Amateur Radio

Volume 85
Number 4
April 2017
Price: $9.70 incl GST
www.wia.org.au

WIRELESS INSTITUTE OF AUSTRALIA

Serious contesting

- AIS saves lives
- SSTV with Arduino
- A simple 40 m receiver

ISSN 0002-6859
04
02 685048

The radio... YAESU

Great Pleasure in Operating Wide-Coverage Base Station

With M-1 Superior Microphone and SP-10 Exceptional Sound Speaker

M-1
Ultimate
Reference Microphone

SP-10
External Speaker
for FT-991A

HF/VHF/UHF 100 W ALL MODE TRANSCEIVER

FT-991A

C4FM
DIGITAL CLEAR VOICE
Clear and Crisp Voice Technology

144/430 MHz 50 W

AMS
Automatic Mode Select

SP-20
External Speaker
for FTDX3000/FTDX1200

FTDX3000

YAESU
The radio

YAESU Authorized Dealer

Andrews Communications Systems
Shop 8, 41-51 Bathurst Street, Greystanes NSW 2145
Tel: +61-2-9636-9060
URL : www.andrewscom.com.au

Strictly HAM Pty. Ltd.
Shop 12B Church Street Bayswater Vic. 3153
Tel: +61-3-9729-7656
URL : www.strictlyham.com.au

YAESU Authorized Service Center

Andrews Communications Systems
Shop 8, 41-51 Bathurst Street, Greystanes NSW 2145
Tel: +61-2-9636-9060, Fax: +61-2-9688-1995
E-mail: radioandrews@hotmail.com

VK Radio Repairs
347 Settlement Rd, Thomastown Victoria 3074
Tel: +61-3-9465-9399, Fax: +61-3-8682-8748
E-mail: yaesu@vkradio.com.au

Volume 85
Number 4
April 2017
ISSN 0002-6859

Amateur Radio

The Journal of the Wireless Institute of Australia

Registered Office
Unit 20 11-13 Havelock Road
BAYSWATER VIC 3153
Australia
Phone: 03 9729 0400
Fax: 03 9729 7325

Production Deadlines
All articles, columns, hamads and advertising booking by **first day of previous month.**

General

Technical

This month's cover:
Our cover photo this month shows the impressive antenna installations at the contest station of Tim Duffy K3LR in Pennsylvania USA. Read a little about Tim's station in this month's Contest column on page 37. Photo by Tim Duffy K3LR.

Columns

Contributions to Amateur Radio

Amateur Radio is a forum for WIA members' amateur radio experiments, experiences, opinions and news. Manuscripts with drawings and/or photos are welcome and will be considered for publication. Articles attached to email are especially welcome. The WIA cannot be responsible for loss or damage to any material. Information on house style is available from the Editor.

Back Issues
Back issues are available directly from the WIA National Office (until stocks are exhausted), at $8.00 each (including postage within Australia) to members

Photostat copies
If back issues are unavailable, photocopies of articles are available to members at $2.50 each (plus an additional $2 for each additional issue in which the article appears).

Disclaimer
The opinions expressed in this publication do not necessarily reflect the official view of the WIA and the WIA cannot be held responsible for incorrect information published.

Amateur Radio Service

A radiocommunication service for the purpose of self-training, intercommunication and technical investigation carried out by amateurs; that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.

Wireless Institute of Australia

ABN 56 004 920 745

The world's oldest
National Radio Society, founded 1910.

Representing
The Australian Amateur Radio Service
Member of the International Amateur Radio Union

Registered Office of the WIA
Andersson House
Unit 20, 11 Havelock Road
Bayswater, Victoria, 3153
Tel: (03) 9729 0400 Fax (03) 9729 7325
email: *nationaloffice@wia.org.au*
http://www.wia.org.au

All mail to
PO Box 2042 BAYSWATER VIC 3153
Business hours: 10am – 4pm weekdays

National Office

Executive Administrator	Bruce Deetholts	VK3FBLD

Board of Directors

President	Phil Wait	VK2ASD
Vice-President	Fred Swainston	VK3DAC
Directors	Robert Broomhead	VK3DN
	Roger Harrison	VK2ZRH
	Ewan McLeod	VK4ERM
Secretary	Jim Linton	VK3PC
Treasurer	Vacant	

Coordinators

AMSAT	Paul Paradigm	VK2TXT
ARDF	Jack Bramham	VK3WWW
Australian ARISS	Shane Lynd	VK4KHZ
Awards	TBA	
Clubs	Ted Thrift	VK2ARA
Contests	Craig Edwards	VK8PDX
John Moyle Field Day	Denis Johnstone	VK4AE
Editor 'AR'	Peter Freeman	VK3PF
EMC/EMR	Gilbert Hughes	VK1GH
Standards	Phil Wait	VK2ASD
	Ron Cook	VK3AFW
	Noel Higgins	VK3NH
NTAC	John Martin	VK3KM
Historian	Peter Wolfenden	VK3RV
IARU Region 3 Liaison	Jim Linton	VK3PC
Monitoring Service	Peter Young	VK3MV
ITU Conference & Study Group		
	Brett Dawson	VK2CBD
	Dale Hughes	VK1DSH
QSL Curator	National Office	
Repeater	Peter Mill	VK3ZPP
	Andrew Chapman	VK4QF
Webpage	Robert Broomhead	VK3DN

Editorial

Peter Freeman VK3PF

Almost too late...

This issue of the magazine is due for delivery in VK3 and via the Digital Edition on 23 March. It is almost too late for you to post your ballot papers, which need to be received at the National Office by 27 March.

If you have sent off your ballot papers, I suggest that you pay the small amount for an Express Post envelope, insert the completed papers in the appropriate completed envelopes inside the Express Post envelope and send it today. There is then a chance that your votes will be received in time, but only if you take this late action TODAY.

Proxy forms for AGM

There has been some confusion about the Proxy Form for the Annual General Meeting (AGM), mainly because one form was included with the March edition of this magazine, and an updated form was later posted on the WIA website.

If you are considering using a proxy to present your views at the AGM, it would be prudent to download the revised form from the WIA website and use that form. Note that the revised form is also included on the obverse of the mailing sheet for this issue.

An enjoyable weekend in the hills

In late February, I had the pleasure of joining eight other amateurs in a weekend based at a ski lodge at Mount Hotham – a reprise of a similar event a year earlier. You can find a brief account in this month's **SOTA and Parks** column, which will also point you to some more detailed accounts in individual blogs.

The days were spent split up in different groups visiting mountains in the region. The evenings were enjoyable social occasions, with some time spent planning the activations for the following day and discussing various items of gear suitable for SOTA.

There was also discussion about another event next year, perhaps based at a different location in the north east of Victoria to entice the Activators to some new summits.

Propagation

One might say **"What propagation?"** On the Mt Hotham weekend, we had very poor propagation on HF on Saturday. As a result, many of the summits were qualified using VHF between the various groups at different locations. Conditions were a little better on the Sunday, with several 40 m contacts made. By Monday afternoon, when I activated some summits during my return trip, HF conditions were reasonable. I even managed contacts to Germany and Croatia with my 5 W signal from the last summit.

The ARRL Letter for 9 March reported no sunspots on 4 March, and only a single spot on 5 March. As I am preparing this Editorial, I can only hear an occasional chaser making contact with an amateur out activating a Park. The Space Weather Systems HAP Chart shows much of Victoria covered in yellow, indicating an optimal frequency for contacts in the region was estimated to be 4 MHz or lower. There is no NVIS to allow contacts at around 190 km range.

Continued on page 5

WIA comment

Phil Wait VK2ASD

Preparing for Hahndorf

As this election period draws to a close we are all very keen to see the makeup of the next WIA Board, one that will guide the WIA into the future in interesting times. It's certainly been a very difficult and personally draining year and I, for one, will be very glad to see the end of it. Hopefully the new Board will settle down quickly and can get on with what we all want them to do – provide effective and stable administration of the WIA, and light the way forward.

I would like to thank everyone who has nominated for WIA Director. There are some talented folk, and from what I can gather from their public information releases, there is a good variety of skills.

This week I have been working on the Directors' report to be presented to the AGM in Hahndorf, SA. The Directors' report shows the state of the Institute's affairs at the end of our financial year, which is 31 December each year. The report includes a tally of the number of licence assessments by licence grade. In 2016 there were 578 Certificates of Proficiency issued, about 40 less than the previous year. Of these 385 were Foundation grade (an increase of 7 on the previous year), 101 were Standard (a decrease of 35), and 92 Advanced (a decrease of 22). The numbers show a small growth in new Foundation certificates, but a decrease in the numbers of new Standard and Advanced certificates. There are always relatively small changes in the numbers each year, so speculative conclusions about increases or decreases cannot sensibly be drawn, although I'm sure some will do so!

An important measure of the success of the Foundation level is the number of Foundation licensees that upgrade to Standard or Advanced levels. During the year, 90 people upgraded from Foundation to Standard, and 30 direct from Foundation to Advanced. The Foundation licence is certainly encouraging new people to enjoy the hobby of Amateur Radio, and it's acting as a feeder into the higher licence grades.

Another interesting statistic this year comes from Marc Hillman VK3OHM. Marc has been tracking the numbers, and the transmission mode used, for contacts submitted for DX awards, and has produced a bar graph going way back to 1947. Marc's work can be seen on the WIA website at: *http://www.wiaawards.com/charts/charts.php*

The chart very clearly shows how Amateur Radio has dramatically changed over the last decade or so. Up to ten years ago, phone (SSB) dominated the bands, followed by CW, and a very small number of digital contacts (presumably mainly RTTY), but in the last ten years, digital modes have really taken off. Now, phone and CW each represent only about 20%, with digital modes making up a whopping 60% of all contacts counting towards awards.

The other major activity at this time of year is preparing the WIA's accounts for submission to the AGM. The WIA does not currently have a Treasurer, (one not being required under the WIA's constitution), and we are currently using the services of a commercial Book-keeping firm (*2-Peas*) to maintain the day-to-day accounting functions. A Melbourne based accountancy firm has prepared the year-end accounts for the Auditor. It is the Board's intention to release the audited financial report to members well in advance of the AGM, and to take questions relating to those accounts in advance of the meeting. Answers received from the accountants will be presented to the meeting in Hahndorf.

One thing I will impress upon the new Board is the value of using paid professionals to manage the WIA's accounts. Largely due to the use of professionals this year, the WIA's accounts will be in perfect condition to hand-over to the new Board. Contrary to what some believe, or perhaps have hoped, this has been a very smooth process and my strong suggestion to the new Board is going to be that it retain the services of paid book-keepers, rather than rely on volunteers. The WIA's trading position will be disappointing this year, but not as bad as some have suggested.

So, that's it from me in an election month. We will soon know who will be running the show for the next year. If you possibly can, you should make every effort to attend this year's AGM in Hahndorf. The guys in Adelaide have put together a ripper of a weekend – it's bound to be one of the best ever. See you there.

Phil Wait VK2ASD
President

PS: This issue contains a new proxy form for voting at the upcoming AGM. The form distributed with the election pack in the last issue contained an error. Although we expect all proxies to be accepted by the meeting Chair, we cannot make that a watertight guarantee. If you have already submitted your proxy on the old forms, please re-submit using the new form with this magazine. The Board apologises for this mix-up, which we think has gone unnoticed for many years past.

WIA news

The ACMA and WIA meeting

The Wireless Institute of Australia (WIA) met with the Australian Communications and Media Authority (ACMA) in Canberra on Friday 24 February.

It was a mix of face-to-face meeting in Canberra and by teleconference for two in Victoria.

The ACMA team of three was headed by its manager of spectrum licencing policy Dominic Byrne, Executive Manager of the Spectrum Management Policy Branch David Brumfield, and a Senior Policy Officer Stewart White. The WIA representatives were Phil VK2ASD, Peter VK3MV, Dale VK1DSH and Fred VK3DAC.

The ACMA talked briefly about the draft new Radiocommunications Act due to be made public in later this year and the changes it may bring to licensing.

The ACMA explained that they were undergoing substantial staff reductions with some delays being experienced.

The WIA suggestion that Foundation licences could have callsigns with a three letter suffix was being further explored, but no decision had yet been reached.

The WIA Exams Service was discussed including its financial and delivery performance.

A definition of reportable complaint was discussed.

Reciprocal licence arrangements were discussed and agreed that all claims for overseas licences needs to include proof of operator competency to be licensed in Australia.

The WIA advised the ACMA that it was introducing a new arrangement for consultation with members. The proposed changes to the three amateur licences under a future review of the Licence Condition Determinations would draw on the findings of that consultation, but as yet no date had been set. The WIA had identified options for Foundation licensees to have a three letter suffix callsign to help them access digital modes, should digital modes for Foundation licensees be approved. The ACMA licensing section indicates that its SPECTRA system should be able handle them, and the WIA agreed that there be a test to prove the concept.

In seeking Amateur Service access to the 60 m band (5351.5 - 5366.5 kHz) the WIA offered to work with Defence that currently uses that spectrum.

At the end of the two hour meeting a greater understanding was had by both sides on a number mutual interest issues.

Rotary Club Foundation Centenary VI100TRF

The Rotary Foundation began in 1917 with a meagre donation, to now being able to fund a number of activities for the world including the eradication of the disease polio.

Rotary members have supported thousands of projects to provide clean water, fight disease, promote peace, basic education, and grow local economies. Now Rotary is highlighting the Foundation's work over the past 100 years.

Rotarians of Amateur Radio in Australia hit the HF bands for three months from February 26 to May 26, with the special event callsign VI100TRF. More information on qrz.com

Important Message about Proxies for the AGM

A draft version of the proxy form was sent to the printer for inclusion in *AR* magazine. The form was different to the version published on the website.

The difference between the forms has caused some confusion, and discussion about their validity on social media. One form requires the member to sign, and the other relies on the member's membership number to confirm the member's identity. Both forms rely on the membership number and callsign to confirm the members address, rather than a specific entry on the form.

It is anticipated that proxies on either form will be accepted by the AGM Chairperson, however, to ensure all proxies are accepted, members are asked to resubmit their proxy on the new form unless they have previously included their address.

Resubmitting your proxy on the new form ensures your proxy will be accepted in all circumstances.

The new proxy form is available on the WIA website or on the obverse of the address sheet of the April issue of *AR*. The correct revision date is 05/03/2017.

If your proxy is received by the WIA office on the earlier forms, and if your address is not included, the WIA office will attempt to contact you and ask you to resubmit your proxy.

The WIA apologises for this inconvenience, however under the circumstances we have taken this action to remove any doubt.

Excellent video from the ISS

Recent use of HAM-TV on the International Space Station in Europe has taken this popular educational activity to a new level. The Collège André Malraux in France asked ARISS Europe for HAM-TV support for its scheduled contact with European Space Agency Astronaut, Thomas Pesque KG5FYG.

The experimental HAM-TV was possible due to the equipped ground stations in Europe to provide video coverage from the ISS downlink signal. This particular contact had voice transmissions from the ISS on the UHF band on

437 MHz, with a ground station at the school. As a back-up feed to the school was the ON4ISS ARISS telebridge station in Belgium.

ARISS (Amateur Radio on the International Space Station) lets students talk directly with those on board, inspiring them to pursue interests in careers in science, technology, engineering and math, and engaging them with radio science technology through Amateur Radio.

The contact lasted about 10 minutes on Monday 13 February and also involved a series of five radio amateur ground stations in Europe equipped with the HAMTV receive capability. These were linked together forming a chain for the video from the ISS. It had a downlink signal of 2395 MHz and was streamed live on the British Amateur TV Club server seamlessly, using Multi viewer technology which selects the strongest signal.

The video from space in real time was excellent, with Thomas at first testing, and seen checking that the antenna was correctly connected to a hand-held UHF transceiver and the correct frequency was set. Then, wearing a head-set, the astronaut answered 19 questions in the French language prepared by students watched in awe at the school by an audience of 190 students and guests. Looking at the camera and gesturing to areas in the Columbus module he seemed at ease in dealing with the inquiring youngsters. The contact ended with a wave from Thomas, a thank you, and then he floated out of sight.

HAM-TV from the ISS has certainly added a new dimension to talking to the crew on the International Space Station. It is just another part of our part of our diverse hobby an exciting opportunity to inspire the minds of students and to hopefully generate a greater awareness of our unique hobby. With two stations already in Australia being HAM-TV equipped ground stations, Shane VK4KHZ and Martin VK6MJ, hopefully video from the ISS via HAM-TV is a possibility for an Australian school.

Editorial

Continued from page 2

Contacts were possible into NSW. I have not really been looking at other bands over the past week, but suspect that propagation is likely to have been patchy. On the other hand, whenever a major DX Contest is happening (it seems like most weekends at present), it can be difficult to find a clear spot on any band which is delivering some propagation.

This leads to some clear options for those wanting to play portable radio when the weather is not too hot: try a lower band, or try some VHF/UHF bands. Good luck!

Until next month,

Cheers,

Peter VK3PF

A super simple 40 metre receiver from available parts

Peter Parker VK3YE

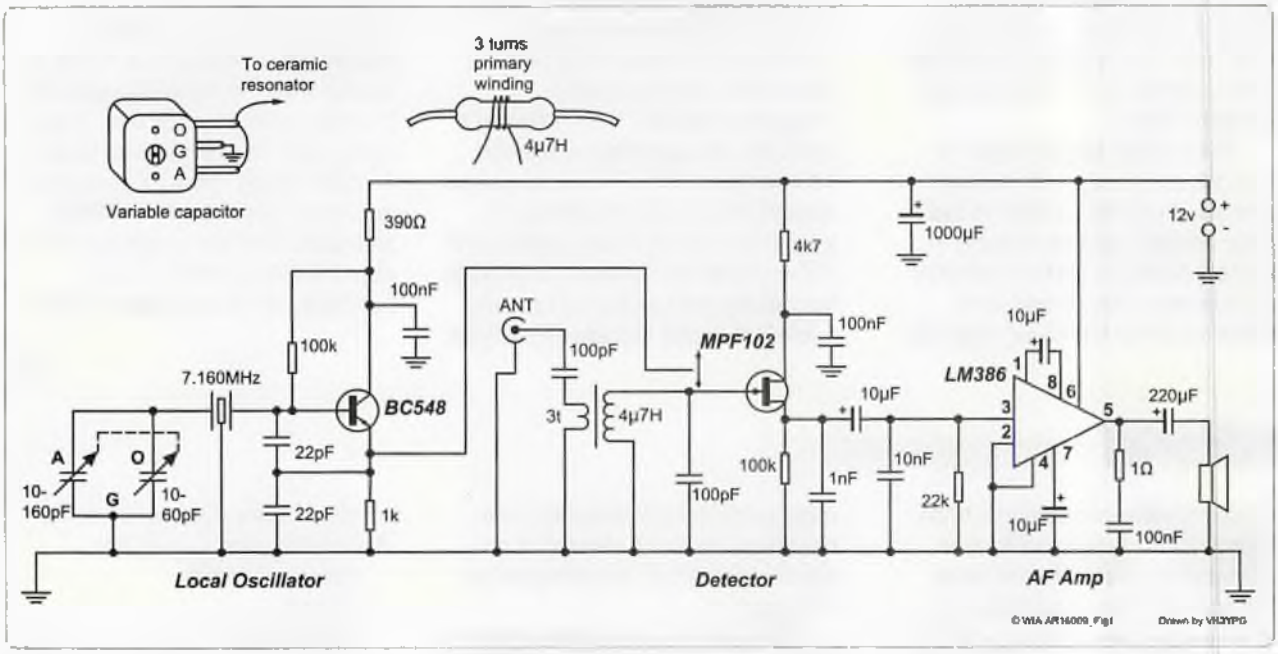


Figure 1: Schematic.

Homebrew receivers have a reputation for being cantankerous beasts difficult to get going. While electrically simple, regenerative sets need to be mechanically solid if they are to be stable. In addition tuning can be difficult and they can 'pull' on strong signals. Direct conversion receivers overcome these problems but again good construction is needed, this time to prevent hum pickup by the high gain audio amplifier.

Another approach, used at least as far back as the 1930s but overshadowed by regenerative receivers, is a simple detector provided with some RF bias from an RF oscillator within the receiver. RF bias increases sensitivity (especially if using diode detectors with a threshold voltage) and provides a beat signal for CW and SSB reception. Such receivers operate like direct conversion receivers and require no fiddly regeneration control. The separate oscillator also protects the receiver from frequency pulling on strong signals, which can happen on 'regens'.

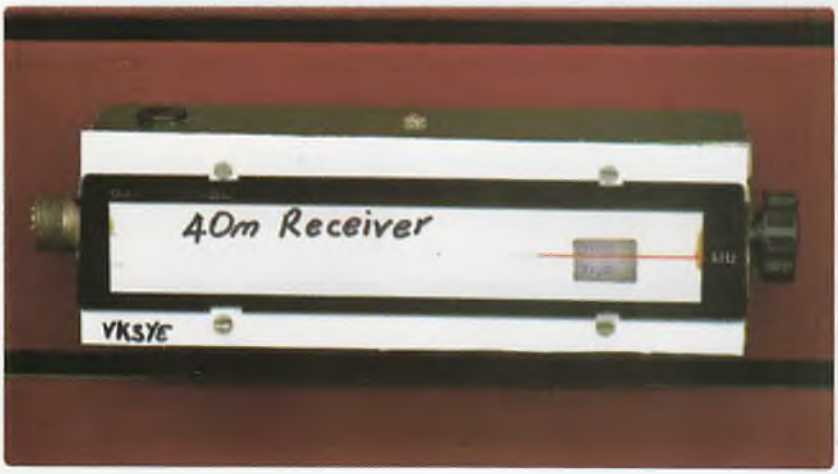


Photo 1: Receiver – front.

This receiver is an amplified detector with RF bias. It tunes a popular segment of the 7 MHz band and costs less than thirty dollars to build. It's frequency stable even with no special construction precautions. Fewer than thirty parts are used yet it will drive a speaker on most

signals. High performance is not claimed but if you want an easy to build receiver ideal for casual listening then look no further.

Circuit description

This set is best thought of as a direct conversion receiver. Figure 1 shows the circuit.

Incoming signals from the antenna are filtered to pass those frequencies near 7 MHz. This is achieved in the front end tuned circuit comprising a 4.7 µH RF choke in parallel with a 100 pF capacitor. Online LC calculators confirm that this combination of values resonates near 7 MHz.

Coupling from the antenna is achieved via another 100 pF capacitor and three turns of thin wire wound over the body of the 4.7 µH inductor. The reason why it is 100 pF and not a higher value is that it provides additional medium frequency cut to lessen overload from any nearby AM broadcast stations.

The MPF102 FET forms a detector which converts the RF present at the gate to audio at the source. This very weak signal is presented to the LM386 stage to be amplified to speaker volume.

Although technically these stages comprise a receiver it is not a very good one. Also, it will only properly demodulate AM signals since it needs a carrier for modes most often used by amateurs. Help on both these counts comes from the 7 MHz local oscillator which provides a local carrier to restore the carrier that was removed when the SSB signal was generated. The local oscillator uses a 7.16 MHz ceramic resonator with a series variable capacitor to provide frequency shift over a popular section of 40 metres. 7 MHz supports propagation day and night so signals should be audible most times, at least in south-eastern Australia.

The FET detector requires so little signal from the local oscillator that no electrical connection between the stages is required. Instead a piece of insulated wire is extended from the oscillator's emitter to somewhere near the detector's gate. You will find a position that gives the best compromise between strong signal performance (tight coupling with the lead very close or even wrapped around) and weak signal performance (lead further away).

Parts

All parts are widely available except for the ceramic resonator which may need some searching. I used a three legged 7.16 MHz type available from Mini Kits (*http://minikits.com.au/*).

A two legged type can also be used but you may need to increase the 22 pF capacitors in the oscillator (try 100 to 220 pF). Resistors are all standard quarter watt / 5% tolerance. Capacitors can be disc ceramic for the lower values and electrolytic or tantalum for the higher values. A small signal NPN transistor, such as a BC548, 2N3904 or 2N2222A, will work for the

Photo 2: Receiver – inside.

local oscillator while a 2N3819 or MPF102 is suitable for the detector.

The case can be new, reused or made at home. Metal is preferred for shielding. A salvaged biscuit tin or soldered together pieces of circuit board material would be fine. Some other parts came from an old clock radio including the variable capacitor and dial drum.

Construction

Since there are so few components, an etched printed circuit board is not needed. Instead I soldered the earth connections of components to a 5 x 6 cm piece of printed circuit board material. Leads, especially those to the tuning capacitor and antenna, should be kept short.

The audio amplifier is mounted on its own board as it was salvaged from another project. The LM386's close pins make construction on either a matrix or printed circuit the best option. Alternatively, use 'dead bug' construction, with the IC's back glued to the board. Easiest of all is to use a LM386-based kit amplifier such as the 'Champ Amp' which comes with its own circuit board.

Build the ceramic resonator local oscillator first. Leads should be kept short with the oscillator built around the variable capacitor. A salvaged transistor radio type can be used. These typically have three connections. The centre one (often marked G) is ground while the outer two are the two sections of the variable capacitor. Bridge these to maximise low-end frequency coverage. Some sort of dial is desirable; I used a drum type from a discarded clock radio.

When complete, spot the local oscillator's carrier on a nearby 7 MHz receiver fitted with a short wire antenna running to near the oscillator. Adjusting the tuning capacitor should vary its frequency to cover a useful section of the SSB portion of the band. My receiver covers 7.060 to 7.170 MHz . A slightly different range is possible by changing capacitor values and/or substituting a different ceramic resonator such as 7.2 MHz. Check wiring and voltages if no signal is heard.

The next stage is the audio amplifier. This is a common circuit and should work first time. Test by applying power, connecting a speaker, and putting a finger on the input connection (Pin 3). You should be rewarded with a hum.

Finally there is the FET detector. It should be positioned fairly near the local oscillator since we need to tap off some RF from it. The 4.7 µH RF choke has three turns of very thin enamelled copper wire wound over its body to form the primary winding through which signals from the antenna are passed. Wire approximately 0.1 mm diameter, such as salvaged from an old transformer, is suitable.

Testing and use

Use a good antenna such as a coax fed half wave dipole for best results from simple receivers like this. Except for very weak signals, transmissions audible on a large receiver should be detectable on this one.

Tune across the band until you find an SSB signal. Some patience is required when tuning stations in as this receiver lacks fine tuning. Adjust the tuning for an intelligible signal and move the wire on the local oscillator's emitter for best reception.

The characteristics of 7 MHz give this receiver a range of up to about 1000 km during the day and

Photo 3: Receiver – close up of circuitry.

3000 km at night. Signals from further away may sometimes be audible but will probably be weak.

What if you get a signal that appears across the whole band irrespective of the tuning setting? First of all identify the station or at least its frequency. If it is heard day and night it is probably an AM broadcaster whose transmitter is very close by. Or, more commonly, it may be a powerful shortwave station, especially if the interference is only there at night.

The simple FET detector used is more prone to breakthrough than passive diode detectors which would have needed additional circuitry. Its use was the main design compromise made. Ways to overcome the limitations of weak detectors include:

- Add a selective antenna coupler, such as a Z-match, between the antenna and the receiver
- Remove one or two turns from the primary winding over the 4.7 µH inductor
- Add front end RF attenuation by including a 1k to 5k potentiometer at the antenna connection wired similar to a volume control (or a parallel 22 to 100 ohm resistor for a fixed level of attenuation)
- Reduce the 100 pF in series with the antenna connection to a lower value like 22 or 47 pF
- Replace the 100 pF in parallel with the 4.7 µH in favour of a variable capacitor to allow precise tuning of the front-end
- Add a second front end tuned circuit to better reject extraneous signals.

Alternatively you could just build a receiver with a different detector. If you do this I suggest leaving this receiver as is. This is because components are so cheap nowadays and it is educational to have two receivers to compare.

Once you're happy with performance, tidy any loose ends, add labels to the box and make a tuning scale.

Conclusion

An extremely simple receiver has been described. Using less than thirty parts it should make an excellent beginners or club project. A demonstration of it appears on the author's YouTube channel at *youtube.com/vk3ye*

WIA Contest Website

To keep up to date with all of the major Australian contests, including rules and results, at the WIA Contest Website at:
www.wia.org.au/members/contests/about

AIS Saves Lives!

