

# THE PROPAGATOR

The monthly newsletter of the Illawarra Amateur Radio Society Inc. (IARS)

Meetings are held on the second Tuesday each month (except January) at 7:30pm in the State Emergency Services building in Montague Street North Wollongong.

VISITORS ARE MOST WELCOME

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Volume 94 Number 5

May 1994

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Next meeting we will have Peter Corkeron who is the State Secretary of Wicen giving us a talk on G.M.D.S.S. ?

Type writer donation. the club has recieved a type writer and when sold the proceedes will come to the club and person interested in this can contact VK2MT for details.

From the treasurer (Brian VK2UBF). Don't forget that when you sign up a new member for the coming year you will receive a discount on your membership renewal so get to it and sign up a new member or two the more you sign up the cheaper the cost will be for you.

There's still a few trees left for those wanting Jacandara trees before the supply runs out see brian this meeting or call him on 145.650 after 4:30 most evenings all money from the sale of trees goes to club funds.

## MINUTES

Minutes of General Meeting of IARS held at the SES HQ Montague St. North Wollongong on April 12, 1994

Apologies: JPS.

Visitors: There were five visitors. VK2TM & VK3AEO and three others inquiring about amateur radio.

Attendance: 22

Minutes of Previous Committee Meeting were read and Confirmed moved XQX seconded UBF

Correspondence In: A technical magazine and club newsletters received.

Correspondence Out: There where no outgoing correspondences.

Treasurers Report: Opening Balance \$456.43

Exp \$411.80

Income \$300.00

Balance as at 12th April 1994 \$344.63

General Business:

David YKQ PIG Report. The gateway is working well world wide. There is now also a direct link to Newcastle Uni.

The formal part of the evening closed. A talk was given John Kuotek from the N.S.W. Bushfire Brigade.

Dealing with the difficulties of communication during the fires. The meeting closed at 2100.

## IN-FLIGHT NEWS SERVICE

Passengers on Ansett domestic flights will now be able to watch up to the minute news bulletins using a technique developed by the seven Network & AAV. The Airline has commissioned Seven to produce a multi-edition news service "Ansett Air Show News", to be updated during the day & shown on Ansett flights.

The News programme will be telecast via Satellite to Ansett satellite receiver dishes set up at airport terminals around Australia. The 24 minute news programme will be recorded at the terminals as it arrives by satellite & video cassettes will be loaded onto aircraft for replay during the next flight.

The airport terminal recording functions will be controlled remotely from AAV in South Melbourne. This system developed by AAV, will record the bulletins, rewind the tapes, print cassette labels & eject tapes, all remotely. Airline personnel will then transfer the cassettes to the aircraft.

(from Broadcast Engineering News-April '94).

## THE ORIGIN OF "HAMS"

Have you ever wondered why Radio Amateurs are called "Hams"? Well it goes something like this.

The word "HAM" as applied in 1908 was a station call of the first wireless station operated by some amateurs at the Harvard radio club. They were Albert S. Hyman, Bob Almy and Pogie Murrar.

At first they called their station "Hyman-Almy-Murrar". Tapping out such a long name in code became tiresome and called for a revision. They changed it to "HY-AL-MU", using the first two letters of each of their names.

Early in 1909 some confusion between signals from Amateur Wireless Station "HYALMU" and a Mexican ship "HYAMLMU". They then decided to use only the first letter of each name and so the station call became "HAM".

In early pioneer days of unregulated radio, Amateur operators picked their own frequency and call letters. Then, as, now, some Amateurs had better signals than Commercial Stations.

The resulting interference came to the attention of Congressional Committees in Washington, and Congress gave much time to proposed Legislation, designed to critically limit Amateur Radio activity.

In 1922, Albert Hyman chose the controversial "WIRELESS REGULATION BILL" as the topic for his thesis at Harvard. His instructor insisted that he send a copy to Senator David I. Walsh, a member of one of the Committee hearing the Bill.

The Senator was so impressed with the Thesis that he asked Hyman to appear before the Committee. Albert Hyman took the stand and described how the little Station was built and almost cried when he told the crowded Committee room that if the Bill went through they would have to afford the licence fees and all other requirements which the Bill imposed on Amateur Stations.

