THE PROPAGATOR

ILLAWARRA AMATEUR RADIO.SOC.INC.

MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO. SOC. INC.
VOLUME - 87 , NUMBER : 8 SEPTEMBER 1987.
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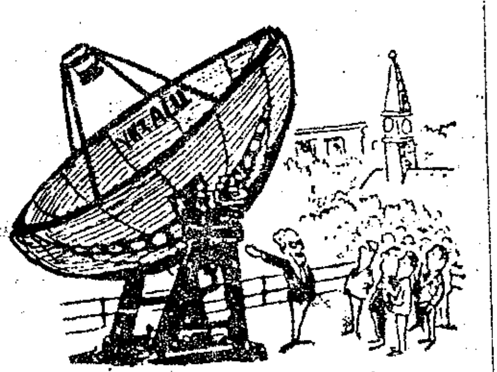
MEETINGS ARE HELD ON THE SECOND TUESDAY OF EACH MONTH , (EXCEPT JANUARY) AT 7.30.PM. AT THE STATE EMERGENCY SERVICES , BUILDING , IN MONTAGUE STREET , NORTH WOLLONGONG .

VISITORS ARE MOST WELCOME TO ATTEND THE MEETING'S .



"It picks up radio waves from gaseous nebulae, and blacked out professional games"

OSCAR 10

AMSAT BROADCAST WARNING OSCAR 10.

Until further notice from Amsat, do not use Oscar 10. The next period of communication with Oscar 10 will commence around Nov. 20th. When the Sun's orbit will again be good enough for charging the satellites batteries.

Further info on satellites can be obtained from Amsat on the Amsat net every Sunday on 3.585.Mhz. at 1000 UTC.

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I.A.R.S. SHOWS THE WAY

An interesting demonstration of R.T.T.Y. capabilities on glass screen is being organised by Roger Graham VK2AIV for a computer group in the Illawarra area.

Roger and Mike VK2DFK and Morry VK2EMV will co-operate to show the transfer of graphics and data via Ham Radio links on 2 metre.

Other club members will be taking part in this link-up on 24-8-87 at 7.30.pm.

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SEPTEMBER MEETING

Will be held in the SES Headquarters , Montague street, North Wollongong on the 8th September 1987 and a store promotion night and ragchew are intended.

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COMMITTEE - REPORT

The August committee meeting had a limited attendance because the weather was atrocious causing other commitments for some members. Businuss was mainly discussion on future activities for the club meeting nights and what direction the club should be taking for fund raising and social activities.

The possibility of having a club rig and a working station in our club room at the S.E.S. building was again raised and any offers of equipment at suitable prices or donations would be welcome.

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SERENDIPITY & THE TRANSISTOR

Most people when asked to nominate the date when the transistor burst onto the world scene say 21st Nov.1948. To be perfectly fair that is indeed the date when Bratteen and Shockley demonstrated the transistor in the form we now know, as the point contact transistor and so set in motion the development of the vast field of semiconductor electronics we know today.

However, back in the dim dark days of 1928, the point contact transistor was disoovered, demonstrated and ignored because "real radio people" know only valves are any good and the effect demonstrated was a defect not an advantage.

Unfortunately in moving QTH I have since lost the particular copy of the"English Mechanic" for 1928, which requested help from an enthusiast to overcome the problem encountered by a constructor of Crystal Radio's, who, had found his set oscillating and wanted to stop it doing so.

The problem arose because of the great deal of experimentation carried out seeking suitable material for use as a crystal detector. This work was done by ordinary enthusiasts and the materials selected for trial as a semiconductor and used with a "cats-wisker" were weird and wonderful to say the least.

One favourite material, due to its reliability was carborundum, but this did have a serious flaw as regards its common useage.

