Teletypes and Telex (RTTY).

Lightning Repairs.

JOTA/JOTI 2023

And More

16/11/2023

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WIA Affiliated Club

Cover photo, Power supply crowbar project design.

         (If you have any good photos, please send them in)

Contents.

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Event Queue

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November:

3rd	7:30	Prac night
17$^{th.}$	8:00	General Meeting
25$^{th.}$		GGREC Field Day

December:

1st	7:30	Prac night
--.	--	General Meeting – _Usually not held in December._

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 Message

Presidents report November 2023

A short report this month. My last report was produced from the other side of the planet in Japan, but now I am back in VK3. It was a fun and interesting journey that I would recommend to anyone.

 We are rapidly approaching the February deadline where the ACMA takes over Amateur licensing. So far there has been no feedback from the August submissions requested by the ACMA and many of the details remain unconfirmed. For existing operators, not much will change except license renewals will no longer be sent. For new operators, the process will be quite different. At this point we are all observers waiting to see what happens next.

 Fred VK3FWR has been organising the field day on November 25. We are all looking forward to that. Information is being circulated with all the details. If you wish to attend, message Fred on field.days@ggrec.org.au   If the weather is friendly, it should be a fun day.

 As happens every year, there will be a Christmas hamper to be raffled off at the GGREC Christmas breakup party. A basket will be present at this Friday night's meeting. Please remember to bring something to add to it if you can. A bulletin will be sent out shortly with details of the planned Christmas breakup.

Cheers, Ian VK3BUF

From The Editor
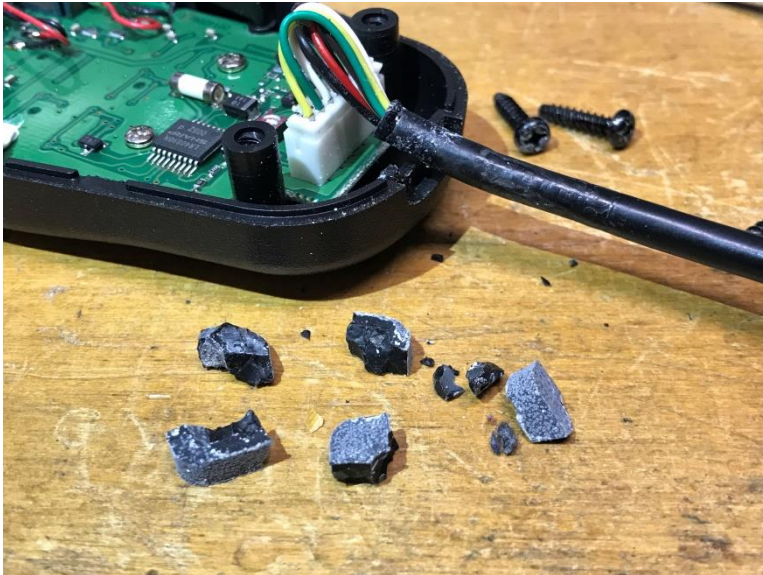
This month it's microphone woes and really bad printer drivers.

I started the day on the 10:00 net then my microphone started dying on me. Electrically its fine, just that there is now nothing holding the cord in place.

This mic, an option for my FT897 soon lost its strain relief; the 'rubber' quickly developed a white-ish sheen and started to crumble away, however it stopped at the main grommet holding the cord in place, the was until the morning net, admittedly several years later.

I'm not sure what it's made of, some form of plastic rubber substitute, however they definitely got the chemical mix wrong when they made these, I've never seen a strain relief die like this before. So the search is on for a replacement, maybe something donated from a power lead off the back of some old kit, long ago put in the junk pile. One of the challenges is the plug on the end of the lead is way bigger than the actual cable sheaf, so I'll have to pull the pins out of the plastic block to thread them through whatever I end up using. Unfortunately they are crimped on, so the only other course is to cut it off and reterminate, yuk.

My next troubles were at St Johns church, just up the road, I have visited it a few times sorting out their 'C3003' multifunction laser printer, this is a big floor stander, not a desktop toy. The first time, I just re-installed the driver on the priests laptop and all was well, then I was called back to fix one of the ladies laptops, she prepares a lot of their material at home, then drops in with her laptop and prints off multiple copies for attendee's, Same fix.

So when I was called up the other day I was a bit perplexed – why?

As unusual they are all very non-technical, so questions about the WiFi and whether they have a connection usually just confuses them, so I have to reword it to something like 'Can you google search for XXXX', which also confuses as they say, we don't want that, we want to print – making me look a tad stupid.

So I rebooted the printer, as in go through the proper shut down & startup procedure, rather than just yanking the power lead, as we don't want to call a service tech for the printer/copier.

That and rebooting her Windows got me nowhere, so I accessed the printer's settings and found it's IP address, which I could ping from her laptop. So if we are connected why can't we print? So I started the Windows printer troubleshooter, it came back suggesting that we turn the printer on! *Nuts..* After further poking I found it was trying to talk to the printer on IP 192.168.15.6 whereas the printer was currently at IP 192.168.15.8. The printer was set to use DHCP, which means at powerup it asks the network for an address, rather than using a fixed one – an extremely common way of doing things. Unfortunately the dumb-ass driver written by the printer's manufacturer, specifically for it, cannot handle that. It's not like we've been into some obscure engineering menu and did something, No this is a standard user menu set to an everyday setting – however…. AARRRGGHHHH

Paul VK3TGX

JOTA/JOTI 2023

The Jamboree of the air was a lot of fun this year thanks to the members that gave up their time to help running the various activities for the Guides.

The weather was fine and sunny, which meant that the fox hunting kits could be put to good use.   The guides had lots of fun tracking down the hidden "fox" which was well hidden in the car park and surrounding areas.   Bruce Williams and Mike Pearton coordinated many fox hunts on the day and there was no shortage of Guides lining up to track down the fox.

Yarn, VK3NOV was busy teaching the Guides the correct way to send Morse code.   Some of the Guides needed to learn Morse for their communication badge and Yarn was the perfect teacher to get them on their way to mastering Morse.

In the shack, Klaus, Fred and Don were busy making contact with other JOTA stations on HF, VHF/UHF as well as DMR Jota talk groups.   Klaus was very pleased to set up HF communications with the Philippines.   I was able to link up with Newcastle Scouts on DMR and the Guides had some long conversations asking the Scouts about their weekend Jota activities

Thanks also to Max Hill, Gerry Watts, for helping out on the day.

The Guide leaders were very happy with the way the afternoon went and made sure we had plenty of tea, coffee and snacks throughout the day.

