THE PROPAGATOR

MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO SOCIETY.
VOLUME - 86 , NUMBER : 1 FEBRUARY 1986.
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MEETINGS ARE HELD ON THE SECOND TUESDAY OF EACH MONTH. (EXCEPT-JANUARY) AT THE STATE EMERGENCY SERVICES BUILDING , MONTAGUE STREET , NORTH WOLLONGONG. VISITORS ARE MOST WELCOME TO ATTEND MEETING'S.

NEXT MONTHS MEETING -: The next meeting of the Illawarra Amateur Radio Society will be held on Tuesday 11th February at 7:30 pm at the usual meeting rooms at the State Emergency Service Headquarters in Montague Street, North Wollongong.

DECEMBER MEETING -: The last meeting of the Illawarra Amateur Radio Society was the December meeting.

The raffle prize for the evening was a Christmas Ham which was won by Ray VK2XCC/PHD (in keeping with his Father Christmas image perhaps!!!)

Also at the last meeting it was pleasing to see the large roll-up of XYL's for the Christmas meeting. Many thanks to Angie, XYL of Graeme VK2CAG, for arranging for so many XYL's to turn up.

In repeater news, many thanks to VK2EXN, Ian, VK2DFK, Mike and VK2EMV, Morry for a trip up to Mt Murray on Christmas Eve to repair damage done to guy wires by vandals. Many thanks to Lola, Ian's wife, for allowing Ian to make the trip on Christmas Eve.

Good to hear VK4ZEF/2 Eric back in Australia again even if only temporarily.

The Christmas Picnic in December was well attended by club members and families at Cataract Dam. The day turned out to be sunny and hot and the site was ideal with plenty of shade for avoiding the sun.

It was good to see so many people turning up and enjoying themselves and wearing the club tee-shirts.

Father Christmas turned up for the kids and helped to add to the Christmas feeling.

Many thanks to Ray VK2XCC/PHD for the exellent organization and preparation for the day!!!

Another callsign heard over the Christmas period was that of VK2KING, otherwise known as Brian VK2AXI, who was in Wollongong over this time. (Those complaining of TVI over this period will know that the KING was back in the 'Gong !!! Hi Hi .)

REPEATER REPORT GRAEME VK2CAG

At a recent committee meeting a resolution was made to establish a packet radio repeater in the Illawarra area. At present there are 2 operators on packet in this area. There are a few more interested in the mode, but the incentive to get going is low with such a small potential for contacts. The packet operators in the Sydney area are anxious to see a repeater established in this area as well, which will bridge the gap between Sydney and Canberra.

Our application has been received by the State Repeater Committee and is being processed.

All of our repeater sites have been considered, and the most suitable one is Mt. Murray. Sublime point has too many restrictions on antenna placement, and it would be impossible to get the separation needed from the existing repeater aerials to prevent interference between the new and existing repeaters on 2 metres. Also, the existing 2 metre repeater at Sublime point is in the upper megahertz, and too close in frequency to the packet frequency. Hill 60 would not give the DX coverage needed because of its location. Mt. Murray is an ideal location as far as coverage is concerned. There are no restrictions on aerial size and spacing, and the packet frequency is one megahertz from the existing repeater 6850, thus minimising the possibility of mutual interference. The only problem with Mt. Murray, and it is a serious one, is the energy problem. We are having enough trouble keeping enough energy up to 6850 to keep it on air without supplying another repeater as well.

So we have decided that the installation of a packet repeater on Mt. Murray will be done without causing any drain on club funds and without affecting 6850 repeater in any way that is detrimental.
The interest is so great that we are already in possession of a donated transceiver and controller suitable for the job, and have had offers from outside this area of help with solar energy.

Since a packet repeater has a very low T/R duty cycle it consumes a small fraction of the energy used by a normal voice repeater. This means that if only one additional solar panel is installed, there will be an overflow of energy which can be used to provide additional energy to 6850.

A packet repeater, or any packet station for that matter, is a store and forward device which alternately transmits and receives on the same frequency. No duplexer is needed since the transmitter and receiver are not going at the same time, as with a normal repeater. A single frequency is used for transmit and receive and is used by all operators at the same time. The repeater will hear all signals on the channel that are in range, but will only respond to and repeat a signal with the repeater's particular address code. That means that it will be idle in spite of packet activity on the channel unless specifically called to repeat. The frequency in use for packet is 147.575MHz.