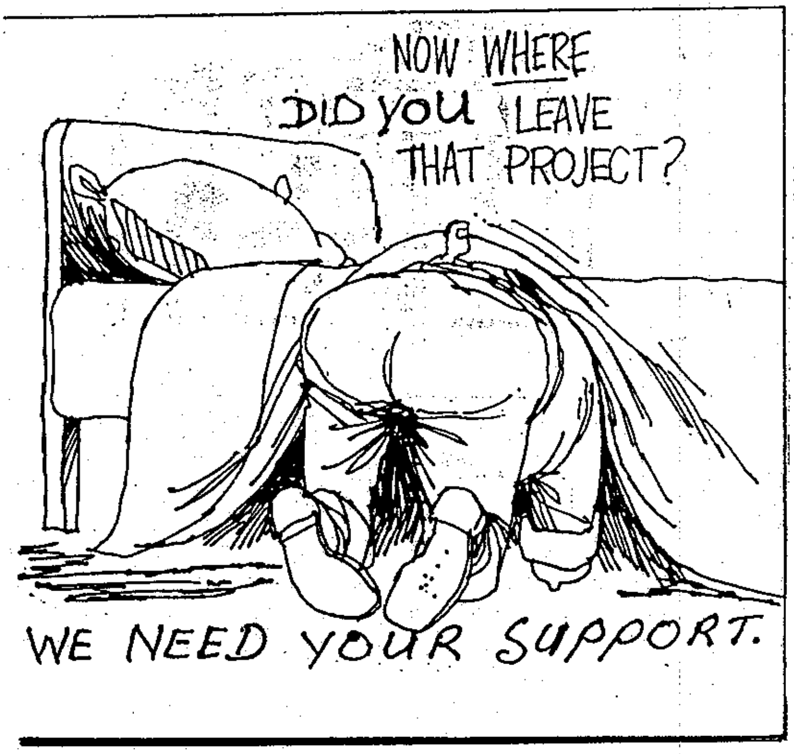
This flaw was the rather high value of barrier poten-tial (from memory about 1.6 volts). This high value meant of course that the signal applied to the derector had to exceed that value or "no signals". In the days before valves were commonplace that was not to bad , close to a high power transmitter, but, out in the country it meant no reception.

Experiments were carried out on ways to try and reduce the barrier potential by biasing the junction by means of external battery circuit which provided 95 - 98% of the 1.6 volts in the form of a forward bias, leaving only a fraction of a volt to be provided by the signal.

Of course the problem of isolating the high impedance signal path from the low resistance battery circuit was quite a hitch.

Somebody had the clever idea of using two "catswhiskers" mounted so as to contact the block of carborundum in close proximity, and these could be used so that one formed the "signal junction" whilst the other biased the whole thing in such manner as to reduce the value of barrier potential.

This technique greatly reduced the interaction problems of the two circuits and the circuit became manageable. This was indeed a solution (of a sort) and many varied circuits and configurations were designed, published and discussed by the"listeners-in" of the period.



SERENDIPITY & THE TRANSISTOR

CONTINUED

But after a few months some poor soul found his neighbours complaining of whistling QRM emanating from his crystal set, and preventing them from enjoying theirs.

What had happened, was that he had quite unknowingly produced a point-contact transistor, and what was worse, had also adjusted the bias and circuit components so as to produce "negative resistance" and a loop gain greater than 1, and so had produced an R.F.Oscillator.

If that isn't serendipity what is ?

By 1929 the problem had become quite commonplace and in a copy of the English Mechanic for Sept 27/1929 is a letter on the subject including a claim by a French experimenter to have developed and oscillating crystal detector with a gain of 15 times.

As the dear old valves took over, the tetrode and pentode having arrived on the scene some two or so years earlier, their greater reliability and robustness led them to replace the crystal detector and so the transistor, in the view of some of us "die hard old valve types", sank back into the obscurity from which it should never have emerged.

But seriously, isn't it incredible that the transistor was demonstrated 20 years before it became a real possibility and NOBODY recognised it's value.

Of course the F.E.T. was similar in that its theory of operation was worked out 30 years before the device was demonstrated, again by a Frenchman, in the form of the "Tecnetron" in 1959, but that is another story.

Reprinted from B.A.R.G. News March 1987.

August General Meeting

The monthly meeting for August was a reasonable roll-up with around 40 members and guests present.

Some transceivers donated to the club were auctioned by Keith VK2OB with the club benefitting from the proceeds.

The usual big spenders were bidding for the goodies available and we may see some new operators on six metres when this equipment is converted. The evening closed with the usual ragchew and cuppa and biscuits.