Kind regards

Bruno Tonizzo VK3BFT

Lightning Repairs

Last Wednesday there was some lightning off in the distance, then all of a sudden the kitchen lit up and there was a very large bang – Yikes that was close – as testified by the wife jumping in fright. The power was still on etc., so it wasn't a direct hit, but boy was it close.

Marianna then noticed one of my "clock boxes" had a few indicators active, saying the burglar alarm system was going off etc. which of course it wasn't, otherwise we would have been getting deafened by sirens.

So something had happened. My first action was to unplug the 'alarms' input plug from my 'Video Clock' that process this info, no change. So I power reset it, that cleared the alarms, so somehow a spike had gotten past the input buffers that are rated for plus and minus 30V and caused an 'SCR latchup' in the 6303 processor used in this box. So all ok? Well that was until I reconnected the alarms cable and tested it – bang went the fuse!
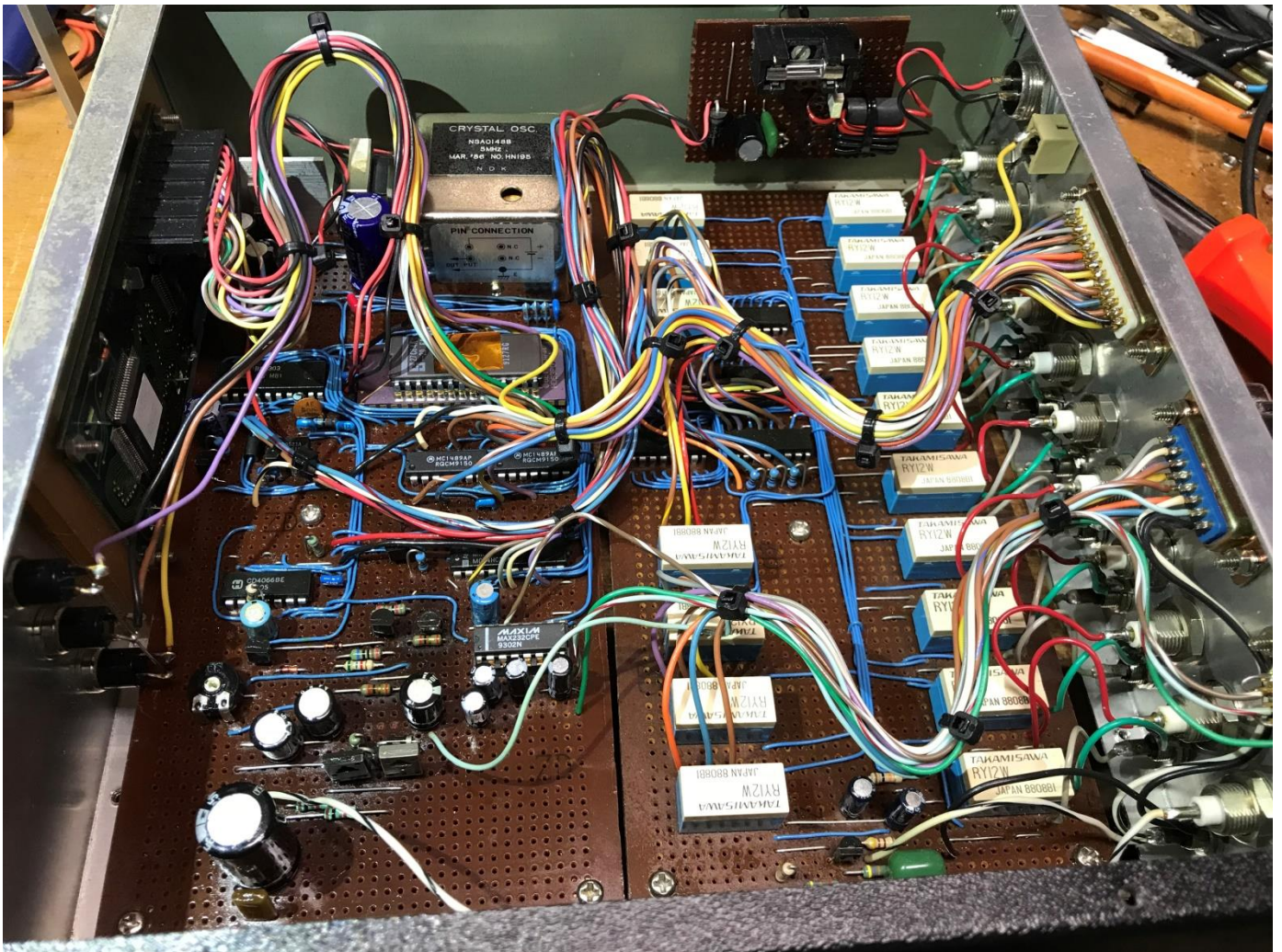
This is the innards of my 'Video Clock' (not the 'clock' Marianna was looking at), I built it many many years ago, back when people used VCR's (Video Cassette recorders) to record security camera footage. This box has ten video inputs (hence all the relays), a video titler for adding date and time info, along with eight alarm inputs used to select the appropriate camera feeds when things happen. Whilst the VCR control functions have long been abandoned, the rest still seas active use. One day I'll install IP cameras etc., but even then the alarm and clock, driven by a 5MHz ovened oscillator, will see continued use. At about 1 second drift in 6 months it's not bad, something to compare GPS time with to validate I am getting good data and that the U.S. aren't playing silly buggers with their GPS systems.

To bring the alarm signals into the box and connect them to a 5V TTL level processor I used a pair of DS14C89 IC's. I could have used a row of discreet transistors etc., however having four inputs per IC was appealing. All the inputs would be 12V based, so heaps of safety margin, or so I thought.

I looked through my 'deceased estate' left overs and found a tube of 1489's, as in the RTL, rather than CMOS version, so I now have two of those doing the duties.

I'm now thinking of adding an extra spike suppressor box into the mix, some extra input resistors, snubber caps and transils (transient voltage suppression diodes) should greatly enhance the protection.

