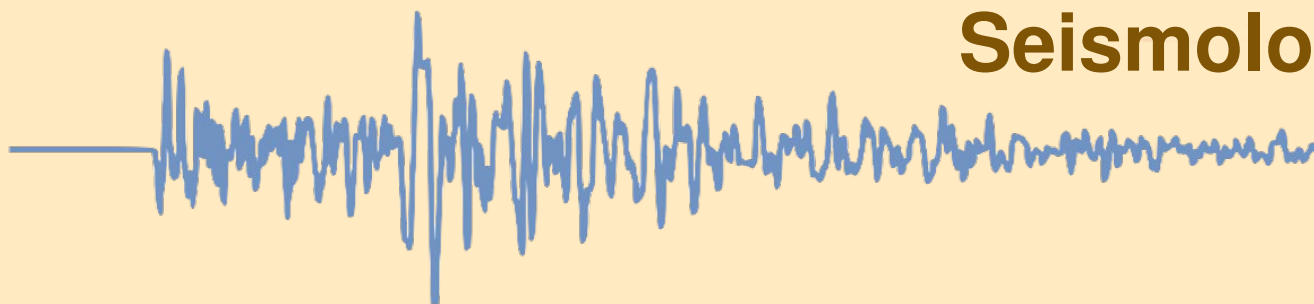


**Newsletter of the Seismological Association  
of Australia Inc. Jul-Aug 2020**



# Seismological Association of Australia Inc.

Newsletter of the  
**Seismological Association of Australia Inc.**  
PO Box 682, Mylor SA 5153

## Your Committee

**Chairperson - Blair Lade**  
m: 0407 189 061 e: blairl@bettanet.net.au

**Chief Seismologist - David Love**  
p: 08 8336 8003 e: david@earthquake.net.au

**Public Officer - Paul Hutchinson**  
m: 0419 829 216 e: windfarmer@bigpond.com

**Secretary - Joe Grida**  
m: 0407 558 036 e: joe.grida@internode.on.net

**Treasurer - Joe Grida**  
m: 0407 558 036 e: joe.grida@internode.on.net

**Editor - Peter Gray**  
m: 0418 829 632 e: weaksignals@iinet.net.au

The SAA can be contacted by post to the  
address above, or by email to any member of  
Committee, as listed above

**Membership** of the SAA is open to all, with the  
only prerequisite being an interest in seismology.  
Membership applies for the calendar year  
(January through to December)

Membership fees are:  
Full member \$50

A Membership application form can be obtained  
from the Treasurer by email or [download it here](#).

## Member Submissions

Submissions for inclusion in the Newsletter are  
welcome from all members; please note that  
submissions may be held over for later editions.  
Wherever possible, text submissions should be  
sent via email in almost any word processing  
format. Your name may be withheld only if  
requested at the time of submitting. Images  
should be high resolution and uncompressed,  
although high resolution JPEGs are acceptable.

All enquiries and submissions should be  
addressed to the Editor and preferably sent by  
email to weaksignals@iinet.net.au

**From the Editor** - As this edition of the SAA  
Newsletter is published, I wonder how I have  
managed to scratch together some seventeen  
editions over the last few years.

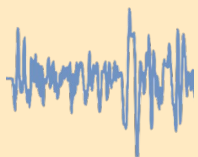
Well the real answer is "**with the help of our  
members**" of course. As 2020 heads toward its  
inevitable end, I'm thinking that this newsletter is  
starting to look a little tired and in need of a  
change. Does it need a shave and apply some  
new makeup, some surgery/perhaps a facelift or  
just decapitation?

I will not be seeking to extend my position of SAA  
Newsletter Editor beyond the AGM this year,  
eighteen editions will have been enough for me  
and probably for you too, dear reader.

If another member is willing to take over this task,  
I am sure that the SAA Committee would be glad  
to hear from you, I know that I would.

In announcing this decision, I would very much like  
to thank the following members for their multiple  
contributions of articles of interest. David Love,  
Kevin McCue, Randall Peters, Mike Turnbull, Paul  
Hutchinson, Colin Lynham, Blair Lade and Gary  
Gibson. If I've missed anyone, my apologies.

**Peter**



# SAA News

**A new magnetometer for The Peters Seismological Observatory** - The SAA has been asked to host a vector compensated triaxial digital fluxgate magnetometer on a long term loan from Mr Markus Wiedermann in NSW. The [Magson Model MFG-1S](#) will be located within the vault of the TPSO, to take advantage of the temperature stability offered by the site. Maximum temperature variation in the seismic vault, in any one month, is less than 0.3 Deg C. with an annual temp variation less than +/- 0.75 Deg C. Temperature lag in the vault is slightly more than 6 months behind the seasons. The installation of a high grade magnetometer at TPSO will be invaluable to determine if there be any correlation between observed inconsistencies of the high resolution tiltmeter and disturbances to the magnetic field. Both Marcus and SAA members are making arrangements to launch this project in the near future. Once it is up and running, we will inform members where to be able to access the data. We look forward to a long and productive partnership with Marcus and appreciate his efforts, expertise and the opportunity to participate in this endeavour.

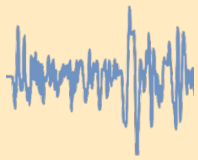
**Science Alive 2020** - The annual Science Alive is to be held again in Adelaide this year. Due to the COVID-19 pandemic, the event has been re-scheduled until November. In view of the potential health risks that SAA members may be exposed to over three days facing the public, the Committee has decided to decline the offer to attend this year's event, assuming that it actually takes place.

