THE PROPAGATOR

MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO SOCIETY
P.O BOX 1838 WOLLONGON N.S.W. 2500

VOLUME 85, NUMBER : 3 APRIL: 1985
REGISTERED BY AUSTRALIA POST PUBLICATION NO. NBH 1491

MEETINGS ARE HELD ON THE SECOND TUESDAY OF EACH MONTH (EXCEPT JANUARY) AT 7.30 P.M. AT THE STATE EMERGENCY SERVICES BUILDING, MONTAGUE STREET, NORTH WOLLONGONG. VISITORS ARE WELCOME TO ATTEND MEETINGS.

THE APRIL MEETING - will be held on Tuesday, 9th April as usual at the SES Headquarters in Montague Street. We will be welcoming one of our Life Members Keith VK20B to the Chair for a twelve month period and might we wish the new committee the best of good fortune for its coming term. The monthly talk will be on 'Packet Radio' given by John Robinson and the Kenwood ATV Group who addressed us last August on Slow Scan activities in and around Sydney.

LAST MONTH'S MEETING - was our 23rd Annual General. A casual inspection of the attendance list of the inaugural meeting in 1962 revealed a few names common to that of 1985. They included Don VK2ZRX, Lyle VK2ALU and Les VK2ALK. There were several others who are still active members - perhaps next year.

Retiring President Dave VK2DFL handed the reins to Lyle who as ensconced Returning Officer guided Keith to the Chair for the next period. Dave retires after 2 years as President and before that, two years as Secretary. A full listing of the new committee appears on the back page but here we make particular mention of V/P Bill VK2DYU, Secretary Jim VK2EJH and Treasurer Andrew VK2XGC (second term).

LIFE MEMBERSHIP. Lyle Patison VK2ALU whose name was in the forefront on day one and has remained there ever since has been recognised for his services by the bestowal of Life Membership of the Society.

New calls were recorded for Dave Routledge VK2NGS and Peter Woods VK2VCK both of whom are now active within the Club Committees.

On the social side, Ray, VK2XCC delivered a verbal on the picnic held at the Sublime Point Repeater Site on March 10th. As usual, weather was A1 and an enjoyable time was had by all.

REPEATER REPORT GRAEME VK2CAG

There have been some good openings to ZL this month, and the new aerial and duplexer at Mt. Murray have given a good account of themselves. ZL3ADH in Greymouth in the south island had a particularly good signal into Mt. Murray for several hours at a time on the 15th and 16th. Reports on the strength of 6850 repeater from the ZLs compared with the other repeaters on the east coast of N.S.W. were indeed pleasing. 6850 appeared to be the most consistant repeater to ZL during the opening. Whether this was due to propagation or its geographical location is not known, but one thing is for sure and that is that the contacts through it would not have been as good without the new aerial and duplexer. Hats off to the fellows who are responsible!

The energy situation at Mt. Murray has been bordering on just satisfactory over the last month. With little wind again and a high level of usage, its been a battle for the battery to keep up with the energy demand. The energy has been almost totally supplied from the sun as there has not been much wind. Towards the end of the month there has been a bit of wind, and we are coming into that part of the year when we can expect more.

Thanks to Morry and others who have been keeping a close ear on the pitch of the ident tones and monitoring the battery condition, and keeping those informed as to why we need to conserve energy. Many users of the repeater outside the Illawarra area do not receive the "Propagator", and would not otherwise get to hear about the characteristics of this repeater, so we have had some info put into the W.I.A. broadcasts. The best thing we can do is to spread the word to as many people as possible that this repeater is powered by the wind and sun, and that the ident tone pitch indicates the state of charge in the battery. Most users, when aware of the facts, use the repeater with the kind of respect it deserves. In a small number of cases a person using the repeater has acknowledged that the battery is low because of the low pitch of the ident tone, then he has continued to ragchew on for another hour or so after that.

How would that person feel if he was called by a ZL or even rarer DX station, then the repeater went off air because its battery just couldn't keep up?

HERE ARE SOME FACTS ABOUT THE ENERGY NEEDS OF MT. MURRAY:

* The repeater draws 50 mA on standby and 5A on transmit.
* The solar panel charges at 2A in sunlight and 400mA overcast
* The wind generator charges at 2A in 15 knot wind, 5A in 30 knot wind, and maximum output of 8A at 50 knots.
* Statistics show that the sun shines on an average of three and a half days out of every seven over the year.
* The average daily period of useful sun is 7 hours in winter and 10 hours in summer.
* Energy calculations are done in Amp-Hours, that is, the current in amps multiplied by the number of hours that the current is flowing.
* A figure of 10% is allowed for losses in the battery and charging regulator.
* Calculation gives that in the absence of wind the repeater takes 1.32 AH (amp-hours) in 24 hours just to run the receiver and cover losses. THat represents 40 minutes of sunshine, or 3½ hours overcast weather.

* ON a sunny day, the repeater can be used for 4 hours in any 24 hour period to break even. (Thats 20AH in and out).
* On an overcast day that is reduced to just under one hour.
* Allowing for all losses, the <u>average</u> daily repeater on-air time catered for by the solar panel is just over one and a half hours!
* Wind, when it does blow, provides much more energy than the sun because the generator has a potential output of 4 times that of the solar panel, and it can blow for the full 24 hours, giving it 3 times the daily generating timecompared with the solar panel. The maximum potential output from the wind generator is some 12 times that of the solar panel! Its plain to see why we have no energy shortage in winter.

