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 91, NUMBER 3 MARCH 1991

EDITORIAL COMMENT

Once again we find ourselves keenly attacking our keyboards to bring you this much awaited document. The trickiest part is to make it look up to date even though we write it only a week and a half after the meeting.

Many thanks last month to Steve VK2XNH and the others who helped us put together a good meeting night at fairly short notice...even the all knowing people at the Propagator didn't know what was going on until we got there.

Inside for this month, we have a report on the Illawarra Amateur Radio Society assault on the 1991 Gosford Field Day. It was a big one, with several members enjoying a good day of wallet lightening. More details inside...

With a bit of luck, we should get some decent goodies in this month's newsletter, to save having to pad it out with useless drivel. Read on...

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PROGRAMME

MARCH: March's meeting will star a guest speaker from the WIA. Non-WIA members are more than welcome to come and be converted to see the light.

APRIL: Yet another Auction night. All those money junkies out there can come and engage in an evening of wallet lightening.

MAY: My cue card here says that May's talk will be about ATV. This should be an interesting night, although somewhat scary. Talking to Peter VK2KHE could take on a whole new meaning.

JUNE: June will be a home-brew night. This means that you could actually come along and find out how to use all the rubbish that you scored at the April auction.

JULY: Annual general meeting. Time to get yourself involved in the running of the Club for once, instead of just sitting around whinging.

COMMITTEE MEETING MINUTES

The Committee meeting held at S.E.S. Headquarters on 19/2/91

After attending the Gosford field day meeting of the W.I.A., Brian VK2KLH had returned with some literature pertaining to the input of the clubs to the WIA. More information follows in the PROPOGATOR but basically WHAT the WIA wants is information from the clubs as to what they want from the WIA. Each club has several other clubs in it's region. There are 8 regions. One representitive from each region will put forward the various regions ideas etc... The first meeting is to be around June or July.

A crane has been arranged to lift the Tower into place once the centre pipe can be purchased and fitted. When the tower has been erected Keith (VK2DB) will build the monoband antennea to be placed on top of it.

Rosie will be put up at Mt Murry on test this Sunday 24-2-91 on frequency 440.050 MHz weather permitting.

The 6 metre repeater was discussed and it was decided to pursue the matter further.

The March meeting will be a talk from the WIA about what it does and where you as the Amatuer fit in and what they can do for you.

THERE BEING NO FURTHER BUSINESS, THE MEETING WAS CLOSED AT 21:07.

THE APRIL AUCTION

THIS COMING APRIL THERE WILL BE A MINI AUCTION HELD.AT THIS AUCTION THERE WILL BE SOME REALLY GOOD STUFF AVAILABLE. SOME OF THE SECOND HAND EQUIPMENT HAS SOME FANTASTIC APPLICATIONS FOR AMATEURS.IF YOU HAVE ANYTHING THAT YOU WANT TO TURN INTO CASH OR DONATE THE PROCEEDS TO THE CLUB,MAKE SURE YOU GET THE GEAR TO THE MEETING WELL BEFORE IT STARTS.

THE IARS AGM

NO ITS NOT TOO EARLY TO BE THINKING ABOUT THE AGM.REMEMBER THE LAST AGM WHERE PEOPLE WERE EXTREMELY BACKWARD IN COMING FORWARD TO ACCEPT A POSITION IN THE CLUB. NONE OF THE ELECTED OFFICERS WILL BE STANDING FOR RE-ELECTION SO WE WANT TO SEE SOME FRESH FACES.

SPEAKING FROM PERSONAL EXPERIENCE, I WAS A BIT DUBIOUS ABOUT TAKING ON A POSITION, BUT AFTER DOING IT NOW FOR NEARLY SEVEN MONTHS, IT HAS BEEN A TRUCK LOAD OF FUN, AND WOULD RECOMMEND A POSITION TO ANY MEMBER OF THE CLUB.

UP AND COMERS

THIS YEARS TECH CLASS HAS BEEN ONE OF THE BEST ENROLMENTS IN YEARS. THERE IS NOT A SEAT IN THE HOUSE. (SOME ONE TOOK THEM ALL)
SO WE MAY BE IN FOR A BUMPER CROP OF BRAND NEW AMATEURS THIS TIME NEXT YEAR.GOOD LUCK TO ALL. ED.

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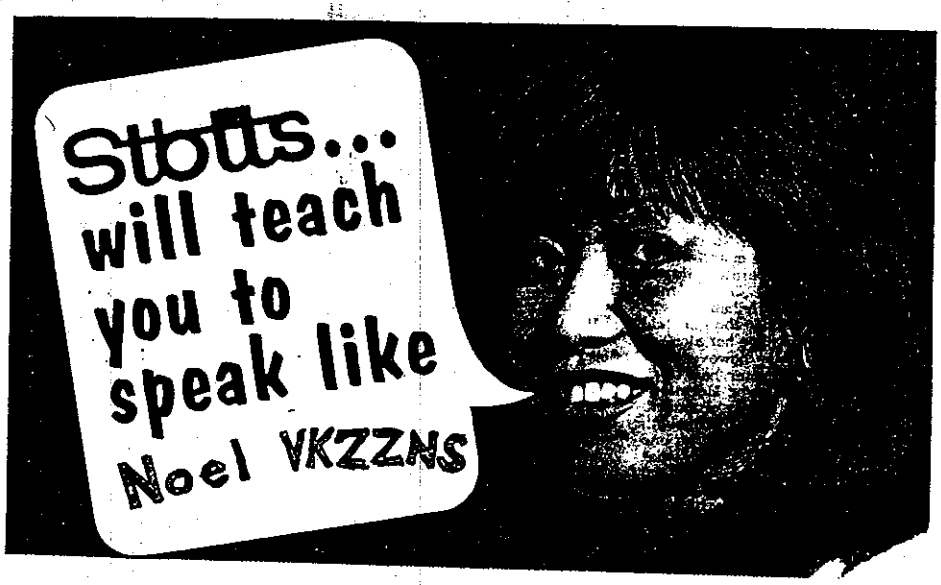

NEW SPEED TALKING COURSE

YOU TO CAN SPEAK AT HIGH VELOCITY

LIKE AN EXPERT

BUSINESS & MANAGEMENT
Bookkeeping
Accountancy
Business Management
Industrial Management
Small Business Management
Organisation & Administration
Electronic Data Processing
Computer Programming
Home Computers/BASIC
Understanding Personal Computers
Cost Accounting & Control
Financial Management
Marketing Cert. of Australia
Diploma of Marketing
Certificate of Sales Management
Salesmanship
Sales Management
Retailing
Market Research
Public Relations
Advertising
Copy Writing
Export Management
Display/Window Dressing
Personnel Administration
Employment Officers
Train the Trainer
Supervision & Human Relations
Safety Officers
Industrial Relations
Industrial Psychology
Office Supervision/Management
Production Management
Purchasing & Supply
Institute of Purchasing & Supply Management
Transportation Basics
Economics
Law (Commercial, Company, Taxation)
Report Writing
Effective Communication

