

September 2021



Nixie Frequency Counter The Volta Temple Keep Yourself Busy

And More



Cover photo, A busy workshop, see page 4 – From the Editor. (Keep yourself busy)

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Note: - club meeting minutes are now via a link in club emails sent out by the secretary.

Event Queue

September:

17 th	General meeting, see club emails
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October:

1 st	Prac/Natter night, see club emails
2-3 rd	Oceana contest – Courtesy WIA
15 th	General meeting, <mark>see club emails</mark>

November:

13-14th Antennapalooza

Club run events are only possible with the involvement of ALL members. Without volunteers to coordinate and participate in club events the club will fail to prosper

GGREC President's Message

September President's Report

I would like to thank all members for their patients and support while we are in lockdown. I know these are difficult times for all of us. Most of the members I have spoken to during out 10:00am catch up on VK3RGW have had two vaccination shots which will help us get together as soon as restrictions are relaxed. I would also like to thank every member for supporting GGREC.

The committee has been working to keep our bills paid and handling any correspondence that comes in. Bruce Williams, who lives very close to the Clubrooms, has been looking after the state of the rooms and surrounding grassed area. Bruce has also installed the battery charger to keep our deep cycle batteries in good working order and I thank him for his contribution.

Helmut VK3DHI has reported that he is getting excellent HF propagation at the moment on both SSB and CW so there is some life getting back in the bands.

It would be great if members would write a paragraph or two about their radio projects for the newsletter as we would all be interested in your activities. Alternatively, log on to our video sessions for a good chat.

Kind regards,

Bruno Tonizzo VK3BFT

President GGREC Inc.

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From The Editor



Wow what a crazy month it's been here at the 3TGX QTH, I had all these plans for some projects, but in the end not that much happened.

I'm also supposed to be also chasing spares for a home theatre amp, ha ha to that.

The most I can own up to is getting my second jab of AZ – Now I have to figure out how to get our vax certificates. I hope it does not involve the MyGov website....

I had two lines of attack planned for this month,

First – Get into the WiFi project comms using those cheap WiFi modules I showed off,

Second - I was wanting to do a disassembly of that old Time & Date generator box I've had in the mag a few times, I was thinking of ripping out it's eproms, reading them, then disassembling the code to see how it all works. Everything in it is OLD, the processor is a SC/MP, or 'Scamp', these are first generation chips, where the goal was to have something that worked, rather than an industry leading design. I found the data sheets, and it is odd – for a starter, it has no stack. I cannot say I've run into a chip before that had no stack.

The stack is a main part of how you call subroutines and are then able to return from where you came. (the return address lives on the stack) So its code is going to be odd to say the least. It will probably resemble some code I wrote for a mate many moons ago that ran on a 'TEC' (Talking Electronics) computer that had no ram, the CPU, A Z80 had all the stack stuff along with all the instructions to use it, all useless with no ram – what a nightmare

The eproms are definitely first generation devices, as they require a 12V rail to bias the internals – unheard of these days, kind of like in the early valve radio days where apart from your high tension supply, say 200V, and a filament supply, say 2V (back then), you often had other rails to bias the valves etc. so multiple batteries all separate, running various bits.

In trolling the web for something else, I stumbled upon an Arduino based EEprom programmer (wiring diagram above) that I am hoping to modify a touch to read my ancient eproms. I'll make sure there is no programming voltages anywhere near it – I only want to read them.

Darn, my shack is getting awfully congested with 'stuff', all good for projects however there are just not enough hours in the day to get through it all. Some say 'Toss it all', but then what would I do. Maybe that's why so many people are having trouble through the pandemic, They've turned their environments (homes) into one of those ultra 'clean' (as in empty/sterile) places that gives you nothing to do when its 'bad outside'

Learn from their mistakes, fill your shack, keep yourself busy.

Paul VK3TGX



The Volta Temple

In 2017 I was lucky enough to visit Italy and part of the holiday was to spend some time at Lake Como. One day as we were walking along the lake edge, we saw the Volta Temple.



The temple was inaugurated in 1928 and was built for the first Centenary of Alessandro Volta's death (1745 – 1827).

Inside the temple are many showcases containing the original equipment used, and inventions made by Volta. It was very interesting seeing crude wet and dry battery stacks, electromagnets experiments for analysing gases before and after combustion. He even experimented with small hand held gas fuelled guns.



Item 313 - Device for Volta's studies on inductive actions (electric atmospheres) with a scale for distances and an electrometer connected to the plates of the apparatus.



