



# THE PROPAGATOR

MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO SOCIETY.

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

I.A.R.S. is a Member Club of the Wireless Institute of Australia.

<u>PRESIDENT.</u>	<u>SECRETARY.</u>	<u>EDITOR.</u>
Jim Potts, VK2BBG, 14 John St., WOONONA. 2517.	Brian Boseley, VK2BCI, 111 Bellevue Rd., FIGTREE. 2525.	Ian Bowmaker, VK2AGN, 15 Akuna St., KEIRAVILLE. 2500.

MONTHLY MEETING. Held on the Second Monday of each Month,  
at 7.30 pm., at the Wollongong Town Hall Meeting Room.

CLUB STATION - VK2AMW. CLUB REPEATER - VK2RAW, 2m, Channel 5.

I.A.R.S. MONTHLY BROADCAST.

The Monthly Broadcast takes place on the Sunday preceeding  
the Meeting Night each month, at 1900 Hours EAST.

Frequency used by VK2AMW for the broadcast is -  
Repeater Channel 5, or Simplex Channel 40.  
Relay by Brian, VK2BCI, on 28.460 MHz.

I.A.R.S. CLUB NETS.

6 Metre.	9.30 am Sunday,	52.525 MHz	FM.
10 Metre.	8.00 pm Sunday,	28.460 MHz	USB.

OCTOBER 1978

Members are advised that the monthly Meeting of the Illawarra  
Amateur Radio Society will be held at the Wollongong Town Hall  
Meeting Room at 7.30 pm on Monday 9th October, 1978.

Visitors are most welcome to attend.

A film of general interest will be shown at the meeting, as well  
as the usual Raffle.

ELECTION OF SECRETARY. Brian, VK2BCI, has had to relinquish his  
position as Secretary - he is moving to the Sunshine Coast.  
An election will be held at the October Meeting to fill the  
position of Secretary. Nominations may be made in writing prior  
to the meeting, and will also be taken from the Floor at the  
meeting.

We take this opportunity of thanking Brian for his efforts  
during his office as Secretary and wish him every success in his  
new venture up in JOH-LAND.

MEETINGS FOR REMAINDER OF 1978.

13th November, Talk by John Milton, District Radio Inspector.

11th December, Auction Night. Found your items for sale yet?

Hopefully no printing problems this month, we have some technical  
articles. If your article has not yet been published, dont  
dispair, it will be. What have you built recently? How about  
putting pen to paper and telling us about it.



### FOR SALE.

- (1) UHF unit, 432 MHz Simplex Xtals fitted.  
Same unit type as Repeater. \$70.
- (2)
- (3) STC Carphone, High band, FM. Unmodified.  
Well suited for conversion to 6 Metre band. \$25.
- (4) Various High and Low band FM transceivers suitable for  
conversion to Amateur bands.  
Price \$5 each - proceeds to Club funds.

Contact Brian Boseley, VK2BCI, at meeting or home QTH.

### WANTED.

Circuit diagram for Barlow Wadley XCR30 portable communications receiver. Will photo copy and return.  
Peter Laughton, at meeting, or phone 29 5047.

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### CONGRATULATIONS. New Call Signs.

Les Kirchmajer now holds VK2ALK, formerly VK2ZEB/VK2NHI.  
Richard Fox has now added VK2NRK to his VK2ZF0.

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### Moonbounce Report - October 1978

Detailed inspections and discussions are being held by University staff on the best method of shifting the dish, for costing the move.  
A final decision is expected shortly.

### Oscar Notes

Oscar 7 was not operating on Mode B for a couple of weeks but is now back on this mode. There is quite a high noise level on the passband. Contacts have been made with strength 8 signal reports, but you have to put about a strength 6 signal into it in this mode to do much good.

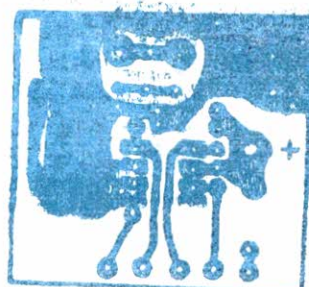
Mode A operation is no problem.

Oscar 8 Mode J is still my main interest. Checks with VK2RX indicate that signals are fairly good, but do not seem to appear during portions of some passes. The reason for this may be discovered now that I have my 100/25kHz frequency scanner operating. The beacon seems quite weak on this mode.

