Contacts by Continent

In the contacts by band stakes, probably the couple of disappointments were that we didn't spend more time on 80m, 30m and 17m. It was a combination of factors that contributed to this, including antennas, workable band combinations that didn't interfere with each other and operator availability.



Contacts by Mode



Contacts by Band

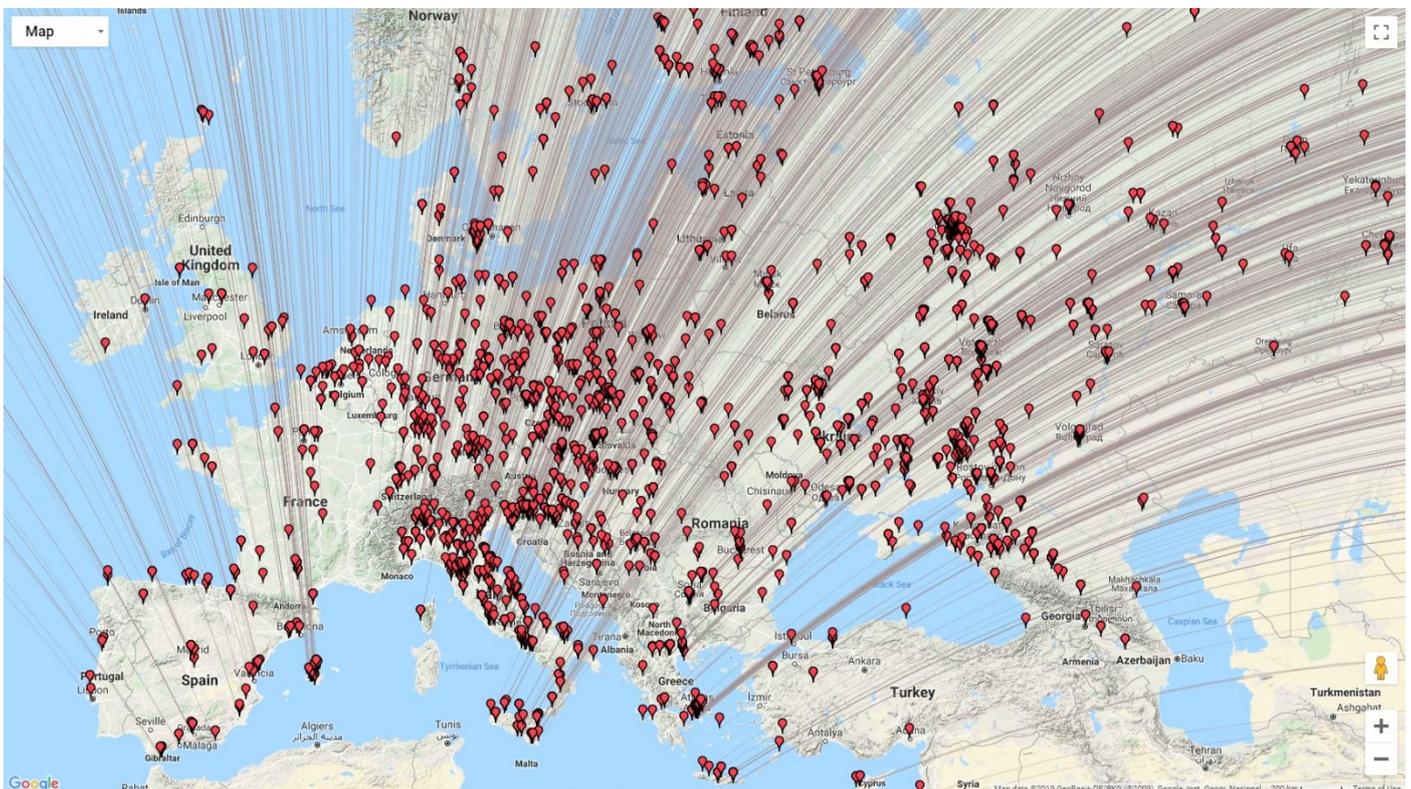
For a 4 man expedition to cover as many bands as we did, including 6m EME, we are very pleased with the results achieved.

