Driving Large LED Displays

Industrial Computing

Fixing a Plasma Ball Light

And More

20/07/2024

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WIA Affiliated Club

Cover photo,. Plasma Ball, see page 9
(If you have any good photos, please send them in)

Contents.

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Event Queue

July:

5th	7:30	Prac night
13-14th.		IARU HF World Championship
19th.	8:00	General Meeting
20th	12:00	Mid-Year Lunch
21st		Trans-Tasman Low Band Contest (wia.org.au)
21st		YOTA Contest 2024 (wia.org.au)

August:

2nd	7:30	Prac night
16th	8:00	General Meeting
17-18th		Remembrance Day Contest (wia.org.au)
25-26th		A.L.A.R.A. Contest (wia.org.au)

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

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President's Report June 2024

Hi all,

As your all aware I'm on afternoon shift at the moment, but the last few Wednesdays I've had the club rooms open at 10:00am. Many members have attended and a good time has been had by all. This week Graeme VK3KCS & Amy from G&C communications came to visit us. Thanks to Graeme, Amy and also Mike VK3KTO for stopping off and bringing us all delicious Vanilla Slices from the Tooradin bakery.

Radio wise because of the wet weather no portable activities have happened, but all nets continue to run well. Especially the Laundry Net hosted by Mike VK3TDK which I've been able to participate in remotely from the truck. 7.128 MHz Thursday evenings 8:00pm, Mike is usually there from around 7:30pm to take early check ins.

Last Prac night Bruce VK3BRW gave a presentation on Antenna Feeder Lines and briefly covered Antennas. Disappointingly I missed this presentation but have been informed it was well received by all who attended.

This coming Friday night is a social meeting as we held a General Meeting in July.

Bruce VK3BRW has a fascinating presentation for everyone on one of the world's first commercial AC generation plants, located near Niagara Falls in Canada. I believe he's been there so this should a great one.

I encourage anyone who has a interesting subject they wish to Talk about or Present to the club to contact Bruce or myself, also if there is a particular subject you would like to have presented let us know.

Saturday 20th is our mid-year lunch with a very large booking to be held in Pakenham.

Big thanks to Ron VK3FRDL and Helmut VK3DHI for doing the investigation and booking, to make this happen. This should be a great event with close to 30 people confirmed.

Guys the Shack needs a good clean, I will with the help of the committee set a date and ask for a few members to come down and help.

Raspberry Pi projects are still ongoing I need to confirm times with people to continue this on, also arduino projects are still ongoing which I believe Klaus VK3IU has now jumped onboard.

I hope to see you all soon,

Best 73s

Fred VK3FWR

President GGREC

From The Editor

This month I ended up 'stuck in a loop', I had been working out in my radio shack, but realised I needed some info stored only on the study computer, so I barked it up and was busy playing with Arduino code for the 'Large Display' project.

Marianna, my wife, was on the phone talking to her mum when things started going pear shaped. The call started cutting out, so she tried to call back but was getting nowhere.

The house phone runs via the NBN, we don't pay extra to use it, Marianna can yak all day long and it doesn't add a cent to the bill, so I wandered into the kitchen, and I could not get dial tone, just the long beep that basically says 'we have a problem'

So back into the study and I have a look at the Telstra NBN 'Gateway' modem/router, only two lights on, that's strange. Then I noticed I didn't have internet access, nor could I talk on my local network to my NAS etc. Normally the Telstra box falls back to a 4G mobile phone connection when the NBN is down, but that light was not on, also NBN dropouts don't usually impact my local network, so something different was afoot.

The NBN 'Fibre to the kerb' box was fine, so time to reboot the Telstra box. It seemed to be taking ages to come back up, and when it did it was not happy, with a crackly dial tone, somethings not right. Then I glanced over to a network switch box and its front panel was going berserk. Then it dawned on me what I had done.

I kind of have two networks, the house one running mostly on 100MB Ethernet and WiFi, and the second one that feeds the radio shack on a way older link. I have two ways of linking them, one with an old HP hub, and also with a little no name hub that runs on 12V. If I have everything up in the study and the shack, I use the no-name 12V job, it comes on automatically with I hit the big switch in the study, otherwise I use the noisy HP with its whining fan.

I'd love to use WiFi, however the sisalation in my study walls kills it in the back yard.

In all my comings and goings, I had accidentally switched both hubs on causing a great data loop. These two boxes are totally dumb, and they were flat out bouncing everything back and forth between the two of them. The poor Telstra box we basically getting swamped with endless repeated, and probably mangled packets trying to rout it all etc. It had basically had enough and threw in the towel, so down it all went.

So I pulled the plug on one of them and sanity returned, along with a call from Marianna's mum wondering why we kind of disappeared. Marianna not really understanding my descriptions just told her mem it was the NBN's fault – Oh well saved from being tossed into the silly bugger box by Marianna & her mum.

Paul VK3TGX

Driving Large LED Displays

Sometimes you just want a big LED display. By large I'm not referring to the physical size, but rather the number of digits, or individual LED's in it, the above display been quite small and easily covered by a single finger.

The usual answer is to multiplex the display, otherwise, in this case I'd have 128 LED's to drive, however even with multiplexing I still have 8 segment leads and 16 digit common lines, more than most chips have I/O lines to handle. Whilst there are dedicated chips out there for driving displays, they often don't extend this far. A popular one being the MAX7219, as used in many LED modules, however they top out at 8 digits, with no way of slaving two together for bigger jobs. If we are talking individual display digits, then you could break it down into two 8 digit banks, use two MAX chips, however if it's a pre-built module then this line is closed to you.

Another route is using something like a 74HC154, 4 to 16 line decoder, trouble is these cannot directly drive a display being limited to just 25mA, so you either need to add on some driver IC's, or use a bank of transistors. Yes there are other chips, but most are SMD

Now remember that here I am talking about driving the common legs of a multiplexed display, assuming 8 segments (7seg & a decimal point) then the common lead will see 8 times the current of the segment lines. Say you're using something like an Arduino, and pushing 20mA per segment, that gives you 160mA on the common, no Arduino can handle that.

