Update on the Callisto project, 16/04/2019

I knocked up a 4m tower during a few lunch hours at work

The plan is to bolt the tower into the limestone rock at the Receiver site. The grey box is for the receiver electronics and 2 solar panels will be mounted above that.

The top section for the tower has a sun tracking mount to which the antenna will be attached.

The solar tracking mount uses linear actuators and an ‘ebay’ solar panel control system.

The above pictures show the top section during initial testing, it appears to work quite well and should be an excellent match for the log periodic antenna that Peter made.

Day 1. A quick trip out to the receiver site to drop of the tower, nice container David!

Day 2. Now comes the ‘fun’ part, digging the trench for the conduit and the holes for the tower and guy anchor points, shouldn’t take long.

This is hard work! It’s going to take a couple more minutes (before I give up).

Fractured limestone, I’ve dug trenches before, but this is terrible stuff.

Time to get the big boy's toy out.

Thanks David!

Give me a couple of minutes and I'll clean it up.

Blair “All, done, it will look better once I stick the conduit in it and fill it in.”

John “But that’s only the trench for the conduit and we’ve been here all day!”

David “Don’t give up your day job”.

We’re going to have to come back another day.

We revised what we were going to do after the trip and now have a much better idea about what we need to do to put the tower up. Plan “B” Bolt tower to rock, no guy wires.

Went to ‘Bunnings’ and spent $300 on steel hardware, glue, 10 bags on concrete and long masonry drill bits that suited my industrial mains powered hammer drill. (if you’re going to play with rock or concrete, you’ve got to have the right tools, forget battery powered stuff here!)

Day 3. First thing was to drill into the limestone 400mm and glue in 1 metre long pieces of M20 (20mm diameter) galvanised threaded rod. The drilling was done with a 12mm drill then a 16mm drill then finally I put down a 24mm diameter drill. That took the best part of an hour. David brought out his compressor to clean out the holes in the rock.

I used Ramset brand Chemset 101 to glue the m20 rods into the limestone.

Picture shows the 4 x M20 threaded rods glued into the rock.

We then added some reo, put on the new tower base as a template for the rods and mixed 10 bags of concrete to fill the hole and stabilize the rods. That only ½ filled the hole, so more concrete next time we visit.

Once the concrete went off, we removed the new steel tower base and I welded it to the tower.

After attaching the top to the tower and a bit of rigging, the new tower was lifted with the back hoe bucket and placed onto the rods.

Peter admiring our day's work as the sun heads low into the west on another long day.

2+ hours driving sees us both home, but we've got the tower up! Progress IS being made!

What's left to do? More concrete, the top of the tower has to have the RA and DEC axis bearings and arms fitted, linear actuators installed and the 5 metre log periodic antenna that Peter made over a year ago attached. Solar panels and the receiver box also need to be mounted.

Then it all needs to be wired up, made water proof, although, it hasn't rained out here for over a year so that's not high on the list of must do.

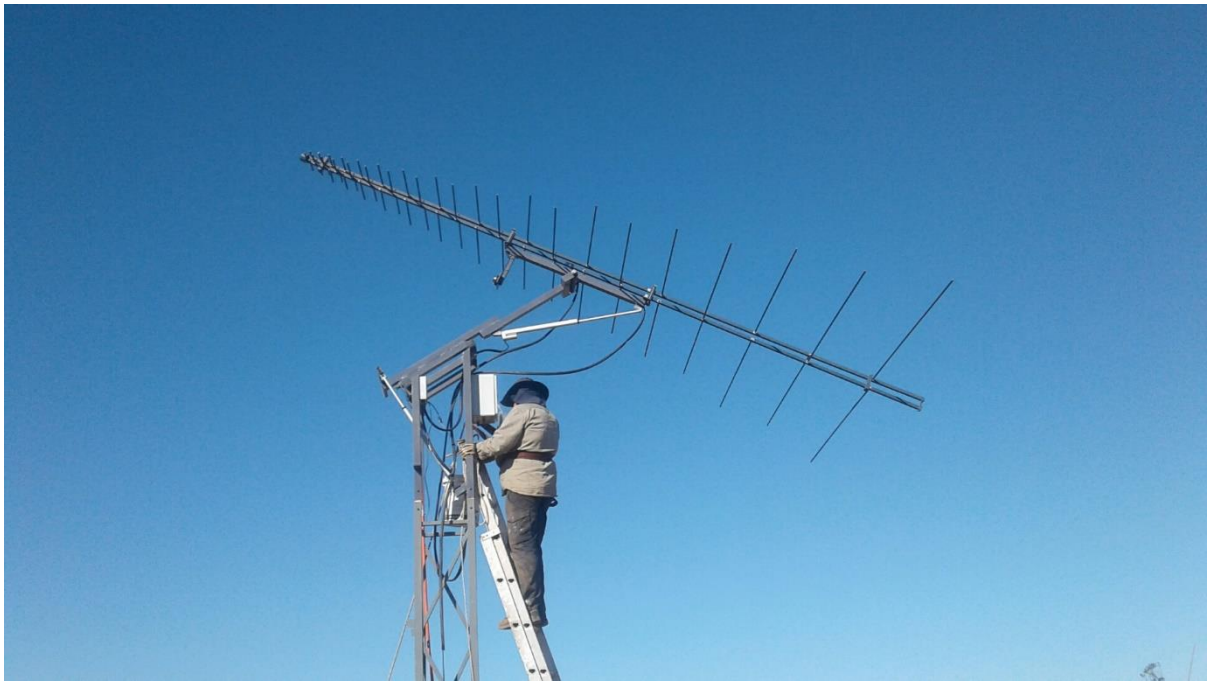
Day 4. Another day and 2 hours of driving and the tower's still standing!