Whilst I was at it I did a bit of long overdue maintenance and fixed a design flaw that I've been going to action for several years, it's just that the box was working ok, and what's the saying, "If it ain't broke, don't fix it" – usually wise advice.
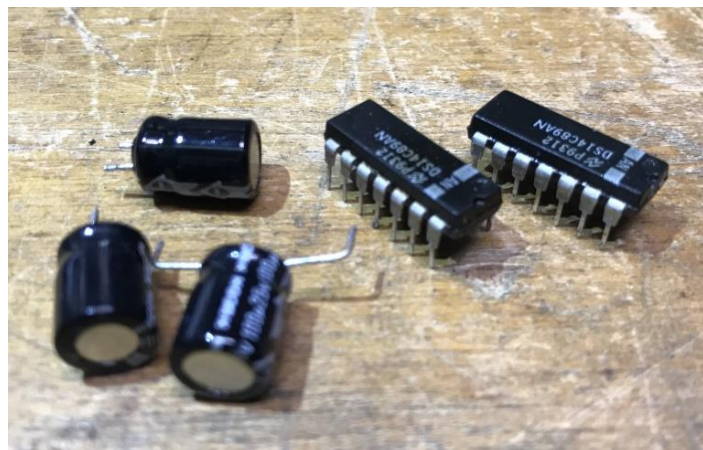
Anyway, the video quality had been slowly degrading, so I kind of suspected a few dried out caps, and boy was I not wrong. The three in the video buffer amp were all but open circuits, with one not even registering as a component on my ESR meter. Many moons ago I scored a bag of 100uf 25V electo's, these have been my Go-to cap for ages, they defiantly hadn't stood the test of time in this application. I still have heaps of these caps, fresh examples measured 0.2 ohms ESR, whereas ones from the same bag that have been in use here, were at best 20 ohms, or completely open. I was rather surprised as I didn't see composite video as a particularly hard load on electros.
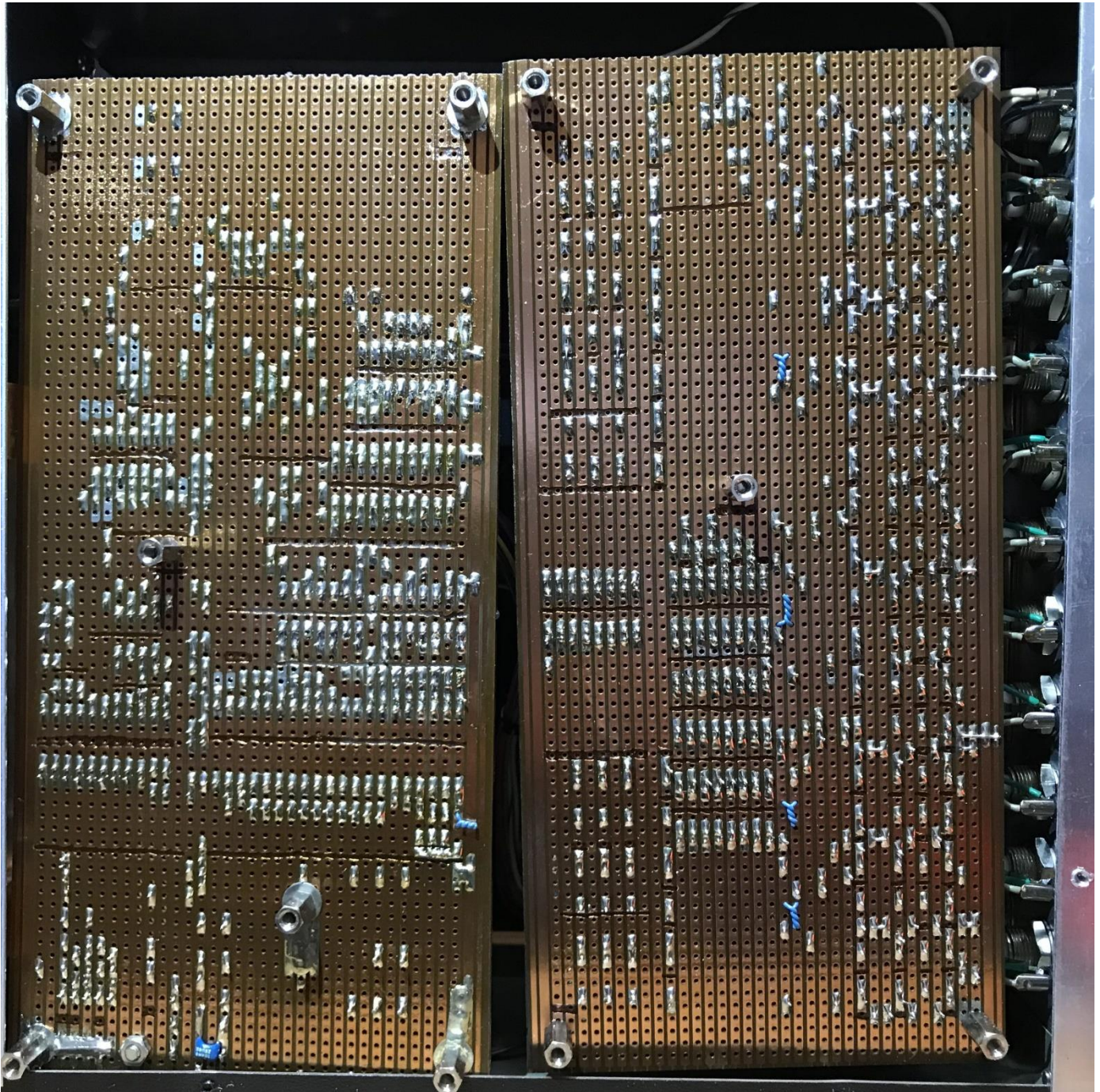
This is the underside of the boards, I don't know about you, but I find this way neater than the donut boards everyone is using with solder blobs etc. used to link groups of pads together. Building like that on donut boards is fairly easy, however removing and changing parts is awkward as you end up sucking off the solder used to link pads, or the wire links bridging the pads gets in the way. Yes there are links on this vero-board, but they have their own holes so don't get in the way of the solder sucker.

So that was it – for now? Anyway my bigger concern of a fried radio in the shack did not seem to happen. I had my FT897 connected to my new vertical stick on top of my Nally tower, a prime spot for a lighting strike, however all appears well, particularly as I took park in the 10:00 net this morning and nothing seemed out of place.

Paul VK3TGX

Teletypes and Telex (RTTY)

Try finding one of these on the web, or more importantly, a manual – no joy so far. Anyway I have figured a fair amount of it out so far - well at least the bits that affect me.

This Radio Teletype Terminal dates from the era of the mechanical teleprinter, evidenced by the use of a UART IC to regenerate the signal. Back then a UART (Universal Asynchronous Receiver & Transmitter) were better at recovering the data from a noisy signal than a mechanical receiver as was fitted to teleprinters back then. In the later years of electronic teleprinters adding a UART offered no improvement as that is how an electronic teleprinter works, using a UART, or simular. The Tx teleprinter signal is then converted to FSK (Frequency Shift Keying) by the use of an XR2206 function generator IC, not produced since the early '80s. Whilst you can supposedly still buy these, they are knockoff's that poorly imitate the original design. (i.e. avoid them – you don't need the headache) Incoming messages from the radio are converted from FSK back to digital using a XR2211 demodulator.