Various experiments looking at wet and dry cell batteries



Item 711 – Compound microscope built by Selva in Venice. Item 712 – Solar Mirror for optical experiments built by Selva in Venice.

It was amazing to see hundreds of the actual items used to perform Volta's experiments all displayed within a very historic temple. A true age of discovery.

Bruno Tonizzo

Nixie Frequency Counter



"The other day" I was watching a YouTube video from "Mr Carlson's lab" where he was resurrecting an old HP 'box' with Nixie tubes, as he thought it would make a nice display for use on his channel.

Now hang on a second, I have a Nixie frequency counter, let's dig it out and see what it's good for. All I knew was it lit up and was not producing any smoke. It appears to be some form of student project as all I can find, identity wise is it being built by the 'Research Training Annex', otherwise it has no branding etc. on it. Maybe one of its circuit boards may be more revealing; however it is all somewhat shoohorned into the case, so a bit painful to pull apart for a quick looksee.



It does have an external reference connector on the back, so it can't be that bad – only half decent gear has that – although hang on a minute, under the socket it says '1KHz', who on earth uses 1KHz? I have a quite old HP Quartz reference oscillator from way back then, it has 5MHz, 1MHz, & 100KHz outputs that were used back then (now everyone typically uses 10MHz). This is not to say that I could not arrange a high stability 1KHz signal by dividing down the output of my GPS Disciplined Oscillator (GPSDO), it's just got me somewhat intrigued as to what it's using inside. Everyone uses a crystal oscillator for their timebase, however a 1KHz crystal would not be small, so having one in this small box... no.

Anyway, I fed a 2.5ish KHz signal in the front panel, however I was greeted by a very unstable display. It was kind of stepping up and down by a few hundred hertz, so off with the lid.



The 'time base out' socket was initially missing, however fitting one did not help, as the output was the 1Hz clock used to drive the counters gate, not the 1KHz I expected. (i.e. same as clock in)

The top board (buried under the front & back 'rails', hence making disassembly a pain) had a row of 7490 TTL counter IC's, along with an op-amp (input pre-amp most likely) as well as a small bridge rectifier and a few other passives. Prodding about with my scope revealed a 100Hz 'clock' derived from the mains – oh darn – they're not using the mains as a counter reference – surely not, where's the 1KHz as per the



external input?

I should not talk too quickly here. In my very younger years I built this 3MHz counter that featured as an Electronics Australia magazine project (or was it ETI?) that also used the mains – boy is it bad, it doesn't even have display latches, so the display blinks at either .5Hz, or 5Hz, not so bad on the X100 scale as it blinks at 50Hz.

Why does it still exist?, Well the box has to be useful for something....



Anyway, getting back to the Nixie counter, I soon found this clock signal, that seemed to be the main counting gate signal, that had these random pulses on the leading & trailing edges, these were not constant, but slowly drifted back and forth (and were sending that 7490 divider chain nuts)

Here's the problem, this is a greatly blown up 100Hz negative going pulse derived from the mains transformer/rectifiers circuit, all this random noise is driving the TTL gate used to extract this clock, somewhat crazy.

Here is part or the waveform from around the rectifier, the circled part is what's zoomed-in in the next two pictures.

So where is all this crud coming from?

I got a bit of a hint at dusk as it suddenly all went away. What have I that shuts down at dusk? My solar system...

So the next day I went and shut it down in the middle of the day, and sure enough all that noise disappeared, then promptly came back when I restarted it. Yuk.









So after playing around with a decade resistor & capacitor box, I was able to filter out enough of this noise to make the counter fairly stable.

Considering how bad the mains reference is, it's not really worth spending any time with this counter. (although it IS Nixie based) However I was interested in seeing if I could fix it. After all a 2K2 resistor and a 0.1uF cap was not going to break my bank.



My radio shack does have a fairly good mains filter, however this interference just walks all over it.

As a laugh, I fitted a pair or ferrite suppressors, one with the mains cord looped twice through it – Not the slightest change in crud levels, boy are these things over-sold as an interference solution. I've never had any luck with them – hopefully you will get better mileage than me.