GRAEME VK2CAG.

Morry VK2EMV, repeater custodian and night nurse, tucks VK2RAW into bed for the night to rest her batteries.

<u>For Sale:</u>
Excellent Condition Good Will oscilloscope,
Single Channel, 7MHz Bandwidth 130mm screen
$240

Contact Fred VK2YSB
Ph 84 3736

E.M.E. REPORT BY LYLE VK2ALU

Moonbounce Report - April 1985.

During the 12 months to end February 1985 VK2AMW participated in a total of six 1296MHz EME test periods, during which contacts were completed with 15 stations on CW. SSB signals were copied from OE9XXI on one occasion. Several receiving preamplifiers were tried and three methods of noise figure optimisation were used to improve receive system performance.

Dish pointing accuracy was markedly improved by the installation of an hour angle tracking computer which was designed and built by a University Undergraduate to our specifications. It provides a readout of error in degrees between the actual dish pointing direction and that of the moon, in hour angle and has helped to achieve echoes from the moon when it is not visible due to cloud cover etc.

On 2nd March we participated in scheduled EME tests during which SM6FHZ and G3LTF were worked M/C copy. It was particularly pleasing to have the contact with G3LTF as several previous attempts over the past fourteen months had each just failed to achieve the necessary information transfer in the short "windows" available between us.

Lyle VK2ALU

Satellite Notes.

As has been mentioned previously, Oscar 10 carries two transponders. The Mode B transponder is operational for a much longer period per orbit than the Mode L transponder. Access to the Mode B transponder is also somewhat easier than that to Mode L, as operation via Mode L requires a transmitter with output at 1269 MHz, not as easy to achieve as that on 435 MHz, particularly if one wishes to run with more than just a few watts output. The alternative to higher power from the transmitter is, of course, a very high gain antenna.

High gain from the antenna, that is something in the order of 22dB or more, requires at least four long loop yagis or a parabolic reflector type antenna of 1½ metres or more diameter. The gain achieved from the loop yagis is reduced if they are placed in a circularly polarised configuration in order to make them fully compatible with the right hand circular polarisation of the satellite's receiving (and transmitting) antennas. An array of helix antennas can be used but a dish is quite attractive as a circularly polarised feed can be used.

The downlink from the satellite on 436MHz is not so difficult to accommodate, but a relatively high gain right hand circularly polarised antenna is desirable and a low noise gasfet preamp. at the antenna is almost a "must". The same 70cm antennas as are used for Mode B uplink may be OK, provided that the antenna mounted gasfet preamp. is properly bypassed and isolated by good quality coaxial relays.

At this QTH Mode L downlink signals have been received for some time, although there is relatively few stations active on this Mode at present. Signals are generally of better quality than those

A 145/1269 MHz transverter and 5 watt O/P PA unit was recently "got going" so an attempt was made, by arrangement with VE7BBG and ZL2AQE via Mode B, to put a VK2 signal into the satellite on Mode L. A small dish of a little over 1½ metres diameter was used, but time prevented the replacement of the 1296MHz dipole plus reflector feed by a circularly polarised feed. However as both VE7BBG and ZL2AQE use relatively large dishes, they felt confident of results.

The test took place on 17th March and, although I could not initially hear my own signals, VE7BBG reported them S7 to 8 and ZL2AQE gave an S4 to 5 report. We were soon joined by KAØOOQ who is located near St. Louis and JR1WZI, giving a five country round table as my first Mode L contact. All signals were quite readable this end and part way through the contact I started to hear my own signals, very weak but definitely there.

The Mode L gear at this QTH has to be set up before any test (it takes about ½ hour) but more contacts will be looked for during the next few weeks.

The Mode L transponder is currently operational for approx. 44 minutes, between MA52 and MA68, on each orbit. From April 1st it is understood that this is to be changed to a similar period between MA120 and MA137 which is about Apogee (MA128) time, where path loss will be greater than at present.

Mode B transponder operation is understood to then be between MA32 and MA119, and again between MA138 and MA200-with both transponders (but not Mode B beacon) being off between MA201 and MA31.

Harry VK2JHW reports that he has had a number of contacts on Mode B, though as yet he is receiving signals up to approx. S3 only.

Ian VK2EXN now has a Satellite Orbit program for his Apple compatible computer and has made up a VK5 2 metre converter with VK3 preamp. in preparation for reception of Oscar 10 signals.

Oscar 10 passes over the weekend and holiday periods for the next month or so for a QTH in the Wollongong area are-

UTC date for AOS	AOS UTC	LOS UTC
April 4	1641	0328 (on 5/4)
5	1555	0243 (on 6/4)
6	1509	0157 (on 7/4)
7	1419	0112 (on 8/4)
12	0956	1056
	1716	2103
13	0856	1012
	1745	1954
14	0011	0400
	0740	0928
	2254	0844 (on 15/4)
April 19	1827	0505 (on 20/4)
20	1740	0421 (on 21/4)
21	1654	0337 (on 22/4)
26	1302	2351
27	1208	1240
	1450	2305
28	1115	1149
	1506	2217
May 3	2125	0724 (on 4/5)
4	2025	0641 (on 5/5)
5	1933	0557 (on 6/5)

The above information was derived from my ZX81 program. See last months Propagator for background information on Oscar 10 Orbits.

