The
PROPAGATOR
Illawarra Amateur Radio Society Inc.

The monthly newsletter of the Illawarra Amateur Radio Society Inc.
Registered by Australia Post publication number :- NBH - 1491.

Meetings are held on the second Tuesday each month (except January) at 7.30 pm in the State Emergency Services building in Montague St, Nth Wollongong.

Visitors are most welcome.

VOLUME 92, NUMBER 6 JULY 1992

ANNUAL GENERAL MEETING

Notice is hereby given that the Annual General Meeting of the Illawarra Amateur Radio Society Inc will be held at 7:30pm on Tuesday 14th July, 1992, at the SES HQ in Montague Street. But you no doubt knew that by now.

Big news for the month is that negotiations with the SES are proceeding and it looks like we will be able to keep using the hall for the short term at least. Another venue has been lined up, but the Committee feels that we might remain in our home as long as we can.

Many of the "back-page names" have indicated that they might like a change for the next year, let's face it, everyone gets sick of a job after a while. Put some thought into doing a bit - I know that you are sick of hearing this, but the Society falls on its face if nobody has a go. It truely is EASY!!!

Inside are the Annual Reports for the various people who give annual reports. Hopefully they will interest you....

PROGRAMME

Not very much to say here. However:

JULY: Annual General Meeting, where all the positions need to be filled. After the A.G.M is a further Special General Meeting where the proposed changes to the Rules of Association will be voted on; see last issue of the Propagator for details of the changes.

AUGUST: We have arranged Mr Col Christiansen to come and talk to us again this month. Readers may remember Col from last December, he was a very interesting speaker.

SEPTEMBER: This month has been pencilled in as a Technical night; it is pretty much up to the new Committee to work out what they want to do.

OCTOBER: Nothing yet for the meeting, but remember the visit to the CSIRO in North Ryde on the 19th, also various other bits and pieces happen in October.

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PRESIDENT's REPORT

This is traditionally the time when one reflects on the previous year's progress, and thanks those who have been involved. In such a process, many people get mentioned and a few get left out.

I believe that a better way is to thank all of you for your continued support for the Club, as seen by attendance at, management of, and contribution to the many events and achievements during the year.

You have run evenings on antennas, auctions, homebrew, packet, repeaters and video. You have supported evenings on Antarctica, military radio, propagation and spread spectrum. These are the things which we can all see and readily appreciate.

A great deal of work is also done by you, which only sees light of day after much toil and struggle; such as recording the club history; running our QSL bureau; maintaining our repeaters; helping newcomers to gain their licences by running classes at TAFE; publishing technical articles and posting test questions in the Propagator; producing our monthly bulletin; establishing a local Packet BBS; building a network to Goulburn and beyond; and managing those enjoyable annual events - JOTA, Christmas at Cataract and the Gosford Field Day.

Our own members have been trying to attract new members to the hobby by running a stall at the Lifestyle Expo; producing a video about our repeater sites; and more recently manning a radio station at the Science Centre.

Our members therefore owe a debt to one another for these various achievements and developments. But there are events on the horizon which we must not ignore if we are to remain a viable hobby and maintain a viable club:

* The SES sees us as purely a hobby group; we have lost our storeroom and its expectation of becoming a club station.

* Gone are the days when we could claim that our hobby produces the elite technicians, designers and engineers who build and maintain our technological future.

* We have witnessed a rise and fall in the WIA's esteem - the Conference of Clubs seems to have died; many WIA members became alienated by the visibly high-handed way the entry exa process was "devolved"; the NS division of the WIA has twice ha to postpone its AGM for lack of quorum.

* The race for spectrum mean both pressure on our existing band and increasingly technica equipment which few of us ca maintain, let alone home-brew; th present range of military equipmen is unlikely to be released to us a any price.

* Part of our entree to th Science Centre was that we were t be demonstrating nea state-of-the-art communicatio technology; a visit to Parramatt shows a museum of artifacts whic would have excited the previou generation.

