

the PROPAGATOR

MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO SOCIETY

PO BOX 1838 WOLLONGONG NSW 2500

No. 80/6

JUNE 1980

THIS MONTH'S MEETING --

Monday 9th June, 7.30 p.m. at the Congregational Hall, Coombe Street.
Special feature of the meeting will be a demonstration of
slow-scan television by Ian Mackenzie, VK2ZIM.

LAST MONTH'S MEETING

The raffle prize - a chassis punch set and nibbling tool, was won by Jim VK2BOU. Sounds like just the gear for a party!

Ian VK2DKS won the foxhunt on 28.35 MHz, and with it a voucher for parts from the store.

REPEATER USAGE

Hours of transmission of the Wollongong repeater, Channel 5, were measured for one week commencing at 8 a.m. on Saturday 12th April, 1980. The results, in hours and minutes, are shown in the table:

DAY	8 a.m. - 10 p.m.	10 p.m. - 8 a.m. (following day)
Saturday 12th	2h 25m	10m
Sunday 13th	3h 46m	18m
Monday 14th	1h 3m	4m
Tuesday 15th	47m	4m
Wednesday 16th	37m	2m
Thursday 17th	58m	5m
Friday 18th	1h 48m	12m

Total for the week was 12 hours, 19 minutes. The overall average is 4.4 minutes per hour, including approximately 2 hours for the Sunday W.I.A. broadcast relays.

By comparison, "Wireless World" in April 1976 reported that usage of the London repeater, GB3LO, amounted to an average of between 51 to 58 minutes per hour throughout the period 8 a.m. to midnight, and remained substantial at all times except between 4 a.m. and 6 a.m.

- Brian VK2AXI.

FIELD DAYS

The Tamworth Amateur Radio Club's Field Day will be held on the 4th and 5th October (the long weekend). For details, write to P.O. Box W107, West Tamworth, 2340, or contact Peter Squire, VK2DAU.

NEW CALLSIGNS

Congratulations to David VK2YSN and Ted VK2YSS on their new callsigns; both have already come up on 2 metres.

SPECIAL RAFFLE

Tickets in the special raffle for a Kenwood SM-220 Station Monitor, ex VK2NUP, will be on sale at the meeting. One ticket for \$2, or 6 tickets for \$10. The Monitor is in mint condition, and only 160 tickets will be sold, so bring your money with you. (Winner will be drawn at June meeting).

The ANARTS has been formed to promote RTTY and other graphic forms of amateur communication. Each 2 months it distributes a newsletter "AREWISE" to members. It provides kits and machines and helps with developments. Regular broadcasts are made on Sundays at 0300 Z on 7.045 and 14.090 MHz, and at 0930 Z on 3.545 and 14.090 MHz at 45.45 bauds and 170 Hz shift.

Annual membership costs \$2. Write to the Secretary, ANARTS,
c/- 14 Atchison Street, Crows Nest, N.S.W. 2065.

Those who said just a few years ago that TTL was dead or dying were proved yet more wrong by the announcement of two new series by Texas Instruments. Both these third generation designs make use of the Schottky-barrier diode clamp technique.

Advanced Shottky TTL series SN74AS is twice as fast as the SN74S series while maintaining virtually the same power dissipation per gate. TI see it as an alternative to the current ECL family.

per gate. If seen it as an alternative to the current LS technology, the Advanced Low-Power Schottky TTL series SN74ALS is more than twice as fast as SN74LS and consumes half the power per gate. They will offer direct plug-in compatibility with present LS functions. The improved power performance will make the ALS series a viable alternative to standard CMOS, particularly at higher clock frequencies.

DEATHS FROM CB

Although there are now mandatory safety labels for CB and TV antennas in the U.S.A., the Consumer Products Safety Commission says this isn't enough to stem an alarming tide of electrocutions, most of them resulting from contact with power lines while the antennas are being installed. So the Commission is asking for proposed safety standards for omnidirectional CB base-station antennas, in an attempt to make them electrocution-proof. The CPSC says that antennas are the major cause of electrocution among consumer products, and estimates that 220 people were electrocuted while installing communications antennas in 1975; 275 in 1976; and 280 in 1977.

Only 100 lost their lives last year (1978), largely as the result of poor CB sales.

