GATEWAY

The Official Magazine of the Gippsland Gate Radio & Electronics Club Inc A0016893M

September 2022

ILLW Weekend Activity.

The Radio & Hum

AMPRNet

And More

16/09/2022 ver C

WIA Affiliated Club

Cover photo, ILLW at the Cape Schanck lighthouse, see page 8.
(If you have any good photos, please send them in)

Contents.

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

Event Queue

September:

16th	8:00	General Meeting – CANCELLED – see page 3

October:

7th	7:30	Prac Night
14-16th		Jamboree of the Air (JOTA) – 1:00 to 4:00
21st	8:00	General Meeting

November:

24th		Synchrotron visit

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

GGREC President's Message

President's Message September 2022

Due to a series of unexpected issues the September General Meeting has been cancelled.

It is great to see so many new members joining our Club and getting involved in meetings and events. However, it is very important that experienced Club members come along to pass on their experience and knowledge about the Club to the new members. GGREC is in a state of transition and it is essential that we assist the new members as much as we can.

The Secretary position is still vacant, increasing the workload on Klaus and myself. Please consider nominating as Secretary so that we can have a fully functioning Committee.

As mentioned in my last member update, the ILLW event went very well considering that this was our first field operation for many years. We look forward to more field outings in the near future.

The Bunnings Sausage Sizzle was also very well supported by members and raised sufficient funds to cover our operating expenses for the next 12 months.

Coming events include the Jamboree Of The Air (JOTA) on Saturday, October the 15th between 1:00 and 4:00pm, but we might go a bit later to make use of the improving HF propagation. The Club will be looking for your support to operate the radios and foxhunting equipment for the Guides.

The Australia Synchrotron visit is on Thursday the 25th of November. We have a maximum number of 14 places to fill so please let me know if you would like to attend. Cost is $20.00.

Later this year we hope to organise a VHF/UHF Field Day (to be confirmed).

Kind regards,
Bruno Tonizzo VK3BFT
President GGREC

From The Editor

Forget, 'a blast from the past'. This month, 'a blast from the present'. *(ref last mag)*

I was happily mowing the grass with my junk build electric mower (wow, so much better with no ICE fumes) when the lead end emitted a stream of sparks. I didn't initially know where they came from, I just stepped back, then headed off to the power point at the other end of the extension lead to kill the power and make it all safe.

Many months ago, the mowers plug failed, this just resulted in the motor cutting in and out as I moved the lead about, no smoke or flames etc. The same can be said when my Ryobi line trimmer's lead suddenly split open at the strain relief, no 'harm' so to speak.

On closer inspection I spotted this small spot in the cables sheath, that I'd normally put down to some muck getting stuck on the lead, as in a spot of tree sap covered in dirt.

What gave it away was the burn mark on the sockets strain relief. Luckily I had a spare lead socket in my 240V odds-&-sods box, I was soon back out cutting the grass. Yes I did have another lead, however this one needed fixing, so why wait. Otherwise, I'd be kicking myself another day when I grab the lead for a kind of urgent job.

This all kind of highlights how almost nobody seems to know how to implement a good strain relief. This one on the lead is almost just a design cue, it does not flex at all, the one on my line trimmer is quite long, but again it almost does not flex at all, all the strain is on the first 15mm of cable past that joke relief, and that's where they both failed.

Years ago my ancient National vacuum cleaner died, the rubber tail protecting its lead had badly perished, I replaced it with an industrial gland that had a long spiral wrap strain relief, that thing is magic, pull on the cord sideways, and it forms a nice arc, evenly spreading the strain, as it should, so why can't the electric garden tool crew do likewise.

On a totally different note, I did kind of have a blast from the past, working on my old work radio 'hack box', I was running all the old memories through trying to recall why things were as they were. Some just clicked like it was yesterday; others had me scratching my head saying 'what'. All while wondering where the world is headed as I listened to endless commentary about the passing of Queen Elizabeth II, RIP.

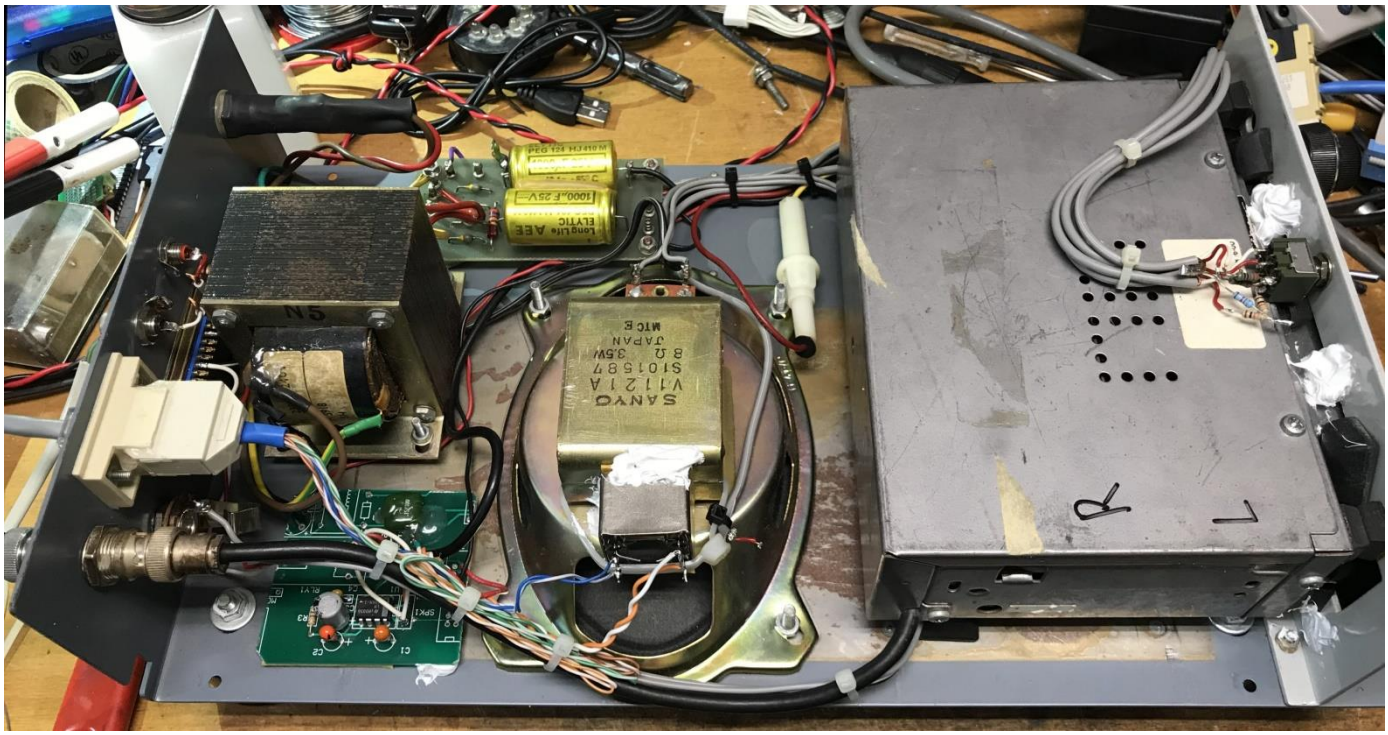
Yes, that is one of the sure things in this world beyond taxes; however it almost did not seem right that it had actually happened. Apparently our new monarch, King Charles III, is a strong advocate to things green, so that has to be good. Just ask Ian VK3BUF about his trips to China and all the pollution, to the point of the sun being reduced to a dull spot.

Paul VK3TGX

The Radio & Hum

Many years ago I saw a construction article of sorts, about making a radio set/mantel radio, etc. by getting a nice speaker box and installing an old car radio into it.

The reasoning at the time was that car radio's had to perform way better than your standard domestic radio as the conditions they operated in were far worse, as in wildly varying reception (as you drive), and quite a lot of interference courtesy of the car's motor etc. These days we have almost come full circle, go down to the shops and try and buy a nice AM radio, with decent sound, in a nice wooden box – You will fail!



Anyway, many many years ago, I needed a radio to listen to at work, I had used the odd plastic box tranny radio, they either walked, or didn't give pleasure due to their tinny sound.

In a fit of madness, I built this monstrosity out of an old 'single card modem' box from work with the radio recently pulled from my Ford Cortina car (I had upgraded the car to stereo etc.)

All made from junk, box with +&- 20V power courtesy of Telstra (or was it Telecom back then), radio from Ford, speaker probably from an old TV, all standing on monstrous rubber feet from an old photocopier. (to let the downward firing audio out)

Over the years it was modified several times, aux-in for connecting a CD player, and aux audio out feeding remote speakers on several other work benches for colleagues to listen too, as radio reception was poor in our building, most portable radio's sucked, whilst the old Ford car radio mostly shined with a nice solid tone, in a way validating the constructo project's claims.