If we are to maintain a viabl club, we will need to thin carefully about what we want t achieve, what kind of membership want to attract and retain, a what kind of image we want in t community. Responses to t questionnaire showed that we sti want to be turned on by technic detail and applications - but are the converted. Will that enough to attract and maintain t next generation?

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TREASURER's REPORT 1991-92

Balance carried forward: $1318.21
as at 10th September 1991

EXPENSES:

Propagator	$620.18
Repeaters	405.20
Auction Payout	290.00
Gosford Trip	152.40
Tower	120.00
Insurance	80.00
Miscellaneous	47.32
TOTAL EXPENSES	$1715.10

INCOME:

Membership	$677.00
Donations	255.00
Gosford Trip	165.00
Auctions	48.70
Store	23.10
TOTAL INCOME	$1168.80

Balance carried forward: $771.92
as at 16th June 1992

It bears comment at this point that this report does not cover the full year. The period from July to September is when the majority of the memberships are paid, and so the Club gets a lot of money in this period.

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CSIRO VISIT

Readers will probably remember the Society's plans to visit the CSIRO's research laboratories at North Ryde in October. The fellas at the CSIRO have a heap of gear, and can't possibly show us everything in the one day that we have.

They would like to know what broad section of things that we would like to look at. Suggestions are very much welcomed to Brian VK2KLH at the next meeting, then we can tell the CSIRO what we wish to look at.

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BUT WHO WRITES THE STUFF??

At present, this newsletter is produced by three people, Graham VK2GID who gets it all together, Dale VK2DSH who lays it out and prints it, and Ray VK2XCC who folds it and addresses it.

Graham reckons that his creativity is getting pretty thin after two years. Dale reckons that he would like to try something else for a change after even longer. Ray is going to Queensland for a while after longer still, so he isn't about to keep folding, is he?

So how about it? 1990/91 saw a team of five people producing the magazine! That meant that it was even easier, because it was more spread out.

Many thanks over the past year to our regular contributors, Rob VK2MT for repeater reports, Lyle VK2ALU for his stories, Keith VK2CB for DOTC questions, the two Pats VK2KCV and VK2GPJ for minutes, as well as our occasional writers, John VK2XGJ for Packet stuff, Phil VK2PG for technical articles and of course VK2TPH for the never ending stream of advertisements (want to buy a cheap FT767? See Phil).

It turns out that something well less than half is actually written by the Editorial team. All you need is a small amount of creativity, a computer and printer (IBM is convenient, because you can use all my files, but anything will do), and a little bit of spare time. It is truely amazing how much help you get from other people to put the thing together. So, HAVE A GO!

QSL CARDS AT CLUB

Another lot of QSL's have arrived, Graham VK2GID has cards for VK2's: ALK, AQF, BHO, BIT, BZ, CO, CRM, FDE, FDU, FDW, FEJ, FJE, IU, JAC, JHW, JJ, JJJ, JT, KHE, KSP, KWN, PEF, PG, PJA, VDM, ZRK.

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REPEATER REPORT
(As at 28th June)

VK2RAW/VHF:146.850: Following on from the last report, Ken VK2TKE went to Mt Murray on the 24th May to try a couple of ideas to stop the apparent desense. One idea was to pull the repeater apart and replace the 10.1V zener on the exciter's supply rail. Th is is the same diode that Graeme VK2CAG had replaced previously due to it breaking into oscillation at certain voltages. (These oscillations were getting into the transmitter stages and causing broadband noise, which was in turn getting into the receiver, causing desense.)

Ken changed the diode and also checked the repeater system with a borrowed IFR to see if that showed up any problems. (An IFR is a very expensive piece of equipment that can measure, monitor and check just about every aspect of a piece of RF gear. He could find nothing conclusive, and due to it being late in the afternoon, the desense had stopped. (We already knew that the desense was at its worst during daylight hours, 8:30am to 5:00pm, due to the higher voltage produced from the solar panels.) After spending two and a half hours on the site, he left in darkness.