## WHERE DID WE WORK?

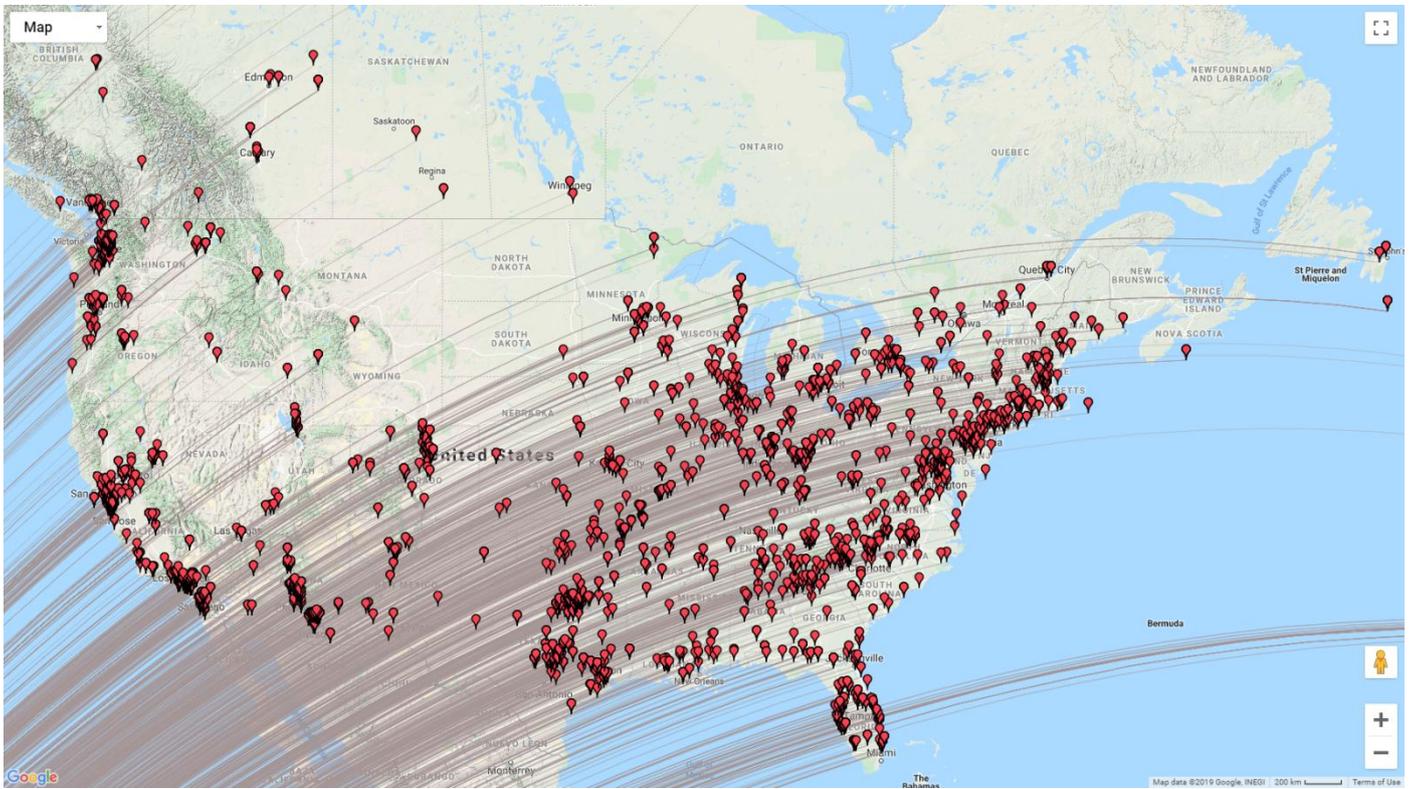
We also took a look at the maps of where we made contacts.