Congressional debate began on the "WIRELESS REGULATION BILL" and the little station "HAM" became the symbol for all the little Amateur Stations in the country crying to be saved from the menace and greed of the big Commercial Stations who didn't want them around. The Bill finally got to the floor of Congress and every speaker talked about the ".... poor little station "HAM".

So that's how it all started. You will find the whole story in the Congressional Record. National publicity associated the station "HAM" with Amateur Operators. So from that day to this, and probably until the end of time in Radio, and "AMATEUR" is a "HAM"

This article originally appeared in "Florida Skip" in 1959, and has been reproduced over the years, by other Amateur Radio Clubs including the General Motors Worldwide Firebird Amateur Radio Club.

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### Available in our junk yard .....

1. Electronics bits and pieces (millions!)
2. Meters, gauges, instruments, cables, wires etc.
3. Metal sections :- copper, brass, aluminium, s/steel
4. Motors, gearboxes, pumps, assorted machinery
5. Steel sections, sheet, planks, ladders, shelving, scales, safes, compressors
6. We buy all metals including platinum and gold
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# WAY BACK THEN.....Episode 29.

The VK2AMW Moonbounce Project

1978 - 1982 (The period in between) - Part 1.

- (i) Location of the new site.
- (ii) Change from 432 to 1296MHz.
- (iii) Dish relocation transport problems.
- (iv) Design criteria for 1296MHz system.
- (v) Project finances resolved.

You may have noted that the title of this episode has been changed from "The Dapto Moonbounce Project" to "The VK2AMW Moonbounce Project" - as it could no longer remain at West Dapto, because of the vandalism to buildings and equipment which was covered in Episode 24.

After some discussion, the University agreed to the Project being relocated to their Optical Observatory site on the Escarpment, directly west of the city of Wollongong and in a fairly secluded bush setting about 300 metres south of the Picton road. The dish and Control building would be about 50 metres north of their observatory building, but outside the security fence surrounding the observatory. It would have to be inside the area made available to them by the Water Board and AIS, on whose property it was located. A 6 feet wide track was cut through the bush from the road gate to the site. Hopefully the dish would be hardly visible from the road.

The major concern of the University was the possible cost of dismantling of the dish and its mounting structure, transport feasibility and cost of re-erection of dish and of a Control building at the new site. The severe damage and theft of items at West Dapto was covered by Insurance, but at that time it was not clear as to what amount would be received.

It was not known whether the other organisations concerned would agree to the installation or whether there were other radio services in the area which could be affected by our transmissions. The University undertook to sort out matters with the other bodies while we cleared the situation with D.O.C. All this took quite a long time - meanwhile the dish remained at West Dapto - at the mercy of anyone who chose to wreck it!!

The major physical problem was the transport of the 30 foot diameter dish and its mounting structure from West Dapto to the new site. Unless this could be resolved then there was little point in proceeding with the other arrangements! A detailed survey of the dish indicated that it was not practicable to cut it into sections for transport (being of "all-welded" tubular construction which had suffered somewhat from the ravages of time), so it would have to be transported in one piece, with the supporting structure as a second unit.

Initially, it was thought that road transport in this configuration would not be possible because of the height/width of the dish on the transport vehicle in relation to poles alongside the narrower sections of road at corners etc and height of power lines across roads. An approach was thus made to the military authorities, to see if they may be willing to provide (at little or no cost on a "training exercise" basis!) their largest helicopter, to do the move. Somewhat understandably, they indicated their reluctance to take on this exercise, not so much because of the weight of the dish, but because of its size and type of construction (what if it broke up while in mid air!!)

A detailed survey was then made of possible land routes and it was determined that, if the dish was placed at a certain angle on a support on the semi trailer then the whole shebang might just squeeze through, with a minimum of lifting of wires over the road, over the selected route. However the track in from the road to the new site would have to be considerably widened if permission to do this could be gained.

With agreement of the haulage contractor, this problem was put to one side while permission was being sought from the various bodies for the project to be located at the chosen site.