This was like 30 odd years ago, I then moved to another department where the boss saw the same problem and had ABC radio piped around the work benches, all you needed was a 100V PA speaker. Now my radio has been sitting disused, atop a speaker in a spare room for the last 20 plus years, just chilling, gathering dust.

The other day, I was lamenting the awful AM reception I am experiencing at present, lots of QRM to put it lightly. Now if I was looking for weak DX, then the wines and pops probably would not be so bothersome, however having it on a strong local signal is just not on, I want to enjoy the broadcast, not strain to pick up what they are saying.

I have several radio sets around, from a Yaesu FRG-7700 communications receiver, to various portable sets and HiFi component receivers, non are really usable on the domestic AM band.

One thought I had was to put a radio permanently tuned to ABC Melbourne, 'out the back' and pipe the audio back into my house, so hopefully distancing it from any QRM I generate. So I grabbed this old work radio to give it a try, unfortunately it wasn't working all that well, severely crackly pots, and the aux audio out was dead. Also in a quiet work moment, I had made a quite large VU meter out of an old NEC PABX incoming calls display, that ran off the aux outputs, this was also dead.

Another problem was their was quite a lot of hum in the speaker – now this was probably always there, it's just that in a noisy work environment this would go unnoticed, however for my quiet 'tests' it was a no-no.

The pots were easily fixed with some contact cleaner spray, the AM/FM switch was a problem as it lay deep in the radio's bowls, so I elected to just exercise it a few times and it was a lot better. The aux-out was my fault, I had installed, then removed a pair of buffer amps to give stereo out from the aux stereo in's, but never reconnected the mono buffer afterwards, Also the balanced audio out it had, had been reconfigured as an input!, this confused me for a good hour, however I cannot for the life of me recollect why on earth I ever did that mod.

This balanced audio out, on an RJ45 LAN style connector was why I grabbed this radio for the test, I can just pop a network cable into it and patch it back into the house, easy-peasy.

There is nothing like trying to figure out 20+ year old wiring with (of course) no diagrams, and only a very sketchy memory. Anyway, this was all fairly easy – just a pain that I'd misplaced my audio signal tracer amp. A digital multimeter sure makes a rather poor audio signal tracer.

Sorting out the hum was another issue, it was not a fault as such, but rather a limitation of the original build. Power for the radio comes from a 240V power transformer, these unfortunately often radiate quite a large magnetic fields, even the supposedly better toroidal transformers offend quite a bit. I once used a toroidal transformer in a CRT based serial terminal, the magnetics sent the CRT nuts, only fixed by replacing it with a switch-mode power supply.

It all comes down to layout, keep the signal wires away from the transformer. In this case the transformer was all but hard up against the back panel, unfortunately the back panel is where all the connectors are. Also earthing is an important consideration, a one point earth connection is usually the best, I had four, one for the BNC antenna port, one on the quarter inch speaker jack, and a third on the 12V voltage regulator, where it was bolted to the chassis for cooling, and one at the RCA aux audio inputs. And oops, a 5th for the 240V mains cable.

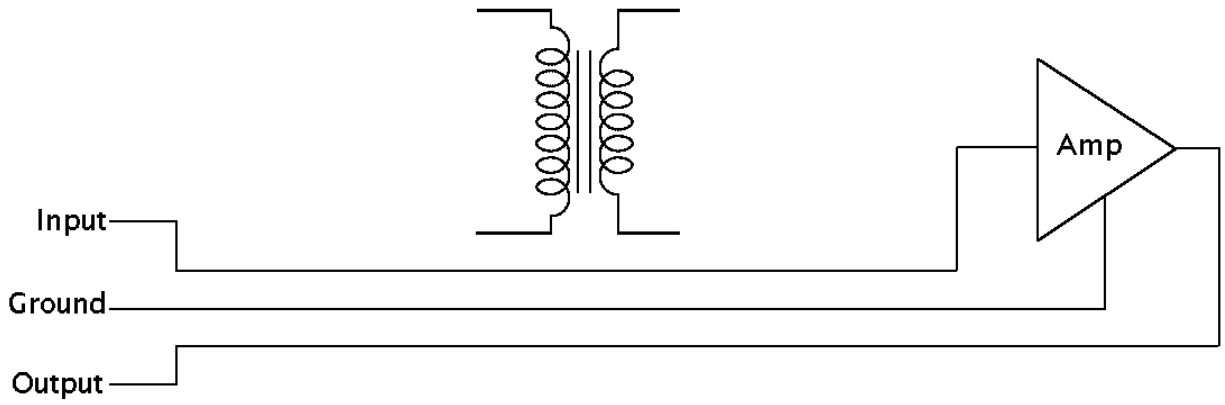
The regulator was easily fixed with a sil-pad and insulating bolt bushing, the aux input's earth was simply cut, they can get their earth via the chassis – not ideal, I'll revisit it if it's a problem in the future. The antenna socket setup seemed optimal, it was over to the side almost as far as possible, plus I like a nice hard chassis antenna connection, very good for handling any atmospheric surges from outside antenna's (although it will never stop lightning!).

This just left the speaker socket, and its lead that ran under the transformer, BAD. As the socket was close to the antenna BNC, I re- ran the lead so it now follows the antenna lead.

Having all your signal wires run together past the transformer means that the transformer will hopefully couple equally into each of them, as in there is no difference between them.

Everything is earthed at the back panel at the BNC antenna & speaker ports, meaning any induced signal from the transformer will cause the car radio to bounce up and down by a few millivolts, however as there is now no other earth, it will not cause any hum currents to flow.

Originally, with two earths the AC magnetic field was causing a voltage differential on the three connection points of the radio, this resulted in currents/voltages to be induced into the radio's audio amplifier, that the amp then dutifully amplified and sent to the speaker. It didn't matter where the volume control was set, the amp always saw this few millivolts of earth hum.



In this simplified diagram, the transformer will tend to induce a voltage in the three wires passing it, hopefully equally into all three. Now when the input signal, say 1V gets to the Amp, it will have some 50Hz hum on it, say 0.5V. However the earth wire will also have this same 0.5V hum on it. As the amplifier amplifies the difference between its input and its ground, say 2X, this will give 2V of signal plus 0.5V of hum. Now when the signal goes back to the terminals, the transformer will again induce another 0.5V of hum, however this time it will nullify the hum already on the signal, leaving a relatively clean 2V of signal. If we now earth the amp module directly to chassis at the amp, rather than using the earth from the terminals, then it will also amplify the hum, giving us 1V of hum, when the signal goes back past the transformer only half of the hum will be nulled, meaning a permanent half a volt of hum on the output, not good. If one of the wires runs, say on the other side of the transformer, its hum signal will not match and we won't be able to nullify it out, more hum on the output, Bad!

Normally these signal wires will be shielded, however coaxial shielding does not stop magnetic fields. This setup above is far from ideal, ideally you would use a magnetically shielded transformer and put it in its own separate power supply box, keeping the two well apart.

Ideally is a nice world, practical is the world we live in. In my radio these options are not available. The transformer at hand is what I have, I want a one box solution, the budget is zero, so we just do the best we can with what we have, and try and make the above diagram work as close to perfect as possible. Keep the wires that have to go past the transformer tightly bundles, maybe even twist them together, and as far away as practical.

In the end, the radio is much better, however it did not solve my AM QRM problems, so it's back atop the speaker in the spare room. It's really just a momento to fun days and people at the Telstra TSG, it does not have to actually work, it's done its time. Hopefully it can just sit there, just chilling, for another 30 years. (That means I've made it to 91)

Paul VK3TGX

International Lighthouse Lightship Weekend - ILLW

Cape Schanck international lighthouse and lightship event under VK3BJA/p

GGREC participated in **The International Lighthouse And Lightship Activity Event** on August 20th (Saturday) from the Cape Schanck Lighthouse area. Parks Victoria permitted us to operate within the Cape Schanck lighthouse compound at the site of the old radio tower.

We registered our participation with the event organizers of this event

https://lighthouses.org.au/international-lighthouse-weekend/

Back Ian's van for 40m SSB operations and me (VK3IU) trying to get some more CW contacts in vain.

The preparation effort for this activity started in May 2022 with us making contact with the Lighthouse society which refred us to Parks Victoria. We had to fulfil a series of pre-conditions before we could apply. Some lead to the adjustment of our WIA provided Public Liability Insurance from 10Mill to 20mil, as this has become the new standard. A detailed activity plan with a standard layout of our operations, nomination of site marshals etc. At the end Parks Victoria approved our application.

The week prior of the activity we conducted an antenna test run at the club rooms, where the interested members had the opportunity to fine tune their antennas.

On the morning of August 20, 2022 Mike VK3KTO and Klaus VK3IU meet at the shack and loaded the required materials into our cars. We drove both vehicles to Cape Shank, with me (VK3IU) hitting a bad pothole in Pearcedale, which caused my tyre to slowly loose pressure over time, it was replaced the next Monday, thanks VicRoad for keeping our roads safe.

On arrival in Cape Shank we meet with the participants and also Tom VK3FTOM who joined our activity as guest, you all may know him. Tom is very active and loves field day operations. Thanks for supporting us Tom.

