



# GATEWAY

**The Official Magazine of the Gippsland  
Gate Radio & Electronics Club Inc.**

**March 2018**



**Repair Bench – Yamaha CRX-040  
Core Values by Ian VK3BUF  
Arduino – A Binary Clock  
And More**

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Note: - club meeting minutes are now on the club website

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## Event Queue

### March:

- |                                    |  |
|------------------------------------|--|
| 2 <sup>nd</sup>                    | Prac Night – Club rooms                                  |
| 16 <sup>th</sup>                   | General Meeting  |
| 17 <sup>th</sup> -18 <sup>th</sup> | John Moyle Memorial Field Day Contest                    |
| 25 <sup>th</sup>                   | VK3 EMDRC HamFest, Great Ryrie Primary School, Heathmont |

### April:

- |                                  |  |
|----------------------------------|--|
| 6 <sup>th</sup>                  | Prac Night – Club rooms  |
| 7 <sup>th</sup> -8 <sup>th</sup> | Antennapalooza - <a href="http://antennapalooza.org.au/">http://antennapalooza.org.au/</a> |
| 20 <sup>th</sup>                 | Annual General Meeting – See 'April election', page 4                                      |

### May:

- |                  |                           |
|------------------|---------------------------|
| 4 <sup>th</sup>  | Prac Night – Club rooms   |
| 12 <sup>th</sup> | MDRC HamFest – see page 8 |

***If you work for a living, why do you kill yourself working?*** This was the catchphrase of 'Tucó' played by Eli Wallach in the classic movie *'The good, The bad and The Ugly'* (Tucó was the ugly one) Last Saturday night was a warm one. I set up a large screen under the stars, dragged the lounge room furniture outdoors and a small group of us re-watched this re-mastered 3 hour epic with beer and popcorn. But the rogue had a point. It's ok to work hard and generate wealth for food, shelter and a better life, but what if the process of this hard work becomes so onerous that you never do anything else? If at some level you don't enjoy the work that you do, then you ought to consider doing something else.



*There are two kinds of people...*

If you have done the hard yards to obtain your Amateur radio license but somehow you are perpetually too busy to press a transmitter button, then that's a sign you don't have the right balance. Still, the fact that you have taken some time out to read this magazine says that all is not lost. Just remember that when you prioritise your lifestyle and conclude that all available time has to be spent working, then you will never go anywhere, do anything and certainly never press that PTT button.



The big event is nearly upon us. On April 7 and 8, the weekend after Easter we will see the 5<sup>th</sup> such event unfold. Of course this time it is a combined effort of four different Clubs. If you intend to come along, a brief email with a name/callsign to [bookings@antennapalooza.org.au](mailto:bookings@antennapalooza.org.au) will be appreciated by the organisers. This year has a focus on how to help those just started in the hobby of Amateur

Radio. Look out for the articles elsewhere in this month's edition of Gateway.

The new Radio Society of Australia (RSA) has begun to have an impact on the future of Amateur Radio. As we saw from a recent bulletin, there was a meeting earlier this month between the ACMA executives and leaders of RSA.

There were many topics discussed, including the important need to clarify

laws around the possession of radios with out-of-band capability. The interpretation by some ACMA field staff had stressed that possessing such a radio was illegal, even if the owner was only using it on frequencies permitted by their license.



*These stickers are beginning to appear on cars around town*

This has been a sore point for many Amateurs, because a lot of classic rigs, like the old FT101E and TS520 from the 1970's came out of the factory with the ability to transmit beyond band edges. Most drivers possess a car that can drive more than 100kph and the law relies upon the driver to stay within limits. Amateurs ought to be able to own older rigs, or re-purpose commercial equipment to work on Amateur frequencies, without the presumption that it would be used illegally out-of-band.

We look forward to hearing the responses from the ACMA soon. Information about RSA and details of how to join can be found at: <http://vkradioamateurs.org/> Persons wanting to receive their regular bulletins may join for free until the end of 2018.

### **Caenarvon talk**

Canarvon is not just that rural city on a dry river bed on the WA coast, there is another Canarvon called Caenarvon and sometimes Caenarfon.



This one is in Britain and was home to Marconi when he was performing his early experiments in Radio around the world.

Last year Michael VK3GHM visited this location to check it out. Perhaps to see if there were any old vacuum tubes lying about that had escaped the lawnmowers. Either way, we are privileged to have Michael giving a presentation about this historical radio site. So there is that extra something to look forward to when you attend our March General Meeting This Friday Night.



*A very Game of Thrones looking  
Caernarvon castle*

### April election

Yep, next month in April will be the GGREC Annual General Meeting, where from a cast of hundreds members get to select who shall govern their association for yet another year. As always, all positions are available. We do have some nominations already. Michael VK3GHM and Chris VK3QB are willing to continue in their present roles of Admin Secretary and Treasurer. I shall be stepping down as President, but I am willing to continue in the largely ceremonial role of *General Secretary* where the sole function is to file a report to Consumer Affairs Victoria each year via their web site.

Every few years I help out on the committee because I like to see our Club continue its good work and this has been the second of a two year stint. I also have a pretty busy working week. Part of the joys of working for oneself, but it does mean that I lack sufficient time to give my Presidents role my full attention. So I shall take another break from the committee for a year or so. Just because you may have been on the committee in the past does not mean that you still can't help out now. In fact, we rely upon it. Please think seriously about helping out when we have our positions to fill next month.