As we had "conquered" 432MHz EME, VK2ALU proposed that we move our operating frequency up to 1296MHz, at least to start with, while later on we might try to work both 1296 and 432MHz. This, of course, meant the construction of a complete receive and transmit installation which was up to EME capability on 1296 - which 2ALU undertook to carry out while the other matters were being resolved.

Calculations indicated that, with the increased dish gain, from 30dB at 432MHz to approx. 37dB at 1296, but with an increased EME path loss, from 261 to 271dB (average), it would be necessary to provide a receiver with about 1 to 1.5dB noise figure and a transmitter with at least 150 watts CW output and preferably somewhat more, if echos might be copiable above noise. A bit of a challenge in those days, for someone who did not have access to such as the high power klystrons which were being used by the odd station in the States, but nothing is impossible when a few of the bits and pieces might be forthcoming from EME friends "over there" in order to get a station on "down under" (not the first, but there was not any VK on 1296 EME at that time). The problem which was a worry was, could we improve the pointing and tracking accuracy of the dish to cope with the 2 degree half power beamwidth on 1296? (actually we needed an accuracy of better than 0.75 degree for satisfactory operation). Optimistically, that one would be solved too! To be on the safe side we submitted a request for a High Power Permit to D.O.C., for EME operation on both 432 and 1296MHz, from the new site.

By the end of 1978 the University had received the insurance money for the damage etc. at West Dapto - so we had an idea of what our overall budget would be. We could make it if 2ALU provided all the rf equipment! (at no time did the club have finance available for the Project (except for the purchase of one length of low loss coax cable and for reimbursement of postage and telephone calls), even though the EME Project was universally known as The Illawarra Amateur Radio Society Moonbounce Project and always operated under the callsign VK2AMW - so be it - various club members certainly joined in, which made it all more worthwhile.

End of Part 1. .... Part 2 next month.

Lyle VK2ALU



## PHILIPS FM-828 INFO

While at the March meeting I was asked by numerous people if I knew anything about 828's. What I know isn't all that much compared to others, but prompted by the questions at the meeting, I thought a bit of info on the radios may be helpful to others contemplating using one of them on 2m or 70cm.

The first versions came on the market around 1975. These were VHF versions, which were later updated to "Mark:2" versions. The differences between the originals (Mark:1) & the Mark:2's circuit-wise aren't all that great, except for the Power Supply/Audio PA Board. I guess Philips decided not to veer too far from a good proven design. The most obvious difference between the Mark:1 & 2, is that the Mark:1 has a stainless steel case with 4 grub screws & the Mark:2 has a black case with 4 black plastic clips. (Also on the PA heatsink, the Mark:2 is marked as such on the metal label plate).

Around the early 80's I believe, Philips brought out UHF versions of the 828. The UHF circuit has remained basically unchanged (ie: no Mark:1's or 2's).

Over the years since 1975, many different versions of the 828 have been manufactured. This is a list of all that I know about, apologies if I miss some.

G Band - 30-40MHz

E Band - 68-88MHz

B Band - 130-157MHz

A Band - 148-174MHz

T Band - 403-420MHz

U Band - 450-470MHz

W1 Band - 470-500MHz

W2 Band - 500-520MHz

(these Band letters are on the PA heatsink label plate).

Channel versions of 1,3,6,10 & 10+ chls.

Channel spacings of 12.5, 20, 25 & 50kHz.

Can have both normal front-panel control plus remote control option. Lots of Factory suggested mods for the "AUX" button.

Internal TXer Time-out control.

Can be converted to a rpt'r.

25W conservative RF Output.

Better than .35uV sensitivity at 12dB SINAD.

The circuits comprise mostly of basic stock-standard discrete components (you could probably fix 95% of failures with a visit to Tricky Dicks), but this wouldn't be often anyway, they are very reliable.

The most asked question is, which models lend themselves to conversion/use on the Amateur Bands? Once again, this info is only what I am aware of & I guess if you put enough effort in, you could convert anything to any frequency. But in this case, we're talking about no modification, just re-tuning to get them onto one of our bands.

For 2m, the best would be a "B Bander", but I've never seen one. An "A-Bander" easily goes down to 144-148MHz though.