Lyle VK2ALU

Sale of Amateur Radio Equipment.

Barry Goodman VK2ZAG has moved out of the district and is giving up his interest in the hobby for the time being. He has collected quite a lot of equipment and "bits and pieces" over the years which he has asked me to try to sell for him. Most of the following items will be at the April meeting of the club either for direct sale or auction - as indicated.

For Auction

Oscilloscope - "Heathkit" - Laboratory type Model O-12
Freq. 8Hz to 5MHz - with Instruction Manual.

Digital Frequency Counter - "Lunch" - range 20Hz to at least 300MHz with prescaler.

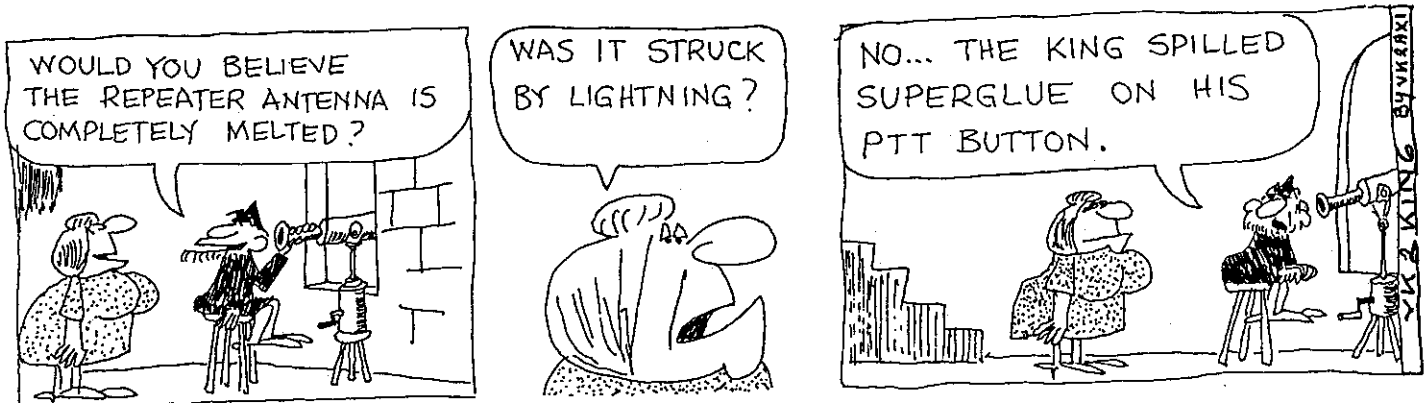
Transceiver - "Multi Palm II" - 2 metre FM hand held - with crystals installed for several repeater channels.

Transceiver "Bigear Type 2" - 2 metre PLL mobile transceiver with digital frequency display.

For Sale

Two - mobile Transceivers for CB use on 27MHz - multichannel
Two - Handy Talky transceivers for CB use on 470MHz band.
Sanyo - cassette tape recorder - battery type
Transmitter - Receiver Unit - similar to those used by IARS for 70cm repeaters
Two - Racal Modulation/Deviation Meters - Freq. Range 48-600MHz.
Signal Generator 4.5 - 150KHz - with inbuilt attenuator.
Home brew receiver with digital readout - 2 metres??
Sweep Generator - "Mega-Sweep" - Freq. range 50KHz to 500MHz with extension to 1000MHz - with Instruction book.
12 Volt regulated power supply - 3amp.
High Voltage power supply unit - 300VDC 100ma??
Coaxial cable with plugs - including RG8 & RG58 cable
Transformers, high voltage and low voltage
Feed through and bypass capacitors for UHF use
Coaxial capacitors for UHF use - 1 to 10pf variable, etc
Various other small items, such as tuning capacitors, mica capacitors carbon resistors, BNC connectors, milliameters and microameters etc, etc.
Solid aluminium Dish, 4 foot diameter, good for use up to 10000MHz.

Lyle VK2ALU



FROM LYREBIRD.

Page 12. Mid-South-Coast Amateur Radio Club. 'The Lyrebird' Spring 1979.

VISUALISING SWR (refer page 13) Most amateurs have a working knowledge of Standing Wave Ratio. (SWR) and are aware that it is preferable to have minimum SWR on feeders so that power lost in the antenna feeder is kept to a minimum. However, this writer has heard numerous remarks on the air which indicate that many theories exist on the subject of how the SWR can be varied, including the erroneous idea that SWR can be varied by changing the length of the feeder.

To help clear the air of such misinformation, this article contains a graphical presentation of the relationship between the SWR on a transmission line and the length of the line. The presentation, usually referred to as the "SWR CIRCLE", shows how the feed-point impedance can be found when the SWR and electrical length of the transmission line are known.