First up, another 10 bags of concrete, might work off that pie I had for breakfast if I'm lucky.

11 am, I'm ready to call it a day and we've only just got the concrete done.

We've got to get younger people involved in doing this sort of work. Mixing concrete is a good educational exercise …….not!

Here’s Peter with the antenna about to be hauled up onto the top. It’s only about 20kg, but still quite difficult with just the 2 of us on site.



There it is, all the bits and pieces bolted onto the tower.

Now it’s just a wiring job and we’re feeling pretty pleased with ourselves.

Day 5. 1 more bag of concrete (that makes 21 x 20kg bags).

Peter's turn to wear the safety belt and spend an hour up the ladder.

On the right are the 2 solar panels that are going to keep this running.

I had the antenna tracking system running by about mid day and by the end of the day we had everything on the tower wired up.

We turned the receiver on, connected the laptop and everything appears to be running.

We don't have the proper internet connection yet, but we installed a 3/4G modem on a cheap router and we think that's connecting. We're going to let it run for the next couple of days like that and see how it's going.

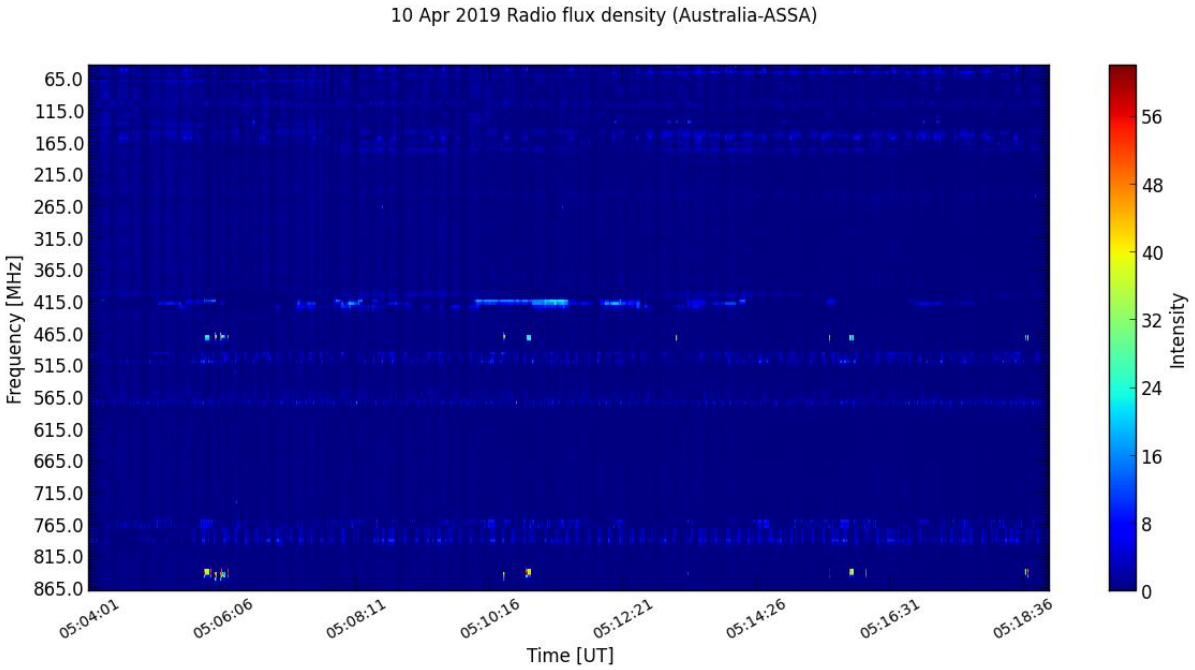
What's left to do, install the cat 5 wiring between the tower and the container, install the network router, solar power supply and communication equipment (there will be other projects and monitoring activities carried out at the site at a later time).

Day 6. We finished installing and terminating some network cables between the tower and the container. Even had time to tidy up the cabling at the top of the tower weather wise.

Peter looked at some data on the Rasberry Pi (LX) and it looks like it all worked for a couple of days and then played up some what.

We investigated and found a couple of issues in the LX configuration file and an under rated fuse that had blown on the battery. With a cloudy day and full sun the next, the solar charger did what it was supposed to do and pumped around 12 amps into the battery for a while (a very short while it would seem) until the 4 amp battery fuse said "I'm getting out of here!" We put in a 15amp one and it was fine after that. With 160 watts available from the solar panels, that should be enough.

We think we have resolved most things and once we get the network hardware installed and sorted it should be all go.



Here's a bit of data from the first day.