Adelaide Hills Amateur Radio Society Inc

March 2015 Newsletter

Contents

Watching the "quadrokopteri"
See page 7.

PRESIDENT'S COLUMN

January saw our Club picnic held again at the Bridgewater Park picnic grounds, but this time with a small difference in that we tried a BYO everything picnic style, this seemed to be quite a success with about 35+ members and their families attending. The grounds have been recently upgraded and levelled, making the area even better than before, plus the weather provided us with a warm afternoon to enjoy the proceedings.

February has seen the AGM come and go, this year there were sufficient candidates to enable elections take place, that has got to be a good sign for the Club. This resulted in a change for me, from VP to President, I thank all of those who supported this move, but thanks must also go to Tony for steering the ship last year.

Planning has now commenced on the organising of this years activities both for the general meetings and also for the Shack Saturday mornings, plus there are some changes to be made to the AHARS web site to make it easier to navigate. It was decided at the last committee meeting that subscriptions will again remain at the $20 mark this year, this is possible because of the success of Antenna Analyser project.

I am hoping that we may be able to fit in some visits this year for at least one of our Thursday night meetings, there have been various suggestions as to suitable venues, if you have something in mind that you would like to see, please contact any member of the committee with your suggestion and we can take it into consideration.

This year we would like to put more focus on getting younger persons of our community to join AHARS, and stimulate their interest in radio and electronics, for this is the only way to ensure that the club has a future. We are continuing to run foundation training courses and have managed to add further members to our fold.

To this end, we have purchased some of the latest technology in SDR based transceivers for members to learn about and use, and we will need to consider a series of SDR project/workshops to be held at the Shack, where a practical simple SDR can be built to introduce the newer members to this technology and provide them with constructional skills at the same time. Graham Dicker will run a workshop on using the Arduino Nano series of chips which are extremely cheap, with practical programming and simple interfaces, a real "hands on" approach to using these devices,. Details will be forthcoming via email and the broadcast.

There will be several auctions to be held during the year, some silent type as per the usual format, but others to be held on the odd Saturday at the Shack, where you can again pick up a bargain and swap tall stories and true, as has been held in the past years. We are again looking for someone to handle the job of "equipment recycling" and running the Clubs deceased estate managers function, if you think you would like a go at this, please contact me through the usual channels.

This year's Buy and Sell has been locked in for November the 1st, this is always a popular event and one of the few that commercial dealers are still coming to. I have heard reports that we are now considered by many to be the largest of the Hamfests available in Australia, a good tribute to the success of the event organisers and the hard work of many members to make this happen.

We have good times ahead, and I look forward to this coming year at AHARS.

Good health to all, 73 from Barry VK5BW

EDITORIAL

1.The AGM has come and gone, and the committee has seen some changes: Of note perhaps is the "promotion" of Paul, VK5PAS, from ordinary committee member to Vice President. David, VK5KC, has rejoined the committee, and brings a wealth of experience and wisdom with him. Our thanks to Tony, VK5KAT, for his work over the last year as President, and also to those continuing committee members.

2. AHARS will be busy with the ANZAC 100 radio activities this year. Paul has placed a full page about what he has organised for us, on our website. There is a summary in this newsletter.

3. I have come across 2 old hand sketches of Socket Connections for

❶ an AR8 Receiver; Junction box, (PSU and ATU), ❷ and an AT5 Transmitter; (Junction box and PSU).

These are from the estate of Don Campbell, VK5DD, SK.

I have placed these on our AHARS website, and in the on-line version of this newsletter. If you would like a copy, please contact me. John, VK5EMI, Editor. **(--... ...--!)**

