WANSARC NEWS

Incorporated in Victoria, 1985 Registration Number: A0007611S

The monthly magazine of the

Western & Northern Suburbs Amateur Radio Club Melbourne, Australia

www.wansarc.org.au

146.450 MHz FM VK3AWS 28.470 MHz USB

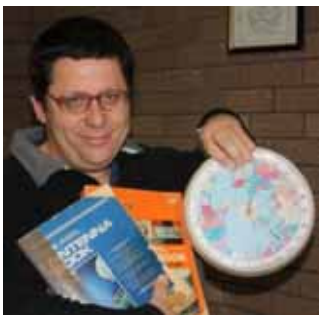
Volume No: 42 Issue 8 August 2011

Next Club Meeting, Friday 5th August

Ern Rose Memorial Pavilion, Seaver Grove, Reservoir @ 7.30pm

Last meeting was a talk and show by Mark Tell from ACMA. Mark spoke for over 2½ hours and took questions for nearly another half hour after that, with yet another half hour of club members marvelling at the radio setup in his ACMA car before he could leave! Mark spoke about interference issues, the amateur service, imports from overseas giving grief, some funny stories throughout his career and much other interesting and useful information. The last 40 years of ACMA's work and equipment and duties was covered with a informative well presented slideshow. To quote Mark, *"We would rather educate than prosecute..."*

Also equipment from the estate of Laurie VK3DPF was on offer for sale, with much of the proceeds benefiting WANSARC. Items sold were VX-150 2m handheld transceiver, OSKERBLOCK SWR/POWER meter, TOKYO antenna matching unit; Low Pass filters; YAESU ham radio world clock, YAESU FT-212 RH 2m FM transceiver (this was the rig Laurie used on the net), along with other items including components, component cabinet, a multimeter, field strength meter, test meters and mixed bags of components.



John with his purchases ↑

Mark conducted the 'auction' ← in an orderly fashion

LAST WANSARC MEETING

ACMA TALK - FIELD OPERATIONS SECTION

Mark Tell, Assistant Manager of Field Operations Section ACMA, gave us slideshow presentation. This was quite an informative session providing an overview of what his section within the ACMA does.

He started with a "step back into history" and explaining the past and current structure of the Field Operations Section.

The current day fleet of vehicles generally contain two Icom 2500 receivers, Doppler direction finding equipment, GPS and a considerable amount of other field portable equipment such as dummy loads, filters, power meters, spectrum analysers and Rohde & Schwartz PR100 communications receiver. The PR100 is quite expensive, but an excellent tool that can be used to look at a span of frequencies performing very quickly and efficiently.

Mark detailed various areas of Field Operations.

Management of radio communications and broadcasting interference complaints, many due to people purchasing devices from overseas which don't conform to Australia's band plan.

ACMA operates an ITU approved HF monitoring station in Quoin Ridge, just out of Hobart. The ACMA investigates interference throughout and outside of Australia to services like Australia Defence, Civil Air Services and investigation for interference to the Amateur bands and respond to issues detected through Intruder Watch. There is a direction finding network comprising of three remote controlled facilities Capalaba out of Brisbane, Cox Peninsula in Darwin and also in Perth. Those three can quite accurately pin point the source of a HF service almost through the world in conjunction with the other two stations when required, that facility can be active from Quoin Ridge or remotely via the Internet. There are actually 27 remote monitoring stations around Australia, 3 of those in Melbourne. VHF/UHF signals can be triangulated using these monitoring stations.

Quoin Ridge was selected due to it's quiet radio environment and it's outside the ITU tropical noise, an area of low ionospheric noise. It allows an extensive array of antennas, and has some quite large receiving antenna arrays. Only a couple of staff operate this facility, generally business hours but also at some other odd hours at request. The main monitoring room has a large bank of HF receivers connected to voice recorded units and some spectrum analysers. There is still a 1KW HF transmitter at the site.

Everything that transmits that is used in Australia must be licenced under either a Spectrum licence, apparatus licence or class licence. Equipment is checked for compliance and labelling checks, Site audits are done, Electromagnetic energy visual inspections for high power or microwave stations that pose risk to human to human life, educational awareness activities, compliance monitoring and telecommunications cabling inspections. There are also other activities carried out for other sections in the ACMA such as things to do with the WIA contract and the Australia Maritime college doing tests for Marine operators certificate of proficiency. ACMA staff may need to go to a boat onramp to check for licence certificates.

Recently a site audit was carried out at Melbourne's highest man made radio comms site at the top of Eureka tower, containing some 350 licenced services in one location! Normally 4 or 5 inspectors go out to inspect such a site and verify connectivity and labelling.

Staff engage with stake holders at times, and recently did some testing with the CFA for unmanned aerial vehicles. This aircraft had a 5W VHF repeater setup for CFA frequencies. The CFA and MFB and others were looking at how to facilitate emergency comms rapidly in the event they lost a site or capacity. This aircraft was tested to orbit up at 7000ft.

A field inspection of the Spirit of Tasmania was also recently conducted.

Mark also explained the structure of how the ACMA handle problems, whether it be education, or an "Advice Notice" or "Warning Notice" and under more serious cases "Penalty Infringement Notice" which can be allocated immediately without going with the prior steps. This depends on the imputed knowledge of the offender. Equipment may be seized and fines handed out under serious circumstances.

Digital Switchover field survey programme

There are four vans very well equipped with pump up masts with antennas that can be rotated towards the appropriate transmitters. These vans are decked out with usual direction finding gear and regular field work activity as well as additional gear for measuring Digital Television services.

Supporting major events

Formula 1 GP, Red Bull Air Race, Moto GP, Aust Open Tennis, Golf etc. as well as Disaster and Emergency Response.

Formula 1 GP at Albert Park has quite a number of people from all over the world into one small location, into a high density RF area which is quite a challenge. There are 1000 licenced services in one square kilometre of the track! This is on top of what's already operating in the area. A number of countries media reps bring equipment with them that functions in different ways.

During disaster events various Telco providers bring out there "Communication on wheels" trailers (COWS) which can result in interference issues that need to be investigated.

LAURIE VK3DPF STILL SUPPORTING WANSARC

I write to advise members that the executor for the estate of our late member, Laurie, VK3DPF, has contacted me in relation to the management of Laurie's equipment. The executor has asked that I manage Laurie's equipment in accordance with Laurie's wishes.

As such I have commenced cataloguing equipment, the first group of which was offered to club members at nominated prices at the last club July meeting.

A number of "major" equipment items will be offered for sale to club members in the first instance.

This equipment is currently being boxed up and assessed.

Equipment includes a YAESU FT2000, a YAESU FT890 and a Yaesu FT102 plus FC102 antenna matching unit.

Note also that a NALLY tower will also be offered in due course.

Other items of equipment will be added to this list when assessed.

By agreement with the executor of Laurie's estate, WANSARC will benefit financially by receiving a portion of monies received from the sale of significant items such as the transceivers mentioned above. *~Mark VK3PI*

The Rotary Raffle effort by WANSARC has concluded with 200 tickets (20 books) sold - a very creditable effort. Unsold raffle tickets, sold raffle tickets and a WANSARC cheque for $400 was handed to Rotary. *~Mark VK3PI*

WANSARC ON 23cm

It started with Frank **VK3OP** and Frank **VK3ZO**, but occasionly we have Mark **VK3PI**, Mick **VK3CH** and Ian **VK3QL**.

WANSARC members can be found at 1294.950 NBFM voice.

STAINLESS STEEL WIRE FOR SALE

A few club memebers met at Bundoora Park to get wire for various antenna projects, some wire is still on the roll, Trevor **VK3ATX** is the one to ask for full specs and cheap prices. Trevor is on 146.450 most days, or catch him on the NET, Tuesday nights 7.30pm

FOUNDATION LICENCE COURSES

Weekend courses 10 & 11 September,
3 & 4 December
Foundation licence information;
Barry Robinson VK3PV 0428 516 001 or
arv@amateurradio.com.au

D-STAR FREQENCY CHANGES

There appears to be some minor changes to the 70cm band plan for D-Star since May 2011. There are a couple of minor changes on the 70cm segment.
145.1375 is still denoted as ch3 and freq for 2m HotSpots.
145.725 D-Star Comms Site Elevated Hot Spot

The old 70cm D-Star simplex freqs:
D-Star Simplex ch1 438.9000
D-Star Simplex ch2 438.9125
D-Star Simplex ch3 438.9250

The new 70cm D-Star simplex freqs:
D-Star Simplex ch1 438.9000
D-Star Simplex ch2 438.8875
D-Star Simplex ch3 and HotSpots 438.9125
D-Star Elevated HotSpots 438.9250
Ignore the VK D-Star website simplex info http://www.dstar.org.au/simplex.htm as that's out of date with the WIA band plan. *~Nik Presser VK3BA Geelong*