FINDING V.H.F. BALUN LENGTHS

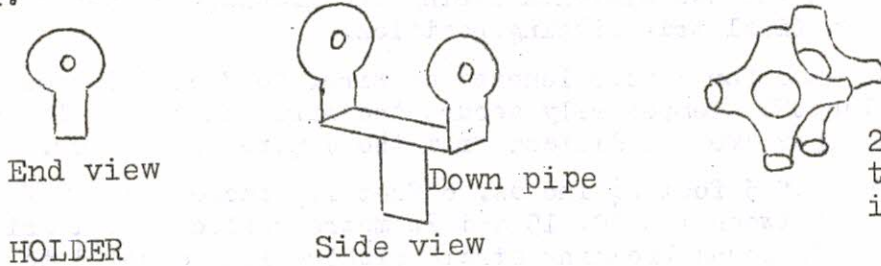
The grid-dip oscillator provides a handy means for finding the exact length of a half-wave coax balun. Starting with a piece longer than calculated, short one end with a short loop and couple to the g.d.o., which has been set at half the desired frequency. Unravel the braid at the unshorted end of the balun a little at a time until a "dip" is indicated on the g.d.o. The second harmonic of the g.d.o. can be monitored on the station receiver for super accuracy. This method is useable up the 432MHz band, since most g.d.o.'s go up to at least 216 MHz. Since the Q of the balun is high, coupling is easy and provides a positive indication on the g.d.o.

RADIOACTIVE
AREA
RADIO LESS ACTIVE AFTER 11.00 PM.

- Notice hanging on wall of
John's VK2VWT radio shack..

TWO-ELEMENT THREE-BAND SPIDER QUAD

A centre hub is the first item. Made from 2 rotary clothes line hubs and held together by making a holder as shown from $\frac{1}{4}$ inch thick steel.



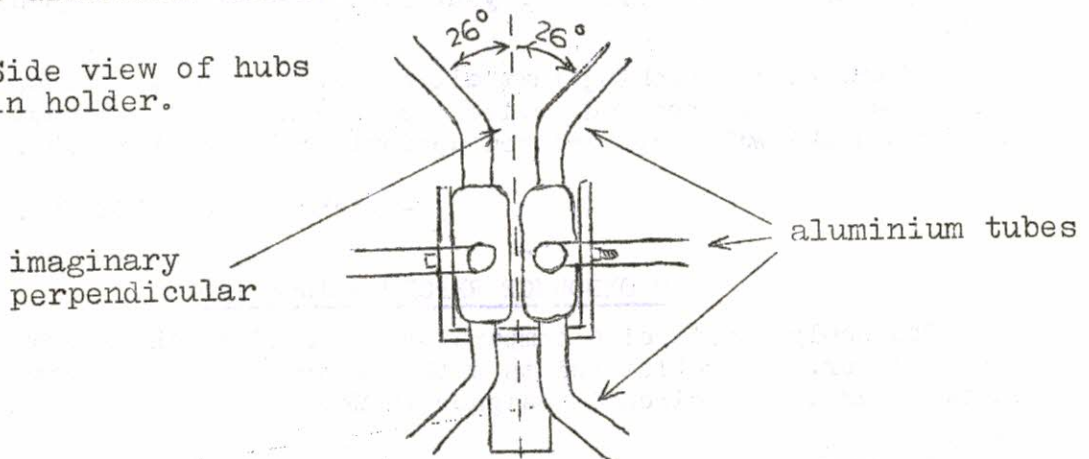
Approx. 6 inch long 2 inch water pipe used as down pipe and then welded onto the holder.

A bolt is then fed through the centre of the hubs and then out the other side of the holder. This bolt can then be tightened after antenna has been fully assembled. This will tighten the hubs and prevent them from turning independently of each other once the antenna is in the air.

Eight 3 feet lengths of 1 inch aluminium tubing are now required and are then inserted into the outer holes of the hubs. The inside of the holes may require a bit of filing so that the tubing will fit further and tighter into the holes.

A take-off angle of 26 degrees will now be necessary on each of the aluminium tubes.

Side view of hubs in holder.



Eight 15 feet fibreglass fishing rod blanks were then used. They slide perfectly onto the 1 inch aluminium tubes. Ensure that the tubes are all exactly the same distance and angle between each other. Then secure them to the hubs. The fishing rods are then slid onto the aluminium tubes and then secured by using fibreglass tape, resin and hardened. This completes the basic construction.

The next step is to securely mount the antenna onto a pole, so that the side for the reflector is facing the ground - i.e., the tips of the four elements for the reflector are touching or just above the ground. This makes mounting of the wires easy.

The two hubs may be left separated and all assembly of wires made in two separate parts. This will save turning over prior to 0.15 wavelength spacing between the driven and reflector wires.