### Hamfest Sale 2018

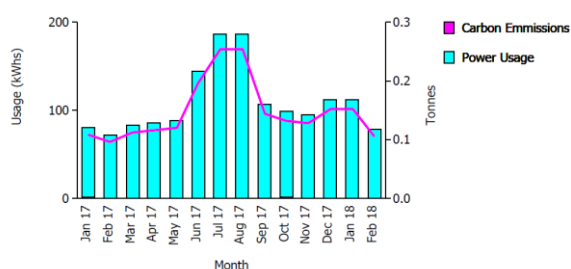
Bruno VK3BFT has kindly offered to coordinate this year's Hamfest Sale in Cranbourne. For which we can all be grateful as the job is within safe hands. As we saw at the last meeting, our Club does rely upon the income from this event to keep the books afloat. Dianne, VK3JDI has agreed to again take bookings for the event.

### Power Audit

You will hear more about this in the coming weeks, but at the last prac night we completed a power audit of how much energy we use versus how much we are being charged for. They don't seem to match very well. In fact it looks like the 'average' power usage we are being charged for is about double the amount of power we use only twice per month. For the 2% of the time when the shack is in use our total consumption is around 1100 watts. For the rest of the time it is around a

mere 150 watts because of our two repeaters on standby. Yet Commander Power says we consume an average of 3.68KW/h. This is not correct. Also, you can see from the adjacent chart that they claim our power consumption doubles in the peak of winter. Yet our actual Summer/Winter profile should be about the same. An appropriately accusatory letter has been sent to them and we await the response. I don't know who's bill the GGREC is paying for, but it sure doesn't look like ours!

Your Average Daily Usage was 3.68kWh for this bill



That's it for now. See you on Friday night

# From The Editor – Computer Woes

What a busy month – Magazine time already – better check that calendar, yep, mag time.

This month seems to have been dominated by sorting out various computers. One lady from church 'inherited' a Windows 7 machine, I have my doubts about how legit her copy of Windows is, partially because it is an Enterprise edition, and secondly because she has no CD's etc. etc., all courtesy of her 'ex'. I'm just assuming he obtained the computer from his work, and that copy of Windows 7 was on it. It's all a bit grey, so to speak. Occasionally I get called on to do a spot of support here and there. It really could do with a complete Windows re-install, it's got so much left overs in its registry and everywhere else it's not funny. Yes, I can extract the registration key from it, however a CD of that particular version is alluding me. The latest saga was they had bought an anti-virus program, but it would not install because it could see another already installed scanner. All well until they tried to uninstall the old one, it wasn't in the list of installed programs, so Windows uninstall was of no use. What's more, I could not find it in the 'programs' folder either. I eventually found an entry for it in the registry, an entry that pointed to a non-existent program folder. So I simply deleted that registry entry and all was well – for now. Boy do I hate the registry, what a crappy way of doing things.

The second computer, a brand new laptop owned by another lady from an adjoining church.

I had already spent a few hours helping her install Office 2016, and then a single copy of Microsoft Publisher. Publisher normally only comes with the full blown professional version of Microsoft Office, currently listed at \$589, whereas most mere mortals go for the \$199 Office Home & Student edition – no Publisher. If one digs deep enough, you can buy Publisher on its own (about \$150 ??) so you are kind of ahead. Anyway this machine started losing the plot in the power department, even whilst plugged in its battery started running low, and threatening to shut down. So back to Harvey Norman's it went. When she got it back I was they called upon to get it all running again – 3 cups of coffee and a few lost hours. When I finally left, I knew she would need more – this 'grace period' only lasted 2 days! – So "I'll be back"

She thought I had done such a wonderful job, that she passed my details onto another bloke from the same church. His 'new' Windows 7 laptop, set up by a neighbour? had a few issues. Firstly it would not allow him to edit several document files, these turned out to have been created by a very old copy of Microsoft Office, and the new Office version on his 'new' laptop didn't trust the files and was refusing to open them - something that is fairly easy to fix.

I've bumped into that one myself, I'm not sure why Microsoft believes opening somewhat old files is a security risk, but they do. Obviously they have never seen a real library with hundred year old manuscripts.

The second problem was the machine was not performing Windows or virus scan updates. I think the Microsoft virus scanner could not update its virus definitions because it was an ancient copy, needing updating along with the rest of Windows, So the Windows update failure was probably the primary problem. I've also struck this one, if you do a clean install from a CD, update won't work. The problem appears to be that the updater is too old and cannot see what it needs on the Microsoft servers. The fix is to manually download a heap of updates and any service packs and install them, then the PC is closer to a current configuration and the automatic part then wakes up and starts working. Yes this all sounds like hear say, and not very scientific, but with what one can gleam from Microsoft it's the best fix I have found so far.

*Paul VK3TGX*

# Antennapalooza 2018



***In a first for Amateur Radio in Australia, four Victorian Radio Clubs are joining forces to host a major field event.***

**Antennapalooza, now in its fifth year, will return to Drouin West on April 7 & 8 (the first weekend after Easter)**

**The theme for 2018 will be about what it takes to get started in the hobby of Amateur Radio. Visit: <http://antennapalooza.org.au/>**

Set in a 6 acre field, 50km due East of Dandenong, visitors can bring their tent or caravan, or just stay for the day. Set up an antenna and have a play on-air, or just listen to a few short talks on different aspects of getting into Amateur Radio. Free Entry, just come along, relax and enjoy the day. Bookings are not essential, but please email a registration with your **name** and **callsign** so we can plan logistics. Let us know if you plan to camp or just stay for the day. Email us at: [bookings@antennapalooza.org.au](mailto:bookings@antennapalooza.org.au).