One of our generous members has been kind enough to loan us a solar panel for a while. It has been installed at Mt. Murray, and since it was connected we have had no problems with energy. The panel is half the size (electrically) of the existing one, bringing the solar charging capability from 2.25 Amps to about 3.5 Amps. Eventually the panel will have to be returned to its owner, but it has got us out of trouble this summer, and has given us the opportunity to estimate the amount of energy needed when the time comes to install out own. It appears that one more full sized panel like the existing one will supply all the needs of 6850 and a packet repeater with a common storage battery.

Some changes have been made to the control system at Mt. Murray, but not affecting the operation of the repeater. As mentioned in the last Propagator in the repeater report we have made the alterations necessary to the control system to allow the connection of latching co-axial relays for control of transmitter power, should it be necessary. The latching relays are still a problem, but this project has been given low priority because of the unexpected loan of the solar panel.

Some time over the holiday season one of the guy wires was broken at Mt. Murray. It was one of the top insulated guys made of that special Debeglass material which we purchased earlier last year. Temporary repairs were made to prevent antenna breakage, and more permanent repair is to be done in the near future. It appears that the damage may have been done wilfully by persons unknown, and this is the first time since Mt. Murray repeater has been operational that this type of thing has occured. Future work on the repeater's antenna system will concentrate on more srength and security of accessible parts like guy wires etc.

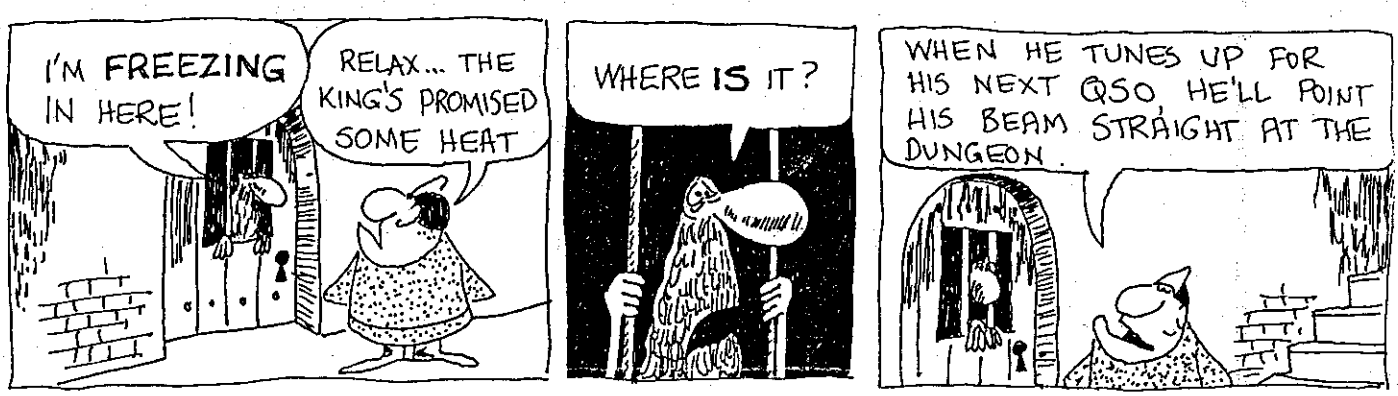
Peter VK2JAM and Rob VK2MT have taken on the job of making up the duplexer for Sublime Point 7275. They have made up one sample cavity for testing before going on to complete the duplexer. The cavities were made up at the same time as the ones for 6850, but there is still a lot more work involved in putting them together to make the finished unit.

At this time of writing a fault appears to have developed at Mt. Murray. The transmitter shuts down after a few seconds, even at times in the middle of an ident. Weather permitting, this will be attended to next weekend 28/1/86. Read the next exciting episode to find out what went wrong!

STOP PRESS ON REPEATER

In late repeater news, thanks to Graeme VK2CAG and VK2EXN Ian for re-activating the Mt Murray repeater after the shut-down of the repeater on 20th January after a fault in a series of transisters, cause unknown. The repeater was put back on air on the 25th January.

See Graeme's Repeater Report next issue for further details of this fault.



E.M.E. REPORT BY LYLE VK2ALU

Feed horn checks are continuing. Feed port SWR is fairly reasonable at 1.3 to 1 at 1296MHz, but the connection between the feed port and receive preamplifier via a short piece of coax. and an isolating relay is causing an unacceptable increase in refected power as well as a variable insertion loss due to changes in coax. relay contact resistance.