The SWR on the transmission line between the transmitter and the antenna coupler, "A" in Figure 1 (Page 13) can be varied by tuning and adjusting the length to equal , a half-wavelength or any multiple of a half-wavelength. Point Y is the feedpoint impedance when the feeder is equal to a quarter-wavelength or odd multiples of a quarter-wavelength. The feed-point impedance at Point Z is due to the feeder length being equal to one-eight-wavelength.

It should now be clear that varying the length of the feeder cannot vary the SWR on the "B" line, nor can it vary the feeder losses per foot. When the feeder length is increased, simply "go around the SWR circle" in a clock-wise direction. Remember that one full trip around the SWR Circle is equal to a half-wavelength of feeder.

The use of different feeder lengths to obtain variation in feed-point impedance is known to hams as "pruning the feeder to get the antenna to load." "Pruning the feeder" is sometimes necessary because of the limited impedance-matching capabilities of the coupling circuits. In this manner, a feed-point impedance which will more easily couple by inserting a device such as an impedance bridge in the "A" line. In this manner, a "flat" or nonresonant line (SWR = 1.0) can easily be realised.

The SWR circle applies to the "B" line coupler to antenna or, if no coupler is used, transmitter to antenna. Although optimum tuning of the transmitter and coupler assures that the maximum r-f power is being transferred to the feeder terminals, it has no effect on the SWR.

In Figure 2, the SWR circle is plotted for a 52 ohm cable. Similar SWR circle can be drawn for any other cable characteristic impedance and the procedure will be described later in this article.

Referring to Figure 2, suppose an SWR of 2:1 is measured on the "B" line because a 52 ohm coaxial feeder is terminated by a 26 ohm resistive antenna impedance. Depending on the feeder length, the feed-point impedance could be 26 ohms resistive at Point X, 104 ohms resistive at Point Y, or any one of the infinite number of complex impedances, such as Point Z. Point Z represents a feed-point impedance of 65 ohms resistive in series with a 39 ohm inductive reactance. The convenient way to write this mathematically is:- 65 + J39. Point X is the feed-point impedance which is found when there is no feeder, or when the feeder match the feeder to the transmitter (or coupler) can be obtained.

It is important to note that although the feeder length has been changed, the SWR remains constant. You are simply going to another point on the SWR circle.

The SWR on transmission line "B" can be adjusted for minimum only by doing one of the following: (1) changing the transmitter frequency, (2) adjusting the length of the antenn element or elements, or (3) adding or adjusting a matching device at the junction of the antenna and the feeder.

.....RADIOTRONICS.

RESTORING NICAD CELLS AND BATTERY HOLDERS. The failure mode in NiCad cells is caused by fine conducting whiskers which grow between the electrodes and prevent the cell from accumulating a charge. A momentary high-current through the cell will sometimes disintegrate the whiskers, allowing the cell to charge normally. I have successfully restored several cells by charging a 35,000-uF capacitor from a 12-volt supply and discharging the capacitor across the cell. After two discharges of the capacitor, each cell was recharged according to the manufacturer's recommendations.

The spring clips in battery holders lose their gripping ability after about a year and should be replaced. A poor connection will result in a small resistance in series with each cell, causing a significant voltage drop when current is drawn from the battery pack.

.....Ed. Piller, W2KPQ ... Q.S.T.

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VISUALIZING SWR

'SWR Circle' Clarifies Theories

Refer Page 12.