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KENNELLY .. HEAVISIDE .. LAYER

By VK2 PZY (radio engineering handbook 1931)

Since radio waves are known to be electromagnetic in character and are of the same general properties as the waves of radiant heat and light, there is no reason why they should not travel in a straight line with no more than the customary deviations due to diffraction, reflection, and refraction. One of the earliest problems in radio theory after the success of Marconi's first transoceanic signal in 1901-1902 was to account for the manner in which the waves emanating from Clifden, Ireland, progressed to Glace Bay, Nova Scotia, where Marconi picked them up. One had three choices here:

1. To assume that the wave penetrated through the earth's crust.

2. To assume that the diffraction effects caused them to bend around the surface and follow the curvature of the globe.

3. To assume that something happened in the upper layers of the earth's atmosphere to refract the waves back to the earth's surface.

A ray of energy sent out tangentially from Clifden, for instance, would otherwise pierce the sky in a straight line and be lost as far as further usefulness was concerned.

The first of these possibilities was easily thrown out. The electrical constants of avarage earth and sea water were well known.

The absorption of a wave which would be obliged to travel through the earth's crust would be so enormous that there would be no possibility of getting across the Atlantic.

Calculations made on the pure diffraction effect indicated that this also is not sufficient to account for the bending of the waves around the contour of the globe.

Kennelly, of America had suggested a reflecting medium in the upper layers of the earth's atmosphere, and simultaneously Heaviside, in England, had made the same suggestion with the additional idea that the reflecting medium was ionized, that is, contained positive and negative ions.

The theoretical possibilities of such a layer were analyzed by a great number of different investigators and a satisfactory explanation for the return of the rays to earth was arrived at when it was found that the properties of such a layer could easily be such as to cause an advance in the phase of velocity of that portion of the wave front which extended up into the upper regions of the earth's surface.

This caused a change in direction of this advancing wave, which continually bent it back again towards the earth.

In case the bending is more than sufficient to equal the earth's curvature, the ray will return to earth at some point at a distance from the transmitter which will depend upon the frequency.

The higher the frequency, the more difficult it will be for the ionized layer to bend the ray, and therefore the farther it will travel before coming down to earth.

After coming down to earth the ray is no doubt reflected again and proceeds upward where it encounters the Kennelly-Heaviside layer at a certain time and is returned to the earth at a point approximately

KENNELLY HEAVISIDE LAYER CONT.

twice as far away from the transmitter as the point of its first return.

Considering any single ray then, we would have a possible points of reception at regular distances at recurring intervals, from the transmitter outward, assuming for the purposes of argument a similar condition in the Kennelly-Heaviside layer over a considerable stretch of territory.

Actully, however we do not have points of reception but rather zones of reception, which we familiarly refer to as first, second, third, etc., zones of reception, corresponding to the first, second, third, etc., regions where the rays are retuned from the layer.

Excepting at the limiting frequency, there is always a cone of rays available for communication purposes. The ray which is most nearly horizontal will strike the Kennelly-Heaviside layer at the flattest angle and will therefore be most certain to be turned down, but it will (from the nature of its path) travel long distances before coming down again.

A ray which more nearly approaches the vertical will, if returned at all, come back much closer to the transmitter, but if the frequency is high enough it will have such penetrating power and so little deviation that it will never be returned at all.

For any given frequency then, there is, under ideal conditions, a limiting angle of uptake from the transmitting antenna above which radiation is no longer useful because it penetrates the layer and does not return to the earth.

Now, as the frequency is increased and the rays become more penetrating and less easily deviated, they have to strike the layer at flatter and flatter angles in order to have any chance of returning to earth at all, and therefore as the frequency is increased the rays which angle sharply upward are eliminated as far as useful communication is concerned and only the very low angle rays are of any use to us,until finally, the useful cone of radiation, which is included between the horizontal ray and the ray proceeding upwards to the critical angle with the horizontal, has become a very small angle indeed, and with still further increase of frequency this angle vanishes altogether.

Thus, for a given condition of the layer there is a critical frequency above which it is not possible to get long distance communication.

Immediately below this critical frequency we get a very narrow cone of rays available, perhaps up to 3 or 4 degrees above the horizontal ray, and naturally when these are turned back down to earth they come back a long distance away from the transmitter.