At 10am we finally meet the ranger who guided us into the Cape Shank compound and provided further instruction to us. The setup was quickly done due to the prep work the members did prior. Ian's Van was used as wind shield and we decided not even to try to put up the gazebo due to the strong winds.

Operations commenced from the van on 40m SSB with many contacts being made within Australia and to other Australian lighthouses.

Mike VK3KTO setting up his VHF antennas

We participated from 10am to about 4pm in the event when we choose to call it a day due to the strong winds and an approaching bad weather front on the horizon. The majority of the contacts were made on 40m SSB from Ian's Mitsubishi VAN, although we tried CW on other bands and Mike VK3KTO tired hard on VHF SSB, but conditions where not favourable during the day for DX. Nevertheless it was a nice experience and everybody enjoyed it a lot.

A two day operations was not possible this time due the Bunnings Sausage sizzle the following Sunday, but maybe next year if interest exist.

We certainly learned a lot during this activity and will be better prepared the next time.

Front, Mikes VK3KTO ute with his VHF antenna setup, note the "RED flag" at the VHF Yagi

The Lighthouse society was very welcoming to us and excited about the operations as there had been no activity for the past two years due to Covid.

Thanks to the participants in this official Club activity and we hope for many more to come.

Participating members and guest:

Bruno VK3BFT, Albert VK3BQO, Iain VK3BUF, Mike VK3KTO, Fred VK3FWR, Tom VK3FTOM, Don VK3ABI and kids, Mike VK3TDK and Klaus VK3IU

73 de Klaus VK3IU




Pics, VK3TGX

Vacant Position

Club Administration Secretary

The club currently has an open position for interested members. In this position you will be part of the club committee and work closely with the President and Treasurer to steer the clubs and its activities. Your duties include

- record the attendance at Club Meetings,
- record and preserve the minutes of the Club Committee and Club General Meetings and
- to perform all other duties as ordinarily pertain to his office.

Crtiteria.
You been a financial member of the club for 12 month or more.
Comfortable to handle club correspondence and well versed in the written English language.
Happy to attend the monthly meetings (twice a month) and available during the week to perform the duties of the secretary.

Pay none
Benefits maybe

Please apply to the president
president@ggrec.org.au

AMPRNet Direct Address Allocation

Back at the dawn of the Internet (1981) there were **Internet Protocol version 4** (**IPv4**) address ranges defined for **Class A, B** and **C networks**, refer **RFC 790**:

https://www.rfc-editor.org/rfc/pdfrfc/rfc790.txt.pdf.

For the largest organisations there were to be 127 **Class A** networks with 16,777,214 hosts per network. At the other end of the scale, for small organisations there were 2,097,152 **Class C** networks limited to 254 hosts per network.

Obviously these days there are more than 127 large organisations needing connectivity to the Internet and the world is close to exhausting the pool of **IPv4** addresses. Therefore this class system was superseded by **Classless Inter-Domain Routing** (**CIDR**) and other techniques to extend the life of **IPv4**. People still commonly refer to these obsolete Class subnet designations.

IPv4 has been superseded by **IPv6**. There are estimates that an **IPv6** address could be assigned to every grain of sand on Earth plus 340 billion equivalent planets. Refer to:

https://skeptics.stackexchange.com/questions/4508/can-every-grain-of-sand-be-addressed-in-ipv6

Although an Australian **Internet Service Provider** (**ISP**) such as **Aussie Broadband** enables **IPv6** by default on every service activated, the vast majority of people still rely on **IPv4** addresses for their PCs and internet connectivity.

RFC 790 listed all the assigned **Class A** networks up to September 1981. The assignments at that stage included the US military, government institutions, universities, large companies and the last entry at 44.0.0.0 was the '**Amateur Radio Experiment Net**' referenced to **Hank Magnuski** (**KA6M**). Licensed amateur radio operators (Hams) around the world can still be granted **IPv4** addresses within this range for non-commercial use. This includes such purposes as experimentation, education, etc. When one or more **IPv4** addresses are required by their club or for personal use a licenced amateur radio operator may request addresses in this reserved range.

This block of addresses has become the **Amateur Packet Radio Network** (**AMPRNet)** or **44Net**. It is managed on behalf of all licenced amateurs worldwide by the private foundation **Amateur Radio Digital Communications**. Refer to:

https://wiki.ampr.org/wiki/Main_Page

This Wiki provides guidance for the different types of allocation supported by **AMPRNet**. Due to the many differences worldwide between implementations by **ISPs** the **AMPRNet** Wiki can only provide limited guidance for the **Direct Allocation** option. For this option you must be able to configure **Border Gateway Protocol** (**BGP**) and the minimum allocation is a /24 block i.e. an old Class C subnet or 254 host IP addresses.

This document attempts to provide some guidance by illustrating one method of implementing a **Direct Allocation** in Australia. My experience is limited to one retail **ISP** using a **National Broadband Network** (**NBN), Fibre to the Premises** (**FTTP**) service. Similar facilities by other **ISPs** may be available but I am unaware of costs and procedures. Other broadband technologies e.g. **Fibre To The Node** (**FTTN**), **Fibre To The Curb** (**FTTC**), etc., may be supported. Unfortunately there are no guarantees and as the saying goes, your mileage may vary.

This guide will be limited to my experiences with the **AMPRNet**, the **National Broadband Network** (**NBN**), my ISP **Aussie Broadband**, some obsolete **Draytek** Vigor modem/routers and a **pfSense** firewall. I am no expert, you have been warned...

NBN Co Limited (**NBNco**) has been offering free upgrades to **FTTP** connections through retail **ISPs**. Currently this option is only available to a limited number of suburbs and towns. With this upgrade the upper speed limits for our broadband service increased from 100/40 Mbps to 1,000/50 Mbps. The terms and conditions require having an NBN Home Fast, Home Superfast or Home Ultrafast plan for one year.

Needless to say the retail ISP's plans may not follow the **NBNco** naming conventions. For example **Aussie Broadband** describes these offerings for retail customers as:

- Home Fast – **Family nbn** 100/20 typical evening speed 97 Mbps.
- Home Superfast – **Power User nbn** 250/25 typical evening speed 244 Mbps.
- Home Ultrafast – **Power House nbn** 1,000/50 typical evening speed 600 Mbps.

We had an existing 100/40 Mbps **FTTN** xDSL service with **Aussie Broadband** and that had been the highest speed tier available. Theoretically this would be a free **FTTP** upgrade without any change of plans. To improve our gaming experiences an upgrade to the 1,000/50 Mbps plan was chosen.

I had previously registered an expression of interest with **NBNco** for a speed upgrade. **NBNco** sent an email on how to participate in this program of works when our suburb became eligible for **FTTN** to **FTTP** upgrades. Refer to NBNco's:

https://www.nbnco.com.au/residential/upgrades/fttp-upgrade-with-higher-speed-tiers

As soon as the **NBNco** email hit my Inbox planning began for a **FTTP** upgrade. **NBNco** has very specific requirements for the installation of their **FTTP** equipment. Reference is '**Preparation and installation guide – SDUs and MDUs**'. Where SDU (Single Dwelling Unit) is defined as "A structure that contains only one (1) premise" while MDU (Multi Dwelling Unit is defined as "A structure that contains more than one (1) premise".

https://www.nbnco.com.au/content/dam/nbn/documents/developers/newdevs/preparation-and-installation-guide-for-sdus-and-mdus-2021.pdf

For details refer to **Section 4.3 Providing space in the premises for nbn equipment installation.** This section includes clearances and ventilation requirements. On a large sheet of light weight card (try a craft supplier or Officeworks, etc.) I drew up full size mock-ups of the two orientations of the NBN equipment. Then the hunt was on for a suitable location in the study at the rear of the house.

One of my Personal Computers in the 1980s was a DEC VAX-11/750 minicomputer with Ethernet. Our last rental was an old farmhouse that was to be demolished after we moved into our house that was then under construction. Compression cracks had developed in the plaster (dry wall) when the weight of this system tried to take it to the centre of the earth. This is why our house was constructed on a concrete slab so that it could take the weight of multiple minicomputers. So given PCs with Ethernet why our house was built without the planned communications cabling specified in the contract is a long story concerning the builder, a plasterer and Easter.

One task as a Licenced Cabler I avoided over the past 21 years was running UTP cabling to 15 points throughout the house. This NBN upgrade was the trigger to finally complete the cabling of the house. Catch was I had broken my knee and could no longer access the roof space. With a concrete slab there was no underfloor space.