For 70cm, both a "T" & "U Bander" will apparently do well. A "W1" won't make it all the way down, mainly due to it's RXer Front-End & the PA. The Exciter section will however (that's what feeds the WIA B/cast to 8225 from Mt Murray, all 100mWs of it). It's PA however, makes a very nice amplifier on 63cm though! Forget the "W2" unless you want to do lots of mods. As far as 6m is concerned, I believe the "E Bander" works on 50-54MHz, but I don't know if it was with or without circuit modifications. Perhaps one of our readers may be able to inform us.

I would dearly like to get my hands on a "G Bander" for the 10m FM Gateway on 8225. I have only just recently found out that they were manufactured & everybody I've questioned about them, didn't even know they existed.

Due to the channel spacing on VHF Hi-Band being changed from 25kHz to 12.5kHz, there is expected to be a huge amount of 828 "A Banders" coming onto the second-hand market (if not just dumped). Already Telecom has off-loaded a heap to the VK2 WIA, there will be more to come.

To convert one of these models to 2m is very easy. Just follow the tuning instructions in the 828 Manual. Minimal test eqpmt is necessary. The Exciter & PA Boards are the "easiest" requiring only a good analogue multimeter, power meter & a radio tuned to the output freq. The RXer boards are slightly trickier, but only if you don't have a signal generator (like me). If you have no access to a sig gen, possibly you could get the RXer tuning into the "ball-park" with the help of a close friend (distance-wise not emotional), TXing an adjustable level signal. With a sig gen, I reckon the whole set could be tuned in less than 15 mins.

When ordering X-tals for an "A Band" radio for use on 2m, it is recommended that instead of using the normal suggested formula for the X-tal's frequency of  $[f(\text{carrier}) - 10.7]$  divided by 3, use  $[f(\text{carrier}) + 10.7]$  divided by 3. This will put the freq for the X-tal for the 2m channel, well within tolerance for the X-tal oscillator. The "old" formula apparently still works for 2m, but the "new" formula should be better. Most X-tal manufacturers will know what you're on about.

A couple of mods that I have put into my "A Bander" that is now on 144.700MHz for Packet are:

LO/HI (1/30W) power switch with accompanying DIM/BRIGHT TX LED on the existing AUX switch. Most of the time, you don't need the full output. (Ask me if you want details on how I did it, there are different ways).



The RX audio is taken out to the TNC before the Volume Control Pot & Spkr Amp. My TNC much prefers this "line level" output, it seems to decode much better, (possibly because there is a bunch of caps & resistors after the Volume Control, which probably have a "filtering" effect). The only prob with lifting the audio at this point, is that it is not muted (this is done further down the track). This is easily overcome with the addition of a NPN transistor (BC 548) to gate (mute) the line audio to ground, in parallel with the existing gating transistor on the input to the spkr audio amp. Using this "line level" output to the TNC allows you to turn the spkr audio up & down without interaction with the output level to the TNC.

I also added a 22uF cap to the base of both these gating transistors to remove the annoying spkr "click" at the opening & closing of the mute, even when the volume is turned right down. The capacitor "softens" the gating.

If possible, get the internal TXer Timeout circuit (on the Audio/Reg Bd) working if you are going to use the radio for unattended Packet use. It could save you embarrassment. (The T/O is usually factory preset for around a minute, but can be easily changed.)

One last change, was removing both of the multi-pin DIN sockets on the back of the set & replacing them with more "common" type sockets, to match existing eqpmt. The ordinary 4 & 8 pin mic sockets of most radios will fit perfectly into the holes where the DIN sockets were. Unfortunately, the large nut that secures onto the back of these 4 & 8 pin sockets won't fit on the inside of the 828. This is easily overcome however by grinding or filing down two opposite sides of the nut, till it fits snugly into the 828's "crevice". When securing the socket now, the nut won't spin while the socket is being screwed into the hole. Insulate the ends of the wires you don't need while obviously keeping the wires with [EARTH], [PTT] & [MIC AUDIO]. There will already be a wire carrying [RX AUDIO], but this is spkr level audio & as recommended above, the use of the line level audio direct from the RXer bd, (possibly taken from the "hot" side of the volume pot) is a better way to go for feeding to a TNC. Wire the new 8 pin socket as per your existing 2m radio, so you can use either radio for voice or packet. I also used the second hole to mount a 2 pin socket which I use to feed 12V DC to the 828. (These 2 pin polarised sockets have the same dimensions as the 4 & 8 pin sockets.) I did this because I was unable to get a DC plug to suit the existing 828 power socket. I have since been informed that the special 828 DC plugs are available at Vimcom. I hope this info will be of some use to anyone contemplating useage of an 828 on an Amateur band. I would be very interested if anyone has any other mods or ideas regarding 828's. If you want more detail on any of the above, don't hesitate to ask.