Julie Gonzales VK3FOWL and Joe Gonzales VK3YSP

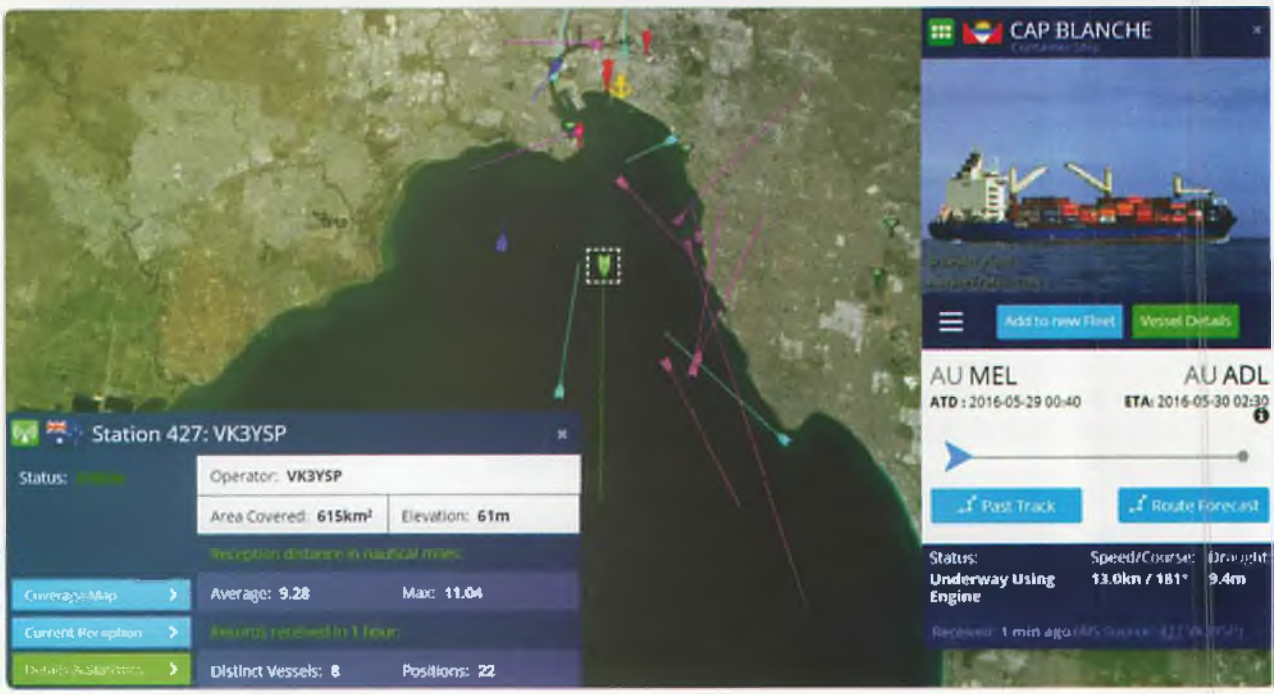


Figure 1: AIS Vessel and Station Information.

If you live near the coast and would like to be part of a global network making a voluntary contribution to the safety and security of shipping, or if you are just one of the millions of keen experimenters who bought a Raspberry Pi single board computer and still have it sitting in the bottom drawer at home, then this article might be of interest.

In September last year we were invited by Jeff 9V1AS to give a talk at the Singapore Amateur Radio and Transmitting Society (SARTS). The first speaker that evening was Mr Will Ellison of Solis Marine Consultants. Will gave an excellent presentation about the work of his organisation, investigating maritime safety incidents and the need to expand the global network of costal Automatic Identification System (AIS) receiving stations.

Will explained that AIS is a vessel tracking system, compulsorily fitted to vessels of 300 tonnes or more, used to send their position, course, speed etc. to nearby ships and to costal shore stations. AIS, which is a secondary system to radar, is used extensively for navigation, collision avoidance, fleet monitoring, maritime security, accident investigation and search and rescue. It is a line-of-sight VHF system, supported by Government, commercial and, incredibly, privately-owned shore-stations. These stations receive the ship's data over the air and then they upload it to AIS servers over the Internet. There are a number of AIS servers around the world including: *www.aishub.net, www.marinetraffic.com, www.pocketmariner.com*, and *www.shipfinder.com* to name a few.

Some share the data you upload for free, some provide receiving station information and some provide access to real-time and historical data for analysis. They also have web-based, desktop and mobile apps so that you can view your AIS data on a map. If you browse to any of these web sites you can experience this amazing system for yourself. Click on a ship, and you can see all its details. If the location or callsign of the receiving shore station is displayed, you can click on it to see its coverage and receiving statistics. An example is shown in Figure 1.

Now, it is true that the coastal system has recently been augmented by satellite-based AIS receivers, which now provide mid-ocean vessel tracking but this emerging technology has yet to achieve the high availability and low latency of the fixed shore-stations. Coverage is so important that

some AIS operators even offer free receivers to prospective stations located in poor-coverage areas. After the presentation, we asked Will why this topic was applicable to amateur radio operators. He said quite simply that radio amateurs had the necessary antenna masts, time and expertise required to build and operate their own AIS receiving station. They are quite literally an untapped resource in the global quest for better maritime security and safety.

We then discussed the availability of suitable hardware and software and the complexity and cost of building an AIS receiver kit. Although DVB television dongles had been used for this in the past, at the time they suffered from poor frequency precision and temperature stability. And the software, typically based on the gnu radio suite, wouldn't run on the inexpensive Raspberry Pi computer although, more elaborate kits was commercially available for around $300. So, at the time, it seemed to be beyond the scope of a typical amateur radio weekend project.

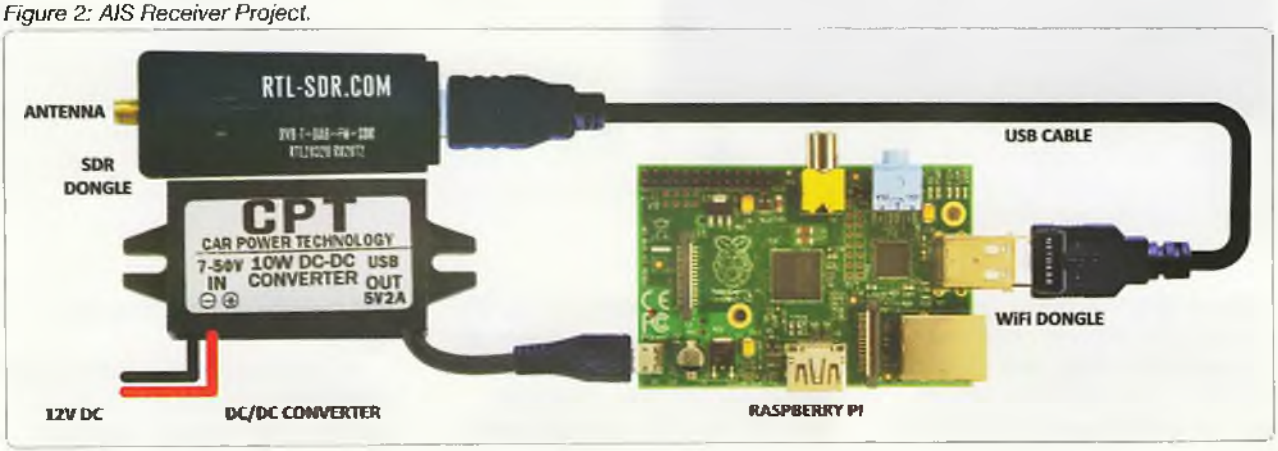
It wasn't until recently that we revisited the idea and after a bit of Googling we happened upon a workable solution: These days, you can get RTL-SDR dongles with a temperature-compensated crystal oscillator (TCXO) with 1 ppm frequency precision. So that takes care of the drift and tuning problems. Then we found an optimised RTL-AIS demodulator/decoder program, which didn't require gnu radio and sends AIS data directly to an AIS server. What's more, we tested it and found it would run reliably on our 2012-vintage Raspberry Pi version 1 board! The hardware setup we used is shown in Figure 2. The parts shown can be obtained new for under $100.

So, we began our own AIS receiver project by first setting up a receiving station account on one of the AIS servers. It was quite simple. After entering your callsign and location they send you an e-mail providing the IP address and port number you need to use to send them your AIS data.

Then, we downloaded the latest Raspbian-Jessie disk image from www.raspberrypi.org onto a PC and copied it to an 8 GB SD card using Win32DiskImager. Note: You will need a micro SD card if you are using the Raspberry Pi 2 or 3. The Jessie distribution appears to contain a lot more support for RTL dongles than the original Wheezy one did.

We plugged the SD card into the Pi, connected up an HDMI monitor and then a USB keyboard, USB mouse and USB Wi-Fi dongle via a small, powered, USB hub (a necessity for the Pi version 1 boards, as many will remember). The system was powered up and it booted to the desktop. After our locale and Wi-Fi settings were

Figure 2: AIS Receiver Project.



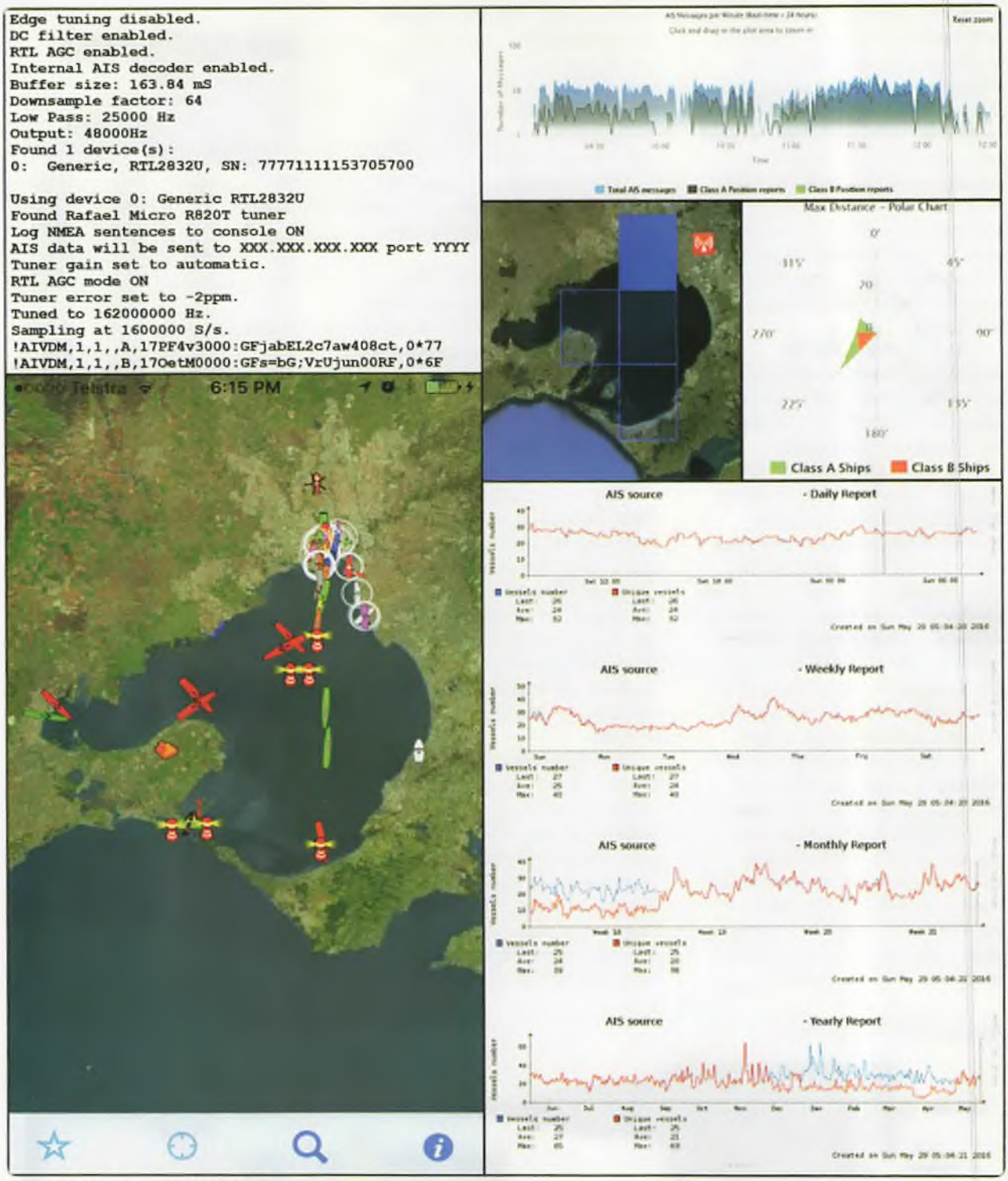


Figure 3: AIS Receiver Operation.

entered, the system was configured to start up in terminal mode and was rebooted. Then, over the Internet via the Wi-Fi dongle and our home Wi-Fi router, the system software was updated and the RTL-AIS program and its dependencies were downloaded and compiled. Some auto-start-up commands were added to the terminal profile and then the unit was shut down again.

All that remained was to remove the hub and to connect the Wi-Fi and RTL-SDR dongles directly to

the Pi. The system was powered up, this time via a 12 V battery and a 12 V to 5 V USB DC/DC converter. With an antenna connected to the RTL-SDR dongle we could see the received AIS data, which are called NMEA sentences, displayed on the screen. By logging into the AIS server we verified that our data was also being uploaded correctly and we could review our receiving station coverage and statistics. The AIS receiver operation, including RTL-AIS output, message statistics, coverage area and pattern, is shown in Figure 3, along with Pocket mariner's Boat Watch mobile app.

Although the new system worked "out of the box" some optimisation might not go astray. A quick frequency check with a program called "kalibrate", using a local mobile phone tower as a frequency reference, showed that both of our two new RTL-SDR dongles were off frequency by +2 ppm. The correction of -2 ppm was entered on RTL-AIS command line and the device restarted. To confirm the value, we found by trial and error that the receiver would work with an offset from -7 ppm to +4 ppm, with a mean value of -1.5 ppm. So -2 ppm was actually close enough! It also indicated that other, lower precision dongles might be pressed into service with a bit of "tuning around".

Another useful optimisation is to run a program called AIS Dispatcher from AISHUB. This brilliant little program down-samples the AIS data by removing duplicate NMEA sentences before uploading them to the AIS server. Note that each vessel sends the same NMEA sentence on two different frequencies; 161.975 MHz and 162.025 MHz. The RTL-AIS receiver monitors both frequencies simultaneously. Removing the duplicate sentences can reduce your upload bandwidth by as much as 50%. AIS Dispatcher also lets you upload the data to as many as 12 different AIS servers. You might wonder why this is so important. Well, it turns out that some AIS servers don't like to share your AIS data for free. That's not fair, so with AIS Dispatcher you can create multiple AIS server accounts and upload to them all!

We decided to package our AIS receiver in an ABS weather-proof enclosure so that it could be mounted directly on the antenna mast. Since it uses Wi-Fi, there was no need for routing long coaxial or Ethernet cables through the window. The unit, which draws only 2 watts, could be run from a 12 V plug pack over a thin, two-core flex. Better still we could use a 25 W solar panel, 2 A solar charge controller and 20 AH SLA battery to power the system continuously. The completed unit is shown in Figure 4.

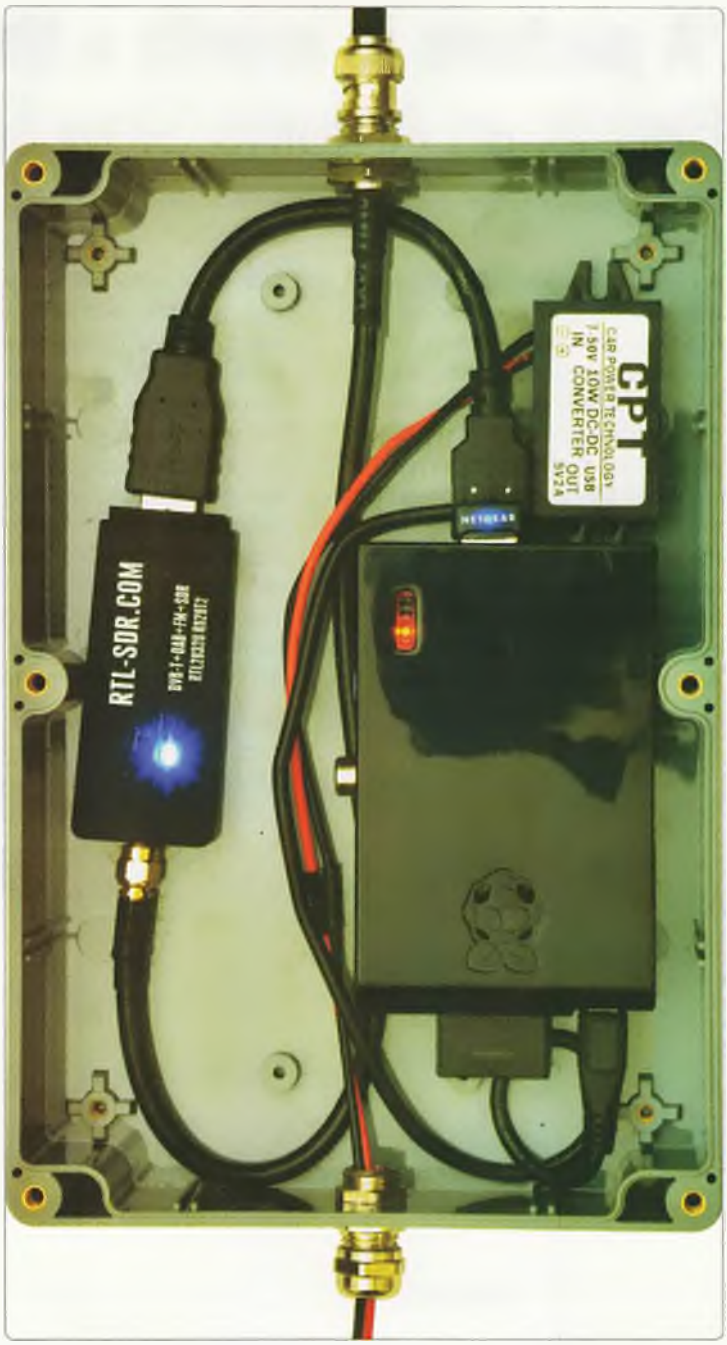


Figure 4: Completed AIS receiver unit.

The receiver requires a 162 MHz vertically-polarised antenna. The antenna pattern (omni-directional or uni-directional) needs to suit your location. Again the Internet has numerous examples for home constructors, including a coax-collinear, a Slim Jim and an assortment of Yagis. A bandpass filter is also required if strong nearby interference is present. We mounted a collinear antenna and the enclosure on a 6.5 m mast. The results have been completely satisfactory. For a parts list and more detailed, step-by-step, build instructions please visit us at *www.sarcnet.org*.

'A picture is worth a thousand words'
Part 2: an Arduino Slow Scan TV receiver

Dale Hughes VK1DSH

An Arduino based SSTV generator was described in an earlier article of this magazine (December 2016). This article presents a matching Arduino based receiver that can display off-air images transmitted using compatible SSTV modes.

When SSTV was first developed, the Cathode Ray Tube (CRT) was the only means of displaying received images and various CRT based designs were published, even by the venerable *Electronics Australia* magazine (1). An issue with the simpler designs was that they typically used CRTs with long persistence (P7) phosphors which held the image as an after-glow for some seconds after reception, thus the usable reception modes were limited to relatively low resolution images sent quickly. After that came various designs that digitised the signal and displayed the image on a conventional Fast Scan TV monitor (2) and these systems worked very well with the different SSTV modes that were developed over time. The final iteration was the Personal Computer with appropriate software which could demodulate and display the SSTV images and this became the most popular and successful way of using SSTV on the amateur bands. MMSSTV (3) is one of the more popular and flexible programs that are freely available for sending and receiving SSTV. There are even SSTV aps for your mobile device!

The idea behind this project was to come up with a simple 'build-it-

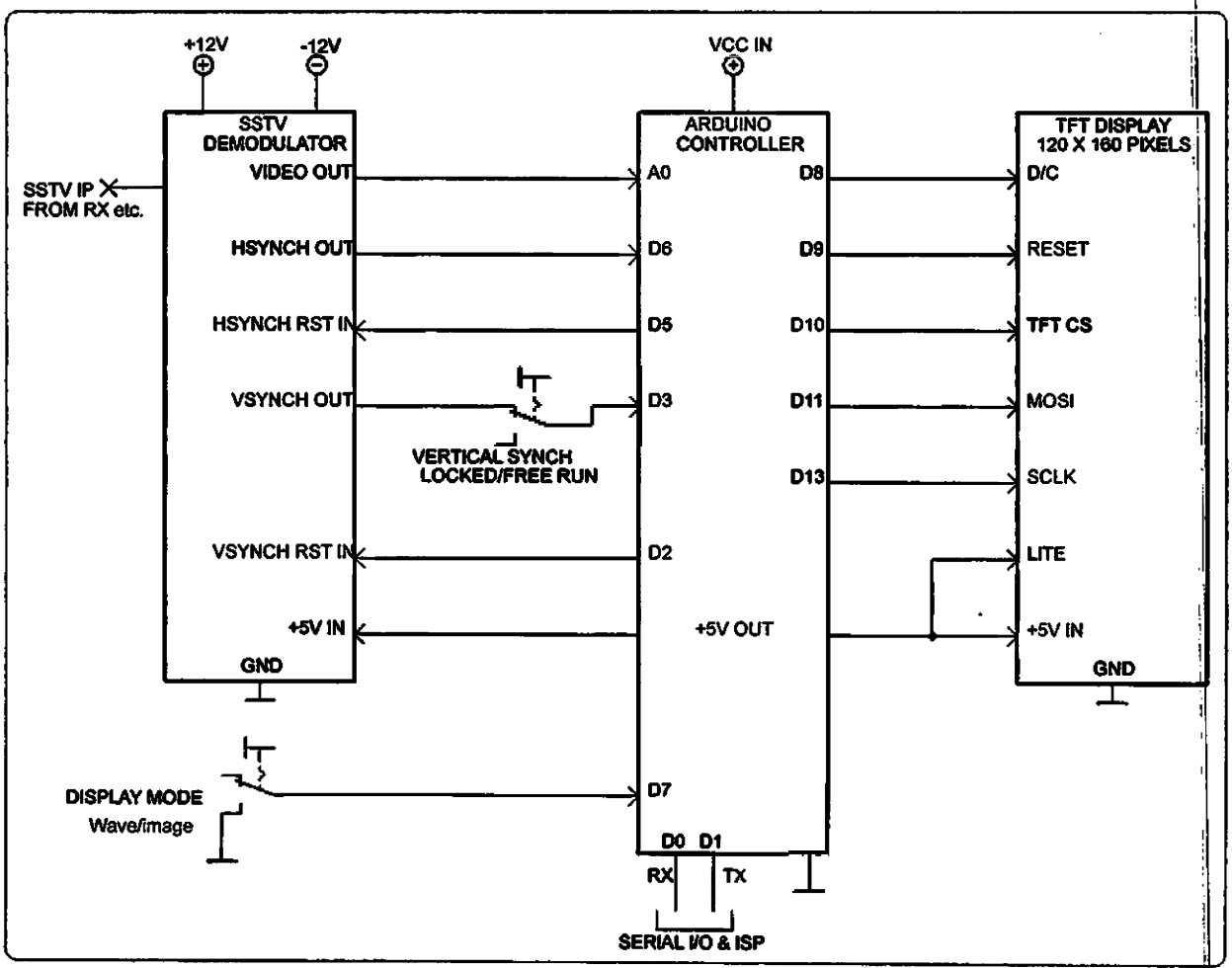


Figure 1: Block diagram of the SSTV receiver.

yourself', low-cost and functional system that could receive and display grey-scale images without using a PC while using readily available components. The receiver provides two functions:

- Display 120 line by 160 pixel monochrome images (also known as quarter VGA)
- Display the waveform of every second video line on an oscilloscope like display which is useful for testing purposes.

Figure 1 shows the bock diagram of the receiver and it consists of three parts; the demodulator, the Arduino microcontroller and a display. The demodulator converts the frequency modulated SSTV sub-carrier to an analogue video waveform and extracts the vertical and horizontal synchronising signals required to maintain image synchronisation. The analogue video signal is digitised by the Arduino and then sent to the display. The Arduino also uses the vertical and horizontal synchronisation signals to write each pixel in the correct place on the display.

Demodulator circuit description

Figures 2 and 3 show the demodulator that converts the SSTV subcarrier in the 1500 – 2300 Hz frequency band to a voltage between 0 and 5 V that represents the brightness of each pixel. Synchronising pulses are also derived from the 1200 Hz tone bursts. To remove image brightness variations due to signal amplitude changes the SSTV tone first passes through a limiter stage (U1) which produces a square wave output with constant amplitude. The signal then passes to a band-pass filter (U2) with a centre frequency of 2300 Hz (corresponds to white), this demodulates the frequency modulated sub-carrier by acting as a 'slope detector' i.e. as the signal frequency varies the filter output amplitude changes; maximum amplitude corresponds to the brightest pixels and the lowest amplitude output corresponds to dark pixels. The SSTV tone, which now varies in amplitude with brightness, is passed through a precision rectifier (U3 and U4) which extracts the envelope of SSTV signal which is then filtered by U5 to remove the high frequency ripple. The filter cut-off frequency is approximately the highest possible video frequency, which corresponds to alternate black and white pixels (approximately 900 Hz). The final stage of video processing is U6 which adjusts the DC level of the video signal to ensure the image component stays between 0 and 5 volts which are the limits of the Arduino Analog to Digital Converter (ADC). Diodes D3 and D4 protect the ADC input from spikes or excessive voltages.

Extracting the 30 millisecond vertical and 10 millisecond horizontal synchronisation signals from the SSTV sub-carrier is done using a high Q band-pass filter. The filter (U7) extracts the 1200 Hz bursts from the SSTV signal, the tone bursts are then rectified and clipped to produce a series of pulses at the output of U8D. The pulses are then passed through a low-pass filter which integrates them to produce a pulse whose amplitude depends upon the duration of the 1200 Hz input signal. The shorter 10 millisecond (therefore lower amplitude) horizontal pulses are detected by U8C and the longer vertical pulses (higher amplitude) are detected by U8B. The pulses are then latched by RS flip-flops U9A and U9B. The synchronising pulses are latched so that the Arduino microprocessor can know that a synchronising pulse has occurred even if the processor is doing something else when the pulse arrives. At the appropriate time the latch is reset by the Arduino software to await the next pulse. The latches reduce the burden on the Arduino to keep in exact time synchronisation and therefore improve image stability.

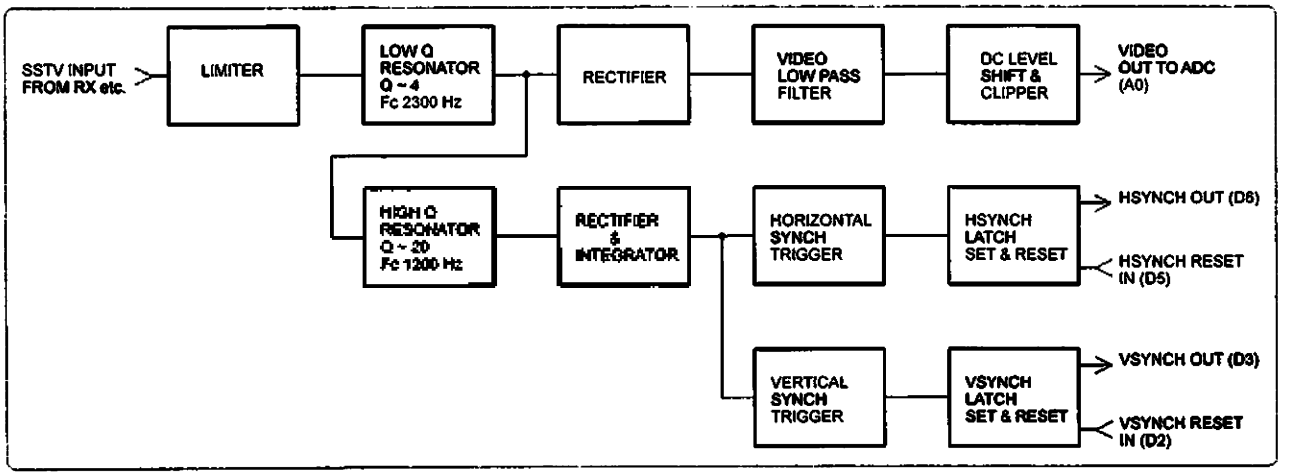


Figure 2: The demodulator block diagram.