Internet wiring and phone cabling in your home or office is regulated by the **Australian Communications and Media Authority** (**ACMA**) and registered cablers perform this work.

https://www.acma.gov.au/cabling-your-home-or-office

At this point I engaged a Licenced Cabler to install CAT-6 cables to points throughout the house. If you do engage a Licenced Cabler ensure you receive a **TCA1** form or equivalent describing their work performed and add this to your dwelling's records. Refer to:

https://www.acma.gov.au/cabling-advice-forms

The logical equipment location from an **NBNco** techs/contractors perspective would be to install their **Network Termination Device** (**NTD**) in the lounge room at the front of the house. An external **Utility Box** is typically installed near the location of the conduit containing the lead-in from a pit in the street to the house. For our installation the opposite side of the wall is the lounge room. There would have been adequate space with an adjacent power point in the lounge room to install the **NTD**.

For a relatively low cost considering the size of the whole job the Licenced Cabler also installed conduit to the **NBNco** specifications from the location for an external **Utility Box** to my preferred location for the **NTD** in the study. With a draw string in place and the layout drawing this actually simplified the task for the **NBNco** contractor. It may have been possible to have **NBNco** install the required conduit to the rear of the house and place the **NTD** in the study without the additional cost of the Licenced Cabler but this was not investigated.

The **NBNco** document references a battery backup power supply option. After Y2K a large number of **American Power Conversion** (**APC)** brand **SmartUPS** units were sent for disposal through a local auction house. These regularly self-test their sealed lead-acid batteries. It is a simple task to feed them new batteries after their batteries fail a self-test. Unfortunately there are a number of manufacturers of batteries providing a range of **Ahr** ratings in the required form factor. Selecting the highest **Ahr** rating may theoretically increase the UPS runtime but may

come at the expense of a shorter service life. Personally I select manufacturers for the longest service life. Needless to say your mileage will vary. Typically my preferred band of batteries cost more than the replacement cost for a new, less capable UPS.

As our existing network and all PCs have reliable power it was logical to select **NBNco's** free battery backup power supply option. At this point I applied to **Aussie Broadband** for a free **FTTP** upgrade with the battery backup power supply. Also opted to upgrade to the highest download speed plan (1,000/50).

The order was accepted but the power supply request was rejected. I tried various avenues including contacting **NBNco** to have the power supply added to the order. All requests were rejected. I was advised by **Aussie Broadband** that the power supply request could only be submitted after the **NBN** equipment had been installed.

Aussie Broadband had scheduled an appointment for the first **NBNco** tech visit in a couple of weeks. I was surprised when the very next day a team of **NBNco** contractors appeared to install optical fibre from the pit on the other side of the road to the house. They attempted to use small and large diameter rods down the conduit but hit a blockage in the area of the street gutter or the nature strip. The last thing they tried was to fill the conduit with water but none appeared in the street pit. They took pictures, marked up the probable location of the blockage in the conduit and advised me that another team would address the blockage.

The next day a new team arrived and decided to dig up my driveway about 10 or 12m from the actual blockage. They had not received the relevant info from the previous team. After directing their attention to the area of the blockage they attempted to use a 6mm rod and they pushed past the blockage. The water used by the previous team had softened the blockage in the conduit and digging was avoided. This team installed the external **Utility Box** and the optical fibre cable from the pit on the other side of the road to the house.

The internal **NBNco** work was completed without incident during scheduled appointments. The last step was to test internet connectivity with the **NBNco** tech. Having confirmed a working service from my PC on my network (via a **DrayTek Vigor2862ac** modem/router) I immediately rang **Aussie Broadband** to request the battery backup power supply. This request was also rejected as **NBNco** had not advised the **ISP** that the service had been activated. This advice occurred overnight. The next day I could finally order the power supply through **Aussie Broadband** and another **NBNco** visit was scheduled.

On the appointed day the **NBNco** contractor arrived, learnt that I already had an active service and asked me "why am I here?". He had rolled without checking the order and without a power supply. On his return that afternoon the power supply was finally installed. Why **NBNco** wants to pay for an extra site visit just to install a free power supply option that could have been installed with the **NTD** escapes me? May be with time these kinks found with the **FTTP** upgrade process will be addressed.

I could not fault the speed and responsiveness of the **NBNco** staff and contractors. All work was completed on schedule.

The **Australian Competition and Consumer Commission** (**ACCC**) runs a broadband performance monitoring program and I have been a long term testing volunteer. Refer to:

https://www.accc.gov.au/consumers/internet-landline-services/monitoring-broadband-performance

The initial download speedtest results being reported varied around 250 Mbps with higher speed peaks. **Aussie Broadband** and various **Ookla** speed tests were all returning similar results. Given everything appeared to be working perfectly the first thought was the service had been incorrectly configured with a lower download speed. Tech Support confirmed the service had been configured as 1,000/50 Mbps. I was advised the issue was not with the line configuration but a known issue with early **Draytek** modem/routers.

My obsolete **Draytek Vigor2862ac**, xDSL modem/router had performed well at 100/40 Mbps on **FTTN** on the first **Wide Area Network** (**WAN**) port. The second **WAN** interface provided an automatic failover to a **Telstra 4G Mobile Broadband dongle**. The third **WAN** interface is specified at 1,000 Mbps and this was connected to **NBN NTD**, Port 1. After multiple configuration changes and much testing it was determined the **FTTP** service had hit a bottleneck with the **IPv4**, **Network Address Translation** (**NAT**). **NAT** allows multiple devices (e'g. PCs, TVs, etc.) to share one (1) IP address. This is the one address that is used to connect a service to the internet therefore this **IPv4 NAT** facility could not be disabled.

If we had been running at a lower speed tier or using **IPv6** (where **NAT** is not normally required) then it was likely the obsolete **Draytek Vigor2862ac** would not have been a bottleneck. As I do not have access to a current production **DrayTek Vigor2866** series modem/routers their performance cannot be reported. The DrayTek website provides a **Vigor2866** vs **Vigor3862** comparison:

https://www.draytek.com.au/products/adsl-vdsl-modem-routers/vigor2866-series/

It stated the NAT throughput was 500Mbps for the **Vigor2862** Series while the **Vigor2866** series was 1.6 times faster at 800 Mbps. A Whirlpool forum posting on June 29th, 2022 by a DrayTek Australia technical support person provided some different results at:

https://forums.whirlpool.net.au/thread/3m01v5l8

Performance was stated as:

Older model routers which have a throughput greater than 250Mbps are:
Vigor2860 /Vigor2925: approx 300Mbps
Vigor2862/Vigpr2926: approx 400Mbps
The latest model routers Vigor2865 and Vigor 2927 have a throughput of approximately 800Mbps

All these and some even earlier **DrayTek** modem/routers (e.g. Vigor2830 series) have a 1,000Mbps Ethernet WAN port and will exhibit **NAT** throughput bottlenecks. It is highly likely there are other brands of modem/routers that will exhibit the same or similar **NAT** throughput problems. Therefore a free **FTTP** upgrade may have hidden hardware costs. The performance of the current testing did confirm **FTTP** delivered measurably lower latency than the **FTTN** service. So that was a small win. My solution was to replace the obsolete **Vigor2862ac** with a dedicated **pfSense** firewall.

Another technique to extend the life of **IPv4** is **Carrier Grade NAT** (**CGNAT** or **CNAT**). When this is deployed it breaks the end to end principle. Refer to:

https://en.wikipedia.org/wiki/Carrier-grade_NAT

I have always paid $5 per month for a **Static IP Address** from **Aussie Broadband** for each service. This means your service does not have **CGNAT** nor the standard retail Port restrictions.

NBNco's wholesale provisioning is significantly different for the 1,000/50 Mbps tier and that is why the **Aussie Broadband's**, 1,000/50 Mbps plan states there is an evening speed of 600 Mbps. Other plans do not have that great a sensitivity to the time of day. For example, the Home Superfast plan's evening download speed of 244/250 equals 97.6%. While the Hone Ultrafast plan's evening download of speed 600/1000 equals 60%.

Needless to say the users actual experience is not as simple as the numbers calculated above. The following are the results from the **ACCC** broadband monitoring program of the Download Speed (Multi-Threaded Only) tests for my **Aussie Broadband** 1,000/50 Mbps, **FTTP** service. Date range was the last 30 Days.

Time	Mbps	Standard Deviation
01:00	932	6.8
03:00	927	2.9
05:00	928	2.6
07:00	928	3.2
09:00	925	5.4
11:00	924	17
13:00	921	22
15:00	922	24
17:00	869	121
18:00	876	85
19:00	789	161
20:00	719	132
21:00	707	226
22:00	827	129
23:00	915	36

The minimum mean or average evening download speed reported for this 30 day period from the **ACCC** testing service (**SamKnows**) was 707 Mbps. Assuming a normal distribution and given the Standard Deviation (Std. Dev.) a rough approximation of the minimum download speeds for 9:00am and 9:00pm would be

Time	Mean (Mbps)	x1 Std. Dev. 68%	x2 Std. Dev. 95%	X3 Std. Dev. 99.7%

09:00	925	920 Min	914 Min	910 Min
21:00	707	481 Min	255 Min	29 Min

Unfortunately the data would not be normally distributed as by definition there could not be traffic delivered above the fixed, upper download speed limit of Layer 2. That is the data is skewed and not normally distributed. At 09:00 the mean or average download speed would be 925 Mbps and as a rough approximation, 99.7% of the traffic would be downloaded at 910 Mbs or faster. While at 9:00pm:

- The mean or average download speed would be 707 Mbps.
- 68% of the traffic would 481 Mbps or faster.
- 27% of the traffic would be between 255 and 481 Mbps.
- 4.7% of the traffic would be between 29 and 255 Mbps.