This shows a very large skip distance effect, and after they rebound again from the earth and are turned back a second time, that there is a second zone of reception, but between the two zones there is a wide region over which reception is not possible and this region (the existence of which was experimentally verified in the spring of 1926 by the naval research laboratory) has been called the

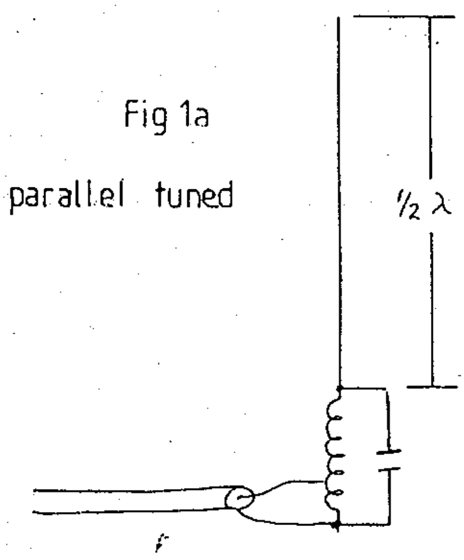
SECONDARY SKIP DISTANCE REGION.

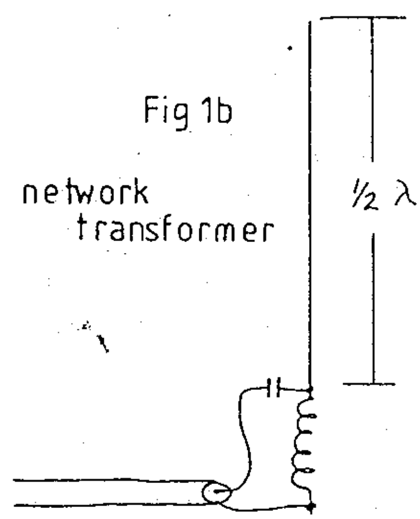
NEED A 2 M ANTENNA ???

A SIMPLE, LOW COST PORTABLE 2M ANTENNA.

Here is an antenna with features which make it attractive for portable operation or installations where a ground plane is not available or not desirable.

Electrically, the antenna is an endfed halfwave dipole matched to 50Ω coaxial feedline by a network transformer instead of the more common parallel tuned circuit (like the popular Ringo). Figs 1a & 1b compare the two matching methods.





This article refers specifically to an antenna constructed from 1.6mm dia. wire (or rod) for the 2m band and although other dipole diameters and other bands are possible no such work has been undertaken by the writer at this time.

The author's version is constructed as a unit from a single length of 1.6mm dia. tinned copper wire & after adjustment for lowest VSWR the antenna was housed in a fibreglass fishing rod blank. The wire could be enamelled & the housing could be PVC conduit.

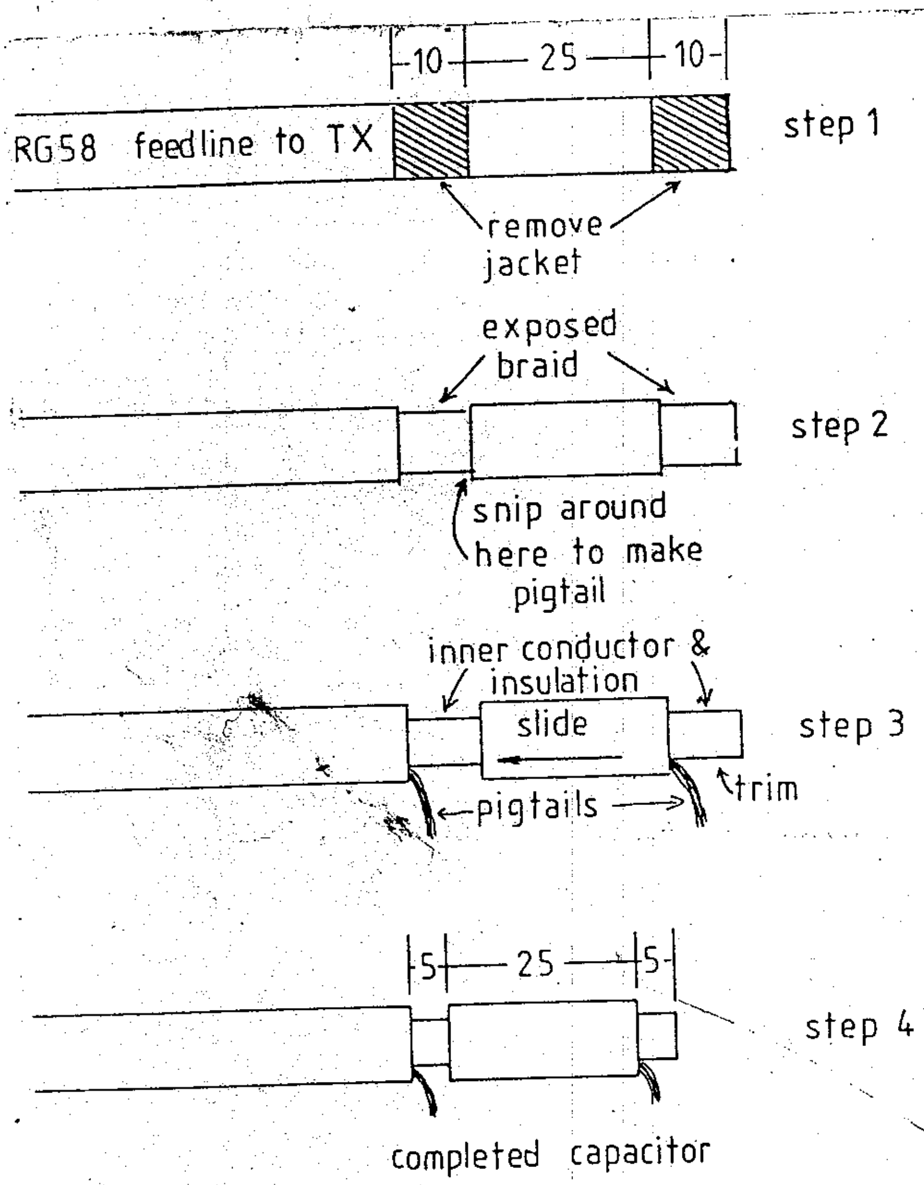
Providing the capacitor & coil are accurately constructed very little adjustment should be necessary to achieve a low (<1.5:1) VSWR, any adjustments being taken care of by squeezing up or stretching the turns of the coil. The imperial dimension given in Fig 3 occurred because of the twist drill used as the former on which the coil was wound.