HOSPITALITY & TOURISM
Hotel-Motel Management
Travel Consultant
Food & Beverage Service
Gourmet Cooking
Catering

SECRETARIAL & CLERICAL
Shorthand-Pitman's & Pomeroy/pt
Typewriting
Bookkeeping
Private Secretaries
General Office Practice
Typist-Bookkeeper
Typist-Clerk
Typist-Receptionist
Receptionist Duties

HORTICULTURE
Landscape Design
Home Gardening
Plant Propagation

AGRICULTURE
Rural Bookkeeping
Beef Cattle Production
Soil Management, Crops & Pastures
Dairy Farming
Pig Production
Sheep Husbandry
Goat Husbandry
Farm Mngt Economics
Farm Management
Station Management
Farm Mechanics
Hobby Farming

MUSIC
Guitar
Musical Appreciation
Piano
Piano Tuning & Repair

RECREATION
Horse & Pony Care
Genealogy (Family Trees)
Astrology
Wine Appreciation
Coin & Medal Collecting
Chess
Graphology
Handwriting Analysis
Coaching your Sport

PERSONAL DEVELOPMENT
Parenting Skills
Stress Management
Beauty Care & Personality
Correction of Stammering
Coping with Agoraphobia
Fitness & Nutrition
Basic Yoga
First Aid

DESIGN
Interior Decorating
Fashion Design

ART
Calligraphy 1 & 2
Commercial Art
Photography
Fashion Drawing
Cartooning
Drawing & Sketching
Oil Painting
Water Colour
Creative Art
History of Art
Lettering
Showcard/Ticket Writing
Signwriting

CRAFT
Dressmaking
Dressmaking & Pattern Drafting
Crochet
Modern Embroidery
Macrame
Patchwork & Quilimaking
Soft Toy Making
Machine Knitting
Upholstery
Cake Decorating & Chocolate Making
Ceramics
Doll Making & Repair
Antique Dating & Restoration
Sewing Stretchknit Fabrics

LITERARY
Short Story Writing
Novel Writing
Freelance Journalism
Writing for Children
TV/Radio Script Writing
Non-Fiction Book Writing
Poetry Writing

GENERAL EDUCATION
Handwriting - General Education Cert.
English (all levels)
Arithmetic
Maths (all levels)
History:Asia, Europe, Aust
Australian Politics
Consumer Education
Geography
General Science
Biology, Physics
Chemistry; Geology
Clear Thinking & Logic
Spelling
Basic Education for Adults

ELECTRONICS
Intro to Electronics
Digital Electronics for Technicians/Servicemen
Microcomputers (Z80)
Industrial Electronics
Radio Receivers
Radio/TV Servicing
Colour Television
VCR Servicing
Amateur & Novice Radio Operator's Certificates

BUILDING
Building Construction
Builders' Drawing
Estimating & Tendering
Bricklaying
Builders' Bookkeeping
Carpentry & Joinery
Painting & Decorating

ENGINEERING
Diesel Engineering
Automobile Engineering
Automotive Electrics
Automotive Maths
Motorcycle Mechanics
Introduction to Welding
Mechanical Engineering
Production Engineering
Engineering Drawing
Survey Plan Drawing
Surveying/Field Assistants
Levelling
Road & Municipal Construction
Soil Testing

HARDTRADE
Car Maintenance
Home Maintenance
Home & Industrial Security
Motor Mower Repair
Locksmithing

SEAMANSHIP
Calculator Celestial Navigation
Coastal Navigation
General Safety & Seamanship
(Small Craft Operators)
Marine Radio Certificate

LANGUAGES
Italian, French, German, Spanish, Japanese, Latin
& 50 others

SCHOOL CERTIFICATE & PUBLIC EXAMINATIONS
Leaving Certificate (Vic)
Higher School Certificate (NSW)
Junior & Senior (QLD)
Police Entrance

1991 COURSES
- Tourism •Pet Care
- Advanced Japanese
- Waiter/Bar Attendant
- Computer Language/C •Human Biology and Society
- 50 Languages
- Leadighimg-Weaving

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ZAPHOD's HINT No VK2TKE

During the same broadcast, Graham VK2GID called back on the callbacks (funny thing to do) from Simon VK2XQX's station. In such a situation, the correct protocol is to identify as VK2XQX/VK2GID (and you pronounce the "/" as "oblique").

Ken VK2TKE was running the broadcast for Peter VK2KHE, and got completely confused by this. Perhaps Ken should review his procedural manual. Tch tch.

Also Ken, the correct phonetic for the letter "G" is not George but Golf. Subaudible hums are normally the responsibility of CTCSS systems. Perhaps Ken needs to look at some theory as well.

CONGRATULATIONS

CONGRATULATIONS ARE IN ORDER TO THE FOLLOWING PEOPLE FOR PASSING THE VARIOUS EXAMS THEY SAT FOR AT THE OLD BASTARD SCHOOL OF AMATEUR HOPEFULLS(O.B.S.A.H.) SORRY KEITH

ROBERT	BONELLA	LIMITED
PHILLIP	KLOWER	LIMITED
MICHAEL	ECKARDT	LIMITED
STIVEN	BORDIN	LIMITED
WARREN	GIBSON	REGULATIONS
MICHAEL	ECKARDT	NOVICE MORSE

WELL DONE EVERYONE AND WE HOPE TO HEAR YOU ON AIR SOON. WELCOME TO THE WORLD OF AMATUER RADIO.

Having trouble with pager interference on 2m? Dale VK2DSH sent us the following article:

So was I until I built the following filter and fitted it into the aerial input of my receiver:

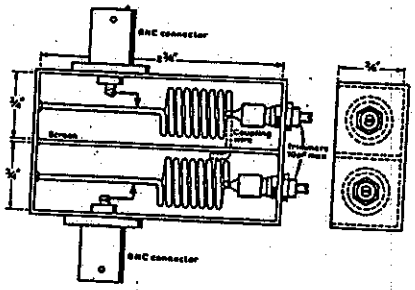

Fig 6.20. A small bandpass filter for 144MHz

The above filter was taken from the RSGB VHF-UHF manual, 3rd edition, page 6-8. For further information on filters, I recommend all of chapter 6 in the above manual.

My filter was slightly different to the device shown above. I used 25pF piston trimmers from disposals equipment, however almost any type of capacitor could be used. Instead of coupling the two coils as shown, I used a 1.5pF disk ceramic capacitor.