For the 9:00pm reporting there would have been a significant amount of data delivered at 600 Mbps or less. As stated these calculations only provide a rough estimation. From the test results 83 Mbps was the slowest download test speed in this period. Therefore these calculations over estimated the decreases in download speeds.

At various times I have used **Smoothwall GPL**, **IPCop**, **IPFire**, **ClearOS** and **pfSense** software firewalls. After my previous experience with web servers hosted at home I've seen countless attempts to compromise my systems therefore a firewall is mandatory. In addition to standard firewall facilities I was looking for:

- Intrusion Detection System/Intrusion Prevention System (IDS)/(IPS). Preferably based on the **SNORT** application but willing to consider alternatives.
- Currently supports IPv6 as my ISP enables IPv6 by default.
- **BGP** routing. This is a mandatory requirement.
- Preferably open source software.

pfSense had the best feature set for me but comes with a much, much higher level of complexity. Alternative software and hardware firewalls exist and each person will have to make their own decision on what is best in their environment and with their circumstances. For **pfSense** refer to:

https://www.pfsense.org/download/
https://docs.netgate.com/pfsense/en/latest/preface/index.html

These days I have multiple **Hewlett-Packard** (**HP**) **DL380 Gen 7** servers with dual, hex core, Intel X5600 series processors. Industry now considers these obsolete and they can be typically bought for a few hundred dollars on eBay. These plus my radio equipment such as the 2m and 70cm repeaters, etc., all require IP addresses. If I was just running some web sites from home then a single IP address assigned by my ISP would be adequate. Once complexity increases additional IP addresses can be appropriate. Given the exhaustion of **IPv4** addresses an **ISP** only allocates one **IPv4** address per service. Therefore an **AMPRNet** allocation is appropriate plus it permits experimentation and self-learning education.

I have known for years of the existence of the **AMPRNet** address range. Decades ago, in the dim, dark past I had been assigned a few addresses for packet radio. As my partner was working from home the non-commercial restriction meant I never took any wider advantage of this facility. In 2017 I asked **Aussie Broadband** the cost of implementing **BGP** routing. The answer was no cost to configure nor any additional costs to run **BGP**. This philosophy was one of the attractions of **Aussie Broadband**. The only requirement was a **Letter of Authority (LOA)** that permits the use of designated **IPv4** addresses.

Although it is not a requirement to use a **FTTP** service, for me it is just a more convenient option. The **NBN NTD** has four, 1,000Mbps Ethernet data ports and independent broadband services can be assigned to each data port. It is not possible to have multiple 1,000 Mbps services created but it is possible to have a mix such as 1,000 Mbps on Data Port 1 with a 50 Mbps service on Data Port 2. By implementing a second service I can configure, document and test configurations without disturbing our existing services. This permits me to experiment (i.e. break things) without disturbing my partner's access to the internet.

It took **Aussie Broadband** one day to configure a second service for **NTD** Data Port 2. Another day to provide the **BGP** peer. For the initial configuration and testing I chose the cheapest broadband plan which obviously has the slowest download speed (i.e. Starter nbn plan 12/1 Mbps) with a Static IP address option to bypass **CGNAT**. All **Aussie Broadband** plans have unlimited data. So once the testing phase is completed it will be a trivial exercise to have **Aussie Broadband** change the service to a higher speed plan.

Before generating your IP address allocation request it is important to understand the requirements. By default you will be unable to transmit packets using your **AMPRNet** allocation as the source addresses directly from your home network. For further info refer to the FAQ entry "**Why can't I just route my AMPRNet allocation directly myself?**" in the **AMPRNet** Wiki at:

https://wiki.ampr.org/wiki/Why_can%27t_I_just_route_my_AMPRNet_allocation_directly_myself_%3F

There are three ways around the restrictions

1. Creating direct tunnels to other **AMPRNet** subnets using a gateway.
2. Accessing **AMPRNet** via a VPN.
3. Working with **AMPRNet** and your ISP to properly announce your allocation directly

This document is only going to cover this third option.

To gain access to the reserved address range a licenced amateur has to be registered on the **AMPRNet** Portal at https://portal.ampr.org/ by selecting from the Home page the Register page at:

https://portal.ampr.org/register.php

The required information is:

- Callsign
- Username
- Password
  Note: this password does not have to be a single word. It is recommended to have about 5 to 8 words with spaces. They can be all lowercase or uppercase if it helps you to remember.
- First name and Surname
- Email address
- Organisation if applying for a club, otherwise leave blank
- Grid square (6 figure Maidenhead locator)
- Country

To keep your address block active you need to login to the portal every 3 to 6 months. Once registered, select the Allocations tab and request a **Direct Allocation**. A **Direct allocation** requires **BGP** support and the minimum allocation will be a /24 subnet which is equivalent to an old **Class C** network.

The **AMPRNet** Wiki outlines the process for requesting an address block:

https://wiki.ampr.org/wiki/Requesting_a_block

All the people supporting this process are volunteers and it may appear as though an application has been lost in the system. In my case I started the process in early July 2022 and my ISP completed their configuration in early September. So panic not.

Following the procedure in the Wiki I submitted a request in the Australian country network block (44.136.0.0/16) for a **Direct Allocation**. This was approved by the Australian coordinator **Steve VK5ASF**. Because it was a **Direct Allocation** the request was then past to the **BGP coordinator** for processing.

The **Asia Pacific Network Information Centre** (**APNIC**) is the **Regional Internet Registry** (**RIR**) administering IP addresses for the Asia Pacific. This will be designated in literature as the **RIR** for Australia. For the case of all **AMPRNet** allocations the **RIR** is the **American Registry for Internet Numbers** (**ARIN**). As you will be communicating with your Australian **ISP** regarding **BGP** implementation you may be advised by the **ISP** that you should take out a membership or proceed through **APNIC.** Ignore that advice which is the default for an Australian ISP. The **BGP coordinator**, **Chris G1FEF** for **AMPRNet** will be performing magic on your behalf through **ARIN**.

You will receive an email requesting some information on your proposed use. There is no boiler plate text to use as a crib. The more information you can provide the better informed the **BGP coordinator** will be to make a decision. Provide a detailed answer in an email and just use your **AMPRNet** Allocations message box to update status. Add your entries to the top of the thread with Initials, comment and date. For example:

GP: Reply sent (2022-07-31)

If this submission is acceptable you will then receive a **Request Form**. Sections 1 and 3 provide instructions and notes. Similar to the email detailed above, there is no boiler plate text to use as a crib. My comments for the Section 2 questions are:

1. Your allocated subnet will not be within the Australian 44.136.0.0/16 allocation. 44.31.X.0/24 is not a typo and should not be modified. Generally new **Direct Allocation** requests will be created in this address block.
2. **BGP** is a protocol that manages the routing of packets between different autonomous systems across the Internet. **BGP** uses an **Autonomous System Number** to uniquely identify each system. These may be abbreviated as an **AS Number** or **ASN**.

   I believe this question is asking for your **ASN**. Unfortunately the **ASN** that will originate the announcement of your subnet may not be known at this stage. With **BGP** both ends of a link require an **AS Number**. Your **ISP** will already have a public **ASN** and that will be documented at Question 11.

   I asked **Aussie Broadband** to allocate my **ASN** and they provided an **ASN** from within the private, 16-Bit **ASN** range of 64,512 to 65,534. Similar in concept to private **IPv4** addresses these private **AS Numbers** are not propagated across the Internet. **Aussie Broadband** required the address allocation before they could assign a private **ASN**. This is not a serious Catch 22 problem where you require an **ASN** to get an allocation but you can't get an allocation until you have an **ASN**. If your ASN is unknown make a note that your **AS Number** is dependent on your **ISP's** requirement for the address allocation, or whatever is the issue.

   Similar in concept to the **IPv4** to **IPv6** design changes there is an extended, 32-Bit **AS Number** format. If your ISP assigns an extended format **ASN** but your equipment does not support that format it may (should) be possible to request an appropriate **ASN**.