The original teleprinters used a 5 bit code, called ITA2 (International Teleprinter Alphabet 2), often referred to as 'Baudo code', although that term is also used as a measure of the transmission speed. Most of the world settled on 50 baud, (50 Bits per second), although for Amateur radio use 45.45 Baud is the default speed (also used commercially in the U.S.) I once heard that 45.45 baud resulted in an even number for words been sent, although I can find no reference to that. (Some computers use 45.00 as fractional speeds are a problem)

The transmitter, or Sender as it was sometimes called consisted of a simple set of contacts rapidly operated to generate the code, likewise the receiver used an electromagnet to turn the electrical signal into a mechanical force, hence the transmit and receive was by a current loop. Now if you rapidly switch on a voltage to a coil of wire, as in an electromagnet, the inductance of the coil will resist an incoming signal trying to switch it on, the solution here is not to feed a voltage to the coil, but rather a current. You start with a much higher voltage than the coil needs, like 50V, then use a resistor to limit the current. The result is a much faster rise in the magnetic field. On the other side, when the current is switched off, the inductance will generate an immediate back EMF (Electro-Motive Force) as it tries to maintain that current. In electronics it is common to put a diode across a relay coil to supress that voltage and prevent damage to the relay driver, however doing so slows down the collapse of the magnetic field slowing the release of the relay, usually not a problem, however this is a problem on a teleprinter, where you want the current to stop as soon as possible, so the resultant mechanical pulses more truly represent the pulses of the serial data stream. So yes, you do

have to snub this back EMF, but just enough so that no damage is done by the high voltage back pulses, but not enough to overly slow the magnets release.

Many years ago I was connecting a paper tape reader to my TRS-80 computer; I was trying to digitise TTY pictures, popular back then. This reader used an electromagnet to pull the paper tape through, if I overly damped the collapsing field, it would not release sharply enough and the tape would stall, On the other hand if I didn't damp it enough the voltage spikes would crash my computer. Now I was using a relay to drive that coil, so plenty of isolation? - obviously not. The margin for the ideal damping was incredibly fine, a touch less and I crashed, a touch more and the tape would not run. (and I got the odd whollop from it too)

The next bit of the teleprinter story is connecting them together remotely, well that was just done by the lines initially set up for telegraphs, as in Morse code, they both used the same current loop. However an extra control box was added to start and stop the motor used to run the machines. When I started with Telecom/Telstra, I worked in the Melbourne Telex exchange, or 'Auto Telex' as it was called, customers in the city and not far from it used what was called a 'Single Current' service that consisted of a 40mA current loop, as in 40mA or Zero. The line mostly had two states Mark, 40mA or Space, zero current, or open. There was a third lower current state that was used between calls where the machines electric motor was turned off.

The problem here was it didn't take much line length before the resistance was too high to maintain the 40mA loop current, so a second system, called 'Double Current' was invented. It was not called double current because they doubled the current, actually it used less current at 25mA however a 'Mark' was now Negative 25mA, and a space was Positive 25mA, pretty much like a serial port on a PC works (No modern USB rubbish here) except it is current based rather than voltage based as RS232 usually is. Initially the current basis was for the same reasons as mentioned before with trying to rapidly switch an electromagnet, however now the receiving device was a relay. Add in some line inductance and current mode is kind of better.

Now a catch, before with single current, there was just one loop, however with a double current service, the line was split into two, with separate send and receive, just like a PC serial port, however there are just two wires… So the signal return path was via the earth. Every Telex service had to have a good solid earth connection, via its own, a communications earth. One could patch into the electrical earth, however this was frowned upon, as a Telstra tech you did so at your own peril.

As the current was now almost half, and only travelled up one leg of a cable pair (a 'telephone' line is two wires, referred to as a pair) it could work at a much greater distance. This covered pretty much all the suburbs, however country use required extra equipment that I'll pass on describing here. Operators in known dry areas soon learned where the earth rod was and learned that a bucket of water was a much quicker fix than logging a fault with Telstra.

Next came operating them via radio, of course originally done by the military, but quickly adopted by Amateur radio operators, and this is kind of where this Codan 7816 box comes in, probably intended for commercial operation rather than Amateur use, however we all know where all old radio equipment ends up, with amateur operators.

This box takes the Mark and Space DC signals and turns them into audio tones, well two to be precise. If you then feed these two alternating tones into a HF SSB transmitter you end up with a carrier that steps between two frequencies. There are a few different standard spacing's, or carrier shifts used, the Codan is using about 200Hz, it is probably changeable as there are heaps of option links inside.

I started out with RTTY long before I had an Amateur ticket, I was quite happy to sit back with my short wave radio monitoring the many transmissions that used to exist; there were numerous news services on the air, now it's just a few keen amateurs.
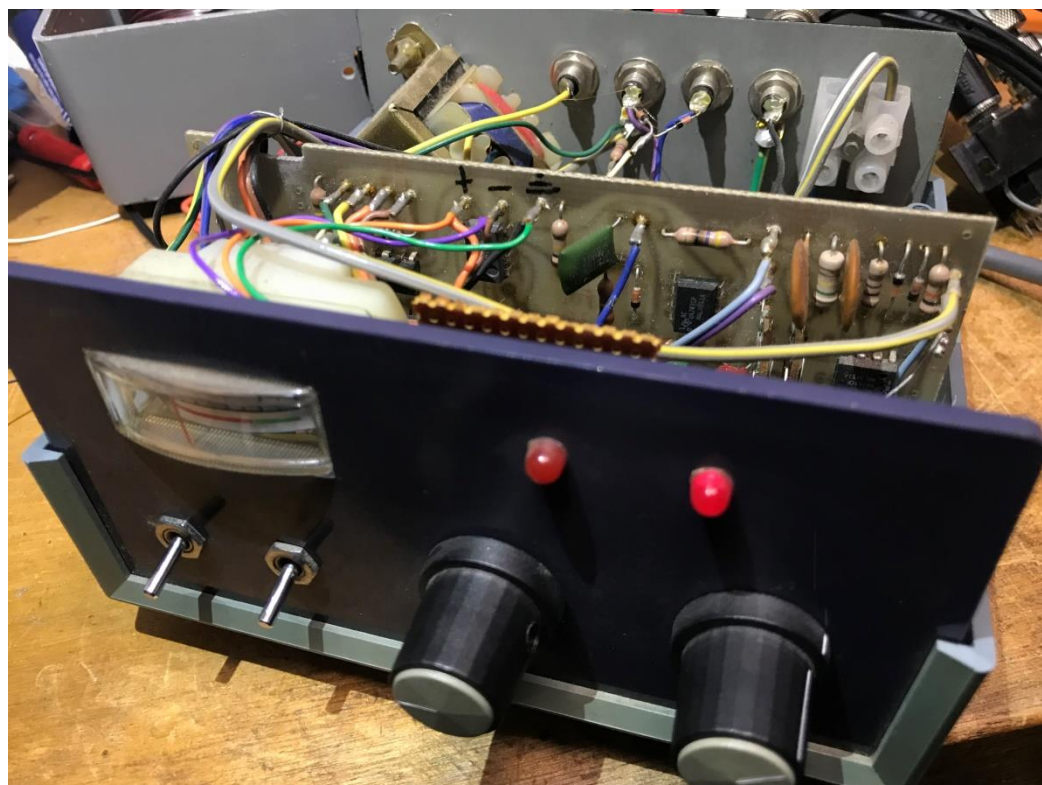