Wind 9 close wound turns of 1.6mm dia. wire on a 5/16" dia. former, bend up the ends & then stretch the coil to achieve the dimension shown in Fig 3. Capacitor details are shown in Fig 2.

Although the feedline as shown is RG58 & it is mounted up inside the coil (Fig 4) there is no reason why RG213 (or RG8) cannot be used with the "capacitor" parallel with the coil on the outside. It is important however to note that the length of the capacitor only holds true for solid polythene coax. Foam coax has lower capacitance per foot than solid polythene & a new capacitor dimension will have to be found if foam coax is used.

This antenna was the culmination of a search for a lightweight, slim, ground independent antenna for WICEN & it has been used on two exercises so far to my complete satisfaction.

de Ray VK2TV



dimensions in m.m.

Fig. 2

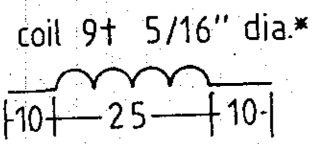


Fig 3

*see text

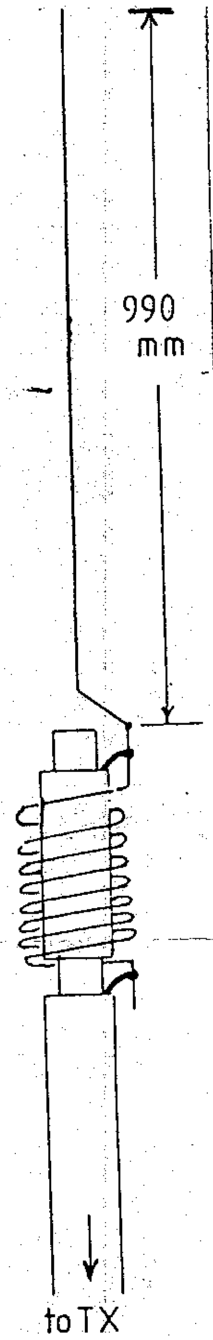


Fig 4

NOTE. Some dimensions exaggerated for clarity.