The coils are of 9 turns each, 16 gauge wire, close wound. The shank of a 1/4 inch drill makes a suitable former. The position of the input and output taps on the coils does not seem to be all that critical, I placed my taps at the base of the coils.

So that construction could be simplified, I suggest scrap double sided circuit board for the filter box, as it can be cut with tin snips and soldered very easily.

My filter shows a bandwidth of about 1 MHz and an insertion loss of about 2dB. The filter was tested and no spurious responses were noted between 10 and 400 MHz.

Good filtering...Dale VK2DSH.

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ZAPHOD's HINT No VK2MT

On the broadcast today, Rob VK2MT was discussing the break through that exists on VK2RIL. During this lengthy transmission, Rob was the only one to suffer any pager interference. A typical comment from our smart repeater.

Rob will soon be working on a system so that during WIA broadcasts, the VK2RAW ident will appear in the gaps provided for the purpose.

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REPEATER REPORT

It's Sunday morning, 24th February and this report is due around at Simon's soon. I was hoping to get a report from the Packet fellas (no, not you Ray VK2XCC) regarding the installation of the Rosie link on UHF at Mount Murray. This will hook our digipeater to the packet backbone and speed up access into and out of the area. A small UHF omnidirectional antenna and some feedline had to be installed on the tower, then the UHF transceiver and interfacing hooked up inside the cubicle.

Changing the subject somewhat, yesterday arvo I thought I'd check how VK2RAH 10 metre repeater was going. It is still transmitting on the five foot helical on the cubicle roof, util it gets its spot on the tower back from VK2RUW. I hooked up my little converted GE CB that puts out about 2.5W and kerchunked the repeater.

The repeater came back around S9. That didn't make sense - ours only comes back at S2 or 3 from here with the helical. I did it again and again. It was still S9's, but wavering a bit. I put a call out on the frequency. You guessed it, it wasn't our repeater.

Almost immediately I got a return call from N1GWY in Boston Massachussetts. He was on a link frequency on 6 metres tied to this repeater W1OY. We chatted for about five minutes finding out info on this repeater. It has links from 29.620MHz onto 50, 144, 220 and 440MHz. It has a digital voice mailbox, etc etc. Not bad.

The conditions dropped a bit so I went across to my "big" rig (100 watts) and continued for a while longer. I was drooling over the microphone by the time he finished telling me about some of the repeater systems they have over there. This contact was all done on my very old "Station Master" antenna about thirty feet up. Who said ten metres is dying?

are you interested in MW DX listening? Well, this isn't really DX, but on 1035kHz there are no station allocations in Australia. In fact there are a few unoccupied frequencies across the MW band. (such as, 585, 909, 1125, 1305, 1359, 1440, 1539, 1611). Does anybody know why these gaps exist?

On these empty frequencies you may be surprised what you might hear. I've heard Asian, Hawaiian and sometimes Stateside stations. In Australia our MW stations are spaced at 9kHz, but in many other countries the spacing is 10kHz, so when the gap and frequency match up, have a listen. I know a lot of you probably know this, but some jmay find it interesting. (Next month... Rob writes the whole magazine... Ed).

On with the report. A visit to Knight's Hill is planned for the end of this week. Hopefully, we will have got VK2RUW's antenna up to the 200 foot level and increased the power level to around 20 watts. This will allow us to put VK2RAH's antenna back up.

Steve VK2XNH has spent many hours building an amplifier for VK2RUW. To avoid any desense problems from happening he has put input and output helical filters in the circuit. Those who were at the last meeting would have seen the three improving levels of amps he had built, even with matching power supply. Thanks Steve.

Returning from a recent trip down the coast, I was rather surprised when I was able to access VK2RUW from just north of Bateman's Bay. That was 20 watts into a small colinear on the front mudguard (for Pete's sake, Rob, fender is a Yankee word...Ed). VK2RAW access didn't occur till just south of Ulladulla.

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POWER GAIN FROM TX AERIALS

F.C.JUDD G2BCX

The so-called gain of a transmitting aerial is dependent on the directivity alone, that is, by causing the power supplied to the aerial to be radiated in one or more specific directions. Even the simple dipole is a directional aerial. No aerial produces gain in the sense that it amplifies the power supplied to it, but assuming a perfect aerial with no losses, all the power supplied will be radiated. Also, no aerial exists that will radiate the power supplied in all directions around it (not to be confused with the omni-directional properties of a vertical dipole or similar aerial). By all directions is meant at every angle from a central point within a spherical area.

The Isotropic Source

It is convenient to assume that such an aerial does exist and which is known as an "isotropic radiator" better visualised perhaps as a point source of radiation at the centre of a sphere with an area $4\pi r^2$ as shown in Fig. 1.[1] It could be imagined as a small marble at the exact centre of an inflated and perfectly spherical balloon. If the radiated power from such a point source is "P" then, for a given distance "r", the unit power "P" arriving at any single point "p" on the surface area of the sphere will be

$$\frac{P}{4\pi r^2}$$

Because the radiation from an isotropic aerial would be uniform in all directions its gain would be absolute unity. This allows it to be used as a reference against which to compare the directivity and therefore the power gain of aerials having directive properties. As will be shown later, accuracy in this respect has proved to be equal to and even better than that obtained by direct measurement using a real reference aerial, such as a dipole.

If the isotropic aerial could be replaced by a real directional aerial, then the power from this reaching the surface of the sphere as in Fig. 2 would be concentrated through an area formed by a cross-section of the whole radiation field. The position of this cross-section is taken as being between the angles intersecting points where the power amplitude is 3dB down from maximum, i.e., at 0·707 of maximum radiation intensity.

If this cross-section were circular, with a diameter of say 40 degrees, then its area would be

$$\frac{\pi}{4}d^2 = \frac{\pi}{4}40^2 = 1256{\cdot}63$$

square degrees. The ratio of this area to that of the sphere in square degrees is a direct ratio of directivity and also the power gain of the directional aerial with reference to the isotropic source.[2] Taking the area of the sphere as $4\pi 57{\cdot}295^2$ or ≈ 41253 square degrees, the power gain of the directional aerial would be

$$\frac{41253}{1256{\cdot}63} = 32{\cdot}82$$

The power gain in decibels would therefore be 10Log_{10} 32·82 or 15·16dB, or more correctly, 15·16dBi ("i" indicating the gain over an isotropic source).

Application to Real Aerials

This method of assessing power gain can be applied with reasonable accuracy to all aerials having a main single lobe providing the maximum amplitude of side or rear minor lobes is more than 15dB down with respect to maximum amplitude in the main lobe. What we need to know otherwise is the area of the cross-section of the main lobe at half power which is −3dB or 0·707 of maximum radiation intensity, i.e., the intensity at the most forward tip of the main lobe.