Measure out a length of wire 36 feet 6 inches long, place this on the inside of the reflector elements and then overlap the ends together by 1 inch each, bind together with thin wire and then heavily solder the joined section. Slide the wire down the elements and when the wire is taut and equidistant from the centre of the hub, secure tightly and then bind the wire at the elements with fibreglass tape (several layers), resin and hardened. This is the 10 metre reflector wire completed.

Measure out 2 more lengths of wire, 48 feet 8 inches and 73 feet 9 inches long and do exactly the same as for the 10 metre wire. This then completes the reflector.

2 ELEMENT QUAD - CONTD.

Now turn the antenna over, so that the other four elements are facing the ground. Measure out a length of wire 34 feet 9½ inches long and place it over the elements and after attaching a 1:1 balun to each end of the wire, centre the balun so that the join in the wire and the balun will sit dead centre between the two elements facing the ground when the antenna is raised to its final transmitting position.

Do the same for 2 more lengths of wire, 46 feet 5 inches and 70 feet 1 inch in length. Temporarily secure the wires onto the elements and ensure that they are equidistant from the centre of the hub.

Spacings of 5 feet 2¼ inches, 6 feet 11½ inches and 10 feet 5¼ inches are required between the 10, 15 and 20 metre reflector and driven element wires. Use 100 pound breaking strain fishing line doubled to pull the elements to these measurements and secure. These distances are for good average directivity and spread of signal, but are not critical. They are based on 0.15 wavelength.

Now turn the antenna over, so that the driven element is now sitting as though it was in its permanent transmitting position. First test for SWR on 10 metre wire by connecting 75 ohm thick co-ax onto the balun and transmitter etc. By continually connecting and disconnecting the balun off the wire, trim off small portions of the wire until SWR drops below 1:1.5. Permanently secure the balun onto the driven wire and weatherproof balun and co-ax.

Do the same for the other two bands and then permanently secure, weatherproof etc.

When checking SWR, select a frequency approximately midway between the upper and lower portion of your favorite working frequencies for each band.

After double checking that all wires, elements, baluns, co-ax etc. are secured and weatherproofed, raise the antenna to its correct operating height and SWR will have dropped approximately another 0.2.

- Michael Keech VK2VXS.

MOONBOUNCE REPORT - June 1980

The newly built noise comparator was used to check over the GASFET preamplifier. A problem exists with the transistor and details have been passed back to the circuit designer in W6.

Microwave News.

An initial contact took place recently on 10GHz between VK2BYY portable at Stanwell Tops and VK2ALU portable at Port Kembla headland. Signals were S9 each way after adjustments were made to equipment.

Oscar Report.

The Oscar Phase 3 satellite was launched by European Space Agency rocket from French Guiana on 23rd May. Unfortunately one of the four rocket motors of the first stage of the rocket did not ignite and it went out of control and had to be destroyed.

This was a tragic end to what was to be the first amateur satellite in the Phase 3 series and was a great disappointment to all concerned with the Oscar program. A tremendous amount of work done by dedicated amateurs in a number of countries throughout the world and well over \$100,000 in Amsat finance was lost.

It could be up to 3 years before a replacement can be built. Further donations will greatly assist to help to finance the construction of more of this series of amateur satellites, which may well revolutionise our methods of working DX during the 1980s.

I will be pleased to provide details of Amsat membership to any interested Club members.

- Lyle VK2ALU.