WHY MOBILE PHONES CAN'T FLY

Australians transporting mobile phones in their airport baggage or via Australia Post may unwittingly be in breach of local and global regulations regarding lithium-ion battery transport.
The energy-dense batteries are banned from being transported in checked luggage and air freight, due to the risk of them spontaneously combusting under certain circumstances.
According to the US Federal Aviation Administration combustion may occur "when a battery short circuits, is overcharged, is heated to extreme temperatures, is mishandled, or is otherwise defective".
Regulations developed by Australia's Civil Aviation Safety Authority (CASA) that "Lithium Ion Batteries with a Watt-hour rating exceeding 160 Wh" are not permitted on Australian aircraft.
Smaller batteries for portable electronic devices are allowed under specific conditions in carry-on baggage as long as their capacity is less than 100 Wh and they contain less than 2g lithium.
As an example, a Lenovo ThinkPad 9 cell laptop battery is rated at 94Wh. The IATA says batteries over 100Wh capacity may require airline approval.
Smaller batteries are allowed under specific conditions in either checked or carry-on baggage, depending on their capacity.
Airline passengers typically sign declarations stating that they are complying with dangerous goods regulations – although they may not be fully aware of the requirements.
A Qantas spokesperson told *iTnews* that the airline's "policy on lithium batteries satisfies all relevant regulations".
Senders of express post satchels are required to make similar declarations, which could provide legal protection to airlines and Australia Post should any lithium-ion battery related fires occur.
An Australian Post spokesperson told *iTnews* that it imposes a blanket ban on sending any sized lithium-ion battery by air freight due to "IATA requirements as well as other regulatory schemes, CASA and other air carrier requirements.
"Australia Post will accept articles containing lithium batteries for carriage by road transport only within Australia, provided that certain requirements are met," the spokesperson said.
Battery transport is further complicated by the increasing popularity of third-party extended capacity lithium-ion clone batteries.
These are banned altogether from air transport by the International Air Transport Association (*IATA).*
IATA Passenger Baggage guidelines warn consumers to "be vigilant when buying replacement batteries from unknown sources, such as on markets or internet auction platforms.
"The differences between genuine and copied battery types may not be visible but could be very dangerous; such untested batteries may have a risk of overheating or causing fires".
The US Federal Aviation Administration (FAA) released a warning video in late 2007 which shows how a laptop at LAX airport caught fire while being charged at a wall socket.
Undeclared consignments of lithium batteries in the cargo hold are suspected to be the cause of UPS Flight 006 crashing in the United Arab Emirates on September 3, 2010, resulting in the loss of life of the captain and first officer as well as total write-off of the Boeing 747 aircraft. *~Copyright © iTnews.com.au*

An elderly man is stopped by the police around 1am and is asked where he is going at this time of night.
The man replies, "I am going to a lecture about alcohol abuse and the effects it has on the human body."
The officer then asks, "Really? Who is giving that lecture at this time of night?
The man replies, "That would be my wife."

THE PUSH FOR MF ACCESS

The International Amateur Radio Union (IARU) push for an Amateur Service secondary allocation on the 600-metre band continues to be a high priority.
It appears to be a battle around the disused International Maritime Distress Frequency 500kHz, a move that has gained opposition from those countries reluctant to allow radio amateurs use the actual frequency.
The matter is to be discussed by the IARU Administrative Council at Sun City, South Africa, on August 19-20.
The ultimate decision will be made by the International Telecommunication Union when it meets for the WRC-12 in Geneva, Switzerland, January 23 - February 17, 2012.
Malta is the latest to give its radio amateurs limited access to 501-504kHz on a secondary basis until December 31, 2011.
Those stations using it have up to 10 Watts (10dBW) and shall not cause harmful interference to services operating in the same or adjacent bands. *~ARV Website*

UNIX CHIEF DIES - WAR SECRETS REMAIN CLOSED

A cryptographer who helped develop the Unix computer operating system that controls an increasing number of computers, Robert Morris, had died aged 78 in New Hampshire of complications from dementia.
Morris was the digital gatekeeper of the United States government's computer secrets.
An original thinker in the computer science world, he also played an important clandestine role in planning what was probably the US's first cyber war.
That was back in 1991 when electronic attacks on Saddam Hussein's government began ahead of the Persian Gulf War.
Although details are classified, they are believed to have destroyed Iraq's military command and control capability before the war began.
Unix, which began as a research effort at AT&T's Bell Laboratories in the 1960s, became one of the world's leading operating systems, along with Microsoft's Windows.
Variations of the original Unix software, for example, now provide the foundation for Apple's iPhone iOS and Macintosh OSX as well as Google's Android operating systems.
It is the key element of any IRLP node system.
~ARV Website

HOW BIG DOES A HEAT SINK HAVE TO BE?

Unfortunately this question couldn't be answered in one sentence. However, the proverb "A lot helps a lot" is surely appropriate in this case. Amplifiers built up of semiconductors always work best at moderate ambient temperature due to the physical properties of the transistors.

Exceeding the max. working temperature given by the manufacturer will cause the termination of the transistor. Furthermore the lifetime of semiconductors will be less at high working temperatures.

Some hints when dimensioning and working with heat sinks:

1. What is the max. air temperature for a heat sink to work well? Is it inside or outside, in a hot area, etc.
2. Is the device continuously active or just for a short time? At short times of activity a smaller heat sink can be used as the device cools down during the off-time.
3. When using heat sinks with a profile and without additional cooling of a fan, it's very important to assemble it vertically because the air must go unhindered through the cooling ribs.
4. Black anodized heat sinks will give a better cooling effect than bright surfaces.
5. When using heat sinks out of doors, direct solar radiation should be avoided. This can lead to an exceedance of the max. working temperature of the amplifier even when it's not operating.
6. RF power amplifiers usually will be supplied in aluminium or copper cases with a flat floor space. The mounting area of the heat sink should also be flat to enable best heat transfer.
7. The use of thermal paste improves the thermal resistance between the amplifier and the heat sink. Silver pastes have a better heat conductance value as common products.

Here is an example for dimensioning a heat sink:

Max. air temperature:

Tair = 25°C Power loss of the amplifier:

TV = 60W (Power consumption of the amplifier minus output power)

Max. case temperature of the amplifier: Tcase = 50°C

Max. thermal resistance (Rth) of the heat sink is the difference between air temp. and the case temp. divided by the power loss of the amplifier.

$$\Delta T = T_{case} - T_{air} = 50°C - 25°C = 25°C$$

$$R_{th} = \frac{\Delta T}{P_V} = \frac{25°C}{60W} = 0.41\frac{°C}{W}$$

In common the thermal resistance of a heat sink is determined by the manufacturer.

In comparison to the computed value of Rth, principally a heat sink with a smaller value should be used to avoid overheating.

Please check the case temperature of the amplifier after mounting the heat sink and the first start up to exclude errors.

A thermal switch on the heat sink which interrupts the operating voltage and therefore protects the amplifier when a cooler is defect or other troubles to the cooling occur could be very useful.

As shown the size of a heat sink depends on different factors and has to be adapted to the individual conditions.

CHANGE IN CALLSIGN RECOMMENDATION PROCEDURE

From 8 July 2011 a change has been made to the procedures for a Callsign Recommendation for a two letter callsign in Queensland, New South Wales and Victoria.

Since 1 December 2010 the procedure in respect of two letter callsigns in those states has been that no callsign recommendation can be made until seven days after a callsign is placed on the Public List, (the list of available callsigns on the WIA website) to allow someone who has inadvertently allowed a licence to lapse to claim back the callsign.

Applications for these two letter callsign were still required to be lodged by mail, but after the seven days had elapsed, if there was more than one application for a callsign and the callsign has not been claimed back, then the applications were drawn at random in the presence of a WIA Director, Secretary or Treasurer. This ensured that those living in more remote areas, without Express Post, were not disadvantaged.

Now applications for a two letter callsign in Queensland, New South Wales and Victoria may be sent by mail, facsimile, scanned and sent by email, or delivered by hand to the WIA office.

After the expiration of seven days, the ballot procedure will determine the applicant who will receive the Callsign Recommendation.

In addition, fees paid by unsuccessful applicants will be retained until the callsign has been allocated by ACMA, and if the callsign is not allocated, then the next applicant drawn would be offered the callsign and the fees will only be refunded to unsuccessful applicants after the ACMA has allocated the callsign.

The WIA cannot accept a standing application for a two letter callsign, as the application for a Callsign Recommendation must always relate to a particular callsign. *~Michael Owen - VK3KI*

EMDRC D-STAR NET - THURSDAY NIGHTS

The Eastern and Mountain Districts Radio Club (**EMDRC**) run a D-Star Net each Thursday evening at 8pm local time, through the **2m DV Repeater VK3RWN C**. The Net (**VK3ER**) provides an opportunity to find out the latest Club information and to encourage D-Star activity amongst Club members and amateur radio operators in the Melbourne area.

Visitors are welcome to join this Net.