Polar Co-ordinates

Radiation patterns are usually plotted in polar co-ordinates and the usual reference for maximum intensity is either 1 or 10. These figures are of little consequence providing the scale along the axis of the lobe plot is linear. It is only necessary to ascertain the 0·707 point of the

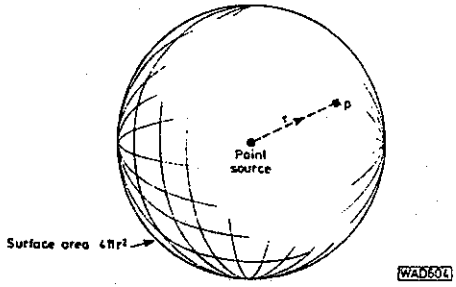

Fig. 1: Configuration of an isotropic radiator as a point source

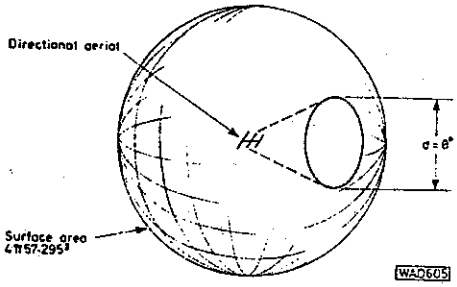

Fig. 2: Area of directed radiation in relationship to that otherwise produced by an isotropic source

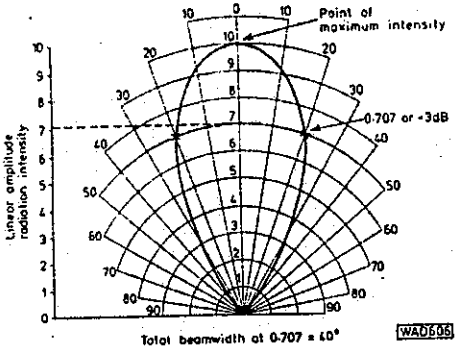

Fig. 3: How the beam width of radiation at −3dB is established with reference to absolute intensity

maximum and the angles where the lobe plot crosses this point as in Fig. 3.

The beamwidth at the −3dB points of commonly used aerials is, however, rarely the same for both horizontal and vertical polarisation, often being wider in one particular mode. Hence the reason for establishing the total beam area at −3dB which in some cases will, therefore, be elliptical. Typical polar patterns for vertical (V) and horizontal (H) modes are shown together in Fig. 4(a). In horizontal mode the beamwidth at the −3dB points is 34 degrees and in the vertical mode 40 degrees, thus producing the elliptical area as in Fig. 4(b). Taking the area of a sphere as before, we have

$$\frac{41253}{0{\cdot}78534 \times 34 \times 40} = 38{\cdot}624$$

this being the power gain. Converting to dB this becomes 10Log_{10} 38·624 = 15·86dBi (gain over an isotropic source).

It is more usual to refer to "gain over a dipole" (dBd), and since the power gain of a dipole over an isotropic source is 1·64, which is 2·14dBi, it is only necessary to subtract this from the gain of an aerial reference to an isotropic source. In the example above the gain over a dipole would be 15·86 − 2·14 which is 13·72dBd.

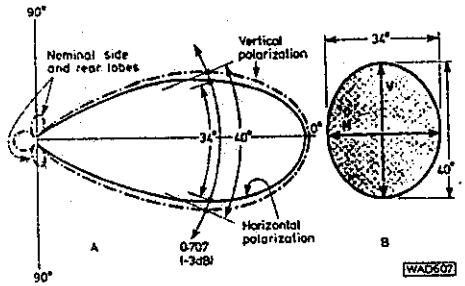

Fig. 4: How the total area of the beam at −3dB is established

However, it is possible to allow for this when using the "area of a sphere/area of lobe at −3dB" method and get the power gain over a dipole directly. The fact that the lobe cross-section might be elliptical or circular must first be taken into account. With the area of a sphere taken as 41253 square degrees, divide this by

$$\frac{\pi}{4}(\approx 0{\cdot}78534) \text{ which is } \approx 52525$$

Elliptical or circular areas in square degrees can now be derived from the beam widths in degrees for both horizontal and vertical modes which are simply multiplied together.

Next, the power gain of a dipole over an isotropic source must be accounted for by dividing 52525 by 1·64 which is ≈32027. The formula for gain over a dipole in dB now becomes

$$10\text{Log}_{10}\left(\frac{32027}{\theta_H \times \theta_V}\right)$$

where θ_H and θ_V are the half-power beamwidths in degrees for the horizontal and vertical modes respectively.

The graph in Fig. 5 gives a range of gain factors from 5 to 25dBd for the −3dB main lobe areas from 100 to 10 000 square degrees. Note the addition of 10 to the dB figure when the square degrees are between 100 and 1000. Accuracy of the method depends mainly on the accuracy of verifying the 3dB beamwidths in degrees in the first instance, but will generally be to within better than 1%. Checks carried out with both scale models and normal full-size aerials have proved that the method is viable.

Power Gain and Effective Radiated Power

Effective radiated power, or e.r.p. is the product of power fed to the aerial times its power gain. For example, an aerial having a gain of, say, 14dB over a dipole, would have a power gain of 25·12. Therefore, assuming no losses, the e.r.p. from ten watts fed to such an aerial would be 25·12 × 10 = 251·2 watts.

Provided they are well constructed with good insulating materials, etc., and in clear surroundings; v.h.f. aerials have little loss so a near true e.r.p. can be expected. Mismatch between feeder and aerial, or transmitter, and also feed cable loss will of course reduce the power actually reaching the aerial. A real 3dB loss in feed cable for example, would be a loss of half the power to the aerial.

Aerials for the h.f. bands generally exhibit higher self-loss due to conductor resistance and ground reflection losses because efficient operation of such aerials relies to a great extent on the effectiveness of the ground conductivity. However, to get some idea of the e.r.p. of an aerial, the real power gain must be known. Aerial gain will be quoted either in dBd or dBi so power gain could be that over a dipole or an isotropic source. If the latter, then the power gain figure will be larger. In the example given, 14dB over a dipole, the gain over an isotropic source would be 14 + 2·14, the power gain of which is approximately 41.

With 10 watts the e.r.p. would therefore be 410 watts but only with reference to an isotropic source, of course. So first establish how the aerial gain is quoted because it is usual to rate e.r.p. with reference to a dipole. Table 1 shows power gain from dB gain over a dipole, and it must be remembered that 2·14dB should be subtracted from the figures for dBd if gain is given with reference to an isotropic source.

Gain is Known but What is the Beam Width?