   Discuss the **ASN** requirement with your ISP. Worst case you will have to pick your number at random from the pool of private **AS Numbers (**64,512 to 65,534).
3. Only required if applying on behalf of a club.
4. Your details with your street address.
5. Fill out the fields and **don't** say as above or use some equivalent statement.
6. It may be extremely difficult to estimate the number of IP address that will be used immediately, within 6 months and/or within 12 months. I had to use best guesses for my estimation .
7. To describe what this allocation will be used for I supplied a summary of the information I had previously submitted in my email to the **BGP coordinator**.
8. To answer how the usage will benefit the Amateur Radio Community I based this on the outcomes of Question 7.
9. Provided a short statement that this Amateur Radio allocation would not be used for commercial purposes, etc.
10. For any additional information I noted the issues with the missing **ASN** at Question 2.
11. For **Network Service Provider** (**NSP**) I supplied details of my **ISP**s.
    a. name: Aussie Broadband Limited
    b. ASN: 4764
    c. NOC email: Aussie Broadband Network Operations Team <corporate@aussiebb.com.au>
    d. NOC telephone: +61 3-5165-0000
    e. Postal address: P.O. Box 3351, Gippsland Mail Centre VIC 3841, Australia

Returned the completed **Request Form** via email and update the **AMPRNet** Allocation request notes. On approval a **LOA** was created and sent as an email attachment. This was forwarded to my **ISP** to configure, provide a private **ASN** and provide confirmation of the **BGP** peering with my **Static IP address**. They allocated a private **ASN** and advised they are only advertising to me a default router and only permitting the allocated prefix to be advertised. In other words they were implementing appropriate filtering on the service.

My obsolete and now spare **DrayTek Vigor2862ac** modem/router supports **BGP** and would be the fallback in case of equipment failure. **DrayTek** still provide security updates for the **Vigor2862 series** and for the **Vigor2860 series** which was the previous generation. Firmware and manual downloads are available at:

https://www.draytek.com.au/support/downloads/

The simplest way to test the BGP line configuration will be to configure the **Draytek Vigor2862ac** then test. So the next step will be to download then install the latest device firmware. Building the pfSense firewall, testing, documenting, etc.

To be continued…

Garry Page
VK3ZGP/VK3Z

Valve Gear Testing

Recently I started thinking of playing with a bit of valve gear, to see how it performs & compares to modern transistorised equipment.

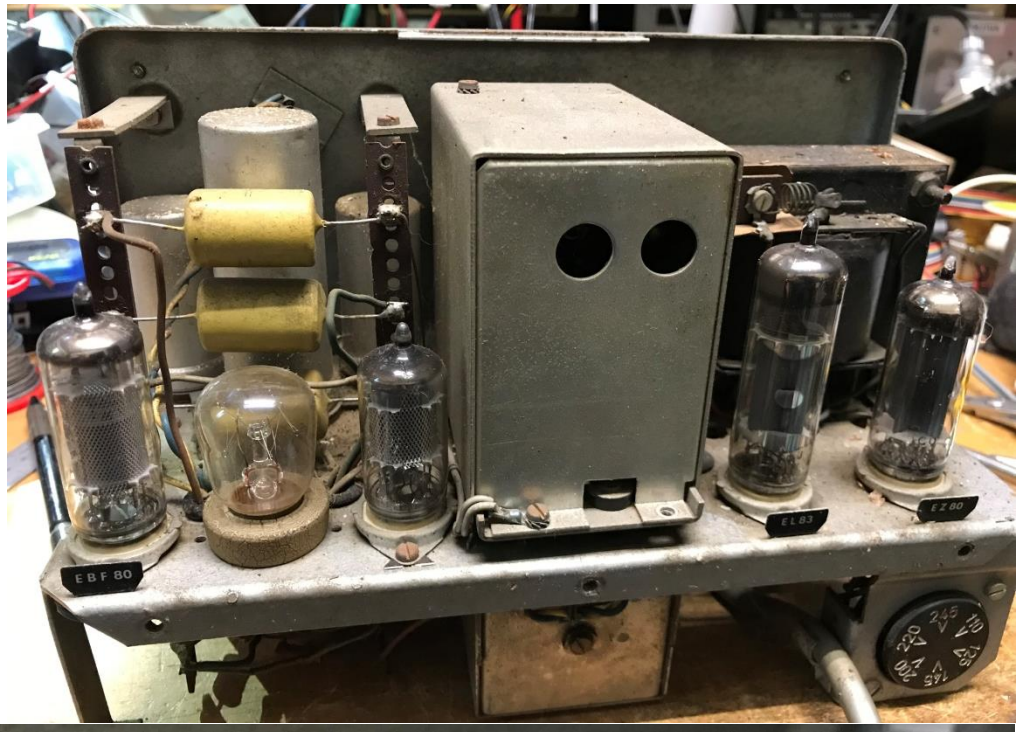
First cab of the rank was a Philips GM2315 audio oscillator. Yes I have far newer offerings, and of course, the modern option of a laptop, or dare I regress, a phone app. However I was going to test a valve amp, so why not use a valve signal generator.

This unit has been in storage for many years, so just powering it on didn't seem the best idea, I have just watched a YouTube video on a nice restored valve radio where the mains transformer had lost the plot and destroyed itself, about the only good spot was it didn't also set the wooden case on fire.

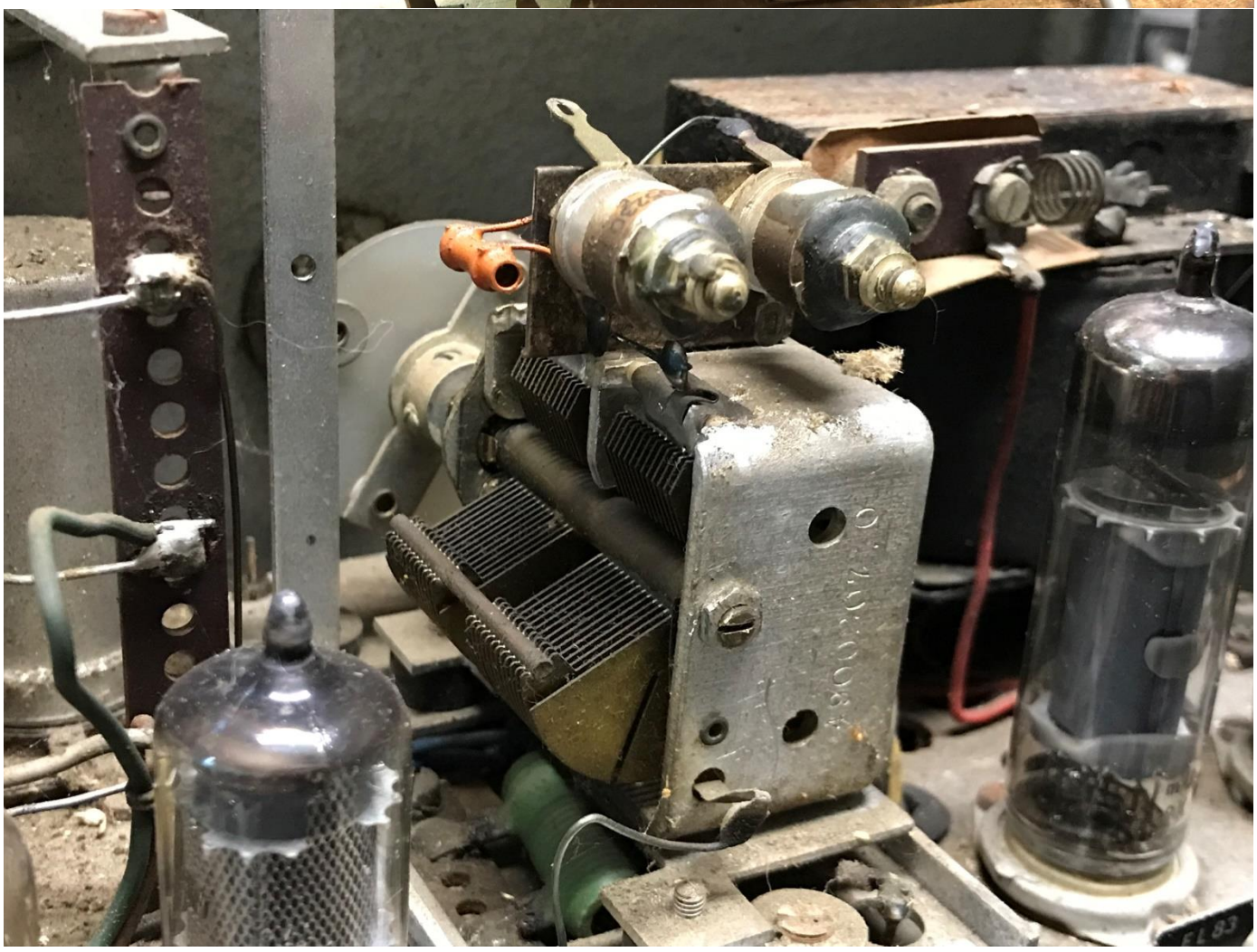
The main problem in old gear is the capacitors, they become exceedingly leaky with age, apart from really screwing up the equipment's performance, they can destroy valves, and transformers. When it comes to power supplies, they can cook the rectifier tube and, as per the YouTube video, totally destroy the power transformer. Unfortunately on old valve gear, a dead transformer can easily spell the end, as replacements are usually unobtainium. See https://youtu.be/poRjaC_qHIU

Apart from just blindingly replacing all the electro's and paper caps, the other option is to gently bring up the power and hopefully the electro's will re-form. Lots of the retro valve community use a 'dim bulb tester', this is just a regular old 240V light bulb in series with a power socket. You choose a suitable bulb so that the set on test comes up slowly.