Local Access:
URCALL: CQCQCQ
RPT1: VK3RWN C
RPT2: VK3RWN G *~EMDRC Website*

CRANBOURNE HAMFEST ATTENDED BY WANSARC

This years hamfest had Mick VK3CH selling his final lot of stuff and some items for Trevor VK3ATX. At 1pm Mick announced the rest was free and the table was soon stripped bare!

Club members seen looking and shopping thought the day were PI, ED, ACA, ZFS, FJPM, QL & CN.

It was a cold morning but a fine day later on.

Mick has sold off all the unwanted stuff and will be a visitor not a seller at future hamfests. *~VK3CH*

Remembrance Day Contest

Sat 13th Aug, 08:00 utc - Sun 14th Aug 07:59 utc

http://www.wia.org.au/members/contests/rdcontest/

THATS LIFE

I was talking to my kids last night and said *"I never want to live in a vegetitive state, dependant on some machine and a bottle of fluids to keep me alive, thats a crap way to live. If that ever happens to me, just pull the plug."* So they got up, unplugged the computer and threw out my glass of scotch. Bloody cheeky kids!

~Anon

BRAKING SYSTEM FOR ROTATOR

Written by Trevor Close VK3ATX

I have rebuilt a medium size rotator and was looking to put some more antennas on my tower but knowing that it would add extra stress to the already worn old rotator I was hesitant as this could lead to the destruction of the rotator.

I started thinking of different ways to lock the mast coming out of the top of the rotator, like having pin drop through the mast like on auto transmission then I thought to have a steel plate with holes in it so it would not weaken the mast.

I then wanted something light weight to avoid a heavy tower this lead me to alloy but this all looked like a lot of work and costly.

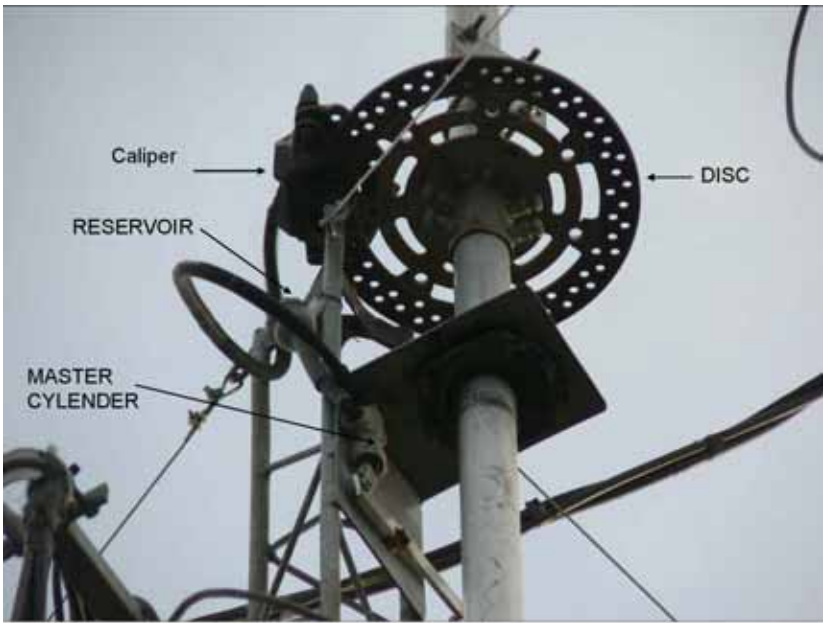
I have come up with a plan to use a motor bike disc braking system on the top of the tower, I went down to the motor bike wreckers and had a talk with him and found out that the rotor for the bike are very expensive even second hand so more discussion and he said would it matter if the rotor was buckled, no of course not if it is only slight.

So I walked out with a Honda CB rear disc brake caliper, rotor slightly warped, master cylinder, reservoir, and some hardware for $45 which I thought was fantastic and the best part is it all only weights 2kg all alloy and plastic and designed to handle sun wind rain and dirt.

The rotor is a composite high carbon steel alloy.

After about half a day of forging bending welding bolting and adjusting I have mounted the entire braking system on the tower.

Now one and a half years have passed and the system is still there and works a treat as it was meant to as a brake on the mast to stop all backlash when not in use.



Lever activates cylinder via pulling on cord.
This will be replaced by a spring which will hold the brake on and activate a solenoid to release the brake.

The ACMA steps up its fight against radio interference

A recent ACMA investigation has identified two people who were unlawfully using a commercial radiofrequency for their own personal communications channel.

The investigation was initiated when a licensed operator, whose clients had reported extensive interference on their licensed frequency, complained to the ACMA. This interference was caused by encrypted communications, which prevented the legitimate operators and their on-road staff from communicating with each other.

The severity of the interference required the licensee to transfer its clients from the compromised frequency until the problem was resolved.

Investigative work by the ACMA's Field Operations and Interference Management & Monitoring sections, who also received information from the public, tracked the origin of the interference to two Melbourne suburbs. Field staff used direction-finding and other techniques to pinpoint the exact addresses from where the offenders were transmitting.

Staff were also able to identify the encryption key, which helped in gathering valuable evidence to support compliance action against the two individuals.

The severe nature of the interference and the high risk to the safety of end-users meant that, for both of the identified locations, the ACMA applied to the Melbourne Magistrates Court for search warrants under section 269 of the *Radiocommunications Act 1992*.

ACMA staff executed peaceful entry search warrants on both premises and seized a total of seven radiocommunications devices. These radios had been programmed to operate on the frequency that was the subject of the interference.

The radios were also programmed to transmit frequencies for the Victoria Police country network, the Victoria State Emergency Service, the St John Ambulance, and the Department of Sustainability and Environment. Programming transmit frequencies for organisations (such as the police) in unauthorised radios can cause serious interference to emergency communications, through either deliberate action or by accident (for example, jamming the transmit button permanently in the operated state).

The investigations and search warrants resulted in the resolution of the interference. As a penalty, radios used in contravention of the Act worth in excess of $5,000 were surrendered to the ACMA. One offender, who held an amateur foundation licence, had his licence suspended for three months. The other offender was unlicensed.

The ACMA regulates the use of the radiofrequency spectrum in Australia, including ensuring that anyone issued with a licence is able to use their licensed frequency free of interference.

The ACMA has a range of powers available to it under the Radiocommunications Act to investigate complaints of interference. It considers the severity of the interference and the risk to licensed users of the radiofrequency spectrum before deciding on the most appropriate response to each complaint of interference.

Article taken from ACMA Sphere Magazine
June 2011 issue, Page 8 - Reprinted with permission

Victoria D-Star Repeater Network Update

For those of you operating D-Star you would be aware that changes happen to repeaters, either good or bad.
Many improvements are planned, but like most things with amateur radio, works done are the result of a few individuals putting in a lot of planning, travel, getting site access, tools, gear and donated money to keep things going, usually unpaid for their efforts.

The list here is put together by Nik VK3BA.
It's as accurate as the information he has been able to gather, which is usually good.

D-Star ports are;

A - 23cm
B - 70cm
C - 2 meters

VK3 D-Star Network

VK3BA 14th July 2011

Site ID:	Port:	Site Name:	Service Area:	Status:	TX Freq:	Offset:
VK3RBA	B	Mt Buninyong	Ballarat	Taken Off-Air 25-11-09. Unknown re-launch date	439.9875	-5.0MHz
VK3RBA	AD	Mt Buninyong	Ballarat	Taken Off-Air 25-11-09. Unknown re-launch date	1298.7000	none
VK3RBA	G	Mt Buninyong	Ballarat	Never established		
VK3RDK	C	Horsham SES Complex	Horsham	Operational	146.6375	-600kHz
VK3RDK	G	Horsham SES Complex	Horsham	Operational		
VK3RWN	C	Olinda	Melbourne	Operational	146.9125	-600kHz
VK3RWN	B	Olinda	Melbourne	Operational	438.3000	-5.4MHz
VK3RWN	A	Olinda	Melbourne	Operational	1273.9000	+20MHz
VK3RWN	AD	Olinda	Melbourne	Operational	1298.3000	none
VK3RWN	G	Olinda	Melbourne	Operational but with linking restrictions		
VK3RMM	C	Mt Macedon	Melbourne	Off air - aparent issues with site owner	146.9625	-600kHz
VK3RMM	B	Mt Macedon	Melbourne	Off air - unknown reason	438.0500	-5.4MHz
VK3RMM	A	Mt Macedon	Melbourne	No longer proposed	1293.9750	-20MHz
VK3RMM	AD	Mt Macedon	Melbourne	No longer proposed	1298.5000	none
VK3RMM	G	Mt Macedon	Melbourne	Off air - unknown reason		
VK3RMC	C	Narre Warren	SE Melbourne	Operational	146.7625	-600kHz
VK3RMC	B	Narre Warren	SE Melbourne	Operational	438.1250	-5.4MHz
VK3RMC	A	Narre Warren	SE Melbourne	Proposed	1273.9500	+20MHz
VK3RMC	AD	Narre Warren	SE Melbourne	Proposed	1298.1000	
VK3RMC	G	Narre Warren	SE Melbourne	Operational		
VK3RGV	B	Mt Wombat	Shepparton	Operational	438.2000	-5.4MHz
VK3RGV	G	Mt Wombat	Shepparton	Operational		
VK3RNP	B	Hamlyn Heights	Geelong	Off-air but output freq in use with Simplex HotSpot	438.1750	-5.4MHz
VK3RNP	G	Hamlyn Heights	Geelong	Off-air - home brew in progress		