AH...AT LAST!...I CAN LEARN TO USE A COMPUTER; JUST FOLLOW LES BELL'S LEAD...
Type in PRINT "HELLO"
...the screen should look something like this:
READY
PRINT "HELLO"
PARDON?
the computer executed your command as soon as you typed RETURN...
...I SAID PRINT HELLO!
...of course, this is a trivial example...
DUMB BLEEP!
WHERE IS THE "PLEASE"?
BLAMP!
...the computer will patiently wait in case you want to type something else as well
1,2,3....
UP YOURS
...let's write a simple program.......
YAWN
...if you make a mistake while typing a program, don't worry about it...
SNAP!
HEY! DOAP! KARNT YOU SPEL?
...if you want...
[UH OH!] WAIT ON... ..LET'S BE FRIENDS...
...just hit return...
SPLANG!
...that will get rid of it...
PANT PANT PANT

ON THE NET

2nd August 1987.

VK2MT-Rob Co-ordinator, VK2NNJ-John, VK2ENX-Tony VK2EMV-Morry, YJ8IND/O-Rod from Vanuatu, and A35DX-Ray Australia call VK2AUP in Tonga. DX !!!!

9th August 1987.

VK2ENX-Tony Co-ordinator VK2DFL-Dave, VK2IU-Ralp, VK2BIT-Peter, VK2PHD-Ray VK2EBI-Kevin, VK2EMV-Morry.

16th August 1987.

VK2PZY-Dave Co-ordinator VK2EBI-Kevin, VK2DFL-Dave, VK2MT-Rob, VK2FCP-Fred, VK2BHO-John, VK2PHD-Ray, A35DX-Ray.

23rd August 1987.

VK2EBI-Kevin Co-ordinato VK2MT-Rob, VK2BIT-Peter, VK2EMV-Morry, VK2ENX-Tony, VK2PHD-Ray, VK3CMH-Martin in VIC.

WINNERS

F.R.L.3. Winners

Week No:	5	N. Blaney.
Week No:	6	T. Mowbray.
Week No:	7	J. Hayes.
Week No:	8	J. Hayes.

A WINNING STREAK FOR F.R.L.3.

Our F.R.L.3. has received two small dividends since last month so we are now waiting for bigger things.

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HELP NEEDED

This issue concludes Rob VK2MT's series on Aussat which has been of great interest to members and we are no longer receiving a repeater report or an EME report due to lack of EME club activity.

This means we need articles on anything suitable for publication and members are urged to submit anything they consider may be of interest to members.

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THE STORY OF AUSSAT

Last month we looked at the main users of AUSSAT. In this final article we will take a look at the other many & varied smaller users & the problems that can upset satellite reception.

Two of the most notable of the smaller users of AUSSAT are Alan Bond's "Sky Channel" & the opposition, the Bell Group's "Club Super Station". (Just recently Mr. Bond bought out the opposition so as to pool the resources of both Satellite TV Networks.) Amateur readers of this article would no doubt have seen the satellite receiving dishes on the clubs & pubs around the place. The clubs have very small dishes on their rooves (1.2 metres) where as the pub's dishes are much larger (3 metres) & due to their size are mainly sited on the ground. Both services were set up very quickly in mid '86 when their AUSSAT 2 transponders became available. Their programming is based mainly on sport, news & rock music, aimed solely for their viewing audiences at the aforementioned social venues. Their signals are fully encoded & can only be received by subscribers of the particular service with a special decoder.

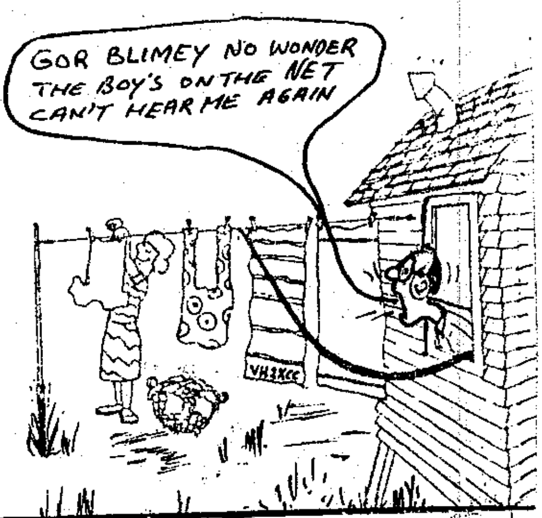
At present 75% of AUSSAT's revenue comes from leasing ground stations & transponders to radio & TV organisations. In the longer term though, other communications & data services are expected to take up an increasing percentage of transponder capacity until useage is divided equally between radio & TV broadcasting and specialized video & data links.