The website <http://antennapalooza.org.au/> will provide info on how to find the venue, what to expect when you get here and list the short lectures that will feature on the Saturday and Sunday.



Free tea, coffee & barbecue facilities will be on hand. Toilet facilities are provided. In the evening a warming fire will be lit in the Treed Area. (if no fire danger alerts are pending) Experienced Amateurs can try their field equipment, meet old friends and throw some snags on the barbie. Visitors, who have heard a little about Amateur Radio, but want to know more, will benefit from this event. The brief lectures in the central pavilion will answer many questions that prospective operators will need to know.

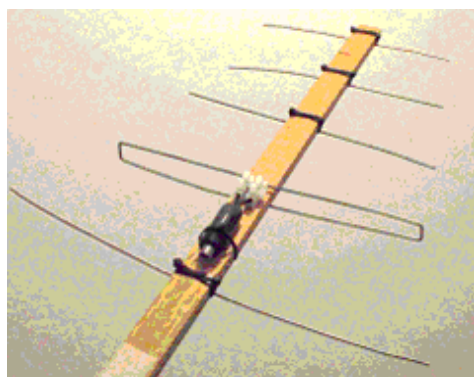
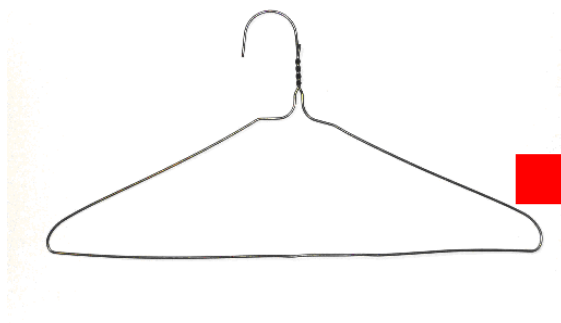
**Antennapalooza 2018 is jointly sponsored by:**

- ♦ **The Gippsland Gate Radio & Electronics Club,** (GGREC)
- ♦ **Eastern Mountain District Radio Club** (EMDRC)
- ♦ **Frankston & Mornington Peninsula Amateur Radio Club** (FAMPARC)
- ♦ **Moorabbin District Radio Club** (MDRC)



**This year it's time to get bent!**

That's right. We want to see what creative things our visitors can do when armed with some old coat hangers and a pair of pliers



**Turn THIS into THIS  
(or something even better!)**

On April the 7<sup>th</sup> Visitors to Antennapalooza will see a large pile of wire coat hangers. They are invited to take up to 12 of these and turn them into a working antenna for the 2 metre or 70cm band. At 4:00pm these must be submitted on the Assessment Table. A short time later these will be collected and judged by a panel of 3 judges. Each construction will receive a score out of 20 for five attributes, to give a maximum possible score of 100 points.

- Originality
- Robustness
- SWR check
- Visual Appeal
- Gain

**At 5:30pm the first and second prize winners will be announced.**

**(First prize: A highly coveted, bag of PL259's... Second prize: A slightly smaller bag)**

There are a few rules:

- ♦ Antenna must be built on the day using coat hangers provided
- ♦ Up to 12 coat hangers can go into the design
- ♦ Bring your own tools for cutting & bending the coat hangers
- ♦ Ok to add your own non-metallic parts, plastic, tape, cable ties, sticks
- ♦ Ok to add your own coax, balun, screw terminals and solder connections
- ♦ Take a number from a box provided, then fill out these details:  
**Name, Callsign, Submission number, Antenna operating frequency**
- ♦ Attach your number to your creation when it is submitted.  
(Judges won't know who built each antenna)
- ♦ Entrants can keep their creation but organisers may take pictures
- ♦ Where actual gain is difficult to measure, Judges will use their best estimates.
- ♦ Only one entry per person permitted.
- ♦ A minimum of six entries will be needed for the event to proceed.

**Amateur Radio is all about creativity with fun and here is an opportunity for both.**





# Moorabbin and District Radio Club.

PO Box 58 Highett 3190

VK3APC

**\*\*\* Saturday 12th May, 2018 \*\*\***

## HAMFEST 2018

**Brandon Park Community Centre – 649 Ferntree Gully Rd, Glen  
Waverley**

**Melways Reference 71 C8**



- \* GREAT VENUE
- \* PLENTY OF SPACE
- \* MELBOURNES BIGGEST
- \* MAJOR AND MINOR DOOR PRIZES

The Moorabbin & District Radio Club have much pleasure in inviting you to participate in  
**VK3's BIGGEST ANNUAL HAMFEST**  
Snacks and hot food will be available – FREE TEA  
& COFFEE!

Talk in via 439.900Mhz 70cm VK3RSE

**PRIZE DRAWS:** Every entry ticket goes into the draw & additional tickets on sale

**SALES: NEW** - Importers and suppliers of amateur equipment & accessories.

**SALES: USED** - Preloved ham gear & accessories, PC's & bits & pieces

All inside and undercover. Demonstrations of Radio equipment and accessories.