Rob - VK2MT

## NEWTEC ELECTRONICS

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### "GHOST-FREE TV"

Planning to put Australia on the path to a "ghost-free" television future, a team from North America will be in Sydney in May for a trial of a PAL version of the system currently being deployed in the US.

The Philips Ghost Cancelling Reference (GCR) signal is presently being transmitted by around 200 of the 1,600 television stations in the US, ready to give relief next year to TV viewers troubled by multi-path interference of television pictures. Set-top units are due to go onto the market in the US in early 1995, under both the Philips & Magnavox brand names, retailing for \$US 149. Also, TV manufacturers will build the GCR decoders into their sets, initially the expensive models, like the largescreen projection models. This will be using a third generation chipset Philips is releasing later this year, aimed at GCR consumer products, specifically TVs & VCRs. The advantage to Australia in being able to follow the Philips standard is the economies of scale it will deliver to the local receiver market. The chipset used in North America will be able to be used in PAL version set-top units & GCR-equipped receivers sold in Australia. Sydney tests will start soon with participation from FACTS, the ABC, Philips Australia, Sony, representatives from the Aust. Broadcasting Authority & the Communications Laboratory in Canberra.

(from Broadcast Engineering News-April '94)



# REPEATER REPORT

4/4 - 1/5/1994

## VK2RIL (5650)

On Easter Monday went to Sublime Point to do a minor modification to 5650 & also to install the second of the two "talking clocks" bought by the Club a few years ago. The modification had to do with the recently installed "courtesy ident". (It was a peculiarity that it had, that most people would not have even noticed, but which I found slightly irritating). I won't bother with details, suffice to say it took a few hours to overcome. I went to connect the "talking clock", but found that of all the many tools & bits & pieces I had brought (just in case), I'd forgotten the clock! Had to return to the site another day, but this turned out to be necessary anyway due to another problem...

Upon opening the cabinet on arrival, found that the battery chgr appeared to be charging excessively (putting out 4A), when the battery bank should have been fully charged. Checked the chgr & all appeared to be OK, just the batteries weren't accepting the charge. Suspected one of the 2V cells. Had no hydrometer so checked each cell with a DMM. All voltages were the same, nothing suspect. Decided to leave as was, apart from reducing the "strain" on the chgr (by decreasing the maximum current out to 2A) & return to the site with the missing clock, a hydrometer, spare battery bank & spare chgr on the next day or so.

Returned at lunch-time on Wednesday the 6/4. Installed clock with no probs. Checked all battery cells with the hydrometer & found one that had a very low specific gravity compared to the other 5 cells. Replaced it with one from the old 8725 set (that had been on charge at my place for the past 4 or 5 months). The chgr immediately responded by dropping the charge current to the "normal" level. All went well, or so I thought...

In the process of exchanging the battery cells I managed some how to get battery acid onto my good work clothes, with rather disastrous results. My Levis are now much lighter & cooler. (Have been told by my teenage sister-in-law that they look really trendy now!).

I don't know how the acid got on me, I was extremely careful, (after my previous encounter with 7 litres of acid in the back of my car), but somehow the acid was more determined than I was careful. Oh well...

Anyway, the "talking clock" on 5650 behaves the same as it's sister on 8225, that is, it announces the time every hour & will also "tell" you the time when you send a DTMF "9" to the rpt.