**Bunnings BBQ fundraising** - Bunnings have recently resumed their community fundraising BBQ's at their warehouse stores. There have been some additional conditions placed on participating community groups, primarily to better manage the sausage scoffing patrons in social distancing requirements. For the same reasons as outline above, it is unlikely that that the SAA will be participating in these activities anytime soon.

**Vale Edward Cranswick** - South Australian members will be saddened to learn that Ed Cranswick passed away in early July. Edward was a member of the Adelaide Seismological Interest Group, this group went on to form the SAA when the Geological Survey of South Australia was wound up. A summary of Ed's achievements in seismology will be in the next edition of the SAA Newsletter.

**A new logo for the SAA?** - The publication of ASR2016 (see page 4) has prompted a review of the SAA Logo. The SAA squiggle is actually a MS Excel chart of a digitised waveform provided by David Love and cobbled together with the registered name to form a letterhead, required for a letter to Bunnings way back in mid-2017. Kevin McCue has been able to get some sample graphics professionally produced by an associate and these are being considered by the Committee. Look out for an announcement shortly.

**On the Cover** - Just when you'd heard enough about Raspberry Shakes, this image is of a live datastream to a laptop using Datacast - RSUDP.



# The Annual Seismological Reports, Australia

Kindly submitted by Kevin McCue

## 1980 - 1998

The series was started in 1980 by David Denham and Peter Gregson in the Observatory Group at the Bureau of Mineral Resources (forerunner of GA) and they published the first 4 volumes - 2 years in arrears (because that was the ISC timetable). The last one GA published was ASR1998.

From 1985 the role was rotated amongst GA seismologists until 2001 when it was discontinued.

## 1999 - 2001

ASR1999 and 2000 were published by AEES members on the AEES website, along with an addendum to 2008.

## 2008 - 2015

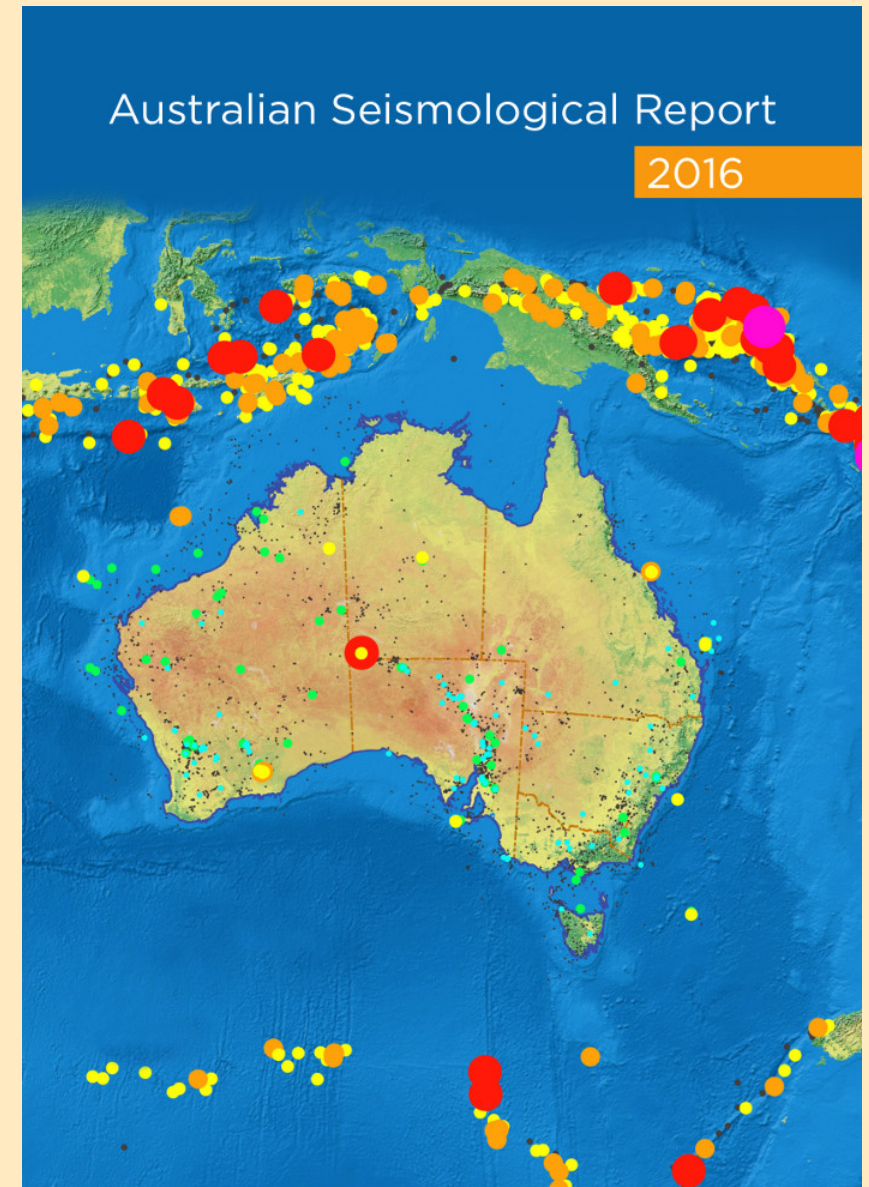
GA resumed the series under Hugh Glanville, the first GA Record 2009/37, but after the 2015 report GA has again cut the series.

## 2016 -2020

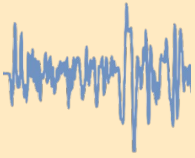
ASR2016, edited by Kevin McCue and David Love, is being published by the Seismological Association of Australia. ASR2017 is beginning to come together as an early draft and the remainder of the series is currently at the production planning stage.

## Where can you get them?

Adam Pascale has agreed to create a page under the Downloads menu for links to the [Annual ASRs](#) on the AEES website.