Mid-South-Coast Amateur Radio Club. THE LINEBIRD Spring 1979 Page

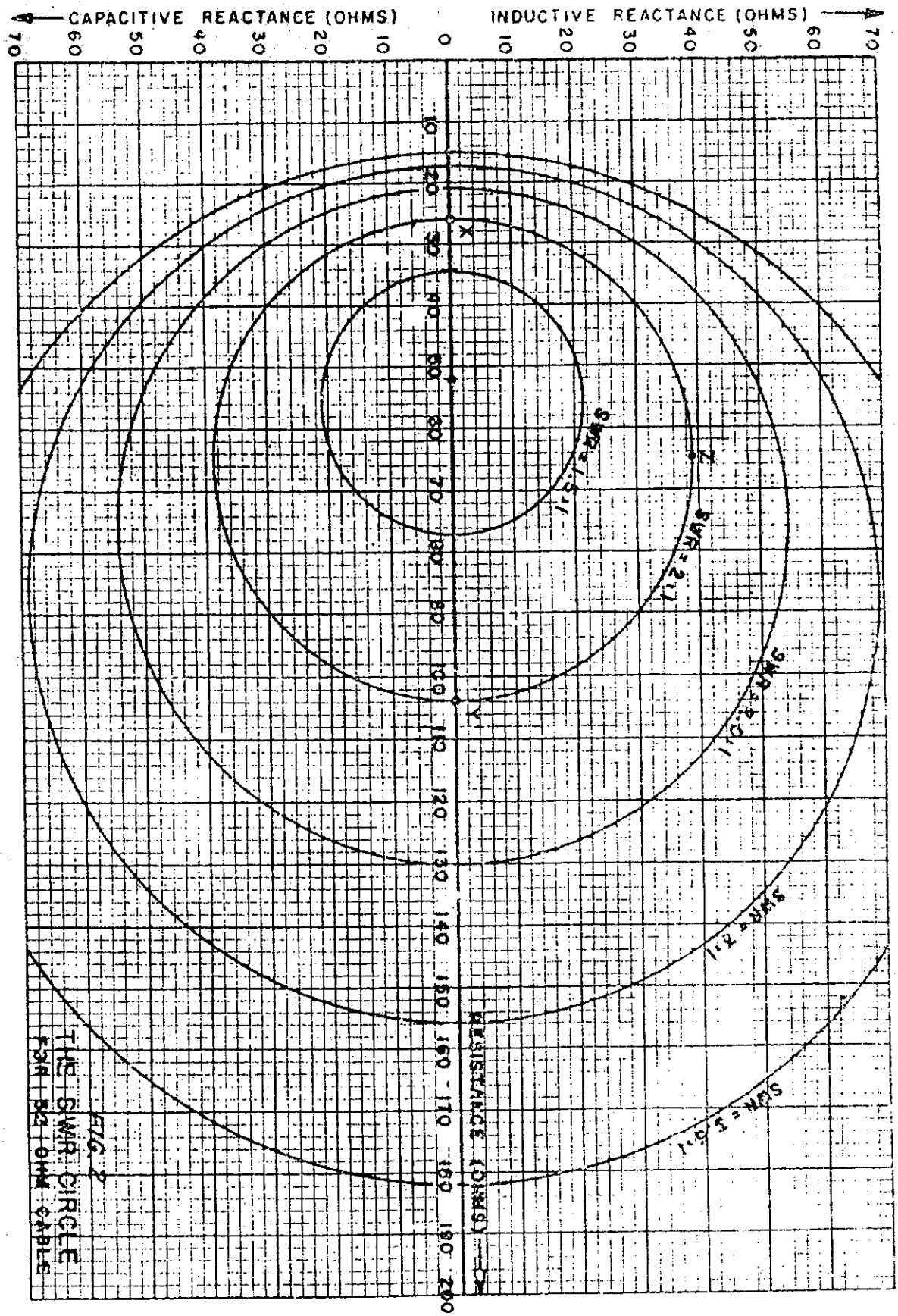
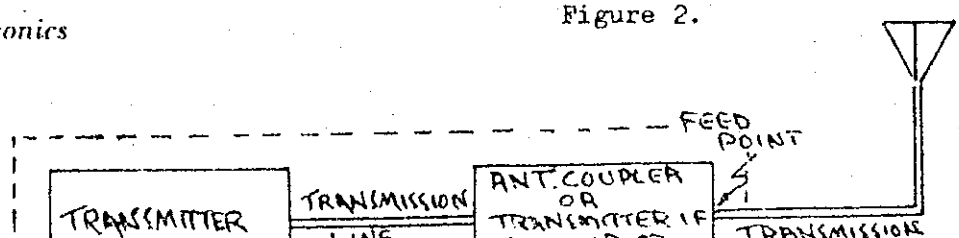


FIG. 2 THE SWR CIRCLE
FOR 50 OHM CABLES

Figure 2.

Radiotronics



MEASURING R-F LOSS IN COAXIAL LINE.

The efficiency of your co-axial lines may be determined by measuring the line loss at your operating frequency. You can do this by merely short circuiting the far end of your coaxial line and measuring the standing-wave ratio with your SWR meter. If there is no line loss whatsoever, the SWR reading will be infinite (full scale), indicating that the reflected wave is equal in amplitude (size) to the incident wave. In a real-life situation, of course, this is not the case, and the SWR reading under the test condition will be less than infinite, due to line loss.

In order to make this measurement, the antenna termination is removed from the far end of the transmission line and the outer shield is firmly shorted,a really short short, to the inner conductor of the line. A small amount of power at the required frequency is applied to the line through the SWR meter. The meter is adjusted for full scale reading on the "forward" position, and the meter switch is then thrown to the "reverse" position. The line loss may then be computed from the reverse reading and the chart in Figure 3...Page 5.

If, for example, the SWR turns out to be 4.5, the cable loss (attenuation) is 2 decibels. This means that your coaxial line is about 63 percent efficient, and that 37 percent of your transmitter output power is being lost in the line. If the SWR reading, on the other hand, is 9; then your line loss is only 1 decibel and your line is about 80 percent efficient.

..... William I. Orr. W65A1.

NOISE REJECTOR. - great for CW or phone receivers (Refer Fig. 2 Page 5)

This circuit has proven to be simple, effective, and a pleasure to build and use, providing much-needed noise rejection. The unit has only 3 controls: a 4-position switch to select desired combinations of the noise limiting diodes, an r.f. filter notch control, and a tone control. The three diode combinations handle progressively more severe noise pulses.

This is followed by the a.f. filter, which is simply an a.f. T-match circuit a smoothly adjusting type being quite effective in limiting the a.f. passband over a sufficient range for both phone and CW uses. The inductor in an 88 mH toroid. This part of the unit is also noise limiting.

The filter is followed by an audio peaker circuit in order to overcome insertion losses of previous circuitry. The peaker, restores the audio level back up to desirable level. The output of the unit cuts still other types of noise, and adjusts and clears up received signal problems.