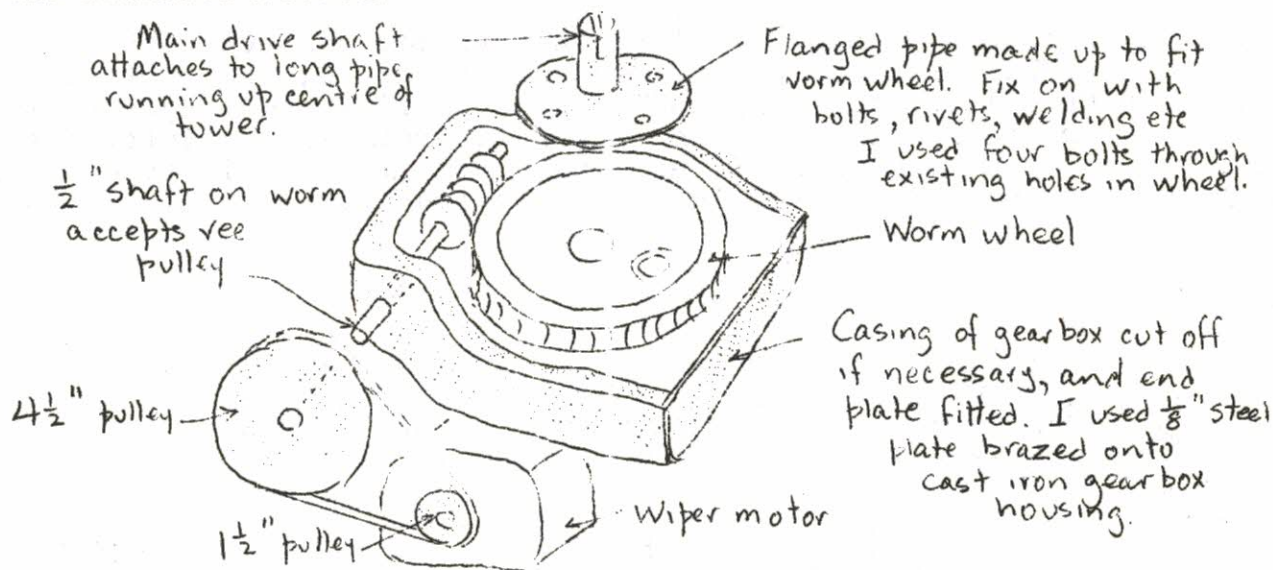
FOR SALE: A.W.A. CRO, working condition, \$65 on.o. and HMV record player with built in 30 watt amplifier, \$100 o.n.o. also works. Both are for sale only because they have been replaced by newer items. See Gio VK2VPD.

Details here are for a rotator constructed from washing machine gearbox and windscreen wiper motor. Performance figures approx:

1 revolution in 60 seconds
 Max. torque 40 foot pounds at drive shaft (500 Kg cm.)
 Operates from 9-12 volts D.C., 2.5 amps. Reversible.
 Dimensions: Depend on parts used. This model was approx.
 cylindrical, 240 mm high and 200 mm diameter.

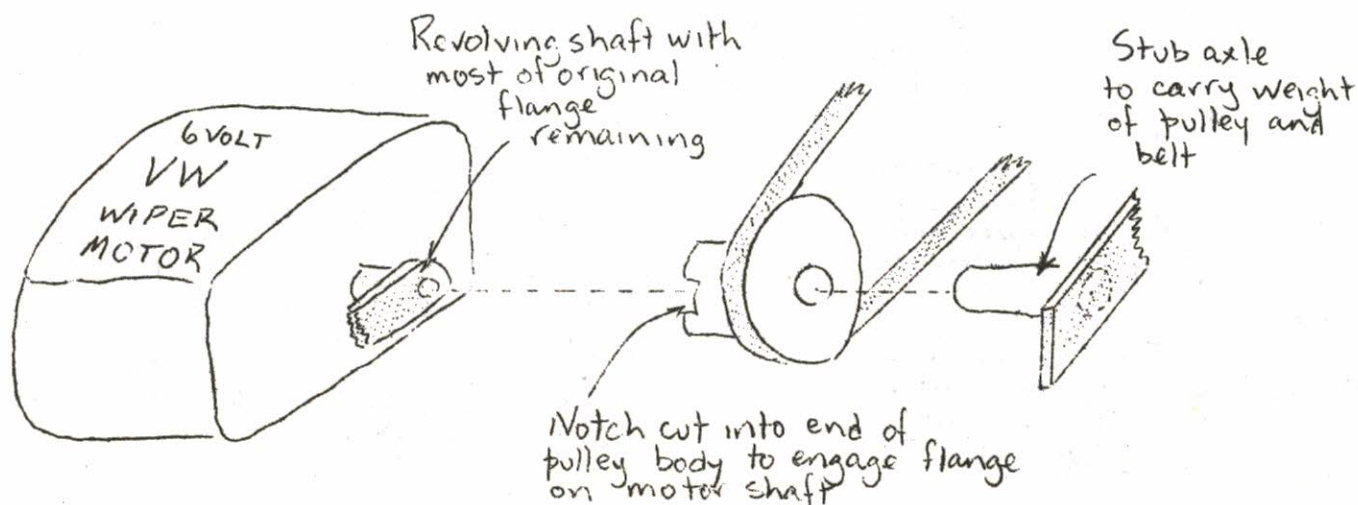
First the windscreen wiper motor: I used a 6 volt Volkswagen wiper, chiefly because that was the first one found at the local tip. But it's a good choice. Compact, robust, operates indefinitely from 12 volts. Reversible by simply reversing polarity of supply.