Adelaide Hills Amateur Radio Society Inc
Club Program 2015

MARCH		
Friday 13th		AHARS Regular Luncheon (All Welcome) - Blackwood RSL, Brighton Parade
Friday 13th		ALARA Luncheon - Cafe Di Mare. Currie St, Adelaide
Saturday 14th	9.00am	Social get together over a cuppa - At The Shack
Thursday 19th	7.30pm	**Detective Blundell from SAPOL :** Internet Safety & Computer Fraud Monthly meeting At The Blackwood Community Centre
Saturday 21st		John Moyle Contest (TBC) - At The Shack (TBC)
Sunday 22nd		John Moyle Contest (TBC) - At The Shack (TBC)
Friday 27th	Noon	AHARS Regular Luncheon (All Welcome) - Blackwood RSL, Brighton Parade
APRIL		
Friday 10th		AHARS Regular Luncheon (All Welcome) - Blackwood RSL, Brighton Parade
Friday 10th		ALARA Luncheon - Cafe Di Mare. Currie St, Adelaide
Thursday 16th	7.30pm	**Member's Buy & Sell** Monthly meeting At The Blackwood Community Centre
Friday 24th		AHARS Regular Luncheon (All Welcome) - Blackwood RSL, Brighton Parade
Saturday 25th		Graham Dicker - *Aduino Nano* construction program - At The Shack
MAY		
Friday 8th		AHARS Regular Luncheon (All Welcome) - Blackwood RSL, Brighton Parade
Friday 8th		ALARA Luncheon - Cafe Di Mare. Currie St, Adelaide
Thursday 21st	7.30pm	**VK5PAS – Parks Awards** Monthly meeting At The Blackwood Community Centre
Friday 22nd		AHARS Regular Luncheon (All Welcome) - Blackwood RSL, Brighton Parade
Saturday 23rd		VK5PAS- Practical and Theory of Portable operating - At The Shack
Saturday 30th		"AHARS Breakfast", Auction and Working Bee - At The Shack

Outcomes of the AHARS ANNUAL GENERAL MEETING held on THURSDAY 19th FEBRUARY 2015

62 Members and visitors attended the meeting at the Blackwood Community Centre.
Visitors were Spud, VK8ZWM; Larry; Michael Finch and VK2XOR.
The President, Tony Hughes, VK5KAT, welcomed all and opened the meeting.
Reports were presented by the President (Tony Hughes, VK5KAT), the Treasurer (Peter Reichelt, VK5APR), and the QSL Manager (John Elliott, VK5EMI).

VOTING FOR THE 2015 COMMITTEE

POSITION	NOMINEES		ELECTED/APPOINTED
President	Tony Hughes, VK5KAT* Barry Williams, VK5BW		Barry Williams, VK5BW
Vice President	Paul Simmonds, VK5PAS		(Unopposed)
Secretary	Jean Kopp, VK5TSX*		(Unopposed)
Treasurer	Peter Reichelt, VK5APR*		(Unopposed)
Committee Members	David Clegg, VK5KC Denis Haseldine, VK5HH* Lyall Whyatt, VK5WL	Roy Gabriel, VK5NRG* Jim Tregellas, VK5TR*	Roy Gabriel, VK5NRG Jim Tregellas, VK5TR David Clegg, VK5KC

** = Elected officer, 2014-15*

Adelaide Hills Amateur Radio Society Inc
WICEN SA Report

From the President:

WICEN SA President, Nic, VK5ZAT, assisted SAVEM in the recent major bushfire in the Sampson Flat area travelling past police road blocks to deliver UHF handheld radios to the One Tree Hill staging area for use by SAVEM, RSPCA and DEWNR personnel. SAVEM continued to use the handhelds for 14 days of their involvement on the fireground.
SAVEM: SAVEM (SA Veterinary Emergency Management) has approximately 250 plus volunteer members who are vets or nurses. SAVEM has vet equipment, funding, training, volunteers and resources to provide "...Triage, Treat, Rescue and Reunite POST EVENT..." for animals affected by emergencies.
When requested, WICEN SA can provide operators to assist SAVEM.
Nic, VK5ZAT

From the Secretary:

RoSA is later this year, 30th October to 1st November 2015.
Radio command *Go-Box* plans have been finalised and build has begun.

The Go-Box Concept: WICEN SA are building a portable box for a command (radio net control) location that contains four radios. Amateur VHF, amateur UHF, commercial VHF and commercial UHF radios. All WICEN SA owned equipment.
This Go box will contain all cables & antennas required so the operator can open and start using. In the future, additional boxes for power and remote radios will be built.
The idea is that in an emergency, the amateur volunteer will use their personal equipment until the Go boxes can be transported to the location required. Then everyone uses the WICEN SA equipment.
If SAVEM need radio communications, we can deliver the go box with the commercial radios that have full power of the mobile size radio to communicate with the Motorola handhelds WICEN SA now have.
The Go box can also be used at events such as RoSA, horse endurance, car rallies and displays.
Andrew Macmichael, VK5FMAC
Have you considered joining WICEN? We are a great bunch of amateurs, who enjoy getting out and operating portable, and providing assistance at various events.
http://www.sa.wicen.org.au/
2015 AGM: May. Exact date to be finalised.