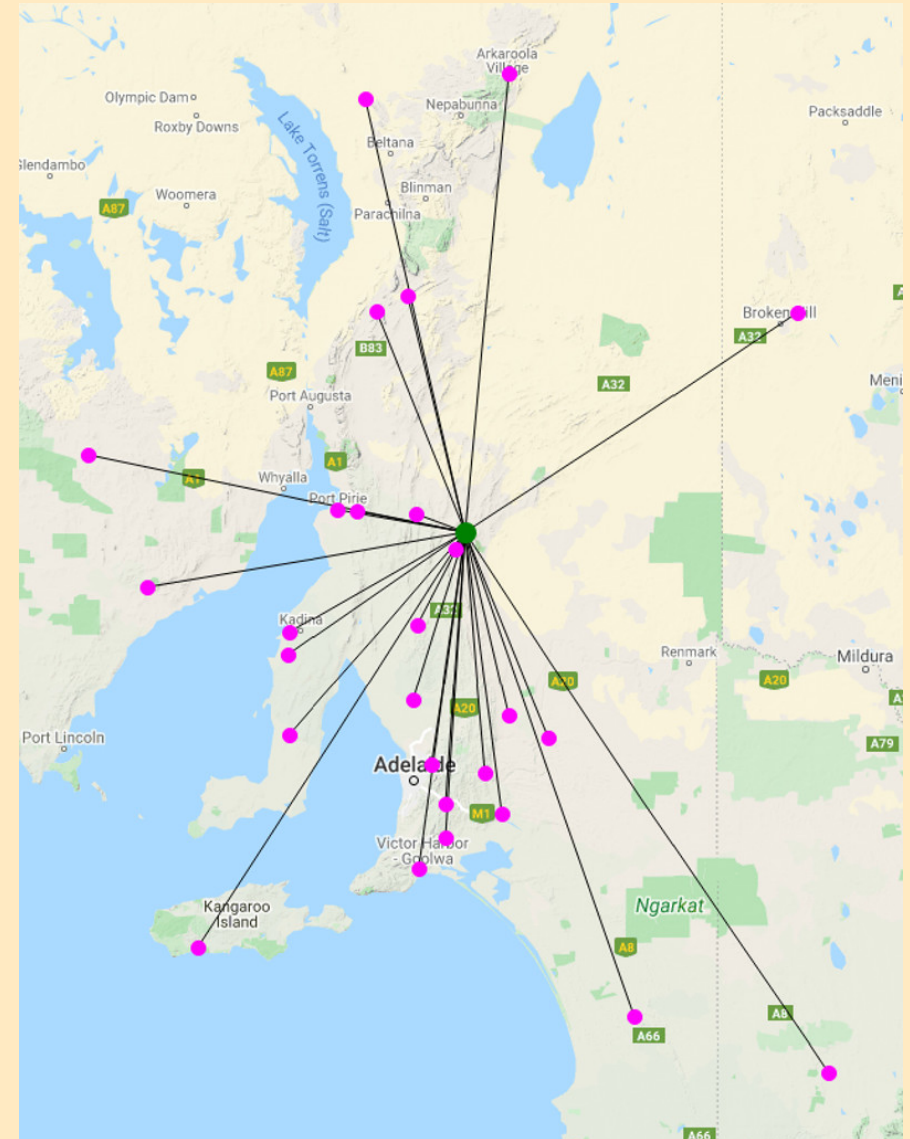
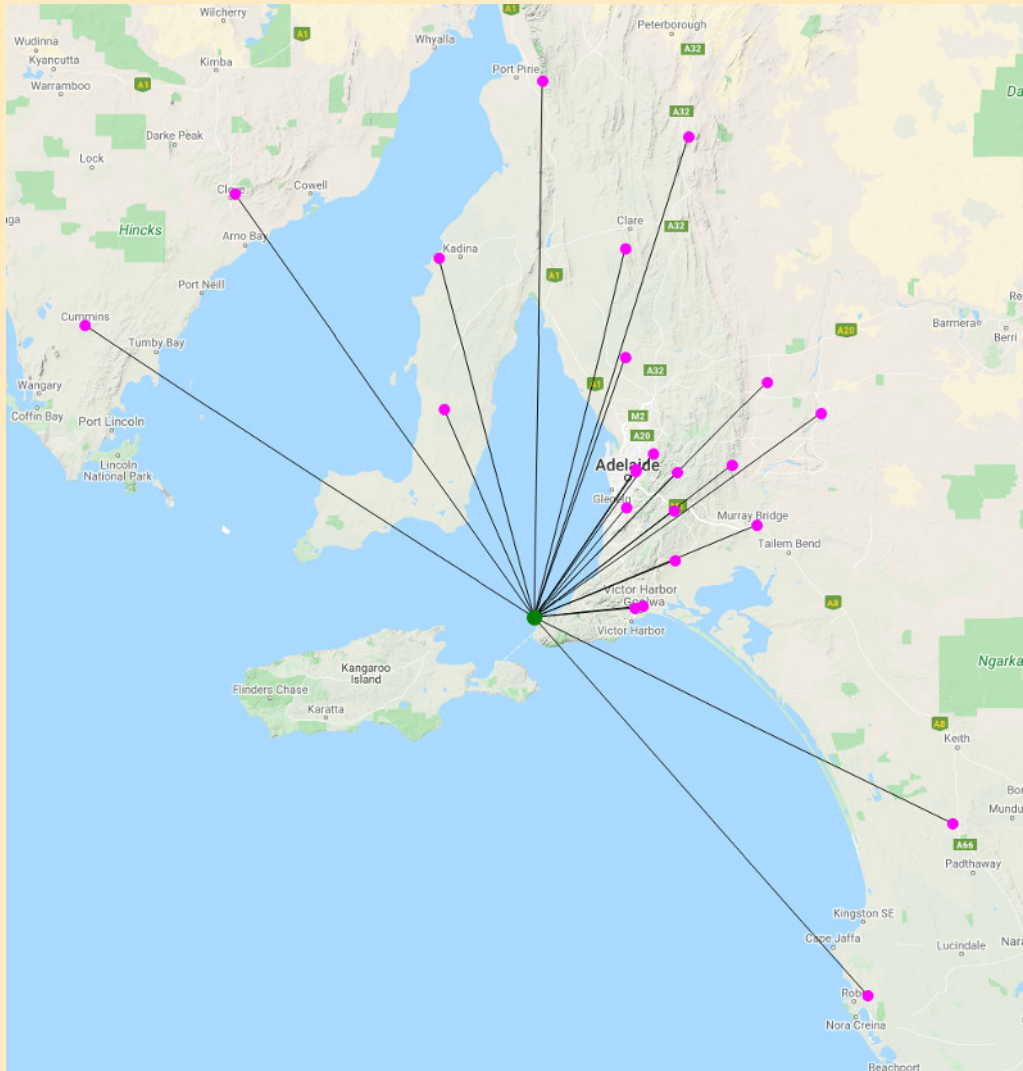