The map of Europe tells the tale with the number of contacts into western Europe visibly less once you cross the path that traversed the north pole. While we did manage contacts into France, the UK and Spain, there were far fewer than countries east of that line. You can take heart that it wasn't for lack of trying. Clearly it was just hard at this point of the solar cycle.

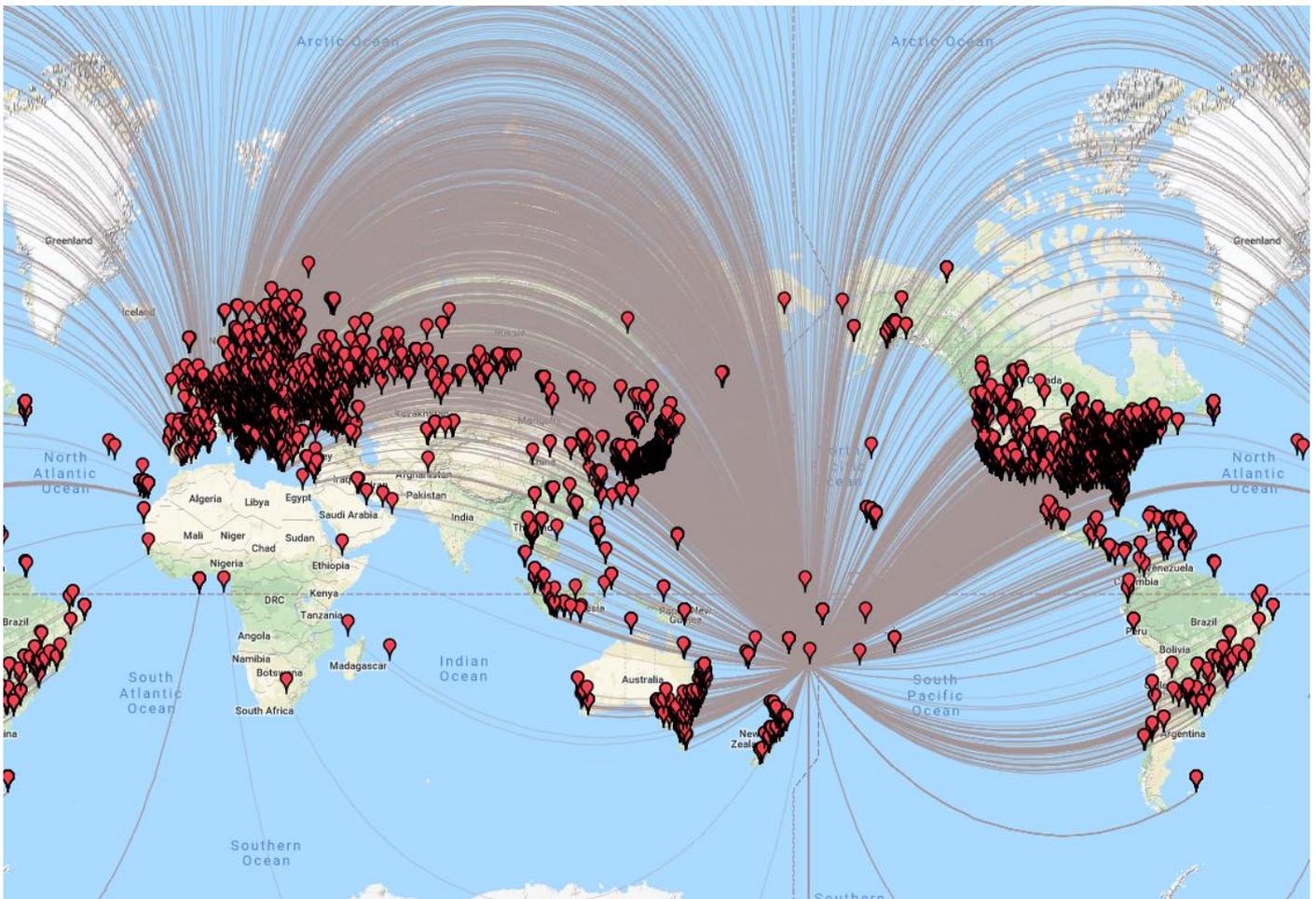
Looking at the North American map we can see good coverage over the populous states even into the far North East while the global map shows a good quantity of South America was reached as well.