Work has not yet commenced on the new security system.

Satellite Notes.

Signals via Oscar 10 continue to improve during the 'after Apogee' portion of each orbit. Signal strength is down and spin modulation fading is noticable prior to Apogee.

The satellite attitude was repositioned to Lon. 230 a week or so back and is currently being changed again to improve sun angle during the present eclipse period.

The operating schedule was modified again a few days ago, (typing date is 24/1/86) and is

Mode B MA 40 to 199
Mode L MA 200 to 216
Mode B MA 217 to 225
OFF MA 226 to 39
This could be changed again shortly.

My operating periods on the satellite have been very restricted over the past weeks, even so prefixes heard have included CE, W, KH6, FK1, KB, ZL and JA on the orbits to the east of VK2. Orbits to the west of VK2 have included VKØ (Mawson base), ZS, 7P, TR8, 4X4, HZ, YB and UK. Other VK stations have been heard referring to a much wider group of prefixes worked.

Only low power is needed after Apogee, with power levels of 5 to 20 watts being quite adequate on occasions.. My first contact with TR8 (on any band) lasted about 30 minutes. It developed into a pleasant 'round table' with a ZS6 and a VK4 joining in. The reception was 'like sitting in the shack with each other' - no background noise, no QSB, no QRM and full duplex operation due to the dual bands in use (though it is hard to get away from following the 'over to you' technique at times - Hi!!).

Who needs the HF bands for DX or for ragchewing?? In addition CW, RTTY and slow scan TV (or is it Fax?) can also be heard in the bandpass from day to day. What more can you want?

Lyle VK2ALU.

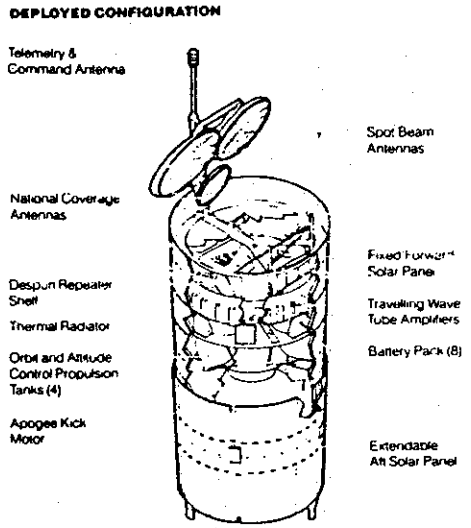
WANTED - WANTED.

Don Reynolds VK2ZRK (QTH as in Callbook) is looking for a 2 Metre SSB Transceiver such as a TS700S in good condition, also a 2 Metre to 28MHz receiving Converter (solid state) and a Microwave Modules 432/28S Transverter. Can anyone help? Don may be contacted by phone on 042 - 293459.

AUSSAT AUSTRALIA

AUSSAT Australia is the company that controls the Australian Communications Satellite System (A.C.S.S.) consisting of the two satellites set into orbit by the American Space Transport System (the Space Shuttle) late last year. (See fig. 1). A third satellite will be put into orbit during this year.

A.C.S.S. consists of two geo-stationery satellites in orbit at a height of approximately 36 000 km above the equator. These satellites are placed at the nominal locations of 156 E and 164 E longitude.



Each satellite carries four 30-watt transponders and 11 12-watt transponders operating in the KU-Band of frequencies. This means that the transponders operate over 14.0 to 14.5 GHz on uplink and 12.25 to 12.75 GHz on downlink. In addition each satellite will carry a spare 30-watt transponder and some spare 12-watt transponders to take the place of any transponders ceasing to operate for any reason.

The 30-watt transponders are designed principally to operate in the zonal beams to provide contiguous coverage of Australia for the Homestead and Community Broadcasting Satellite Service (H.A.C.B.S.S.).

The 12-watt transponders will operate in Fixed Satellite Service (F.S.S.). F.S.S. is designed principally for the distribution of radio and television programs (i.e. point to multi-point distribution) and the transfer of trunk telephony and data signals (i.e. point to point distibution).

The major distinction between Broadcasting and Fixed services is that the broadcasting mode (H.A.C.B.S.S.) is designed for reception by the general public, while F.S.S. is designed for private reception by identified parties or locations.