**ENTRY ONLY \$7.00**

(Doors Open 10am – entry tickets on sale prior)  
(INCLUDES **FREE** DRAW IN THE MAJOR DOOR PRIZE..... )

Tables available at \$20 each, (1.8m long)  
includes lunch voucher. Please contact:

Lee Moyle, VK3GK. Tel: BH/AH (03) 9705 1051 or  
Mobile (0429) 810101

Email: vk3gk@aanet.com.au

Graeme Lewis, VK3GL. Tel AH:

Mobile (0418) 171601

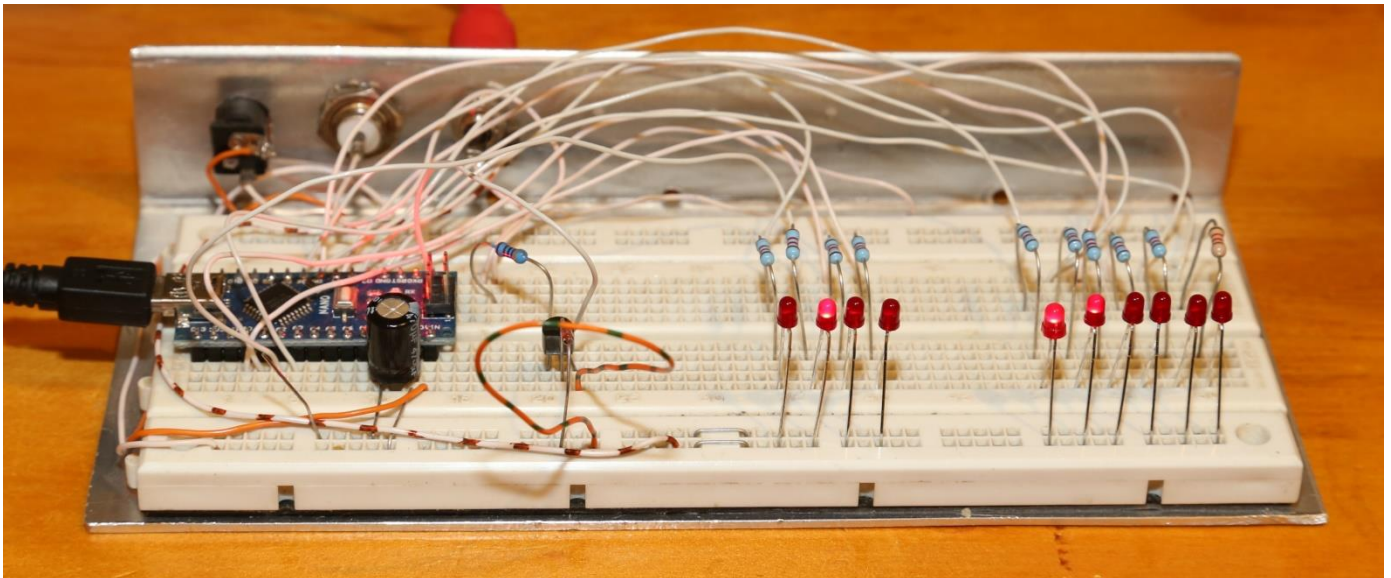
Email: vk3gl@bigpond.com

Webpage - [www.mdrcl.org.au](http://www.mdrcl.org.au)





# Arduino – Binary Clock



A while ago – quite a while ago I saw some adventurous souls were making binary clocks, more as a novelty than anything super practical, so feeling the need to get back into building 'stuff', I thought I'd build one.

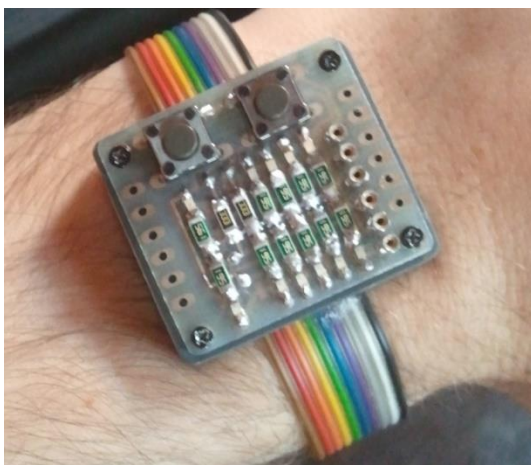
So what is a binary clock anyway, it's basically a digital clock, but instead of using the traditional decimal digits (i.e. 0-9), it uses binary numbers instead (as in 1 & 0 only). So 5:10 ends up being displayed as '101:00110', this is usually done with a row of lamps, a '1' being lamp on, and zero being lamp off, so my prototype breadboard above is saying "4:48"



There is actually two competing formats for displaying the time in binary, I prefer my layout as it looks cleaner to me, with two sets of lamps, one for hour and one for minutes. The other method (slightly more popular) is to use 4 vertical sets of lamps.

This unit is actually using 6 sets, as it also shows the seconds. Each vertical column of LED's represents one digit of a traditional decimal clock. The first column is the tens of hours, the second hours etc., so this clock is saying 10:48:36. A more correct description for this display is 'Binary Coded Decimal' or BCD for short. I preferred going pure binary and dispensing with decimal altogether.

It's up to you; the extra code is not that complex.



How about taking it to a smaller level and make a wrist watch, or just buy this one from the internet.

Unfortunately, Wikipedia didn't have any info as to where they got this image. Darn, the internet sales department just lost a sale.





Here is another example of what is possible, as you can see there is a lot of scope to being creative.

This one is an 'Instructable'.

Follow the link, there is a video clip showing it in action.

Vertical BCD based display.  
15:34, or 3:34PM.