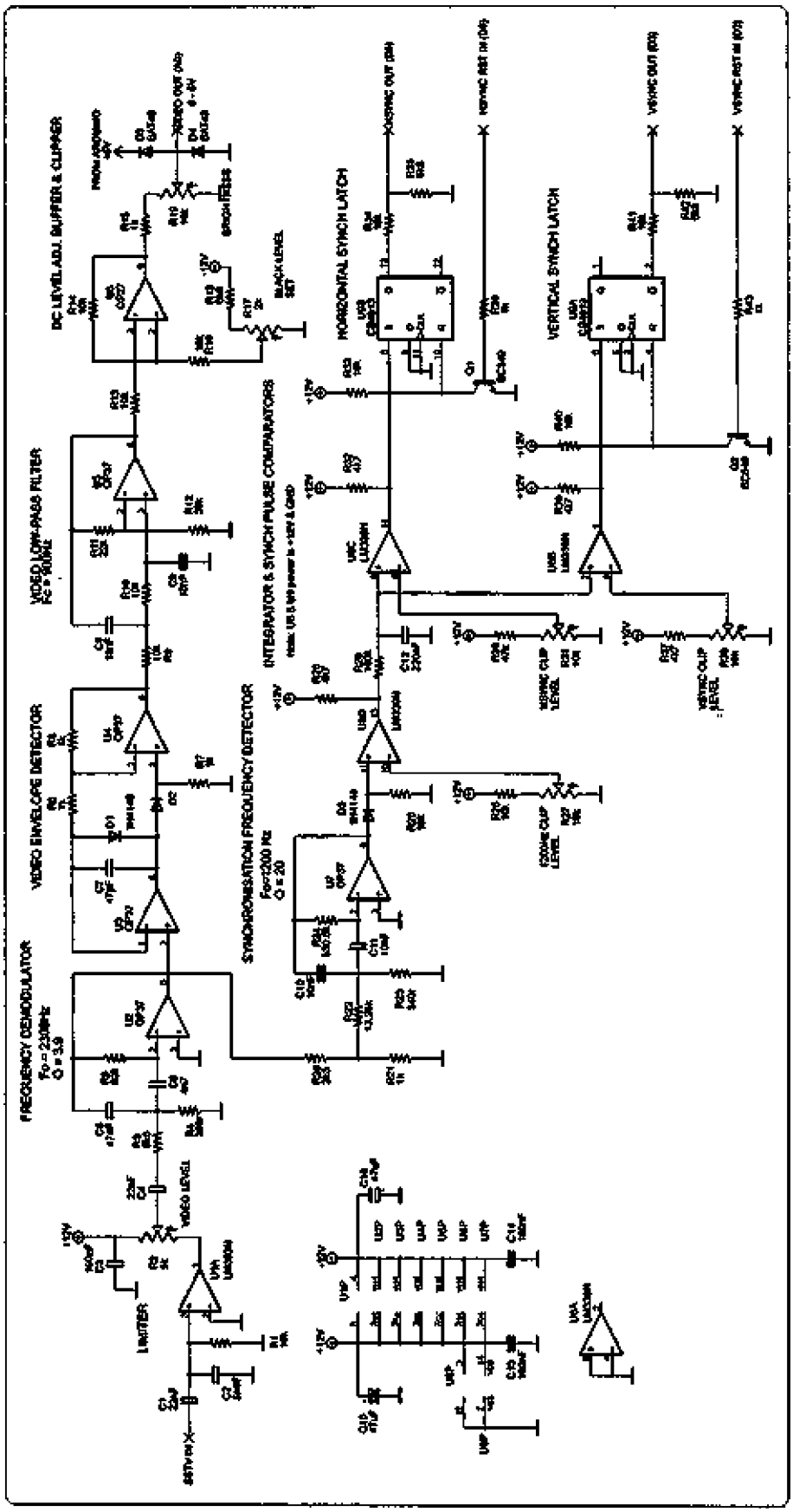


Figure 3: Demodulator circuit schematic diagram.

The Arduino display

Following receipt of a vertical synchronising pulse, the Arduino resets the display to the start of the top line and then starts digitising the video envelope using its internal 10 bit ADC. Each display pixel is digitised at the correct time based on the pixel count starting from the horizontal synchronising signal and the digitised signal is sent to the display through the Arduino Serial Peripheral Interface (SPI) connection. When all 120 lines have been received the systems holds the display until the next vertical synchronising signal is received.

To allow the receiver to display an image, or part image, if a vertical synchronising pulse is missed, the receiver can operate in a 'free run' mode. In this case each line is written to the display at the current line position. Switching to the synchronised mode forces the lines to be written from the top of the screen down upon receipt of a vertical synchronising pulse.

The display can also function as a simple oscilloscope; in this case the software waits for a horizontal synchronising pulse and then starts digitising the video envelope. The values are written to the Arduino Random Access Memory (RAM) and after 160 pixels have been received the software plots the waveform on the display as an oscilloscope like trace during the next video line, so only every second line is displayed. This was done as the software to plot the lines joining each point takes some time to execute and is unable to keep up with the incoming pixels in real time. None-the-

less it is a useful feature as it allows you to examine the incoming video waveform.

The display is a 1.8 inch (45.7 mm) 120 by 160 pixel colour TFT display from Little Bird Electronics (4), though in this application the image is only displayed in monochrome. The TFT display uses a 16 bit value for setting the colour and brightness of individual pixels, 5 bits are used for both the red and blue components and 6 bits are used for the green component. So while the digitised video information is 10 bits, only the most significant 6 bits are used for the green value and the 5 most significant bits are used for both the red and blue values. Combining the data in this way produces a monochrome image.

The image size is very similar to that available from a small CRT type display. Larger display modules could be used with minimal changes to the Arduino software.

Adjustments

There are a number of adjustments required for correct operation of the video decoder. Potentiometer R2 adjusts the limiter output level to that required for correct operation of later stages. R2 is adjusted so that the voltage difference level between black and white is approximately 5.5 V at the output (pin 6) of U6. While measuring the output of U6, potentiometer R17 (Black Level Set) is then adjusted so that the voltage for black is as close as possible to zero volts. This puts the video signal into the correct range of values for the Arduino ADC. A grey-scale test signal is very useful for doing this adjustment; otherwise it can be done with a standard audio signal generator by injecting 1500 Hz for the black level and 2300 Hz for the white level while performing the above adjustments. The brightness control can be then used to adjust the image on the display for best results.

Correct adjustment of the circuit that extracts the synchronising signals is best achieved with a suitable SSTV test signal, either from the previously described SSTV test generator, or from a PC using an application like MMSSTV. The first step is to monitor the output of comparator U8D and adjust potentiometer R27 (1200 Hz Clip Level) so that a series of pulses of duration 10 ms (horizontal) and 30 ms (vertical) synchronising appear on the output of U8D.

Potentiometer R38 (V-synch Clip Level) is adjusted so that the output of U8B responds only to vertical synchronising pulses. Potentiometer R31 (H-synch Clip Level) is adjusted so that pulses are generated at the output of U8C that correspond to the horizontal synchronising signal (noting that the output of U8C will also generate signals in response to the much longer vertical pulse). Table 1 gives measured values for the voltages at the comparator (U8) inputs as measured on the prototype unit.

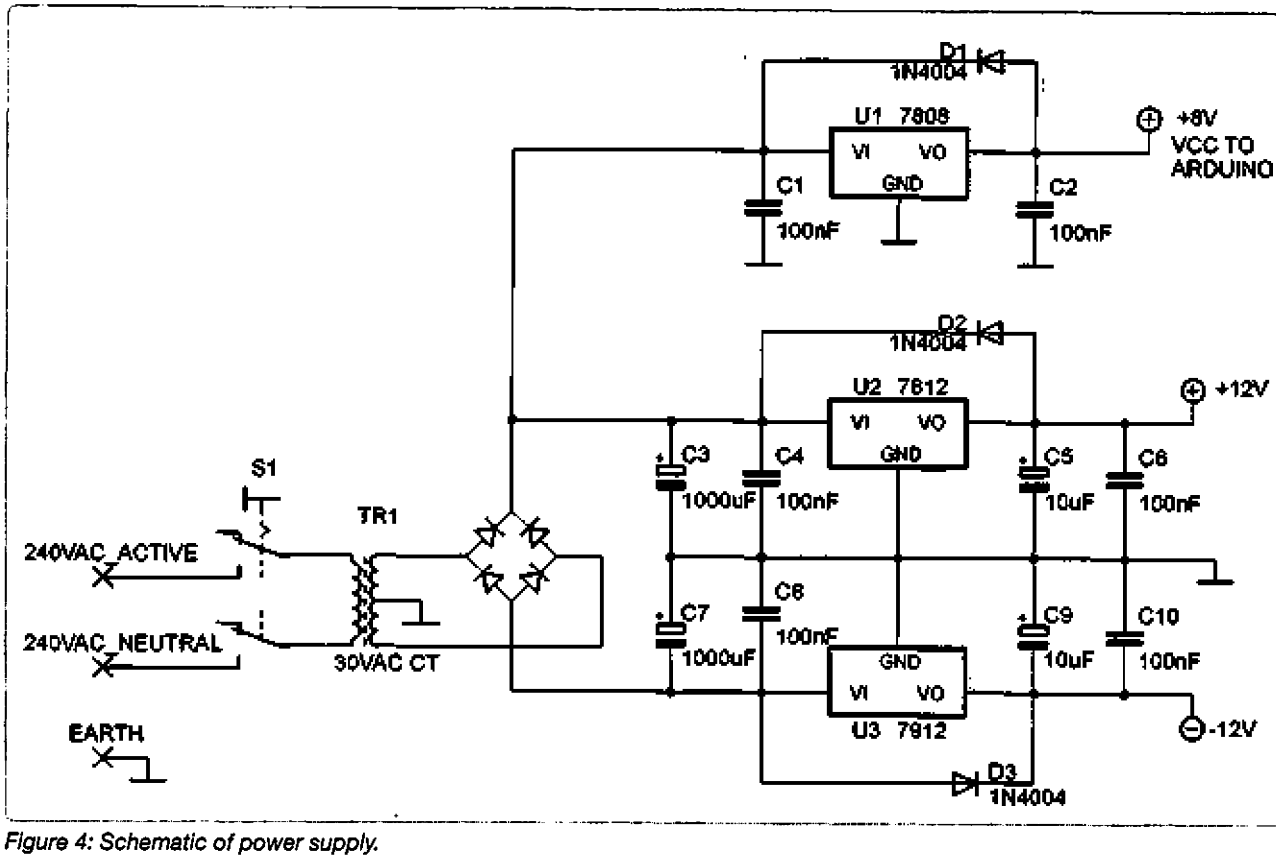


Figure 4: Schematic of power supply.

Control	Potentiometer	Location	Value (VDC)
1200Hz Clip Level	R27	Pin 10 U8	2.08
H-synch Clip Level	R31	Pin 8 U8	0.808
V-synch Clip Level	R38	Pin 6 U8	1.257

Table 1: Adjustment (from prototype) settings, assuming that the video signal (white-black) is 5.5 V at the output of U6.

Power to the receiver is provided by a conventional linear power supply using three-terminal regulators supplied from a power transformer which has a 30 VAC centre-tapped secondary. Positive and negative 12 VDC is generated for the analog circuitry and an 8 VDC supply is provided for the Arduino microcontroller. Figure 4 shows the schematic of the power supply.

Conclusion

A basic SSTV receiver has been described. The receiver will display monochrome images of 120 lines by 160 pixels based on the 'Robot 12' standard. The receiver uses a video demodulator built using readily available components which is also easy to adjust for correct operation. Both the SSTV receiver and companion transmitter/test source might make interesting STEM (5) projects for teaching some fundamentals of programing, image transmission, analogue and digital hardware. None of the components used in the receiver are critical and a wide variety of substitutions for the operational amplifiers, comparators and Arduino hardware is possible. The Arduino source code is available from the author.

References

(1) "A basic monitor for slow-scan television", Ian Pogson, Electronics Australia, May, 1974.

(2) See for example "Slow Scan Television Explained", Mike Wooding G6IQM. *http://sstv.ccone.at/downloads/sstv.pdf* and other web sites as well.

(3) For information about MMSSTV see *http://hamsoft.ca/pages/mmsstv.php*

(4) *http://littlebirdelectronics.com.au/products/1-8-color-tft-lcd-display-with-microsd-card-breakout-st7735r*

(5) Science, Technology, Engineering and Mathematics. STEM projects are designed to encourage learning in these areas.

Figure 5: The complete SSTV receiver. Circuit construction is non-critical and the various items of hardware can be assembled in any suitable enclosure.

Radio Theory Handbook – Beginner to Advanced

New theory textbook released

Jim Linton VK3PC

More than 40 years electronics and communications experience, and being the founder of the Radio Electronics School in 1997, provide the foundations of this latest reference text.

Ron Bertrand VK2DQ has authored an eBook that also has a hard copy version, called the Radio Theory Handbook – Beginner to Advanced.

It covers 36 topics using multiple chapters on four of them in 565 pages, including a useful alphabetical index.

Looking at its table of contents and reading the chapters it is a text book that goes beyond the Amateur Radio syllabus for the Standard and Advance licences.

Like other publications available, it seeks a much broader market. It adequately caters for the experimenter and those who wish to be further educated.

For example, this book has text on microphones, some special modes of transmission and reception, oscillator types and valve technology. These are not in the international standard syllabus.

However, this is a very important and affordable text book that technicians and those studying the theory knowledge needed for three tiers of Amateur Radio licence in Australia and overseas will find useful.

The book begins with a firm understanding of Basic Electricity in three chapters. Once this concept of electricity is learnt, it leads to current flow, voltage, resistance and power – with their application and calculation.

Only a minor point but the publication does not stick to the accepted format of the use of

Mega and kilo when discussing the conversion of one to the other (page 33) but treatment of the subject is good.

Chapter 4 covers Ohms Law thoroughly showing how to transpose the formula. To my mind the inclusion of a triangle diagram found elsewhere could further help those studying the subject.

Magnetism is then discussed, followed by alternating current that has a vital role. Next to come are capacitance, inductance, multimeter, cells/batteries, transformers, circuits, resonance, oscillation, impedance, power supplies, electromagnetic radiation, frequency & wavelength, solid state devices, amplifiers, oscillators, propagation, modulation, transmitters & receivers and filters.

Outside the syllabus it goes into valves (electron tubes) and thermionic emission and covers these subjects well. While not in widespread use these days, it can be beneficial to understand the basic principles that are now achieved by solid state devices.

The treatment of analogue television interference may be superfluous now that digital TV is used but, as the book explains, the broad subject is still required learning.

This catch-up with digital transmission and a greater appreciation of electromagnetic compatibility (EMC) with a relentless explosion of things electronic may be warranted.

Advice on being diplomatic and cautious when dealing with a neighbour complaining of interference is sound advice.

The ways in which a radio signal can find its way into household appliances, as well as knowing the causes and cures of interference, are clearly explored.

Chapter 37 is on antennas from the basic types, gain and radiation patterns followed by transmission lines, standing wave ratio, baluns and more.

Test equipment, measurements and discussion of a number of special modes of transmission and reception are covered.

It is a well-designed reference book that has the basic concepts of electronics and communications in a teaching style adopting a methodical progressive approach with the vast experience of the author coming through on every page.

Radio Theory Handbook - Beginner to Advanced, is available is a paperback or as a downloadable eBook. The link is:

https://www.amazon.com/Radio-Theory-Handbook-Beginner-Advanced/dp/1534696121/

SOTA & Parks

Allen Harvie VK3ARH

New VK2 Mountain Goat: Russ VK2BJP

Russ VK2BJP started activating 4 May 2014 and in the last days of January gained Mountain Goat status. Russ achieved the 1000 points required with only 137 summits.

The final summit was Mount Tawonga VK3/VE-076 and it was a ZL contact that took him to Mountain Goat, whilst, in typical fashion, activating three summits along Eskdale Spur in NE Victoria.

Living in Albury, on the NSW and Victoria border, gives him excellent access to some of the highest and most numerous summits in VK. Russ had taken full advantage of this position with activity predominantly in the Victoria NE region (VK3/VE-xyz). Russ tends to activate seasonally by activating several summits in the area and has a modest sprinkling of winter bonus points.

Congratulations to Russ and looking forward to more contacts.

2017 VK3 SOTA Conference

The fourth VK3 annual SOTA conference was held on 11 February 2017 at the Club Rooms of the Moorabbin and District Radio Club, 31 Turner Road, Highett. There were 32 attendees from around the state and from over the Murray River border. The little club room was packed.

The doors were open at 9:30 am for a free welcoming coffee and tea. The talks began at 10:00 am with Andrew VK3ARR, one of only two regional representatives of the SOTA Management Team, giving a run-down of summit updates. Software is used to locate potential summits with final checks being made by examination of detailed maps. New summits are to be added for most VK regions this year.

A more detailed analysis of VK statistics by band and mode was presented by Wayne VK3WAM. Activity seems to have levelled out after some rapid growth. The low sunspot count has seen a reduced reliance on 40 m and more on 2 m and surprisingly 15 and 10 m where sporadic E has played a role.

At 11:00 am there was an exodus to the park outside where Peter VK3YE demonstrated his simple 160 m vertical. A very solid contact over 50 km was made using 10 W of AM. The antenna cost, excluding the squid pole, would be less than $10. Many of the attendees took advantage of the few minutes before the next session to load up on caffeine again.

Glen VK3YY gave a warts and all users report on the Elecraft KX2. This is a Software Based Transceiver in a small box with most of the features and capability of the KX3. It is HF only and weighs in at half the mass of an FT-817 but with more features and better performance. The hand microphone supplied came in for some criticism and Glen has replaced his with an alternate. With 10 W output and inbuilt ATU and battery it is a formidable little rig that can be slipped into a coat pocket.

A few savvy activators have been using VK port-a-log, an application for Android tablets or phones. The creator, Peter VK3ZPF, gave a very intriguing presentation showing how it simplified log keeping and general operating when away from home. The pencil and pad log scribble is now consigned to history. It's not just a log program for SOTA, WWFF or Shires portable operation, it can send and receive spots, given phone coverage at the site. It is a fully developed feature rich application in world-wide use. Just Google for the Yahoo site from which you can download the app.

The last speaker was Peter VK3PF with a talk titled "40 m is not working. Again!" Peter discussed some of the current and possible future options for bands to be used on activations, given the unreliability of NVIS on 40 m. Being a VHF/UHF/Microwave operator from way back, it was not a surprise that Peter concentrated on the bands above 50 MHz. His 6-element 2 m beam using the top two sections of a squid pole is an elegant solution to a light weight beam for the bush basher.

In the meantime, Tony VK3CAT, the Club's resident BBQ expert had cooked up a pile of excellent sausages with onions. These were eaten with relish and tomato sauce by a hungry throng

Several other SOTA antennas were erected including a kite for 80 and 160 m. It was too balmy to allow a launch but most peaks have adequate breeze most of the time. VK3YSP set up on JT65 to show that even though the bands sounded dead it was possible to hear ZL, VK5 and VK6 on 20 m at lunch time. He then proceeded to run 100 mW and have a QSO with a VK4.

Some plans for testing new 4WD and camping gear were hatched in between munching sausages. Marc VK3OHM, Allen VK3ARH and Peter VK3ZPF were seen talking about the working of the Local Government Area and Summit ID look up App on parksnpeaks.org and all three went home and are now writing new code to make it even better. This shows the value of face to face networking at events like this.

Thanks to Tony VK3CAT and Ken VK3KIM for assisting with the organizing, Tony VK3CAT for the catering and cooking, Ken for handling the finances in the

absence of the treasurer and the Southern Fly Fishers for the loan of their BBQ.

Next year will be bigger and better.

Ron VK3AFW

2017 SOTA Mount Hotham gathering

Brian VK3MCD organised the second annual gathering of SOTA enthusiasts based at the Peninsula Ski Club at Mount Hotham, held over the last weekend in February. The site is surrounded by 10 point summits, some easy to get to and many not so easy, however staying at 1750 m ASL gives the best possible starting point to access these big mountains.

The activators worked in groups to tackle summits with activities ranging from a 22 km return (walking) activation of VK3/VE-002 (Mt Feathertop), to a drive up evening activation of VK3/VE-006 (Mt Hotham), including 160 m. As always, opportunities for all.

Weather was excellent but HF conditions were average to poor during the day. We relied on 2 m FM contacts back to base camp where Alan VK3FABT was stationed as well as S2S contacts with the other activators on mountains to qualify some of the summits.

During the late morning, we received news that Ron VK3AFW's car had overheated near Omeo. After Nunniong, VK3MCD drove into Omeo and picked up Ron, then headed off to activate VK3/VG-015 (Mt Phipps) and VK3/VT-020 (Mt Birregun). Ron was in good spirits for someone whose engine had just blown up.

Just wanted to thank all the chasers who, in trying propagation conditions, supported the activators and to Brian for making this repeat event a must do on the SOTA calendar.

Sunday saw some heading for home (via some summits of course) or activating further summits in the Hotham region prior to heading home on Monday.

In attendance were Tony V3CAT, Glenn VK3YY, Paul VK3HN, Ron VK3AFW, Allen VK3ARH, Brian VK3MCD and Peter VK3PF. Missing from photo is Alan VK3FABT and Ken VK3KIM.

Everything fell into place and I think that all had a fun weekend, although Ron's weekend was a little soured despite achieving half goat.

Activator reports include:

VK3PF: *https://vk3pf.wordpress.com/2017/03/02/2017-sota-mount-hotham-gathering/*

VK3HN: *https://vk3hn.wordpress.com/2017/03/03/hotham-sota-weekend-2017/*

VK3ARH: *https://vk3hra.wordpress.com/2017/02/27/25022017-hotham-sota-activation-weekend/*

Parks activations continue, somewhat dependent upon the weather. Several VK5 activators attempt to get out on a Friday evening, if the weather conditions make it safe – they are always wary of hot and windy conditions, which make the fire danger high. Others are activating when opportunities and weather conditions allow. Keep a watch on ParksnPeaks.

Finally, on returning to Mt Strickland VK3/VN-030, Nick VK3ANL went in search of a battery left on the site November 2016. By working back from the operating stump, he found the missing Turnigy 3600 mAh 3S1P LiPo, 45 A Anderson connectors and Yaesu DC6 power cable. After drying the power connector, he then went on to use it to power a FT-817 for another 25 contacts over 45 minutes. At that point the voltage was starting to sag. So, there you have it, an all-weather performance combination that can support three full activations over four months and you can leave onsite saving the need to carrying the weight.

Allen VK3ARH

DX Talk

Luke Steele VK3HJ

Solar activity continued at low levels through February, with many days of no sunspots, and solar flux down in the 70s and occasionally into the 80s. In fact, the current trend is below the curve of the predicted decline towards solar minimum around 2020, indicating a minimum as soon as some time in 2018. What actually occurs remains to be seen, so don't give up on the HF DX just yet!

The best band for DX continues to be 40 m. Keep an ear on 20 m, whilst there are fewer good openings, there is still a reasonable amount of activity there. There have been a few closer expeditions to places like Pitcairn Island, Tonga, Austral Islands, and Macau that have been workable on 17 m, and some of them on 15 m also. After looking for Europe on 160 m around sunrise, TL8TT Central African Republic was worked on 40 m phone one morning. Europe has also been coming in on 40 m after sunrise.

There has been some activity from UK Sovereign Bases on Cyprus recently, with the most active being ZC4A in the first week of February. This entity was regularly on air, especially in contests with ZC4LI Steve always very active until his passing in August 2013.

Upcoming DX

DXpedition activity scheduled for April includes the following:

P29VXG **New Guinea**, New Britain Island (OC-008) 6 - 12 April. Haru JA1XGI will be operating from Rapopo on HF with an IC-7300 to a 6 m high vertical antenna.

A website with log search can be found at: *http://island.geocities.jp/P29vacation/index.html*

S79Z **Seychelles**, Mahe Island (AF-024) 6 - 18 April. A team of six Czech operators will be operating CW and SSB, 160 - 10 m. QSL via LotW or OM2FY.

J5 **Guinea Bissau**, Rubane Island (AF-020) 7 - 15 April. Josep EA3BT as J5B and Núria EA3WL as J5W will be operating CW, SSB and RTTY on 40 - 6 m, and maybe also 80 m. QSL via EA3BT.

A25UK **Botswana**, 25 April - 6 May. A team of eleven UK based operators will be on CW, SSB and RTTY, 160 - 10 m. QSL via M0OXO, and LotW. For more information see their website. *http://www.a25uk.com/*

See NG3K's "Announced DX Operations" website for a very up-to-date calendar of DX activations around the world. *http://www.ng3k.com/misc/adxo.html*

Other news

There has not been much DX activity from your author's station this past month due to moving house. Over the next month or two, the station will be back on air, with plans for Low Bands antenna improvements.

Thanks to Lee VK3GK for his article on the upcoming two island DXpedition later this year.

Christmas Island VK9XI and Cocos (Keeling) Island VK9CI DXpedition, October 2017

In May 2015, several VK Contesters and DXers travelled to Dayton Ohio to attend the famous Dayton Hamfest.

Late one evening after the DX Dinner or Contest Dinner, a few well known DXpeditioners (K3LP, K1LZ, GM3POI etc, whom some of us had met before on previous DXpeditions) caught up with us and we started chatting about potential venues for DXpeditions into the Oceania and Pacific regions. Well that worked for us VKs, as the potential commute to the destination was reasonably close by.

David K3LP suggested we should seriously consider and take a look at the possibility of activating Christmas Island VK9X and/or Cocos (Keeling) Island VK9C as these were fairly wanted and rare for North America and Europe, especially on the Low Bands.

Cocos Island is nearly the antipode for North America and is a difficult path, especially for the East Coast USA. However, Japan and Europe are "basically" in a northern direction.

Chris VK3FY, Peter VK3FN, Tony VK3TZ, Lee VK3GK and David K3LP were all present at these first discussions and so the seed was planted to plan a DXpedition to Christmas and Cocos Islands.

Now, when was the "best time" to go?

It was decided that October is probably a good month. It is pre cyclone season, around equinox time and also coincides with the Oceania DX Contest, how convenient.

A joint decision was made to participate in the SSB portion of the contest from Christmas Island on the first weekend and then travel to Cocos-Keeling Island to operate the CW portion the following weekend.

So we planned to spend seven days on each island.

The best part about the ODXC is that it's only 24 hours long, so not too taxing and we can still get a lot of DXpedition operating in as well, compared to the big 48 hour contests which can burn you out after 2 days solid operating.

Initially only as a group of five but we were heavily weighted as SSB ops, we needed another good CW op. What to do?

During discussions, Luke VK3HJ's name kept popping up. Luke, a well-known DXpeditioner (VK9MT, YJ0VK, VK9NT, etc) and DXer, who has a great CW and low band operation skillset. So an invitation was offered to Luke from the team to participate, which he accepted.

Krassy K1LZ was still pending but has now committed to come, bringing with him a complement of low band phased verticals for 80 m/160 m in his "kit bag" – as well of some other niceties which will complement our operating and higher band activities.

At this stage David K3LP, Krassy K1LZ and Chak JT1CO will be part of the "international" contingent; they will add to the CW ops and will focus mainly on the 160 m/80 m Low Band operations.

Keep an ear out on the bands, watch the DX Clusters in October for VK9XI on Christmas Island from 3 - 10 October and VK9CI on Cocos (Keeling) Island from 10 - 17 October.

Operation: 160 m -10 m, including WARC, with the possibility of 6 m.

Modes: SSB, CW and some RTTY thrown in for good measure.

We have great venues on both islands, a good assortment of performance antennas, quality radio gear and a good selection of operators.

So a simple chat around a table, in a far off land, evolved into this DXpedition into the Indian Ocean in October 2017.

Hopefully the propagation gods will favour us and if we are on and active – well you should hear us.

See you in the pileup.

73, Team VK9XI and VK9CI

Doc VK5BUG has been busy with his new book *Cellar-dwellers on the go! Operating 2200, 630 & 160 m away from home*, ISBN-registered, 15 chapters, 200+ pages and an international compendium involving 12 authors. This is the sequel to the *MF Down Under* which sold out four print runs. Doc has been off air for about 15 weeks and is now enjoying some time on air again, together with post-grad full time study at Flinders Uni.

Doc was on 160 m around sunrise on 25 February. After working Kay JA8EIA on 160 m with only 20 watts, Doc put out a few CQ calls with 5 watts and worked Shige JH2FXK. Five watts! To work DX on Top Band, one usually needs quite high power, so these QSO with only very low power are quite special. Another point worth mentioning is that Doc is in his seventies! We look forward to his new book about to be published, and news of his activities on the LF and MF bands.

Please email me with any DX related news for inclusion in this column. I am particularly interested in hearing about DX worked or heard in other states. vk3hj@wia.org.au

73 and good DX,

Luke VK3HJ.

GippsTech 2017

The annual GippsTech conference is coming. With a reputation as a premier amateur radio technical conference, GippsTech focusses primarily on techniques applicable in the VHF, UHF and microwave bands, especially for weak-signal contacts.

GippsTech 2017 will be happening on the weekend of 1 and 2 July, at Federation University Australia Gippsland Campus in Churchill, Victoria, about 170 km east of Melbourne.

Call for papers

Anyone wishing to share information with others is invited to submit a title and brief summary of your planned presentation to the Conference Chair Peter VK3PF as soon as possible. Please be sure to indicate your expected length of presentation: it could be a short 10 minute item through to a detailed presentation of up to an hour.

We look forward to seeing you at GippsTech in early July.