Now let's take a look at some of the specialized users of AUSSAT. The Macquarie Radio Network is at present putting together a system to link its 27 owned or associated radio stations (eg. 2WL) in all the mainland states & N.T. The AAP News Service operates a large communications network providing data to hundreds of subscribers around Australia. You may have noticed the small white 1.8 metre dish on top of the Illawarra Mercury building in Keira Street, (& no, it's not a birdsbath). Before AUSSAT the standard structure for this kind of service consisted of a large central data bank which users (like the Mercury) could access through their own terminal & a Telecom land-line. On AUSSAT, AAP broadcasts data at a rate of 128 K Bits/second.

Another user is the Department of Aviation. They required a system that was totally reliable for air traffic control in Australian airspace. The majority of aircraft communications takes place on VHF. Before AUSSAT, the vast distances of our continent proved to be very expensive to build & maintain repeater stations with "line-of-sight" bearers. They now lease four transponders & have set up a network of 45 manned & 55 unmanned Earth station sites through-out Australia. These sites use normal VHF to & from the aircraft & these signals are relayed back & forth via AUSSAT. For maximum reliability & safety the entire ground-space-ground communication link is duplicated.

Video conferencing between companies & organisations is one more of the smaller users. Video conferencing saves the time & cost of travelling & is much more convenient for the people concerned. Also the Federal & State governments are keen on setting up systems for the service of hospitals, school of the air, railway systems, emergencies/disasters, etc. Oil & mining exploration companies are looking at AUSSAT as a way of transferring voice, facsimile & data communications between remote sites & head office. The list of possible users is endless. Some of these remote sites can be provided with a satellite service by using trailer-mounted dishes. Even some TV stations already have trailer-dishes for truly remote broadcasts of news stories.

Now let's take a look at possible problems that Mother Nature can cause these satellite systems. Basically, there are really only 2 main problems that sometimes present themselves with reception of satellite signals. The first one is when it rains heavily. The GHz frequencies used for uplinks & downlinks, have a wavelength about the same size as a raindrop & attenuation of signals can be quite severe. This isn't normally a problem for TV stations because they have large dishes with high gain. (Typically 8 to 13 metres in diameter). However, the HACBSS (Homestead & Community Broadcasting Satellite Service) uses dishes in the 1.2 to 1.8 metre range, the rain attenuation problem would be real problem except that it hardly ever rains in the centre of Australia where the service is used.



THE STORY OF AUSSAT CONTINUED

The other problem that can upset satellite reception only occurs twice a year. The Earth's movements through space places the sun directly behind each satellite. This results in increased RF noise levels for a few minutes. This causes an increase of "snow" on the picture & "hash" on the audio which can go from no noticeable effect to total obliteration in a couple of minutes. (The larger the dish size, the lesser the affect time & vica versa). The reason for the interference is because the sun has an RF output of around 10 to the 26th power Watts compared to a satellite transponder of 12 or 30 watts. This effect last occured to AUSSAT 2 in the Wollongong area on the 4th of April. The problem occurs twice a year when the sun raises it's arc across the sky towards summer, and lowers when the winter months approach. Other than these two problems, using the AUSSAT satellites is extremely economical, efficient & reliable due to their being only one "hop" between any two sites in Australia. After the initially high cost of the satellites themselves & launch fees, running costs are lower than maintaining the many microwave bearers or coaxial landlines necessary to cover the vast distances of Australia.

Well that concludes this series on AUSSAT. I do hope you the reader, have received as much enjoyment reading about Australia's own satellite system as I did in researching it. By the way, I hope you learnt something you did not already know! (PS - after reading this series remember I am definitely not a "writer" so please be forgiving for my use of the English language, HI).

Catch you later, 73's VK2MT

*Reference sources: Dept. of Communications (DOC 511) & HACBSS News No: 5
Electronics Australia Sept. '85 & May '87
& the many technicians & engineers at WIN that I earbashed!

THE ILLAWARRA AMATEUR RADIO SOCIETY. INC.
P.O.BOX.1838. WOLLONGONG. 2500. N.S.W.

MEETINGS: Are held every 2nd Tuesday of the Month except January, at 7.30.pm. in the S.E.S. Headquarters, Montague street, North Wollongong.

REPEATERS:

VK2RAW	146.850.	(VOICE)	VHF	Mt Murray.
VK2RAW	147.575.	(PACKET)	VHF	Mt Murray.
VK2RIL	147.275.	(VOICE & R.T.T.Y)	VHF	Sublime Point.
VK2RUW	438.225.	(VOICE)	UHF	Hill 60 Port Kembla.
VK2RIL	438.725.	(VOICE & R.T.T.Y)	UHF	Sublime Point.