D-Star Simplex Frequencies

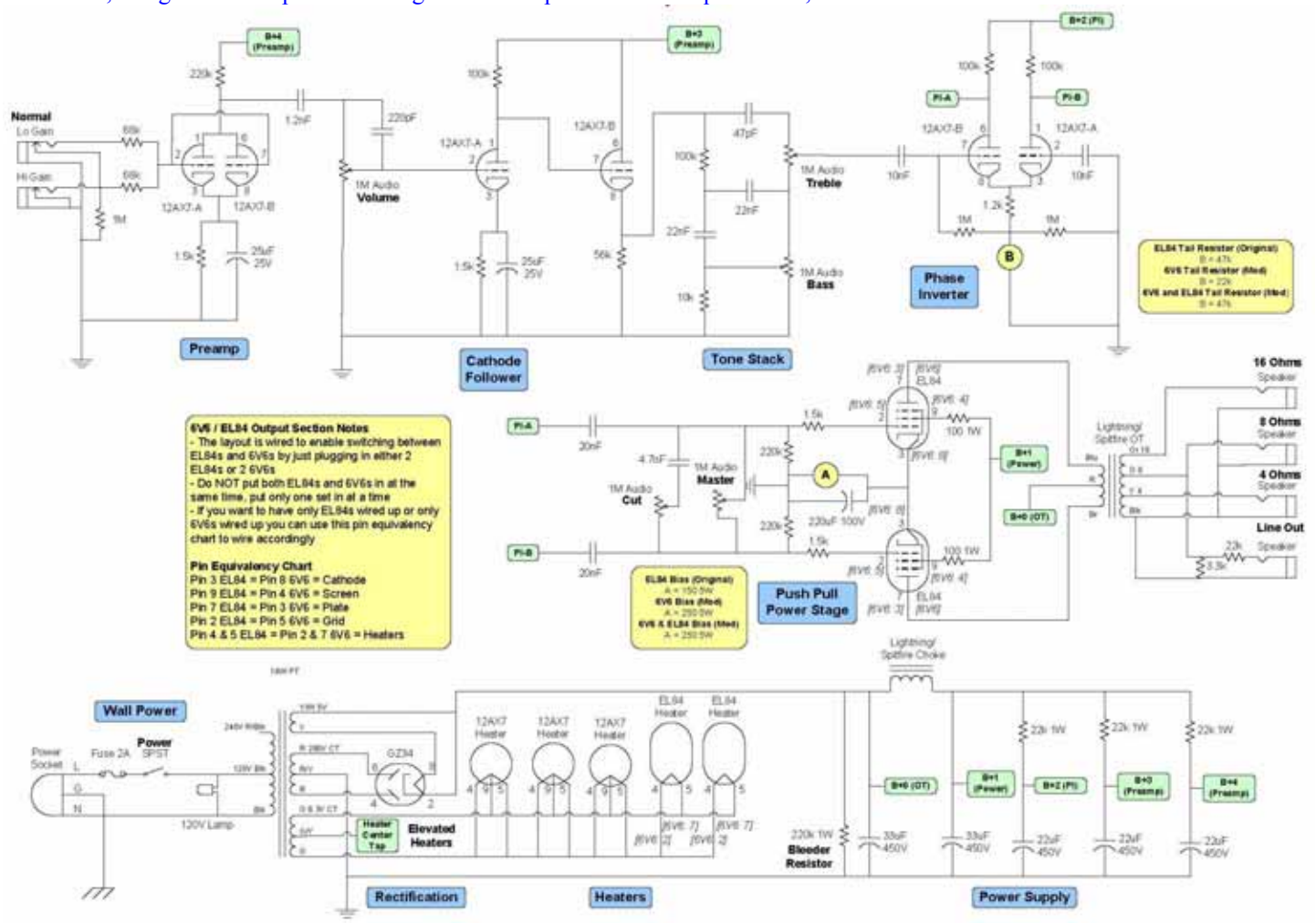
Channel Label:	Frequency:		As of May 2011:
DV 2m Simplex ch1	145.1250		145.1250 DV 2m Sim 1
DV 2m Simplex ch2	145.1125		145.1125 DV 2m Sim 2
DV 2m Simplex ch3	145.1375	HotSpot use	145.1375 DV 2m Sim 3
		Elevated HotSpot use	145.7250 HotSpot
DV 70cm Simplex ch1	438.9125		438.9000 DV 70cm Sim 1
DV 70cm Simplex ch2	438.9000		438.8875 DV 70cm Sim 2
DV 70cm Simplex ch3	438.9250	HotSpot use	438.9125 DV 70cm Sim 3
		Elevated HotSpot use	438.9250 HotSpot
DV 23cm Simplex ch1	1297.5000		
DV 23cm Simplex ch2			
DV 23cm Simplex ch3			

~Data compiled on dates mentioned by Nik Presser, VK3BA and printed with permission

6V6GT Valve Stereo Amplifier (How to keep warm in Winter) ~Mick VK3CH

For many years I have wanted to build a valve amplifier from scratch. One of the most used valves I can remember is the 6V6GT.
I found a supplier of new valves on the internet in VK4, as I did not know of any places in Melbourne selling them.
They had everything needed, transformers, "push back" wire, even older type looking components to give it a real "aged" look.
I also found this circuit on the internet and decided to use it, it appears to be for guitar use, but it has a fantastic sound, either with my tuntable or CD player. I don't care what anyone says, I can pick the difference in the sound, its really unique.
6V6GT's need a 5000Ω load matching transformer, but when used as a "push pull" stage use a centre tapped 4000Ω transformer.
The power supply DC choke used was a 150 milliamp 8 Henry choke. Output transformers were 15 watts, to avoid any heat.
The circuit can use either higher powerd EL84's but I used 6V6GT's as I have used them years ago when I was in high school.
It's been years since I ever cut a hole using a valve hole cutter, sure brought back memories of sore fingers, cuts and blood!
But no accidents this time, but before any drilling, many checks of distances were done in case of mistakes.
I had the choice of either Russian or Chinese supplied valves, Chinese ones dissapointed, Russian valves far superior in this circuit.
Aparantly valve production in Europe is now down to only a handful of places and becoming more rare each year I'm told.
This project is not cheap, around $1200 for everything. This was built mid 2008 but I forgot to write about it, so here you are...
All components supplied from **ELECTRONIC VALVE and TUBE COMPANY** in Queensland. Look at http://evatco.com.au/
They say *"We also stock books on vacuum tube applications as well as a large range of specialised components such as transformers, chokes, chassis, high voltage capacitors, potentiometers, musical instrument loudspeakers, knobs and tube sockets."*

The circuit, using 240 volt input and wiring to suit 6V6 pins and bias requirements, 5Y3GT is called GZ34 in the circuit



As its a stereo amplifier, two lots of the circuit with the 12AX7's and 6V6GT's were built with the single 5Y3GT supply powering it.
Individual 6V6GT gives an audio output of around 5 watts, so the push-pull configuration gives 10 watts per channel.
The actual power depends on the plate voltage; 180 volts - 2 watts; 250 volts - 4.5 watts; 315 volts - 5.5 watts.
While I tried to keep and "old time" look to it, my fear of noise and hum that valve amplifiers can get, made me err on the side of caution and used thin teflon RF coax for all the weak signal stages.
All AC heaters lead wiring was well twisted and multiple earths avoided so as to not have "earth loops" which can give big problems.
With hindsight I probably could have not bothered with the 12AX7 Pre Amplifier stage, as the thing has a lot of gain.
I can hear a weak hum with the volume up loud and tracing the path tells me most of the hum is comming from the pre amp stage.
I did not worry about multiple speaker type outputs, just wiring the 8Ω output to the rear terminals, but the speaker matching transformer has output windings for either four, eight or sixteen ohms.
Also did not bother with the low and high gain inputs, with the input wired directly into the pre amp stage.
One day I might get around to putting it in a cabinet, to hide high voltage wiring and terminals, but seems a shame to hide the tubes!
It took four days to build, the most effort was in all the marking and drilling, the fun part was the actual construction and soldering.
The Treble and Bass controls really alter the sound, quite amazing to try them out on different styles of music.
Lots of LP records of bands from the 60's were played to test it out, while sipping on a nice pure malt scotch, or two, or three... or four
A great way to while away a Saturday afternoon. Well, it started out as an afternoon...