The next day, when the sun was high, we checked the system and sure enough the desense was still there. This was rather unfortunate, as we had "pinned our hopes" on the zener being faulty again, but no such luck.

On the 8th of June (long weekend Monday), Ken again went up to Mt Murray to check some more ideas. I won't go into all the details, but suffice to say that Ken spent many more hours but was again unsuccessful. He decided to bring the entire system home again to check on his work bench (lucky he built that box...Ed).

One of the first discoveries was that when the repeater's transmitter was initially keyed, the output was clean, but after a while spurious signals appeared above and below the main carrier. Due to the nature of the diplexer (being a "notch" type), the .. spurii's would pass freely into the receiver. Many more hours were spent on the repeater, till eventually after some careful tuning of the exciter stages the spurious signals ceased. This tuning took longer than it might, because he had to keep varying the supply voltage to see if any spurii's appeared at different voltages.

On the 18th June, Ken found that the exciter's output transistor had died. The repeater had been left off for a day or so, although power was still hooked up to the exciter and PA stages. Possibly some sort of spike may have got into the power supply, who knows? He went to replace the transistor for the third time (all due to different reasons), but had no equivalent. Due to family committments, Ken knew that he would have no time to work on the repeater for the next 4 weeks, so he elected to replace it with a lower wattage output transistor (the old one was 7W, the new one is 4W). To avoid driving it too hard, he put a 100 ohm resistor in series with the exciter supply. The repeater was reinstalled functioning fully, except for a slightly lower output, on 21st June.

All went well that day, but at night when the battery voltage fell, the repeater's transmitter would fail after about 30 seconds of transmitting. We could only surmise that with the resistor in series and the voltage drop across the resistor became too great and so the transistors were unable to function. All these problems left us very frustrated, we didn't seem to be able to win one battle. There

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was one bright note and that was that the receiver's sensitivity was excellent, no desense at all.

Graeme VK2CAG supplied us with a replacement exciter output transistor (SRF1076) which was installed this weekend. The rain finally stopped, so we installed the transistor, which took one hour. When turned on, we got heaps of spurious signals again. We tried tuning on site, but not successful. Wasn't able to spend more time, it had now been dark for over an hour, so decided to bring the whole repeater back to town and try to retune it. Left the site, very cold, very wet, very dark, very slippery and very disappointed.

VK2RIL/VHF:147.275: As reported in the previous 2 Propagators, it appeared that something was "false-triggering" the repeater. It sounded like the culprit may have been a pager. Well the interference has got worse and now great slabs of Pager digital mess ages are going through 7275. It would appear that the interference is not totally the result of the pager (whichever one it is), but more the combination of the pager's signal and another signal mixing together. Pager transmitters operate virtually continuously sometimes, but the interference 7275 is suffering is intermittent in nature.

I guess that the next step before reporting the problem to DOTC is to remove the repeater and check that the receiver is not at fault. Unfortunately, this will all take time and so the interference is probably going to get worse before it gets better. In the meantime, if you have both a 2m receiver and a VHF scanner, see if you can match up the pager's frequency. After hours of listening to assorted pager transmissions (what agony), I have been unsuccessful. (The Sublime Pt pager is 148.8785 MHz.)

VK2RIL/UHF:438.725: All the work on the repeater (except installation) has been completed. Many, many hours were spent getting the repeater up to scratch after its original condition. The major problem was desense (again). When first "fired-up", the repeater had around 20 to 30 dB of desense. After rewiring many connections and adding a heap of feed-thru capacitors and ferrite beads, the desense is now non-existent.