The uplink mode for each satellite will have two complete national beams each capable of receiving signals from anywhere in Australia. The downlink modes for each satellite will have the ground contours shown in Fig. 2.

Homestead and Community Broadcasting Satellite Service. The satellites will play a major role in the extention of ABC regional radio and television services to 30 000 people living in remote and under-serviced areas of Australia. This service known as HACBSS will provide television and a number of sound

broadcasting channels in each of the four zones shown in Fig. 2. The system architecture allows for duplication of HACBSS to distribute alternative programming using the second satellite if reguired. (As yet no policy has been determined on this mode yet by AUSSAT.)

Depending on the geographical location of the receiver and the earth station design, antenna dish diameters for satisfactory reception of HACBSS in most areas of Australia will lie in the range of 1.2 to 1.8 metres. (Larger diameters may be necessary near the edge of primary coverage or in areas of high rainfall. Such dishes may need to be from 1.8 to 2.4 metres.)

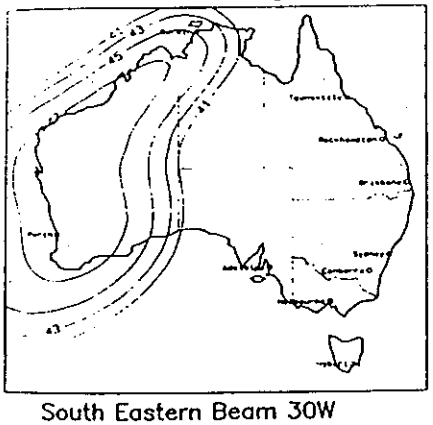
The Department of Communications is currently undertaking an extreme field and laboratory test program involving prototype HACBSS earth station equipment. At the time of the tests about 130 units had been installed at three test sites representative of extreme climatic and environmental conditions in outback Australia. The information obtained from these field trials will be used to formulate HACBSS system standards, earth station specifications and the preparation of performance guidlines for such equipment to be purchased subsequently by the general public.

Since initial planning was carried out, developments in this area offering the possibility of high quality, low cost reception of multiple sound channels and other narrow-band services (such as data, high speed teletext and electronic mail) have been produced. These developments could be incorporated on the present satellites' television channels along with the television signal.

by Paul Suters (VK2KPS)

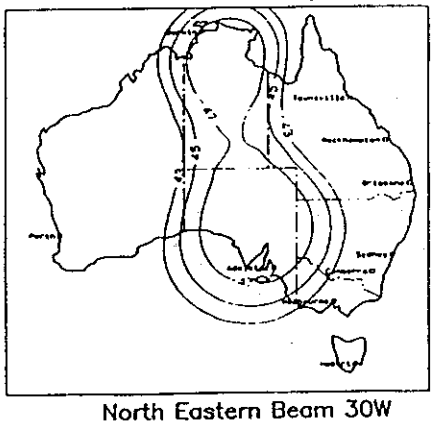
Western Australian Beam 30W

EIRP from 160E Longitude



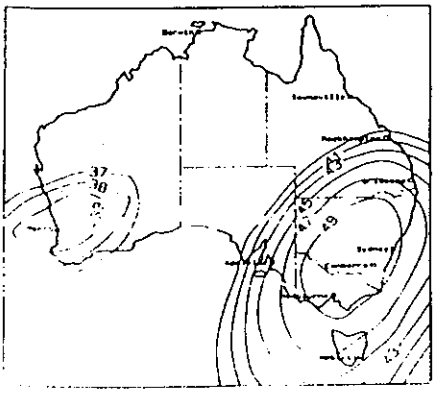
Central Australian Beam 30W

EIRP from 160E Longitude



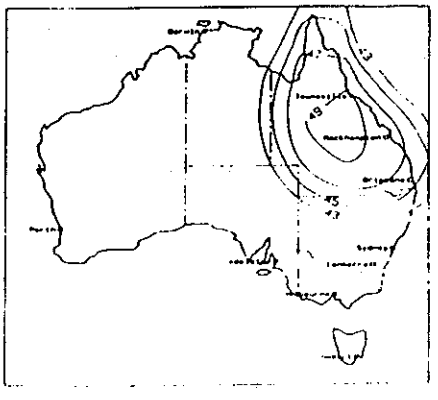
South Eastern Beam 30W

EIRP from 160E Longitude



North Eastern Beam 30W

EIRP from 160E Longitude



Helical antennas for 435MHz

An easy-to-construct design offering true circular polarization

by James Miller
B.Sc.
G3RUH

This antenna design was produced for satellite working with Oscar-10, but it has also proved excellent for ordinary local and long-distance operation. It has eliminated at a stroke the frustration of accurately matching and phasing crossed Yagis to true circular polarization and obtaining an acceptable s.w.r. throughout the band.