6V6 is the designator for a vacuum tube introduced by Radio Corporation of America RCA United States in late 1937.
6V6 is a beam-power tetrode, similar to its predecessor the 6L6. While the 6L6 was an excellent tube, it was not suitable for use in consumer electronic devices because it required a lot of input power and hence a large, hot, and expensive power supply, and generated far more output power than required, especially in a distortion-reducing push-pull pair. With the introduction of the lower-powered 6V6, which required only half the heater power of the 6L6, the beam-power tetrode became a usable technology for the home, and became common in the audio output stage of radios and audio amplifiers where power pentodes such as the 6F6 had previously been used. The 6V6 required less heater power and produced less distortion than the 6F6, while still offering higher output in both single-ended and push-pull configurations.

The 6V6 was introduced in both metal and shouldered glass tubes. RCA was promoting the superiority of its metal tube designs in the second half of the 1930s, and this tube, having been introduced during that period, was produced in large quantities in this format. Other tube manufacturers also produced the 6V6 in glass tubes, which were commonly found in radios not made by RCA. By 1940 the 6V6 was mostly being produced in a smaller "GT" glass envelope, and later the 6V6GTA was introduced which had a controlled warm-up period.

Various 6V6's manufactured around the world; from left to right; 6V6GTA by General Electric, 6V6GT JAN National Union (1940s), 6P6S (USSR, 1978) and modern production 6V6GT by Electro-Harmonix, which I used in my amplifier.

Generally 6V6 tubes are sturdy and can be run beyond their published specifications (the 6P6S, which has poor tolerance for out-of-spec operation versus most American and West European-made 6V6 variants, is an exception). Because of this, the 6V6 became very popular for use in musical instrument amplifiers. This market allows Chinese, Slovakian and Russian tube factories to keep the 6V6 in production to this day. It is very often used in guitar amplifiers, such as the Tweed Fender Champ.

12AX7 is a miniature dual triode vacuum tube with high voltage gain. It was developed around 1946 by RCA engineers in Harrison, New Jersey, under developmental number A-4522. It was released for public sale under the 12AX7 identifier on September 15, 1947. The 12AX7 was originally intended as replacement for the 6SL7 family of dual-triode amplifier tubes for audio applications.
The tube is praised for its distinctive valve sound, and its ongoing wide use in guitar amplifiers has caused it to be one of the very few small-signal vacuum tubes to continue in production since it was introduced.
The 12AX7 is basically two 6AV6 triodes in one package. The 6AV6 was a miniature repackaging (with just a single cathode) of the triode and twin diodes from the octal 6SQ7 (a double-diode triode used in AM radios), which itself was very similar to the older type 75 triode-diode dating from 1930.

Currently, the 12AX7 is made in various versions by two factories in Russia (Winged C, formerly Svetlana, and New Sensor, which makes current production tubes under the Sovtek, Electro-Harmonix, Svetlana, Tung-Sol, and other brands for which the firm has acquired trademark rights), one in China (Shuguang), one in Slovakia (JJ), for a total annual production figure of 2 million units (estimated). The vast majority are used in new-production guitar amplifiers or for replacement purposes in guitar or audio equipment.
The 12AX7 is a high-gain (typical gain factor 100), low plate current triode, and is therefore best suited for low-level audio amplification. In this role it is widely used for the preamplifier (input and mid-level) stages of audio amplifiers.
With its high Miller capacitance, it is not suitable for radio-frequency use.

Typically a 12AX7 triode is configured with a high-value plate resistor, 100k ohms in most guitar amps and 220k ohms or more in high-fidelity equipment. Grid bias is most often provided by a cathode resistor. If the cathode resistor is unbypassed, negative feedback is introduced and each half of a 12AX7 provides a typical voltage gain of about 60.
The cathode resistor can be bypassed to reduce or eliminate AC negative feedback and thereby increase gain.
The initial "12" in the designator implies a 12-volt heater requirement; however, the tube has a center tapped filament so it can be used in either 6.3V or 12.6V heater circuits.

The 12AX7 was the most common member of what eventually became a large family of twin-triode vacuum tubes, manufactured all over the world, all sharing the same pinout (EIA 9A). Most used heaters which could be optionally wired in series (12.6V) or parallel (6.3V), with respective current requirements of 150 mA or 300 mA. Other tubes, which in some cases could be interchangeable, include the 12AT7, 12AU7, 12AV7, and the low-voltage 12U7, plus many 4-digit EIA series dual triodes.
They span a wide range of voltage gain, ruggedness, and transconductance.

The 5Y3 is a medium-power directly heated rectifier vacuum tube introduced by RCA in 1935. It has found wide use in tube radios and early guitar amplifiers of the Fender Champ type. Virtually identical, electrically, to four-pin type 80 tube, but with an octal base.
Until the invention of the transistor in 1947, all practical amplifiers were made using thermionic valves.

The simplest valve was invented by John Ambrose Fleming while working for the Marconi Company in London in 1904 and named the diode, as it had two electrodes.
The diode conducted electricity in one direction only and was used as a radio detector and a rectifier.

In 1906 Lee De Forest added a third electrode and invented the first electronic amplifying device, the triode, which he named the Audion.
This additional control grid modulates the current that flows between cathode and anode.
The relationship between current flow and plate and grid voltage is often represented as a series of "characteristic curves" on a diagram.
Depending on the other components in the circuit this modulated current flow can be used to provide current or voltage gain.
The first application of valve amplification was in the regeneration of long distance telephony signals.
Later, valve amplification was applied to the 'wireless' market that began in the early thirties. In due course amplifiers for music and later television were also built using valves.

The overwhelmingly dominant circuit topology during this period was the single-ended triode gain stage, operating in class A, which gave very good sound (and reasonable measured distortion performance) despite extremely simple circuitry with very few components: important at a time when components were hand made and extremely expensive.
Before World War II, almost all valve amplifiers were of low gain and with linearity dependent entirely on the inherent linearity of the valve itself, typically 5% distortion at full power.

Negative feedback (NFB) was invented by Harold Stephen Black in 1927, but initially little used since at that time gain was at a premium. This technique allows amplifiers to trade gain for reduced distortion levels (and also gave other benefits such as reduced output impedance).
The introduction of the Williamson amplifier in 1947, which was extremely advanced in many respects including very successful use of NFB, was a turning point in audio power amplifier design, operating a push-pull output circuit in class AB1 to give performance surpassing its contemporaries.

World War II stimulated dramatic technical progress and industrial scale production economies.
Increasing affluence after the war brought about for the first time a substantial and expanding consumer market.
This enabled more advanced valve designs to be marketed at affordable prices, with the result that the 1960s saw the increasing spread of electronic gramophone players, and ultimately the beginnings of "high fidelity".
Hifi was able to drive full frequency range loudspeakers (for the first time often with multiple drivers for different frequency bands) to significant volume levels.
This combined with the spread of TV, produced a 'golden age' in valve development and also in the development of the design of valve amplifier circuits.
A range of topologies with only minor variations (notably different phase splitter arrangements and the "Ultra-Linear" transformer connection for tetrodes) rapidly became widespread.
This family of designs remains the dominant high power amplifier topology to this day for music application. This period also saw continued growth in civilian radio, with valves being used for both transmitters and receivers.

From the 1970s the silicon transistor became increasingly pervasive.
Valve production was sharply decreased, with the notable exception of cathode ray tubes (CRTs), and a reduced range of valves for amplifier applications.

Popular low power tubes were dual triodes (ECCnn, 12Ax7 series) plus the EF86 pentode, and power valves were mostly being beam tetrode and pentodes (EL84, EL34, KT88 / 6550, 6L6), in both cases with indirect heating.
This reduced set of types remains the core of valve production today.
The Soviets retained valves to a much greater extent than the West during the Cold War, for the majority of their communications and military amplification requirements, in part due to valves' ability to withstand instantaneous overloads (notably due to a nuclear detonation) that would destroy a transistor.

The dramatic reduction in size, power consumption, reduced distortion levels and above all cost of electronics products based on transistors has made valves obsolete for mainstream products since the 1970s.
Valves remained in certain applications such as high power RF transmitters and the microwave oven.

In audio applications, valves continue to be highly desired by some users, both in the higher-end home audio market and in the guitar amplifier market. Amongst stereo enthusiasts, there is a subgroup of audio buffs who advocate the use of tube amplifiers for home listening; they argue that tube amplifiers produce a "warmer" or more "natural" valve sound. Companies in Russia, China and Eastern Europe continue to produce valves to cater to this market.

In the guitar amplifier market, most performers continue to use tube amps today, including in folk, blues, roots rock, and in harder genres such as metal, where tube amps are used to create heavy distortion.
Audio engineers suggest that the subjectively pleasing aspects of tube amplification may be due to the non-linear overdrive that is produced with tubes.

Tube amplifiers respond differently from transistor amplifiers when signal levels approach and reach the point of clipping.
In a tube amplifier, the transition from linear amplification to limiting is less abrupt than in a solid state unit, resulting in a less grating form of distortion at the onset of clipping.
For this reason, some guitarists prefer the sound of an all-tube amplifier; the aesthetic properties of tube versus solid state amps, though, are a topic of debate in the guitarist community.