BROADCAST: On Sunday evening prior to the club meeting, at 7.00.pm. R.T.T.Y. Mode, and at 7.15.pm. on voice. Transmitted on 147.275.VHF, and relay on 3.562.Mhz. Callbacks will be taken after the voice broadcast.

W.I.A. RELAY: On 146.850. at 11.00.am. and at 7.30.pm. each Sunday.

CLUB - NETS: On 3.562.Mhz. SSB on Sunday at 8.00.pm. and a slow morse net on 28.440.Mhz on Thursday evenings at 8.00.pm.

NEWSLETTER: "THE PROPAGATOR", published Monthly to reach FINANCIAL-MEMBERS in the week preceeding the club meeting. All articles, adds etc , to the editor must be in, or try , by the 3rd Tuesday each month.

MEMBERSHIP: The Secretary, I.A.R.S.Inc, P.O.Box.1838. Wollongong. 2500. Full membership is $10 per annum; students & pensioners concessional members $5 per annum.

AWARDS: The Award of the Illawarra Amateur Radio Society.Inc. is the LAWRENCE-HARGRAVE-AWARD. VK stations require 10 contacts with I.A.R.S. members. Overseas stations require 5 contacts with I.A.R.S. members. A contact with VK2AMW is sufficient for the award. Band-details, date, frequency, station worked and $2 or 4 I.R.C.'s .to THE AWARD-MANAGER, I.A.R.S.Inc, P.O.Box. 1838. WOLLONGONG.2500. No QSL-CARD is required.

STORE: The club store operates at each club meeting. by COMMITEE-MEMBERS.

COMMITTEE:

PRESIDENT: VK2DYU- BILL CHADBURN. 45 Beltana Ave, Dapto.
VICE-PRESIDENT: VK2OB - KEITH CURLE. 24. Beach Drv, Woonona.
SECRETARY: VK2JTB- TOM BROWN. 10. O'Keefe Cr. ALBION - PARK.
TREASURER: VK2VAV-YKQ-DAVE HENDERSON.8.Gladstone st.Bellambi.

GENERAL-COMMITTEE: VK2MT - ROB McKNIGHT, VK2BIT - Peter Woods, VK2XCC/PHD - RAY BALL.
REPEATER - CHAIRMAN: VK2CAG - GRAEME DOWSE.
REPEATER -COMMITTEE: VK2EXN - IAN CALLCOTT, VK2EMV - MORRY .v .d. VORSTENBOSCH. VK2DFK-MIKE KEECH, VK2MT-ROB McKNIGHT, VK2BIT-PETER WOODS, VK2TPH-PHIL HOWCHIN, VK2XGJ-JOHN SIMON, VK2FCP-FRED BROWN.
QSL-CARD'S OUT : VK2EXN - IAN CALLCOTT.
QSL-CARD'S IN : VK2BIT - PETER WOODS.
PUBLICITY - OFFICER: VK2VAV/YKQ - DAVE HENDERSON
BROADCAST - OFFICER: VK2ENX - TONY MOWBRAY. VK2ALU LYLE PATISON.
CARTOONIST : VK2AXI - BRIAN WADE.
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SOCIAL-DIRECTOR : VK2XCC/PHD - RAY BALL. D.O.C.LIASION VK2OB - KEITH CURLE.
CANTEEN-MANAGER : VK2DYU - BILL CHADBURN.
LIFE - MEMBERS : VK2CAG-GRAEME DOWSE. VK2OB-KEITH CURLE.VK2ALU-LYLE PATISON

SUNDAY - EVENING - CLUB-NET - ROSTER:

FIRST SUNDAY OF THE MONTH	:	VK2MT - ROB McKNIGHT.
2 nd SUNDAY OF THE MONTH	:	VK2ENX - TONY MOWBRAY.
3 rd SUNDAY OF THE MONTH	:	VK2PZY - DAVE CAPON.
4 th SUNDAY OF THE MONTH	:	VK2PHD - RAY BALL.
5 th SUNDAY OF THE MONTH	:	VK2EBI - KEVIN MURPHY.
And on stand-by	:	VK2DUP - GRAEME PARSONS.