In my case I have a few LED bubble displays that I wanted to get going as I kind of like these for their sharp digits, albeit small, especially when one crams 16 of them into one panel that's intended for a hand held device, like a calculator. I didn't actually have a use case for this display, I was just trying to get it up and showing something. If I was making a project, especially one that others may like to replicate, I'd use something more popular these days.
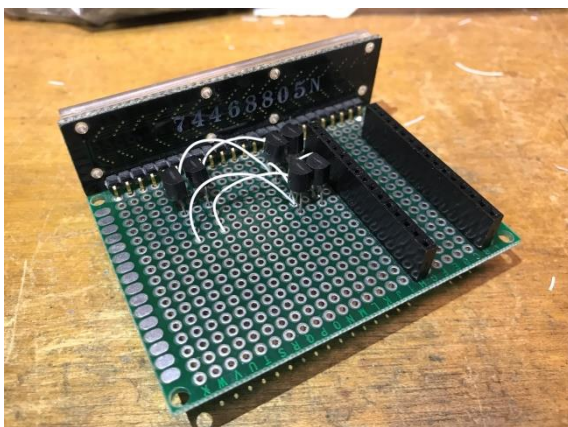
I had already mocked up the display, popping it onto a proto board just wide enough for it, and also placing an Arduino Nano behind it. Another option would be a Raspberry pi Pico, or an ESP32 style board, however I still needed something to actually drive the LED's. In my stashes I had a bag of PN100 general purpose transistors, so 16 of these for the common drive, whist hoping 20mA from the Nano would be enough for the segments, luckily these bubble displays are fairly

efficient, so 20mA should be fine (albeit, I'd never stretched this to 16 digits) so that's the path I chose, use what I had.

As I knew real estate was tight, I elected to use minimal joining of strings of doughnuts. Instead using wire wrap wire for most of the joints, as this could mostly be inserted into the holes alongside the component leads.

However I was still short of I/O on the Nano, so I used an extra set of 4 transistors to break that bank of 16 column drivers into four banks of four, with the extra transistors switching the banks.

Doing it this way the four banks of drivers could be all connected in parallel off just 8 I/O lines. Even though the same transistor in each bank was driven, only one passed any current as I only enabled one set of them at a time by switching their emitters.
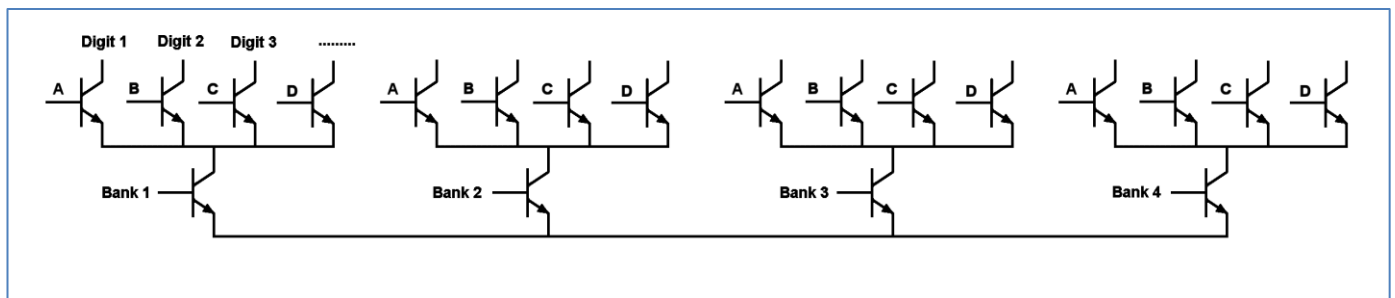
This is the circuit of the column drivers, all the 'A's are directly connected, as well as the 'B's etc., with only one limit resistor for each group of four
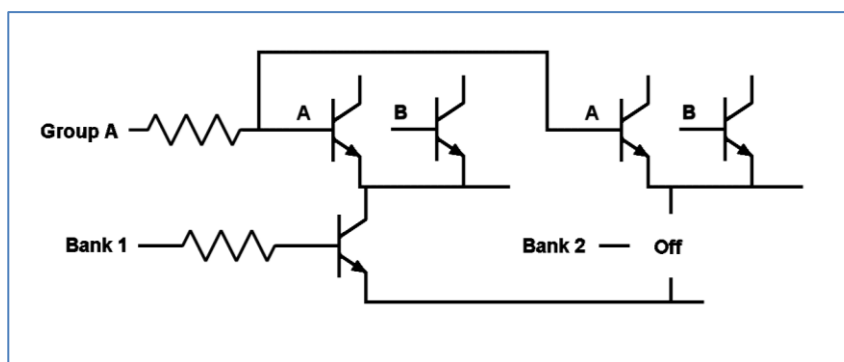

Here is a simplified view that hopefully makes it a bit clearer.

If I turn on Group A & Bank 1, only the first column will be driven, the other banks do nothing as their emitters are left floating, as if the bank 2 transistor was not there, as shown.

Now I could add extra layers and save a few more I/O pins, however it's all a balance between how many pins you need to save, verses how many transistors that are used. In my case I've cut 16 lines down to 8, so 8 for the columns and 8 for the segments is within the Uno's abilities.

Another thing that could be done is to use a BCD to 7 segment driver to save 3 lines on the segment drive side, however that means I can only display segment patterns as defined in the decoder driver, I prefer to be able to do my own, making the display much more versatile, being directly driven by the Arduino Nano pins A0-A5, D10, & D11 via 150 ohm resistors.

One possibility is to make a 32 segment stereo bar-graph meter with the display, just a different program and I'm off, however I'll leave that one for another day.
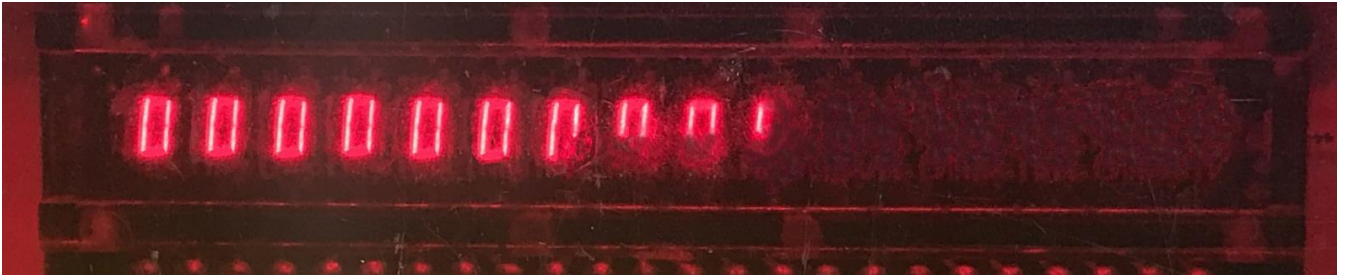
Here is a mock-up courtesy of some graphics editing, the Uno has several analogue inputs so sampling audio is not that hard – although directly sampling the audio waveform is kind of pushing things, so don't expect much response at the top end.