We're still "testing" on this unusual frequency of 5650 & are still receiving favourable comments re the same. Monitoring of other more "orthodox" rpt frequencies is continuing, but in this area they seem to all suffer the same problem, ie: Pager crap, either on the input or output frequency. Our enquiries & testing are continuing. If you have any ideas or suggestions, please tell us...

## VK2RUW (8225/29.020)

A few interesting things have happened in the last month. You may have heard of the problem that two FM commercial stations transmitting from Knights Hill recently had with their antenna systems. It was a most unfortunate set of circumstances where the strength of the winds at Knights Hill, had twisted & loosened the connection from the thick heliax to the antenna array, till eventually it started failing. This didn't happen overnight, but over a period of possibly quite a few months. A LOT of High Tension arcing occurred, melting teflon insulators & severely blackening with carbon, the copper plumbing.

What has this to do with 8225 you may ask? Well you may also remember me reporting last month, I quote - "8225 is basically working well, but there is some unexplainable interference that occasionally pops up. It manifests itself as severe static or noise over the top of signals. Sometimes it sounds like rectification from metal components on the support tower, but other times nothing like it. It is presently very intermittent..."

That was typed on the 3/4, 12 days later the FM Station's feedline totally failed (due to high VSWR). Well I don't know about you, but I would think 10kW's of VHF RF arcing across pieces of metal 30 or so feet away from 8225's antenna would tend to cause just a little bit of "severe static". In the past 2 weeks, no "static" has appeared over 8225, so it looks like that may have been the problem.

We are seriously considering changing 8225's antenna system from the present 20' long colinear side-mounted on the tower, to 2 high gain yagis facing up & down the coast. The idea is to point the south facing yagi straight at Nowra, the signal will then follow the Princes Hwy south thru Milton & Ulladulla & onto Batemans Bay. Thus, all the major south coast towns & the main arterial road will be "covered". The north facing yagi will be pointed almost straight at Mt Keira, up thru the northern parts of W'gong, along the F6, thru the main parts of Sydney & up the coast to Gosford, etc. To the east of Knights Hill, there is only Kiama which is basically "line of site" anyway, so should have no access problems. To the west is Mittagong/Moss Vale/Bowral. Presently, we have no stations that regularly use the rpt from these areas, so it may not be greatly missed. In "theory", the signal strength to the main service areas, (W'gong, Nowra the south coast) should be increased considerably (?).

The radiated signal up & down the coast from 6750 from Mt Mumbulla near Bega is very good. It uses 2 high gain antennas facing north & south & is useable at my place in Fairy Meadow 95% of the time (without any lift in conditions, eg: ducting). Anyway, as the saying goes... Nothing ventured, nothing gained.

Next visit to Knights Hill (in the next week or so), the 10m frequency will be changed back to 29.040MHz, the same frequency as the VK4 gateway is operating on. Even with the poor sun-spot conditions, there is still some good copies coming thru the Gateway onto 8225. JA's still call in, as does a VK8 & some ZL's.

Apart from the voice system, it looks like the ROSE Packet switch may be re-installed at the site, to help fill-in a gap in the Packet network to the south. Michael (XCE) is working on the re-installation.



### VK2RAW (6850)

The work that was done at Mt Murray on the 23/3 (& reported in the April Propagator) has proven to be quite worthwhile. The longer rpttr tail & beep seem to be working well. The change in antenna for the WIA Broadcast Link has increased the signal strength considerably to 8225 at Knights Hill.

The "quality" of the Broadcast on 8225 (relayed thru Mt Murray), is very good & in turn it also sounds good on 29.020MHz & on to 8325 Goulburn (via the next link). The number of stations calling-in from Goulburn (& surrounds) after the Broadcast has increased due to the better quality. Previously, they had to endure the noise & fading on one of the HF circuits from Dural.

Still have to get back to Mt Murray to check-out the Solar Panel Regulator & also to increase the rpttr transmitted audio level slightly. When at the site on the 23/3, the audio level was left a little low. Everything else working fine though.

**VK2RIL (8725)** - Nothing much to report. Have noticed that the transmitter has drifted down in frequency slightly. Will attend to it next visit.

That's it for another month, till next time...

Rob - VK2MT.