Compared with other antennas it has a very wide bandwidth - a low Q - which makes it forgiving of dimensional inaccuracies. It is therefore easy to construct successfully.

This article describes 9 and 16-turn helices for the 430-440MHz amateur band. The nine-turn version simply has fewer turns and spacers, but it is short enough to permit end-mounting. Gain figures of the two versions are 12.8 and 15.2dB respectively. You can use more turns, but the mechanical penalties increase rapidly at this wavelength, whilst the extra gain per turn is marginal.

For many years Kraus[1] has been a central figure in promoting helix antennas, and a little detective work reveals dimensions identical to his figures in almost every design guide (for example the R.S.G.B. VHF/UHF Manual, ITT Reference Data for Radio Engineers etc.).

More recently, King and Wong in their brief summary paper[2] presented performance characteristics based on a large number of gain and pattern measurements of helices of 5 to 35 turns, with various pitch angles and other parameters. The paper augments and expands Kraus's theories.

The design of this antenna is based on that work. A pitch angle of 12.8° with a circumference of about 1.08 wavelengths are used. From King and Wong's curves this yields a maximum gain (allowing for mechanical tolerances) at 435MHz, for aerials of reasonable size (Fig. 1). These gains are typically 3dB lower than Kraus gives, but seem to be representative of actual practice.

Materials

In choosing materials I was guided by the need to make an antenna that could survive several years' weathering with only minor attention; and that for the most part used common material and needed simple workshop practice. I did not consider timber stable enough - but you could try it.

The reflector and boom are aluminium and the helix copper. The feed-strap is brass and the screws are zinc-plated. The spacers are of black Delrin. A waterproof N-type connector is used for the r.f. connection. For protection, the completed antenna should be varnished.

To ensure success, it is important to do things in the right order: for example, the length to which the spacers must be cut depends on the final diameter of the helix. Handling the helix itself calls for a boom through its middle and so it is easier to do drilling first. So:

- obtain all materials — see table 3;
- build up the reflector assembly;
- drill the boom;
- wind the helix and stretch along the boom;
- make and fit spacers;
- fix the copper spiral to spacers;
- fix reflector to boom;
- install feed strap;
- adjust s.w.r.

Reflector

The reflector is a nominally 600mm square piece of expanded aluminium fret, obtainable as *Expamet* 351A, which is widely used as a grille material. The size is not critical and 500mm square could be used if windage is a problem. Take especial care to cut the Expamet sheet without leaving jagged edges.

The mesh must be stiffened, or it will bend easily in a light breeze and may quickly break. In one prototype the support/stiffening was fabricated from a 100 x 100mm 16 s.w.g. (1.6mm) centre plate and some 10 x 10mm 18 s.w.g. (1.2mm) aluminium angle, and was quite satisfactorily strong and lightweight.

For the final version model I tried a simpler design, bent up entirely from 18 s.w.g. sheet metal (Fig. 2,3). The stiffening is bolted through the mesh with M3 × 10 screws and stiffnuts, using 16mm diameter washers on the front face, cut from waste metal. To keep the reflector all-aluminium, 3mm ($\frac{1}{8}$") pop rivets could be used instead of screws.

Once the stiffening is fixed, mesh can be snipped away to allow the boom and N-type connector through. The connector is a single-hole-fixing type and can be fitted either way round depending on whether the feed is to be from the rear or along the boom from the front.