You'd probably be better off doing this with a Raspberry Pi Pico, or an ESP32 as their processors run way faster and should be able to sample the audio at a full 44.1/48 K samples per second, as per standard digital audio.

After all the hardware was done, I needed some code, so I recycled some clock code I wrote back in 2019 for the GGREC Arduino course we ran. – *I can't believe it's been that long.*

That code makes a 6 digit clock, so I hacked in Year, Month, & Day, that took me to 14 digits, so I added milliseconds onto the other end. The Nano as is a lot of Arduino's not that good as clocks, well not without some assistance, as they don't have a good crystal based timing reference, instead using cheaper ceramic resonators, so they tend to wander heaps. In the past I've used an oven stabilized reference I have kind of fed around the house, although a GPS or NTP (Network Time Protocol) source would do the same thing.

Getting away from an external source, there are several clock modules available, complete with backup batteries that could be used, but with one problem, their ain't much I/O left, two analogue ins (hence the level meter idea) or the serial port, where I'll probably end up injecting my T&D data... Yes these two pins can be re-assigned, however that gets a little messy as they are what's used via the USB interface chip for programming and debugging.
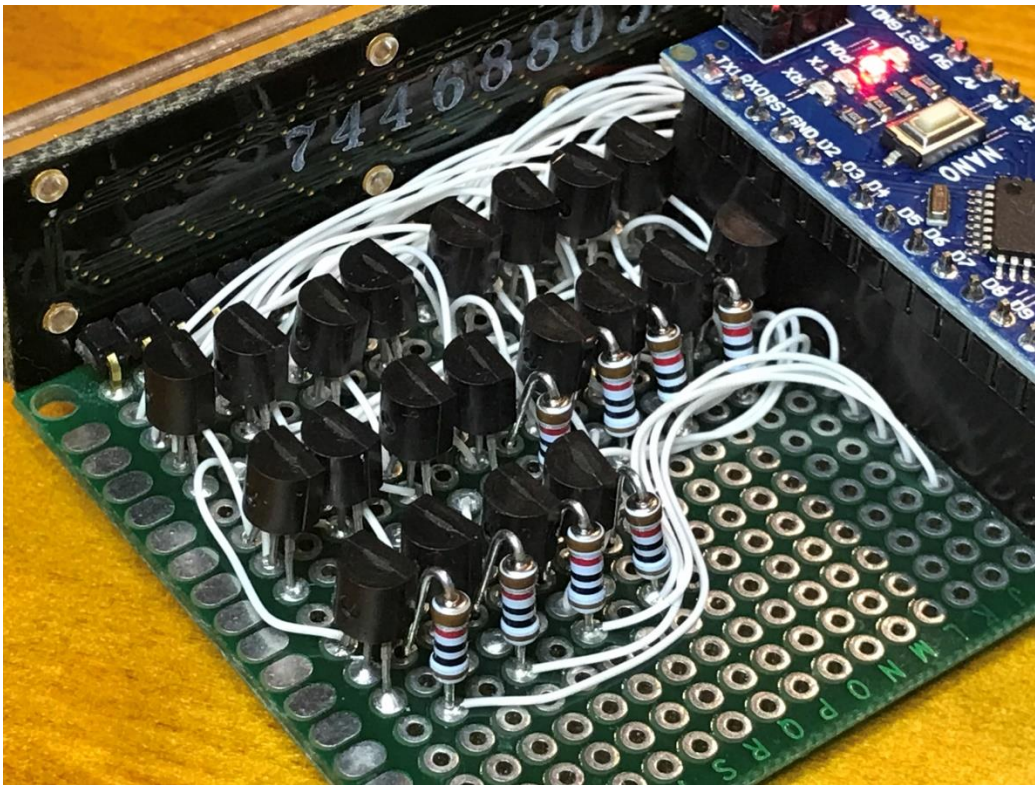
This is what a pile of wire wrap wire looks like here, certainly not as dense as a full on wire wrap build.

I have one of Ian VK3BUF's old Atmel 90PWM boards on a wire wrap base, maybe that will be my next build, although that will be in assembler – I haven't touched those for years, I have NO recollection of the code, so that'll be a shock to my system!.

Segment drive resistors are hidden under the Nano

Here is a back view of the board, only three rows of linked pads, fairly neat I thought.

The Wire-warp 90PWM job will probably be more like a 3 dimensional build extending a fair bit above and below the board. So maybe I should go out of my way in that regard.

On the other hand I have a few valves just waiting to amplify some audio…..

One side thought, on that 16 digit clock, on the right end we have a digit clocking over at 100Hz, far too fast for the human eye to follow, yet on the other end, the last two digits will never change in my lifetime, assuming this thing runs that long. Assuming no malfunctions anything seen on this display will never be seen again. Unlike a regular 12 hour wall clock, with no date, that says the same thing twice a day, every day. But it's only a 16 digit display. Nothing so special. Then one sees a science report/article and they are talking numbers with thousands and thousands of digits, yet we never stop to think of the incredible scope such a number is.