My main decoder was this ETI730, it worked extremely well and could resolve signals with a very narrow shift.

The front controls are input gain, shift (as in the tone spacing), the two switches are power and invert.

If you accidentally used the wrong sideband, the signal would be upside down, so just flip the invert switch rather than retuning.

On the back are four RCA sockets, the first is for incoming audio from your radio, the next two are for a tuning scope, and the last is an RS232 signal to feed into a serial port, or maybe a dedicated TTY printer/teleprinter. Whilst I could have acquired one in my time at Telstra, I never did instead always using a computer.
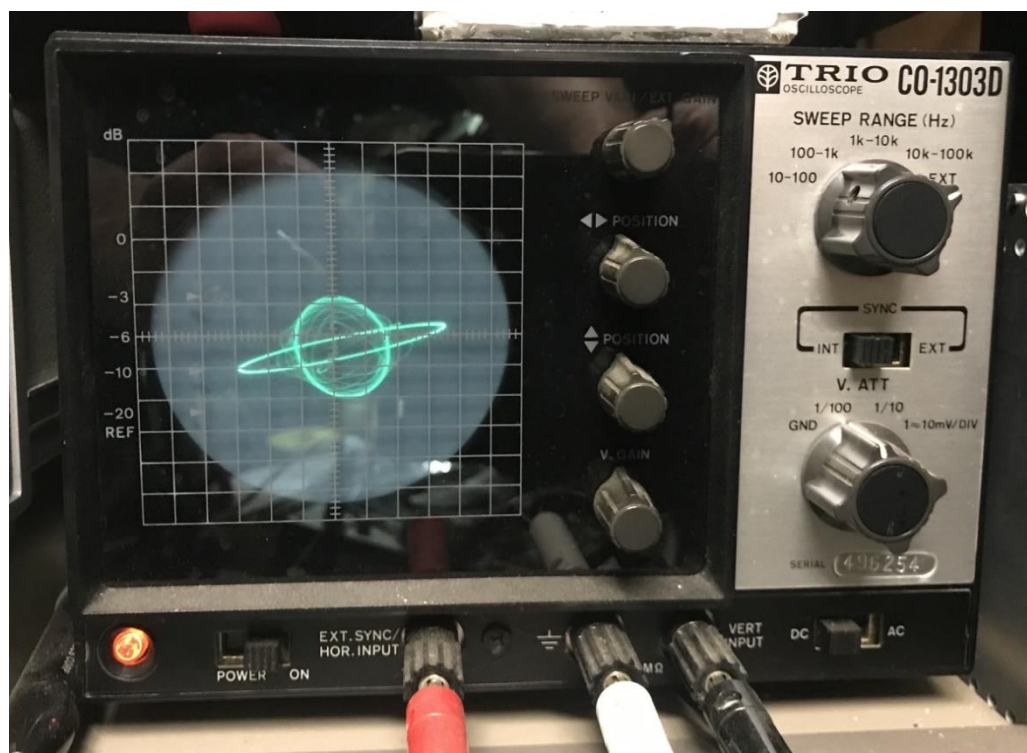
This is my little 3MHz scope I received as a birthday present many years ago, it is not calibrated, as in it cannot really measure anything, just give you a looksee at a signal.

However it makes a good X-Y display for tuning in RTTY signals.

What you see is the result of feeding the Codan 7816 into the ETI730, not very good at all, oh dear.
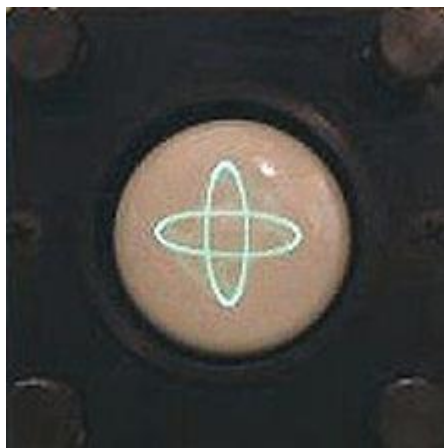
It should look like this with both ellipses the same.

Image courtesy https://en.wikipedia.org/wiki/Radioteletype

The ETI 730 has two filters, one for the Mark, the other for the space tone. One filter is adjustable, the other fixed. Normally using a SSB receiver the horizontal ellipse it set using the radio's tuning control, the other via the second pot on the '730

I'm not sure what's up with the tuneable filter on the '730, as its ellipse is nothing like the other, back when I used this in anger they did match. Oh well, another repair job to attend.

By this you can see that this demodulator is only really suitable for HF RTTY on SSB, as that's the only way to set the first filter. As you slide off frequency, the cross twists to one side, so it's real easy to get back on frequency.

I did spot this bargraph version online during a google search, nowhere as good as a CRT, as the first thing you see is a twist in the cross as you wander off frequency, an effect not visible on this bargraph version

(The upper one is also a HAL)

However these days most people will probably be using a software package that does it all via a sound card.

You just pipe the audio straight into your computers audio input, just like most digital modes, then some really nifty software will use DSP techniques to extract the characters and display them, complete with a tuning scope emulation and water fall displays – Luxury, pure Luxury!