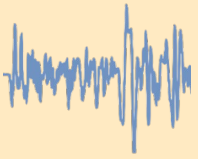


# Recent Seismic Activity

**CAPE JARVIS 2020-07-07 01:50 2.8MLv**



**HALLETT 2020-08-04 00:09 3.0MLv**



# The Significance of Corrosion on Long Term Tilt Measurements

Kindly submitted by Paul Hutchinson

## No! Victor Harbor is not rapidly tilting down to the NNE

Over the last two years, an abnormally high rate of long-term tilt to the NNE, has been observed at the Peters Seismological Observatory (TPSO) located near to Victor Harbor, South Australia. The Lippmann tiltmeter S/N 001 located on the seismic pier of TPSO has been showing what was considered by Dr Gabor Papp of the Geodetic and Geophysical Institute, Sopron, Hungary, to be a grossly abnormal high rate of long term tilt for crustal bedrock. Which was somewhat of a puzzle seeing that the tiltmeter appeared to be functioning correctly. Functioning correctly by showing that the actual twice daily tilting of the bedrock at TPSO, to be very close to the predicted and ever changing effect that the Sun and the Moon's gravitational forces has on the Earth's solid crust.

Yet whilst the Lippmann recorded solid earth tilting that was very close to the predicted, never-the-less a grossly abnormally high rate of long term tilt to the NNE was imposed upon the traces. Was the whole Peters Seismological Observatory sliding down the hill? Was the crust in this area actually tilting to the NNE at such an abnormally high rate? Was the Victor Harbor area tilting to the NNE at an abnormally high rate?

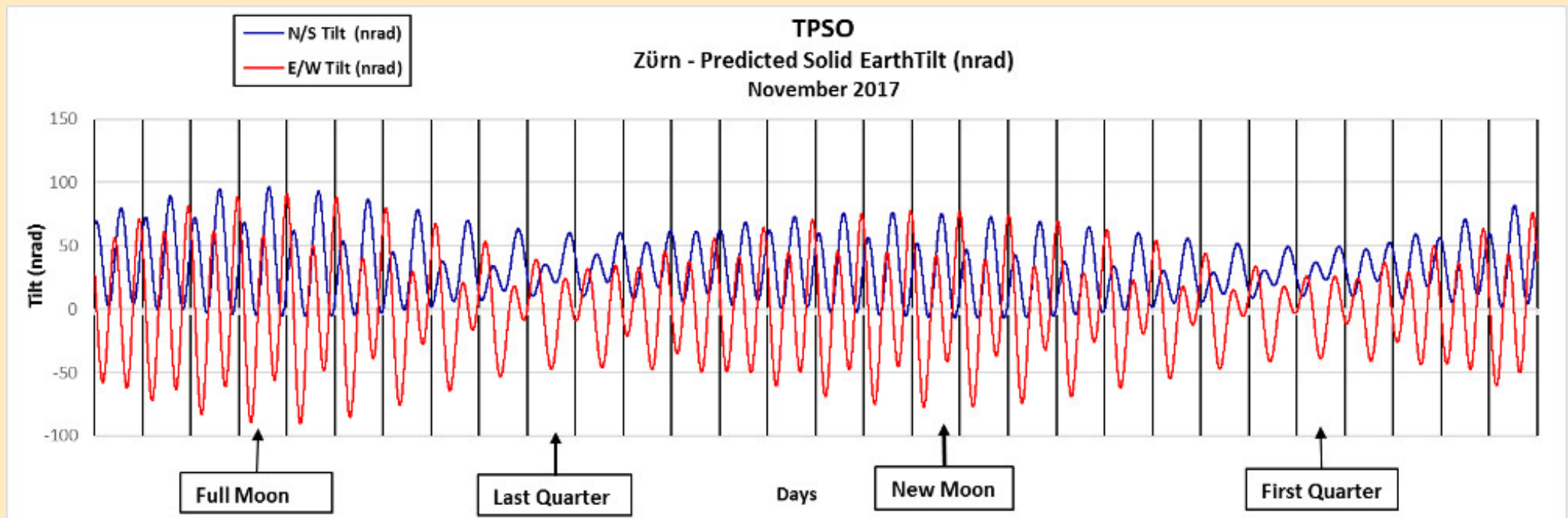
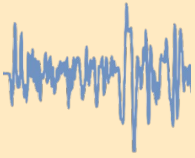


Figure No. 1 Predicted Solid Earth Tilt (nrad) for TPSO for the month of November 2017



# The Significance of Corrosion on Long Term Tilt Measurements

## The Answer

A few months ago one channel of the Lippmann tiltmeter failed, and the instrument has been sent to Europe for an overhaul. The actual instrument itself was bolted onto the top of a 10mm thick, 263mm square aluminium base plate. The aluminium base plate having three brass levelling screws with a very fine thread, allowing for precise levelling of the tilt meter. But after removal of the instrument from off the base plate, an examination showed that corrosion had occurred where the brass levelling screws rested on the concrete seismic pier. With corrosion occurring to a different degree, on each one of the bottoms of the three brass levelling screws.