Aluminium tube 19mm square and of 16 s.w.g. wall is obtainable from most ironmongers or non-

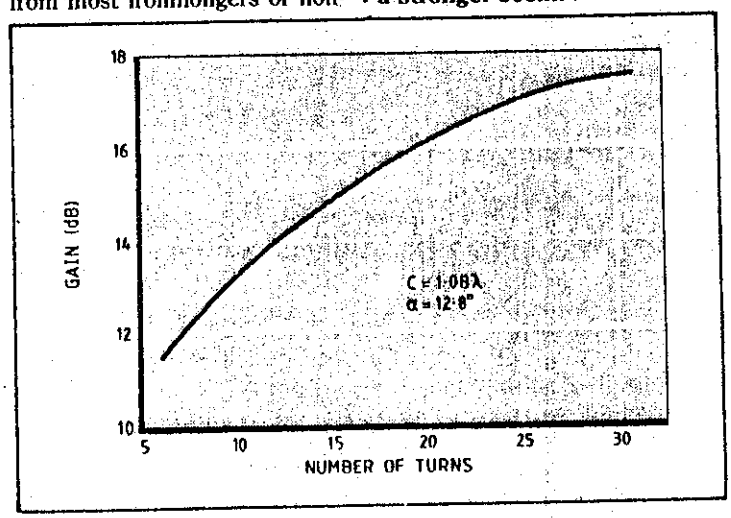


Fig.1. Gain versus number of turns for helical antennas having a pitch angle of 12.8° and circumference of 1.08λ (based on curves in reference 2). The 9 and 16-turn designs described here have gains of 12.8dB and 15.2dB respectively. At 435MHz, longer antennas would need a stronger boom.