<http://www.instructables.com/id/The-Binary-Clock-the-City-Clock/>

My clock is based on an Arduino Nano, the only catch with these modules, is that the onboard reference truly sucks, it is a rather inaccurate ceramic resonator, there are a few fixes for this thou. If you look on the web, to places like Banggood etc., there are plenty of cheap clock modules to supply a more accurate time to the Arduino, Including GPS derived if you are fussy.

Another rather simple hack is to obtain a 16MHz crystal oscillator module and just feed it into the Arduino, to where the ceramic resonator is fitted. Ideally one should remove the resonator, but you can get away without doing so. Just download a datasheet for the ATmega328 processor to see what the input pin is (Not an Arduino pin, but a pin on the actual IC).

In my case, I have a serial clock source running about my house, a project done ages ago as I got sick of resetting an ever growing pile of clocks when daylight savings starts and ends. This is however probably way beyond what most people would do, so just use a pre-made module.

```
digitalWrite(A0,displayhours & B0001); // 1
digitalWrite(A1,displayhours & B0010); // 2
digitalWrite(A2,displayhours & B0100); // 4
digitalWrite(A3,displayhours & B1000); // 8
// Set minutes LED's
digitalWrite(2,minutes & B000001); // 1
digitalWrite(3,minutes & B000010); // 2
digitalWrite(4,minutes & B000100); // 4
digitalWrite(5,minutes & B001000); // 8
digitalWrite(6,minutes & B010000); // 16
digitalWrite(7,minutes & B100000); // 32
```

Here is the extremely simple code needed to take the hours and minutes and light up a row of LED's

Then all that is needed is some resistors (I used 1.2k) then strait into my LED's, no driver IC's.

If you're time comes from an external source, you may need to convert from 24Hr format to the 12Hr format, here is another snippet of simple code.

```
displayhours=hours;
if (hours>12){
    displayhours=hours-12;
}
if (displayhours==0){
    displayhours=12;
}
```





Believe it or not, this is a clock.

A Kaleidoscope binary clock.

<http://www.chronoart.com/bigbin.html>

Unfortunately no longer made, however it should not be that hard to replicate.

I watched the demo video, and I thought it was too hard to read, so even if I bought it, I'd have to rebuild it with my own code.

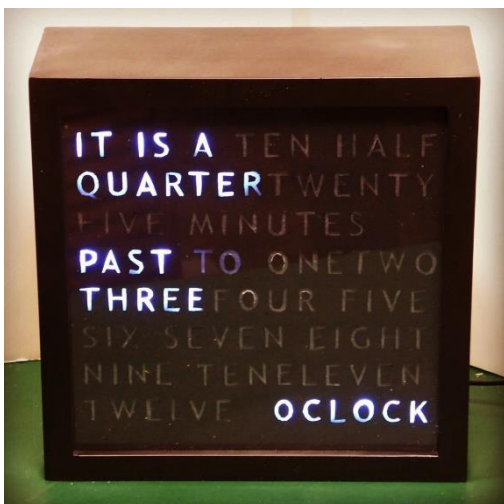
### And now a trap to watch out with your Arduino's.

If you only ever use one module type, then you may be free of this one, however if you do change, remember to reset the Arduino IDE to match the module you are now using. At the start of this project, I loaded the code for my 'Big Clock' project, it would not compile, let alone program. It kept saying "A1 not defined", as in Analogue port 1 had disappeared from the face of the earth. I had spent quite a few hours getting that project up and running, and now my code had been corrupted – NO.....

Then I remembered, that last project I did was the 'WiFi Sixty Four' modem that used the esp-01 module. Unfortunately when I loaded the 'Big Clock' project the Arduino IDE did not automatically change to the board type setup for that project – A bit of a bug in my book.

So when you design something, put a few comments into the start of your code detailing the board used, the programming setup and anything else that comes to mind, because next year, when you go back to it, it may need more from your memory than you can recall.

As a further catch, Arduino central has re-written the bootloader used on the Nano, not sure exactly why, my Google searches failed to find an answer. The only hint is that there is now a 'P' after the processor part number, as in ATmega328P, so maybe it's an update brought on by Microchip revising the silicon. All my boards use the old bootloader, something I could not have easily documented in my earlier code, as there was only one bootloader to select in the IDE at the time, one cannot document the future!



So what is next – a word clock?

[https://www.mike-gualtieri.com/posts/arduino\\_word\\_clock](https://www.mike-gualtieri.com/posts/arduino_word_clock)

A nixie tube clock.

or an Analogue panel meter clock.

Put in your requests....

*Paul VK3TGX*



## THE CHANGING NATURE OF AMATEUR RADIO – AN OPINION by Ian Jackson VK3BUF

For some time I have been contemplating the future of Amateur Radio in Australia, where it is heading, what its challenges are and ultimately what can be done. So I put together a treatise on the many things that have influenced the hobby over the past ten years or so. Unfortunately, there is quite a lot to be worried about. The first part is broken down into about 18 topics. The second half deals with positive aspects that still remain, which could be used as a toolbox for recovery, or at least to arrest decline.

This is an opinion piece not representing any group, nor does it direct blame in any single direction, but it may well strike a chord with a lot of Amateurs.

It is too big to reprint here in full, so I have provided a couple of extracts. To read the full document visit: [The Changing Nature of Amateur Radio - full text](#) where a pdf version of the full text has been placed in the **Articles of Interest** section of the GGREC web site...