If the gain of an aerial is known with respect to a dipole, or an isotropic source, the beamwidth at the −3dB points can be verified to within a few degrees. The figure will not be precise if the beam area is elliptical but will otherwise give a reasonable indication for both horizontal and vertical mode. First find the real power gain over a dipole from the gain in dB, subtracting 2·14 if the gain is given with reference to an isotropic source.

For example, the gain is 12·5dBd so the power gain will be 17·78 and divided into 32027 equals 1801 square degrees, which is the beam area. The square root of this will give the approximate beam width at the −3dB points for both horizontal and vertical mode which would be √1801 or near enough 42·5 degrees.

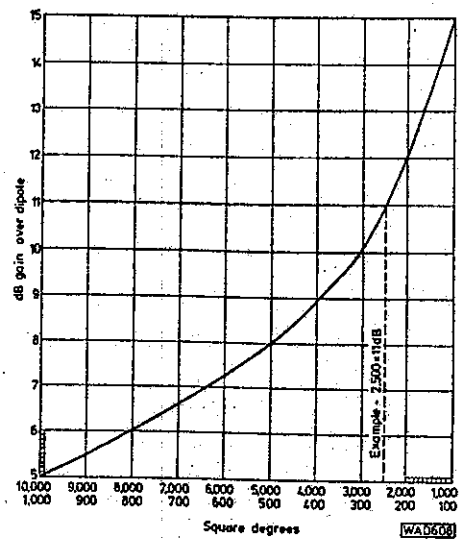

Fig. 5: Graph showing gain of aerial in dBd from a total beam area in square degrees. When lower degrees scale (100 to 1000) is used, add 10 to dB reading, e.g., 500 = 18dB

Table 1: Derivation of power gain from dB gain

dBd	Power Gain	dBd	Power Gain
3	1·995	10	10·00
4	2·512	11	12·59
5	3·162	12	15·58
6	3·981	13	19·95
7	5·012	14	25·12
8	6·310	15	31·62
9	7·943	16	39·81

Power Losses and Front to Back Ratio

Virtually all beam aerials have small rear and/or side lobes or both and generally speaking the higher the forward gain, the less will be the effective amount of radiation from such lobes. By effective is meant the amount in relationship to the full gain of the aerial and is normally expressed as a ratio in decibels. However, the term "front-to-back" implies the ratio of the main lobe level to that from a rear lobe and seemingly not to take any other minor or side lobes into consideration. The term "front-to-back" and the ratio expressed may not, therefore, give a true impression. Power radiated in any lobes other than the main lobe is power lost in the main lobe.

The amplitude of the main and side lobes is usually plotted on a "linear received units of voltage" scale which is used in most polar co-ordinate plots. To simplify things however, a typical Cartesian plot of the radiation from a beam aerial is shown in Fig. 6. Diagram (a) together with (b) is the equivalent in polar co-ordinates. The rear lobe amplitude is 1·3 relative to that of the main lobe maximum at 10. The ratio of these two levels expressed in decibels is

$$20\text{Log}_{10}\frac{V2}{V1}$$

where V1 is the level referred to, i.e. that of the main lobe. Therefore,

$$20\text{Log}_{10}\frac{1{\cdot}3}{10} = -17{\cdot}72\text{dB}$$

The side lobes in Fig. 6 would be

$$20\text{Log}_{10}\frac{0{\cdot}4}{10} = -28\text{dB}.$$

The minus sign indicates a level below that referred to (V1 = 10) and which would be termed 0dB.

Such ratios expressed in decibels, but from real power levels, would be exactly the same, but since power equals voltage squared, then the formula

$$10\text{Log}_{10}\left(\frac{V2}{V1}\right)^2$$

would give the same answer, e.g.

$$10\text{Log}_{10}\left(\frac{1{\cdot}3}{10}\right)^2$$

which gives −17·72dB.

The percentage of power lost in rear and other minor lobes is relatively small providing such lobes are below about −15dB. Nevertheless, a primary consideration in the design of any beam aerial is keeping minor lobes to the lowest possible level. With parasitic arrays, this entails critical spacing between elements and very careful adjustment of element lengths.

Gain and Effective Aperture

The effective aperture of an aerial may be larger or smaller than the physical area occupied by the aerial. Fairly high-Q parasitic and driven arrays commonly used by radio amateurs have an effective aperture which is considerably larger than the physical area they occupy, and is closely related to gain and/or directivity and frequency of operation.

Although it can be shown that the effective aperture is virtually the same for reception as it is for transmission, the reason is rather too complex to deal with here.[1] Nevertheless, effective aperture does have a direct relationship with the "reciprocity theorem" which indicates that the gain and directivity of an aerial are the same for transmitting or receiving.

Knowing the effective aperture of an aerial typical of those used for amateur radio, will add little or nothing to

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what may already be known about its performance. It is dealt with here mainly out of interest and for commonly used aerials can be determined in "square wavelengths" from the simple formula

$$\frac{1{\cdot}64}{4\pi} G_p$$

where G_p is the power gain over a half-wave dipole. The effective aperture of a dipole which has a gain of unity (1), is

$$\frac{1{\cdot}64 \times 1}{12{\cdot}566} = 0{\cdot}13$$

square wavelengths.

Because the effective aperture is due to scattered radiation and its recapture, the area of the aperture tends to be elliptical as shown in Fig. 7(a). A graph for determining effective aperture for aerials with different power gains, or directivity, is shown in Fig. 7(b). The dotted line example shows that for a beam directivity of 2000 square degrees, which in power gain is

$$\frac{32027}{2000} = 16{\cdot}01 \text{ (gain in dBd is } 12{\cdot}04)$$

the effective aperture will be

$$\frac{1{\cdot}64 \times 16{\cdot}01}{4\pi} = \frac{26{\cdot}25}{12{\cdot}566}$$

or 2·08 square wavelengths. The real proportions of effective aperture can be better visualised if square wavelengths are converted to square metres.

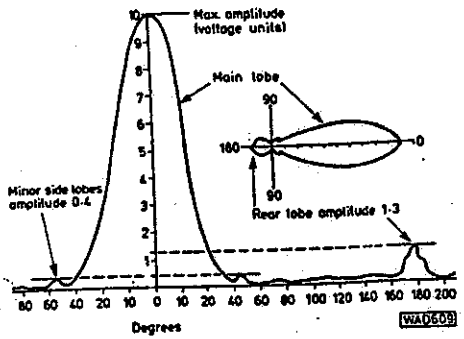


Fig. 6: How the dB level of rear and other minor lobes is related to gain of main lobe at maximum intensity

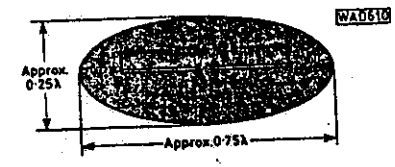
If the wavelength for the above example was 2 metres, corresponding to a frequency of 145MHz, the effective aperture area would be 2·08 × 2 = 4·16 square metres. As another example, an aerial with a gain of 3dB operating at 20 metres, or 14MHz, would have an effective aperture of

$$\frac{1{\cdot}64 \times 2}{12{\cdot}566} \times 20$$

or 5·2 square metres.