MMTTY Ver 1.7 https://hamsoft.ca/pages/mmtty.php
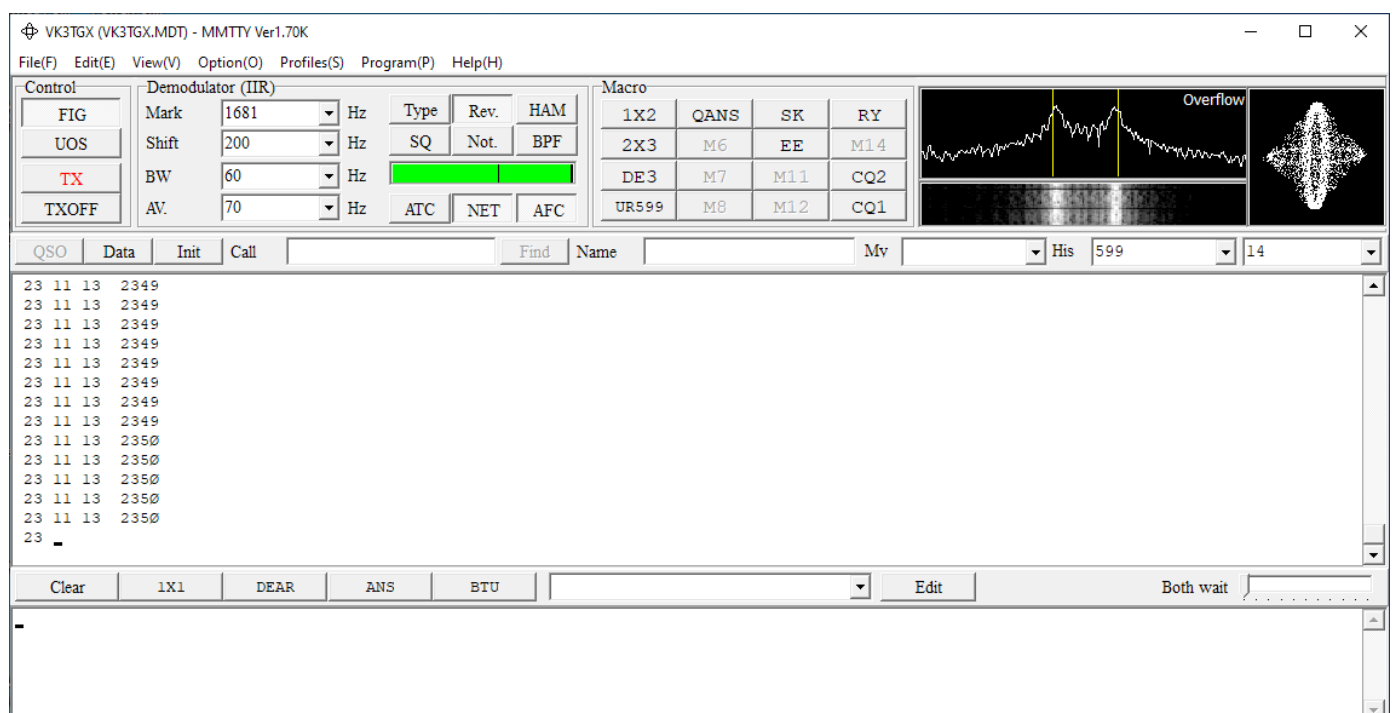
This is MMTTY, that I have used in the past, there is just one problem for me, it only accepts input via the sound card (well, in the version I have) so if you want to use the Codan or the ETI boxes your kind of out of luck. Pity, I like options.

Both the MMTTY and ETI 730 shots are from them demodulating the Codan 7816 audio out, MMTTY says it's upside down, so it looks like I need to swap some more links to get it right.
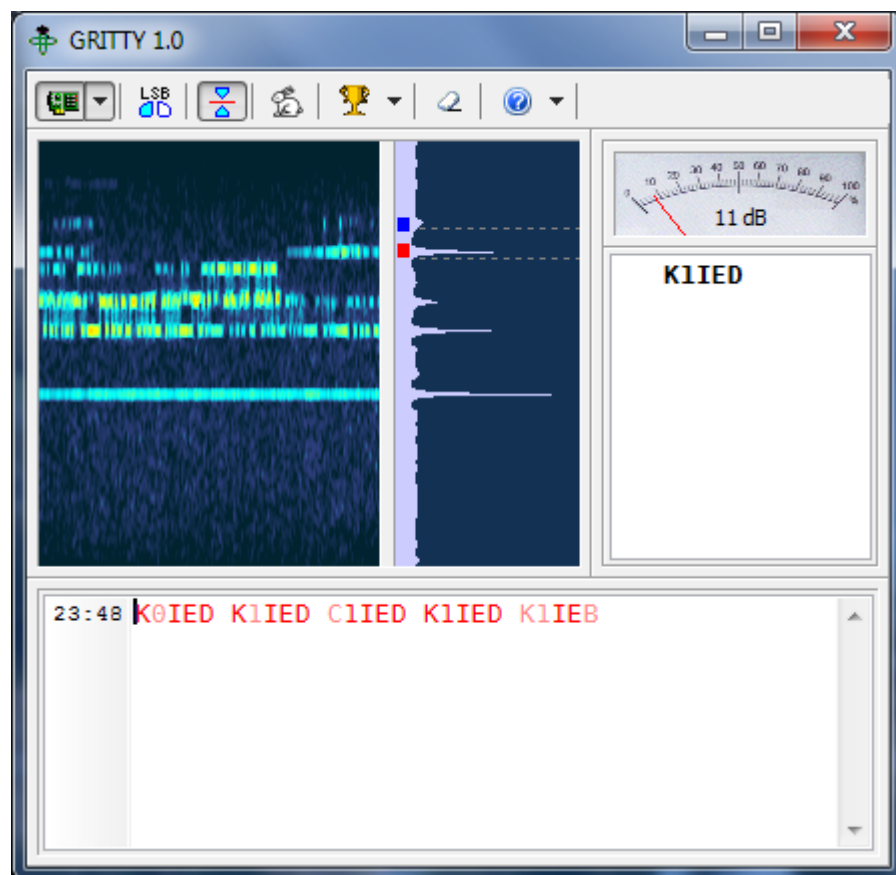
Another one I have used in the past it Gritty,

http://www.dxatlas.com/gritty/

Although I'm yet to test it with this setup. (pic from website)

I did find some code for use on a mobile phone; however at near $10 I didn't bother as I'd be only using it for a short test.

The biggest issue here is a keyboard and getting the audio into a phone. Maybe you could butcher one of those cheap earbuds & microphone setups used for making hands free calls, or you could get it in there via Bluetooth, that's assuming the software app will let you select these as a source. Give it a go and tell us how you fared, it's just a pity there is no free trial period for one to experiment with before laying down the cash.