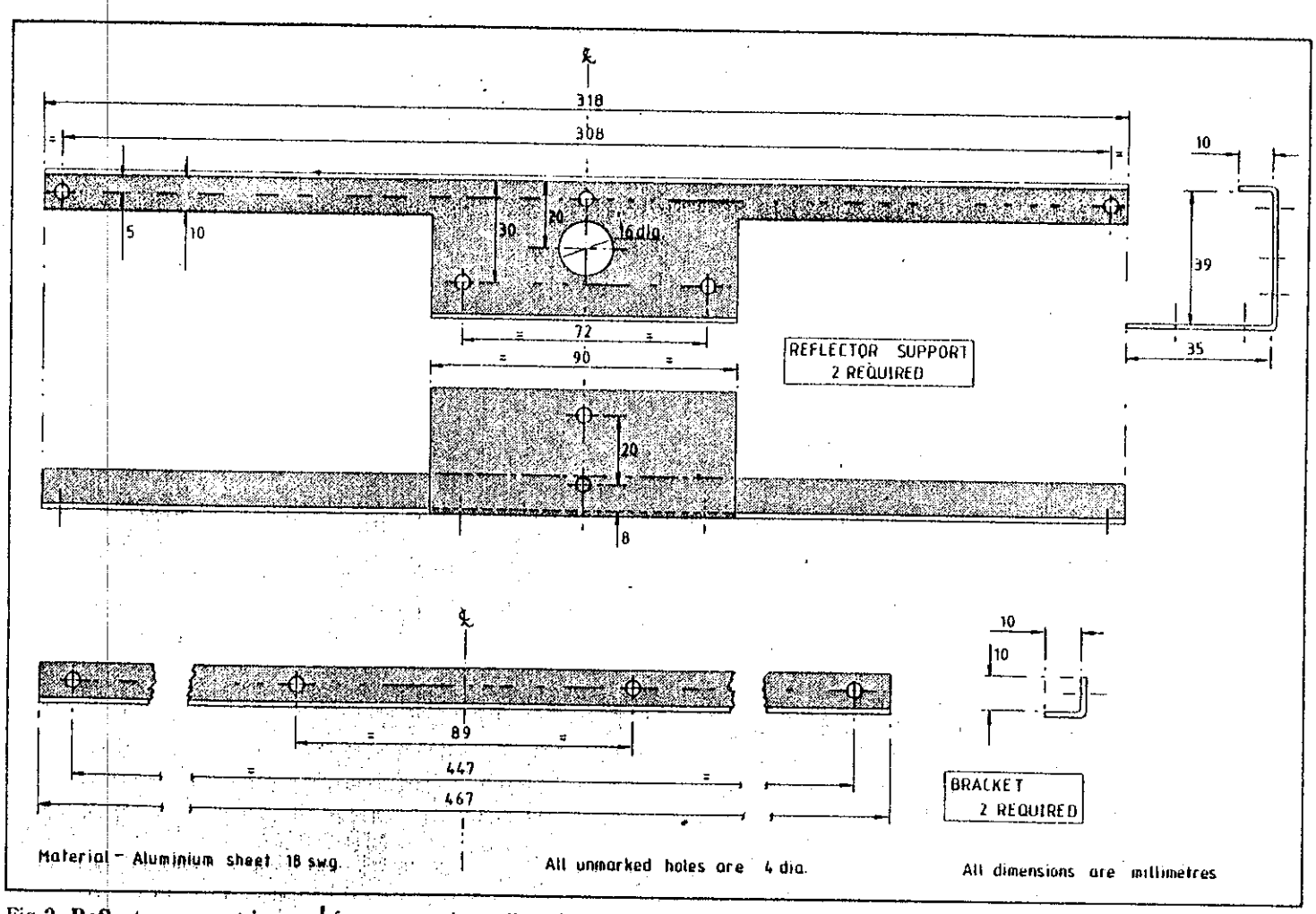


Fig.2. Reflector support is fabricated from 18 s.w.g. aluminium sheet; two of each part are needed. Assemble as shown in Fig.3. The parts are fixed through the reflector mesh with twelve 10mm M3 screws and stiff-nuts, backed with 16mm diameter washers cut from waste aluminium.

Particular thanks to Francis Pullen G4XXX for machining services during the development of this antenna, and to Cambridge Consultants Limited for the free use of facilities.

ferrous metal suppliers. You will need two or three metres, which will allow you a little surplus at each end to clamp the boom for support during construction.

Drill holes of 4.3mm diameter for the spacers and to secure the relector (see Fig.4). Spacers are used every 1.75 turns: the holes must therefore be alternately vertical and horizontal on a 3.5 turn (595mm) pitch. The first spacer is a quarter-turn into the helix; the last supports the end of the final turn.

First drill the spacer holes. Position the reflector mounting holes so as to locate the front face of the reflector 53mm from the first spacer hole. This will ensure an adjustment gap of about 5mm between the reflector and the start of the helix.

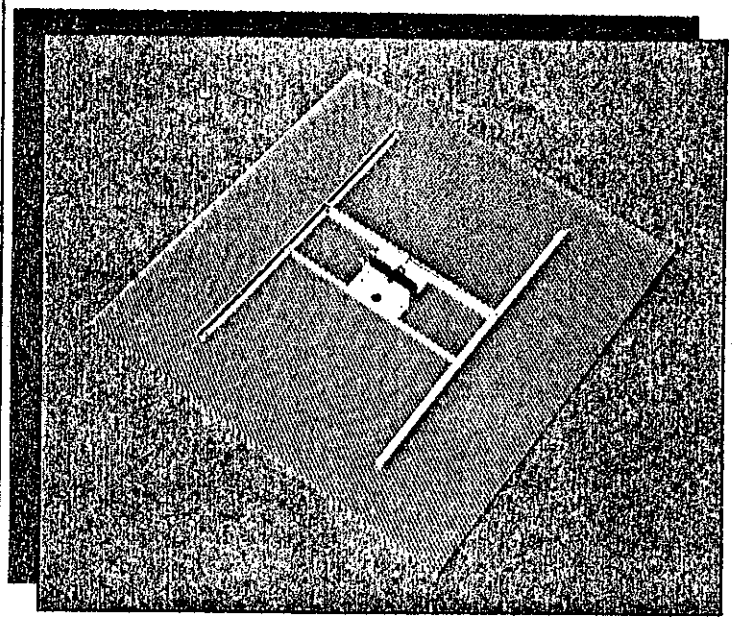


Fig.3. Rear view of the reflector showing assembly of support parts. Rear feed may be obtained by reversing the N-type connector and omitting the feedthrough insulator. Anti-static protection (not shown) can be effected with a small inductor from connector pip to a solder tag on the boom.

Helix

The helix is made from 10mm diameter copper central-heating pipe, which is readily available, easy to bend by hand and quite cheap. It usually comes in 10 or 20m coils. Each turn takes 0.7m, so you can get up to 13 turns out of a 10m length; 20m will make two antennas, one of nine turns and one of 16. If you can obtain odd lengths from a plumber then the pieces can be soldered together. Do not uncoil the raw tubing before winding.

You will need a mandrel around which to wind the helix. It should have a diameter of 229mm and, for comfort, a length of at least 180mm. A search around your attic, scrapyard or the shops may well produce a suitable object. I found a nine-inch cake tin exactly the right diameter though a little short, and I was able to wind the first prototype, somewhat unevenly, using two pairs of hands and a lot of patience. For subsequent models this experience prompted me to make up a proper drum of the correct size out of two plywood discs and some slats.