Installation will take place in the next few weeks. The antenna will be an 8 element yagi facing south from Sublime Point straight through Wollongong. The antenna will be fed with 50 feet of LDF 4-50 Heliax. This combination should provide "saturation" coverage over most of Wollongong. The repeater's ident board was built by Ken VK2KWG and is based around an EPROM. Ken programmed all of the Club's repeater callsigns into the EPROM so that is could be interchanged very easily if needed. The ident has been connected into the repeater to be a "courtesy ident" (like 8225's), so that the repeater waits until the end of an over before identifying. The "fail-safe" timer has been set for 5 minutes, the output power is 10 watts.

VK2RUW/UHF:438.225: Repeater functioning fine, no major problems to report. Some minor adjustments to be done next visit. We have received a letter from the VK1 Division officially endorsing the future linking of our 8225 and Goulburn's 8325 with their Mt Ginini 8525. This link should be up and running after winter, when the snow melts and the VK1 fellows can gain access to their site. (In the winter the only access is by snowcat and that is rather expensive to hire.)

VK2RUW/PKT:144.775: Michael VK2XCE has spent many hours working on the DR200 dual port TNC and the UHF ROSE link radio. The VHF port radio (Hills) was found to not have a good enough receiver front-end to

handle all the RF at Knight's Hill. (There is literally megawatts of VHF and UHF signals transmitted from there.) We decided to approach AAPRA to supply the IARS with a VHF radio (as they have done for all other ROSE systems). AAPRA have given us "permanent loan" of an STC 191, we have to buy the crystals for 144.775 MHz.

Once again, Michael has very kindly offered to do the work in modifying, tuning and interfacing the radio to the DR200. While waiting for this, he installed the DR200 and UHF radio on 30th May. This provides and alternative path for the other existing ROSE systems that VK2RUW can hear (which is quite a lot). In many cases it is providing a single-hop path replacement for an existing 2, 3 or even 4 hop path. The VHF port for users should be on line by July.

VK2RUW/HF:29.620/29.520: Presently off air due to a few problems. The main one is the lack of receiver selectivity with the existing converted CB. Is there anyone reading this who thinks that they would like to try to modify a low-band commercial VHF radio down to 10 metres? Then please contact the Repeater Committee.

As the next meeting is the AGM, this may be my last report - sigh of relief from the Editor (I won't be typing next year's, anyway...Ed). Before closing, I must thank the following people for their invaluable assistance in the past year: Steve VK2XNH, Michael VK2XCE, Peter VK2BIT, John VK2XGJ, Graeme VK2XLA, Peter VK2KHE, Ken VK2KWG, Ian VK2AIJ, and especially Graeme VK2CAG and Ken VK2TKE. A special note of thanks must be made to our very patient wives, Angie, June and Janine.

The repeater committee has plenty of great projects planned for the future, why don't you put your hand up at the AGM to join in and have some fun. Remember that you get your name on the back of the Propagator!

Bye for now, Rob VK2MT

WAY BACK THEN....Episode 9.

<u>Dapto Moonbounce Project-1971.</u>

This year saw construction and testing of equipment and systems in full swing!

Early in the year, some members expressed concern at what the Project may cost the Club, in view of our very limited financial resources, but when the Project Coordinator, VK2ALU, indicated an estimated cost of $25 per year their fears were put to rest.

He explained that, because of the known financial constraints on the Club, the Wollongong University College was being asked to bear the main part of the costs and to provide workshop facilities where required. He was also obtaining donations of some specialised items from commercial organisations and valuable assistance from several Amateurs in Sydney and elsewhere, including overseas, who had experience in UHF equipment construction or in the field of Moonbounce operation.

Nevertheless, the Project was recognised as that of our Club - our members' contribution being that of their time and effort, without which it could not succeed. The enthusiasm shown by so many Club members and others meant that we WOULD succeed!