Those wishing to present at this year's conference should contact the Chair as soon as possible:

vk3pf@wia.org.au

Peter VK3PF

Conference Chair

Further details will be available from the Eastern Zone Amateur Radio Club website: *http://www.vk3bez.org/*

VK7news

Justin Giles-Clark VK7TW
e *vk7tw@wia.org.au*
w *https://groups.yahoo.com/neo/groups/vk7regionalnews/info*

VK7 Repeater News

For a couple of years now, VK3VS and VK7DB have been working on a project to enable the linking of repeaters via the internet. The VKLink project was born and has now been released more widely. It uses a Raspberry Pi (2 or 3), a radio and a CM108/CM119 sound card. There is a daughter board being developed as a complete solution. Currently repeaters VK7RDR, VK7RTV, VK7RAC, VK7RTC, VK7RCH, VK7RAK, VK7RAA and VK7RVP are linked using VKLink in VK7. For more information take a look at the website at *http://www.vklink.com.au/*

The licencing updates of the Northern Repeater VK7RAA have been finalised and includes the following digital voice frequencies pairs using the 12.5 kHz band spacing:

Transmit	Receive
146.9375 MHz	146.3375 MHz
438.4625 MHz	431.4625 MHz
438.4375 MHz	431.4375 MHz
438.4125 MHz	431.4125 MHz
1.2739 GHz	1.2939 GHz

These services are currently being installed and commissioned by David VK7JD. Hayden VK7HH lets us know that 439.950 MHz on VK7RML in Southern Tasmania was permanently removed from service. VK7RTC can be used as an alternative. The link to VK7RCH and VK7RAA via VKLinking is available.

North West Tas. Radio & TV Group (NWTR&TVG)

http://www.vk7ax.id.au/atvgroup

Congratulations to Mark (VK7MPR) and Peter (VK7PRN) who have successfully upgraded to standard level. The NWTR&TVG AGM was held on 4 February 2017 with the following office holders elected: President – Lucas Bryan VK7LSB, Vice President - Tony Bedelph VK7AX, Secretary - Steve Bush VK7EQ, Treasurer - Eric Van Der Neut VK7EV and Committee member - David Sturges VK7VDS.

Northern Tasmanian Amateur Radio Club (NTARC)

http://www.ntarc.net/

The NTARC AGM was held on 8 February 2017 and the following office holders were elected: President - Idris VK7ZIR, Vice-President - Peter VK7KPC, Secretary & Public Officer - Yvonne VK7FYMX, Treasurer - André VK7ZAB and Committee member - Kevin VK7HKN. Thanks were given to Bill VK7MX who has been Public Officer for the last eight years. Ex-officio office holders were re-appointed. Thanks to Peter VK7PD who let us know of some great help offered to another amateur Terry VK7TR who is known as the Mayor of Mangana. Al VK7AN organised a working bee with Cliff VK7CH, Ross VK7ALH and Peter VK7PD to install an 80 and 40 metre fan dipole.

Photo 1: Mike VK7MJ presenting Maxwell to Marconi. (Photo courtesy of Ben VK7BEN).

Photo 2: Rex VK7MO showing varying microwave noise levels using a 10 GHz horn and power meter. (Photo courtesy of Justin VK7TW).

Using Cliff's pneumatic 'launcher' they were able to fire a tennis ball filled with sand over the trees enabling them to lift the fan dipole at least 17 metres off the ground. Later that day Terry was heard on the 'sewing circle' net and was really appreciative of the help given. Surely this is what amateur radio is all about!

Radio and Electronics Association of Southern Tasmania (REAST)

http://www.reast.asn.au/

The 23 cm QSO Parties continue on 1296.1 FM from 10:00 am after the Sunday morning broadcasts using the Mt Wellington as a passive reflector and then beams North using WSJT JT65c and QRA-C weak signal modes. Over the last month the signals have been good enough for voice contacts on SSB.

The REAST AGM was held 19 February 2017 with the following elected: President - Ben Short VK7BEN, Vice-President - Justin Giles-Clark VK7TW, Secretary - Scott Bragg VK7LXX, Treasurer - Alan Jeffrey VK7KAJ and Committee Members - Larry Hower VK7WLH and Barry McCann. Ex-officio office holders were also re-appointed.

The REAST February presentation was given by Mike Groth VK7MJ who gave us a fascinating illustrated presentation on the early development of the electric wireless from Maxwell all the way through to the HF Alternator in the early 1900s. Mike started with Maxwell's equations, experiments of Hertz and Lodge and the confirmation of the electromagnetic wave in 1897. Mike covered coherer and magnetic detector designs and Marconi's experimentation. The presentation ended with the development of the mechanical HF alternator schemes of Goldschmidt, Fessenden, Alexandersen and Poulsen and finished in 1914 and the start of WWI and the introduction of the electronic era of wireless with the valve coming into common use. Thanks Mike for a fascinating presentation.

The Satellite Experimenter's nights have proved popular with a focus on getting GPredict and the various rig interfaces working on Linux to handle the Doppler shift on the receive and transmit. We had some great show and tell - Martin VK7MA brought along his Russian built 300 W Power Amplifier for his ANAN, the author brought along variable attenuators, LNAs, Metronomes, Larry VK7WLH brought along linear power supply modules and Rex has been experimenting with 10 GHz horn antennas and showed us the microwave noise measurements. Check out the REAST Facebook page for more information - *http://wwww.facebook.com/reasttas*

Plan ahead

HARGfest - Lesmurdie	9 April
ANZAC Day (AX prefix)	25 April
International Telecommunications Day (AX prefix)	17 May
Oxley Region ARC Field Day - Port Macquarie	11-13 June
SERG hamfest & Foxhunt Championship - Mount Gambier	11-13 June

VK6news

Steve Kennedy VK6SJ

Greetings to all from sunny Western Australia; beautiful one day, perfect the next!

My name is Steve Kennedy VK6SJ and I have the unenviable job of following Keith Bainbridge VK6KB, who has been writing this article for *AR* for as long as I can remember. I have a hard act to follow and I can only hope I'm up to the task.

Bunbury Radio Club

The next monthly meeting of the Bunbury Radio Club will be held on Saturday, 8 April 2017 from 2:00 pm at 21 Halsey Street, Bunbury. In addition to our regular meeting, Bob VK6TJ will be talking about current technical developments in AM broadcasting. Visitors are very welcome.

As mentioned previously, we are now down to one WIA Assessor, resulting in our licence assessment program being put on hold until we can get another member qualified as either a WIA Assessor or a Training Facilitator. The ability to run these assessments been valuable in many ways, including recruiting new members and providing a convenient service to potential amateurs in the region.

The Bunbury 2 metre repeater VK6RBY is currently off the air. This follows some storm damage to the shack resulting in the repeater deciding to go on a sabbatical. We are currently working to rectify the situation. Meanwhile travellers can work the Bunbury area via our 70 cm repeater on 438.650.

At our February get-together it was decide to return to our old format of a short business segment followed by a technical talk or demonstration each monthly meeting. It was felt that a more structured approach would provide clearer communication for members.

Alek VK6AP invites all members and friends/partners to a monthly "Ham and Cheese" social gathering, where Amateur Radio is not necessarily always the topic of discussion. The time of 11 am is chosen because generally, we are old farts and at that time, the breakfast and morning tea crowd are gone and the lunchtime mob have not yet been allowed out of their offices. This allows us a bit of a quieter period and shorter wait times for food and drinks. Oh yes, it is close enough to lunch time so you can treat yourself to your midday meal.

The last event was at Bunbury and the one prior was in Busselton. In the future we could look at Harvey, Collie or even Bridgetown, to pick up some of our Manjimup/Nannup/Boyanup members. Please make the effort to join in. It was good fun last time and it will be so much better when more members join us.

For those who need to plan months ahead, here is the timetable for the rest of the year. Venues are yet to be decided.

Feb 23, Mar 23, Apr 20, May 25, Jun 22, Jul 20, Aug 24, Sep 21, Oct 26, Nov 23, Dec 21.

Northern Corridor Radio Group

The club meets on the fourth Tuesday of the month for a business meeting at 7:30 pm. All meetings are held at NPSARC. Most Sunday mornings members will also be in attendance from 8:00 am until around lunchtime at the club.

NCRG continues to be a force in the west with ongoing work on our new repeater site in Gnangara amongst a number of long term projects currently in progress. This site will service most of the northern half of the city and up as far as Yanchep. We are still ironing out some issues with our old KL repeater and have been using our new Fusion repeater in the interim.

SK Mel Bishop VK6ER

This leads into the sad news of Mel Bishop's VK6ER passing way too early – in mid January. Mel was the driving force behind the purchase of the Fusion repeater as well as a number of other initiatives at the club including the planning of a ham exam course and our security system at the club. Mel will be sorely missed but our Fusion repeater and the new site will be using the callsign VK6RMB in his memory (subject to ACMA/WIA approval). Vale Mel…

We have been planning our HF remote station for some time now which will allow our members to use our great facility from home (and for a number of our members who are road warriors – when away from Perth). We have an Elecraft K3 and SteppIR at about 20 m and a remote controllable Yaesu rotator. We also installed a Wi-Fi link to one of our member's work premises nearby to provide the fast internet access required to successfully use the station remotely. The station came on the air for the first time on 23 February.

Work on our 23 cm repeater continues. We have a 23 cm base antenna on order and hope to be on air by the next article.

Many of our members have been enjoying using the DMR mode and we have plans afoot to install a DMR node soon at our new repeater facility.

By the time this article is in print, NCRG will have participated

in the John Moyle Field Day coming up in early March. We will be congregating at a nearby national park and you can expect to have heard a big signal from our portable station during the contest.

Our new Equipment room extension to the club is well in progress. The room has a number of purposes including housing our battery bank and power supplies, antenna switching systems and new training centre. Stuart VK6BG has been one of the major driving forces behind the extension but assisted by many members of the club. Our 4-square array for 80 m is currently on hold waiting for cooler weather but once this project is finished, look out 80 m!

Peel Amateur Radio Group

This month, PARG hosted its annual swap meet and attracted a large following from across the Perth Metro area and beyond. It was good to see a number of WA based ham radio vendors attending, along with tables supported by most of the clubs in the area. A great event and looking forward to the next event.

Tony VK6DQ, a stalwart of the group, wrote the following article for this month's club report:

On Thursday, 19 January, the Peel Amateur Radio Group installed a Mesh Network antenna at the top of a Mandurah tower. Eventually we will have a 2.4 GHz system covering the Peel district. This network is the brainchild of Martin VK6MJ who has worked on and is still working tirelessly towards its completion. So far, we have six stations on line. The new antenna will enable us to reach out further into the Peel District and will add greatly to the alternative communications available to us as Amateurs in not only normal communication but in any emergency situation that may arise.

It was only an idea but it grew, and as it grew the benefits it brought became more and more desirable. We worked with very little except enthusiasm and make-do.

Our last job was the tower mesh antenna. The only thing we had to work with was a few pictures taken with a telephoto lens camera. What a job that was, trying to figure out how to fit something to the top of a tower that we could not touch. Working from a picture was not an easy task. The only measurement we had to work with was 310 mm, the width of the ladder. To scale the other steel work from that one measurement should have been easy but it was not all on one plane nor was it parallel to anything else. On top of that there was the perspective as seen by the telescopic camera lens. There was a fair bit of guestimating, albeit a little educated, in the final design of the antenna mounting bracket.

Our rigger scaled the 30-metre tower with no problem. Hung from his belt was the cat 6 coms cable, the antenna and the angle iron bracket to support the antenna. By the time he got to the top he looked about the size of an ant. It was a long way up. The day started reasonably cool with little wind but according to our intrepid climber, the wind velocity at the top was quite high. The bracket fitted like a dream, the antenna looked magnificent. A computer check, before our man climbed down showed that the system was AOK.

We were pleased when our rigger stepped away from the tower, a job well done. Just a final tie up of the cable, plugging in a power supply inside the building and we were away. A further check from a remote computer showed all was working. The gremlins came out later. They always do. A communication from the other occupiers of the building and users of the tower said that they were suffering a serious interference problem with some of their gear. Our system was the only change that had been made, so we were very suspect. The Ubiquiti Bullet was only running at 600 milliwatts and when we shut that down we still had problems. The next choice was the switch mode power supply. You guessed it, as dirty as hell. 100% confirmed by changing the supply. It was a simple job to change, just an inconvenience and a further warning that some switch mode power supplies can be a real problem. We are surrounded by the things, just about every piece of domestic electronics has one and no wonder the RF spectrum is so noisy.

Many thanks to all of the PARG members who managed to spare a few hours or donated a bit of gear to further this project; Martin VK6MJ, Martin VK6FEEE, Lance VK6LR, Terry VK6TTF, Warren VK6HM, Tony VK6DQ and a big thank you to Paul VK6LL who drove around to many sites with a very dubious looking telescopic aluminium pole on the top of his 4WD during our site assessment stage. Attached to the top of the pole was a perforated dish which was supposed to be very light weight. The whole crew can testify that this light weight dish weighed more than we ever imagined. It caused the 12-metre pole to waggle about all over the sky as if it were made of rubber whilst we stood it up with nothing but a lot of luck and a couple of manpower. A great testimony to the tensile strength and reciprocity of aluminium!

Hills Amateur Radio Group

HARG meets twice each month, the second and the last Saturday of each month. The second Saturday is a social and activities day whilst the last Saturday of each month is a "formal" meeting (with talks).

Meetings are held at the Paxhill Guide Hall on the corner of Sanderson and Brady Roads in Lesmurdie.

You are all warmly invited to HARGfest, our annual Amateur Radio swap meet to be held on Sunday 9 April this year. The venue will be the same excellent hall as last year: the Lesmurdie Hall at 96 Gladys Road Lesmurdie.

Entry for sellers at 9.00 am and for buyers at 10.00 am

Food and drink available all day, including the popular HARGburgers.

The raffle will be held at 1.00 pm and doors close at 2.00 pm.

Entry fee is the usual $5 for every person attending, both buyers and sellers.

Tables are free but if you have something to sell please book your table early as last year they booked up really quickly.

Bookings to *vk6zms@iinet.net.au*

Looking forward to seeing you all there.

Avon Districts Radio Group

Peter VK6PK reports the following for the Avon Districts Radio Group, east of Perth.

ADRG has arranged an Allstar link to join the Hoddewell and Kellerberrin repeaters together.

Next step is to provide internet access to the sites. Peter VK6PK, Peter VK6YSF and Jim VK6CA have been actively working on a number of projects at the club. The club also runs VK6REC, a 2 m repeater at El Caballo Blanco on 147.175 MHz + and Peter VK6PK has been driving a project at the Kalgoorlie School of Mines to install VHF and UHF repeaters (VK6RTU) along with a 50 MHz beacon at the School. Peter is looking for a 50.3 MHz transmitter to use for the beacon so if anyone has one available, please email Peter at *beta@vianet.net.au*

The club is also in the early planning stages of installing a repeater between Merredin and Southern Cross.

The club as a net on 3.610 MHz every Sunday night at 2100 WST.

All are welcome to join – members or otherwise.

Ham College

Ham College is the premier learning institution for amateur radio in WA and provides a fabulous service to the amateur community here in the west.

The next Foundation licence courses are 29 and 30 April and 17 and 18 June. The next Standard licence course will have already started in February but the next Advanced licence course is due to start in July.

Interested parties should contact Andrew Smith VK6AS at the college on 0411 463 530.

VHF/UHF - An Expanding World

David K Minchin VK5KK

Introduction

This month we have a report from Leigh VK2KRR on WSPR activity on 50 and 144 MHz in VK/ZL as well as a report from Andrew VK1DA. The series dealing with digital antenna rotator controllers continues, along with Kevin VK4UH's meteor scatter column.

WSPR 2017 Propagation Report

After a slow start, the Tropo season in February 2017 has almost caught up with previous years on 144 MHz and above. Also the usual Es season has yielded some good distance openings however the discovery of Es-extended Trans-Pacific openings on 50 MHz has opened up a new field to explore. WSPR has been a key part to identify when a band is open as well as providing a permanent record of what has happened or been missed! Leigh Rainbird VK2KRR reports in the first instalment for 2017:

As this is the first report of the year, I'll cover most significant events from the beginning of 2017. It's certainly great to see all the stations running WSPR on VHF and above, an excellent way to keep yourself and others informed about what's happening with radio propagation that specifically applies to the VHF and above bands that we're all interested in. Sometimes we can discover NEW paths that we may well have thought not to exist, such as the inland Tropo paths from VK5 to southeast VK4, and the 6 m paths discovered from Chris N3IZN to many VK call areas this summer. It's often a very exciting situation when these types of very rare events occur.

Keep in mind that WSPR at VHF and above can be quite a challenge to the uninitiated, compared to other digital modes. This is mostly due to the very specific parameters, which must be met for the mode to be successful on the higher bands. The main problems users face is radio stability on transmit and radio frequency accuracy. Meaning, there can only be approximately 4 Hz drift from the radio on transmit across the 2 minute period and the WSPR band slots cover only 200 Hz. The higher you go, the harder it becomes to meet these parameters without a rig that's locked to a precision frequency reference. The better the frequency accuracy and stability, the better will be you're the results.

50 MHz WSPR: During January, Sporadic E was quite active on the 6 m band across Australia and to New Zealand. Paths became very commonplace so I will only report on the few very rare Trans-Pacific paths that were detected.

On 10 January, we saw a fantastic catch by Alan VK2EFM who was able to decode Chris N3IZN on 6 m WSPR at a really weak -27 dB signal report. The distance is 12,091 km and time was only 09.24 am EDST or 2224 UTC, quite early.

Then on 21 January, with just 10 watts, Alan VK2EFM was able to have his signal decoded by Chris N3IZN (unknown signal report). Alan also decoded Chris at -23 dB with Chris running 100 watts, in doing so, making what we term a two-way report over the 12,091 km distance. Also on this day, Chris N3IZN heard signals from Brian VK5BC -27 dB @ 13,187 km and John VK5PO -23 dB @ 13,201 km, whilst also being heard by Mark VK2EMA near Dubbo -24 dB @ 12,353 km.

On 3 February, Rhett VK3WE in Gippsland was able to decode Chris N3IZN in southern California, 6 times over a 1.5 hour period from 0022 UTC. Distance is 12,612 km and the best signal level was -10 dB.

On 8 February, yet another Trans-Pacific 6 m path was detected from 0124 UTC. Signal was sent from Chris N3IZN and decoded by myself VK2KRR -24 dB @ 12,531 km. I also heard the next transmission at 0134 UTC -25 dB. Rhett VK3WE also heard Chris from this time slot with a reception of -23 dB. Rhett continued on to hear N3IZN at 0144 and 0154 UTC with -24 and -25 dB reports and Chris has now not been heard in VK since this day.

144 MHz WSPR: Not well utilised in many areas, but one world-renowned path that is being monitored is the Great Australian Bight Path. Here, the Tropo propagation has been exceptional over the first few months of 2017.

Of particular interest has been the seemingly endless paths recorded between Phil VK5AKK atop the Adelaide Hills and Derek VK6DZ west of Albany @ 1909 km. As recorded on the www.wsprnet.org 2 m WSPR database, the path between VK6DZ and VK5AKK was available in January for 16 of the 31 days and in February was available for 14 of the 28 days. So

for approximately half the days across January and February the Bight path was open between Phil and Derek. All this with only 10 Watts of power, quite incredible! For the rest of us, detecting Bight path crossings is not so easy.

2 to 5 January saw a Bight path opening. Derek VK6DZ had paths with VK5BC/p @ 1759 km, SWLKFN41 @ 1902 km (SWL station near Adelaide), VK5AKK @ 1909 km, VK5PJ @ 1945 km, VK3ZAZ @ 2193 km & VK3DXE @ 2463 km. Wayne VK6JR had luck with VK5AKK @ 2173 km & VK3ZAZ @ 2471 km.

15 January saw the following paths with VK6DZ: VK5BC/p @ 1759 km, VK5AKK @ 1909 km, VK3OE @ 2486 km, VK2KRR @ 2664 km.

An opening covering from 24 to 28 January saw the following paths with VK6DZ: VK5KJP @ 1896 km, VK5AKK @ 1909 km, VK5PJ @ 1945 km, VK5DK @ 2083 km, VK3ZAZ @ 2193 km, VK3II @ 2492 km, VK2KRR @ 2664 km, VK3WE @ 2676 km. Great to see Colin VK5DK taking part in this one.

On 5 February, a Sporadic E opening was detected from Dimitris VK1SV with Lloyd VK4FP @ 1786 km and Len VK4ALF @ 1035 km! If we could get a few more VK4 stations monitoring 2 m WSPR the results here would have been much better.

Leigh VK2KRR will be contributing the WSPR report on a regular basis, if you would like to contact Leigh please email him at *vk2krr@wia.org.au*

Summer VHF/UHF Field Day – VK1 perspective

The Summer VHF/UHF Field Day sits right in the middle of the usual summer Es and Tropo season. How that plays out depends on the year and where you are in VK/ZL. Andrew VK1DA reports on the 2017 Field day held over the January weekend.

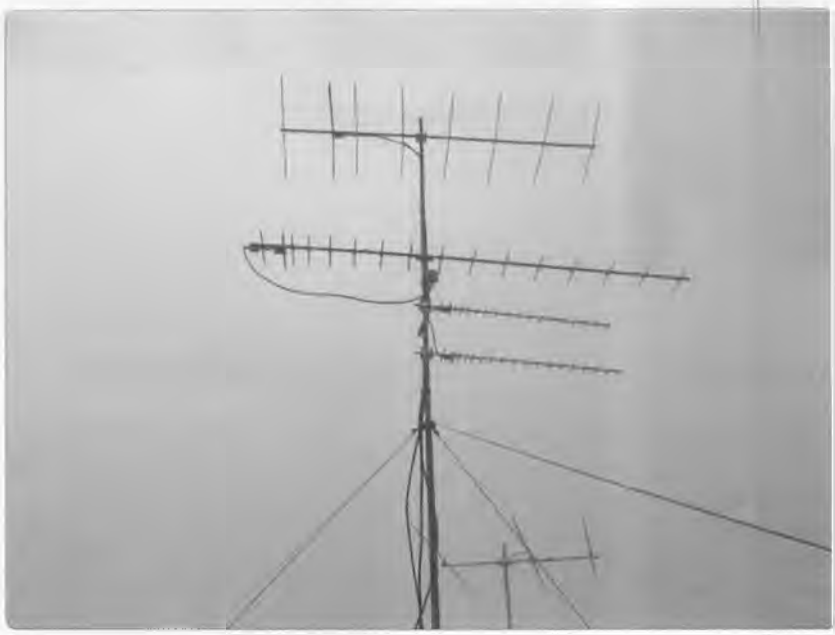


Photo 1: Andrew VK1DA's Summer Field day antenna system.

"Some years ago I tried to drive up to the site and setup on the Saturday and found it hard to be on air before 4 pm or even later. To avoid that, I now plan to arrive on site the previous evening and divide the setup task between Friday evening and Saturday morning. However the plan relied on good weather for the Friday night and unfortunately this time it was very windy and wet from about 7 pm onwards on the Friday night. I didn't know about the very strong wind that had gone through some suburbs of Canberra just after 5 pm. I was en-route from Yass to Mt Ginini at that time and while I saw evidence of high winds having gone through the area, I must have been just behind it when I drove through to the Uriarra area direct from Yass."

"Almost immediately after unpacking my generator and the tent, the wind came up and the rain started. I had to decide whether to do more than set up the tent and possibly some SOTA HF equipment until the weather improved. After observation while unpacking the first few things I decided that the wind gusts were more than my fibreglass pole could withstand and that even the tent would not be a happy place to spend the night. So I waited for the morning and hoped for better weather to arrive."

"On Saturday morning things looked better, even from the perspective of someone who had sat in the driver's seat all night. The tent went up all right and started drying out in the still gusty wind. I assembled the antennas and erected them. After setting up the equipment and starting the generator, I checked beacon signals and found they were not good. Getting on the air slightly after the contest start time, I found a few local portables and home stations were on the air. Then I was called by VK5AKK which was a nice surprise with strong signals on both 2 m and 70 cm. I could hear his carrier on 1296 but compared with Phil's 100 w at the antenna, my 10 W output from the radio was probably 13 dB down and not enough to make the return path work. (Note to self: get the amplifier going!!)"

"Apart from the surprise contact with VK5AKK, signals from elsewhere were lower than usual and the only VK2 portable heard for a while was Gerard VK2IO at Mt Bindo. When working Gerard he asked if I was SOTA compliant on 6 m; I told him no due to the IC-706 running on generator power, but it only took a minute to hook up

the FT-817 and work him using its internal LiPo battery."

"By Saturday evening I had made about 35 contacts on 2 m, 25 on 70 cm and a few less on 6 m. Only VK3ER was worked in VK3, with a few others heard but not worked at that stage. I heard a complicated story that some VK3 stations were wanting to work a mystery station on Flinders Island and positioning their stations on the southern side of hills to optimise their chances. Conditions were lacklustre and activity was low, except for a surprising increase in activity locally, with Greg VK1AI, Al VK1RX, and Andrew VK1AD at a SOTA summit, Matt VK1MT, Jim VK1AT and Dale VK1DSH all operating out in the field. This was a great rollout from VK1. Some local VK1s were available for contacts but they amounted to a handful of contacts, possibly 10 unique callsigns in all. Chris VK2DO arrived at Batemans Bay and handed out contacts to many of the VK1 portables."

"On Sunday morning I found beacon signals from VK3 were greatly improved over Saturday's levels. VK5RSE was audible and VK5VF was detectable by ear, over 900 km away, so conditions were quite promising. Calling my first CQs well before 6 am, I received no replies and decided to put up my 14 MHz vertical as some US stations were going to try to work into VK on CW. I returned to VHF after a few SOTA contacts made with battery power and the 10 W HF rig."

"By then all the computers had been fired up and coffee had been administered to the field day stations, so there were a bunch of contacts to be made on all bands."

"The highlight of the morning was being in contact with Nick VK3VFO and being called by the mystery Flinders Island station, Mike VK3BDL/7. This was the first VK7 on 2 m from Ginini for me. The distance covered is around 500 km, less than the distance to VK3ER or VK3UHF's normal location. But working Mike on Flinders Island on 2 m and 70 cm was quite a nice surprise after Saturday's odd conditions. It was also great to make a contact with Colin VK5DK on 144. Later I also made a contact with Peter VK5PJ on 144 but signal levels were somewhat lower and we did not try 432."

"In the end my logs showed a total of 183 contacts, with the distance scoring system providing about 55 k points."

Photo 2: Andrew VK1DA's antenna system up close.

"The BOM weather station on Ginini reported a max wind gust over the weekend at 91 km/h. The weather station reported the temperature on Sunday morning at 8 C but in the tent my clock indicated 5 C at 5 am, rising to 32 when the sun really got going at about 8 or 9 am."

"Some of the VK1 activity in this event is, I think, attributable to a steady increase in portable operation for SOTA. Just as SOTA has provided impetus for more CW operation by previously infrequent CW users, SOTA is also increasing awareness of the potential of VHF bands to provide useful contacts when HF conditions are poor. Many HF operators only use VHF bands for repeater-based FM operation. SOTA has encouraged them to make simplex contacts on FM and SSB contacts, often being surprised by the distances achieved. In addition, SOTA operators on mountain tops have found that horizontal polarisation generally out-performs vertical polarisation for summit-to-summit contacts on FM or SSB. This is a good development and I think all these special interests can help each other to appreciate and use extra bands and modes. Everyone stands to gain out of that kind of knowledge and experience."

"On the subject of the VHF field day scoring systems, I think a lot of operators in this event are aware that there is a process under way to assess the relative popularity of the scoring systems. The number of log entries received under each rule set is considered a measure of the preferences of the operators. As log entries are permitted under both sets of rules, a lot of operators are effectively having a two way bet. But that simply perpetuates the dual rule system, which I don't think anyone really likes. In my view, it would be better to conduct an actual poll of the operators submitting logs and ask for a vote for one system or the other. I only submit my log for the distance based scoring system, but many submit to both, because you can. In addition, the default setting in VKCL is the grid square system and some operators may not be aware that accepting the default creates an entry and by implication, a vote, for the grid square system. Submitting a log in both divisions does not help the WIA decide which is preferred by operators."

"I'd also like to pay tribute to Mike VK3AVV for his VKCL contest logging software. I think that has helped a lot of us to prepare and submit our logs and it certainly makes a difference."

Digital Antenna Rotator Controllers Part Two

This month we will have a look at digital antenna controllers used for automatic tracking of an object orbiting the earth. That most likely will be the Moon (EME) but also could be a satellite or a distant space probe. Controllers fall into two types. Most commonly the controller will have an interface for an external PC to do the calculations and provide a data stream to position the antenna. The other type is less common where the calculations are done by the controller itself, typically a controller customized to track one or two objects, i.e. the Sun or the Moon. We will look at an example of the latter.

One custom controller that is popular amongst the EME fraternity is John Drew VK5DJ's "Beam Controller". Maybe it would be more aptly called the EME tracking controller given the extent of customization of the firmware and available sensor interfaces. The controller can be used with just about any type of position sensor and motor drive including variable speed (PWM) drives. It has been built by many EME'ers around the world. Tracking accuracy is with fractions of a degree when compared with PC based tracking software such as VK3UM's, Orbitron or the position readout in WSJT-X.

The VK5DJ Controller consists of two parts, the shack unit (main board with LCD display) and the remote position units (encoder boards). A PIC 18F4685 is used on the main board to provide all calculation, encoder analysis, motor drive, PC/GPS input/output and LCD readout functions. Firmware uses something like 50 different calculations to track the moon and updates position data every 1 second. The controller accepts a serial input from either a PC (for external control and display) or a GPS for time and location synchronization. The board can directly switch external relays (or contactors for that big 10 metre dish!) or an H bridge for Solid State control of DC motors. A PWM output option is available to allow variable speeds for motors i.e.