Next the Washing Machine gearbox: These vary of course. I used one from an agitator-type machine of unknown make. It had a hefty cast iron casing, easily cut down with hacksaw to retain only the worm and worm wheel. Gear ratio of the original was 20:1 (More recently acquired a much neater more compact box from a Lightburn machine, with ratio 30:1, and small enough to be used without cutting down. But too late!) Whatever gearbox you use, you will need to remove and discard the parts which gave the to-and-fro agitating motion, and retain only the worm and worm wheel. A suitable flanged pipe fitted to this worm wheel forms the driving shaft for the finished rotator.



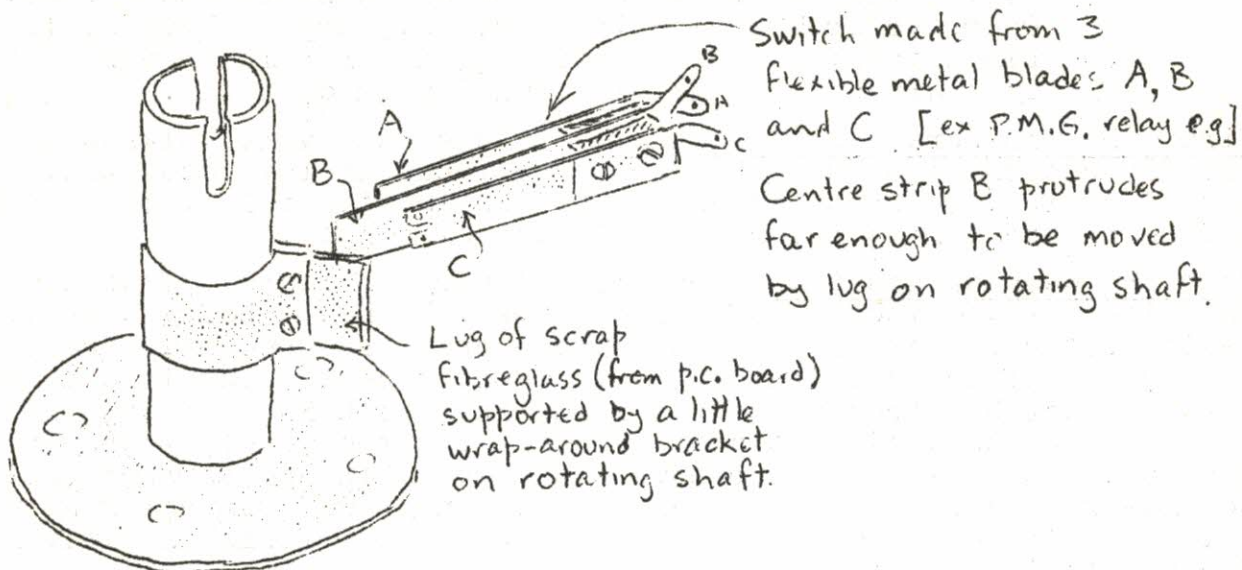
Both of the gearboxes encountered have had a $\frac{1}{2}$ " diameter shaft protruding, suitable for mounting a vee pulley. Now the wiper motor shaft revolves at approx. 60 rpm, and the final drive shaft is to rotate at about 1 rpm. So you need a step-down of about 3 to 1 between the wiper motor and the washing machine gearbox. I used light alloy vee pulleys and a B-section belt (not the heavier A-section...too stiff) In Wollongong, pulleys obtainable from Southern Industrial Supplies at 42 Flinders St, and belt from Apex Belting, 19 Kingsford St. Fairy Meadow. Cost last year was \$6.50 for two pulleys, \$1.50 for belt.

To support the smaller pulley, make up a metal bracket with a short stub axle of $\frac{1}{2}$ " diameter rod, and fix it to whatever chassis you construct. The smaller pulley runs freely on this axle, linked by belt to the larger pulley. The idea is to have the wiper motor supply torque only, without actually carrying the pulley.