While Ralph VK2ZRG, worked on the transmitter in Sydney, assisted by several of our team in making up chassis, power supplies etc, we constructed the various items that went to make up the receiving system and the permanent feed system for the dish, and installed all the power, control, protection and interlocking safety systems, which involved the running of a total of HUNDREDS of metres of a mulitude of cables and wires. By far the largest "non technical" job was the cleaning down and application of several coats of paint on the dish, dish mounting

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structure and external cubicles etc., which kept various members and friends (including a commercial painter and his spray equipment), going for quite a few weekends! This was essential work, in view of the deteriorated condition of dish and structure after some years of being "left in limbo" after the CSIRO departed from what had been their West Dapto solar radio research station.

When the transmitter was completed and tested it was found that the power supply for the PA was not capable of providing the required output. Back to the Drawing Board!! Don VK2ZRK came up with a BIG transformer and Graeme VK2AGV undertook to strip and rewind it to give at least 2000 volts at half an amp.

The power supply was then rebuilt (on a larger chassis) and the transmitter duly produced some 550 watts into a VERY husky dummy load at 1KW DC input.

In September the transmitter was installed in its cubicle and the power amp. in its box at the back of the dish. Then the local RI, using test equipment specially brought from Sydney, carried out a series of stringent tests on transmitter power input and output, frequency and frequency stability (which had to be better than 1 in 10,000,000), before giving us approval to transmit, on a" non-interference basis" which included the proviso that we must not transmit when the dish was pointed to less than 10 degrees above the horizon.

In October we carried out our first test with another station. This was a "listen only" test by W3KE, using the 150ft. dia. dish at the U.S. Navy Research Facility at Sugar Grove in USA>.

The test was arranged at very short notice but we were on the air and with 500 watts into the dish which was pointed at a visible Moon at the designated sched. time, only to be informed later that they had lost access to the dish just beforehand! We were most disappointed, as it was very seldom that a dish of anything like that size was made available for Amateur EME tests.

We were not able to hear our own echos at that time because we did not have a preamp. of low enough noise figure (although we could hear some 10dB of Sun noise). However VK2ALU then received some transistors of the latest low noise design from an Amateur in the EME group in USA and lost no time in making up a new preamp. which was to make the required difference in the next year.

A Project Summary was published in the Club's December Monthly Newsletter, setting out where-we-were-at. Wholehearted support was being given by a substantial proportion of the Club members who were either in, or worked when available with the Project team. (A new Club member, Keith Curle, joined us in June!).

The core group, which at that time included Club members Hank VK2BHL, Roger VK2BRE, Graeme VK2AGV and Geoff VK2ZHU (and not forgetting Ralph VK2ZRG of Sydney, who did so much work on the transmitter/PA unit) put in some 1270 man hours as covered in my 1971 Project Diary and certainly many more hours constructing items of equipment at home.

At last it seemed that our efforts were to be repaid and that our first EME contact may not be far off!

Lyle VK2ALU.

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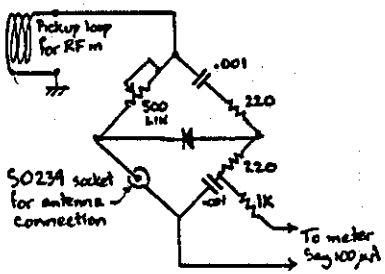
RF Bridge.

Roger Graham VK2AIV

Making a HF whip antenna? You'll need some way to measure the resonant frequency. Various textbooks suggest coupling a dip oscillator into the antenna via a small loop of wire at the base. If you've tried it you'll agree it's difficult to do, and gives only approx answers anyway. Make this little RF bridge and find out how easy it can be.