Also some of the latest HF radios, the ones with large LCD displays, also can do the whole lot inside the radio, showing the received text in the radio's LCD display. I assume you must be able to connect a keyboard, however never having owned one of these I cannot advise. Other sets also can have an input on the back for directly FSK-ing the carrier, read your manual.

Now assuming you're using a PC, then an interface box is advisable, especially if you intend transmitting, probably optional for receive only use. The main purpose of the box is to provide isolation between your radio and the computer. A pair of small audio transformers should have the sound part sorted, as for the PTT control, you can use an opto-coupler, a relay, or just set your radio into VOX mode (Voice activated Tx), although if you go the VOX route, you'd be advised to disable all the Windows etc. sound effect, as every time your computer goes 'ding', 'bleep', etc, your radio will be keyed and all that crud will end up on the airwaves – Not good.

The main reason for the isolation is that a large HF radio will rarely be on the exact same earth as your computer, not a real problem in receive, but as soon as you hit the Tx, and the radio starts pulling 20 plus amps from the power supply, the voltage on the chassis will shift, maybe if you're lucky only tens of millivolts, but probably more. Anyway this is going to be felt by the radio's mic input, a rather sensitive input that is now seeing an earth current flowing from that socket into the computers audio jack, not to mention any residual RF on the radio's chassis,

hopefully not much, but it will be there and this 'computer induced earth' will see some RF nudged into the mic socket – not good, most radio's perform very badly in this situation.
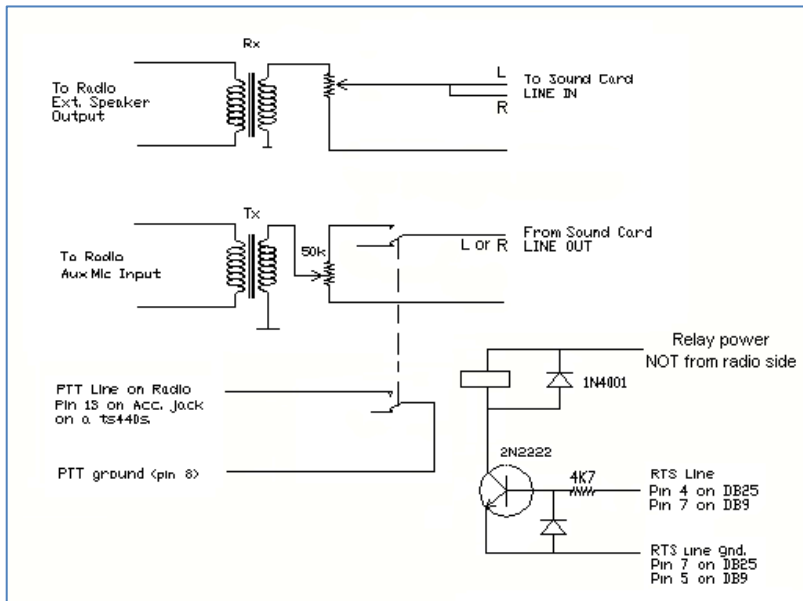
There will be a difference between the radio and the computer, the mic pre-amp will see and amplify this and send it on to be transmitted!

This is kind of a feedback loop and can result is some rather ropey sound from your station. Most operators don't have a way to directly monitor their Tx audio quality, so this problem can go on for ages until someone mentions it to you, at which point you can be rather confused as you've been using this config for a while.

The only catch with this circuit here is you need some volts for the relay coil, DON'T pinch them from the radio/shack power supply as that will void the isolation, either get the volts from the computer – a USB port should run a 5V relay ok. For a 12V relay you'll have to dive into the computer innards, or just use a plug pack.

Be wary of VOX, it can leave you open to accidental computer sound transmissions, not the best when you realise this after listening to music for half an hour....

Cheap USB to serial adapters often don't provide the normal RS232 voltages, but rely on looping back the power from a connected RS232 device, in the above design there is no power going back into the serial RS232 port, so it may output nothing, the relay will never pull in. You could try looping some of the 12V volts from the relay supply back into the CTS and DSR pins, hopefully your adapter will make use of these voltages.

Here is the first hit I had using Google, nice and cheap, as I said, transformers and an opto.

For more money you also get this with integrated sound card, handy for laptops that may not have a line level audio input. (mic level inputs may work – I've had little no success here though)

Now for my oddball bits, with that Time & Date box in the house (as in keep extraneous digital stuff away from the radios) more or less just been used as a clock, I played around with a few ways to get the data out to the radio shack, that is literally a shack in the back yard (originally a commercial granny flat). First off I fed its TTY signal down a cat 5 network cable, normally used for remoting radio's back into the house. That is how I did most of the work poking around inside the Cadan. Now with it mostly sorted, I moved it into my study, I was going to put it on top of the T&D box, but space did not permit. Now thoughts were towards feeding FSK audio out. So with leftovers from last months 'Fun with Lapel Mics' auricle, I fed the audio into a lapel belt pack transmitter. This worked exceedingly well, with the only issue been the Mipro belt pack transmitter eating 9V battery's at an alarming pace. The Mipro does have 5V out for biasing electret microphones, maybe I can back-feed the 5V and lose the battery?

Next I tried a 2.4GHz video sender, these were intended for feeding video (Foxtel etc.) to remote TV's (doing so with analogue video on 2.4 GHz these days is a bad idea, too much WiFi crud) I have a compatible hand-held receiver, that could pick it up over most of my block, so long as you didn't mind the above mentioned WiFi. (I turned mine off, must be the neighbours)