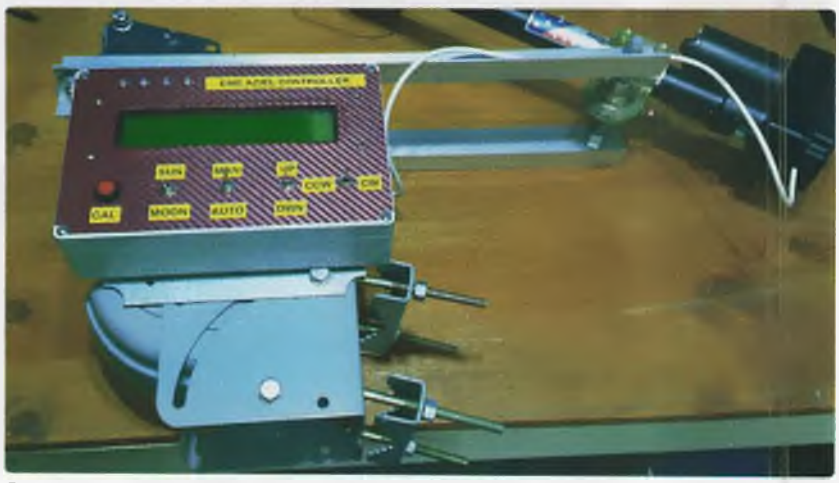


Photo 3: A VK5DJ EME Controller on VK5KK's portable EME system.

transit fast, slow when on target. It is possible to add a real time clock to the board, most types available on eBay will work.

The position encoder boards use a 16F628 PIC and are identical for both Azimuth and Elevation. The boards are remotely mounted in a weatherproof enclosure at the antenna next to the encoders. The boards will handle a range of encoders from linear potentiometers to precision absolute 12 bit encoders like the HH12. These encoders communicate back to the main board using RS485 at 9600 baud. With such a slow data speed it is possible to remotely mount the encoder boards 30 or more metres away.

I've built a couple of John's controllers, the photo shows the one used with my 10 GHz portable EME station. Azimuth and elevation are set by satellite type worm drive actuators. HH12 encoders are both belt driven using fine toothed belts and pulleys used with 3D printers or CNC equipment.

The GPS option with the VK5DJ controller turned out to be an absolute bonus for portable use. Initially I would set the time and latitude/longitude coordinates in manually, that is fine for a home station but if you are portable that is not very convenient! I have now mounted a tiny Ublox NEO7M GPS and patch antenna (the type used in Quadcopters ~$25) in the control box and connected to the Mainboard. As the NEO7M outputs TTL data I have bypassed the MAX232 IC on the board and connected the GPS stream directly to the PIC.

The VK5DJ controller has a "Calibrate Mode" for time and location on start up. All I do when first starting up is to push the calibrate button and wait for the GPS to lock. The controller stays in boot up until it gets valid time and position data from the GPS. As soon as GPS data appears the RTC clock is calibrated, the position is updated in the register and the controller goes to its normal tracking display. The UTC clock is within 1 second and location within 10 metres. I have now put a small PIC in to control this function so the controller automatically calibrates on boot up every time!

For more information on John VK5DJ's Controller please go to *http://www.vk5dj.com/beam.html* John has available PCBs and programmed PIC chips.

In closing

Feel free to drop me a line if you have something to report. Contributions regarding club projects or proposed activities are always welcome. Just email me at *david@vk5kk.com* and I'll include in the column.

73

David VK5KK

Meteor Scatter Report

Dr Kevin Johnston VK4UH

February turned out to be a very productive month. During the weekend of 10 and 11, Wayne VK5APN/p activated some new grid squares in VK5.

Wayne's intention was to operate portable from locations in PF84 and PF85 over that weekend. Using the timing and frequency suggestions, which were actually the basis of the article last month, Wayne operated as a "Special Event" station on 144.330 MHz, the secondary MS focus frequency, running in parallel to the normal activity session on 144.230 MHz the primary MS frequency. He transmitted first period throughout the weekend. All calling stations operated second period irrespective of their own location or call area. This simple protocol allowed everyone the opportunity to attempt an MS contact with Wayne without concern for causing crossed-period QRM to others. The protocol worked perfectly and its value will assist others planning similar rare-square or special event activations for the future. Although the number of posted completions was not great, positive decodes were made by stations from VK4, through VK2 to VK7. Try as I might I was unlucky and did not manage to receive Wayne at this location in QG62; however others nearby in VK4 were successful.

Photo 1: Wayne VK5APN/p activated some new grid squares in VK5.

Rapid dissemination of information about this planned event occurred predominantly using the newly established "Meteor Scatter VK-ZL" Facebook page. As briefly mentioned, almost as an aside last month, the Facebook (FB) page has gone from strength to strength in a very short period of time. To date, thirty VK and ZL Meteor Scatter operators have registered to this closed group. Postings on this page have been an interesting mix of individual activity reports, advanced notice of planned operation schedules, arrangements to run trial sessions on the newer modes, historical information with photographs and videos of outstanding contacts from earlier meteor showers etc., discussions on operating protocols and band plans and, very importantly, information requests from new operators.

Personally, I have never been a big user of Social Media but had registered, like many I suspect, as a way to stay in the loop with kids and family and be part of "their modern way" of posting news and photos about their lives. I had not appreciated the value of this alterative use to keep in touch with others with similar interests. The new FB group seems to have already captured a large proportion of the "usual suspects" from our own MS community and I would encourage everyone to have a look. This is a closed group, only visible to registered amateurs with an interest in Meteor Scatter, and therefore with minimal personal security issues. If you're not sure how to activate Facebook, I suggest you summon help from the "grandies" or ask the teenager next door. All joking aside it is really simple and an effective way of disseminating information. There was even an item on the local TV evening news this evening involving a university Professor of "Sociotechnology", expounding the value of social media participation as a means of reducing isolation and depression and preservation of brain function, particularly in the elderly. Wow: how time and research moves forwards.

General operating conditions throughout the month have been sustained and consistent. The number of operators appearing on the Saturday and Sunday morning activity sessions, on 144 MHz at least, has been a bit down on previous years and the number of interstate completions reflects that. Activity on 50 MHz however is still increasing. The meteor pings received on this band are significantly stronger and of longer duration than those received on 144 MHz and the early morning "peak" persists much longer after dawn than on 144 MHz. Activity and completions continue for many hours after dawn and allows a bit more sleep. Welcome to new operators Cliff VK2NP (QF56ma), Matt VK2ZMT (QF57ua) and Campbell VK4YR (QG62lp) who all made their first appearances in the last month and the welcome return of Allan VK4QG (QG63kq).

Examples of good conditions including:

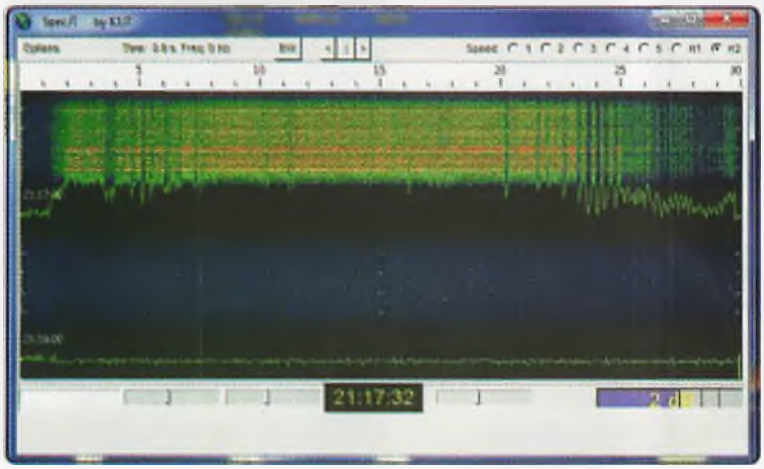


Photo 2: 6 m FSK441 burn from Peter VK5PJ (PF95mk) extending beyond a full 30 second period (by VK4UH in QG62kp 24.2.17).

And even more impressive:

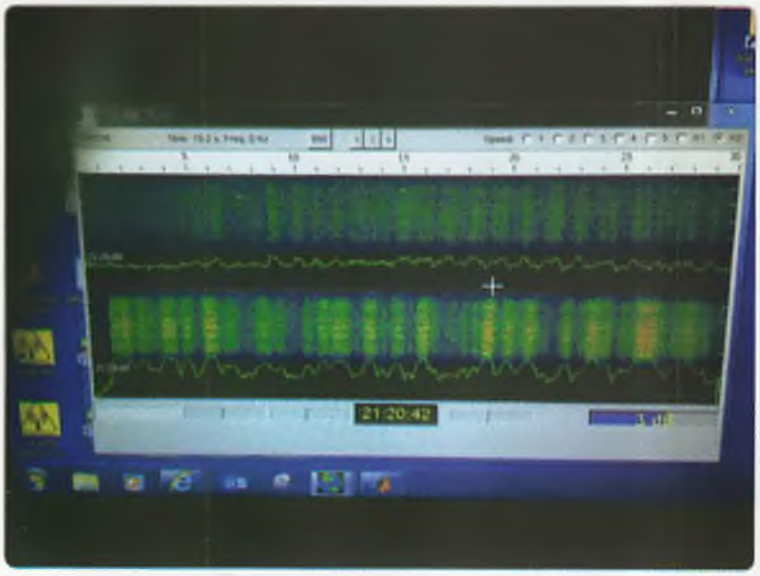


Photo 3: A single 6 m FSK441 burn extending across at least three to four 30 transmission periods from VK3HY (at VK4UH – 18.2.17).

The lower trace of course is the first, the upper trace the third period with a transmission period from my station in between.

Finally this month, Alan Savins posted information on the FB group page about an upcoming series of VK-ZL 6 m MS experiment he is proposing. He advised that Errol ZL2IT in Napier (RF80km) is looking for stations to conduct 50 MHz MS trials between VK and ZL. In an e-mail, Errol wrote: - *"I will Tx towards VK most days on 50.230 MHz using MSK144 (NOT FSK144) 2nd period and 30 second sequence from 7:00 am your time (EST) for about 2 hours. I hope these times will be suitable for some operators on your side of the Tasman. After MSK144 I would return to WSPR for rest of day. I will announce on VK logger each day I am on (which should be most weekdays) however weekends could be a bit intermittent depending on my other commitments. I expect Geoff ZL3PX in Christchurch (RE66hm) will also be on the same frequency and period. Note that this is a low power experiment so power out limited to 10 watts. On the basis of many pings received on WSPR here all day it should be possible; however we shall see. I welcome any reciprocal transmissions from VK. Incidentally I am using the latest WSJT-x 1.7."*

For anyone intending to participate in these trials it will be possible to send a reply via the Facebook group or via e-mail direct to Errol. His posted e-mail address is *zl2it.nz@gmail.com*. I will be offering some suggested amendments to Errol's proposal to improve our chances of making contacts across the Tasman. Interestingly from southern VK4 all the major ZL cities are beyond the normally accepted 2,500 km limit for unassisted Meteor Scatter communications. This is a simple matter of geometry since the majority of meteors are burning up at about 100 km altitude as they enter the earth's atmosphere. With the curve of the earth this height limits the maximum range between two stations with an earth skimming (0-degree elevation) path profile to this maximum range. I have successfully made only two 144 MHz MS contacts to ZL both with Steve ZL1TPH. On both occasions, there was good evidence of mixed mode propagation with tropospheric ducting occurring at one or both end of the meteor scatter path to fill in the gaps. I have yet to hear a single ping on 50 MHz across the Tasman. Thanks go to Errol for proposing these experiments.

Meteor Showers

The next major Meteor Shower event for 2107 will be the Lyrids expected around 22 April and then the Eta Aquariids expected around 6 May.

Contributions for this column are as always welcome. Please e-mail to *vk4uh@wia.org.au*.

Kevin Johnston VK4UH
Brisbane

AMSAT-VK

AMSAT Co-ordinator
Paul Paradigm VK2TXT
email: ***coordinator@amsat-vk.org***

Group Moderator
Judy Williams VK2TJU
email: ***secretary@amsat-vk.org***

Website:
www.amsat-vk.org

Group site:
group.amsat-vk.org

About AMSAT-VK

AMSAT-VK is a group of Australian amateur radio operators who share a common interest in building, launching and communicating with each other through non-commercial amateur radio satellites. Many of our members also have an interest in other space based communications, including listening to and communicating with the International Space Station, Earth-Moon-Earth (EME), monitoring weather (WX) satellites and other spacecraft. AMSAT-VK is the primary point of contact for those interested in becoming involved in amateur radio satellite operations. If you are interested in learning more about satellite operations or just wish to become a member of AMSAT-Australia, please see our website.

AMSAT-VK monthly net

Australian National Satellite net

The net takes place on the 2nd Tuesday of each month at 8.30 pm eastern time, that is 0930 Z or 1030 Z depending on daylight saving. Check-in starts 10 minutes prior to the start time. The AMSAT-VK net has been running for many years with the aim of allowing amateur radio operators who are operating or have an interest in working in the satellite mode, to make contact with others in order to share their experiences and to catch up on pertinent news. The format also facilitates other aspects like making 'skeds' and for a general 'off-bird' chat. In addition to the EchoLink conference, the net will also be available via RF on the following repeaters and links.

In New South Wales
VK2RBM Blue Mountains repeater on 147.050 MHz

In Queensland
VK4RIL Laidley repeater on 147.700 MHz
VK4RRC Redcliffe 146.925 MHz IRLP node 6404, EchoLink node 44666

In South Australia
VK5TRM, Loxton on 147.175 MHz
VK5RSC, Mt Terrible on 439.825 MHz IRLP node 6278, EchoLink node 399996

In Tasmania
VK7RTV Gawler 6 metre repeater 53.775 MHz IRLP node 6124
VK7RTV Gawler 2 metre repeater 146.775 MHz IRLP node 6616

In the Northern Territory
VK8MA Katherine 146.700 MHz FM

Operators may join the net via the above repeaters or by connecting to EchoLink on either the AMSAT or VK3JED conferences. Past experience has shown that the VK3JED server offers clearer audio. The net is also available via IRLP reflector number 9558. We are keen to have the net carried by other EchoLink or IRLP enabled repeaters and links in order to improve coverage. If you are interested in carrying our net on your system, please contact Paul via email. Frequencies and nodes can change without much notice. Details are put on the AMSAT-VK group site.

Become involved

Amateur satellite operating is one of the most interesting and rewarding modes in our hobby. The birds are relatively easy to access and require very little hardware investment to get started. You can gain access to the FM 'repeaters in the sky' with just a dual band handheld operating on 2 m and 70 cm. These easy-to-use and popular FM satellites will give hams national communications and handheld access into New Zealand at various times through the day and night. Currently only SO-50 is available.

Should you wish to join AMSAT-VK, details are available on the web site or sign-up at our group site as above. Membership is free and you will be made very welcome.

VK5news Adelaide Hills Amateur Radio Society

Christine Taylor VK5CTY

AHARS AGM

AHARS held its AGM at the first meeting for the year in February. This year, there were a number of nominations from members ready to replace the ones that were ready to move on.

It is great when we see people eager to help run the club. New faces bring new ideas which are the way to progress. Barry VK5BW, who has been President, and Jim VK5TR, our Vice President, are both stepping down but continuing on the committee. The Treasurer, Peter VK5APR, and Secretary, Jean VK5TSX, are both willing to continue in their roles, so we have changes and continuity.

The nominees were:

Phil VK5SRP President, Gerard VK5ZQV Vice-President, Peter VK5APR Treasurer, Jean VK5TSX Secretary.

Committee members (3 required) Roy VK5NRG, Barry VBK5BW, Jim VK5TR and Trevor VK5NIX.

On the night of the AGM Trevor withdrew his nomination so there would not need to be an election. John VK5BJE conducted the election and all current candidates were elected. Then Jim moved that Trevor be co-opted as an extra committee member. As this option is in the constitution, the motion was put to the meeting and carried. So AHARS will have four committee members instead of three this year, as listed above.

Our thanks go to the out-going committee and welcome to the new group.

Roy VK5NRG, Gerard VK5ZQV, Phil VK5SRP, Jim VK5TR, Jean VK5TSX, Barry VK5BW, PeterVK5APR and Trevor VK5NIX after the Committee Meeting.

VLF Experiments

Following the AGM, Rod VK5ZRK talked about the experiments he has conducted, over many years, on very low frequencies. He admitted that his first contact with such frequencies was when he was a teenager, playing with a crystal set. The strange pops and crackles he could only get rid of when he sat the set on his bed were, in fact, the very noises he later studied seriously.

The frequencies he is interested in are in the range 14-22 kHz. Many of the noises are due to lightning strikes. Using a very sensitive Spectrum Analyser he was able to show us pictures of these lightning strikes on the screen. It is most surprising to see the number of strikes occurring all the time. Rod has built a number of detectors/ amplifiers to which he adds a 3-metre whip to collect these events. He uses JJY signal as a frequency reference. Along with number on NDBs (non-directional beacons) like those used at airports there are some useful references available.

He has also identifies the source of some of the signals detected, as originating in the corona of the sun. Sunspots and flares are therefore of particular interest for those exploring the VLF bands.

The strangest sounds are the ones called whistlers. They can be heard as just that and they show up on the Spectrum Analyser screen as slowly changing and fading patterns. They definitely register on the analyser differently to the signals from lightning strikes.

It sounds as if this could be a new area of interest for the members of AHARS.

From the President's Report

To try to eliminate the problems with vandals that we experienced last year at our Shack at Blackwood, the club engaged the services of a security firm which, along with the extra security installed by our working bees, seems to have had the desired effect. A number of arrests have been made. And no more damage has occurred.

Contests

Trent Sampson VK4TS
e *vk4ts@wia.org.au*

Contest priorities for April 2017

Contest	Date (UTC)	Rules	Difficulty	Software	Modes
JtDX CW	6 - 9 April	*http://www.jidx.org/jidxrule-e.html*	Easy	N1MM any generic logger	CW
Worked All Provinces China	15 and 16 April	*http://www.mulandxc.org/438*	Easy	N1MM any generic logger	SSB and CW
CQ MM DX	15 and 16 April	*http://www.cqmmdx.com/rules/*	Easy Fun	VKCL N1MM any generic logger	CW

A plug for AREG (Amateur Radio Experimenters Group)

Have you ever wanted to learn about contesting but didn't know where to start?

Did you ever want to learn the secrets of how the big stations earn their scores? Well now is your chance!

In May, AREG will be hosting a special event immediately prior to the WIA AGM in Adelaide. On Friday 19 May 2017 at 3:00 pm, the club proudly invites you to attend the "Contest Technical College", presented by Trent Sampson VK4TS. The venue will be the clubrooms, located at the Reedbeds Community Hall in Fulham (5 minutes from the airport for those around Australia flying in who would like to attend). This once in a lifetime event is open to anyone with an interest in Amateur Radio Contesting.

Trent Sampson VK4TS is the Contest Columnist for *AR* magazine and a member of the Lambda Contest Group who operate under the Callsign VK4KW and holds many records in Multi Operator categories in SSB RTTY and CW.

During the 2-hour session, Trent will discuss setting up a modern contest station for SO2R (Single Operator 2 Radios) operation as well as Multi operator station considerations, including equipment selection, interfacing and antenna selection.

The Antenna Selection part will include a real life appraisal of a contest location (likely to be one of the AREG sites) and how well it will work using High-Frequency Terrain propagation analysis.

When considering software, Trent will discuss examples of how to use the most popular software and the lessons learned from it.

Topics Covered will include:

Multi Operator Stations.

SO2R Operation.

Filtering: Bandpass and Coax Stub.

Antenna Selection Software usage.

N1MM with examples of SSB, RTTY and CW.

So organise your Rostered Day Off now or arrange to get into Adelaide a little bit earlier that day if travelling from interstate and make your way to the Amateur Radio Experimenters Group clubrooms for this once off special event!

Contester of the Month: Tim Duffy K3LR

Tim Duffy K3LR owns and operates one of the most prestigious amateur radio contest stations in the United States with twelve operating positions: two for each band. The stations are organised in such a way that the run (CQ) station and multiplier station cannot transmit together.

Photo 1: Tim K3LR explaining some features of his contest station to some visitors.

What is your favourite Contest?
The CQWW contests – as the whole world is "on the air".

What is your favourite Rig?
The Icom IC-7851. It is simply amazing how well it works and the front panel is laid out perfectly.

What modes do you contest in?
CW, Phone and RTTY.

What is your favourite contest band and why?
I love 160 metres for CW DX Contests and 80 metres for phone contests.

What is your preferred Contesting Software?
Since 2006 K3LR has used WinTest.

What is your preferred Mic and Key?
I like the Heil HC-5 microphone (sounds smooth) and the Bencher CW keys.

What is your "not so secret" weapon?
Having good friends that are awesome operators.

What is your best tip to a newbie contester?
Get on the air every weekend for every contest. The more you operate, the better you get.

What are your aspirations in contesting?
Through Contest University - bringing more people into the FUN of Radio Sport Contesting.

What would you improve in your skills and/or station?
Operate more. The more I learn about propagation and antennas - the better our scores are.

Contest Terms

Run = Call CQ and stay on the same frequency

Photo 2: Looking up at one of the antenna arrays.

Search and Pounce = Tune across bands looking for stations calling CQ

Multiplier = a station that increases your score owing to contest rules

Multi = Short for Multiple operator or transmitter

SO2R = Single operator 2 radio

Trent VK4TS is the admin of VK Contest Club (VKCC) web (*www.vkcc.com*) and Facebook pages and has been an active contester since the 1970s.

Emails can be sent to *vk4ts@wia.org.au*

Ross Hull Memorial VHF-UHF Contest 2017: Results

John Martin VK3KM - Contest Manager

This year the overall winner (Section A) is Ted Thrift VK2ARA. The other section winners are Andrew Davis VK1DA and Hilary Bridel VK2IUW. Congratulations to them, and also to the other entrants who made very creditable scores. It is also pleasing to see several entries from amateurs who have not previously sent in a log.

The Ross Hull Contest has been running for 67 years now. It has always been conceived as a DX contest, in honour of the late Ross A. Hull and his achievements in the study of tropospheric propagation, which helped amateurs to cover far greater distances than they had thought possible on the VHF and UHF bands.

It has also usually been quite a long contest: in earlier years it sometimes ran for as long as five or six weeks. This was so that the contest could take in the best part of the summer DX season, and it also allowed entrants to operate when they were free to do so. If the contest ran for only a few days, the odds are that it may not coincide with DX openings, or it might clash with other commitments. But with the long period combined with scoring based on the best seven days, or the best two days, just about everyone should be able to make up a competitive log at some time during the contest period. The approach is simple: operate as you normally would; work whatever DX comes along; and put it in your log. What better fun could you possibly have over the summer holidays?

As for next year, I have flagged the idea of taking a break. But I have to admit that the contest has become quite a habit. So, we'll see how things go!

Call	Name	50 MHz	144 MHz	432 MHz	1296 MHz	2.4 GHz	3.4 GHz	5.7 GHz	10 GHz	24 GHz	47 GHz	TOTAL
Section A: Analog modes, best 7 days												
VK2ARA	Ted Thrift	822	345	205	188	70	-	-	-	-	-	1630
VK2AH	Brian Farrar	616	351	210	200	-	-	-	-	-	-	1377
VK3WRE	Ralph Edgar	-	146	245	376	200	30	-	100	-	-	1127
VK1DA	Andrew Davis	76	411	435	152	-	-	-	-	-	-	1074
VK3ZYC	Jim Collins	34	258	225	112	60	-	10	10	-	-	709
VK3LM	Michael Binz	124	153	210	200	-	10	-	-	-	-	697
VK2XIC	Rob Heyer	60	111	175	192	80	-	-	-	-	-	618
VK2BLS	Darrell Harman	46	84	145	192	130	-	-	-	-	-	597
VK2FLJD	Jason Dickens	-	327	200	-	-	-	-	-	-	-	527
VK1RX	Al Long	34	273	200	-	-	-	-	-	-	-	507
VK4ADC	Doug Hunter	346	66	35	8	20	-	-	-	-	-	475
VK3AV	Bernard Petherbridge	56	108	85	64	40	20	-	-	-	-	373
VK7MO	Rex Moncur	-	-	-	370	-	-	-	-	-	-	370
VK7TW	Justin Giles-Clark	-	-	-	230	-	-	-	-	-	-	230
VK2IUW	Hilary Bridel	6	48	30	-	-	-	-	-	-	-	84
VK4LHD	Robert Garland	-	-	-	40	20	-	-	-	-	-	60
VK3UH	Ken Brown	-	9	10	-	-	-	-	-	-	-	19
Section C: Analog modes, best 2 days												
VK1DA	Andrew Davis	72	384	420	152	-	-	-	-	-	-	1028
VK2ARA	Ted Thrift	416	111	55	48	-	-	-	-	-	-	650
VK3HY	Gavin Brain	88	99	85	88	70	60	60	40	-	-	590
VK3WRE	Ralph Edgar	-	66	115	176	120	30	20	60	-	-	587
VK2AH	Brian Farrar	286	105	65	48	-	-	-	-	-	-	504
VK4ADC	Doug Hunter	346	66	35	8	20	-	-	-	-	-	475
VK1RX	Al Long	34	252	185	-	-	-	-	-	-	-	471
VK3AV	Bernard Petherbridge	56	108	85	64	40	20	-	-	-	-	373
VK3ZYC	Jim Collins	34	132	90	48	10	-	-	-	-	-	314
VK2FLJD	Jason Dickens	-	240	65	-	-	-	-	-	-	-	305

Call	Name	50 MHz	144 MHz	432 MHz	1296 MHz	2.4 GHz	3.4 GHz	5.7 GHz	10 GHz	24 GHz	47 GHz	TOTAL
Section C: Analog modes, best 2 days *(continued from page 39)*												
VK3LM	Michael Binz	90	69	75	24	-	10	-	-	-	-	268
VK2XIC	Rob Heyer	16	36	60	64	30	-	-	-	-	-	206
VK2BLS	Darrell Harman	16	27	45	64	30	-	-	-	-	-	182
VK7MO	Rex Moncur	-	-	-	180	-	-	-	-	-	-	180
VK7TW	Justin Giles-Clark	-	-	-	120	-	-	-	-	-	-	120
VK2IUW	Hilary Bridel	6	48	30	-	-	-	-	-	-	-	84
VK4LHD	Robert Garland	-	-	-	40	20	-	-	-	-	-	60
VK3UH	Ken Brown	-	9	10	-	-	-	-	-	-	-	19
Section B: Digital modes, best 7 days												
VK2IUW	Hilary Bridel	244	-	-	-	-	-	-	-	-	-	244
VK4ADC	Doug Hunter	84	6	-	-	-	-	-	-	-	-	90
VK7MO	Rex Moncur	-	-	-	80	-	-	-	-	-	-	80
VK4LHD	Robert Garland	22	45	-	-	-	-	-	-	-	-	67
Section D: Digital modes, best 2 days												
VK2IUW	Hilary Bridel	192	-	-	-	-	-	-	-	-	-	192
VK4ADC	Doug Hunter	84	6	-	-	-	-	-	-	-	-	90
VK4LHD	Robert Garland	22	45	-	-	-	-	-	-	-	-	67
VK7MO	Rex Moncur	-	-	-	40	-	-	-	-	-	-	40

Contest web page: *http://www.wia.org.au/members/contests/rosshull/*

VK3 news Amateur Radio Victoria

Jim Linton VK3PC
e arv@amateurradio.com.au
w www.amateurradio.com.au

Most repeaters and beacons in Victoria are working thanks to our dedicated volunteers who do the work in the limited spare time left over after full time jobs and family commitments.

The expenditure on repeaters is excess of $20,000 each year. A two-year membership of Amateur Radio Victoria costs $30 or $25 concession - less than five cents a day.

The money being spent on repeaters includes equipment maintenance, insurance, site fees and licences.

The 2-metre repeater major work includes: VK3RMM Mt Macedon, working but needs a transmit antenna replacement; VK3RMK Mt Kerang has some pager interference needing antenna relocation; VK3ROW Beech Forest needs a new tower; VK3RGV Mt Wombat upgrade and refurbishment in progress; VK3RHO Mt Hotham is being relocated; while ARV volunteers from the Geelong Amateur Radio Club are restoring VK3RWL at Mt Warrnambool; and VK3RGS Mt Fatigue is out of service.

The 70 cm repeater VK3RNU Mt Stanley is nearing completion for power and fit out. The VK3RRU site at Mildura has the 2 m beacon to be re-installed after maintenance and the 1296 MHz beacon damaged by a lightning strike. On 6 m, the VK3RMS Olinda was OK but the receiver had to be relocated.

The two digital Amateur TV repeaters face difficulties due to site lease changes. On Mt Dandenong, VK3RML will have to be relocated shortly and after having a 2.4 GHz outlet for a long time, VK3RBO Bendigo is now switched off due to tower space being required for new systems.

VK3RML users will be advised, while VK3RBO is operating with its 1250 MHz transmitter and reception on 446.5 MHz.