Malcolm Haskard AM

It is worth mentioning in forthcoming AHARS and WIA Broadcasts, and Newsletters, that Malcolm Haskard, VK5BA, was awarded an AM, in today's Australia Day Honours' lists.
He is well known in the South Australian Amateur Community, has been a guest speaker at many local clubs over the years, and deserves this Honour.
Submitted by Rob, VK5RG.

"Building the future the best reward.
Malcolm Haskard AM (From "The Advertiser")
PRODUCING well-trained and qualified university graduates is among the highlights for Professor Malcolm Haskard, who today has been recognised in the Australia Day honours.
He has been recognised for his significant service to science, particularly to electronic engineering, and to the community.
Prof Haskard, 78, of Humbug Scrub, said he was shocked and honoured when he was notified of his appointment as a Member of the Order of Australia by mail some weeks ago.
"I was shocked and I guess really humbled," he said. "I never did any of these things for reward, I have enjoyed doing it all.
"My greatest pride is producing a fantastic number of graduates."
He fell into his career as an electronic engineer after wanting to become an aeronautical engineer, which he said was "the right decision".
Prof Haskard was also recognised for community work including being a Justice of the Peace, amateur radio operator and founder of Kersbrook District Men's Breakfast.
Jordanna Schriever"

Subject: Radial system, RW & shed bonding, etc.

Here are some pix of how I went about optimising my earth mat system that includes 60 wire radials from 20 to 195ft long.

First, I design the skyhook to suit my purpose & space access/availability. I know that my systems are detailed & will therefore have to be done in stages.

Then I start with a radial plan & install them: at least four of the longest before anything else gets done. Everything is cleaned, soldered; conductive paste & SS hardware used @ every junction.

Experience has shown me that to install an aerial FIRST means operating will happen before radials are completed properly & therefore the aerial system is most likely NEVER to reach its optimal potential.

Second comes the feedline, since 1975 almost always balanced line for me & from the aerial base/feedpoint right to the balanced aerial coupler terminals @ the operating desk. No baluns, no coax on the output side of the coupler.

There will be one exception & that will be the switchable new MF aerial for 630 & 160m which will have RG213 to a HV series coupling capacitor @ the aerial base because I am installing one freq system @ a time.

Thirdly, I fabricate/assemble the aerial, install, tune & test it on air. Make any mods, silicone everything for which I have used conductive paste & joining hardware & hi ho away I go!!

Anyway, in the attached pix:

128 is a RW tank bonded to a short radial @ the aerial base

129 radial bonded to Mum's garden shed then continued on for another 10m or so

130 RW tank bonded to the workshop shed which is already bonded to the radial system (see next pic)

131 several radials bonded to the workshop shed as above. Note a pair of radials run in the paving slab channel & smothered with silicone: these head out to the opposite side of the yard boundary fenceline for about 165ft

132 bonding to both the cold & hot water copper pipe networks (quite extensive throughout our 90yo dual residential house). Also connects with one of the domestic earthing stakes as shown.

133 shows fence iron sheets & both metal fence rails bonded together with copper wire bridges. The buried black wire is buried under 3 sets of path paving & is bonded to the copper pipes as per pic 132

Each of these has been tested for bonding continuity before silicone was applied.

As I previously had a large Inverted-L & ran a pair of 195ft radials running right below it, the new one will be in the same spot so will have that as well. Good practice for any end fed aerial in my opinion.

I have a few more tanks to bond & once our E boundary neighbour fence issue is resolved, I will be able to get more done over on that side of the block.

Worth noting is that if I ever have any visitors with braces on their teeth, they had better not stand still for long or they may too, find themselves "bonded to me" !!

Another one arm challenge that does also involve a considerable amount of stooping - so I dragged an old cushion around with me & simply lay down on one side to do the ground level stuff. I get too buggered in the low back & hips otherwise!!

Hope this has been of interest.

Very 73 de Me (Doc)

[EDITOR'S NOTES: 1. have asked The Doc for more details for his photos—see following page.
2. Note that the Mains Earth alone should never be used as an RF earth—it will be very lossy at RF, be susceptible to Mains RFI, and might pose an electrical hazard to The Shack under some conditions.
3. An extensive system of earthing & counterpoise cables is essential for working longer wavelengths.
RW = Rain Water . Doc, being an old CW fan tends to use abbreviations for all sorts of things! Anon.]