My first 'Reference' from wayback



Many many years ago I had a go at making myself a frequency reference, admittedly not a very good one (to put it mildly), however the board still rests at the bottom of my junk box, so I resurrected it. It has one thing over my much better (read 'proper') standards, it has 1MHz, 100KHz, 10KHz, 1KHz, 100Hz, 10Hz, & 1Hz, all from a 4MHz crystal. So hopefully it could replace the mains and make these two counters usable – if nothing else, just for a quick test. I needed 100Hz & 1KHz

However all was not well, I just could not get it on-frequency, I tried several caps on the crystal, no luck, I actually pushed it too hard and it started running at an overtone of 8MHz instead of 4MHz. In the end I found another 4MHz crystal, that tuned up with the trimmer near mid-way, where it ought to be.

Actually it didn't really matter, as this was going to be both the reference & the signal to be measured. All the signals are locked together off the one crystal, so the counters should give a prefect reading.



The EA (ETI?) counter was consistently 2Hz low measuring 1MHz, this is a side effect from the designers stealing the leading edge of the counting gate signal as a reset signal, not normally visible when using the mains.

The Nixie counter tended to err on the high side by 2Hz, so they are also cheaping out in the counting gate circuit.



I also found one other issue with this counter, the mains cord was not properly anchored to the chassis, it entered through a rubber grommet, then just had some hookup wire laced around it. It kind of worked, however I fitted a 'P' clip, screwed to the chassis, much better.

So who made it? On further investigation a fair bit of the wiring was all nicely laced up with lacing twine, very Telstra-ish. Telstra did have research labs over at Clayton many years ago, before the bean counters gutted the company. (i.e. the good old days) However the research labs had a few Caesium beam atomic clocks that fed out to the rest of the company. With that kind of kit I cannot imagine them stooping to the mains – no matter what. Back then quite a few organisations did their own training etc. I only know Telstra (or Telecom as it was then known) There was also the SEC (State Electricity Commission) and probably the railways – did they also have 'research', I don't know – can anyone enlighten me. Then of course there are the many universities out there...

Paul VK3TGX

Interesting YouTube Videos



Mr Carlson's 3-6-9 High Performance Antenna! https://youtu.be/VVIV2-9-ncw



How Carl Zeiss Crafts Optics for a \$150 Million EUV Machine <u>https://youtu.be/V_HbVInICc</u>

Meetings on Google

Meeting 20/08/2021







Prac night 2/09/2021







The GGREC is an affiliated club of the WIA

WIA Affiliated Club

We also give Thanks to





For their generous support over the years







Meetings 20:00hrs on third Friday of the month at the Cranbourne Guide hall, Grant Street Cranbourne Prac/Natter nights first Friday in the Peter Pavey Clubrooms Cranbourne 19:30hrs Visitors are always welcome.

Office bearers

President Admin Sec	Bruno Tonizzo Miguel Vaca	VK3GHM VK3CPU	Web Master Magazine Editor	Mark Clohesy Paul Stubbs	VK3PKT VK3TGX
Treasurer	Klaus Illhardt	VK3IU	Property Officer	'committee'	
General 1 General 2	Bruce Williams Leigh Findlay	VK3BRW VK3FACB	Assoc. Secretary	Miguel Vaca	VK3CPU

Call in Frequencies, Beacons and Repeaters

The Club Station VK3BJA operates from the Cranbourne Clubrooms. 6m Repeater Cranbourne VK3RDD, In 52.575 Out 53.575 CTCSS none 70cm Repeater Cranbourne VK3RGW, In 431.425MHz Out 438.425MHz CTCSS 91.5Hz VK3RGW Repeater supports Remote Internet access (IRLP), Node 6794 **offline**. 70cm Repeater Seaview VK3RWD, In 433.575MHz Out 438.575MHz CTCSS 91.5Hz **offline** Simplex VHF - 145.450MHz FM, Simplex UHF - **TBA** VK3RLP Beacons 1296.532MHz & 2403.532MHz **(currently offline)**

Membership Fee Schedule

Pensioner member rate \$40.00, Extra family member \$20.00 Standard member rate \$50.00, Junior member rate \$25.00 Fees can be paid by EFT to BSB 633000 - Account 146016746 • Always identify your EFT payments • Membership fees are due by each April Annual General Meeting (AGM)

Magazine Articles to <u>editor@ggrec.org.au</u> Cut off, 10th of the month All other Club correspondence to: <u>secretary@ggrec.org.au</u> or via post : GGREC, 408 Old Sale Rd, Drouin West 3818 GGREC Web Site & Archive may be viewed at: <u>www.ggrec.org.au</u> Website errors, contact web master: <u>webmaster@ggrec.org.au</u> Facebook Page <u>www.facebook.com/GippslandGate</u>