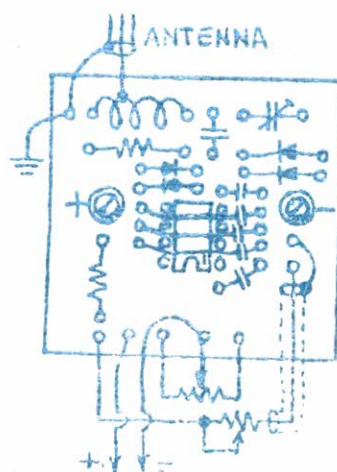
Mode A operation is quite easy to use and is thus very popular with the Oscar fraternity in general.

Those of us who use beams for Oscar operation will find the going somewhat easier when the elevation and azimuth information is published in October AR, for Oscar 8 passes. In the meantime my thanks go to Allen VK2RX for his assistance in providing me with this information.

Lyle VK2ALU.



2M SNIFFER  
P.C. BOARD  
COPPER PATTERN



LAYOUT FROM ABOVE

MOUNT BOARD  
ON BACK OF  
METER.  
NOTE BYPASS  
CAPACITORS  
MOUNTED OVER  
THE 741.



# I.A.R.S. COMPONENTS STORE

## CAPACITORS.

GREEN CAPS. .001, .0015, .0022, .0039, .0047, .0056, .0082,  
and .01, each 10c.  
.039, .047, .056, and .082, each 15c.  
.1, .15, and .47, each 20c.  
ELECTROLYTIC CONDENSERS, 25V, double ended.  
4.7uF, 10c. 100uF, 15c. 220uF, 20c. 470uF, 25c.  
2500uF, 50V, 2.00. 4700uF, 50V, 2.00.

## TRIMMER CONDENSERS.

Wire wrap type trimmers, reduced to ... 5c.  
PCB mounting trimmers, 3-13pF and 2-20pF, each 10c.

## TANTALUM CAPACITORS.

.47, .1, 1.5, 2.2, 4.7, & 6.8 mF each 20c.  
10mF, .. 25c. 22mF ... 45c. 47mF ... 65c.

## NEOSID COILS.

Former .. 10c. Slug, F29 (VHF) ... 10c.  
Cans.... Single, 10c. Double, 15c.  
Small Balun Former, 15c.  
Coil former and can complete, 10c.

## CABLES AND CONNECTORS.

Belling Lee. Sockets, 50c. Connectors, 50c.  
PL259 Plugs, 1.00. SO29 Sockets, 1.00.  
Adaptors for RG58U cable for PL259 plugs, 25c.  
60-AXIAL CABLE. RG8U (heavy) ... 1.20 per metre.  
RG58U (light) ... 50c. per metre.  
Sheathed, light hook-up co-ax, lengths of 4 metres, 1.00.

METERS. S Meter 400uA 1-3/8 x 5/8 ..... 2.50.  
Level Meter dual 200uA meters, illuminated. .. 3.00.  
2" sq. 100mA centre zero meters. ... 6.00.

RESISTORS. Bag of 160 1/4 watt resistors. ... 4.00.  
10 each of values 10, 47, 68, 100, 220, 470, 680,  
1K, 2.2K, 4.7K, 6.8K, 10K, 22K, 47K, 68K, & 100K.

DIODES. 1N4148 ... 10c. OA91 ... 15c.  
EM404 ... 20c. EM410 ... 25c.

LED's. colour RED ..... 35c each.

I.C.'s. 741 ... 85c. LM38 ... 1.35.  
7812 regulators ... 2.00. NE555 ... 90c.

TRANSISTORS. MPF13L ... 85c. BC109 ... 35c.  
2N3568 .. 30c. TIP32A .. 50c. BF167 .. 50c.  
2N3054 .. 80c. 2N5485 .. 95c. 2N5457 .. 50c.  
2N5459 .. 50c. 2N5416 .. 50c. 2N3568 .. 30c.

## PCB TRIM POTS.

Values, 2K, 5K, 10K, 25K, 50K, & 100K. .. 25c each.

## PRINTED CIRCUIT BOARD.

Fibreglass PC board, copper on one side.