↑ *129. The thick black cable is a 60m long 5-core counterpoise to which both fence rails (total length 2 rails x 80m each) have been bonded.*

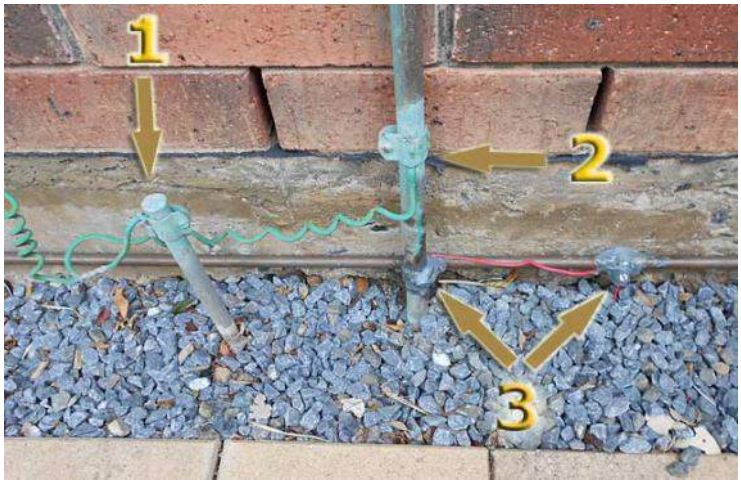
133. ➔ See text.

DOC'S EARTH BONDING DETAILS

128 & 130. A short length of surplus copper pipe has been bonded to an 800 litre RW tank used for ↑ dripper irrigation of the aerial base. The green covered wire is a short radial back to the aerial base.

"Good earthing increases aerial efficiency , and reduces RFI"

131. Three radials from the aerial base have been bonded together with my 10 x 3.5m metal workshop



132. Numbers 1 & 2 are mains earth stakes. 3 is the bonding strap from the horizontal copper water pipe system visible, to the earth stake arrangement. Please note NOT TO EVER rely on simply using the mains earth as your RF earth - my situation sees the mains earth as a minor part of a very extensive 60-radial plus other bonded conductors to be my station RF earth "farm".

Adelaide Hills Amateur Radio Society Inc
Photo Gallery

MID YEAR LUNCHEON - (Held at the Marion Sports and Community Club)

Wolf, (VK5WF), Carole, and Shirley at the table, with Roy (VK5NRG) and Barry (VK5BW) behind.

Lyle (VK5WL), Jim (VK5TR), and Shirley (VK5YL)

Meg (VK5"Yellow Giraffe)" with Tina (VK5TMC). A nice pic of these ladies.

David (VK5NU), Libby, and Bia (*representing Ireland, perhaps? - Ed.*)

JANUARY PICNIC - (Held at the Lions Park, Bridgewater)

David (5NU) with Libby, and Greg (VK5ZBD) enjoying a chat in the shade.

(From L to R): Keith (VK5OQ), Wolf (VK5WF), and Brian (VK5TI), lined up for food or shade. Note the lovely grounds behind.

Thanks to Rob, VK5RG, for these photos - Ed.

A BIT Of HISTORY (VK5BR)

Owen K Griffiths with his radio transmitter, March 1923.

The Blackwood Radio Club was the first of many amateur radio clubs formed in South Australia during the 1920s. Owen Griffiths of Young Street was a foundation member.

ANZAC 2015

From Paul, VK5PAS:

I have successfully applied for use of the **VK100ANZAC** & **VI5ANZAC** call signs for the ANZAC Centenary.

Sunday 16th August 2015 – VI5ANZAC
Sunday 20th September 2015 – VK100ANZAC
Sunday 4th October 2015 – VI5ANZAC (Activation at Belair National Park at WW2/Korea memorial.)
Sunday 25th October 2015 – VK100ANZAC
Sunday 22nd November 201 5- VI5ANZAC

Excepting October 4th, I am hoping that we will be able to operate at the National Military Vehicle Museum at Edinburgh Park.

If you would like to become involved, please drop me an email. **vk5pas@wia.org.au**

(*The above information extracted from the AHARS website - Ed).*

WORLD WAR II RADIO TRUCK

Used throughout the British Army in many theatres of war.

Room only for one operator!