..... 73 Magazine - Sept. 77.

TWO SQUARED = 4 : $2^3 = 8$: HOW ABOUT 2^{50}?

You won't believe this, so perhaps you shouldn't bother to read further!

Example: A sheet of ordinary duplicating paper is torn into two pieces and the two pieces placed one on top of the other. This pair is then torn into two pieces and these two pieces (four thicknesses of paper) placed one on top of the other. Imagine the process could be carried out a total of 50 times and the pieces tightly packed on top of one another.

How high would be the final pile of paper? (It may help to know that a pile of 500 sheets is 6 cm high.) Get your friend to guess the answer. He will probably be miles out.

Solution: Number of thicknesses of paper in final pile = 2^{50}

$$\text{height} = 2^{50} \div 500 \times 6 \text{ cm}$$

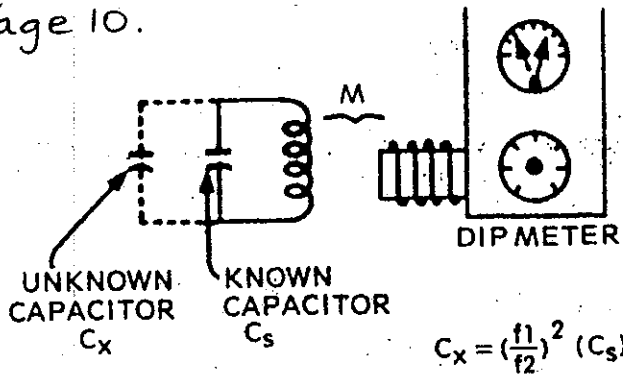
$$= 2^{50} \div 500 \times 6 \div 10^5 \text{ Km}$$

$$= 135{,}106{,}000 \text{ Km}$$

$$= 84{,}441{,}000 \text{ miles.}$$

No, it's not a typists error! It's about 90.8% of the distance to the sun!

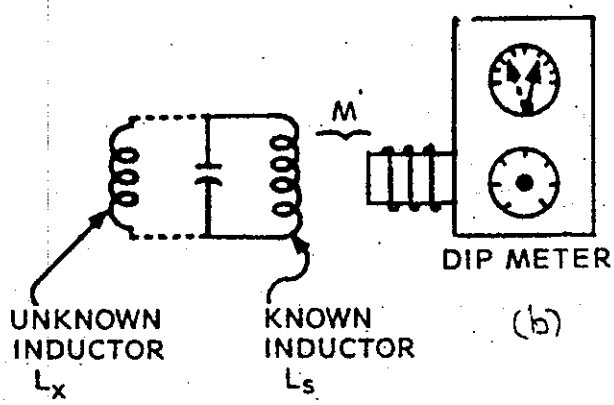
R. B. Walsh - Mathsmaster, Education Dept.



OBTAIN TWO DIP FREQUENCIES:
f1: With C_s only
f2: With $C_s + C_x$

(a)

$$C_x = \left(\frac{f1}{f2}\right)^2 (C_s) - C_s$$



OBTAIN TWO DIP FREQUENCIES:
f1: With L_s only
f2: With $L_s + L_x$

(b)

SOLVE IN TWO STEPS:

STEP 1: $L_T = \left(\frac{f1}{f2}\right)^2 (L_s)$

STEP 2: $L_x = \frac{(L_s)(L_t)}{L_s - L_t}$

Fig. 1. Two-frequency method of determining unknown capacitance or inductance values with a dip meter. (page 3)

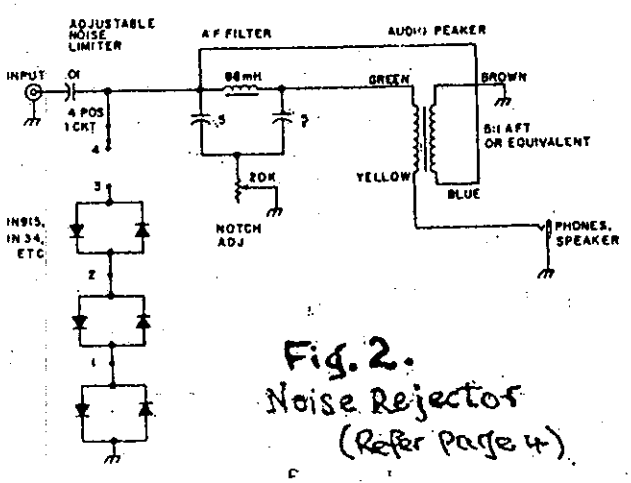
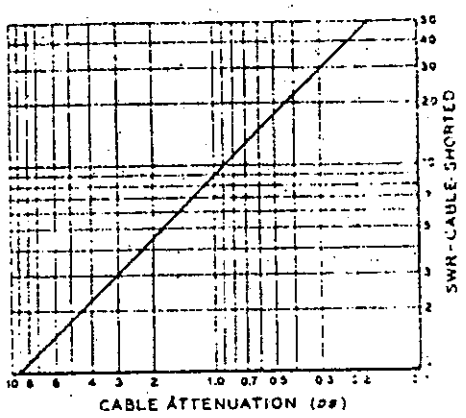


Fig. 2. Noise Rejector (Refer page 4)



COAXIAL LINE LOSS may be determined by simple test. End of line is shorted and SWR is measured under shorted condition. For example, if SWR is 10, line loss is 0.9 decibel.