Paul VK3TGX

Fixing a Plasma Ball Light
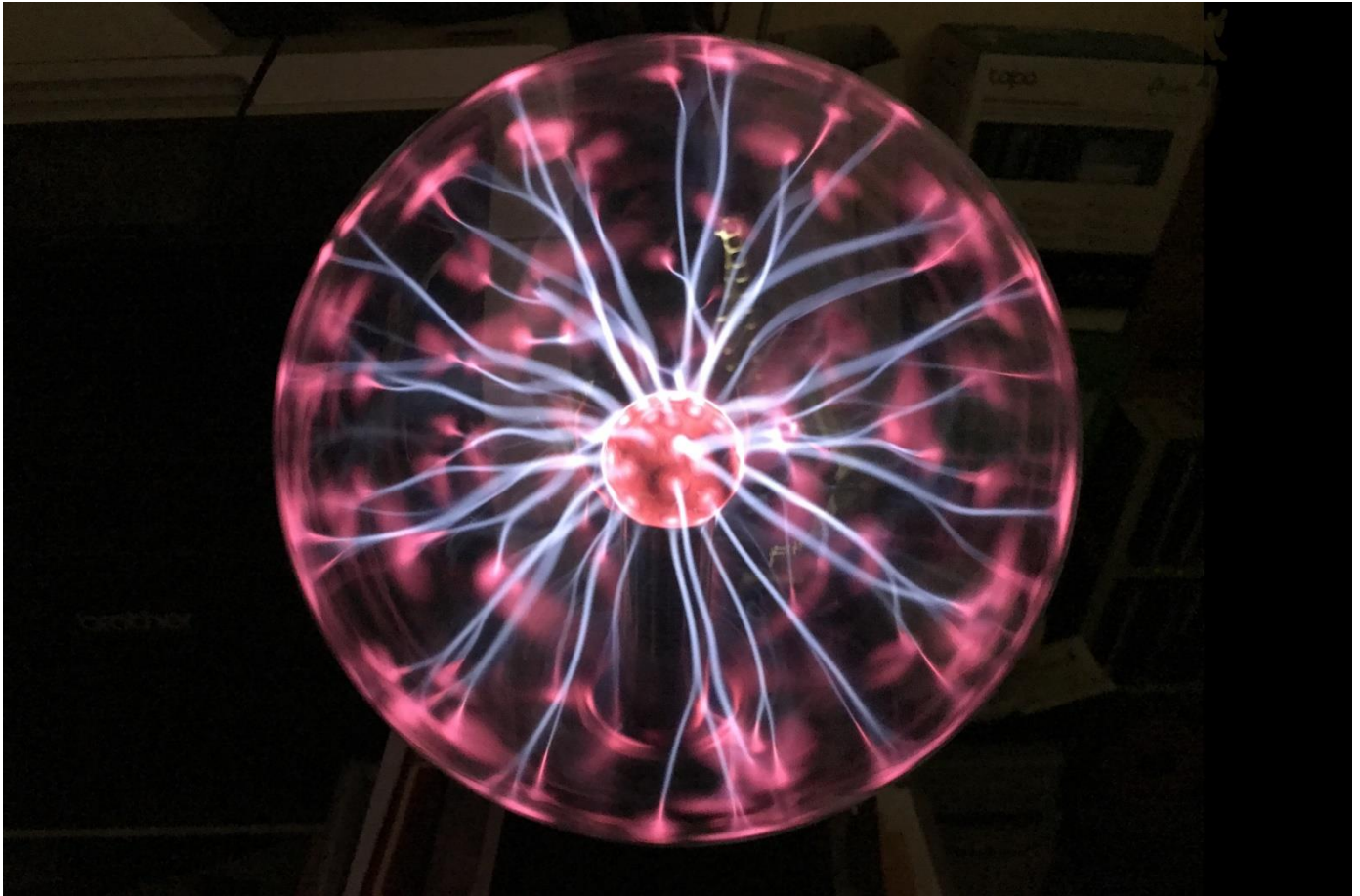
Not so long ago I came across one of these, or rather a very 'blank' one, the usual reason I seem to acquire most things, it stopped so the owner followed the modern mantra of a throwaway society and out it went.


Now I was fairly sure there was not much in it, so probably worth having a looksee to see if I can get it going.

Apart from some extra needless complications of a microphone etc., there is almost nothing to see, just a simple oscillator circuit driving a high voltage transformer, basically the same as found in old CRT TV's and monitors.

The biggest question to me is how to power it as it didn't come with its mains power supply. It has one of those barrel jacks; however the story on the board went a bit deeper as there were several locations for extra parts. It didn't take Einstein to deduce that in an earlier guise it was run from an AC plugpack, as the extra missing bits were diodes for a full wave rectifier. But what voltage – well a quick eyeball on the bottom label said 12V 500mA, and with some help from an electro, positive centre on the barrel jack.

However I was having all sorts of issues following the PCB tracks, I thought I had it right yet my meter said NO, that does not come out here.
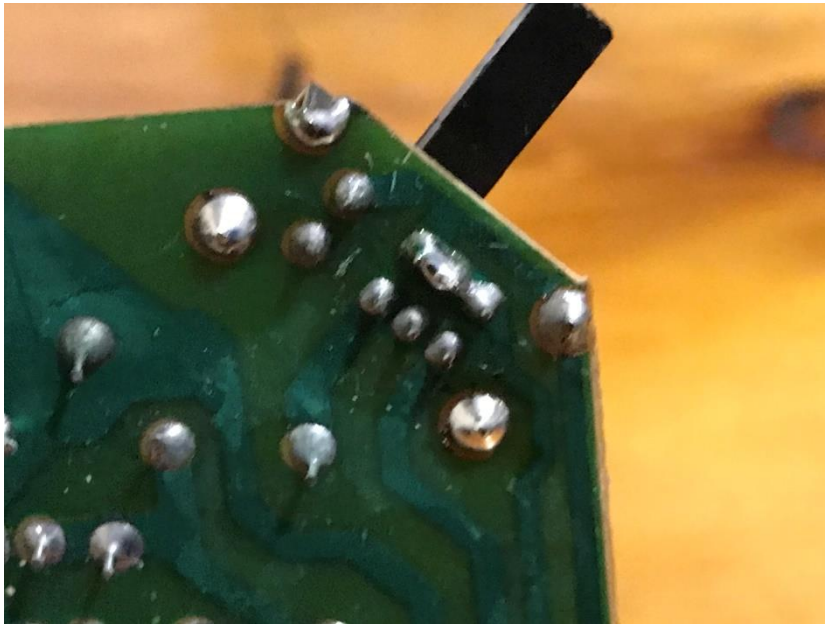

The power switch was strangely in the negative lead, so was it just a dodgy switch?

A blob of solder soon had that bypassed, but still no joy, I could not attain a path from the barrel jack to the electro that I was sure was the main filter.

Then I found it, the negative lead ran around the perimeter of the board to a solder blob used to hold the switch in place, then over to the actual switch contacts. Unlike this picture the switch had four mounting tabs sitting in four circuit board pads, but only one was soldered.