The truck was used for CW, phone and telephone operations. The telephone cable was usually laid out carefully on the ground between the truck and the nearest OP (Observation Post), but more often pulled up in an untidy hurry as the enemy suddenly appeared on the scene!)

The operator of this particular mobile station was none other than Gunner S. Milligan of Puckoon and Goon Show fame - Ed.

FUN IN FINLAND

(From Pekka, OH3GDO).

Pekka's group of ham friends gathers together regularly to test and display their latest projects. Kangasala is an area where the Robot Association meets.

1.This device (below) is their "quadrokopteri ", fitted with a video camera and transmitter, which the operator can pilot to wherever he wishes (perhaps within reason!)

2. At this gathering, Pekka introduced the GPS recording unit for an airplane.

The airplane spreads rabies vaccines in Eastern Finland in spring and autumn. This is an EU project.

The unit records the location of where the baits are dropped.

◄The red line on the map is made up of a series of dots, each dot showing the location of each bait. This line is along the border with Russia.

(Footnote: the main rabies' culprits are raccoon dogs and foxes - Ed.)

BearsFL RADIO COMMS VEHICLE

Compare this with the slightly older unit above!

BearsFL.US is the club amateur radio station of BEARS, the Brevard Emergency Amateur Radio Services, Inc, in Brevard County, Florida, USA. There's lots more information on this active emergency group on : **http://bearsfl.us/**

Adelaide Hills Amateur Radio Society Inc

GENERAL INFORMATION, NOTICES & CLUB CONTACTS

Club Projects

Antennalyser kits.
Saturday morning technical talks.
Details from Roy Gabriel,
VK5NRG. Ph 8278 2522.

Amateur Radio Licence
Study Courses and Examinations
Foundation, Standard and Advanced Licences.
Please See Club Program For Dates
Location: The Shack, Blackwood.
Contact Sasi Nayar VK5SN
0417 858 547 or email vk5sn@wia.org.au

Club Weekly Net on VK5RAD
Listen to or join in on Monday nights
from 8 pm to about 9:30 pm local time.
Receive frequency is 147.00 MHz, with -600 KHz offset.
Net Controller: Jim (VK5TR);
Dean (VK5LB); or Barry (VK5BW)
All licensed amateurs are welcome.

VK5RAD
(Crafers Repeater)
The Repeater Controller is Barry Williams.
All enquiries, including requests for access, etc,
are to be made through him.
Phone 8339 5683 or email vk5bw@wia.org.au

Australian Ladies Amateur Radio Association (ALARA)

http:/www.alara.org.au/

State Representative: Jean VK5TSX
Phone: 08 8322 0066

Encouraging women's interest and active participation in Amateur Radio.

ALARA was formed in 1975 by a small group of Australian ladies interested in Amateur Radio. Membership has now grown to over 200, with many Australian members sponsoring overseas YLs into ALARA.

The term "YL" stands for "Young Lady" regardless of age.

The SA group meets at 12.00pm
on the 2nd Friday of each month
in the Grand Chancellor Hotel, 18 Currie St, Adelaide.

They have a net on 80 metres on Mondays at 1000 UTC in winter and 1030 UTC during summer (day light savings time) at 3.570 MHhz.
There are also EchoLink skeds.

CLUB CONTACTS

Clu President VK5BW	Barry Williams 08 8339 5683
Vice President VK5PAS	Paul Simmonds 08 8391 2397
Secretary VK5TSX	Jean Kopp 08 8322 0066
Treasurer VK5APR	Peter Reichelt 08 8352 5904
Licence Training VK5SN	Sasi Nayar See Opposite

Meetings & Venue

AHARS meets on the third Thursday of each month, commencing at 7:30 pm., at the Blackwood Community Centre, Young Street, Blackwood.)

Postal Address

A.H.A.R.S P.O. Box 401, Blackwood, 5051.

Website Address & On-Line Newsletter

The address for our website is:
www.ahars.com.au
Thanks to Kim Hawtin, our very able web-master.

Articles For The Club Newsletter

Projects, anecdotes, experiences, ideas, advice, etc, all make interesting and useful reading, and will be much appreciated.