Fig. 3. (page 4)

GRID-DIP METER TO MEASURE UNKNOWN CAPACITANCE AND INDUCTANCE. - (Page 5)

There are several ways to do this but in fig. 1. (a) and (b) we use the two frequency method. In order to measure capacitance (fig. 1.a) you need not know the value of the associated inductance in the resonant circuit, this can, in certain circumstances, prove advantageous over single frequency methods. For a reasonable degree of accurancy the distributed capacitance of the inductor must be small compared to the known capacitance, Cs. For most RF coils used in HF work this situation will exist with the use of a 100 pF mica capacitor for Cs.

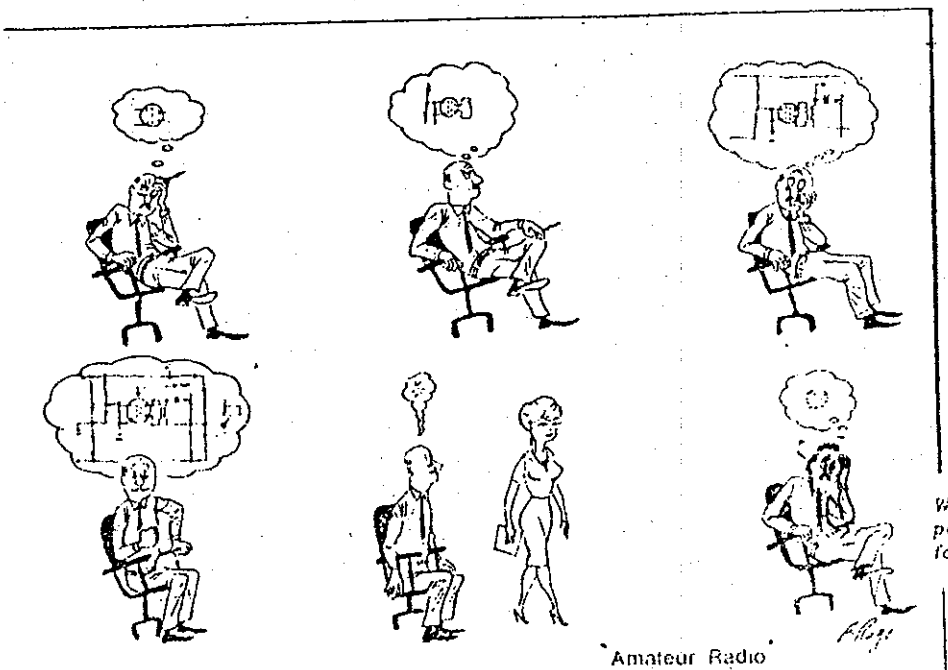
In any event, the self-resonant frequency of the inductor should be greater than three times the resonant frequency resulting from connection of Cs.

In figure 1 (b) we use the two-frequency method to measure the value of an unknown inductor. The value of one of the inductances must be known but the value of the resonating capacitor need not be known. In order to swamp errors from distributed capacitances the resonating capacitor should be at least 100 pF and perhaps as large as 1000 pF. A mica or ceramic type is suitable since the exact value of the capacitor does not enter into the computations, any tolerance is acceptable. Notice that the solution of the unknown, inductance Lx, is carried out in two steps. For VHF and UHF work very close attention must be given to lead length proximity effect, and components characteristics.

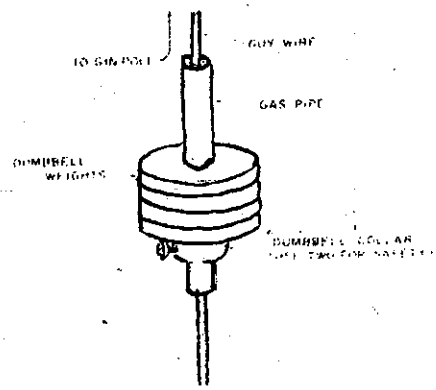
Two unlike power transformers usually cannot be connected together, in series that is, to obtain a higher dc output voltage from a power supply as no centre tap is then available. And as bridge rectifiers are not always convenient in such cases the following circuit should be of interest.

The transformer on the positive side must have sufficient insulation breakdown voltage to handle the combined voltages. Current capacity of each should be sufficient for requirements. The rectifiers should have a peak inverse rating greater than the combined voltages. Transient protection is best placed across the primary side. The transformers must of course be correctly phased or the output will be reduced. Phasing is best accomplished in the primary circuits.