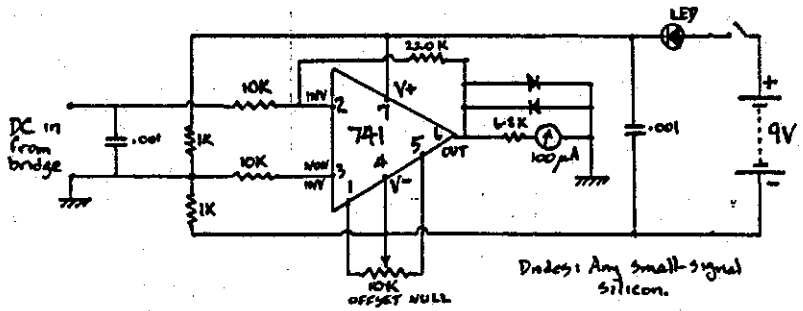
The bridge circuit isn't new (I adapted it from an article in AR for September 1965). And the little DC amplifier which makes it work so well isn't original either (adapted from a circuit in EA for Jan 1977).



The original bridge used a 100 uA meter. I made mine using a 60-0-60 uA centre-zero meter salvaged from junk. It worked OK but the null was rather broad, due to the loading effect of the meter. Vastly improved by adding a little DC amplifier made from a 741 op amp, as shown in the circuit below. The dip became sharper because of the much smaller loading effect on the bridge, and the meter deflection is now much more generous.

Connecting the Antenna: My original version of the bridge had two spring terminals to connect the antenna. An SO239 socket was added in parallel later, and is certainly a better way to go if your antenna will be coax fed.

What Kind of Diode? I tried quite a number of germanium diodes, and some were much more sensitive than others. The one I eventually selected was an ancient point-contact type, glass encapsulated, from a primitive computer board.



How it Works. The small DC voltage from the RF bridge is applied to the inverting and non-inverting input pins of the op amp (pins 2 & 3) via two 10k resistors. The amplified DC voltage out (pin 6) is applied to the meter via a series resistor chosen to give a sensible value of deflection, nearly full scale, when the bridge is unbalanced. In my case, 6.8k was about right for the 60-0-60 uA meter used.

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Offset Null. The 10 k trimpot between pins 1 and 5 is for "offset null". Adjust it so the meter reads zero when there is no input signal.

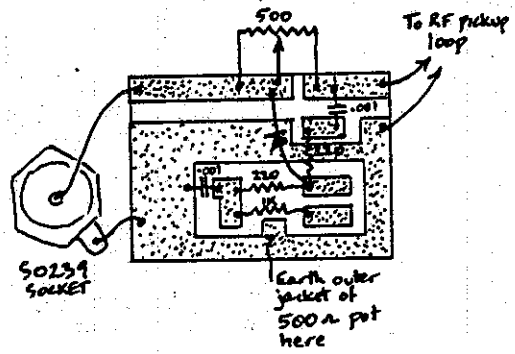
The Battery is a 9 volt miniature type. In the excitement of tuning up your new antenna you'll forget to switch it off, so add a red LED in series with the positive lead to remind yourself. And it tells you the battery is still OK.

The RF Signal to operate the bridge is easily provided by a dip oscillator. I used a pickup loop of 7 turns, about 30 mm diameter, self supporting on short stiff leads held away from the box so the coil of the oscillator could be coupled into it. An RF signal generator could be used instead, or even your transmitter with the wick turned down very low.

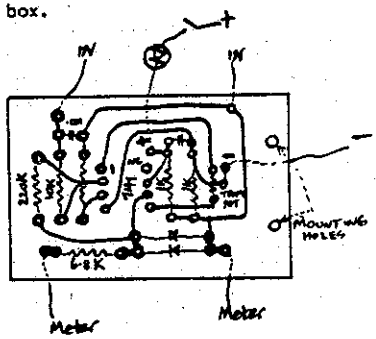
Calibrating the Bridge: Put a big generous pointer knob on the 500 ohm linear pot. Mark the scale directly in ohms from 0 to 500. Either measure the resistance of the pot directly with a good ohm-meter, or insert known values of fixed resistor across the bridge at the antenna socket, and simply tune for a dip.