Valves are high voltage and low current devices in contrast to transistors, which typically operate at lower voltages and higher currents for the same power level.
The high working voltage makes valves well suited for radio transmitters, for example, and valves remain in use today for very high power radio transmitters, where there is still no other technology available.
However, for most applications requiring an appreciable output current, a matching transformer is required. The transformer is a critical component and heavily influences the performance (and cost) of the amplifier.

Many power valves have good linearity but modest gain or transconductance.
Signal amplifiers using tubes are capable of very high frequency response ranges – up to radio frequency.
Indeed, many of the directly heated single-ended triode (DH-SET) audio amplifiers are in fact radio transmitting tubes designed to operate in the megahertz range.
In practice, however, tube amplifier designs typically "couple" stages either capacitively, limiting bandwidth at the low end, or inductively with transformers, limiting the bandwidth at high end.

Advantages of Valves

- Very linear (especially triodes) making it viable to use them in low distortion linear circuits with little or no negative feedback.
- Inherently suitable for high voltage circuits.
- Can be constructed on a scale that can dissipate large amounts of heat (some extreme devices even being water cooled). For this reason valves remained the only viable technology for very high power applications such as radio and TV transmitters long into the age when transistors had displaced valves in most other applications.
- Very low "drift" (of specifications) over a wide range of operating conditions, specifically high heat and high power. Semiconductors are very heat sensitive by comparison, forcing compromises in solid state amplifier designs.
- Electrically very robust, they can tolerate overloads for minutes which would destroy bipolar transistor systems in milliseconds.
- Easily removable for testing or replacement – it is much harder to replace a faulty transistor.
- Softer clipping when overloading the circuit, which many audiophiles and musicians think gives a more pleasant sound.
- Valves with the same type number tend to have very similar characteristics to each other whereas semiconductor devices of the same type can have considerably different characteristics.

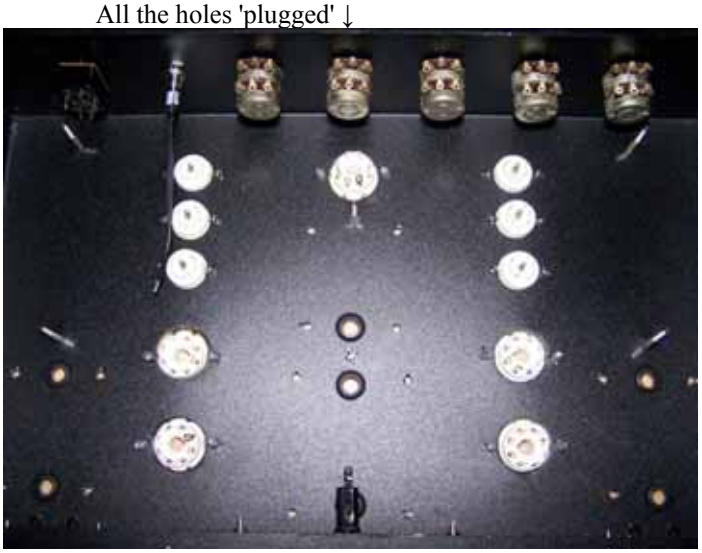
Disadvantages of Valves

- A cathode heater is required. Heater power represents a significant heat loss and energy use.
- Higher voltages are required for the anodes, compared to solid state amplifiers of similar power rating.
- They are significantly larger than equivalent solid-state devices
- High impedance and low current output is unsuitable for direct drive of many real world loads, notably various forms of electric motors.
- Valves may have a shorter working life than solid state parts due to various failure mechanisms (such as heat, cathode poisoning, breakage, or internal short-circuits).
- Available in a single polarity only whereas transistors are available in complementary polarities (e.g., NPN/PNP), making possible many circuit configurations that cannot be realized directly with valves.
- Valve circuits must avoid introduction of noise from ac heater supplies.
- Microphonics – valves may sometimes be sensitive to sound or vibration, inadvertently acting like a microphone.
- Power consumption due to the heater requirements.
- During the life of a valve, its characteristics can change considerably as it ages whereas the characteristics of a semiconductor tend to change very little.