Gain by Stacking or Baying Aerials

This is a subject that would warrant a whole article, but suffice to say here that additional gain can be obtained by stacking aerials one above the other or by baying them side by side. The theoretical gain for a pair of identical aerials is 3dB, so if one aerial has a gain of 10dB then the gain from a pair would be 13dBd and not twice the gain as many suppose. However, the theoretical 3dB is rarely if ever obtained, and even with careful matching and phasing



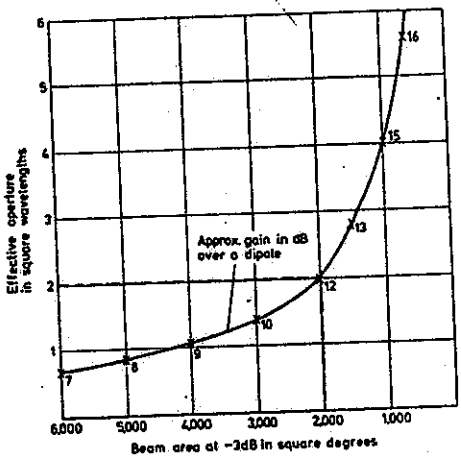


Fig. 7(a): Effective aperture of a half-wave dipole

Fig. 7(b): Effective aperture derived from total beam area or power gain. Note:

$$\text{Power gain} = \frac{32027}{\text{"n" square degrees}}$$

or from the table of dB to power gain

and the necessary wide spacing, the result will probably be no more than 2 to 2·5dB.

The fact that two aerials require twice the amount of material used for one is worth taking into consideration, particularly by those who construct their own aerials, and it may be cheaper to get a real 3dB extra gain by using a single aerial with that much higher gain built in.

Summary

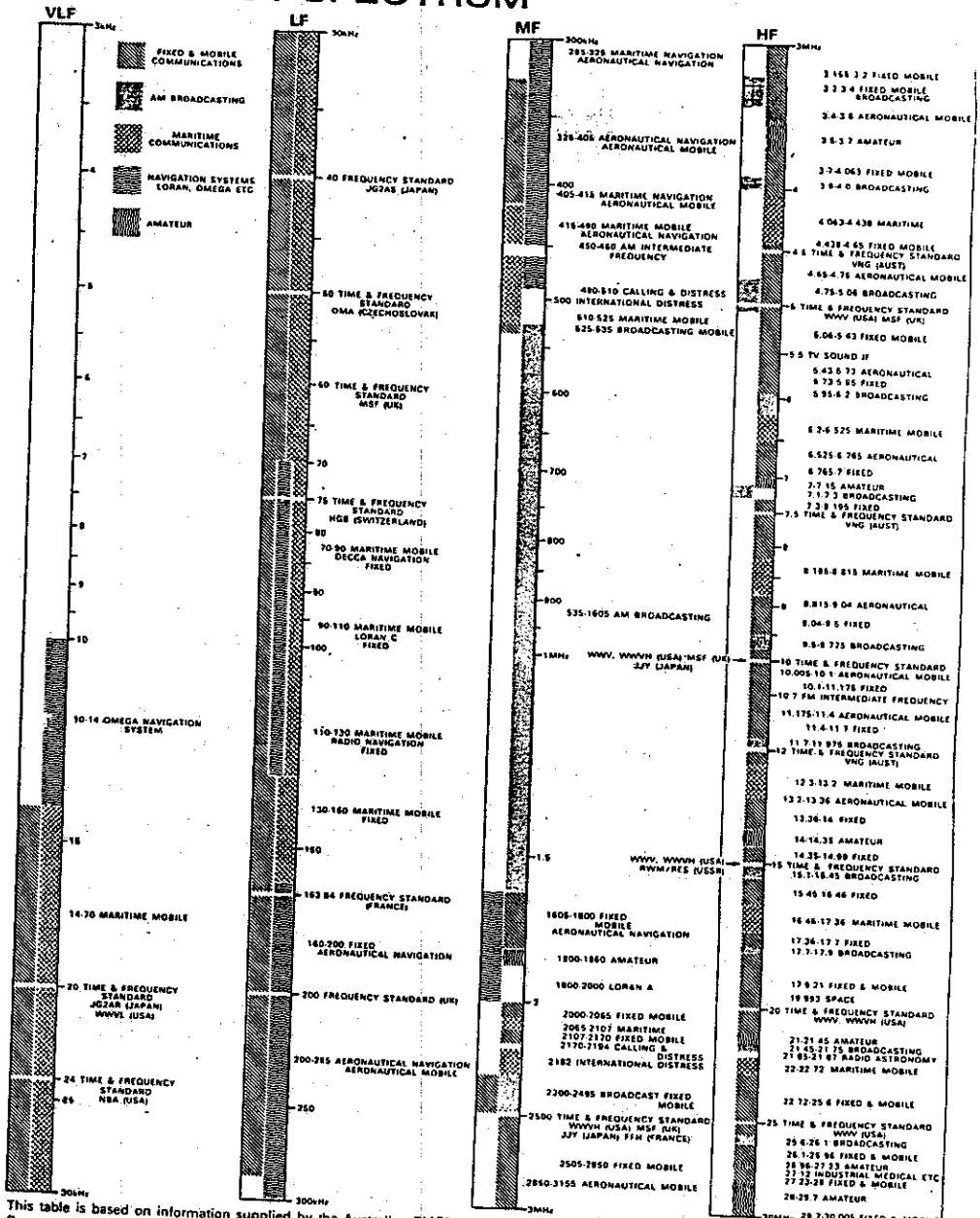
It must be appreciated that reasonably accurate calculation of gain from beam directivity area assumes that losses due to the aerial itself, e.g. high radiation resistance, poor insulation and proximity losses, etc., are reasonably low. Losses due to feed cable mismatch or actual cable loss do not affect aerial gain or the radiation pattern, but power wasted by such causes is power lost to the aerial. Extensive tests with scale model aerials and full size operational aerials, using direct measurement against a reference dipole versus the beam area method, have proved the viability of the latter. Without carefully controlled and known conditions, the direct measurement or comparison method can be very seriously in error. ●

References

1. The Services Textbook of Radio. Vol. 5. Transmission and Propagation. HMSO 1968

2 Antennas. John D. Kraus. McGraw Hill Book Co. Inc.

FREQUENCY SPECTRUM



This table is based on information supplied by the Australian PMG's Department. It shows Australian allocations within the International Telecommunications Union Regulations. While broadly similar to allocations in other countries, they may differ in detail.