Training course enrolments

The state's largest trainer of new radio amateurs is Amateur Radio Victoria with its next weekend being on 22-23 April 2017.

To enrol in the quality Foundation Licence training and assessments please contact Barry Robinson VK3PV *foundation@amateurradio.com.au* 0428 516 001.

In the last quarter of the year will be the bridging course over a number of weeks taking existing Foundation licence holders up to Standard licence level.

Harry Angel Memorial 80 m Sprint 2017

Presented by Dr Kevin Johnston VK4UH

Date: - Saturday 6 May 2017.
1000 UTC - 1146 UTC

The Harry Angel Sprint is an annual 80 m contest event, first established in 1999, to commemorate the life of Harry Angel VK4HA who, at the time of his death at the age of 106, was the oldest licensed amateur in Australia. The duration of the contest is 106 minutes in commemoration of Harry's age, one minute for each year of his life.

The "HA" is held on or around the first Saturday in May each year. The contest is open to all grades of license holder and is structured specifically to suit both seasoned contesters and operators new to contesting. The rules for this year's event are essentially unchanged from 2016. Place winners in the Harry Angel Contest are also eligible to claim points for the WIA Contest Champion (Peter Brown) Trophy.

"Harry Angel" Rules

The contest is open to all amateurs, who are licensed to use 80 m, including individual operators and those entering on behalf of a licensed club or society.

The aim of the competition is to make as many contacts as possible in the allotted time. Each station may be worked on one occasion only per mode.

This year there will be four sections PHONE, CW, MIXED and SWL (Short Wave Listener - receive only).

Entries may only be made in one section.

Frequencies: CW 3500 - 3535 kHz. Phone 3535 - 3665 kHz

Exchange: RS (T) and serial number commencing at 001

Scoring: 2 points per CW QSO, 1 point per Phone QSO, 1 point per station logged SWL

An original Harry Angel VK4HA QSL card.

Log: Transmitting logs must show Time UTC, Callsign of stations worked, mode, RS (T) sent and received and a serial number commencing at 001.

SWL logs Listener entries must include Callsign of station heard, callsign of station being worked and the report being given to station being worked, RS (T) and a listener's serial number commencing at 001. Listeners may only log stations actually heard but need not have reception of both stations in order to claim points.

Each entry shall be accompanied by a statement to the effect that *"Operation was conducted within the rules and spirit of the competition"* – this occurs automatically with entries from the VKCL logging software.

Entries: VK Contest Logger (VKCL) is the recommended logging software.

Logs may be submitted via e-mail in electronic format, the preferred method, or by post. To ensure all electronic logs are captured all e-mailed entries must contain the following string in the subject line:

"Harry Angel Log <CONTEST STATION CALLSIGN>"

Entrants are specifically requested not to send more than one e-mailed log file.

Postal entries must be clearly legible and by preference printed in the above VKCL format.

The contest mangers request that all logs clearly indicate the callsign of the contest station itself – not the callsign of the operator of person filling the log where this is different.

Hand written and typed entries will still be accepted provided that they are clear and legible and in the same basic format as VKCL.

Entries must be received by last post on Monday 22nd May 2017

Electronic submission to:
harryangel@redclifferadioclub.org.au

To ensure all electronic logs are captured all e-mailed entries must contain the following string in the subject line:

"Harry Angel Log <CONTEST STATION CALLSIGN>"

i.e. Harry Angel Log <VK3ABC>

Postal submissions to:

Harry Angel Sprint Manager
Redcliffe and District Radio Club
PO Box 20, Woody Point, Qld 4019

All entries must include a return postal address and a current e-mail

address. Receipt of all logs will be confirmed by e-mail within two working days.

The managers would also welcome a short note with entries indicating some brief details of the station and antenna used and any comments regarding operating conditions occurring during the contest. (Suitable for printing please)

Results: Results will be announced first on the WIA Sunday Morning News Broadcast and then published within 28 days of the closing date on:
WIA Contest website
Redcliffe and Districts Radio Club website
Contest Column of *Amateur Radio* magazine

Award: Certificates will be awarded at the discretion of the contest manager for the top three entries in each of the transmitting sections and for the top entry in the SWL section.

The Harry Angel Sprint 2017 is being coordinated on behalf of the Redcliffe and Districts Radio Club and the WIA by Contest Managers Kevin Johnston VK4UH and Charlie Strong VK4YZ.

Full information regarding the contest is available on the WIA Contest website *http://www.wia.org.au/members/contests/harryangel/index.php* and R&DRC website: *http://www.redclifferadioclub.org.au*

Kevin Johnston VK4UH
Manager Harry Angel Sprint

Results 2016 of Harry Angel Memorial 80 m Sprint Contest

Phone Section		(29)			
VK2SR	61	*1	Chris CARROLL	VK3XV	34
VK4YZ	56	*2	Charlie STRONG	VK2BV	32
VK4NM	54	*3	Andrew MUNSON	VK3VCL	32
VK4VDX	53			VK5FI	31
VK3GZ		53		VK4KET	27
VK2PX	52			VK2DEK	27
VK5MU	48			VK5AKH	26
VK2KDP	47			VK4PB	23
VK1JP	44			VK4IAA	19
VK7VH	41			VK3LM	18
VK2QV		37		VK2QW	12
VK5GR		36		VK2BFC	10
VK7JGD	36			VK6AS	2
VK3ER	35			VK6CG	2
VK5KX	34				

MIXED Section		(9)			
VK4SN	89	*1	Alan SHANNON	VK2IO	61
VK3VT	86	*2	Greg WILLIAMS	VK3HY	60
VK4BZ/P2	69	*3	John SAUNDERS	VK2IUW	56
VK5LJ	64			VK4NRD	36
VK5SFA	62				

CW Section		(7)			
VK7CW	50	*1	Steve SALVIA	VK2PN	34
VK2KJJ	44	*2	Knud Joergen Olesen-Jensen	VK4DX	28
VK3AUQ	38	*3J	Kevin Phillips	VK4DGU	4
VK2IG	38	*3J	Mike DOWER		

SWL section	(4)	
Marcus BERGLUND	34	*1
John RAMSEY	33	*2
Alexandra HEATHCOTE	10	*3

Other	
Ian Kay	Check log accepted

Silent Key

Keven Davis VK7KV

It is with sadness that we let you know of the passing of Keven on the 31 January 2017. Keven was almost 90 being born on 15 December 1928.

"A true family man who was dedicated to his family throughout his life."

He was a Justice of the Peace and a projectionist in his early working life. Keven worked in the Hobart Savings Bank becoming the manager and eventually retiring from the Savings Bank to pursue amateur radio and fly fishing.

Keven could be considered an audiophile with a fantastic collection of microphones from all eras that he had collected over his life.

His big beam in the back yard drew interest from Geilston Bay school kids and he was a keen microwave experimenter with a roof full of different antennas with which he was experimenting.

Keven was also very active in the WIA and WICEN in his early days in amateur radio.

"A true gentleman who will be sadly missed."

Vale Keven Davis.

(David O'Brien VK7OB)

TAC Notes

John Martin VK3KM

HF bands digital segments

The proposed changes to the HF Digi mode segments have now been made. This brings our digital band plans into line with the IARU Region 1, 2 and 3 plans. The updated band plans are available at: wia.org.au/members/bandplans/data/

SSB on 30 metre band

The discussion of the 30 metre band has stirred up some hornets. Not a surprise, but it indicates that we need to tread carefully and avoid making drastic changes that would not be supported by the majority of amateurs. So the band plan has been revised with the addition of a couple of recommendations that will hopefully help focus attention on the need for careful sharing of this band.

The recommendations are as follows: It is suggested that SSB stations operate as usual during the day, but curtail their activity as much as possible after dark. It is also suggested that where possible, SSB operation should give first preference to frequencies between 10.125 and 10.135 MHz. These are recommendations, not hard and fast rules, with those words "where possible" always applying. Flexibility is essential in such a narrow band.

60 metre graphic

The latest edition of the band plans includes a new graphic for the 60 metre band. More details will follow when the band finally becomes available to us.

Redfest and Q-Tech Conference

Saturday 22nd April 2017

The Redcliff and Districts Radio Club proudly announce their intention to host the Inaugural Q-Tech conference to coincide with the 2017 Redfest Convention on Saturday 22 April 2017.

Both convention and conference will be held at the St Michaels College near the Abbey Museum in Caboolture Queensland: the same venue as previous years' conventions.

The Q-fest conference is an entirely new initiative and will be comprised of a whole-day programme of technical lectures and practical demonstrations on subjects of wide interest to the hobby of Amateur radio.

The presentations will be provided by invited Speakers with particular interest and experience in each specialised field. The presentations will utilise the full range of audio-visual teaching facilities of the college intending to produce a first-class technical experience for all those participating.

The entire conference will be recorded and made available as a series of audio visual presentations and also complied into a printed version.

It is anticipated that the conference will attract speakers and attendees from interstate and full catering facilities will be available. St Michaels College is within an hour of Brisbane's domestic and International airports, a main rail link and the Bruce Highway. The nearby Bribie Island is a popular holiday resort and an area of outstanding natural beauty located on Morton Bay.

A list of convenient accommodation for those requiring it will be made available closer to the date. It is likely that subsequent conferences will expand and be held on entirely different dates from the regular Redfest conventions.

Full details will be available on the R&DRC club section on the main WIA website closer to the event *http://www.redclifferadioclub.org.au/*

Kevin Johnston VK4UH

Convener

Plan ahead

GippsTech 2017 Annual VHF/ UHF/microwave Technical Conference | 1-2 July

DX Awards

Marc Hillman VK3OHM/VK3IP

Below are listed all New awards issued in Feb 2017, plus all updates to DXCC awards.
Go to http://www.wia.org.au/members/wiadxawards/about/ to use the online award system.

New awards

DXCC Multi-band (1)

#	Call	Name	Mode	Band	Count
157	N2JJ	Jim Janack	Open	10m	260
158	WX3P	John Plum	Open	20m	122
159	WX3P	John Plum	Phone	20m	117
160	JS3OSI	Toshiyuki Tanaka	Open	15m	111

DXCC Multi-band (3)

#	Call	Name	Mode	Band	Count
100	N2JJ	Jim Janack	Open	20-17-10m	728

DXCC Multi-band (5)

#	Call	Name	Mode	Band	Count
69	N2JJ	Jim Janack	Open	40-30-20-17-10m	1160

DXCC Multi-band (7)

#	Call	Name	Mode	Band	Count
34	N2JJ	Jim Janack	Open	40-30-20-17-15-12-10m	1574

DXCC Multi-mode (Open)

#	Call	Name	Count
446	WX3P	John Plum	107

DXCC Multi-mode (Phone)

#	Call	Name	Count
615	WX3P	John Plum	170
616	JS3OSI	Toshiyuki Tanaka	116

Grid Square

#	Call	Name	Mode	Band
264	WX3P	John Plum	Open	HF
265	WX3P	John Plum	Phone	HF
266	WX3P	John Plum	Digital	HF

Worked All States VHF

#	Call	Name	Mode	Band
210	VK5ADO	David Oates	Open	6m
211	VK5ADO	David Oates	Phone	6m

Worked All VK Call Areas HF

#	Call	Name	Mode
2369	VK5SFA	Steve Adler	Open

DXCC updates

DXCC Multi-band (1)

#	Call	Name	Mode	Band
148	VK3GA	Graham Alston	CW	20m
154	N2JJ	Jim Janack	CW	20m
54	VK3EW	David McAulay	Digital	20m
146	VK2RT	Bruce Beresford	Digital	20m
149	VK3GA	Graham Alston	Digital	20m
23	VK3EY	Robert Puise	Open	20m
59	VK5ADO	David Oates	Open	20m
100	VK3GA	Graham Alston	Open	20m
108	VK3AWG	Christopher Bellmont	Open	20m
138	VK4CAG	Graeme Dowse	Open	20m
145	VK2RT	Bruce Beresford	Open	20m
60	VK5ADO	David Oates	Phone	20m
101	VK3GA	Graham Alston	Phone	20m
107	VK3AWG	Christopher Bellmont	Phone	20m
139	VK4CAG	Graeme Dowse	Phone	20m

DXCC Multi-band (3)

#	Call	Name	Mode	Band
24	VK3EW	David McAulay	CW	30-20-17m
70	VK3VH	Shaun Stoddart	CW	40-20-15m
98	N2JJ	Jim Janack	CW	40-20-10m
66	VK3EW	David McAulay	Digital	30-20-15m
14	VK6IR	Stephen Chamberlain	Open	40-20-15m
65	VK3VH	Shaun Stoddart	Open	40-20-15m
73	VK3GA	Graham Alston	Open	20-17-15m
91	VK4CAG	Graeme Dowse	Open	20-17-15m
50	VK6IR	Stephen Chamberlain	Phone	40-20-15m
86	VK3GA	Graham Alston	Phone	20-15-10m
92	VK4CAG	Graeme Dowse	Phone	20-15-10m

WIA DX & operating awar

WIA offers a range of operating awards, inclu DXCC, VHF & UHF and many other awards.

Details can be found at: *http://www.wia au/members/wiadxawards/about/*

CC Multi-band (5)

Call	Name	Mode	Band	Count
VK3EW	David McAulay	CW	40-30-20-17-15m	1344
VK7CW	Steven Salvia	CW	40-30-20-17-15m	1105
VK4CAG	Graeme Dowse	Open	20-17-15-12-10m	938
VK3SX	Bob Robinson	Open	40-20-17-15-10m	919
VK3VH	Shaun Stoddart	Open	40-30-20-15-10m	839
VK4CAG	Graeme Dowse	Phone	20-17-15-12-10m	872
VK3SX	Bob Robinson	Phone	40-20-17-15-10m	898

CC Multi-band (7)

Call	Name	Mode	Band	Count
VK3EW	David McAulay	CW	80-40-30-20-17-15-12m	1726
VK7CW	Steven Salvia	CW	40-30-20-17-15-12-10m	1453
VK7CW	Steven Salvia	Open	40-30-20-17-15-12-10m	1550
VK4KEE	Robert Hollis	Open	40-30-20-17-15-12-10m	1338

DXCC Multi-band (9)

#	Call	Name	Mode	Band	Count
12	VK3EW	David McAulay	CW	160-80-40-30-20-17-15-12-10m	2039

DXCC Multi-mode (CW)

#	Call	Name	Count
225	VK4CC	Colin Clark	178
231	VK3VH	Shaun Stoddart	250
240	VK3GA	Graham Alston	201
245	VK4CAG	Graeme Dowse	135

DXCC Multi-mode (Digital)

#	Call	Name	Count
20	VK3EW	David McAulay	271
55	VK3GA	Graham Alston	148
58	VK2RT	Bruce Beresford	129
61	VK4CC	Colin Clark	120

DXCC Multi-mode (Open)

#	Call	Name	Count
62	VK4CC	Colin Clark	279
363	VK3OHM	Marc Hillman	239
375	VK2TTP	Peter Pratt	150
381	VK3VT	Greg Williams	313
397	VK3AWG	Christopher Bellmont	209
402	VK5ADO	David Oates	175
415	VK3VH	Shaun Stoddart	292
419	VK3GA	Graham Alston	297
431	VK2RT	Bruce Beresford	147

DXCC Multi-mode (Phone)

#	Call	Name	Count
572	VK2TTP	Peter Pratt	151
590	VK5ADO	David Oates	174
591	VK4CC	Colin Clark	222
598	VK3GA	Graham Alston	251
602	VK3AWG	Christopher Bellmont	163

Marc Hillman VK3OHM/VK3IP

Silent Key

Garry George Stebbings VK7EL

Born on 7 March 1947, Garry lived all of his life in and around Launceston; he first demonstrated his interest in amateur radio when he attended meetings of the local radio club during his time as an apprentice electrician at Powell's Electric Service. This later led to his becoming a licensed amateur in 1983.

In 1984 he upgraded to become VK7EL.

Garry's employment took him to the mining town of Rossarden for a few years; it was during this time he met his future wife Cathy at nearby Avoca.

Garry later took up employment with Comalco at Bell Bay then a position as electrician with Tasmanian Government Railways. During this time he and Cathy moved to a semi-rural setting at Devon

Hills, south of Launceston where they kept horses, goats and later, alpacas. Here Garry had space to erect antennas and became a keen HF operator which included SSTV. He also regularly checked in after Sunday morning broadcasts.

After leaving the railway Garry completed a two year course in electronics at Launceston TAFE Institute. Here he became friends with fellow student Ross Hutchinson who later became licensed as VK7ZR/VK8ZR.

During several episodes with cancer, Garry continued to pursue his interest in radio until declining health decided he and Cathy to move to a smaller dwelling in nearby Perth where he began reassembling his station. Sadly, three months later he succumbed to cancer for the final time.

Garry is survived by Cathy, his wife of 45 years, sons Adam and Joshua and their families.

Vale Garry.

Peter VK7PD and Ross VK7ZR/VK8ZR

ALARA

Diane Main VK4DI

ALARAMeet 2017

Planning for the 2017 ALARAMeet is well underway and so far we have had an excellent response from the YL Community. This Meet is going to be a bit different from previous Meets and you don't have to be a member to attend. We are including some Amateur related activities along with the fun and fellowship.

We would love to have any licensed YLs attend and share their activities and to see just how great it is to be a part of an YL organisation.

Organisers Lyn VK4SWE and myself, who normally communicate via email and phone calls, met in Brisbane to go through the program and fine tune it some more.

Thanks must go to Col VK4CC, Lyn's OM Tex and Bill VK4ZD who had to cope with two very animated ladies. We even managed to enjoy a meal at a seafood restaurant in between the discussions.

We have applied for and been granted the Special Event callsign VI4ALARA from 1 July to 30 September 2017 to publicise the meet. Full details will be released closer to its activation.

ALARA VK4 Meet Up

As I was in Wyong, I missed the VK4 meetup organised by Bambi VK4AYL. We tend to meet whenever Lyn is in Brisbane and although this was a smaller group than usual, I'm assured they all had a great time.

News from Lyn VK4SWE

ALARA member and VK4 Rep Lyn VK4SWE has been doing some DX travelling with her OM Tex. They visited her family in Ireland: Lyn's father was a ship's radio officer for many years and can still decode CW!

Nearby lives Tommy EI2HXB who teasingly shuns Lyn from returning "home" as her family QTH would trump his "most northerly amateur radio station" status! It is friendly banter and Tommy regularly hosts Lyn at his shack, where she has chatted with ALARA DX member Beth MW0VOW. Tommy also uses EchoLink and has his shack radio plus his car rig set up for it. After ALARA Committee meetings, Lyn and ALARA President Shirley VK5YL often switch to the Ireland node to chat with Tommy.

This trip, there was no time to get on air but enough time to present Tommy with an ALARA pen which he was delighted to receive and with luck will use it to fill in QSL cards for contacts with the special callsign VI4ALARA later this year.

Photo 1: Bambi VK4AYL, June VK4SJ, Lyn VK4SWE, Micheline VK4FMGE meeting in Brisbane.

Lyn's travels continued to Brisbane where she met up with fellow ALARA member Diane VK4DI, plus her OM Bill VK4ZD, Col VK4CC and Lyn's OM Tex. Lyn and Di spent an enthusiastic couple of hours planning fun ideas for ALARAMEET 2017.

For the first time ever, ALARAMEET will be held in North Queensland so the northern girls are rallying everyone to showcase the region and also to showcase amateur radio to the world. Find us on Facebook for the latest updates *https://www.facebook.com/alarameet2017*

After Brisbane, Lyn and Tex continued on to Norfolk Island where they met with ALARA DX member Kirsti VK9NL and ANZA DX Net regular Ray VK9NMZ. Lyn was delighted to receive an "eyeball QSO Card" from Kirsti and in return, presented her with an ALARA pen.

For more info on ALARAMEET 2017 visit the website *http://www.alara.org.au/alarameet/index.html*

News from Dot VK2DB at Wyong

Sunday 26th February 2017 saw a crowd at the gates for the annual Central Coast Field Day.
The ALARA table was set up on the top floor with a beautiful view over the Wyong Racecourse.

Eight ALARA ladies visited me at the table for a chat and a few others were working on stalls downstairs. It was good to meet up with Linda VK7QP and Diane VK4DI from interstate. There were two other YLs that flitted away before I could give them a membership form, I'll have to catch them up.

There was advertising for ALARAMeet Cairns in September

Photo 2: Kirsti VK9NL and Lyn VK4SWE on Norfolk Island.

this year, and a small display about the YL International Meet in Milton Keynes last year. Photos on the computer didn't show because the light from the large windows was too bright.

I was happy to receive a Certificate of Appreciation from Henry VK2ZHE as I take the ALARA table to the Port Macquarie Field Day each year (Congratulations Dot).

Photo 3: Dot VK2DB receiving her Certificate from Henry VK2ZHE.

The Lectures and Topic-in-a-nutshell subjects sounded very interesting; they ran most of the day and were well attended. I couldn't get away to hear the one that really interested me but my OM heard it and said it was a very good presentation.

We were all disappointed that the 'big shops' didn't set up this year as that is where we see new equipment and realise we can't live without it. The smaller dealers made some good sales - from the number of bulky bags I was minding around the table. I got a new antenna for the car and a warm hoody.

The day ended early as most stalls were packing up about mid-afternoon and as the top floor was almost empty, so did I.

News from Di VK4DI

After six weeks of solid study, I did sit the three US exams in a row at Wyong and passed all of them with 86% in the extra exam. I am now awaiting my US Extra Class licence being issued. No more study for me for a while and no more dreaming of capacitance, reactance, inductance etc. I was literally dreaming the exam questions! I felt pretty proud of myself after the exams. (Congratulations Di from all at ALARA.)

I am also currently organising our Club's John Moyle Field Day event as our usual co-ordinator will be away.

We'll be on air in the ARRL DX SSB contest this weekend too as VK4HH multi 2 and will be activating VI100TRF over the next three months. (Bill will be on the ANZA Net). No rest at this QTH: Lots of amateur radio activity.

33

Diane VK4DI

Urunga Radio Convention 2017

Ken Golden VK2DGT

The **2017 Urunga Radio Convention** will be on again this Easter, 15 and 16 April, Saturday and Sunday, with Fox hunts and convention activities on both days, quizzes, raffles, trade tables available and pre-loved gear, etc. With the new Deviation open, it means Urunga is a lot less busy.

Why not make it a break from your busy lifestyle and slow down a bit at quiet restful *"Urunga" "where the rivers meet the sea"* the longest running *"fox hunt convention"* in Australia.

The social gathering for the Saturday night dinner at the Bowling Club is always well attended (see Ken VK2DGT at the convention).

The Saturday Night Fox Hunt (Fox O.R. 6 Tx's different freq. 2 m) was very popular. (Safety vests available and may need a light).

The 2016 convention went off without a hitch and was well attended, with many Fox hunters competing for the **Arnold Austin Memorial Award** and the **Brian Slarke Memorial Award** overall for two days.

Photo 1: Bryan Ackerly VK3YNG giving an ARDF presentation at the 2016 event.

Photo 2: URC ran the Foxhunts at JOTA.

Mobile and Pedestrian Hunts Venue: the **Senior Citizens Hall, Bowra Street, Urunga.**

Note: The Pacific Highway deviation is open: coming from the South, turn into Ballard's Road at Valla turn off, travel on old section; it may be quicker to turn in on Waterfall Way North of Urunga.

Contact Information

Ken Golden VK2DGT.
Urunga Radio Convention. Inc.
Email: *krgolden46@hotmail.com*
Phone: 02 66523177

VK2 news

Tim Mills VK2ZTM
e *vk2ztm@wia.org.au*

The major activity in VK2 this month is the annual Urunga Convention over Easter on the NSW North Coast. First held in 1949, the event starts on Friday evening through to Sunday afternoon. The Seniors Citizen's Hall in Bowra Street is the weekend venue with a range of fox hunts and other activities. Contact Ken VK2DGT on 6652 3177 for details.

Foundation course weekends in Sydney include ARNSW on 13 and 14 May – this is a date change to that shown on the calendar; St. George ARS on 20 and 21 May and Waverley ARS on 17 and 18 June. Each venue has assessments for all licence grades on the respective Sundays.

ARNSW have their AGM scheduled for Saturday 29 April 2017 at the VK2WI site. The annual reports for the meeting are due by either post or email during this month. The 2017 ARNSW Upgrade course commenced last month on Monday evenings and, except on public holidays, continues until November. On these evenings, the ARNSW library is open for members. The next Trash & Treasure Sunday is on 28 May.

Following the formation of QRP by the Bay in Melbourne, the ARNSW Home Brew and Experimenters Group formed their own **"QRP by the Harbour"** last month. It was in the afternoon; following the Waverley Ferry contest on 12 March.

The Coffs Harbour and District ARC held their AGM in November 2016 and elected Russell Ashdown VK2VK as President, Les Sidebottom VK2CPC as Vice President, Fred McSkimming VK2FM as Treasurer and Eric Shaw VK2ES is Secretary. At their recent February General Meeting, Fred McSkimming was appointed a Life Member for his services to the Club. The Club meets in its club house at the Rex Hardaker Oval, Toormina on Thursdays from 10 am until 2 pm for those interested in Amateur Radio and Electronics. For further details - check out their web site *http://www.qsl.net/vk2ep/*

The Northern Rivers WICEN group has their AGM at Summerland Lismore on Sunday 9 April at 10 am. St George ARS are planning a low powered multi band WSPR facility from one of their remote repeater sites. The Illawarra ARS have taken out of service their VK2RUW repeater on Knights Hill for a rebuild. Jesmond Electronics Club in Newcastle conducts study in Electricity, Electronics and Radio advises John VK2PJM, who can be reached at *john81913@gmail.com*

The Armidale & District ARC were successful in February in receiving that month's Greater Bank Grant from their local financial institution. Each month three groups compete for the grant by attracting the largest number of email votes.

73

Tim VK2ZTM

Silent Key

Maurice "Maurie" Findlay VK2PW

Maurie, of Badgery's Creek, passed away on 21 January 2017, aged 88. Unfortunately, he had been in poor health for more than ten years.

Maurie's first formal involvement in electronics was at the Marconi School of Wireless, where he gained his BCOCP - some ten years or so before I started instructing in it there.

He became VK2PW sometime before 1947 - my records don't go any earlier!

BUT - most of us will have been touched by Maurie in a different way - he was a frequent contributor - both articles and projects to - Radio & Hobbies, Radio TV & Hobbies, Electronics Australia and Silicon Chip. Anyone who's built a kitset from those days, chances are that Maurie had a hand in it somewhere.

Now, if that's not enough, Maurie ran Findlay Communications in Artarmon, North Sydney. It produced crystal controlled HF SSB transceivers - Stingray brand - models 120 and 140. These were largely (but not exclusively) used by the Australian Navy. In fact - the US Navy bought some 500 of them - an export industry!

RIP Maurie.

Bob Yorston VK2CAN.

PS: Much more of Maurie's life was detailed in March Silicon Chip, p17. It may have been the weather (Emu Plains had 44 degrees C on that day) or maybe everyone in the electronics industry had other commitments, but at the funeral on January 30, apart from Maurie's family and friends, there were, unfortunately, only two representatives from the electronics industry: Gary Johnston of Jaycar, and myself VK2CAN.

VK3news Geelong Amateur Radio Club

Tony Collis VK3JGC

Photo 1: Clive Newton (Bardie) Wawn RAAF DFC.

Photo 2: Clive Wawn Jr.

The Finale of the GARC's Contribution to the 100th Anniversary of ANZAC

The GARC members had the privilege of hearing from the son of the late Clive (Bardie) Wawn, a decorated Australian Fighter Pilot who served in both the RAAF and RAF during WWII. The presentation, arranged by Calvin VK3ZPK, was especially planned for the last Club Meeting before 19 February 2017, being the 75th anniversary of the first Bombing of Darwin.

Although a few questions were asked and expertly answered, the members mainly just listened intently as Clive Wawn Junior related story after story, many told to him by his father while growing up on a soldier settlement farm near Dunkeld, Victoria.

Clive presented an excellent PowerPoint presentation with pictures from Bardie's Collection taken when he served first in Southern England, in France and then in Australia's North after Darwin was bombed.

One of the highlights of the evening was for Club members to thumb through his actual logbook which listed almost 150 missions in Spitfires and Kittyhawks. Members were also able to peruse his massive scrapbook full of clippings and photographs from 1940 to 1945 restored by Clive Jr.

Clive told of how Bardie crashed in the UK at Beachy Head and how both the badly damaged Spitfire and the injured Bardie were again flying a week later. Clive then related an incident where his father's canopy and headset were torn away leaving him without VF radio communications. He recalled his father saying "the Log book went out the window in Milne Bay". Bardie then flew back to the airstrip and after re-arming and refuelling, took off on another operational flight.

The GARC - VK3RGC - VK3ROW - VK3RWL Repeater Linking Project

Many amateurs travel through our area and on the surf coast, the Otway Ranges or into Western Victoria and beyond only to find very little activity on VK3ROW or VK3RWL. To overcome this problem, the GARC is currently in the process of linking these two VHF repeaters back to VK3RGC (VHF) at Montpellier, creating a linked repeater network which will , when completed, provide significant coverage over the south west corner of Victoria.