Unfortunately that one pad also carried the negative PCB track, and after many switch operations that pad had let go open circuiting the power feed. All because someone in the factory could not be bothered to finish the soldering job and solder all four mounting posts.
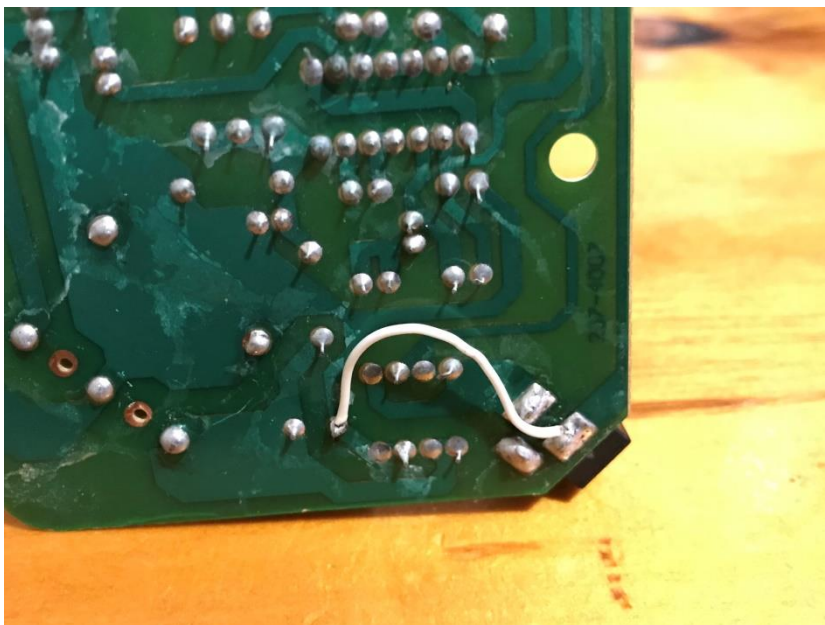
The negative track ran from the corner with the barrel lack around to the next corner for the switch, then all the way back to the capacitor, so I just bridged all that carryon out.

Now all that switch does is activate the sound triggered option.

To turn it off you need to pull the DC lead, or unplug the power adapter, probably a better idea than just leaving the power pack running 24/7, but with no load.

I've seen a fair few items where the user has bashed the living kejivas out of the power switch because it refuses to turn the thing on, rarely is it actually the switch that was at fault, however this time it kind of was, well it's the bit tied to the actual fault.

Paul VK3TGX

Industrial Computing
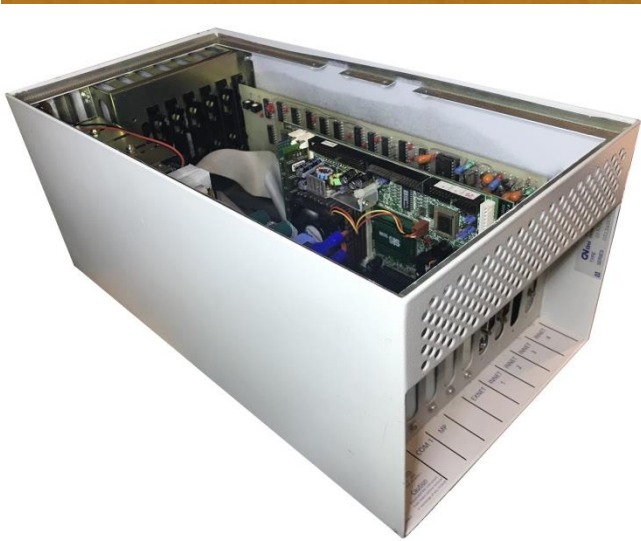
As a break from modern Windows computing I occasionally have a fiddle with old industrial gear, this is all kind of ancient now – if you don't mind that terminology, as 20 years is ancient in computing, unlike anywhere else.

This board (above) has been in this old Telstra box for ages however it was very unhappy the other day, it has been complaining about lost configurations for ages, however when I finally swapped out the Dallas clock chip to fix it the issues continued, it acknowledged a good battery, but nothing was being saved to NV RAM.

Oh well it looks like the end of the road for this old card. pity

Here is another, older board, it is basically an entire IBM PC on a single board computer, minus any video, and that big EPROM on the bottom is drive 'A', read only of course. This one being made by Ampro in the US.

Instead of the IBM card edge connector, this uses that header strip across the top. On the bottom is a matching row of pins so this board can both be stacked ontop of another board, and likewise have boards stacked on top of it. This standard is called PC/104

B side		A side	
GND	B 01	A 1	I/O CH CK
RESET DRV	B 02	A 2	DATA 7
+5V	B 03	A 3	DATA 6
IRQ 2	B 04	A 4	DATA 5
-5V	B 05	A 5	DATA 4
DRQ 2	B 06	A 6	DATA 3
-12V	B 07	A 7	DATA 2
NC, CARD SLCTD	B 08	A 8	DATA 1
+12V	B 09	A 9	DATA 0
GND	B 10	A 10	I/O CH RDY
MEMW	B 11	A 11	AEN
MEMR	B 12	A 12	Addr 19
IOW	B 13	A 13	Addr 18
IOR	B 14	A 14	Addr 17
DACK 3	B 15	A 15	Addr 16
DRQ 3	B 16	A 16	Addr 15
DACK 1	B 17	A 17	Addr 14
DRQ 1	B 18	A 18	Addr 13
REFRESH	B 19	A 19	Addr 12
CLK	B 20	A 20	Addr 11
IRQ 7	B 21	A 21	Addr 10
IRQ 6	B 22	A 22	Addr 09
IRQ 5	B 23	A 23	Addr 08
IRQ 4	B 24	A 24	Addr 07
IRQ 3	B 25	A 25	Addr 06
DACK 2	B 26	A 26	Addr 05
T/C	B 27	A 27	Addr 04
ALE	B 28	A 28	Addr 03
+5V	B 29	A 29	Addr 02
OSC	B 30	A 30	Addr 01
GND	B 31	A 31	Addr 00

View from Top of Board

J2: PC/104 16-bit bus connector

	D	C	
Ground	D0	C0	Ground
MEMCS16-	D1	C1	SBHE-
IOCS16-	D2	C2	LA23
IRQ10	D3	C3	LA22
IRQ11	D4	C4	LA21
IRQ12	D5	C5	LA20
IRQ15	D6	C6	LA19
IRQ14	D7	C7	LA18
DACK0-	D8	C8	LA17
DRQ0	D9	C9	MEMR-
DACK5-	D10	C10	MEMW-
DRQ5	D11	C11	SD8
DACK6-	D12	C12	SD9
DRQ6	D13	C13	SD10
DACK7-	D14	C14	SD11
DRQ7	D15	C15	SD12
+5V	D16	C16	SD13
MASTER-	D17	C17	SD14
Ground	D18	C18	SD15
Ground	D19	C19	Key (pin cut)