Connecting the Bridge to your Antenna. You'll have provided a suitable socket on the base of the antenna, probably an SO239 type. And of course, there's a socket of similar type on the RF bridge. Simply join one to the other with a short coax lead with a plug on each end, and you can take measurements right at the base of the antenna. Switch on both the dip oscillator and the bridge. Couple some RF from the dip oscillator into the pickup loop of the bridge. Vary the frequency by adjusting the dip oscillator. Look for a dip on the meter attached to the bridge (not the one on the dip oscillator). When you've found a dip, adjust the 500 ohm pot on the bridge for the deepest dip. You'll probably be aiming for a nice sharp dip at a frequency in the middle of the band, with about 50 ohm impedance. Later, when it's all tuned up and the antenna is up in the air, join on a longer length of coax and take measurements from further away.

PC Boards I made mine in two parts, because that's how the project grew. The RF bridge is on a little board 50 x 35 mm, supported by soldering directly onto the lugs of the 500 ohm pot. The DC amplifier added later is on a second board 55 x 35 mm held up on little bracket inside the box.



RF Bridge components mount on copper side of board. 500Ω pot on other side This view from copper side.



DC amplifier. This view from fibreglass side of board

AGENDA FOR A.G.M

The AGM will be held on Tuesday 14th July, at the SES headquarters, Montague Street.

1. Apologies and proxies.

2. Minutes of previous AGM.

3. Business arising from minutes.

4. Reports from:
   - Treasurer
   - Repeater Chairman
   - Editors
   - Broadcast (?)
   - President

5. Discussion of reports.

6. Selection of a Returning Officer to manage annual elections of officers.

7. Elections of Officers (see back page for list).

8. Motion on Notice: "That the rule changes outlined in the May Propagator, and as per the sample copy held by the Committee, be adopted".

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SCIENCE CENTRE UPDATE

The club activity at the Science Centre continues apace! We are now into our 3rd month of operation. The station is starting to be a bit more permanent with the addition of a multiband vertical antenna for HF and a 2m J pole. The public response has been good with many people coming to the Science Centre just to see our exhibit.A new exhibit at the the Centre will be Satellite TV! The equipment is being purchased and will be set up so that people can watch and listen to what ever comes down from the various satellites - any club members who are interested in satellite technology would be most welcome to assist in setting up the system. We still require more operators at the station each weekend - it is a lot of fun! So come along and experience another aspect of our hobby!

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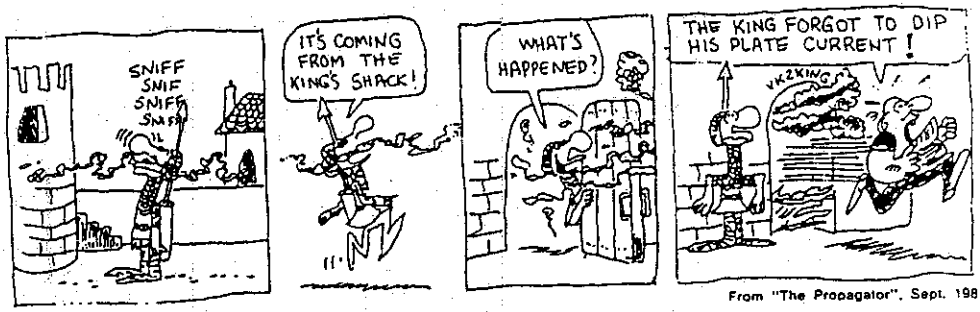
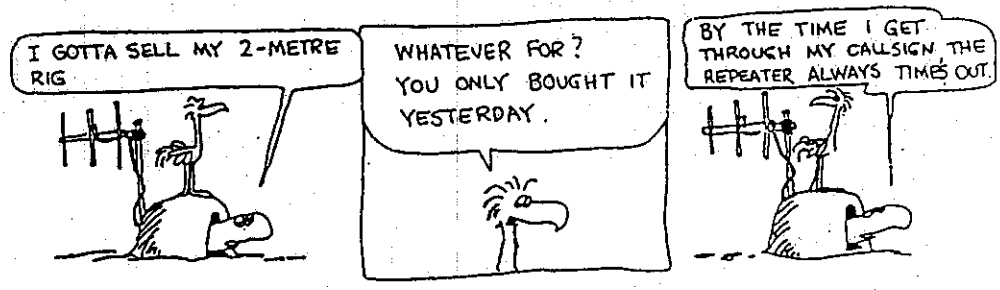