Sheet sizes - 18" x 5" ... 1.50.  
12" x 4 1/2" ... 1.00.

## POTENTIOMETERS.

Values of 5K, 10K, & 25K. each 50c.

SUPPRESSOR RESISTORS for ignition high tension leads.  
In line, screw type. each ... 50c.

## SUNDRY OTHER ITEMS.

Cable clamps .. 10c. ea. Plastic Tape .. 20c.  
Power Cords... 1.00 ea. Wafer Switches... 1.00 ea.  
Meter Leads... 20c. pair. Four Pin Plug & Socket... 10c.  
Alligator Clips - large, insulated, Red or Black... 10c.



## FOXHUNT - SEPTEMBER.

The Foxhunt on Sunday 24th September was thoroughly enjoyed by all the participants. Fox(es) for the day were Brian, VK2AXI, and Rick, VK2NNL, who, determined to be really sneaky, buried the transmitter and antenna in a Woonona sandhill. The local Hounds are getting pretty good these days, and within an hour Keiran, VK2ZKU, appeared on the only access road, Jim, VK2BBG inexplicably drove out of the scrub, and Les, VK2ALK, arrived systematically on foot.

Honours for finding the Fox go to Tim Reynolds, who was apprentice to Keiran, VK2ZKU, for the day - Congratulations Tim.

An enjoyable (if disorganised) picnic followed with Ken, VK2BIZ, SWL's Paul and Brad, and XYL's and Harmonics.

Footnote - These outings present a good opportunity for members and families to have a day of social activity. Please note that you are most welcome to just come along for the outing - you don't necessarily have to participate as a Hound.

## CHANNEL 5A.

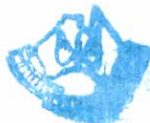
Have you voiced your opinion yet? At the October Meeting we will have copies of a letter for members to sign so that the Club can then post to the appropriate Members of Parliament.

In addition to the letters, the Committee will be making direct personal representation to the Local Members to make the opinion of I.A.R.S. known.

Our Main principle of objection to any proliferation of the use of Channel 5A is that in fringe areas there will be interference with TV reception by Amateur transmissions in the 2 Metre band with the almost certain result that we will lose all or part of our present allocation in that band.

Make sure you sign a letter. Help the WIA to help Amateurs.

# The Wireless Institute of Australia



THE UNITED VOICE OF AMATEUR RADIO

**DOES IT SPEAK FOR YOU?**

**Give the Amateur Service a Stronger Voice**

**JOIN NOW!**

**DON'T STAND BY AND WATCH US LOSE OUR BANDS.**

CONTACT Geoff Cuthbert,  
VK2ZHU, for further  
details and Membership  
Application Forms.