Brand new transformers, Power, 2x Output's and a Choke ↑

The chassis after all the drilling and cutting done ↑

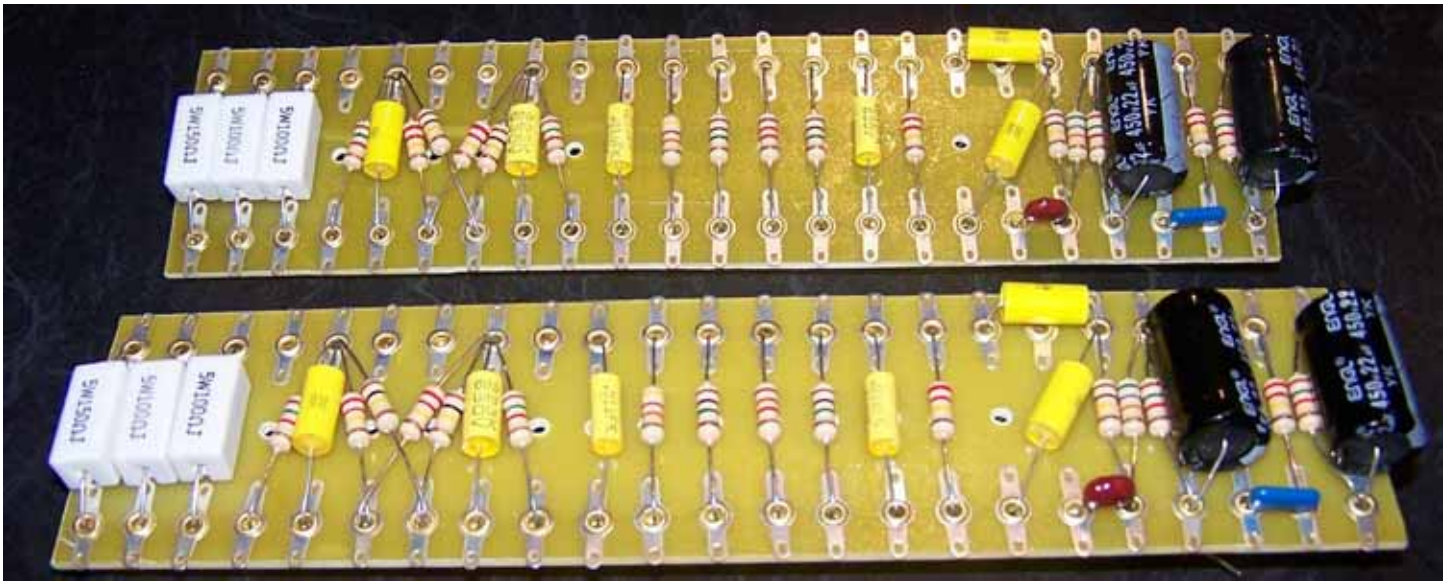
All the holes 'plugged' ↓



Valve hole cutters ↓

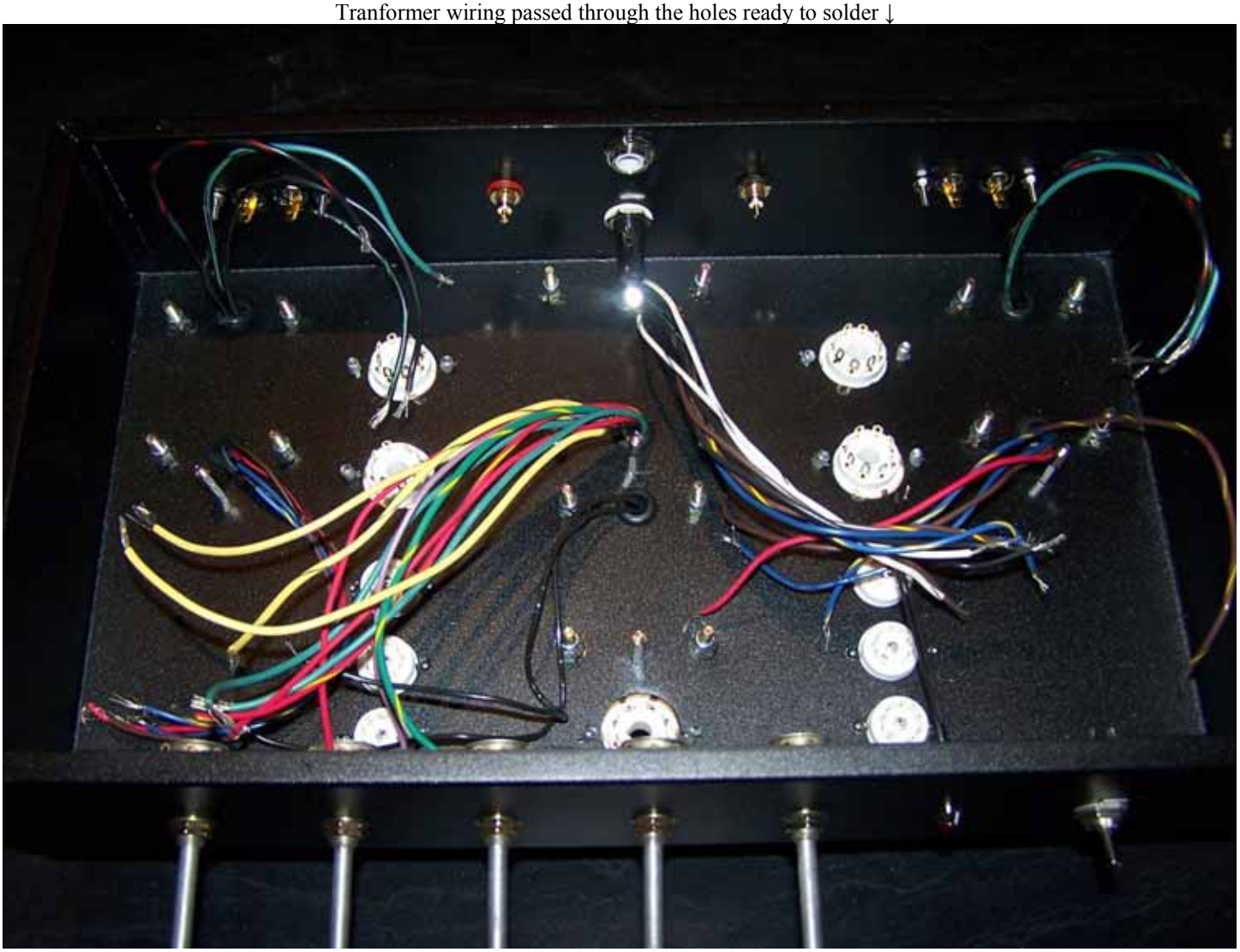
All ready to plug the tubes in ↓

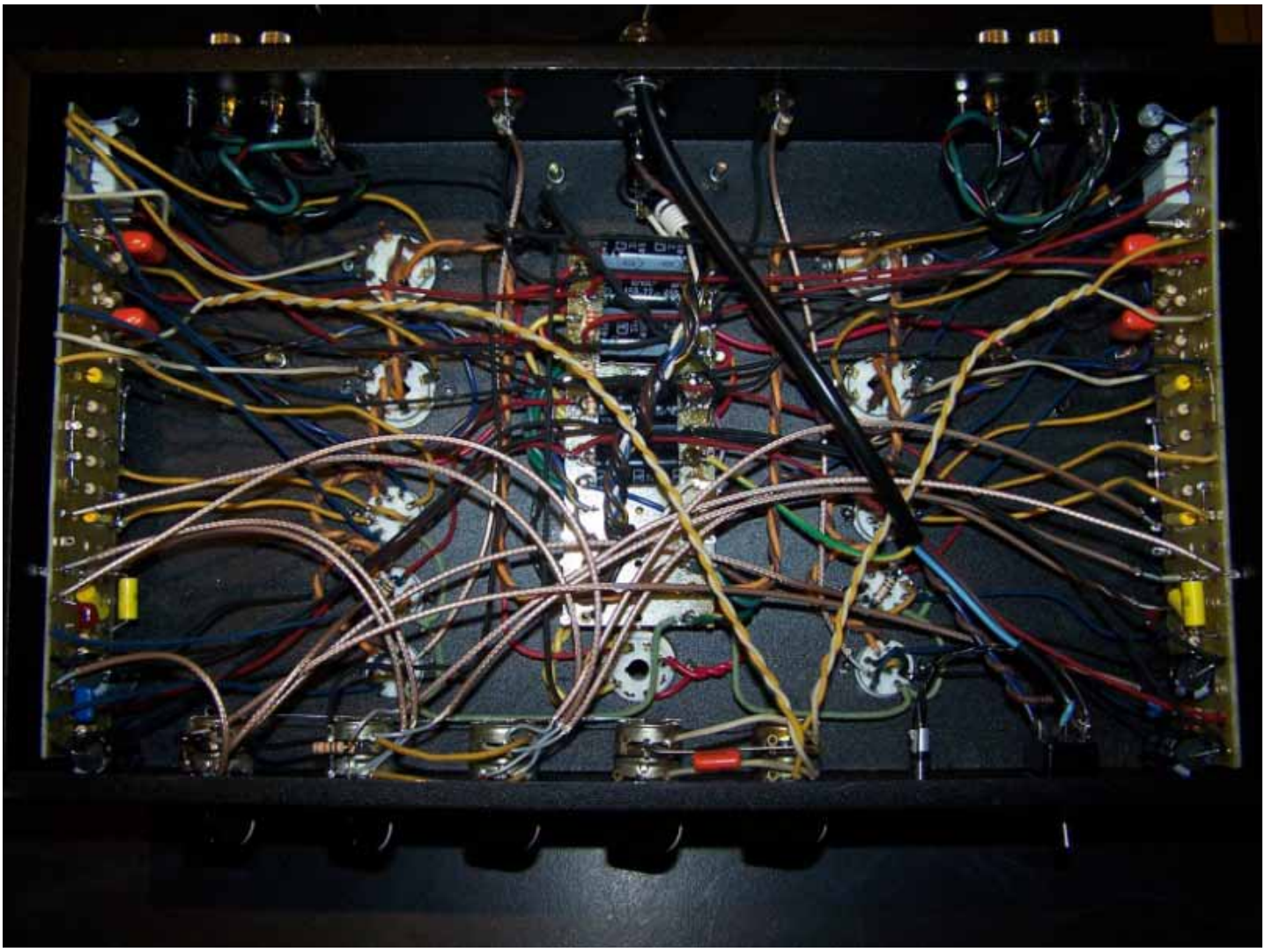
The few valve projects I have made years ago all involved soldering the componenets directly to the valve socket pins.
As this project involves more parts than I am used to, I decided to go with tag strips, but this required much longer lengths of wiring to complete the circuits. It makes layout design simpler, but may cause hum to appear with long lead lengths.
This method would never be acceptable with RF.
If I ever make another one I would do the old way of soldering parts directly to valve socket pins with short lead lengths as possible.
Using 'push back' wiring is easy on your hands. No stripping, just gently push the outer covering on the wire and it moves, exposing as much of the inner lead to attach and solder as you need.
No danger of overheating anything, I used a 60 watt soldering iron for all the connections. Sure makes a change from SMD stuff!
The large chassis is good as the Power transformer is away from the Speaker transformers, so maganetic fields don't find their way in.



Tag Strip with componenets for Left & Right audio channels ready to solder up for point to point wiring ↑