J1: PC/104 8-bit bus connector

	A	B	
IOCHCHK-	A1	B1	Ground
SD7	A2	B2	RESET
SD6	A3	B3	+5V
SD5	A4	B4	IRQ9
SD4	A5	B5	-5V
SD3	A6	B6	DRQ2
SD2	A7	B7	-12V
SD1	A8	B8	0WS-
SD0	A9	B9	+12V
IOCHRDY	A10	B10	Key (pin cut)
AEN	A11	B11	SMEMW-
SA19	A12	B12	SMEMR-
SA18	A13	B13	IOW-
SA17	A14	B14	IOR-
SA16	A15	B15	DACK3-
SA15	A16	B16	DRQ3
SA14	A17	B17	DACK1-
SA13	A18	B18	DRQ1
SA12	A19	B19	Refresh-
SA11	A20	B20	SYSCLK
SA10	A21	B21	IRQ7
SA9	A22	B22	IRQ6
SA8	A23	B23	IRQ5
SA7	A24	B24	IRQ4
SA6	A25	B25	IRQ3
SA5	A26	B26	DACK2-
SA4	A27	B27	TC
SA3	A28	B28	BALE
SA2	A29	B29	+5V
SA1	A30	B30	OSC
SA0	A31	B31	Ground
Ground	A32	B32	Ground

Here is an original IBM PC expansion socket, alongside a PC/104 on the far right, later on with the introduction of the IBM AT with its 16bit bus, an extra set of pins was added – centre. If you look at the first picture, that board also has the PC/104 sockets, just above the regular edge connector, complete with the 16 bit additions. Shown here with a bit of image enhancement.

Physically I could plug in that older Ampro board into this one, except nothing would work as there is no provision in the standard, as in the original PC, for running two processors, that idea came much much later.