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Preliminary Conference

These conferences in each region and consisting of executive and committee members of affiliated clubs in the area have as their main aim the pooling of ideas on running Regional Conferences.

The Region is free to organise the conference the way it thinks best with the following basic rules:

The conference is controlled by an affiliated club in the region and supplies the Chairman and a Secretary, the Conference Delegate or Regional Controller to be a local WIA member for at least 12 months. Voting by attendees at the conference only and one man,one vote.

Many of the clubs will not have the experience in running conferences or field days of any description....some will...and it's from these we seek the advice so that rotation of conferences in a region is possible.

First question asked....How many can we expect?...Your learned club replies.."Depends on your invitation list!".

Here is one of the places your preliminary conference starts.

Regional Conferences have as their main aim giving the clubs a platform to introduce Amateur Radio, communications, electronics and computer technology to all those interested and by those introductions boost membership of the clubs and of the WIA.

And so to invitations....note all local bodies interested in the above:

Scouts and Guides...They're being pushed by their own body
CBers...don't knock 'em...you probably were one
UHF CB Packeteers...they exist...illegal as they may be
Computer Clubs...Expand their horizons with Gateways
Audio Buffs...show them what a transceiver can do
Science teachers and their proteges
Air League
School Radio Clubs
Non Club members and class students
Publicize your classes...invite prospects along
Other groups you know of that we don't.

There's a big field out there and it's varied. If you are as successful as you hope you'll have to design your conference to keep the attention and interest from flagging...this is one of the reasons for the preliminary conference...throw all these ideas in the pot, let Parramatta collate them and between us we'll learn how to handle them.

Lecturettes...5 to 10 minutes...on a multitude of subjects..Federal policies,Warc,Frequency allocations,Division decisions,WIA as such,DOTC and getting a ticket...it's a lot of guff to hold the interest of visitors as well as club members. Once again your suggestions for subjects including local members with specialities.

Motions from Federal and Division will be allowed on the Agenda for there are times when both would have items they would like to fly and see who salutes...once again close collaboration with the general membership.

Look at the time factor of getting Agenda items in to Division with the suggestion 1. All submitted motions from all regions be incorporated on a common Agenda to go to all Regional Conferences.
Suggestion 2. That only regional motions be included in THAT region's agenda plus Federal and Divisional items. There is a time factor of sorts between these ideas.

With hopefully the cross-section of people attending, a question and answer section will need to be included in the Agenda with the answering people possibly at the top table.

One could envisage a number of conference layouts...would you all give thought to how it could be done??

These preliminary meets are not necessarily on a motion basis but toss around suggestions and ideas....record them as such...quote voting as such if it gets to that and the same idea from another region could be lost or carried in the final collation.

Talk with the other clubs in your region, arrange a mutually agreed

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meeting night around early November,advise us and we'll try for a councillorat the meeting. It's getting more difficult by the day with travelling costs but we'll see what we can do.

Any stationery,copying or the like necessary for preparation for and the running of a conference will be handled by the Division on request.

A Region Controller appointed by the region conference for at least a year could be the link between Division and the Region and could also be the Region Delegate. Give a thought to these two positions.

Members,

Give me a hand in getting these conferences off the ground...it seems as if it will help you and your clubs, the Division and its Councillors and even the WIA....not forgetting the Hobby itself.

Many thanks,
73

Reg Brook Affiliated Clubs Officer

VK2AI

GOSFORD WIA MEETING

On Saturday 16/2/91, at the home of Reg Brooks(VK2AI),in Gosford,delegates/convenors for each of the N.S.W. regions met, together with Roger Henley(VK2ZIG) President of the N.S.W. Division of the WIA. Your convenor for the South Coast, Brian Clarke(VK2KLH) was there and reports as follows:-

1. It was proposed and generally agreed that the idea of regional conferences be re-introduced. this was to serve several purposes:-

a)inform the WIA of the desires and decisions of grassroots club members,

b)provide a channel for more informal communication between members, clubs regions and the WIA,

c)improve the image of amateur radio in the community and thereby increase membership in clubs and of the WIA.

There was also the possibility that such conferences might increase band usage, thus reducing our chances of band loss.

2. It was suggested that the first regional conferences be held in June,or early July this year and in April and November of 1992. The frequency of such conferences would then be reviewed.

3. Reg Brooks had put together some notes about the content of such conferences. This note appears earlier in the Propagator. There was no disagreement in general with these notes.

4. It was agreed that the club where each regional conference was to be held, would provide a chairperson and secretary, who were to be members of the club's executive and members of the WIA.Conferences are to rotate around each region's clubs.

5. following the completion of each round of regional conferences, the regional convenors would meet to pool the output from the conferences in the form of information, indications,desires, proposals etc. When the convenors have established their lists, they meet with the councillors of the local WIA Division,who in turn decide what action to take. The convenors will be there to defend and support their proposals - but have no voting rights.

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6. The one area of dispute was the matter of voting at regional conferences. Reg Brooks proposed that anyone who attended such a conference be allowed to vote, on the grounds that,

a)the chair could rule out obviously foolish proposals;

b)the decisions taken would not be binding on clubs;

c)the WIA would have final say;and

d)putting no bar on voting may even promote new ideas from outside our normally staid confines- possibly making us more relevant to our times and communities.

However, Peter from Westlakes argued that voting be confined to people who were full call amateurs and members of the WIA. He spoke with great vigor,at length and may have gained the support of 0.5 to 1 other convenor.

It was agreed that the matter of voting at regional conferences be put to the membership, whose vies would then be transmitted to the WIA. A clear direction on voting would be made before the next conference in June 1991.

There was no discussion of weighting of votes , though the idea of "sensing" the voting, i.e. estimating what proportions of the votes each way were from amatuers, WIA - etc, was discussed but generally ruled out as requiring too much bureaucratic machinery.

An early direction from the club, on how we want conferenve voting to operate is required.

Brian VK2KLH

Did you have something for the Programator? It could have gone here!!

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A GOOD CHEAP DUAL-BAND ANTENNA

Readers will remember an article some months ago about a one wavelength loop antenna for two metres that Graham VK2GID built out of bits and pieces.

It turns out that this antenna is also useful on 70 centimetres. A test with a suitable rig and meter showed that the antenna is also a three wavelength loop on seventy. The result is an antenna that performs reasonably on both bands (also on UHF-CB, if you are so inclined). And it's cheap.

An unfortunate drawback of this antenna is that the Editors now have access to VK2RUW as well as VK2RAW, VK2RIL and VK2RAH. Future recipients of the leather tongue award beware - we can catch you anywhere.