Tranformer wiring passed through the holes ready to solder ↓



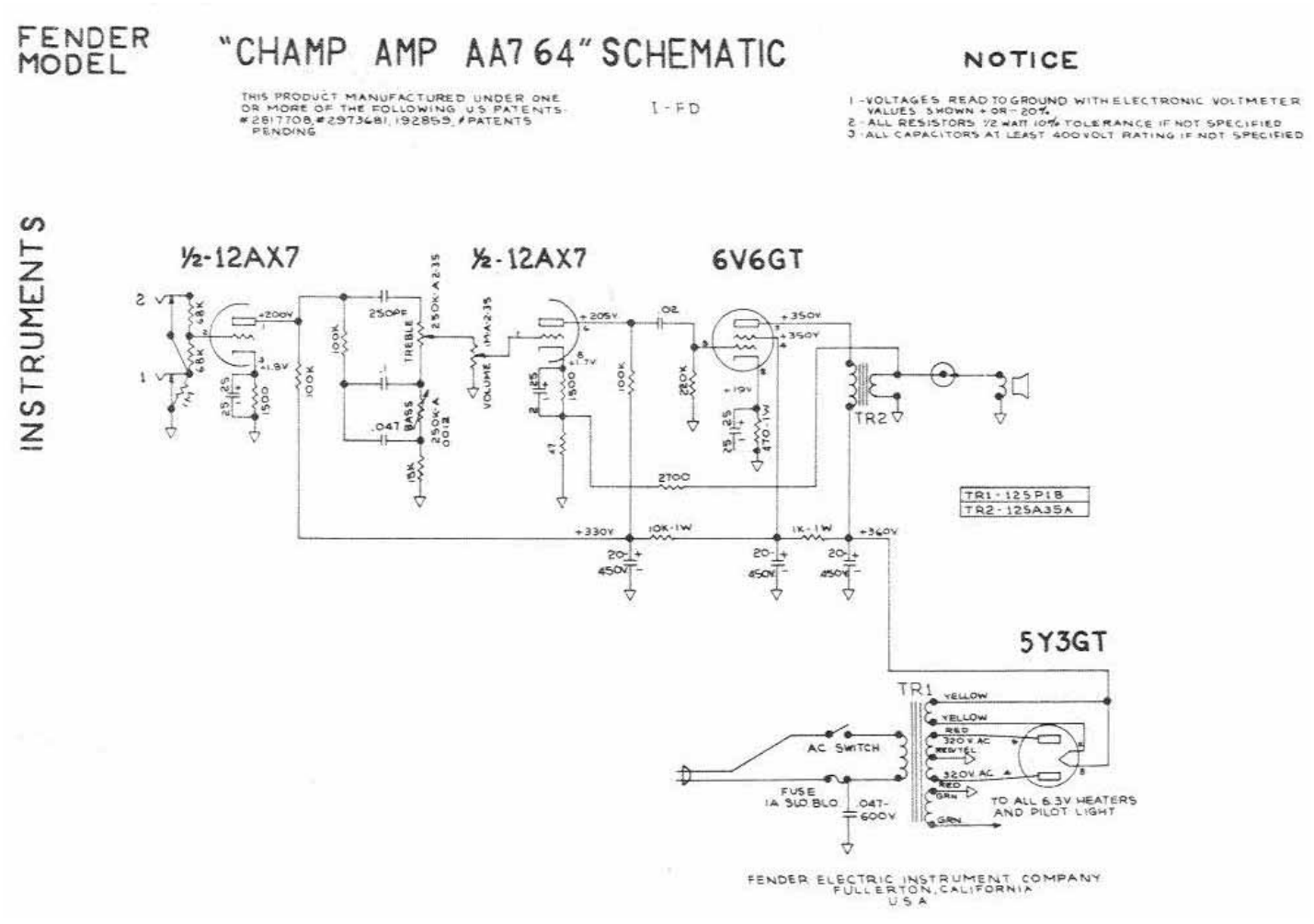


The wiring all done; Teflon coax the only 'advanced' signal carrier in the unit ↑
The completed amplifier, with the warm glow of the valves visible ↓

Centre valve is 5Y3GT rectifier with Choke and Power Transfomer behind it.
Rows of valves either side are Left and Right audio channels, with impeadance matching speaker transformers.
Front to rear are; 12AX7 preamp, 12AX7 Cathode Follower stage, 12AX7 Phase Inverter and the two 6V6GT Push Pull stage.
One day I will put better labels and knobs on the front panel, but it works fine for now. The transformers make it heavy, its 11.1 kgs.

"Lightning" Circuit diagram © Dockery Amplifiers, London, England

The orginal Fender Champ AA764 circuit from 1969



If your keen you can make your own Fender Champ with this kit available from Evatco. ↓

The Fender Champ was a guitar amplifier made by Fender. It was introduced in 1948 and discontinued in 1982. An updated version was introduced in 2006 as part of the "Vintage Modified" line.

The Champ had the lowest power output and the simplest circuit for all of the Fender tube amps.
The Champ had only one power tube, which meant that the circuit is single-ended and class 'A'.
Five watts and the simple toneful circuit allowed the Champ to be used easily and often in recording studios.

By 1955 Fender started putting its amps in the "Narrow Panel" tweed cabinet with a plastic oxblood color grill cloth, and by this time the Champ was officially named the Champ (model 5E1). Through 1957, Champs only had a six inch speaker, but the 1958 model 5F1 featured an 8". The 5E1 and 5F1 circuits used a 12AX7 dual triode in the preamplifier to provide two stages of voltage amplification, and a single 6V6GT power tube to produce about 5 watts.

The 5F1 lasted until 1964, when the Champ finally made the transition to the "Blackface" style of circuit and cabinet. A small number of the last 5F1 style cabinets were covered with the "Blackface" amp cosmetics around this transition, as the factory most likely ran out of the tweed cloth covering. In 1964, a Champ with tremolo was also introduced. It was called the Vibro Champ. The Champ switched to Blackface and Silverface four years later. Fender brought back the blackface cosmetics for a short time in 1981 before discontinuing the Champ the following year.

THE SPECIFICATIONS ON THIS EVATCO KIT

5Watts output @ 4 ohms, Two input jacks, one each bass, treble and volume control knobs ; on &off switch with bezel.
The AA764 Champ Clone is an exact copy of the original. It is a single ended amp, with 1 – 12AX7, 1 – 6V6 and 1 – 5Y3 valve. It has bass & treble tone controls and one volume control. It has an output of 4.5 watts into 4 ohms load. A multi tapped output transformer can be supplied allowing the use of 4 or 8 ohm speakers.
Every part required is supplied with the kit. A circuit (*that may differ a little from the one on this page*) and layout diagram is supplied. Some experience with valve type construction is required. You can see more info at http://evatco.com.au/sonic.htm

~Mick VK3CH

A. High-power RF applications
Many big radio stations continue to use big power tubes, especially for power levels above 10,000 watts and for frequencies above 50 MHz.
High-power UHF TV stations and large FM broadcast stations are almost exclusively powered by tubes. The reason is cost and efficiency--only at low frequencies are transistors more efficient and less expensive than tubes.
Making a big solid-state transmitter requires wiring hundreds or thousands of power transistors in parallel in groups of 4 or 5 at a time, then mixing their power outputs together in a cascade of combiner transformers. Plus, they require large heat-sinks to keep them cool. An equivalent tube transmitter can use only one tube, requires no combiner (which wastes some power), and can be cooled with forced air or water, thus making it smaller than the solid-state transmitter.
This equation becomes even more pronounced at microwave frequencies. Nearly all commercial communication satellites use a traveling-wave tube for their "downlink" power amplifiers. The "uplink" ground stations also use TWTs. And for high power outputs, the tube seems to reign unchallenged. Exotic transistors still are used only for small-signal amplification and for power outputs of less than 40 watts, even after considerable advances in the technology. The low cost of RF power generated by tubes has kept them economically viable, in the face of advancing science.
B. Guitar amps
In general, only very low-cost guitar amplifiers (and a few specialized professional models) are predominantly solid-state. Its estimated that at least 80% of the market for high-ticket guitar amps insists on all-tube or hybrid models. Especially popular with serious professional musicians are modern versions of classic Fender, Marshall and Vox models from the 1950s and 1960s. This business is thought to represent at least $100 million worldwide.
Why tube amplifiers? It's the tone that musicians want. The amplifier and speaker become part of the musical instrument. The peculiar distortion and speaker-damping characteristics of a beam-tetrode or pentode amp, with an output transformer to match the speaker load, is unique and difficult to simulate with solid-state devices, unless very complex topologies or a digital signal processor are used. These methods apparently have not been successful; professional guitarists keep returning to tube amplifiers.
Even the wildest rock musicians seem to be very conservative about the actual equipment they use to make their music. And their preferences keep specifying the proven technology of vacuum tubes.
C. Professional audio
The recording studio is somewhat influenced by the prevalence of tube guitar amps in the hands of musicians. Also, classic condenser microphones, microphone preamplifiers, limiters, equalizers and other devices have become valuable collectibles, as various recording engineers discover the value of tube equipment in obtaining special sound effects. The result has been huge growth in the sales and advertising of tube-equipped audio processors for recording use. Although still a minor movement within the multi-billion-dollar recording industry, tubed recording-studio equipment probably enjoys double-digit sales growth today.
D. High-end audio
At its low point in the early 1970s, the sales of tube hi-fi equipment were barely detectable against the bulk of the consumer-electronics boom.
Yet even in spite of the closure of American and European tube factories thereafter, since 1985 the sales of "high-end" audio components have boomed. And right along with them have boomed the sales of vacuum-tube audio equipment for home use. The use of tubes in this regime has been very controversial in engineering circles, yet the demand for tube hi-fi equipment continues to grow.

WANSARC VK3AWS

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WANSARC CLUB PROFILE

History
The Western and Northern Suburbs Amateur Radio Club (**WANSARC**) was first formed in 1969 and since then has served the needs and interests of amateur radio operators, short wave listeners and those interested in hobby radio and electronics. The club is not gender specific, having both female and male members. Members come from all walks of life with a mix of experience, young and mature, novice and technical. The most important aspect of the club is the willingness of all members to share their knowledge for the benefit of others. Members mainly reside in the west and north of Melbourne; however membership is encouraged from all interested. **WANSARC** is an affiliated club of **The Wireless Institute of Australia**.

Meetings
Meetings held at the **Ern Rose Memorial Pavilion, SEAVER GROVE, RESERVOIR** (Melway Map 18 D5) on the **1st Friday of each month** (excluding January) commencing at **7.30pm local time**. Talk in on **146.450MHz FM**—call club station **VK3AWS**.

Benefits
Free technology and related presentations, sponsored construction activities, discounted (and sometimes free) equipment, network of likeminded radio and electronics enthusiasts, excellent club facilities and environment plus an informative monthly newsletter for members to post articles, news, classifieds for all radio, test equipment, etc, featuring Amateur Radio news from WANSARC, WIA, ACMA, Melbourne Clubs, VK and Worldwide.

Club Nets
146.450MHz FM each Tuesday evening commencing 7.30pm local time.

Website: www.wansarc.org.au **Postal:** WANSARC PO Box 336 RESERVOIR 3073

A proud tradition of supporting hobby radio and electronics enthusiasts since 1969