As can be seen in Figure 2, the corrosion has occurred all over the rounded end of the brass levelling screw. That was in contact with the concrete seismic pier. And as with any corrosion, the end result is an expansion. So the question can be asked, just how much has the expansion of the blue-green corrosion lifted the levelling screw off the concrete, and thereby affected the validity of long term tilt measurements at TPSO.

Indeed from examination of the three brass levelling screws each with their varying degree of corrosion, is it just possible that with the actual layout of the base plate on the seismic pier, that such different growth of corrosion underneath each one of the three brass levelling screws, gave the aluminium base plate a grossly abnormal high rate of false tilting to the NNE.

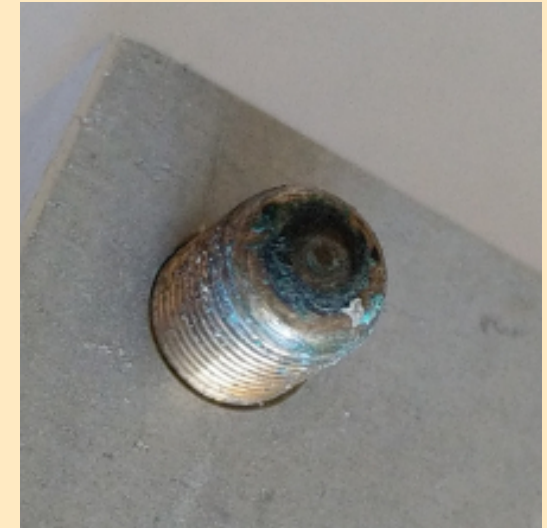
The effect of corrosion under the brass levelling screws. But just how much expansion of the corrosion beneath the brass levelling screw would lift the base plate enough to give false readings? With the brass levelling screws 250mm apart then for the expansion of the corrosion under one levelling screw to give the base plate a false tilt equivalent to the amount of tilt the Sun and Moon twice daily gives to the crust (about 70 nrad) then the expansion would have to be,

$$= 0.250 \text{ meters} \times 7.00\text{E-}8 = 1.75\text{E-}8 \text{ meters}$$

But just how small is 1.75E-8 metres? (The Covid-19 virus is some 1.20E-7 metres in diameter. )

So if we put a single Covid-19 virus under one brass levelling screw (and it did not squash), then the tilt would be some.

$$1.20\text{E-}7 / 1.75\text{E-}8 = \text{some 7 times the maximum twice daily tilt of the crust caused by the Sun/Moon}$$



**Figure No. 2 Underside of base plate showing brass levelling screw with corrosion.**





# The Significance of Corrosion on Long Term Tilt Measurements

So with the corrosion being visibly apparent all over the rounded end of the brass levelling screws, then there is every reason to believe that such a growth in corrosion over the past few years underneath the brass levelling screw/s, would have been enough to have given the aluminium base plate a false long term grossly abnormal high rate of tilt.