## CONVERTING A 27 MHz CB RADIO TO AMATEUR BANDS

Obtain a CB with a CYBERNET chassis (Apollo, Electrophone CB550 & CB590 and Thorn 1503). This board uses a PLL02A chip.

With an 18 channel set upon conversion the set will cover 28.295 to 28.505.

With a 40 channel set upon conversion the set will cover 28.245 to 28.685.

Conversion steps:

1. Locate pin 8 and cut the PC board track as close as possible to the pin as possible. (Now it's on 28 Mhz).
2. In some positions of the channel selector it jumps 20 kHz instead of 10 kHz (eg CH3 - 27.305, CH4 - 27.055) To fill these gaps either add or subtract 5 volts to pin 15.
3. Adjust the VCO (Voltage Controlled Oscillator) to between 0 volts to 5 volts. (eg CH1 3.5 volts).
4. Adjust for maximum output on the power meter by using T4, T5, T6, L7, L11 and L13.
5. Adjust for maximum receiver noise using T7, T8, T9, T1, T2 and T3.
6. Now you should have a 28 Mhz radio but you may need to go through the alignment procedure 2 or 3 times before you attain the maximum output or RX signal.
7. If you require an 'even' frequency (e.g. 28.490 Mhz) you will need to remove C20 (15pf capacitor) and readjust CT1.

(From B.A.R.G. NEWS article written by VK3KAY)

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Over any given twenty-four-hour period, the fifty major hotels and gambling casinos in the Las Vegas area use 1.5 million kilowatt hours of electricity, enough to provide power for a city of some 35,000 inhabitants. The power used by these entertainment establishments simply to light their marquees could supply the electricity for more than 1,000 homes.

The Incas and certain other pre-columbian tribes in Peru developed the decimal system, hundreds of years before it was used in Europe.

Albert Einstein called his brain his laboratory...In science's continuing search for clues to genius, Einstein's brain is being picked apart, gram by gram, and analyzed in a laboratory in Wichita, Kansas...Dr. Thomas Harvey, former chief pathologist, Princeton University, is conducting the study.

Twenty thousand plants are listed by the World Health Organization as being used for therapeutic purposes.

POST BOX - "THE ILLAWARRA AMATEUR RADIO SOCIETY Inc"  
PO Box 1838, Wollongong, 2500.

REPEATERS	VK2RIL	145.650 *	Voice/RTTY	Sublime Point - TEST freq only.
	VK2RIL	438.725	Voice/RTTY	Sublime Point
	VK2RAW	146.850	Voice	Mt Murray
	VK2RUW	438.225	Voice	Knights Hill
	VK2RUW	29.020	UHF Gateway	Knights Hill
	VK2RUW	144.775	Packet (ROSE)	Knights Hill - Off air.
	VK2AMW-1	146.425	Packet	Wollongong UNI (Packet Internet Gateway)

**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.

**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 \$60 per ad per year, member's classifieds free for one issue. See Mick VK2GNV 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	VK2KWG	Ken Grimm	
VICE PRESIDENT	VK2XQX	Simon Ferrie	
SECRETARY	VK2UR	Ron Hanks	(042) 84 2691
ASSIST SEC	VK2SRB	Robert Bonella	
TREASURER	VK2UBF	Brian Farrar	
ASSIST TREAS	VK2GTJ	Theo Jepson	
COMMITTEE	VK2ZWG	Jim Beaver	VK2KLH Brian Clarke
	VK2GMC	Phillip Klower	
REPEATER	VK2MT	Rob McKnight	VK2TKE Ken Goodhew
QSL CARDS	VK2XGJ	John Simon	
PUBLICITY	VK2XQX	Simon Ferrie	
BROADCAST	VK2XGJ	John Simon	VK2MTRob Mc Knight
EDITOR	VK2GNV	Mick Eckardt	(042) 57 4101
CANTEEN	VK2GMC	Phillip Klower	
WIA LIASON	VK2XGJ	John Simon	VK2MTRob McKnight
LIFE MEMBERS	VK2ALU	Lyle Patison	VK2CAG Graeme Dowse
	VK2OB	Keith Curle	