If you have constructive comments, you can send them to me at: [ianjackson@dcsl.net.au](mailto:ianjackson@dcsl.net.au)

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### 7. The rise of broadband electrical interference

Interference is not something that affects everyone, but where it does, the results can be a big turn-off for Amateur Operators. Switchmode power supplies and other high-frequency devices are everywhere. They're in phone chargers, DVD players, large screen TV's and used extensively in LED lighting. Worst case it can obliterate large hunks of the electromagnetic spectrum. The actual offending source can be difficult to find. With higher density housing having become a new normal, broadband interference can originate from one or several adjacent neighbours. Complaints to power companies now result in form letter responses that defer responsibility to the ACMA to resolve. In turn the ACMA are disinterested in all but the easiest of cases, citing a lack of resources to deal with the issue. Even after having successfully obtained a radio license, a few months of solid interference devoid of useable contacts is enough to end with many operators throwing in the towel and selling their station equipment.

### 10. The passing of the older generation of operators.

The wave of post CB amateurs of the 70's and the 80' are now the old-timers of today, as indeed the old timers of that era have mostly passed away. Over the next decade, the passage of Amateurs that stemmed from the bubble of CB boom days will leave a void behind them which will significantly reduce the total number of licensed operators. Like a mirror image of a baby boom, this decline will affect many countries, including Australia.

### 18. A lack of knowledge about 'what Amateur Radio is' by most of the population.

This effect is a little bit 'Chicken and Egg', but the problem is compounding. The less that people know about the hobby, the less they indulge in it and a fall of participation follows. Few people below the age of 25 know that Amateur Radio exists, so the likelihood of involving school and university students is low. Occasionally the children of established Amateurs become involved in radio, but don't stay long in the hobby after finding that most other operators are middle-aged or older. The desire for people to communicate within their own age group is real.

### Summary of positive aspects.

The notes presented here are not a definitive plan to safeguard the hobby, but it is a start. There needs to be a lot of conversation about these issues first. However, talk is not enough. Listing the things that concern us has no traction until it evolves into a plan for the future. We need that plan, we need a lot of people to agree to it and we need to start carrying it out soon.

## Repair Bench – Yamaha CRX-040



A lady from church asked me to have a look at her micro stereo, they hadn't used it for a while, and now they could not get it to go, they were not sure if they had plugged something into the wrong socket, or the remote was faulty. When they advised me that the front panel power button was not causing the display to say anything, I tended to discount all their theories about leads and remotes etc.

When I got it home, yes, it was totally un-responsive to any commands. So was it a micro fault, or maybe a good old faulty power supply. The first challenge was getting it apart, normally it's off with the lid, but not this time, it had a strange-ish wrap around case whereas the top panel wrapped down the front, forming the front panel, and then on under the front for about 20mm. So it was off with both sides. This revealed assemblies attached to the top, front & bottom, so separating it further was a real problem, especially if I wanted to power it up.

Thinking power supply I started with where the power cord entered, this was to a smaller vertical board at the back of the case. (Visible in the picture above) On it were the compulsory mains filters, a small transformer & a relay. The transformer was way too small to run the whole system, so this was a standby power supply, the main supply being powered up by the relay and located further on inside. I poked around the transformer, a few windings went off to the main lower board, but there was a 20V winding that headed off to the relay coil via a rectifier diode, a resistor, and a electrolytic capacitor, the other end of the relay coil going to a miniature surface mount transistor. obviously controlled via the systems micro.

So I pressed the power button, dead silence from the relay. I connected my scope but could only see a quick low-level blip from the transistors collector. (Or was it a FET?)

Next I bridged out the transistor, however the 20V rail now crashed down to a volt or so, far too little to operate a relay. I first thought was the extremely small filter cap on that rail had dried up, so I tacked on a bigger one as a quick test – not that!

I then measured the coil resistance (with the power off, of course) 13 ohms – awfully low.

So I pulled the relay – easy to de-solder, almost impossible to grab from the boards topside for extraction. It was a 12V unit, so why a 20V rail? Anyway the relay worked fine when I connected it to my bench supply. More surprising (or is that no surprise) its coil was many hundreds of ohms in resistance, quite typical for a relay of its size.

So I put my meter back across the circuit board pads where the relay had been – Still 13 ohms.

All that was left was the switching transistor, the small electro filtering its supply, and the standard diode used to suppress the back EMF when the relay is released. The cap had 20V on it, so it could not be 13 ohms, same with the transistor, so we must have a crook diode.

The diode was an extremely small surface mount device, about the size of half a grain of rice.

Devices of this dimension don't have any regular part numbers on them (or a manufacturer logo etc.), if you are lucky a 1 or 2 letter code. The only way to get their proper full part number is to consult the equipment's service manual. Repair manuals used to be readily downloadable from the web, not any more. Most now seem to reside at some manual repository that wants big money before they'll talk to you. Maybe not in this case – I just didn't bother looking.

This diode (maybe under spec'd, as it did fail) was no high performance device, almost any general purpose diode should do, even an 1N914, however I usually use a 1A rectifier diode, like a 1N4004 etc., they are extremely cheap, so why not.

So I re-fitted the relay (no easy feat) then I soldered the replacement diode strait across the relay's through-hole pins, as the original diode's surface mount pads were never going to hold my 'ginormous' replacement 1A diode.

Success, the system immediately powered up when I pressed the power button.