I also played with HF transmission, using an 11.6 MHz crystal oscillator module that had a frequency control input. It worked exceedingly well, but only covered 6 inches to a clip lead connected to my FRG7700. Maybe I'll put that together with an Arduino Nano squirting out 'Quick brown fox's at 45.45 baud as a radio test signal box.
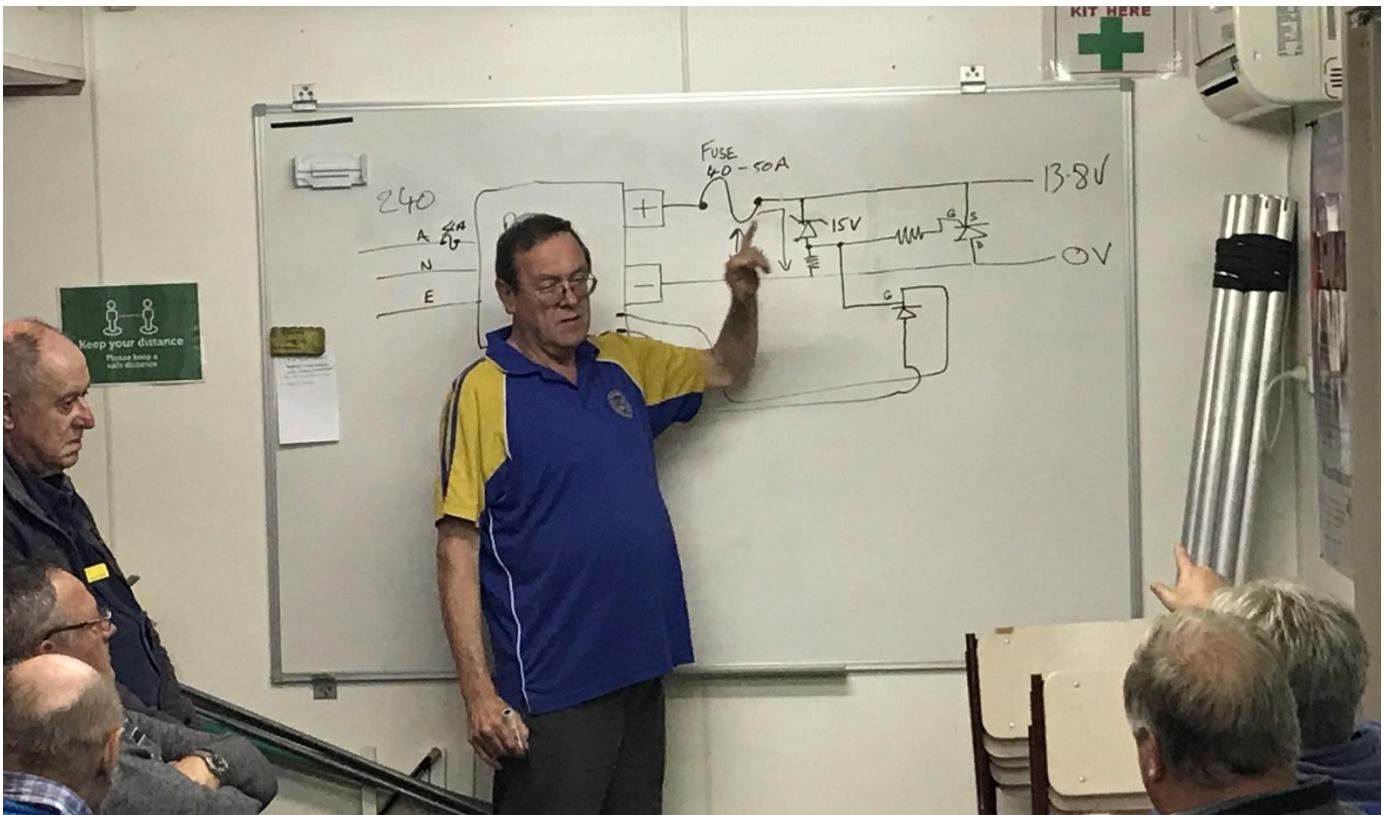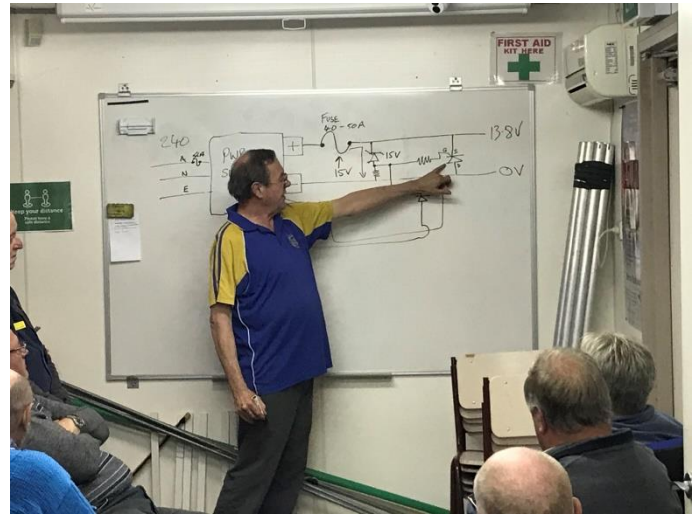

Some TTY trinkets along with the 2.4GHz receiver mentioned above. The panel meter is from Telstra TSG, used to monitor Telex signals while testing and repairing Telex machines. The smaller relay is Mercury wetted and must be used in that orientation, or it turns into a dead short as the mercury floods the contacts located at the top.
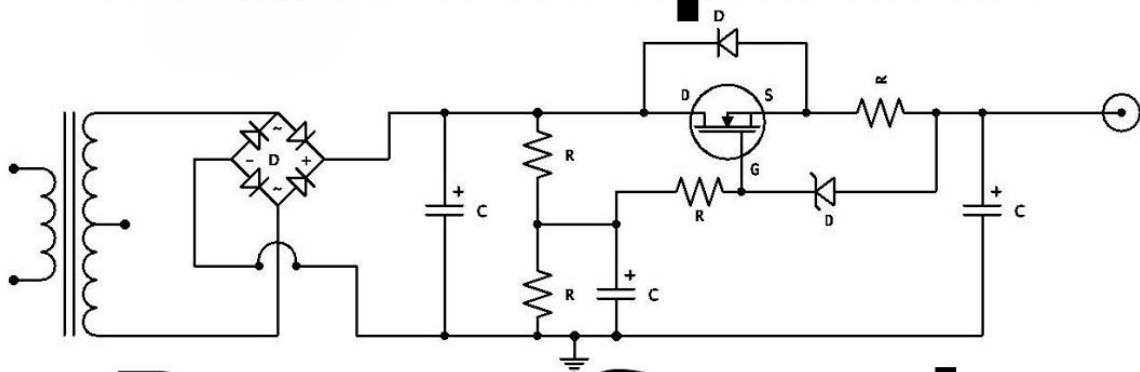
Paul VK3TGX

Interesting YouTube Videos

Restoring an HP-120B Oscilloscope from 1961!
https://youtu.be/hDgjKUY_Riw

Tube Amp Power Supply Design
https://youtu.be/ux94hw1LBx4

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

WIA Affiliated Club

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	Ian Jackson	VK3BUF	General 3	Gerard Watts	VK3ZXC
Admin Sec	vacant		Web Master	Mark Clohesy	VK3PKT
Treasurer	Klaus Illhardt	VK3IU	Magazine Editor	Paul Stubbs	VK3TGX
General 1	Fred Reid	VK3FWR	Property Officer	'committee'	
General 2	Bruce Williams	VK3BRW	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)

Magazine Articles to editor@ggrec.org.au Cut off, 10th of the month
All other Club correspondence to: secretary@ggrec.org.au
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