So it got me wondering, I should be able to attach an ISA bus (what everyone eventually called the IBM PC bus) or "Industry Standard Architecture" video card to one of those little Ampro boards, So I tried and it worked first time.
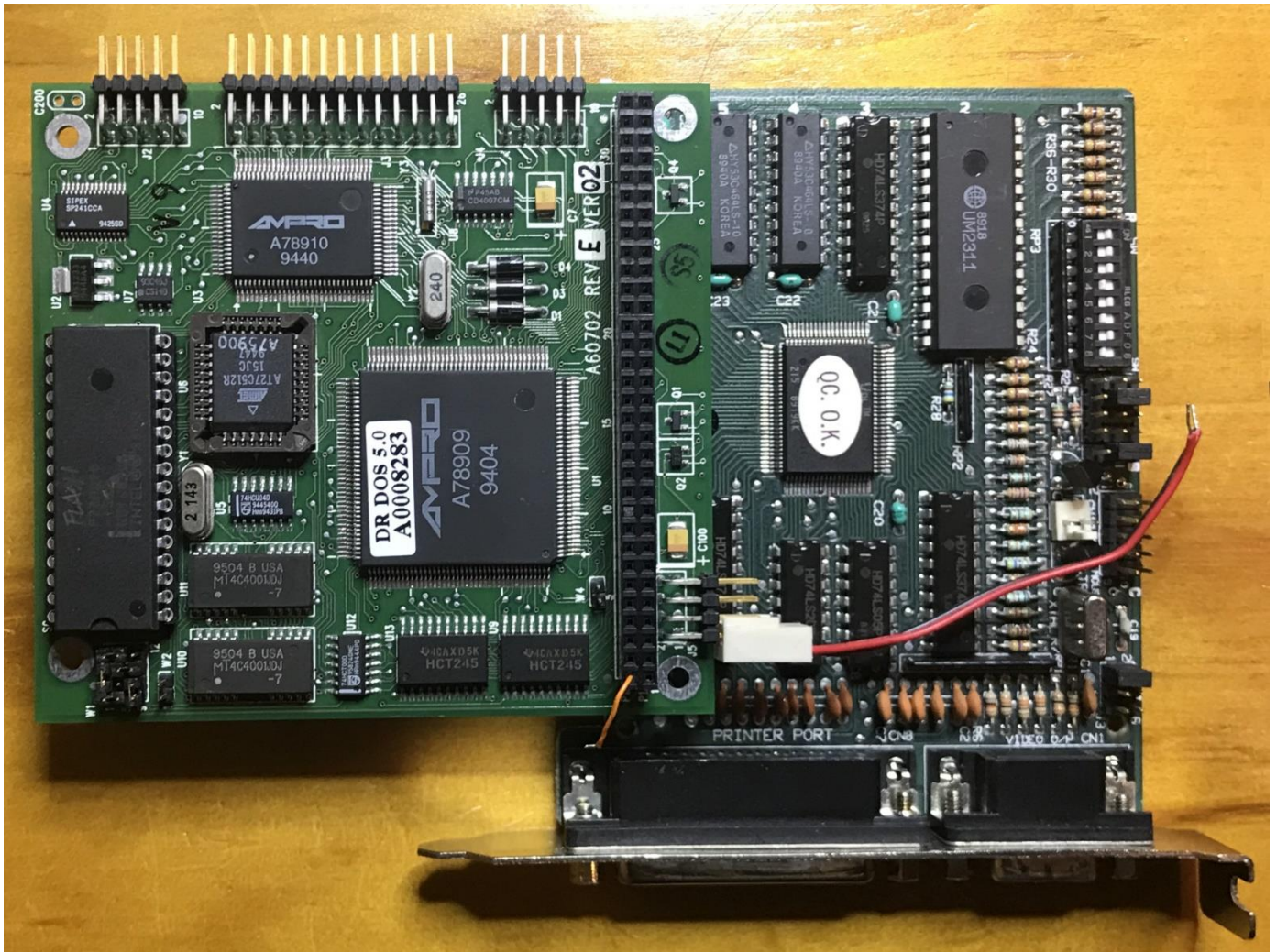
Mind you that card is only CGA, but for my mucking about, fine. I've been able to hack the 'A' drive EPROM and make my own, so there is fun to be had here. I'm currently thinking of trying to put some terminal software in the EPROM and make a serial terminal out of it.
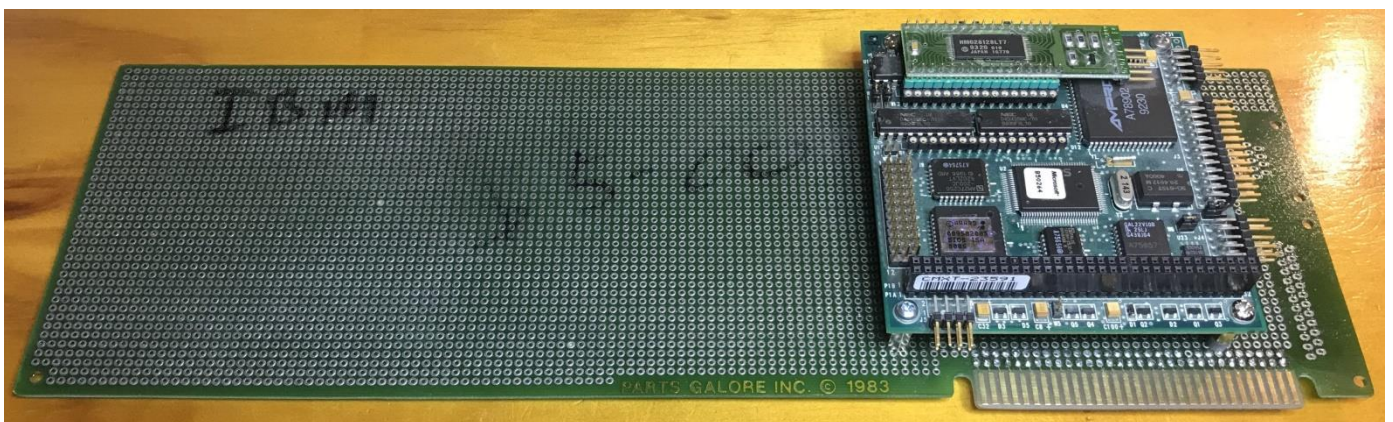
So can I go further and plug one into that old chassis? I picked up this PC proto board years ago at a hamfest, for the princely sum or $5.00, then fitted one of those Ampro boards to it.
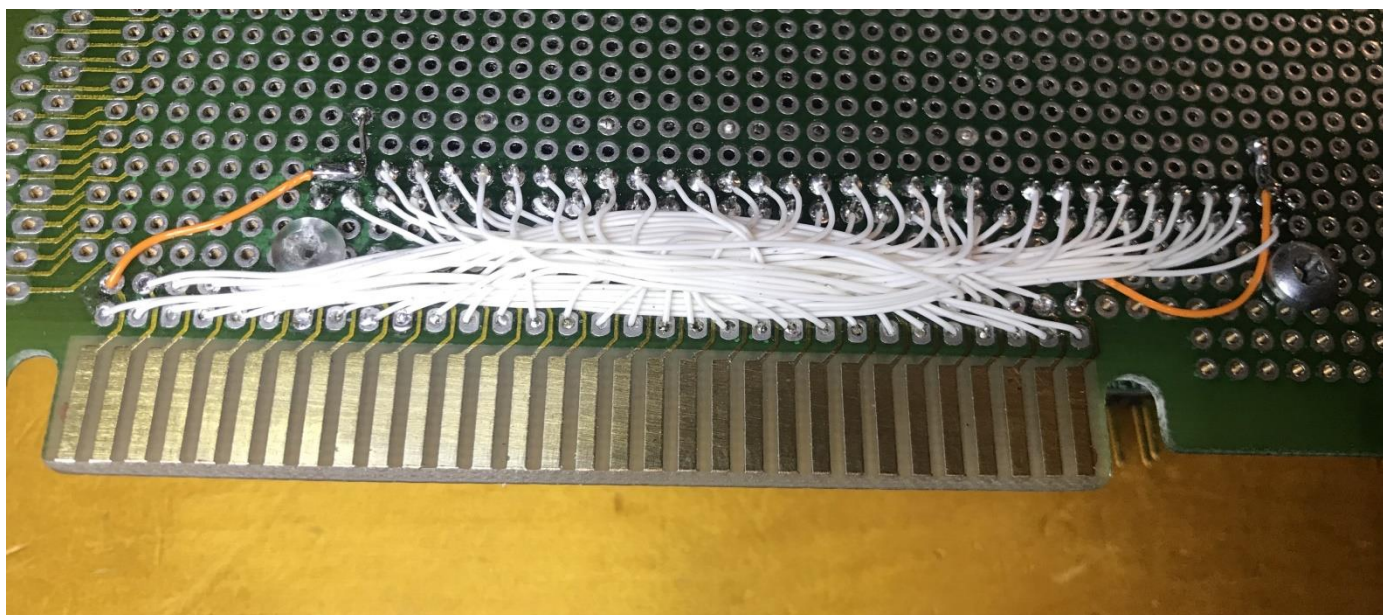
It was out with the wire-wrap wire and start soldering. Unfortunately the two don't exactly line up as the PC/104 is rotated 180 degrees and flipped over, then offset so I kept mucking it up, eventually I got my nut around it and hopefully all is ok, especially as there is an awful lot of wiring that will need replacing.