VK3RGC Montpellier on 147.125 MHz with 91.5 Hz CTCSS provides reliable coverage of the Geelong CBD and surrounding areas.

VK3ROW Beech Forest on 147.275 MHz with 91.5 Hz CTCSS in the Otway rages is 85 km south west of Geelong and provides coverage over a significant part of the south coast, north of the Otway ranges over the Hamilton Highway as far as Mortlake. It is also usable in places along the Mortlake - Warrnambool Road and overlaps coverage with VK3RGC as you head towards Geelong.

VK3RWL Mt. Warrnambool on 147.650 MHz provides overlapping coverage with VK3ROW to the east and north east. Its coverage to the north extends towards Hamilton, to the west to almost Portland and eas along the coastal areas towards the Otway Ranges.

It is planned that linking these repeaters will eventually provide continuous coverage from Melbourne Bayside suburbs through almost to th VK5 South Australian border.

The GARC IRLP Node 6572

The GARC plan to operate the **IRLP node 6572** from the Club rooms in Storrer Street, Geelong. The node will be then be accessed through th Montpellier 2 m repeater VK3RGC. The linking of VK3RGC to VK3ROW and VK3RWL will then extend direct access of the node into the south west of Victoria.

News Rebroadcasting through the Linkage

Currently, at 9 pm each evening, the GARC is currently broadcasting, via th IRLP Node, a selection of **podcasts** from the WIA, ARRL, RSGB and NZAR on **VK3RGL 147.0 MHz** to give a taste of what will be available for **podcasts** of this nature in areas not covered by the Melbourne repeater system. When finally completed, the GARC will also include a regular **podcast** advising of repeater and club facilities, club news and special events.

A more detailed follow up will be provided in the May edition from the Geelong Amateur Radio Club.

AR magazine Media Sales

The WIA is seeking a passionate, motivated and energetic volunteer to assist with the sales and management of advertising space in *Amateur Radio* (*AR*) magazine.

THE ROLE

This is a consultative and relationship-focussed role, reporting to the WIA Communication Committee leader and being a member of the Publications Committee.

THE CANDIDATE

The ideal candidate would be a marketing manager or salesperson with experience in print and media sales. The role is focused on prospecting, cold calling, presenting, negotiating, selling advertising space with new *AR* clients as well as maintaining the relationships with existing advertisers. The successful candidate will manage advertisement bookings, ensure the supply of appropriate artwork to the WIA's magazine production company, provide invoicing details to the WIA National Office, and follow up client payments as required.

EXPERIENCE

The ideal candidate would possess:

- 5+ years' sales experience.
- Ideally having worked in the print and media sales industry (past or present) or have had experience working for a company where the role and responsibilities included marketing and advertising.
- A good track record of securing new business and achieving sales targets.
- Outstanding business acumen.
- Excellent presentation and communication (both written and verbal).

All applicants should have read and agree with the draft WIA Volunteer Charter.

To apply please send your resume via email by the closing date of March 31 to: *president@wia.org.au*

Hamads

WANTED – NSW

Wanted a 60 to 70 amp 14 volt regulated RF quiet power supply at a reasonable price, reply to VK2YO QTHR 02 66742095.

FOR SALE – VIC

Yaesu FT-2900R/E 2 m FM transceiver complete, never used $300.

FT-480 2 m all-mode transceiver with handbook $250. FT-208R 2 m handheld with handbook $100.

Phone Brewster 03 9527 2661 between 6 pm and 10 pm ONLY. Please leave a message if no answer.

FOR SALE – SA

One Yaesu FT-857 in box complete, never used, In the carton.

Micro-Transceiver HF, VHF, UHF, with wide band Receiver and Standard mike Price $900 ONO.

Yaesu FL-2000 Linear Instruction Manual, Very Clean unit. Devoid of Cigarette Smoke Price $200 ONO.

M. Millar VK5MX 08 83467042 or *arvk5mx@gmail.com* QTHR.

An unusual antenna

Steve Mahony VK5AIM

60 years ago the late John VK5JQ, "Juicy Quinces", and I had been trying out different types of ATUs. No: AMUs, Antenna Matching Units.

We had one that would match anything? I forget what circuit it was, probably a C. L. C. type.

With On Air tests with other amateurs the question was asked. "Will it tune up a piece of wet string? Readers will have probably herd this comment made about ATUs in the past.

On hearing this challenge John and I looked at one and other and said "Why not!" Some string that would absorb water, a natural fibre, a hemp type was required. About 35 ft (10.7 m) of string was obtained. We borrowed a container and pinched a table spoon full of common kitchen salt which we dissolved in hot water in our container. The string was immersed in this super saturated salt water. I think we had a cuppa and a biscuit while waiting for the string to absorb the salty water. I guess about 15 minutes.

John had a small 40 m / 7 MHz, valve transmitter, home-made of course, with about 20 W of carrier.

We checked it out with a lamp load and receiver, a much modified WWII unit. All was OK. We took the salty string out of its bath. John attached the string to the aerial terminal of the new ATU, with two big brass washers to ensure a good connection. We attached the free end to a mast down the yard.

On returning to the shack, we could hear the usual noises issuing from the receiver. A good sign.

With big grins on our faces John tuned the receiver. To our amazement there was a VK3 chatting to another amateur. We waited till he handed it over to another VK3. Both stations were about R4 S5 not bad for a piece of "Wet String".

We waited for a break in transmission and John broke in with, "VK5JQ is testing a new antenna" and waited. Back came the reply. "The VK5 you are down in the noise but readable, over."

John replied with the usual station reply. "OK John, I will put it over to the other VK3 and you can get a signal report from him". Back came the other VK3 with a similar report. "Readable with care, and a bit of noise". John replied with a description of the station but did not mention the wet string antenna. I went outside and inspected the wet string. To my surprise there was steam coming off it! I quickly informed John. The first VK3 replied OK and thanks for the QSO. You are down a bit in signal but it could be propagation. John quickly replied and that he would go QRT as it looked like we had a minor problem. The VK3 signal had deteriorated considerably.

We both went outside and inspected the string! In parts it was dry, the still were sections were warm to touch! We questioned was it standing waves?

Both of us never told any amateur friends, we thought we would be laughed at and thought to be silly.

I had forgotten all about the incident till just recently when checking out ATUs for a club talk and demonstration.

Some amateurs might like to try the experiment for themselves. I don't know how one of our Solid State Transceivers finals would like the changing SWR?

PS. Keep playing with Antennas, you can always learn something and can never know everything about them.

73 Steve VK5AIM

Silent Key — Helen Anne Put VK3FYAP

Helen passed away at Royal Melbourne Hospital on Monday 6 March 2017.

She started her radio career with a Realistic handheld then a HMV SSB radio that was set up in the kitchen. Helen's father being a linesman at the SEC had the elevating bucket truck to put up the antenna: a quarter wave "droopy" but after putting it up correctly he looked at it and thought the four elements should be facing up not down so he promptly when up and reinstalled it upside down. It seemed to work well and as Helen was new to radio thought dad must know what he was doing. It was redone shortly after as she had some of her friends come around to check out the new setup and have a bit of a giggle about the antenna: luckily the bucket truck was still on site.

With CB she made a lot of good friends. She also met her husband of 38 years Arno VK3YAP through radio.

Arno and Helen married on 8 June 1979. They lived at various places but always had a CB around in the car or/and in the house.

Arno studied and passed his Regulations and theory examinations and gained VK3YAP. Helen was also interested but had two children to look after at that time. As the family grew, Helen attended swap meets, club get-togethers and other amateur related events.

The family moved from the Latrobe Valley area to East Gippsland were Arno had his first real shack and Helen got more involved in radio things attending local club meetings with Arno.

The family then moved to Wyndham Vale for work. Arno and Helen found the GARC and the GRES, where I (Helen and Arno's oldest daughter) gained my call VK3FLJP. Not wanting to miss out, mum sat the next course at the GARC and gained VK3FYAP.

After mum had some serious medical problems, the family moved back to East Gippsland where dad became her full time carer. But the family was still attended meetings in their area when they could, whilst also looking after their new-born granddaughter, who is now three year old.

Helen was the rock that kept this family together. RIP Mum you will be missed so much.

Lucy Put VK3FLJP

Kite lifted antennas

ino Pavic VK3EGN

Photo 1: A Baden-Powell "Levitor" man-lifter kite of the type used by Marconi. Person believed to be Captain BFS Baden-Powell (1, 2).

First long distance radio contact over was Marconi's Trans-Atlantic experiment in 1901. Marconi used kite lifted antennas, with a kite very similar to Rokaku.

Radio amateurs experiment with kites, often with poor results. This is mainly due to lack of good information.

You can launch a $10 kite at most locations in few minutes, and can lift your antenna 80 m high. With time you can make massive antennas, like 3-element vertical half-wave Yagi for 160 m band.

From home I struggle to work DX on low bands, due to urban noise and poor low angle propagation. At portable locations I use kites, and most CQ calls generate decent pile up. I can run EU stations for hours, at rate of 100+ per hour. Increased antenna height enhances low angle radiation and DX signals. I have experienced up to 3 S units (18 dB) variation in signal strength when antenna height is changed.

Kites suitable for antenna lifting need to be: a stable flyer; a good lifter; reliable, sturdy and easy to assemble. After you launch a kite, it should stay up by itself for hours.

Box kites are very stable flyers, but produce small lift. Sleds are stable flyers and excellent lifters in medium and strong winds. Deltas are excellent in slow wind, but poor lifters and not very stable. Winged boxes are stable, good lifters and suitable for wide range of wind speed.

Simplified kite physics

Kite forces are proportional to the square of wind velocity and the surface area of kite. Lift is vertical force (very desirable); drag is horizontal force (undesirable). The balloon is an example of low lift and high drag. You need 1,000 litres of Helium to produce only 1 kg of lift. Any wind will cause a tethered balloon to go horizontal, making it useless as an antenna lifter.

Using large kites in strong winds creates massive forces and all kite safety rules need to be followed. Sites suitable for HF antennas are most often windy places, suitable for kites too.

Ideally you would have couple of kites to suit different wind conditions. An ideal kite for slow wind will be lightweight, and has big surface area. An ideal kite for fast wind is very sturdy, and has smaller surface area.

Earthing Issues

Antenna towers over 100 m tall can provoke lightning strikes (so called "up-strike). If your antenna is less than 100 m tall, you do not have to worry about "up-strike".

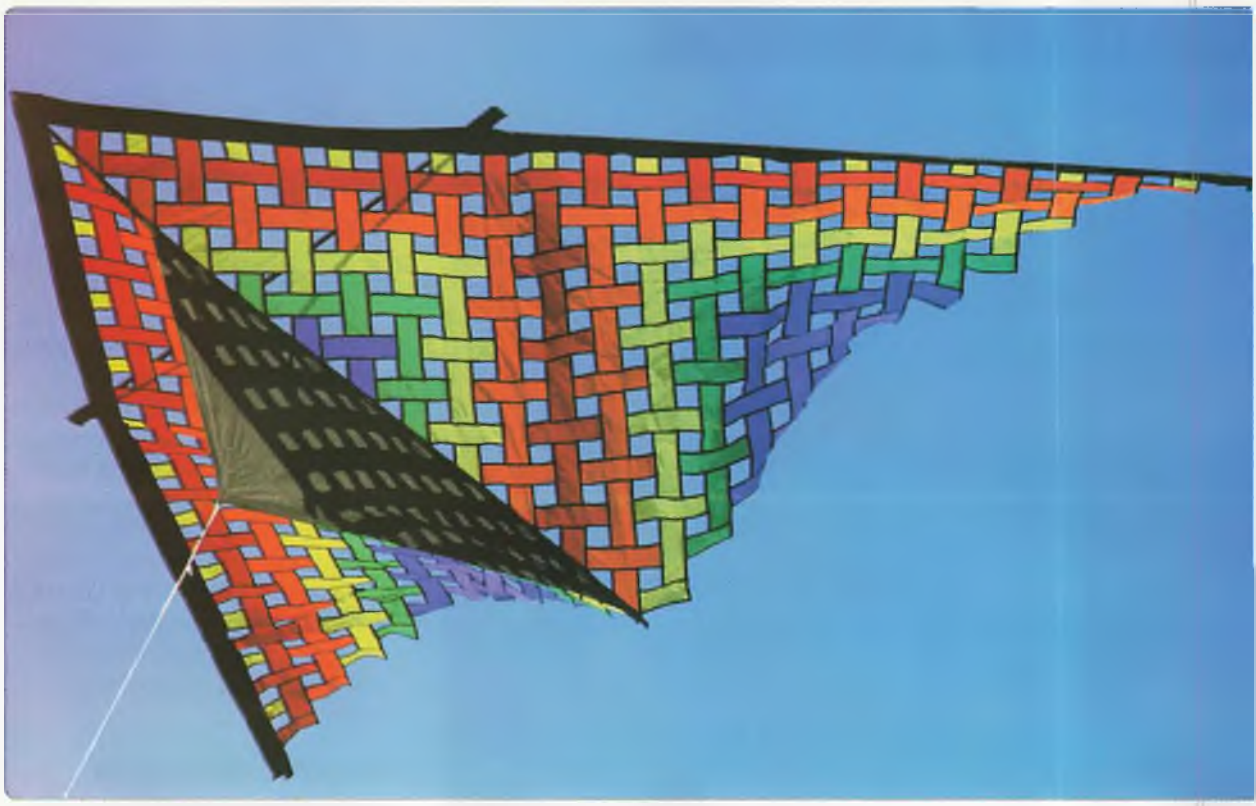


Photo 2: One type of kite: the Delta kite.

However, you will still need lightning protection – just like with any other radio antenna.

Earth's electric field strength is most often a few hundred volts per metre of elevation. During thunderstorms this can increase to several thousand volts per metre. It is possible to have 300,000 V potential difference over the length of a vertical dipole for 160 m.

Static charges will build on the antenna. This build up is slow, but can lead to very high voltages. A bleed resistor can be used to drain static charges to ground (100 kOhr / 10 W). End feeding often involves a parallel tuned circuit, plus earthin both ends of the coax for static charge discharge.

Any grounded metal object can be used as protective earth (fence posts, barbed wire, traffic signs). I often use an aluminium angle piece as a ground rod.

Coax baluns can be used to improve lightning protection too. Most often I use three coax choke baluns, and ground the shield of second balun using an earth rod.

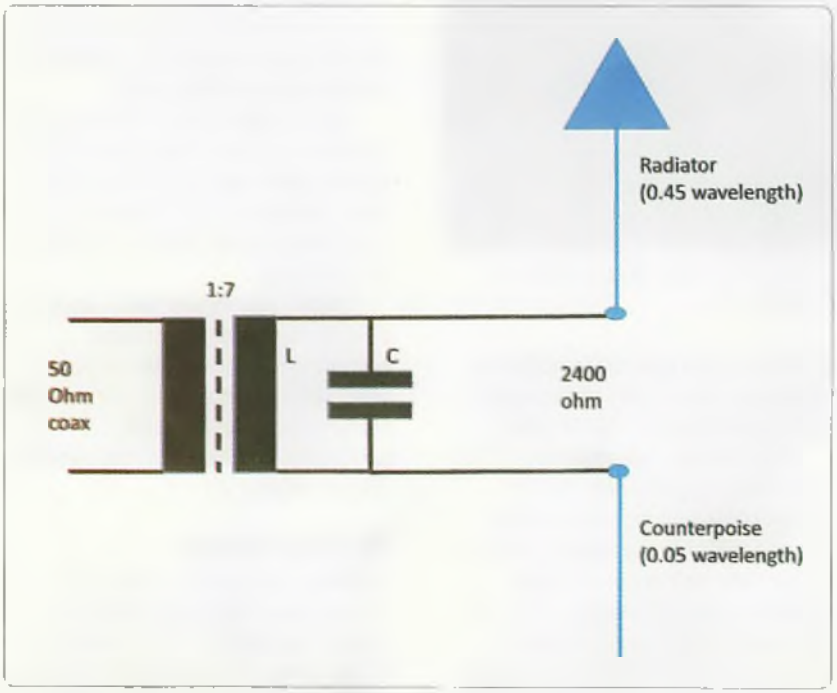


Figure 1: One method used to end feed the antenna.

Suitable antennas

Kite lifting is the best suited to Low Band wire antennas. Lightweight

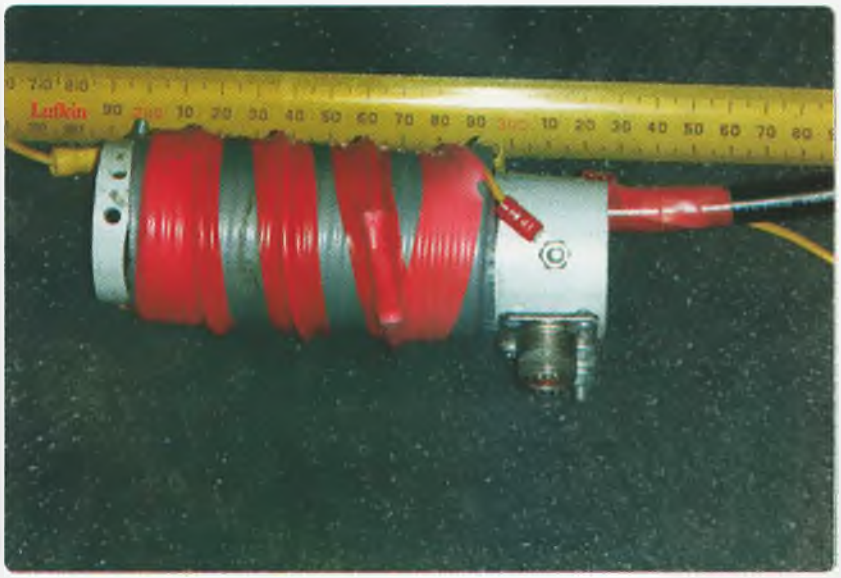


Photo 3: Home-made end feeding tuner unit.

antennas are much easier to lift, very important in slow wind (when less lift is available). A three element vertical Yagi for 160 m can weigh less than 1 kg.

Using insulated wire will increase both weight and wind resistance roughly three times. Good choice is simple copper enamelled wire, also called motor wire. It is very strong and cheap, and all motor repair places have it. Even 0.8 mm diameter can handle 1500 W easily.

Sometimes I use kites in a train to produce more lift, say 2 to 4 kites on a single line. At times I need more kites to lift more elements to make directional antennas.

Most times a single kite can be used to lift a large directional antenna, like a 3-element vertical Yagi for 160 m band. Single high point can be used to attach all three elements. The radiator can drop vertically down, and the parasitic elements can slope away.

Verticals and Ground

Ground quality greatly affects performance of vertical antennas. More conductivity means better performance, and locations near salt water are very advantageous.

Common vertical antennas (ground plane antenna, monopole, inverted L) require a very good ground system. The shorter the radiator, the better the ground required. A good ground system may require many radials, say 128.

Self-Contained Verticals (SCV) do not rely on ground system and are much less affected by earth conductivity. SCV examples are: vertical dipole (half wave), delta loop, half square and bobtail curtain.

Location does not affect SCV antenna functionality, it works anywhere. This is very important for portable antennas. Real life antennas behave very similar to those modelled with EZNEC.

Photo 4: Kites and Spiderbeam 18 m poles.

Photo 5: My 26 m pole used for antenna testing.

A parallel tuned circuit with 49:1 impedance transformer (2500 to 50 ohm) can be used as a tuner. The transformer can make antenna load appear much more balanced to the coax feed-line. This reduces feed line radiation. Tuner can be made small and light weight even for 1500 W power rating.

The primary impedance should be around 500 ohm, making loaded Q roughly 5. You will need roughly 1 pF for each metre of the band (80 pF for 80 m). Coax cable can be used as capacitor, roughly 1 pF per cm length. Most coax is rated up to 1000 V, which limits the power to roughly 400 W. A doorknob capacitor is a better option, at least 3 kV and 10 kVAR rated.

Antenna masts

Modern composite materials are great for antenna construction. Squidpoles are cheap and readily available, say $25 for 8 m length. Spiderbeam makes fiberglass poles in 12 m, 18 m and 26 m lengths. Kites and poles can work complement each other. I use 18 m poles to support coax and tuner, and a kite to lift the antenna wire.

I develop most antennas in my backyard, using a 26 m Spiderbeam pole as a high support. A Vector Network Analyser (VNA) used to be a very expensive instrument. These days you can get a good VNA for say $600. I use the AIM2140, a cheap but accurate little VNA. It is very handy for making tuners, coax choke baluns, filters, etc.

End Feeding (Bottom Feeding For Verticals)

The centre of a vertical dipole can be very high, say 42 m at 160 m. Centre feeding requires supporting lots of coax and a heavy balun very high in the air. End feeding keeps the coax and balun at the bottom, only very light wire needs to be supported high in the air.

End feeding impedance is 2500 to 3300 Ohm, and the antenna is very asymmetric. This can lead to very significant feed line radiation. Balun choking resistance needs to be 10 times feed resistance. Most antenna baluns provide 500 ohm impedance (10 * 50 ohm).

End feeding requires 25,000 ohm impedance.

Photo 6: The home test bench.

Photo 7: Petrol Generators and coax.

End Fed Antennas

Current and voltage distribution of a dipole is shown on Figure 1. Current distribution on Figure 1 is somewhat inaccurate in areas close to the ends, but adequate for the purpose of explanation.

The dipole centre point has maximum current and minimum voltage. We can conclude that feed impedance (Za) is low at this point (roughly 75 ohm).

If we move the feed-point away from the centre, current decreases and voltage increases - Za increases.

A feed-point at the end of the antenna has Za of approximately 2400 Ω.

An approximate formula for Za is 75 / (sin x) ^2, where x is degrees of electrical length. Variable x is zero at one end, 90 in the middle and 180 at other end.

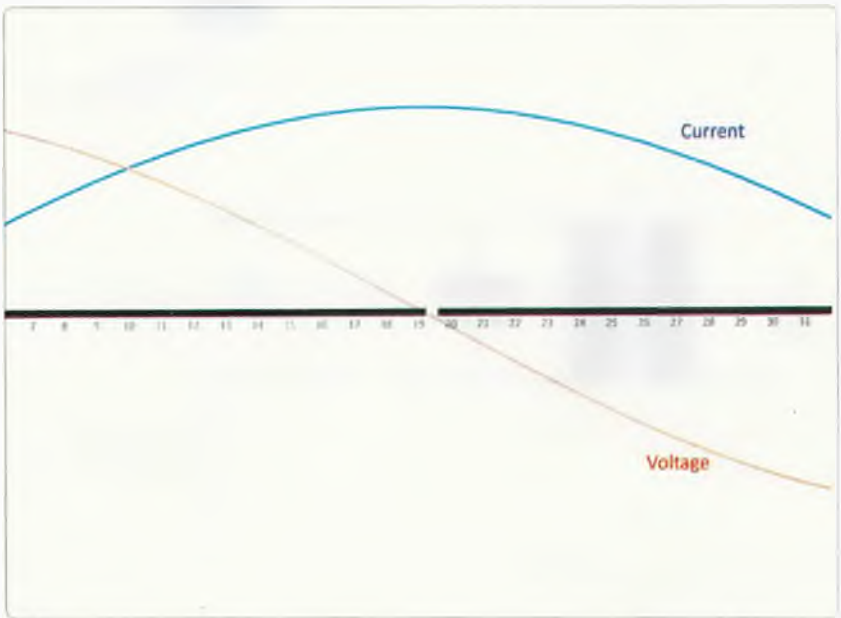


Figure 1: Dipole Current and Voltage distribution.

Moving the feed point from centre to the end does not significantly change resonant frequency. Initially any change is not noticeable. Only when the feed-point gets very close to the end, the resonant frequency will increase by few percent.

End feeding

End feeding offers some mechanical advantages, especially for Low Band vertical antennas. The coax and balun can stay at the bottom, and forces on the support structure are reduced. As a result, we can use a fiberglass pole instead of a tower.

End feeding creates two new problems:

a. Very high feed impedance (2400 Ω),
b. Very asymmetrical antenna.

Feed-line radiation can become a big problem with this type of antenna. If we use medium or high power, the radio chassis can become "RF hot". If we plan to use a directional array, the radiation pattern can be spoiled by the feed-line.

A balun can be used to reduce feed line radiation. The balun needs to have a choking impedance of roughly 10 times Za in order to be effective. For most antennas, we can use a 500 ohm balun (10 x 50 ohm). A balun for end feeding must be 24000 Ω in order to be effective (10 x 2400 ohm). This makes commercial baluns unsuitable.

Impedance match

Impedance matching 2400 to 50 Ω can be done in many different ways. It is desirable to improve symmetry in the same time.

A transformer can make the load appear more symmetrical to the feed-line. An inductive link can be used, with a turns ratio of 7:1, resonant at the operating frequency.

For 1500 W of transmit power, the feed point voltage will be approximately 2000 V. If the antenna is operated away from resonant frequency, the voltage can increase to 3000 V or more. *(Ed. Note: Voltages will be proportionally smaller when running at the Australian legal power limit of 400 W pep.)*

Inductive Link Tuner

This type of tuner is a parallel tuned circuit, with an impedance transformer. The isolation transformer makes the antenna load appear more symmetrical to the feed-line. The use of an autotransformer is not a good option.

A good choice is a secondary with an impedance of 500 Ω, for a loaded Q of 5. The required capacitor is then roughly 1 pF per metre of wavelength (160 pF for 160 m, 40 pF for 40 m band).

The tuner needs to be resonant in the middle of the band we wish to use. It should be low loss and high efficiency.

The secondary coil can be wound as a single layer solenoid. The example shown is built using 2 mm multi-strand hook-up wire, with thick PE insulation.

Good insulation is needed between the primary and secondary windings, such as several layers of electrical tape. The insulation between the primary and secondary must be able withstand at least 3000 V for 1500 W output.

The primary coil has 7 times less turns then secondary, in order to match 2400 to 50 Ω. The primary needs to be wound over the entire length of the secondary, in order to improve coupling.

The coil former needs to be low loss. You can use cheap materials for the coil former, like PVC pipes used for plumbing. It is better to use thin wall PVC tubing, because it has lower loss than a thicker wall.

Capacitor

Coaxial cable can be used for the capaitor, most cables are roughly 1 pF per centimetre if shorter than 0.05 λ. For the 40 m band, we need approximately 40 cm of coax – roughly 0.015 λ.

Coax mostly works up to 2000 V and a doorknob capacitor is a better option for high power.

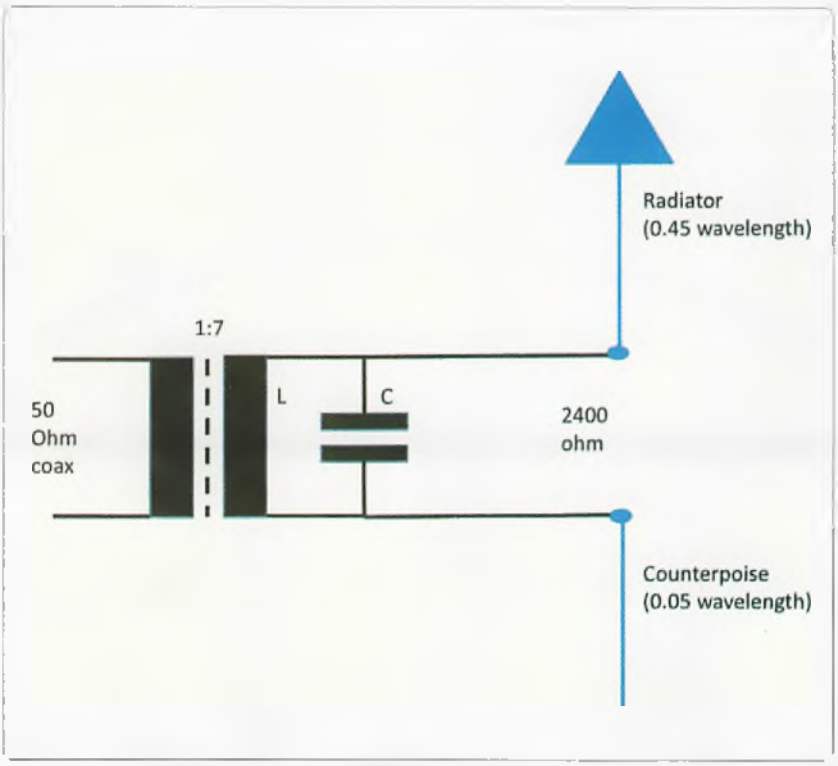
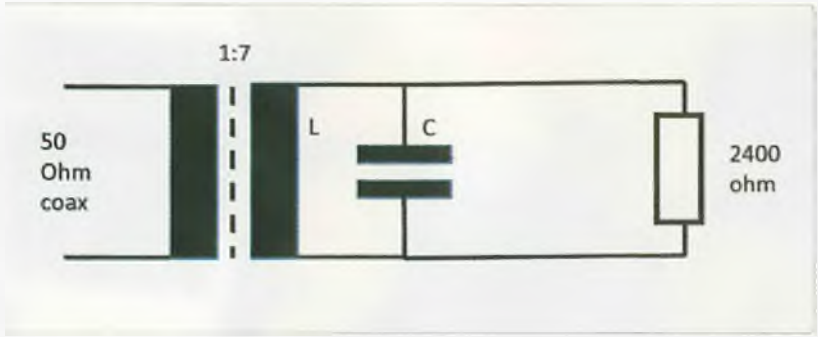


Figure 2: Inductive Link Tuner.



gure 3. Tuning the Inductive Link.