European Stations Worked (map thanks to adventureradio.de)



**North American Stations Worked** (map thanks to [adventureradio.de](http://adventureradio.de))



**Global Stations Worked** (map thanks to [adventureradio.de](http://adventureradio.de))

## CONCLUSION

Now with everyone and everything safely back in Australia we sit back and look at what was achieved. As a first time expedition group we are happy that we delivered what we promised to all of our sponsors, supporters and to the Amateur Radio community in general. Without everyone's support, particularly the financial support received, this would have been far more difficult to achieve. To all of the individual contributors we say a huge thank you for your faith and believe in us.

Special mention must also be made of the 6m EME community who put their faith in a scratch team of novice EME operators to deliver their QSOs from Tonga. Your support meant a lot and went a very long way to making the EME part of the activation even possible. To Lance, W7GJ, Peter VK5PJ, Matt VK5ZM, Dennis VK5FDEN and Bjorn SM7SJR in particular a huge thank you!

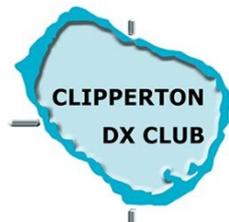
## CORPORATE SPONSORS

We must thank our corporate sponsors who helped with equipment costs for this expedition. A lot of gear had to be purchased to make this possible as a first time team and your support eased the pain in this regard. Special thanks to Rick DJ0IP from Spiderbeam for your help, and also to Carsten VK4OA at RF Solutions as well as Christian from Messi & Paoloni. I must also thank Ivan VK5HS from HF Radio Solutions who helped with our power supplies.



## DX ASSOCIATIONS

We must also say a special thank you to all of the organizations that supported this expedition. Without your contributions, we would not have been able to take the station that we did out into the South Pacific. To all of you we say thank you!



*DX Association Sponsors*

## THANKS TO OUR OFF ISLAND SUPPORT TEAM

We also want to thank our off island support teams. In particular our QSL Manager, Charles M0OXO who has the thankless task of processing the thousands of QSL requests our contacts will generate. We can't recommend Charles highly enough if you are in need of a QSL manager.



*Charles M0OXO – Our QSL Manager*

We also want to thank our pilot team around the world. The communications, camaraderie and support you provided was highly valued by the team. Special thanks to Bjorn ON9CFG who took on the role of Europe and Chief Pilot, Steve N2AJ who represented



North America, Joe JJ3PRT who represented Japan and provided our Japanese webpage, Chris VK5SA who represented Oceania, Ricardo PY2PT who represented South America and Jim AC3EZ who was our ATNO and Youth pilot.

We also want to pass on our regards to Cesar PY2EG who was originally going to be our South American pilot but who had to pull out at the last minute.

## THANKS CLUBLOG!

Another huge aspect of bringing a DXpedition to life is the online presence created for the expedition. Michael G7VJR at Clublog has created a tool of immense value to the Amateur Radio Community, one which we used extensively in bringing you A35JT. The live logging added a truly special dimension to the expedition.



We would encourage all amateurs to consider making a yearly donation to Michael and the Clublog team to support their work bringing Clublog to the Amateur Radio Community!

## TECHNICAL SUPPORT

We must also thank a number of Amateurs back in Australia who helped particularly through the development phase of the project. To Matt VK5ZM, Neil VK5KA, Paul VK5SL and Dennis VK5FDEN, thanks for each of your contributions to the project.

Special thanks to Matt VK5ZM who also helped with Web Hosting support services and servers for our website and his expertise with yacht rigging in the design of the low band antenna system!

## END OF THE JOURNEY

So that brings us to the very end. We hope you have enjoyed working us from Tonga and following along our story. Hopefully we will be able to head out into the Pacific and bring you another one in the future. Look out for us calling CQ perhaps in 2022!

73 de Grant VK5GR – Team Leader for A35JT Tonga