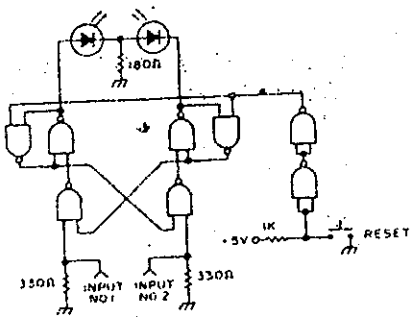
Roger VK2ZTB



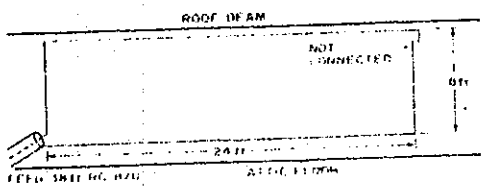
Amateur Radio



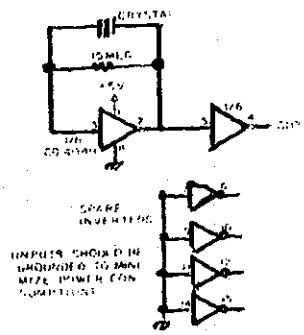
WA0KKC aid for pulling tower sections up a gin pole uses hollow gas pipe and dumb bell weights for counterbalance. Clever!



Which input is first? This circuit will tell. Makes a good game with two people trying to push a button first, etc. Two 7400's may be used. Thanks A7SBH, who gets a free book of his choice for submitting this circuit.

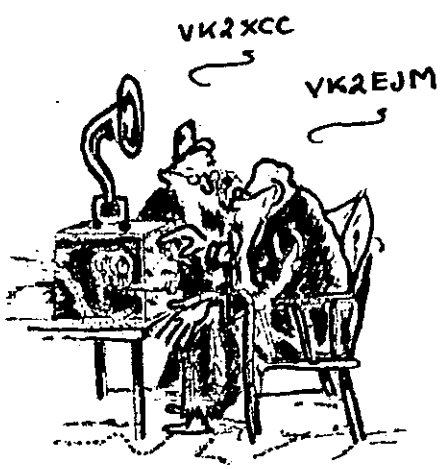


W8KOI attic antenna for 40 and 15m. Uses RG8/U and no balun. Use #18 wire and staple gun for installation. No bad antenna whery an outdoor antenna is a problem.



This very simple clock oscillator uses only three components. It's usable to 5 MHz and draws less than 10 mA. Four spare inverters are available for use elsewhere in the circuit. Thanks to Bruce Brown WB4YTU/WA8GVK

THE OLD X-G NET



WANTED

Memorabilia: Written material or components - the older the better.

Required for - MIKE'S MUSEUM

Contact: Mike. VK2DFK
Ph (042) 83-2438

THE ILLAWARRA AMATEUR RADIO SOCIETY - P.O. BOX 1838 WOLLONGONG 2500

Meetings; Second Tuesday of every month except January, at 7.30 p.m. in the S.E.S. Headquarters, Montague Street, North Wollongong. Committee Meeting - 3rd Tuesday of each month.

Repeaters: VK2RAW - 6850 VHF Mount Murray. VK2RIL - 7275 VHF Sublime Point.

VK2RUW - 8225 UHF Hill 60 Port Kembla. VK2RIL - 8725 UHF Sublime Point.

Broadcasts: On Sunday night prior to Club Meeting - 7.00 p.m. - RTTY on 6850 and 7275 VHF; 7.15 p.m., voice on 6850 VHF , 7275 VHF and by relay on 3.562 Mhz. Call backs after voice broadcast.

W.I.A. Relay: On 6850 VHF at 11.00 a.m. and 7.30 p.m. each Sunday.

Club Nets: 3.562 Mhz SSB on Sunday at 8.00 p.m. and slow morse net on 28.440 Mhz on Tuesday at 8.00 p.m.

Newsletter: "The Propogator", published monthly to reach financial members in week prior to meeting. All articles, ads 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 $10.00 per annum; students and pensioner concessional members $5.00 per annum.

Awards: The award of the I.A.R.S. 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. Contact with the Club station VK2AMW is sufficient in itself for the award. Band details - time, day, date, frequency, station worked + $2.00 or 4 I.R.C.'s to Award Manager, I.A.R.S., P.O. Box 1838, Wollongong 2500. No QSL cards required.

Store: The Club store operates at each Club meeting.

Committee: President - Keith Curle VK2OB, 24 Beach Drive, Woonona.

Vice President - Bill Chadburn VK2DYU, 45 Beltana Avenue, Dapto.

Secretary - Jim Hayes VK2EJH, 1 Kathleen Crescent, Woonona.

Treasurer - Andrew McEwan VK2XGC, 7 Nioka Avenue, Keiraville.

Auditor - Geoff Cuthbert VK2ZHU, 1 Nioka Avenue, Keiraville.

General Committee: Ian Callcott VK2EXN, Wojciech Tomczyk VK2OE, Martin Hutchins, Jim Mead VK2EJM, Gerhard Meuller VK2XGA, Dave Routledge VK2NGS, Paul Suters VK2PGS.

Repeater Chairman: Graeme Dowse VK2CAG.

Repeater Committee: Bill Jut VK2KWJ, Rob McKnight VK2JRC, Morrie Van De Vorstenbosch VK2EMV, Peter Woods VK2VCK, Ian Callcott VK2EXN, Mike Keech VK2DFK,

EME Co-Ordinator: Lyle Patison VK2ALU.

Store: Ray Ball VK2XCC.

Publicity Officer: Dave Myers VK2DFL.

Life Members: Graeme Dowse VK2CAG, Keith Curle VK2OB, Lyle Patison VK2ALU.