A doorknob capacitor rated 3 kV ıd 7 kVAR is the minimum required ·r 1500 W output.

uner Example: Inductive ink for 40 m

ıe coil former is 42 mm PVC ıbing; the secondary winding is 4 turns of insulated multi-strand ɔpper wire 1.5 mm diameter. The primary winding is 4 turns, and matching ratio is 36. This matches 2400 Ω to 75 Ω, ideal for RG-6.

The capacitor is 39 pF and can be coax or a doorknob. Coax will need to be roughly 40 cm. It is good idea to cut a longer piece, and trim to length during tuning. You can cut 60 cm, and trim it to perfect resonance. If you use a doorknob, you can trim the number of windings, or add a smaller capacitor in parallel.

Tuning can be done by connecting a resistor to the secondary instead of antenna, such as in Figure 3.

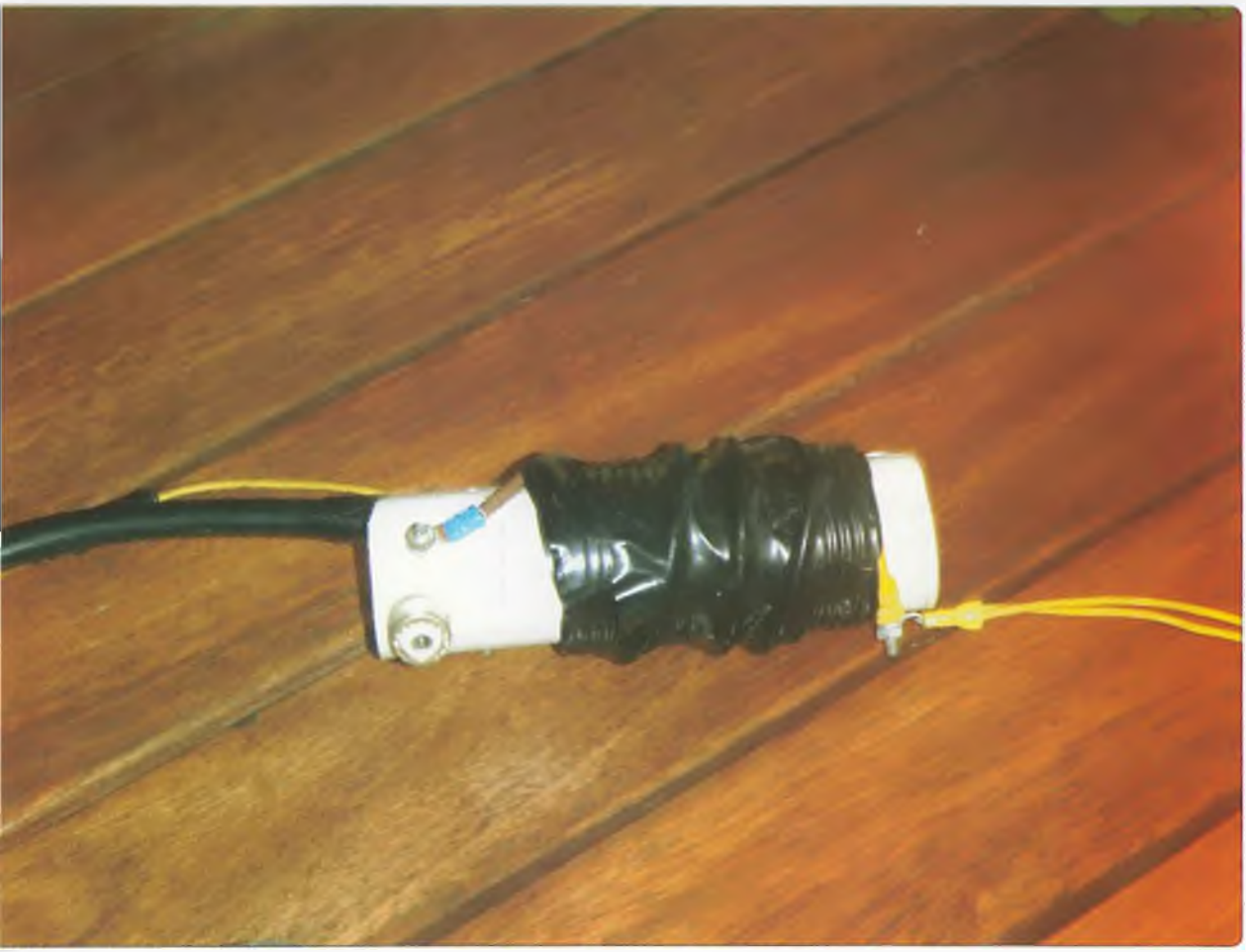
A few finished tuners are shown on Photos 1 and 2.

The secondary is wound first, then covered with several layers of insulation tape, then add the primary. The primary has many fewer windings, but it covers the entire length of the secondary.

If using a doorknob capacitor, it is mounted inside the former. All electrical connections are made with nuts and bolts, 3 mm diameter.

A square shaped SO-239 is OK, but a rounded type sits better on the former tube and needs only two screws.

hoto 1: Inductive Link with coax capacitor (RG-213).



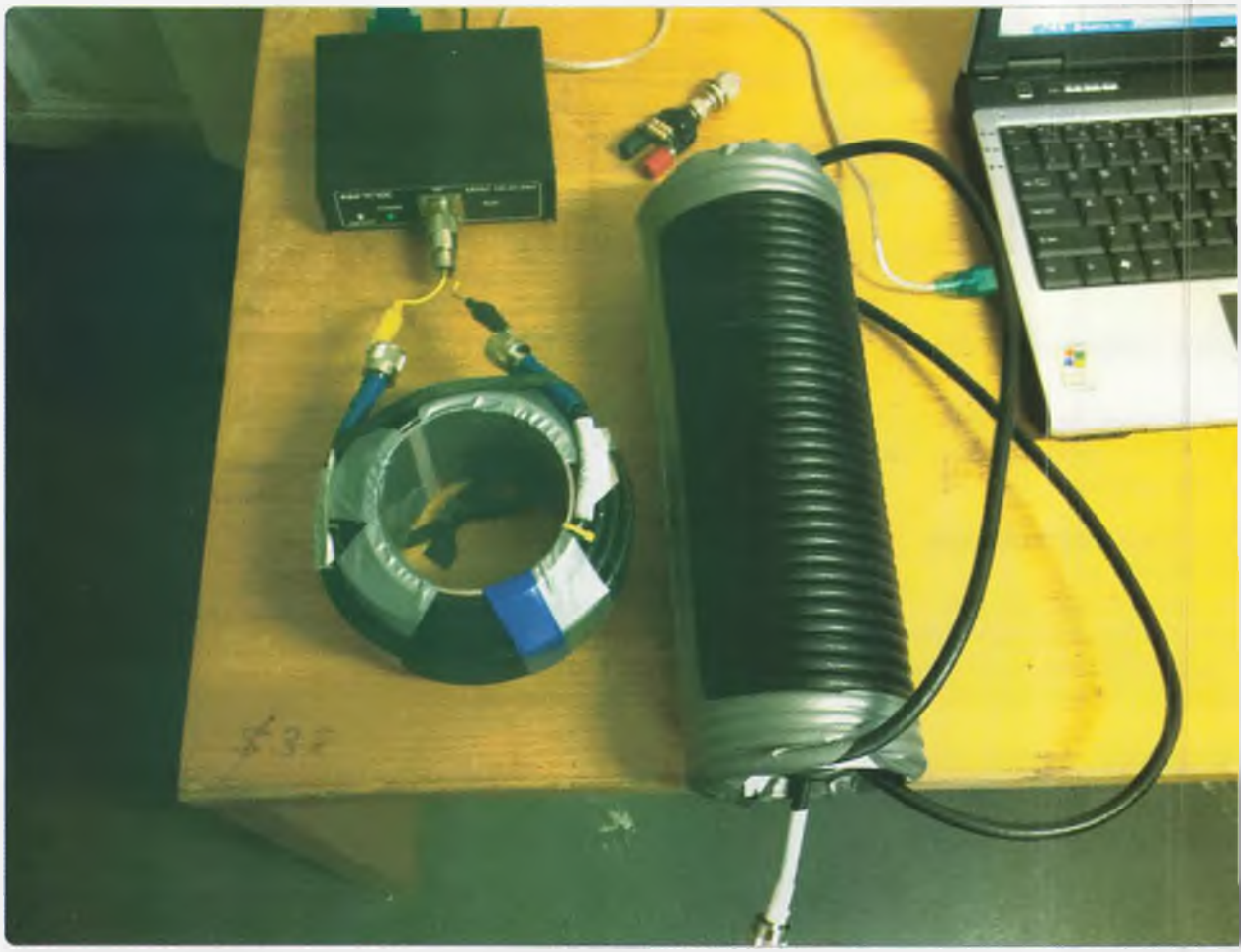


Photo 2: Inductive Link with Doorknob Cap (39 pF) and rounded SO-239

When properly adjusted, the impedance from primary side should be 50 Ω. For this task you can use an Antenna Analyser, an SWR meter or a VNA.

Balun

The balun needs to reduce feed-line radiation, regardless of feed-line length or other factors. Current baluns have many advantages over voltage baluns.

The balun choking resistance needs to be 10 times higher than antenna impedance. This is very difficult at a high impedance point; in this case 24000 Ω is required.

Baluns are much more effective at a low impedance point. It is possible to use two baluns at roughly 0.1 λ distance. At least one of them is bound to be at a low impedance point, and will therefore be effective.

Coax "Choke" Baluns

Coax can be used to make effective low loss current choke balun. At high output power, voltage can exceed 3000 V, and damage coax insulation. It is important to distribute voltage over many turns and prevent voltage breakdown.

The *Solenoid Choke Balun* is very tidy, and repeatable in terms of resonant frequency and choking impedance. This type can be effective over frequency range of 5:1. However, the end product is a long coil using lots of coax – especially on 160 m band.

A **Scramble Choke Balun** has random windings all over each other, reducing coil length and increasing inductance. This also increases capacitance between windings. The coil becomes shorter and less coax is used, resulting in lower loss. Repeatability is degraded, and voltage breakdown of coax insulation is a problem with high power.

A **Multilayer Solenoid** can be wound in several layers, increasing inductance and capacitance between windings. This will lower resonant frequency, and produce a very high choking resistance at resonance (20 kΩ). This form maintains good resistance to voltage breakdown, and has good repeatability. The useful frequency range is reduced from 5:1 to roughly 3:1.

Multilayer coils can be wound

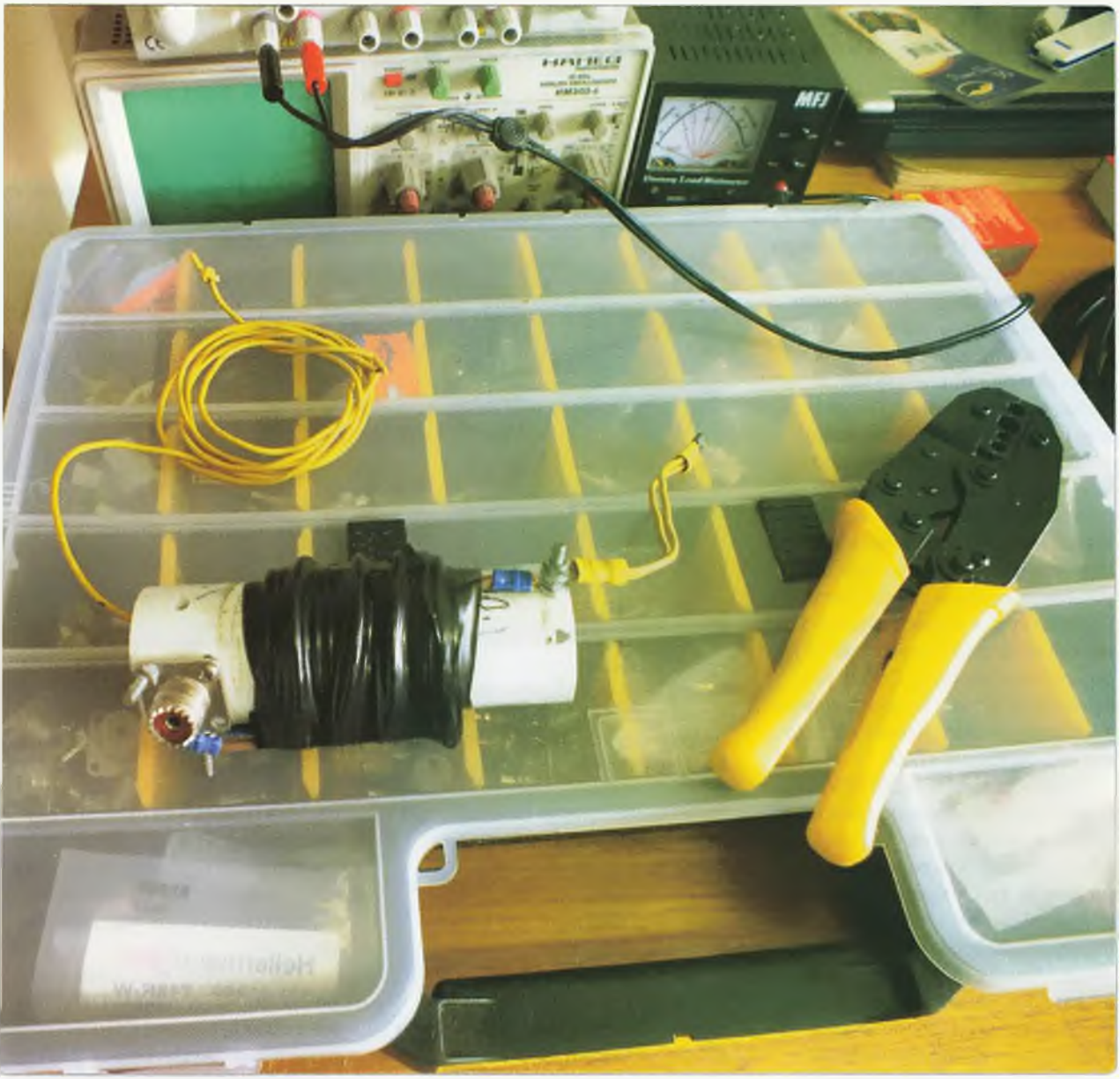


Photo 3: Coax Choke Balun - solenoid style.

easier on a narrow former. If you need a four layer coil with 12 turns, the former width can be 3 times coax diameter. In case of RG-6 coax, this is only 21 mm.

When you finish one layer (3 turns), use tape or cable ties to fix it in position. Then make the next layer, and so on. To distribute voltage over many windings, allow touching between turns of consecutive layers only.

For example we can have 3000 V distributed over 12 turns. Turns 3 and 5 touching is much better than turns 1 and 12 touching.

References

1. *http://www.cradleofaviation.org/history/exhibits/the_dream_of_wings/marconi_kite.html*
2. *https://www.qrz.com/db/WA9YSD/EA8*

VK5RSE Mt Graham Beacons

By John Drew VK5DJ

The 2 metre, 70 cm and 23 cm beacons on Mt Graham near the town of Millicent have served distant amateurs for a number of years and have been heard far and wide. Unfortunately, they were not without their problems especially for nearby hams that had to tolerate key clicks, noise and spots. The only way Chris VK5MC could operate 1296 MHz moon bounce was to turn off that beacon. Imagine for a moment a 10 metre dish pointing almost directly at the beacon five kilometres away on moonrise and you can appreciate the problems. Fortunately the author developed a remote control to permit disabling one or more beacons. On my part, listening for distant beacons was an interesting challenge mostly due to the key-clicks and spots.

Col VK5DK who is SERG's beacon el supremo took a proposal to a club meeting that involved a full update of the beacons to provide non CW digital modes thus enabling very weak signal reception for distant stations. It would also be an opportunity to develop a more streamlined beacon setup and to place all the components in the cabinet shared with the VK5RSE repeater on 146.8 MHz. Part of the plan was to dispense with the 28 V power supply for 1296 and run everything from a single 13.8 V supply.

The club agreed to the proposal, set a budget of $1000 and gave permission for the beacon team to go ahead with the project.

Enter right, the ZLPLL beacon solution. Wayne Knowles ZL2BKC (*www.zl2bkc.com*) has developed, among other projects, a very effective multi-beacon controller, separate ZLPLL exciter boards for 1296, 432 and 144 bands and boards to drive Mitsubishi RA

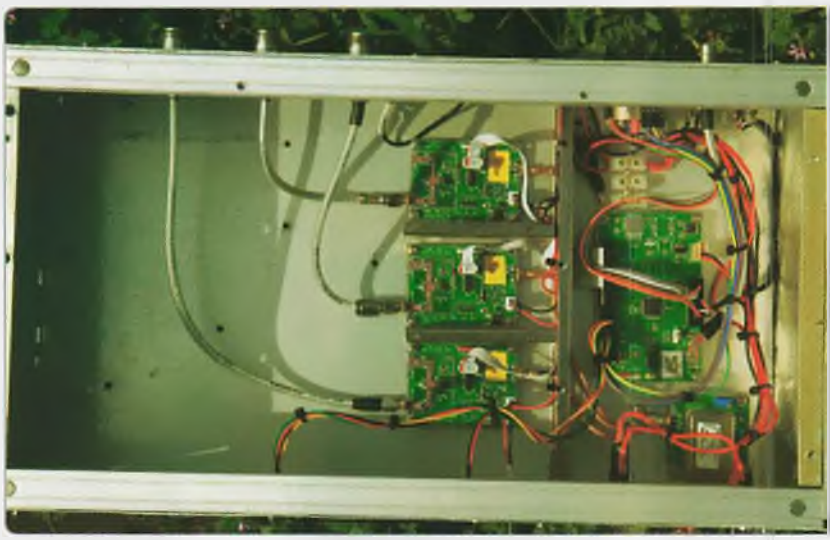


Photo 1: Beacon Drivers: The multi-beacon controller on the right and the three ZLPLL boards with shields to the left. Bottom right is the temperature compensated crystal oscillator and just visible at the top right is the DTMF decoder module. The BNC socket at top right is for the GPS unit on the multi-beacon controller.

series power blocks for each band. Mitsubishi power blocks would come from Mark VK5EME.

For technical beacon details, the author suggests you browse Wayne's website.

The old beacons provided one CW ident and steady carrier per minute. Our new beacons have the following mode cycles:

2 m on 144.550 MHz: CW, JT4D, JT65B (1 minute each)

70 cm on 432.550 MHz: CW, JT4D (1 minute each)

23 cm on 1296.550 MHz: CW, JT4F (1 minute each)

In both non CW digital modes the Call Sign and Grid Locator are sent, additionally every 10 minutes the temperature of the heat sink is encoded e.g. *VK5RSE T30/32* = current temp (30)/max temp for day (32). So by monitoring the beacon heat sink we will, in the event of extremely hot weather, have the capacity to remotely switch off one or more beacons to minimize any overheating. The concrete tank on the top of Mt Graham can get very hot during summer as ventilation is restricted to keep ladybirds and vermin out.

The presence of a mode may be controlled by remote DTMF as are power levels and ON/OFF of the transmitters. At the time of writing, all available modes are activated.

The PLLs are GPS locked and there is a 10 MHz reference oscillator in the event that there is a GPS failure.

Col VK5DK tackled the mounting of the boards while the author modified the receiver from a WeathAlert device to enable DTMF control (see: *http://www.vk5dj.com/receiver.html*). It was necessary to add an op amp with a single stage low pass filter to provide de-emphasis. Tone twist can prevent good decodes so it was necessary to minimize any difference in tone levels. Mounting of the multi beacon

hoto 2: Close-up of the Beacons: Top the final amplifiers and bottom the citers. The display cycles through time/date, GPS data, TX status, temperature d mode. Just showing is the white remote control receiver in a die cast box.

ntroller and the ZLPLL boards me first. They were installed in aluminium box confiscated from l's junkbox.

Although there was room to stall the finals in the one box it as decided against this to provide F and temperature isolation. The al amplifiers were installed in a separate but similar box and mounted on a very large heat sink to which was clamped the temperature sensor. A fan provided air circulation and a large outlet for the air on the other side. Currently the heat sink is running at mid-30 degrees.

Each amplifier draws about 6 A while the exciter box draws 0.9 A. A total draw of just under 20 A. Power output is 20 W on 2 m and 70 cm, while the 23 cm unit puts out about 16 W. These power levels were considered adequate for the role and the power/heat budget.

By the time this article appears we will have placed two new antennas for 2 M and 70 cm on the tower. Currently the 2 M antenna consists of four yagis fed through a four way power divider, one beaming East, one beaming West, one beaming North West and one beaming North East; this is to be replaced by a big wheel to provide omni coverage and built of tougher material than the yagis which have dropped elements. The 70 cm antenna is a double ended yagi with one folded dipole but there is currently a problem necessitating a temporary shutdown of the 70 cm system. A new yagi of the same construction will replace the old antenna. On 23 cm the current antenna pointing E/W will remain.

The beacons were installed by Col VK5DK, John VK5DJ and Trevor VK5NC on 23 September 2016. We anxiously await reports.

hoto 3: Col and Babies: A proud eacon constructor Col Hutchesson VK5DK) stands by the new stallation. From top: the beacons, e remote control receiver, the 46.8MHz repeater.

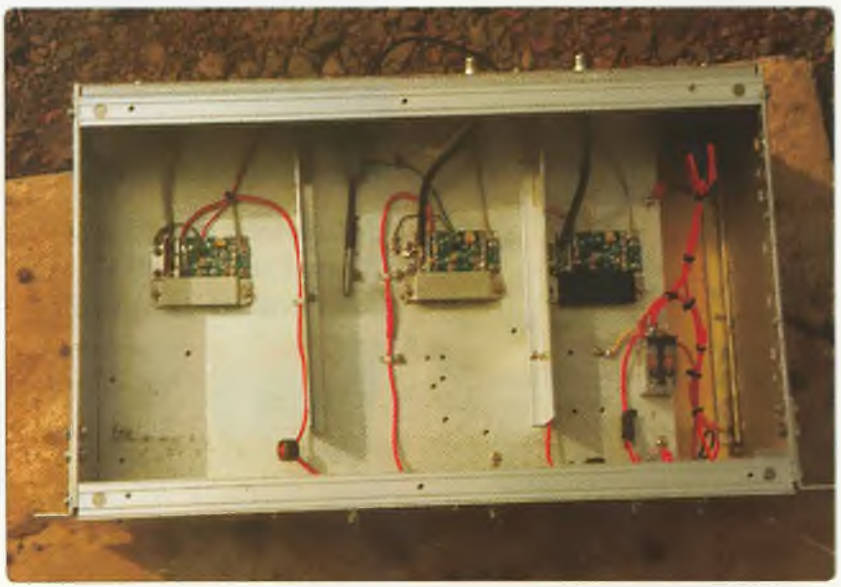


Photo 4: Final Inside: From left 1296 MHz amp, temperature sensor, 432 MHz amp, 144 MHz amp. A heavy duty relay switches the main 13.8 V power to the three units and additional switches enable switching of individual amplifiers.

Contributions to *Amateur Radio*

AR is a forum for WIA members' amateur radio experiments, experiences, opinions and news.

Your contribution and feedback is welcomed.

Guidelines for contributors can be found in the AR section of the WIA website, at *http://www.wia.org.au/members/armag/contributing/*

Email the Editor: *editor@wia.org.au*

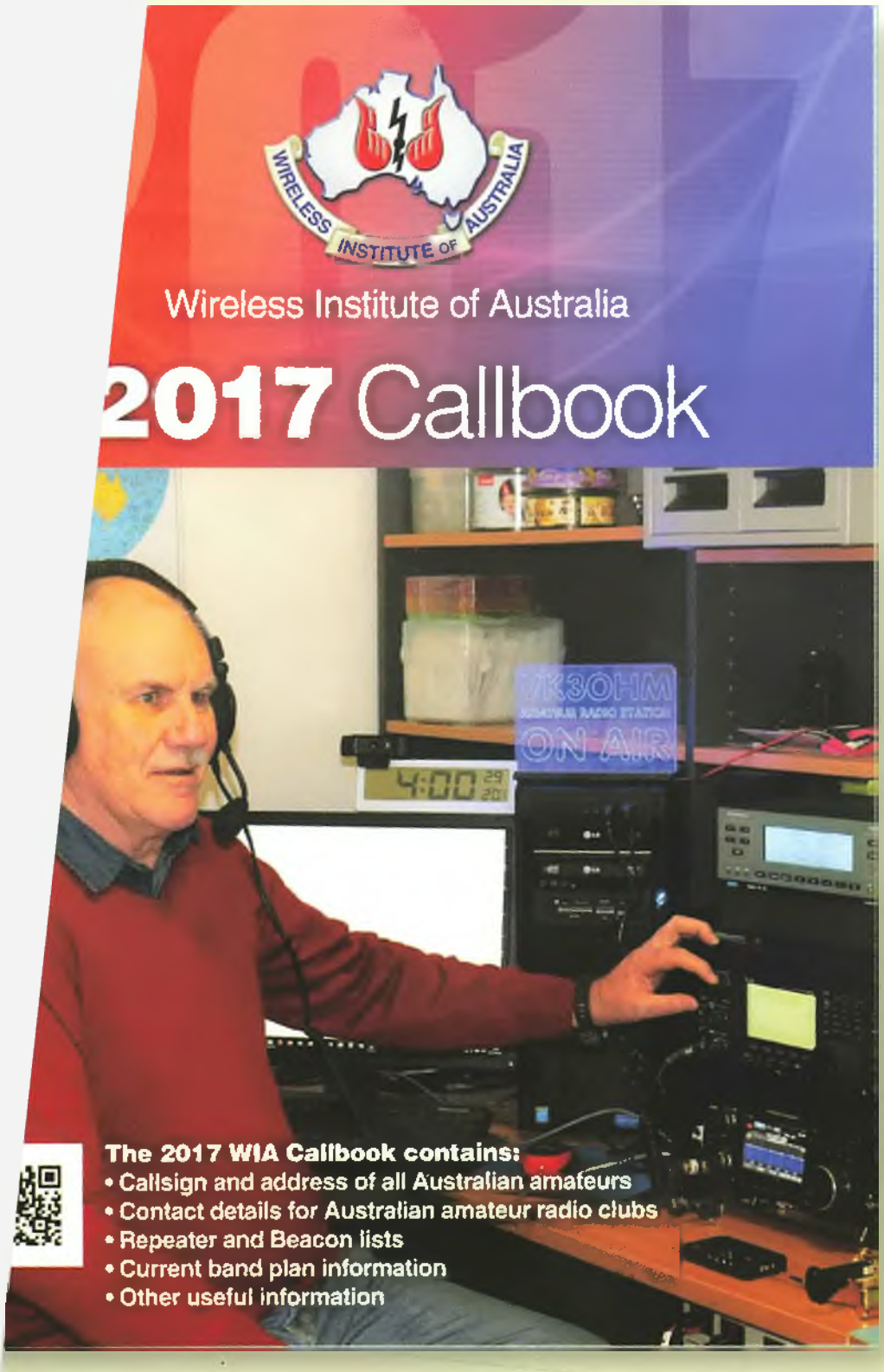
About Hamads

- Submit by email **(MUCH PREFERRED)** or if written and mailed please print carefully and clearly, use upper AND lower case.
- Deceased estates Hamads will be published in full, even if some items are not radio equipment.
- WIA policy recommends that the serial number of all equipment for sale should be included.
- QTHR means the address is correct in the current WIA Call Book.
- Ordinary Hamads from those who are deemed to be in general electronics retail and wholesale distributive trades should be certified as referring only to private articles not being re-sold for merchandising purposes.
- Commercial advertising on these pages Contact admanager@wia.org.au
- Copy to be received by the deadlines on page 1 of each issue of Amateur Radio.
- Separate forms for For Sale and Wanted items. Include name, address STD telephone number and WIA membership number.

'Hamads'
PO Box 2042
BAYSWATER VIC 3153
hamads@wia.org.au

ADVERTISERS INDEX

WIA **2017** Callbook



Available now

ICOM

THE INNOVATIVE COMPACT HF/50MHZ TRANSCEIVER

NOW AVAILABLE

Introducing the IC-7300 Transceiver.

The unit features a high quality real-time spectrum scope and features top level performance in resolution, sweep speed and dynamic range. The IC-7300 is fitted with a new RF direct sampling system, the latest high performance technology seen in Software Defined Radios.

To find out more about Icom's Amateur products email sales@icom.net.au

WWW.ICOM.NET.AU