From "The Propagator", Sept. 1981

From "The Propagator", April 1981

from "THE PROPAGATOR" June '82



POST BOX - All mail can be sent to "THE ILLAWARRA AMATEUR RADIO SOCIETY" at PO Box 1838, Wollongong, 2500.

REPEATERS	- VK2RUW -	29.620	Voice	Mt Murray/Knights Hill
	- VK2RUW -	144.775	Packet (ROSE)	Knights Hill
	- VK2RAW -	146.850	Voice	Mt Murray
	- VK2RIL -	147.275	Voice/RTTY	Sublime Pt
(Off air)	- VK2RAW -	147.575	Packet (NetRom)	Mt Murray
	- VK2RUW -	438.225	Voice	Knights Hill
(Off air)	- VK2RIL -	438.725	Voice/RTTY	Sublime Pt

BROADCASTS - The Wireless Institute of Australia, N.S.W Division broadcast is relayed to 29.620 MHz and 146.850 MHz at 10.45am and 7.15pm each Sunday. Callbacks after the broadcast. RTTY broadcast in the week before the Club meeting, Sunday evening, 8:45pm on 147.275 MHz, relayed onto 3.618 MHz +/- QRM and 29.620 MHz, with callbacks immediately after.

NEWS LETTER - The "PROPAGATOR" is published each month to reach all financial members in the week preceding the Club meeting. Articles and letters are always welcome. Commercial advertising $40 per quarter page per year, member's classifieds free for one issue. See Graham VK2GID for details.

MEMBERSHIP - $20.00 P.A, concessions $15.00 P.A, expiring immediately after the Annual General Meeting in July.

LAWRENCE HARGRAVE AWARD - VK stations require 10 contacts with IARS members. Overseas stations require 5 contacts. One contact with the Club station VK2AMW is suitable. Details of contacts are to be sent to the Club secretary.

********** COMMITTEE **********

PRESIDENT	-VK2KLH - Brian Clarke	
VICE PRESIDENT	-VK2GID - Graham Denney (042) 294170	
SECRETARY	-VK2KCV - Pat Kennedy (042) 673199	
ASSIST SEC	-VK2GPJ - Pat Jordan	
TREASURER	-VK2SRB - Robert Bonella	
ASSIST TREAS	- -	
COMMITTEE	-VK2DSH - Dale Hughes	-VK2GPJ - Pat Jordan
	-VK2XCC - Ray Ball	
ASSOCIATES	-VK2JRG - Ron Hanks	-VK2KWG - Ken Grimm
	-VK2MT - Rob McKnight	-VK2SRB - Robert Bonella
	-VK2XLA - Graeme East	
	-VK2XGJ - John Simons (042) 614628	
REPEATER PRES	-VK2MT - Rob McKnight	
REPEATER COMM	-VK2TKE - Ken Goodhew and others	
QSL CARDS	-VK2GID - Graham Denney	
PUBLICITY	-VK2KWG - Ken Grimm	
BROADCAST	-VK2TKE - Ken Goodhew and his merry men	
EDITORS/PRINTERS	-VK2DSH, VK2GID, VK2XCC	
SOCIAL DIRECTOR	-VK2XCC - Ray Ball	
CANTEEN	-VK2JRG - Ron Hanks	
DOTC LIASON	-VK2OB - Keith Curle	
LIFE MEMBERS	-VK2ALU - Lyle Patison	-VK2CAG - Graeme Dowse
	-VK2OB - Keith Curle	

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