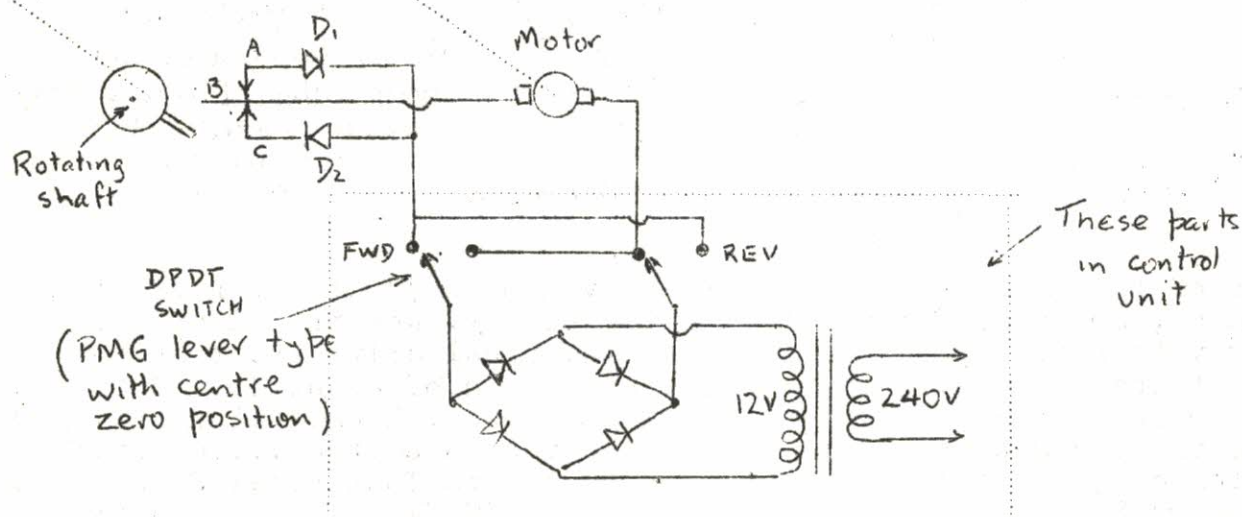


Home-Brew Antenna Rotator...continued.

The next problem is how to limit the rotation of the drive shaft so you don't keep winding the shaft round and round, and so damage the coaxial cable. Sketch here shows one way to do it:

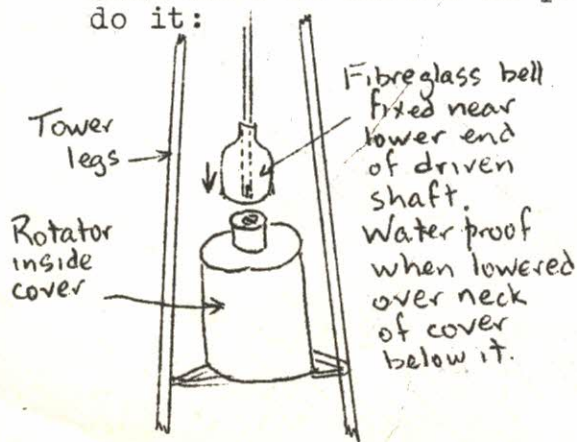


Normally blades A, B and C will be in metallic contact with each other. But when the shaft rotates far enough, the protruding lug of fibre-glass will bend lug B aside until it no longer contacts lug C (if rotating clockwise) or lug A (if rotating anticlockwise). Add two heavy duty diodes (I used automotive press-fit types ex junk box) and a reversing switch in the control unit, and you now have automatic travel limiting:



With the operating switch in the FWD position, current flows from power supply through motor, along blade B, into blade A and back through diode D_1 . Motor rotates shaft clockwise until lug depresses blade B, bending it away from blade A. Motor stops because path via blade C is blocked by diode D_2 . But motor will run in reverse from this position, because diode D_2 will now conduct when polarity of supply is reversed.

The whole unit when completed needs a weather-proof cover of some kind. Water will run down the drive shaft into the works, unless some kind of shroud is provided. The diagram shows one way to do it:



Finally, a brake of some kind so the beam doesn't thrash about in the wind and cause damage to worm and wheel. I've fitted a spring-loaded pair of brake pads high up the tower, clamped against the driven shaft. Brake is on all the time. It's like driving with the handbrake on, but the rotator has plenty of torque.

DISPOSABLE LIGHTERS WARNING

The following warning from an American company's staff magazine bears noting:

Recently a major railroad has experienced two fatal accidents caused by disposable Butane cigarette lighters. These accidents occurred in welding areas while employees were welding with Butane lighters on their person. A spark from the welder landed on the Butane lighter, burned through the case, exposing the liquid Butane which then exploded. One lighter was in a shirt pocket and killed the individual instantly. The other employee had a lighter in his pants pocket. The explosion blew the man's leg off - he died a short time later.

There is the same amount of force in a Butane lighter when it explodes as there is in approximately three sticks of dynamite. You should be aware of the danger present with these lighters in areas where welding and flame cutting operations are performed; also anywhere there are sparks, or an open flame.

-- This item, from the A.I.S. Kembla News, was sent in by John Pratley, VK2VWT.

DX AWARDS

For the award enthusiasts, here are details of the Hong Kong Awards.