I don't have one, although I have all the parts, I instead elected to use a variac, and start at say 20V, then slowly bring it up (in steps) to the full 240V over a few hours whilst monitoring things to make sure nothing bad happens – in this case it was checking the electro's for signs of heating. In my case all went well and a few hours later it was on 240V with coolish electo's and a good output signal.

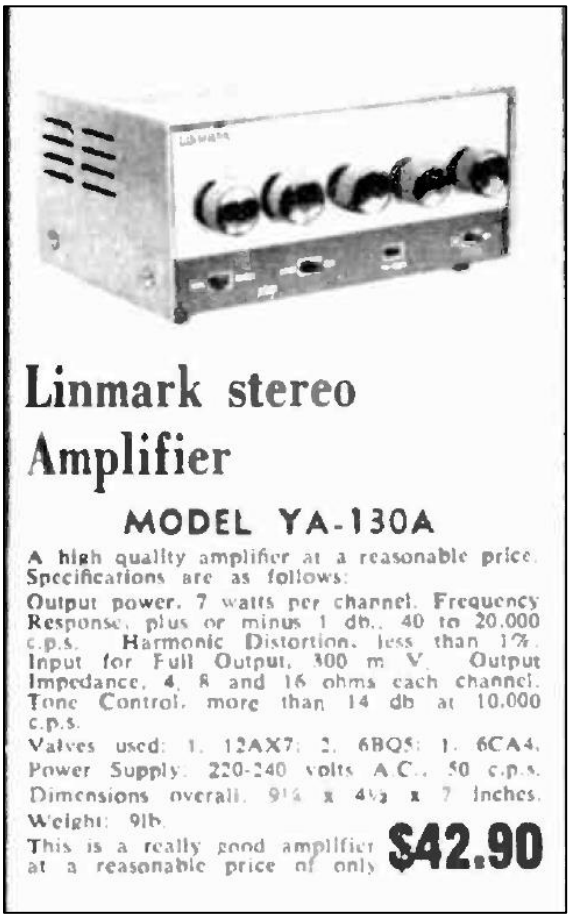


Unfortunately, this set is not the most efficient and the valves etc. made everything quite warm after a few hours so trying to say whether the caps were hot due to self heating was near impossible.



The one part the really got me was how it controlled its frequency, it was using a variable capacitor, just like old valve radio's, I didn't think these were really usable at audio frequencies, especially down to 20Hz, there must be some awfully high impedances going on inside there.

Next came the amplifier, A Linmark YA-130A



Linmark stereo Amplifier

MODEL YA-130A

A high quality amplifier at a reasonable price. Specifications are as follows:

Output power. 7 watts per channel. Frequency Response, plus or minus 1 db., 40 to 20,000 c.p.s. Harmonic Distortion, less than 1%. Input for Full Output, 300 m V. Output Impedance, 4, 8 and 16 ohms each channel. Tone Control, more than 14 db at 10,000 c.p.s.

Valves used: 1. 12AX7; 2. 6BQ5; 1. 6CA4.

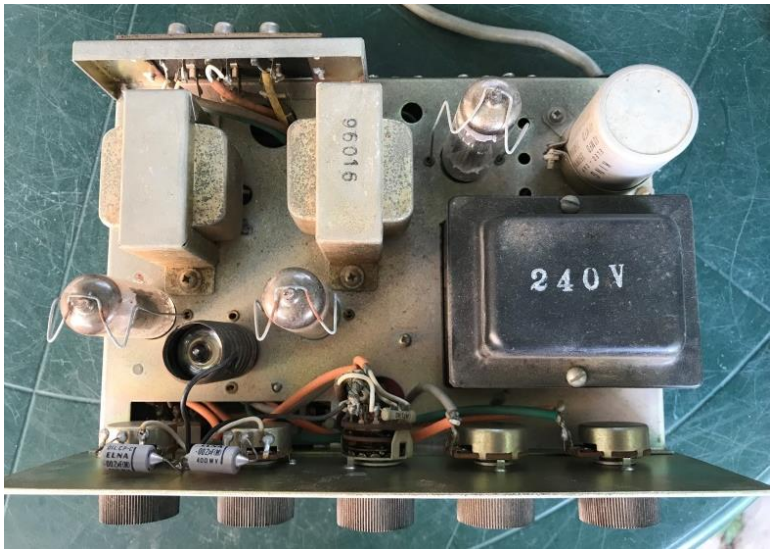
Power Supply: 220-240 volts A.C., 50 c.p.s.

Dimensions overall, 9¼ x 4½ x 7 inches.

Weight: 9lb.

This is a really good amplifier at a reasonable price of only $42.90

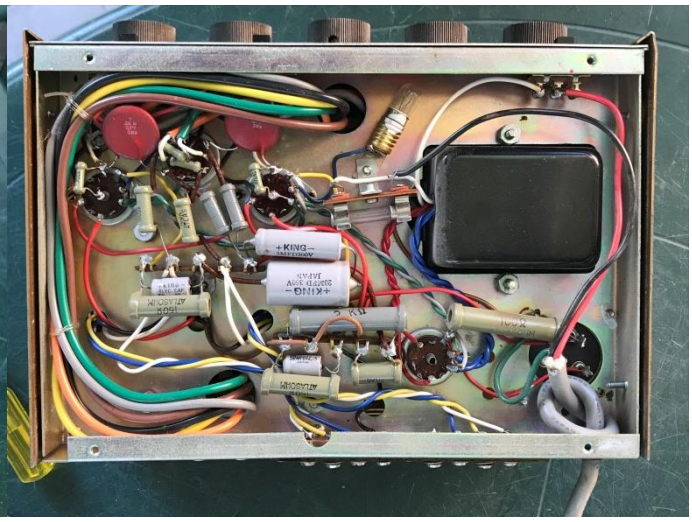
These were originally brought into the country by Warburton Franki, from Japan. In searching I also found a few look alikes, but the innards were totally different.

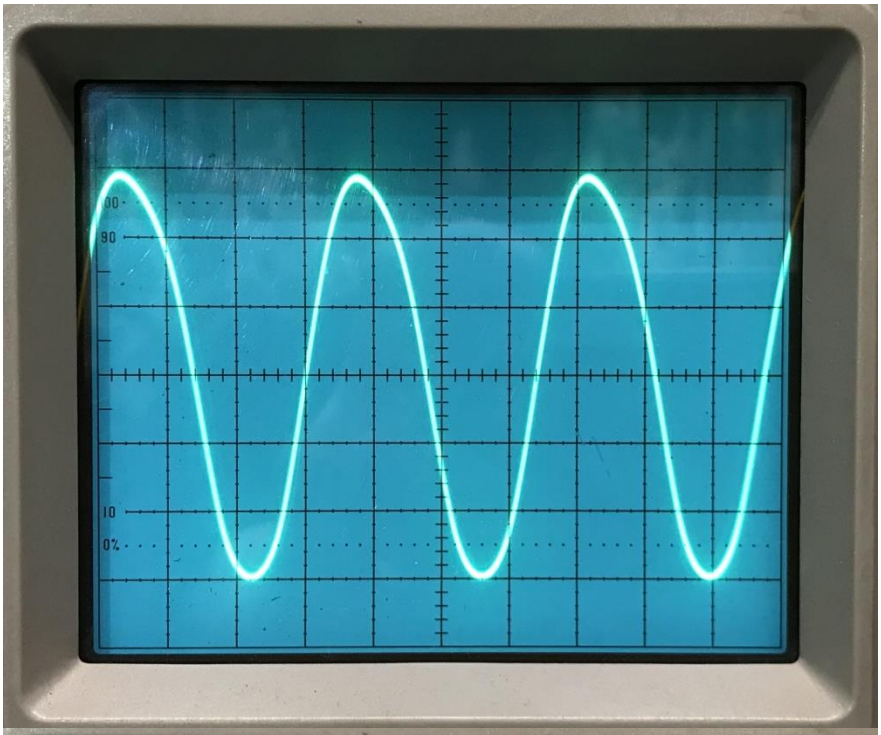


I was a lot more confident in the amplifier working, so I skipped the variac and just ran it directly from the mains. Sitting still it draws 60W, so it needs good ventilation, under a shelf etc. is not a good idea, as I found out years ago when I tried it as a PC amplifier. Things got very toasty.

The advert says it is good for 7W a channel, only if you don't mind severe overdrive and distortion, my tests indicate 3.2W a lot more realistic figure.