Some bench tests with my own speakers soon had me impressed, this thing sounds half decent. Yamaha seems to have done a good job with this one. The owner had hinted that it had cost her quite a bit, and it seemed to be delivering those level of goods. To be fair I only ran it on my single driver test speakers – far from cutting edge audio-file equipment, but I cannot say I often have those test speakers sounding as good as they were.

Some smaller systems have a custom frequency response to compensate for very small speakers, so maybe that is why it sounded really nice. However I'll probably never know as I didn't hook up any test gear to test it out, I just played a CD that had been left in its drive.

I popped the dead diode into a small zip-close plastic bag and handed it back to the owner with stereo, she thought I was having a lend of her when I held up the plastic bag proclaiming this to be the fault. One had to look hard to acknowledge there was anything in the bag!

I cannot believe how much equipment I've come across with a smashed in power switch, it won't turn on so they keep pounding the button!

*Paul VK3TGX*



## CORE VALUES by Ian Jackson VK3BUF

Today I'm taking a look inside multi-core solder. In the workshop I regularly use three sizes of solder, depending upon the type of job is at hand.

There is the 1.22mm solder, dubbed 'fat solder' that is great for filling in a lot of solder fast on wires, relays and screw terminals.

Then there is the 0.71mm solder that gets used the most for circuit board assembly. Resistors, capacitors and most through-hole components.

Finally there is the super-fine 0.35mm solder, which is used exclusively for surface mount parts. This is important. When it comes to surface mount soldering, fine tipped irons are nice, but optional. I'd rather use a bigger iron with the smaller solder than the other way round



*3 profiles of resin cored solder under the microscope*

I took this image recently of a couple of slices of these three different solder types and held them near a 1mm spaced ruler. You can clearly see the five resin flux cores inside the cross section view of these solder samples. This is the part that makes the solder smoke upon melting and allows the metal to flow freely over the junction. I have never quite figured how they manage to get the resin inside the solder, as it has a lower melting point.

My preferred solder is not the newer 99% tin Lead Free solder, but the traditional 60/40% tin-lead version. It has a lower melting point and leaves a nice shiny finish to show a clear bond.

The lead free solder melts at a higher 227° temperature, which means that the iron temperature must be cranked up much hotter. Tips don't last as long and the resin spits on your hands during soldering, so cotton gloves are needed. The finish is frosty looking which makes it harder to see if the solder joint is sound or not.

There have been a lot of big-name products that have failed in the field because of the high-fracture susceptibility of lead free wave soldered joins

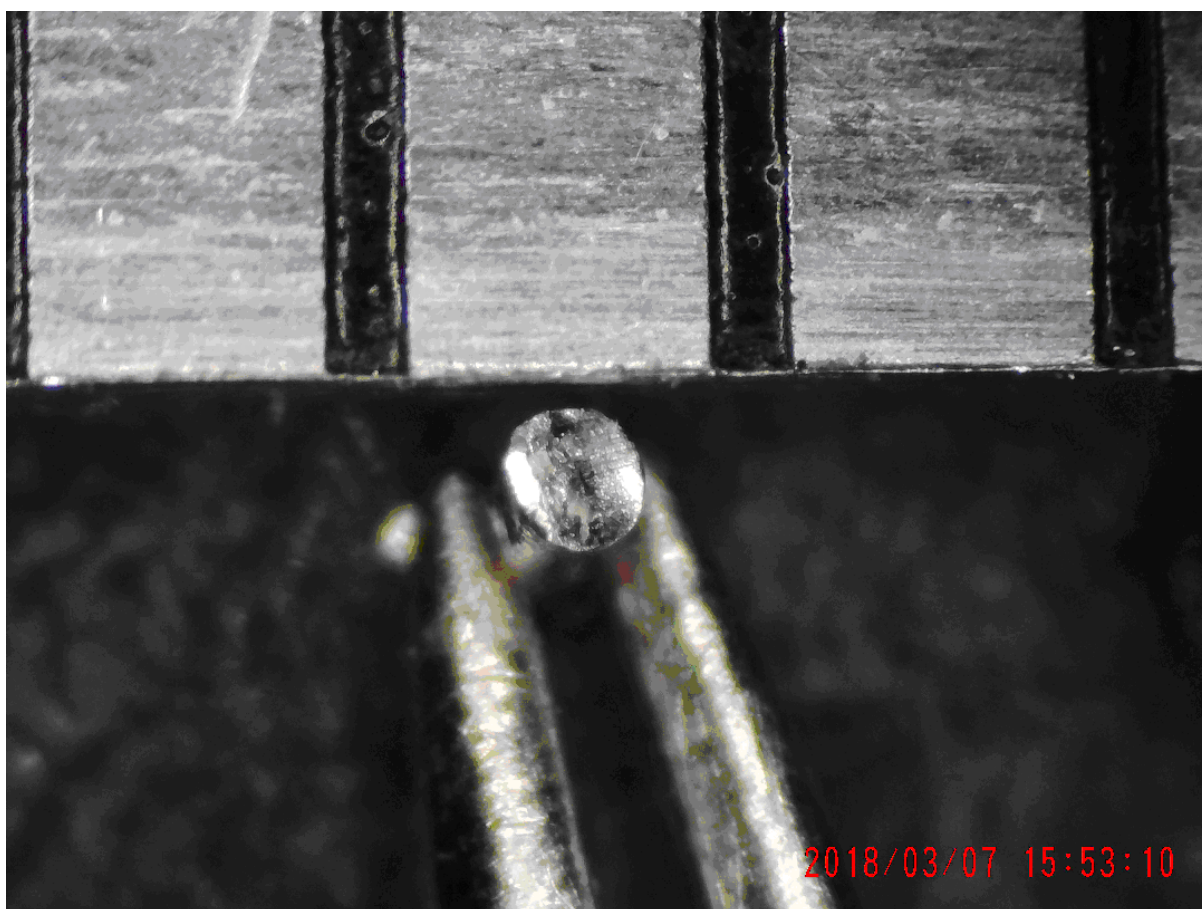


The adjacent picture shows a fault I found in a TV last year where there was a crack through the centre of a pad caused by poor lead free soldering. The slightest tap anywhere on this large-screen telly would cause the picture to flicker.