Add to that I added metal standoffs to hold the daughter board, but I got was too close to the holes that run to the edge connector, so out with that one and replace it with a nylon one so I can have a support with no short circuits.

I have several of the Ampro boards so I don't have to pinch one from another build to get this up, however video boards may be a problem. I have EGA & VGA, but they may be too modern.

These little Ampro boards came out of pay TV video scramblers, probably from the original Microwave pay TV network Melbourne had WAY before the current Foxtel cable network. I'm not a 100% sure, however they were tossing them, and I immediately recognised the Ampro boards and made sure to salvage all that I could.

Many years ago I was going to make a bedside clock out of one, I was into Borland Turbo Pascal at the time and had written some RTTY, Modem, & 3270 Keyboard test software. So I had this clock brainwave, the idea of having a bedside clock that ran on DOS 5 and could be 'rebooted' kind of brought out the geek in me, trouble was the board didn't quite fit into the intended enclosure, so it all ended up in the 'tomorrow' basket. (You know, the day that never comes)

With the way things are going I might just have to revisit the DIY bedside clock, probably not with one of these, maybe a 'Pi Nano etc., as bedside alarm clocks are slowly disappearing from the shop shelves, it appears the new generation just uses their mobile phone. Me personally thinks that sucks, I'd rather go to bed with the mobile switched off, who needs to sleep bathed in RF crud from a mobile propped up on your bedside table.
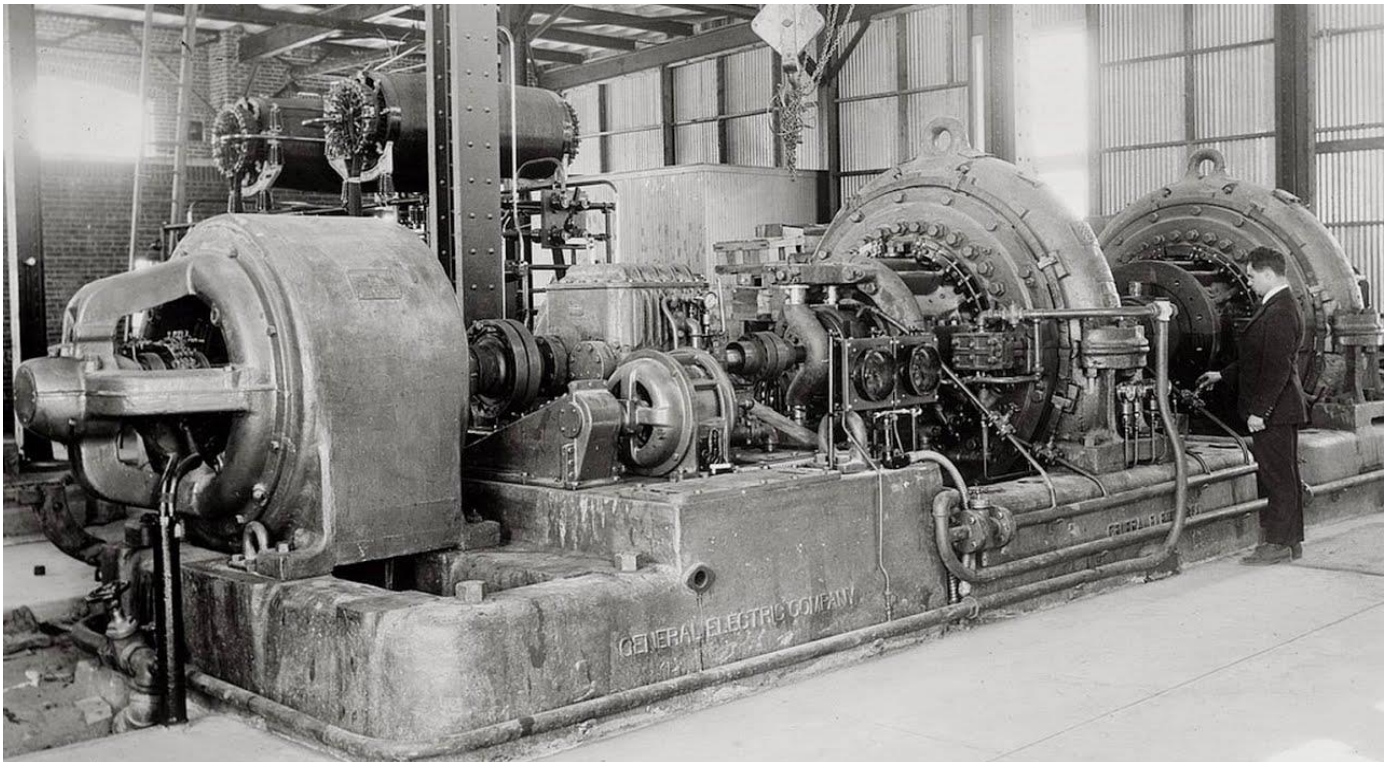
Paul VK3TGX

Prac Night 5/07/2024
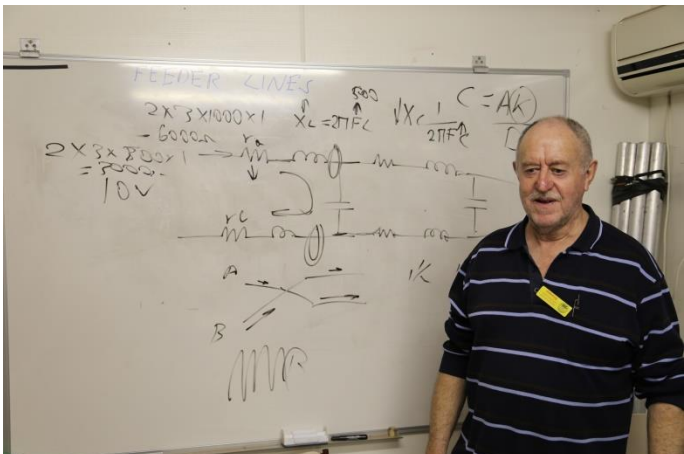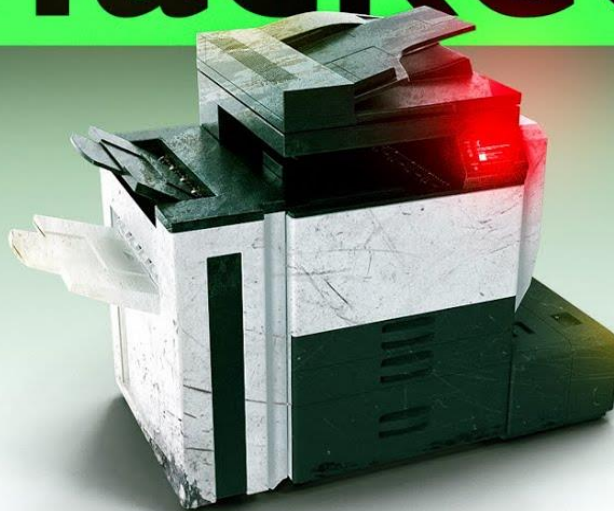

Shot from the security cam monitor

Interesting YouTube Videos

Historical transmitter SAQ Grimeton transmission 12:00 UTC -
Alexanderson Day 2024
https://www.youtube.com/live/UBh-4d7aR6M

How A Printer Lost A Country $81,000,000
https://youtu.be/NlcP-yeq2dg

WIA Affiliated Club

The GGREC is an affiliated club of the WIA
https://www.wia.org.au/

We also give Thanks to

https://www.jaycar.com.au/

https://www.altronics.com.au/

For their generous support over the years

Club Information

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	Fred Reid	VK3FWR	General 3		
Admin Sec	Klaus Illhardt	VK3IU	Web Master	Mark Clohesy	VK3PKT
Treasurer	Bruce Williams	VK3BRW	Magazine Editor	Paul Stubbs	VK3TGX
General 1	Leigh	VK3FACB	Property Officer	'committee'	
General 2	Ian Jackson	VK3BUF	Assoc. Secretary	Bruno Tonizzo	VK3BFT

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 431.575MHz Out 438.575MHz CTCSS 91.5Hz
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)

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All other Club correspondence to: secretary@ggrec.org.au
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