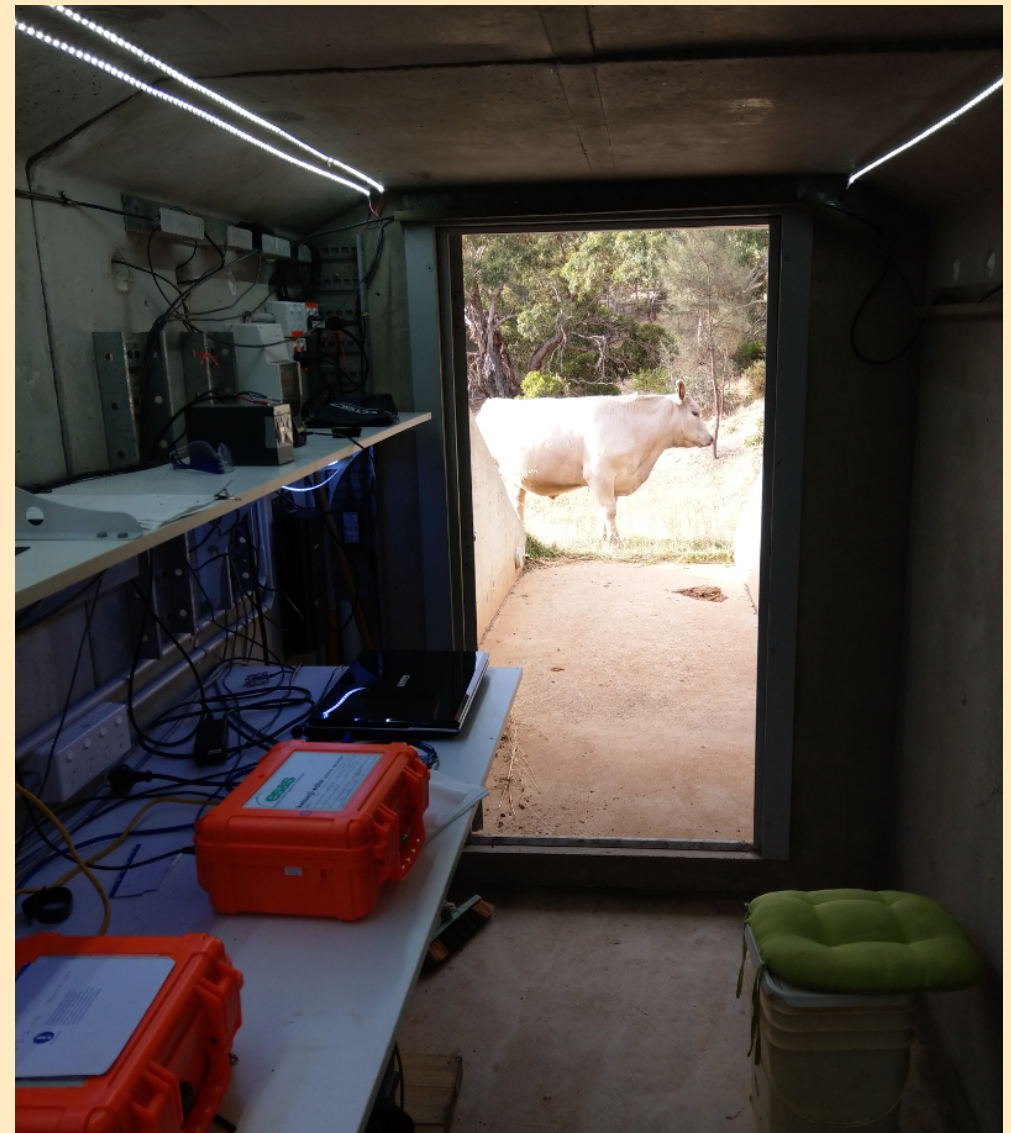
## The solution

When the overhauled Lipmann tiltmeter S/N 001 is returned, and again bolted to the aluminium base plate, we will ensure the three brass levelling screws are sitting on small glass slabs, sitting on the seismic pier. So as to prevent corrosion between the brass levelling screws and the concrete seismic pier. Only then will we know if we have solved the mystery of the grossly abnormal high rate of tilt observed to the NNE at TPSO over the past several years.

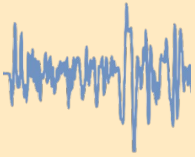
**Caution, particularly when visiting the TPSO**

**Beware of spiders, mice and snakes  
when attending this seismic station.**

**and by the way, don't forget  
about the cows too !!**







# Do you see the light?

Submitted by Peter Gray

## More tales from seismic pit

Some time ago (Newsletter #3, Nov-Dec 2017), I suggested that Middleton would eventually upgrade to a 24bit digitiser. Back in the day, I ran a very well shielded RS232 cable from the seismic pit down to the garage (attached to the house), a comms cable for the Webtronics 16bit A/D card back to the PC. When a Raspberry Pi 3B replaced the PC to collect, store and send data, it was eventually moved out into the pit alongside the A/D card. The RS-232 cable became obsolete and some considerable effort went into making a low power Wi-Fi connection sufficiently reliable to provide a 24/7 link for the system.

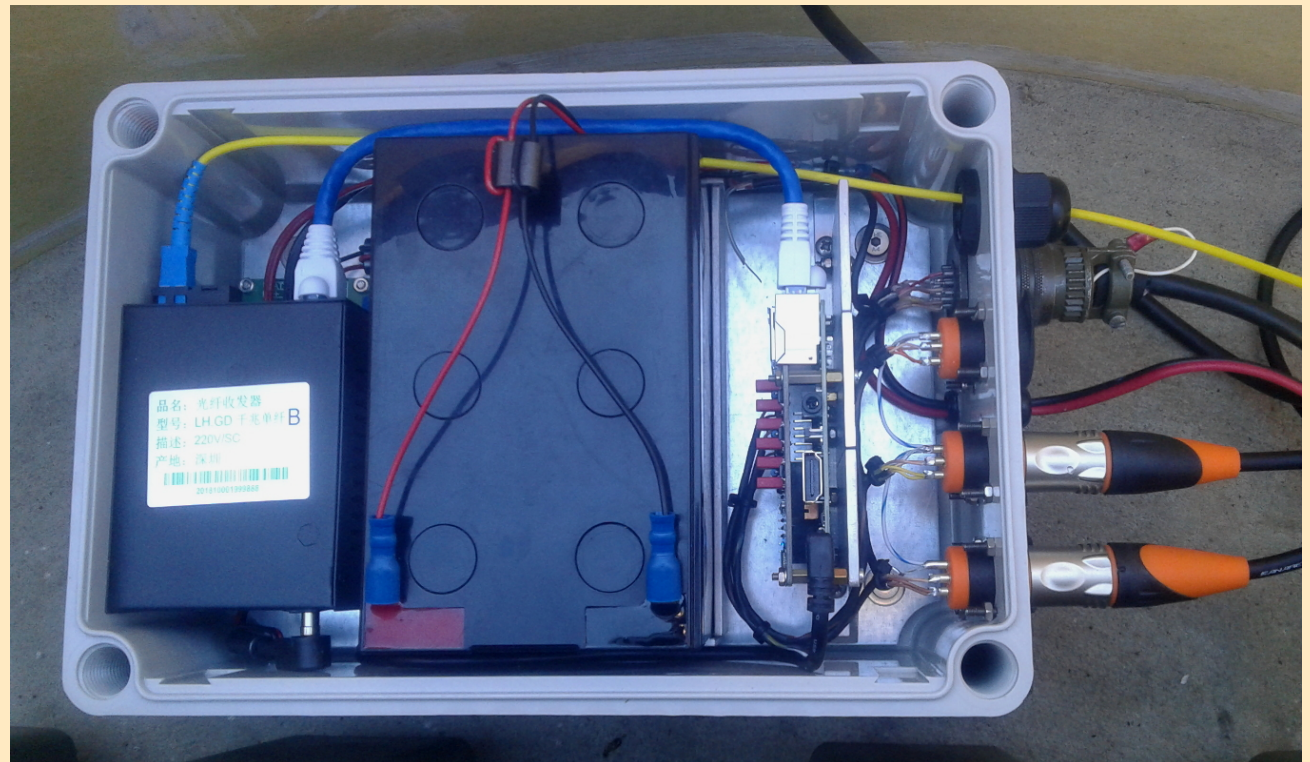
Having now effectively retired the Webtronics system for a couple of Raspberry Shake RJAM digitisers, it became apparent that while the Wi-Fi link was adequate for a single RPi, multiple digitisers would be a bigger problem. To further complicate things, the RJAMS are arguably more susceptible to induced voltage spikes than the Webtronics cards, so 50 metres of CAT5e or CAT6 LAN cable buried just below the surface would be a reasonable antenna to a lightning strike.