UHF FREQUENCIES

For those of you who own the Dick Smith Explorer UHF transcievers, or who have difficulty equating the quoted channel number with frequency, here is a list of channels and their frequencies.

From Morry VK2EMV.

CHANNEL-FREQUENCIES

Switch-position	Frequency	Switch-position	Frequency
1	438.025.	21	438.525.
2	438.050.	22	438.550.
3	438.075.	23	438.575.
4	438.100.	24	438.600.
5	438.125.	25	438.625.
6	438.150.	26	438.650.
7	438.175.	27	438.675.
8	438.200.	28	438.700.
9	438.225.	29	438.725.
10	438.250.	30	438.750.
11	438.275.	31	438.775.
12	438.300.	32	438.800.
13	438.325.	33	438.825.
14	438.350.	34	438.850.
15	438.375.	35	438.875.
16	438.400.	36	438.900.
17	438.425.	37	438.925.
18	438.450.	38	438.950.
19	438.475.	39	438.975.
20	438.500.	40	439.000.

THE ILLAWARRA AMATEUR RADIO SOCIETY

P.O.BOX. 1838. WOLLONGONG.2500. N.S.W.

MEETINGS: Second Tuesday of every 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.
VK2RUW-438.225-(VOICE)	UHF	Hill 60, Port Kembla.
VK2RIL-147.275-(RTTY/V)	VHF	Sublime Point
VK2RIL-438.725-(RTTY/V)	UHF	Sublime Point

BROADCASTS: 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 7.30.pm. each Sunday:

CLUB NETS: 3.562.Mhz. SSB on Sunday at 8.00.pm. and a slow morse net on 28.440.Mhz. on Tuesday 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 by 3rd Tuesday each month.

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

AWARDS: The award of the Illawarra Amateur Radio Society 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., P.O.Box. 1838. Wollongong. 2500. No QSL cards requird.

STORE: The club store operates at each club meeting.

COMMITTEE:
President-KEITH CURLE,VK2OB, 24 Beach Drv, Woonona.
Vice President-BILL CHADBURN,VK2DYU, 45 Beltana Ave,Dapto
Secretary-JIM HAYES,VK2EJH, 1 Cathleen Cres, Woonona.
Treasurer-ANDREW McEWAN,VK2XGC, 7 Nioka Ave, Keiraville.
Auditor-GEOFF CUTHBERT,VK2ZHU, 1 Nioka Ave, Keiraville.

GENERAL-COMMITTEE: Ian Callcott,VK2EXN, Wojciech Tomczyk,VK2OE, Martin Hutchings,VK2BMH, Gerhard Mueller,VK2XGA, Dave Routledge,VK2DWR, Paul Suters . VK2KPS.

REPEATER-CHAIRMAN: Graeme Dowse VK2CAG.

REPEATER-COMMITTEE: Bill Jut, VK2KWJ. Rob McKnight, VK2MT. Morry.v.d.Vorstenbosch,VK2EMV. Peter Woods,VK2JAM. Ian Callcott, VK2EXN Mike Keech, VK2DFK. Dave Colless, VK2EZY.

QSL-CARD'S-IN : VK2DWR DAVE ROUTLEDGE

QSL-CARD'S-OUT: VK2EXN IAN CALLCOTT

E.M.E. CO-ORDINATOR: Lyle Patison, VK2ALU.

STORE: Ray Ball , VK2PHD/XCC.

PUBLICITY-OFFICER: Dave Myers, VK2DFL .

BROADCAST-OFFICER: Paul Suters . VK2KPS.

PROPAGATOR-EDITORS: Paul Suters VK2KPS, Jim Hayes VK2EJH, Gerhard Mueller VK2XGA.

LIVE-MEMBERS: Graeme Dowse VK2CAG, Keith Curle VK2OB, Lyle Patison VK2ALU.

SUNDAY-EVENING-CLUB-NET-ROSTER:

FIRST SUNDAY OF THE MONTH : VK2DFK-MIKE KEECH.
2 nd SUNDAY OF THE MONTH : VK2PHD-RAY BALL.
3 rd SUNDAY OF THE MONTH : VK2EMV-M.v.d.VORSTENBOSCH.
4 th SUNDAY OF THE MONTH : VK2DWR-DAVE ROUTLEDGE.
5 th SUNDAY OF THE MONTH : VK2EBI-KEVIN MURPHY.
AND ON STANDBY IS : VK2KAJ-TONY