Please forward directly to the
Editor- John Elliott VK5EMI
phone 8278 1269 or by email (best)
to vk5emi@wia.org.au

Publishers-
Michael & Kaye Roden VK5FMTR
email - visit01@bigpond.net.au

Our Next Newsletter Will Be Published In June 2015

RESONANT SPEAKER FOR AMATEUR RADIO

From QUA magazine, December 2014. By Kevin, ZS6KMD. (SOUTH AFRICAN RADIO LEAGUE)

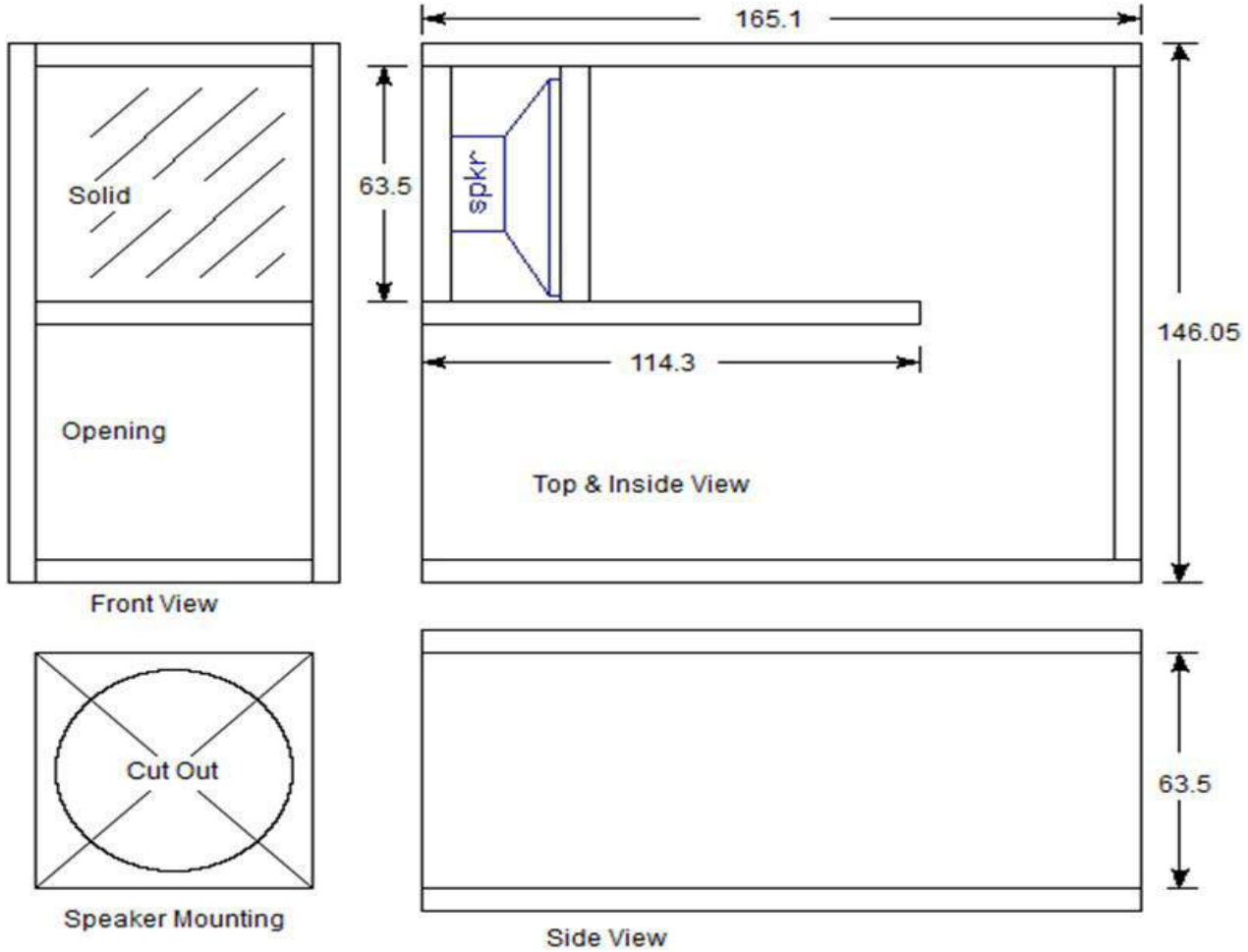
When something is resonant at a specific frequency, all other oscillation or interference and noise is cancelled out and you would only experience that resonant frequency. This is true with RF, Light and Sound. In sound, the resonant frequency can be described as a natural frequency of vibration determined by the physical parameters of the vibrating object.