It was traced back to this single solder join as the culprit. It was only 1.5mm wide. The frosty look to the surface of the solder is typical of these poor quality lead free joins. At first glance it looked like a good connection, but the crack forms a complete circle around a resistor leg.



*A good connection? Look closer..*



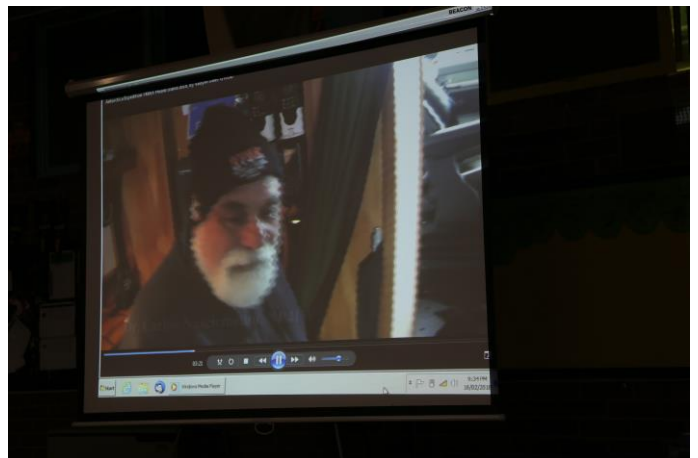
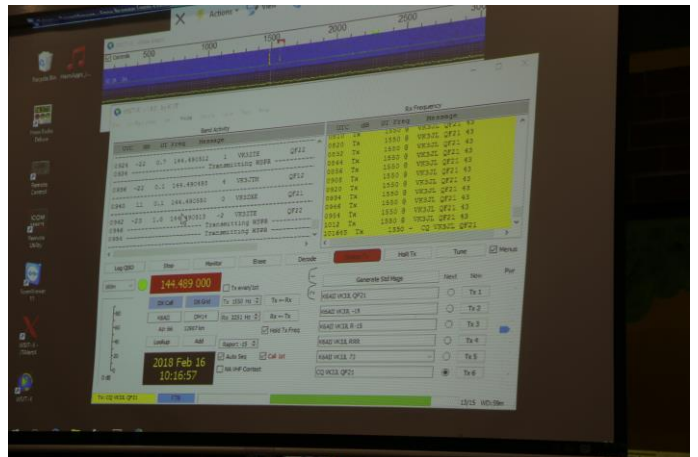
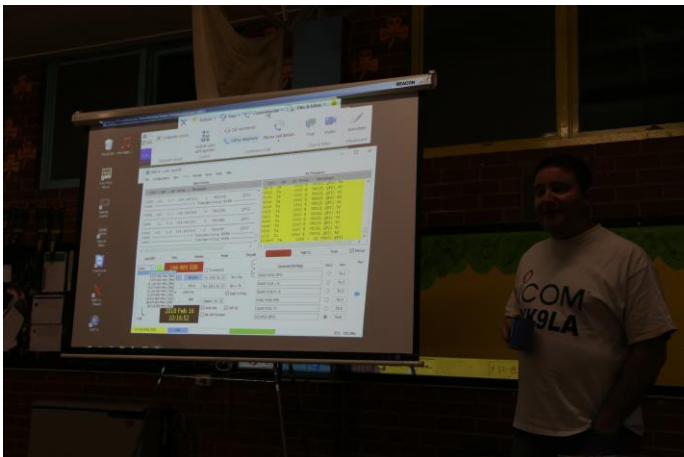
*At one-third of a millimetre in diameter, this solder still has 5 cores of flux inside*

The above image shows a close up of the 0,35mm solder, held up against 1mm divisions of my ruler. In spite of the tiny size, you can still make out the five resin cores within, making it great to get in close for those surface mount chips, without shorting between the legs of the pins.

If you do some soldering from time to time I definitely recommend that you keep some samples of all three solder types in your kit



# Meeting & Talk 16/2/2018







## Club Information



Meetings 2000hrs on third Friday of the month at the  
Cranbourne Guide Grant Street Cranbourne  
Prac nights first Friday in the Peter Pavey Clubrooms Cranbourne 1930hrs  
Visitors are always welcome to attend

### Office bearers

President	Ian Jackson	VK3BUF	Web Master	Mark Clohesy	VK3PKT
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General 2	Ron Lacey	VK3FRDL			

### 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 VK3RLP In 434.475MHz Out 439.475MHz CTCSS 91.5Hz  
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70cm Repeater Seaview VK3RWD In 433.575MHz Out 438.575Mhz CTCSS 91.5Hz  
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VK3RLP Beacons 1296.532MHz & 2403.532MHz (currently inactive)

### Membership Fee Schedule

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Fees can be paid by EFT to BSB 633000 - Account 146016746.  
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• Membership Fees Are Due at each April Annual General Meeting.

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