Nine Dragons Award:

- * One contact with a country in each of the following 9 zones: zones 18, 19, 24 to 30 inc.
- * Contact for zone 24 must be a VS6.
- * Stations within the 9 zones require 2 contacts in each zone, with 2 VS6 contacts.
- * Contacts after 1 Jan 79 only valid.
- * Fee US\$3 or equivalent.

Firecracker Award:

- * Six contacts with different VS6 stations.
- * Stations within zones 18, 19, 24 to 28 require 10 contacts with different VS6 stations.
- * Contacts after 1 Jan 64 only valid.
- * Fee 10 IRC or equivalent.

Usual Conditions Certified log extracts only required.
HARTS, Box 541, Hong Kong.

TRUST THE BRITISH...?

In answer to a question in the House of Commons on July 3rd, the Postmaster General indicated that the widespread evasion of the payment of car radio licences was causing concern. The P.M.G. stated "my estimate shows that there are about three million sets in use, and that there are about two million evaders".

- Wireless World, August 1969.



STANDARD FREQUENCY TRANSMISSIONS

VNG

The Australian Post Office experimental Standard Frequency and Time station VNG, Lyndhurst, Victoria, is controlled by an atomic source and the accuracy is comparable with standard frequency stations in other parts of the world. As far as Australia is concerned it has the advantage of a shorter transmission path than WWV.

The frequencies used are 4.5, 7.5, and 12 MHz.

The time signals comprise 50 millisecond and 5 millisecond bursts of 1,000 Hz at one second intervals. The minutes are identified by substituting the 5 millisecond pulses for the 50 millisecond bursts towards the end of each minute and omitting the 59th second pulse.

During minutes 5, 10, and each succeeding five minutes, nine short 5 millisecond pulses are transmitted at the end of each minute. During all other minutes only four short 5 millisecond pulses are transmitted. Announcements in voice are made during minutes 14, 29, 44 and 59.

The 4.5 MHz transmission is from 0945 to 2130 hours UT. The 7.5 MHz transmission is continuous except for a silent period from 2230 to 2245 hours UT. The 12 MHz transmission is from 2145 to 0930 hours UT.

WWV and WWVH

Station WWV is located at Fort Collins, Colorado, and WWVH is located at Kauai, Hawaii. Both stations broadcast on 2.5, 5, 10 and 15 MHz. Both stations are controlled by caesium atomic oscillators, the frequencies being stable to better than one part in 10^{11} at all times. Changes in the propagation medium cause frequency changes which are several orders of magnitude greater. Both stations broadcast continuously.

Seconds pulses are transmitted continuously, even during tones and announcements, and are derived from the same oscillator which generates the carrier frequency. Each minute, except the first of the hour, begins with an 800 millisecond tone of 1,000 Hz at WWV and 1,200 Hz at WWVH. The first minute of the hour begins with an 800 millisecond tone of 1,500 Hz from both stations.

All time announcements are in terms of Universal Time (UT), which is essentially the same as Greenwich Mean Time (GMT) or Zulu Time (Z).

The 0 to 24 Hours system is used starting with 0000 at longitude zero. The first two figures give the hour and the last two figures give the minutes past the hour when the tone returns. The time announcement refers to the end of an announcement interval, i.e., to the time when the 0.8 second long audio tone begins.

At WWV a male voice announcement of UT is given during the last 7.5 seconds of each minute. At 10.35 UT for instance, the announcement is "At the tone, ten hours thirty-five minutes Coordinated Universal Time".

At WWVH a female voice announcement of UT is given during the period 45 seconds to 52.5 seconds after the minute. The voice announcement of WWVH precedes that of WWV by 7.5 seconds. However, the tone markers referred to in both announcements occur simultaneously, although they may not be so received due to propagation effects.

The female voice at WWVH and the male voice at WWV help to distinguish the two stations.

- from "Break In"

Prototyping Boards:

One of the problems in designing your own circuits is firstly to determine if the damn thing is going to work. Well here are some ways of finding out and then making it permanent.

You have probably seen the breadboarded circuits that John VK2BHO has had at the club meetings and that's the way they were done in the good old days (sorry about that John). There is a more modern way of using reusable breadboard - some of them are Protoboard and Bimboard and they are generically called prototyping boards. They are all similar in that they consist of a system of parallel and perpendicular interconnected holes so that you can connect components by pushing them into the appropriate holes. Once you have used a prototyping board you will wonder how you ever got by without one. In addition you can cascade boards so you build quite complex circuits simply and easily and if you want to change a component just pull it out and insert another.