With this theory in mind, it would be possible to construct a speaker, which is resonant at 600 HZ for CW operators that attenuates other frequencies, similar to what a tuned electrical circuit would do.

If the resonant frequency of a cylinder can be calculated with a formula similar to that used to find the resonant frequency of an antenna using the speed of sound instead of the speed of light, then the formula of L=1100/F is used where 1100 is the speed of sound, F is our frequency and L the length. This is for a cylinder, which is open at both ends. If we close one end, then the formula of L=1100/2F is used. Therefore, if we seal the end of a cylinder 279,4mm in length, we will have a resonant speaker for 600Hz.

Having a cylinder almost 300mm in length is not really a practical solution and it is possible to "fold" the design into a "U" shape providing a smaller footprint on top of the radio or on the shelf. This makes it twice as wide but half the length. Using a cylinder also need not be the end of the design, using a box does not seem to influence the theory and design significantly.

The design below is for a box made from plywood with the speaker mounted on a mounting plate using a hot-melt glue gun. The speaker is 4Ω 58mm 2,5W. All measurements are in millimetres.
Have fun building—73 de Kevin ZS6KMD.
[Many thanks to Kevin, and Dennis, ZS4BS, for kind permission to re-publish this article—Ed.]



As pointed out above, this is only useful for CW.
Working to the nearest millimetre is sufficient. I challenge members to do better than that!
Doc, VK5BUG, promises to have one of these in operation in his shack soon—*Ed.*

CONNECTIONS FOR OLDER RIGS.

From the estate of Don Campbell, VK5DD, SK.

AT5 TRANSMITTER

AT5 Transmitter
Socket Conections.

Junction Box

12. M.F./HF. Relay
7. Pulse
3. L.T. Return
5. 1/c Transformer
9. Mic Operator
10. Cathode Return
4. Sidetone
6. Mic R.C.U.
11. R.C.U. Gen Sw.
8. R.C.U. S/R Sw.
1. Key Relay
2. C.W. Remote Control

Power.

1. + 12 Volts L.T.
8. Gen Rel
9. + H.T. 550 Volts
3. − L.T. 24 Volts } −12 Volts
4. + L.T. 24 Volts } −12 Volts
2. Earth
7. Earth
10. + H.T. 300 Volts.

AR8 RECEIVER

AR8 Receiver
Socket connections

Junction Box

1. 4. Phones.
9. Mic. In.
3. Keying Relay

Power Supple

3. − 12 Volts
1. + 12 Volts
4. + 24 Volts
9. + H.T.

A T 5 Aerial Coupling Unit.

1. 3. MF. HF. Switch.
4. Transmitter Keying.
9. Receiver Keying.
7. 8. Keying Relay.
10. 2. Earth.

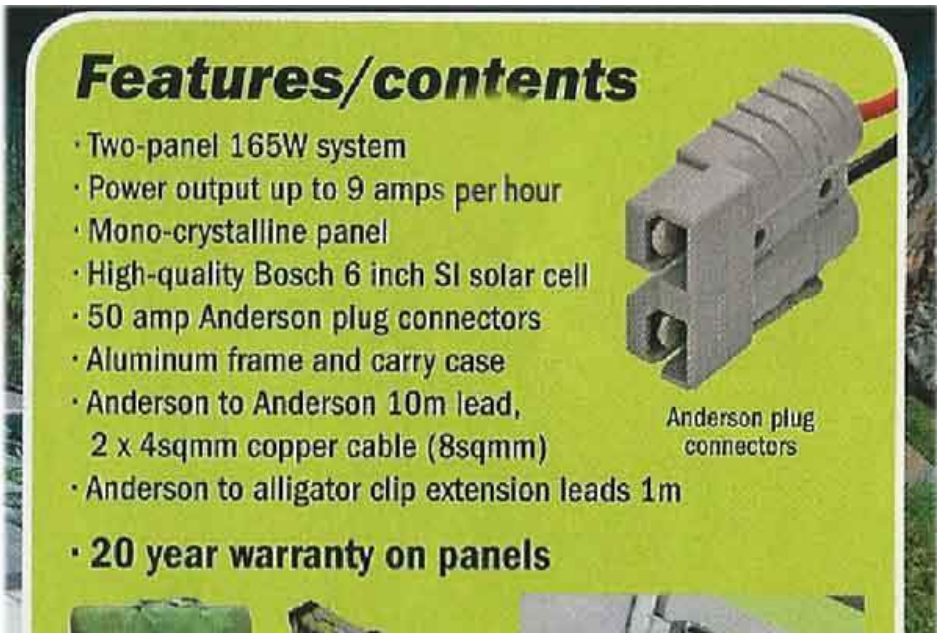
I wondered why I often heard "birdies" on the 2 metre band.
(Trained magpies waiting for my XYL to feed them. — Ed.)