## What to do?

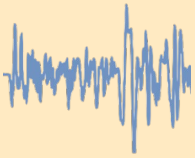
The solution was suggested by Michael Andre Phillips of the Edward Pigot Seismic Observatory (EPSO) at Coonabarabran, NSW. Andre has three instruments configured as an array spaced 200m apart. Long data cable runs in an area susceptible to regular lightning strikes can be done with fiber optics and it's quite likely to be cheaper than copper LAN cables. Being located on the coast, Middleton cops a fair share of electrical storms so the choice was obvious.

## Another eBay adventure

Andre suggested a Media Converter (LAN to fiber transmitter/receiver) pair that used SC connectors for gigabit speeds up to 20km. At the time, these were available for about AU\$35 per A/B pair (foreign exchange rate risk applies). A suitable length of SC-SC fiber pair cables (60m) was sourced for AU\$27 from another seller in Queensland. These media converters only use a single fiber so I ended up with two separate 60m SC-SC cables.



RJAM R3EA4 with Media Converter (type B) on left



# Do you see the light?

As mentioned earlier, there are two RJAM Shakes being located in the seismic pit. With another Media Converter A/B pair I'll be able to have two fibers running back to the garage, offering some level of built-in redundancy in case of a failure. A couple of things that you might like to know:

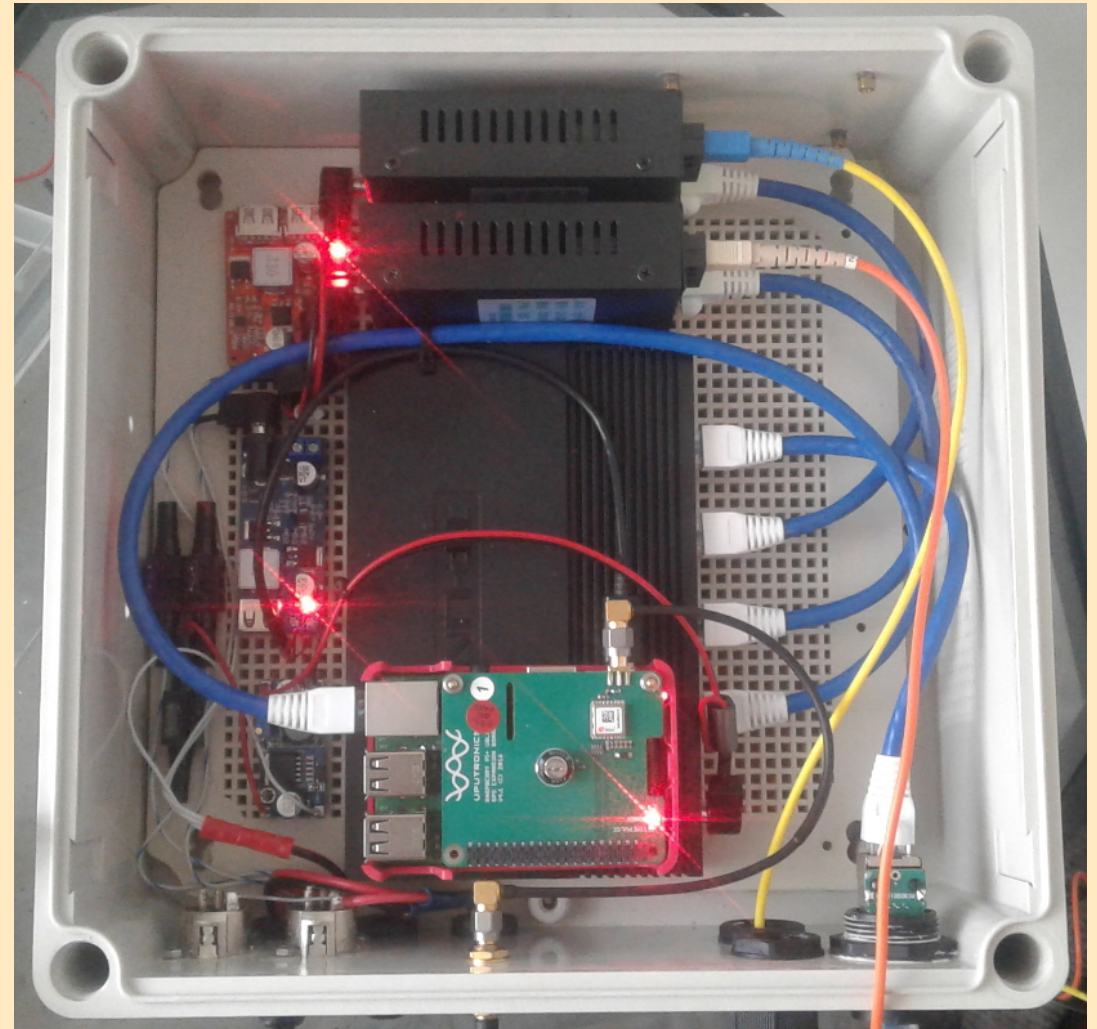
- \* each of these media converters require a 5VDC supply of about 135mA, this needs to be factored into power requirements at both ends of the cable.
- \* fiber cables are difficult and expensive to terminate, well beyond the capabilities of most casual users. Treat them nicely and they should last a long time, if you break one you'll probably need to replace it rather than fix it.