John VK2XGJ has sourced some cheap 23cm rigs, which are advertised as being "Editor Free". More on John's attempt at buying all of Gosford Field Day in another article...

NEW CIRCULAR ANTENNA SYSTEM

At the latest Club meeting, a couple of us noticed a new circularly polarised antenna over the back fence. Rob VK2MT is thinking of using one on a new satellite repeater. Check it out next meeting.

Also noticed over the fence were several netball posts, surplus to Council requirements. A quick measurement showed that they would be about one wavelength on 70 cm. Get your bid in now for these great antennas, supplied complete with poles.

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LEATHER TONGUE AWARD

Following the recent article in these pages about the Society's Leather Tongue Award, attempts to win the award have been coming in thick and fast.

The latest contestant was Peter VK2KHE. It took Peter all of three seconds to twice time out VK2RUW the other night. In his acceptance speech, Peter mumbled something about getting those in the Repeater Committee responsible for setting a short timeout. Sorry Peter, Rob denies any such activities.

John VK2XGJ took great pleasure in handing over the award on behalf of Noel VK2ZNS. It is believed that Noel timed out the Packet digi-peater with one of his rapid fire bursts on a broadcast callback.

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NAME THAT COUNTRY CONTEST

Readers will remember that last month, the Editors launched the first ever IARS International DX contest. The number of entries received was about what we expected...none at all!

For those who might be interested, the country we displayed was in fact Albania. As seasoned DX'ers probably know, This is the top country of the "Most Wanted" list.

Thanks to Bill VK2JBS for demonstrating the latest addition to his mixed bag of computer software.

TOWER CONSTRUCTION REPORT

Have you noticed a large lump of concrete in the ground just outside the front door to the S.E.S building in Montague Street? The concrete with the large chunk of metal sticking out of it?

How did it get there??? What is it for???

This marvel of construction has been performed by the tower committee, Vic VK2XSV and 0.1% of the Society membership. Why is it that I get the feeling that the rest of the Society (yes, you with yer nice clean little mitts holding this documental device) is going to be very interested in the Club Station once it has had all the hard work done?

But I never knew when the work was being done!!! That excuse is a lot of QRM as far as we are concerned, even though I spent all the working bees exercising my posterior muscle at my residence. Good on Vic for his efforts.

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DOTC QUESTION

Last time, we asked you: What are the limits of the 12 metre Amateur band?

The answer is (C): 24.890 to 24.990 MHz. It's a fairly small band. Don't forget that you have to know regulations as well as technical content to get a licence.

This month, Keith VK2OB asks us:

Overtone crystal oscillators provide an output at:

(A) The fundamental frequency only.
(B) Even harmonics.
(C) Near an odd multiple of the fundamental frequency.
(D) All harmonics.

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CHARGER FOR NICAD.
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CONTACT JOHN VK2ZDM

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POST BOX	- ALL MAIL CAN BE SENT TO "THE ILLAWARRA AMATEUR RADIO SOCIETY" AT PO BOX 1838, WOLLONGONG, 2500.			
REPEATERS	-VK2RAH - 29.520	VOICE	HF	Mt MURRAY RX
	29.620			KNIGHTS HILL
	-VK2RAW - 146.850	VOICE	VHF	Mt MURRAY
	-VK2RIL - 147.275	VOICE/RTTY	VHF	SUBLIME Pt
	-VK2RAW - 147.575	PACKET	VHF	Mt MURRAY
	-VK2RUW - 438.225	VOICE	UHF	KNIGHTS HILL
(OFF AIR)	-VK2RIL - 438.725	VOICE/RTTY	UHF	SUBLIME Pt
BROADCAST	-IS ON SUNDAY EVENING AT 6.45pm, IN RTTY MODE, TRANSMITTED ON 147.275 AND RELAYED ON 3.618 MHz +/- QRM. CALL BACKS TAKEN IMMEDIATELY AFTER. VOICE BROADCAST HELD AFTER WIA RELAY ON 146.850 MHz (VK2RAW) AND 3.618MHz +/- QRM.			
WIA RELAY	-ON 146.850 MHz AT 10.45am AND 7.15pm EACH SUNDAY.			
NEWS LETTER	-PUBLISHED EACH MONTH TO REACH ALL FINANCIAL MEMBERS IN THE WEEK PRECEDING THE CLUB MEETINGS. ARTICLES AND LETTERS ARE VERY WELCOME.			
MEMBERSHIP	-$15.00 P.A. CONCESSIONS $12.00 P.A.			
LAWRENCE HARGREAVE 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.			
STORE	-THE CLUB STORE IS OPEN AT EACH MEETING.			

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

PRESIDENT	-VK2KWG - KEN GRIMM	
SECRETARY	-VK2KEY - PAT JORDAN	
TREASURER	-VK2KCV - PAT KENNEDY	
ASSIST SEC	-VK2XSV - VIC HEE	
TREASURER	-VK2TKE - KEN GOODHEW	
ASSIST TREAS	-VK2KHE - PETER TOMLIN	
COMMITTEE	-VK2MT - ROB McKNIGHT	- VK2XSV - VIC HEE
	-VK2FPN - PETER READ	- VK2XGJ - JOHN SIMON
	-VK2KLH - BRIAN CLARKE	- VK2KHE - PETER TOMLIN
REPEATER PRES	-VK2MT - ROB McKNIGHT	
REPEATER COMM	-VK2KHE - PETER TOMLIN	- VK2XLA - GRAEME EAST
	-VK2TKE - KEN GOODHEW	- VK2XGJ - JOHN SIMON
	- TOM JEPSON	- VK2KLD - LES DAVID
	-VK2TPH - PHIL HOWCHIN	
QSL CARDS OUT	-VK2GID - GRAHAM DENNEY	
QSL CARDS IN	-VK2JBS - BILL STONE	
PUBLICITY	-VK2MT - ROB McKNIGHT	
BROADCAST	-??? (Your name could be here....)	
CARTOONIST	-VK2AXI - BRIAN WADE	
PROPAGATOR ED	-ZAPHOD (VK2XQX, VK2JBS, VK2GID)	
PRINTERS	-VK2DSH - DALE HUGHES	-VK2XCC - RAY BALL
SOCIAL DIRECTOR	-VK2XCC - RAY BALL	
CANTEEN	-VK2DYU - BILL CHADBURN	
STORE	-VK2XSV - VIC HEE	
TOWER CO-ORD	-VK2XSV - VIC HEE	
DOTC LIASON	-VK2OB - KEITH CURLE	
LIFE MEMBERS	-VK2ALU - LYLE PATISON	-VK2OB - KEITH CURLE
	-VK2CAG - GRAEME DOWSE	