Printed Circuit Boards:

Once you have your design up and running then the time comes to make your project a little more permanent. If you have never built a printed circuit board then now is the time to try. Once you have built a couple of P.C. boards you will never go back to perf board or similar material.

I started out using a fine tipped spirit dye marking pen as an etch resist. I transferred the required circuit onto the cleaned board using carbon paper. This method is a bit fiddly and a bit rough especially if you want fine lines - but, what can I say - it works.

Then a friend showed me a much better method. It is especially useful for one-off boards where the time spent making a suitable mask for a photoresist board is not worth the time. This consists of using rub-on letters and symbols supplied by a number of companies such as Bishop, Letraset, etc. A good one is marketed by Dick Smith (there's that name again) and is called E Z Etch. You can put this material onto Mylar film (from a draughting supply house) or you can put it directly onto the board since it is etch resistant. If you want to make more than one board then use the photo resist method - again the materials for making photoresist boards can be obtained from the local Dick Schmidt store. I bake the photo resist in an old Sunbeam frypan (my XYL wouldn't let me use hers).

Etching:

Once you have prepared the board by whatever method the next step is to etch off the exposed copper. The most usual method is to use Ferric Chloride solution but I reckon that this about the worst way. You will find it very difficult to see what is happening to the board and it is very slow. Much better is to use a hot solution of Ammonium Persulphate. This does a better and quicker job and you can at least see what is happening.

But if you really are in a hurry to see if you have left out some of the circuit or if half the tracks are going to peel off, then the best brew is a mixture of 50% hydrochloric acid (often called muriatic acid or spirits of salts) and a small amount of 100 volumes Hydrogen Peroxide. With this brew a board will only take 1 - 2 minutes to etch.

*** ALL OF THESE ETCHING MATERIALS ARE CORROSIVE - TAKE CARE.

After your etched board is cleaned of the etch resist and is dry drill the required sized holes and you're there (unless you wish to ask your XYL if she wants to enter your shack to see your etchings).

* * * * *

DEFINITIONS:

Golf Course: A site to be holed?

Wife: A person who can drive for miles without seeing a single antenna.

THE PROPAGATOR - Monthly newsletter of the Illawarra Amateur Radio Society

MONTHLY MEETING - Second Monday of each month (except January), at 7.30 p.m., at the Congregational Hall, corner of Coombe and Market Streets, Wollongong. (Between Kembla and Corrimal Streets).

CLUB STATION - VK2AMW

CLUB REPEATERS - 2 metres: VK2RAW Channel 5 (146.25 MHz in, 146.85 MHz out).

70 cm: VK2RUW Channel 1 (433.225 MHz in, 438.225 MHz out).

MONTHLY BROADCAST - 7.15 P.M. on the Sunday preceding the meeting night.

Broadcast frequencies are: Repeater Channel 5 (or simplex channel 40);
Repeater Channel 1 (70 cm);
28.46 MHz USB.

CLUB NETS - 6 metres: 8.30 a.m. Sundays - 52.525 MHz FM.

10 metres: 8.00 p.m. Sundays - 28.460 MHz USB.

THE PROPAGATOR

Newsletter of the Illawarra
Amateur Radio Society

Registered for posting as a publication
CATEGORY B

I.A.R.S.
POSTAGE PAID
WOLLONGONG
N.S.W.
AUSTRALIA
2500

MR. R. MCKNIGHT
14 IAN BRUCE CRES
BALGOWNIE

2519

I.A.R.S.,
P.O. BOX 1838,
WOLLONGONG. N.S.W. 2500.

PRESIDENT - Keith Curle, VK2OB, 24 Beach Drive, Woonona 2517.

VICE-PRESIDENT - Denis McKay, VK2VDM/YPI, 17 Doncaster St, Corrimal 2518.

SECRETARY - John Doherty, VK2NHA, 7 Risley Road, Figtree 2525.

TREASURER - Geoff Cuthbert, VK2ZHU.

COMMITTEE - Gio Donk, VK2VPD; Ron Dorin, VK2VOE; Les Marchmajer VK2ALK;
Dave Meyers; Ian Squires, VK2DKS; Brian Wade, VK2AXI;
Keiran Kennedy, VK2DAN.

PROPAGATOR EDITOR - Brian Wade, VK2AXI, 72 Murray Road, Corrimal. 2518.

AMATEUR RADIO CLASSES - Friday nights, 6-9 p.m. - contact Keith Curle or Denis McKay.

SLOW MORSE BROADCAST - From VK2AMW, Monday nights (except meeting nights), 7-8 p.m., on 1.805 MHz.

(02) 713 9021

2 CBA-FM Sydney