## How to do it?

At the pit end, it became easier to install a type B media converter in each RJAM enclosure, that way some protection from moisture would help the RJ45 LAN connectors stay dry and there was plenty of DC power capacity available within the box. The SC connectors are 10mm across at their widest point (corner to corner) so that would pass through a 10mm cable gland with a bit of a push, much smaller and easier than routing preterminated LAN cables.

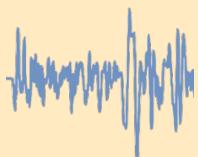
At the garage end, both type A media converters were mounted in another enclosure, along with an 8 port LAN switch. Another Raspberry Pi configured as a GPS-NTP Time Server to service both RJAM Shakes and a GIF image generator for the CQSRG PSN website. Finally, some associated power supplies for the various boxes. This made it easy to stuff it all under a bench out of the way, close to the window where the Time Server GPS receiver would be located. Again, the two fibers enter the enclosure via 10mm cable glands and LAN connection back to the Internet Access Point is by cable through a bulkhead connector.

My thanks go to Andre, this works like a charm. It considerably reduced vulnerability to lightning induced voltages and the hardware didn't cost more than about \$100 for both cable runs.



Garage end - both Media Converters (Type A) at top





# Resources & useful links

Description	URL / Webpage	Notes
<b>SAA Membership Application</b>	<a href="https://www.assa.org.au/media/74629/saa-membership-">https://www.assa.org.au/media/74629/saa-membership-</a>	Join up with the SAA using this form
<b>SAA Flier</b>	<a href="https://www.assa.org.au/media/74629/saa-membership-">https://www.assa.org.au/media/74629/saa-membership-</a>	Our current brochure - flier, saying what we do
<b>SAA Newsletters</b>	<a href="https://www.assa.org.au/resources/technical-special-">https://www.assa.org.au/resources/technical-special-</a>	Download any SAA Newsletter from this site
<b>SAA EqServer</b>	<a href="http://ade-eqserver.dyndns.org:8080/eqserver/">http://ade-eqserver.dyndns.org:8080/eqserver/</a>	South Australian miniseed seismometers
<b>Melbourne University EqServer</b>	<a href="http://meiproc.earthsci.unimelb.edu.au/eqserver/">http://meiproc.earthsci.unimelb.edu.au/eqserver/</a>	Australian miniseed seismometers
<b>Regional Seismic Network</b>	<a href="http://www.regional-seismic.net/">http://www.regional-seismic.net/</a>	PSN seismometers - Aust. Centre for Geomechanics
<b>Australian Public Seismic Network</b>	<a href="http://cqsrg.org/psn/stations/">http://cqsrg.org/psn/stations/</a>	Australian PSN seismometers
<b>Recent SA Earthquakes</b>	<a href="https://earthquakes.mappage.net.au/q.php">https://earthquakes.mappage.net.au/q.php</a>	Data & summaries of recent SA quakes
<b>Central QLD Seismology Research Group</b>	<a href="http://www.cqsrg.org/">http://www.cqsrg.org/</a>	CQSRG - Kevin McCue
<b>Astronomical Society of SA</b>	<a href="https://www.assa.org.au/resources/technical-special-">https://www.assa.org.au/resources/technical-special-</a>	ASSA - Seismology page
<b>Geoscience Australia</b>	<a href="http://www.ga.gov.au/earthquakes/initRecentQuakes.do">http://www.ga.gov.au/earthquakes/initRecentQuakes.do</a>	Our national authority on seismic events
<b>Earthquake Services</b>	<a href="https://www.researchgate.net/profile/Colin_Lynam">https://www.researchgate.net/profile/Colin_Lynam</a>	Citizen Science Consultant - Col Lynam
<b>Seismic Research Centre</b>	<a href="https://www.src.com.au/">https://www.src.com.au/</a>	OEM of seismic instruments & software
<b>symCDC</b>	<a href="http://symcdc.com/">http://symcdc.com/</a>	OEM of seismic instruments & software
<b>IRIS Seismic Monitor</b>	<a href="http://ds.iris.edu/seismon/">http://ds.iris.edu/seismon/</a>	Global seismic events
<b>Joint Australian Tsunami Warning Centre</b>	<a href="http://www.bom.gov.au/tsunami/">http://www.bom.gov.au/tsunami/</a>	Bureau of Meteorology site
<b>Australian Earthquake Engineers Society</b>	<a href="https://aees.org.au/">https://aees.org.au/</a>	An organisation with similar interests
<b>Atlas of the Underworld</b>	<a href="http://www.atlas-of-the-underworld.org/">http://www.atlas-of-the-underworld.org/</a>	Mapping the Earth's mantle
<b>Atlas of Living Australia</b>	<a href="https://www.ala.org.au/">https://www.ala.org.au/</a>	A Citizen Science initiative