Author of this particular Guide is unknown—and probably an SK now! - Ed.
From Imgur.com

FROM A NATIONAL CARAVAN MAGAZINE.

ADVERT FOR A SOLAR SYSTEM

Can you spot the error?
(It should be easy!)



1974 EXAM PAPER

Once you've given up on the toughie above, have a go at the paper below. No cheating!
Note that this was the last of the papers requiring the examinee to write <u>essays</u> as answers.
Submitted by Rob Gurr, VK5RG, who would have breezed through the paper!

Amateur Operators Certificate of Proficiency Examination February 1974

TELEGRAPHY

SECTION L (RECEIVING)

(Speed — 10 words per minute)

Gales lashed Bass Strait over
the weekend with winds of 60
knots creating delays to some
shipping of almost 12 hours
Passengers reported waves of
nearly 25 feet washing over
the bow of their ship Seasoned
sailors have said this 173
mile stretch of water between
Tasmania and the mainland can

SECTION L (SENDING)

Time allowed 2½ minutes

(Speed — 10 words per minute)

Most of the 249 passengers
aboard one ship which arrived
at her destination 13 hours
late were showing the effects
of about 25 sleepless hours

SECTION K (Regulations)

(Time allowed — 30 minutes)

NOTE:—**THREE questions only** to be attempted. Credit will not be given for more than **THREE answers. All questions carry equal marks.**

1 (a) Under what circumstances would the general call "CQ" be used?
(b) Give an example of a **telephony** call using "CQ".

2 (a) State the regulatory requirements regarding the inspection of amateur stations.
(b) What documents should be made available for inspection at the amateur station?

3 Describe the method of resuscitation you would give to a person who has suffered an electric shock. Your answer should include the steps you would take before commencing resuscitation.

4 Give the meaning of the following abbreviations:—
QRA QSB? QRU QSA? AS

SECTION M (Theory)

(Time allowed — 2½ hours)

NOTE:—**SEVEN questions only** to be attempted. Credit will not be given for more than **SEVEN answers. All questions carry equal marks.**

1 (a) Draw the circuit diagram of an amateur station transmitter suitable for operation in the 144-148 MHz band. Explain briefly the theory of operation of each stage of the transmitter.
(b) Describe how you would tune the transmitter described in (a).

2 (a) Explain possible causes of interference to television receivers from amateur station transmitters.
(b) Discuss with the aid of diagrams the technical precautions you would adopt to avoid interference from an amateur transmitter to television and broadcast receivers.

3 With the aid of a circuit diagram, describe the operation of the "product detector" stage of a receiver designed for the reception of single-sideband suppressed-carrier radiotelephone signals.

4 (a) Aided by a sketch or circuit diagram, describe an aerial system for use in the 7 MHz amateur band capable of correctly loading a mobile transmitter while in motion.
(b) Indicate the areas in a motor vehicle from which noise may be radiated and picked up by the receiver. Suggest means of reducing or eliminating this radiation.

5 (a) What are parasitic oscillations and how are they produced?
(b) Why are parasitics undesirable in a transmitter?
(c) Explain the methods you would adopt to locate and suppress them.

6 (a) Discuss features you consider desirable in a microphone suitable for use at an amateur station.
(b) With the aid of a sketch describe the construction and theory of operation of a microphone which you consider meets these requirements.

7 With reference to the propagation of radio frequencies explain what is meant by the following terms:—
(i) vertical polarisation,
(ii) critical frequency,
(iii) temperature inversion, and
(iv) skip distance.

8 (a) Assisted by a circuit diagram describe the operation of a Grid-Dip-Oscillator or a Transistorised-Dip-Oscillator.
(b) Indicate the reason for loosely coupling the oscillator described in (a) to the circuit being measured.

9 (a) Explain the theory of operation of grid-leak bias when used in the final stage of a transmitter.
(b) If the required bias is 45 volts, of which 18 volts is supplied by an external source, what grid current is necessary to provide this extra voltage if the grid resistor is 2,700 ohms?