Ads for simular amps also said 7 watts a channel, so has this unit degraded, or are they just copying each others designs, it has 6BQ5's in the output so it must have the same power, without performing any tests at all

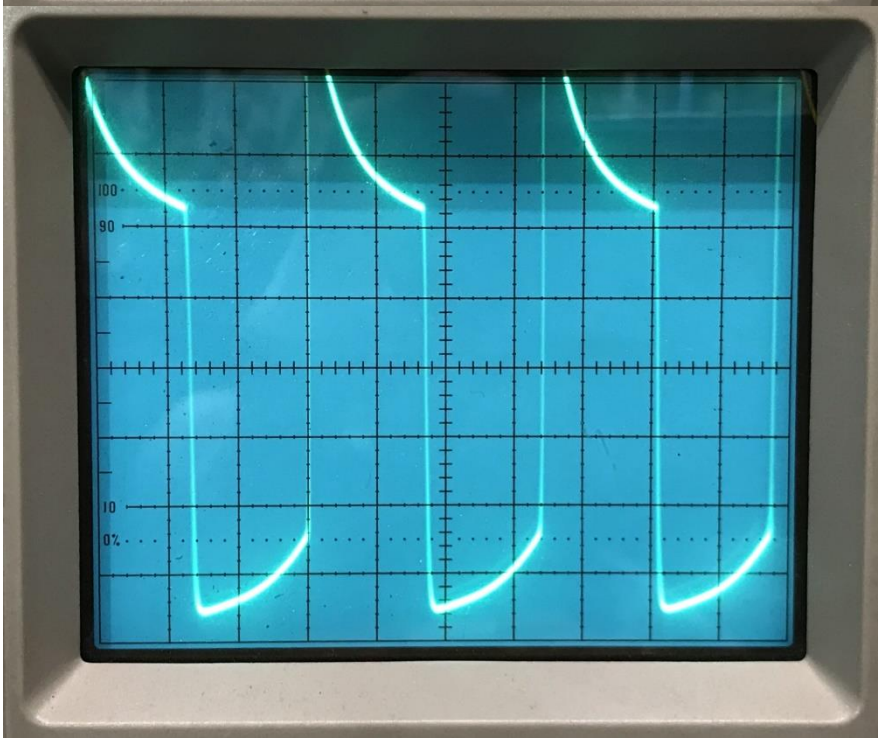




This is the output when driven to just over 3 watts, you can see the supposed sine wave is starting to get somewhat distorted.

So has the modern ways of bending the truth about an amp's power got its roots from back in the good old valve days?

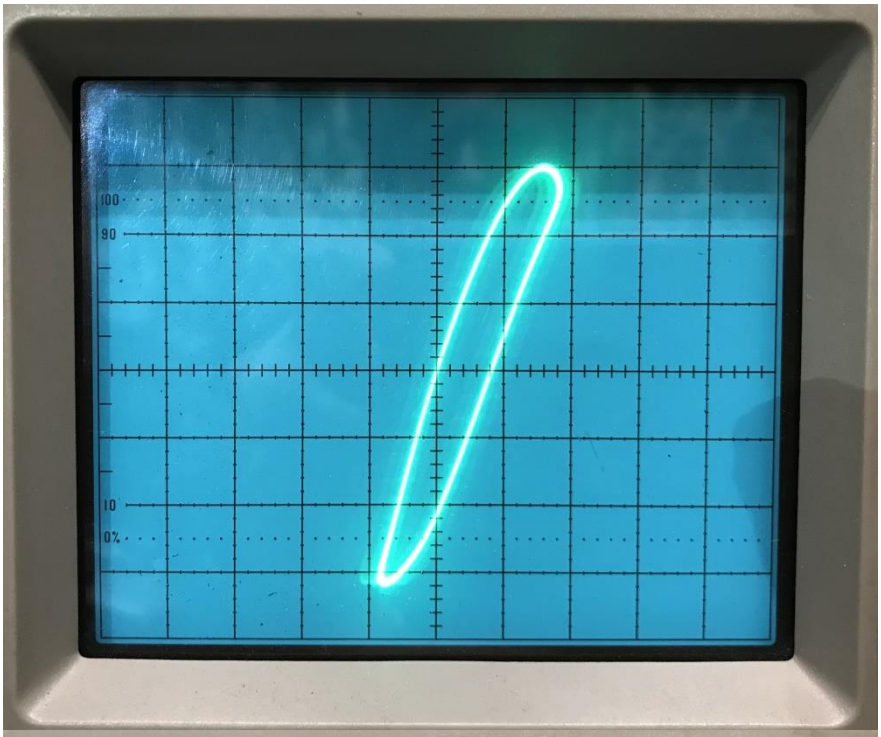
No way should this be marketed as a 7W amp.



To get to 7W of power out, I just kept cranking the input until my meter said 7W, I'm still inputting a sine wave!

Now you must agree, it looks way overdriven.

If this was an electric guitar amp, then maybe this level of overdrive could be useful, but of little use to domestic music reproduction.

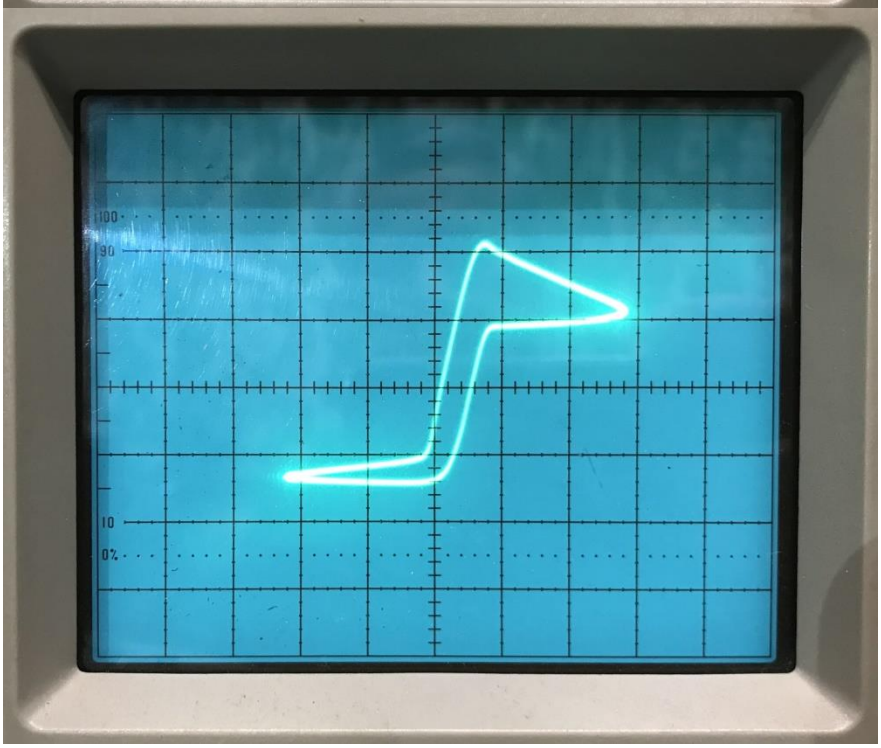


I then put my scope into X-Y mode, with the amp input on the horizontal, or 'Y' axis, and the amplifier output on the vertical, or 'X' axis.

For a perfect amp, you should just get a dead straight diagonal line.

At 500Hz there is some phase shift so it starts to take on an elliptical form.

It was a lot better at 2KHz, but I didn't take a picture.

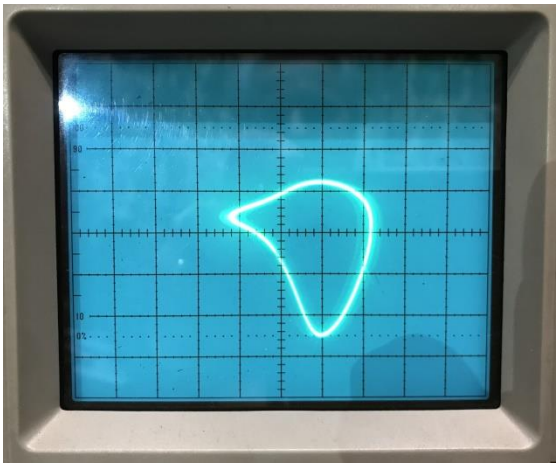


The view when pushed to produce 7W RMS of output.

Both channels performed exactly the same, so it's not like it has a bad channel.

Unfortunately, this is my only valve amp, if someone would like to loan me one, it would be interesting to compare them.

However, even with all these limitations, it does not sound that bad. Keep it to one or two watts and all is well, that is so long as you don't mind its constant 60W or power drawn from the power point. As it is a class 'A' design, it does not matter how hard you drive it, it always uses the same amount of power.



This last shot is at 60Hz, obviously the output transformers are not happy. As valve amps go, the transformers in this amp are tiny.

That is it for now, next month I want to perform tests with speakers, rather than a dummy load.

Paul VK3TGX

Interesting YouTube Videos

The Sun As We've Never Seen It Before, Revealed by NASA/ESA
https://youtu.be/osVd3KcN8Mc

Tour AM Stereo Radio Station Transmitter Custom CQUAM
https://youtu.be/IDYEUqC9YO0

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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.

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General 1	Yarn Oncken	VK3NOV	Property Officer	'committee'	
General 2	Helmut Inhoven	VK3DHI	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 **'Testing'**
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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