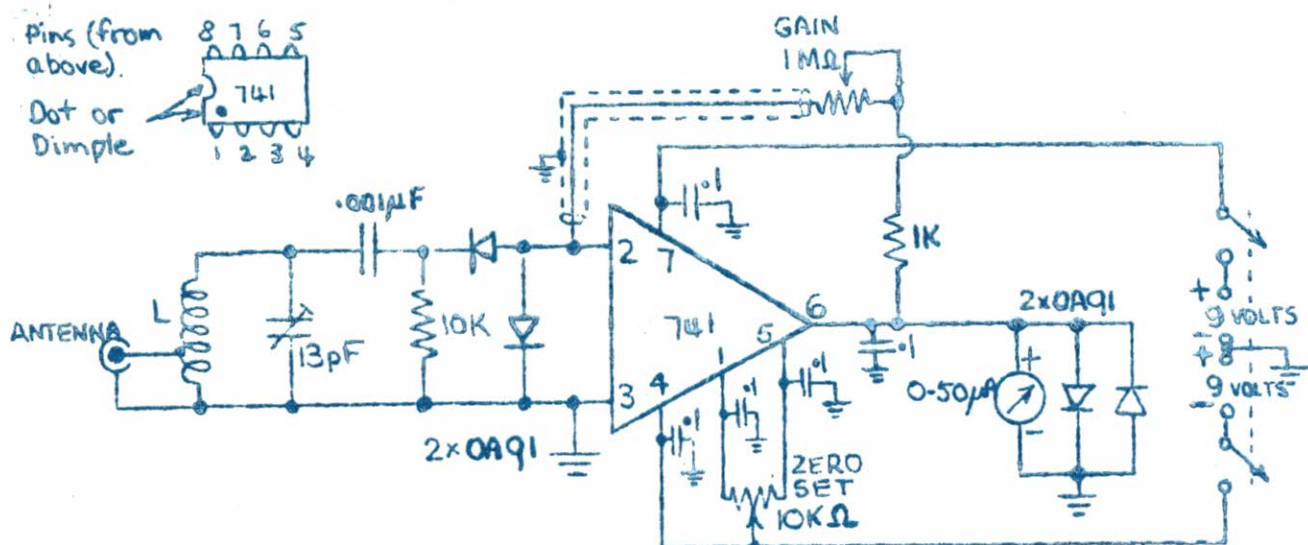
## FOR SALE

2 Metre FM Transmitter-Receiver Unit - with Handbook - same as the unit used to develop the original Wollongong Repeater - with Ch40 xmit. xtal. and modified to 3 channel receive xtal. switching. \$80.  
VK2ALU Ph. 296984 or Callbook address.



## A TWO-METRE SNIFFER

This simple design should help you to find that elusive hidden antenna at the next fox-hunt.



Coil L: 5 turns, 22 SWG, 5/16 inch diameter, 1/2 inch long, tapped at two turns from the earthy end.

Parts: (Mostly obtainable at the I.A.R.S. store on meeting nights):

- 1 x 741 integrated circuit.
- 4 x OA91 diodes
- 1 x 10K linear potentiometer
- 1 x 1M linear potentiometer
- 1 x 10K  $\frac{1}{4}$  watt resistor
- 1 x 1K  $\frac{1}{4}$  watt resistor.
- 1 x 13pF trimmer capacitor
- 1 x .001 uF disc capacitor
- 5 x 0.1 uF disc capacitors
- 1 x 0-50 microamp meter
- 1 x double-pole switch
- 2 x 9-volt batteries with clips.
- 1 x coaxial antenna socket.

**NOTE — FOR  
PC BOARD PATTERN  
+ LAYOUT SEE  
ELSEWHERE IN  
THIS ISSUE.**

### Construction:

1. The circuit can be assembled on veroboard or P.C. board, and mounted direct on the back of the meter.
2. The lead from pin 2 of the I.C. to the 1M potentiometer should be shielded to prevent feedback.
3. The 0.1 uF bypass capacitors at pins 1, 4, 5, 6 and 7 of the I.C. should be returned direct to pin 3, using the shortest leads possible, to avoid instability. In the prototype, these capacitors were mounted directly over the I.C.
4. Generally keep all leads as short as possible.

### Adjustments:

1. With the 1M and 10K pots centred, switch on. Adjust the 10K to produce a zero reading on the meter. At high gains, the zero reading drifts quite a lot with temperature.
2. Using the signal from a nearby 2 metre transmitter, adjust the 13pF trimmer for maximum meter deflection. The amplifier gain is controlled by the 1M pot, with maximum gain being obtained with maximum resistance. The diodes across the meter prevent it being "slammed" too hard.

### Use:

With all the circuitry mounted in a small metal box, attach a quarter-wavelength antenna to the socket. (About 19 inches of straight wire will do.) Then proceed in whichever direction shows an increase in the meter reading - and you should end up finding either the fox or Channel 5A!

Brian VK2AXI



# IMPROVED EARS FOR YOUR 2 METRE RIG

Peter Smith, VK1DS  
6 Rowell Pl.,  
Weston 2611

Want a really hot pre-amp to improve the performance of your 2 metre receiver? Well here is something special - designed by Peter Smith, VK1DS. A gain of 21dBm plus a bandwidth of 4 MHz plus a noise figure of 1.5 dB plus a current drain of 5-10mA really adds up to startling performance.

For best results the unit must be completely screened. Try double-sided circuit board or tinplate for good results. Box dimensions are non-critical except that the circuit Q will be reduced somewhat for smaller boxes. A box size of 70mm by 32mm by 26mm gives good results. An internal screen between L1 and L3 is required as shown and the neutralizing coil should be housed in a screening can. The 2N5245 FET is inexpensive and offers achievable noise figures in the order of 1.5 dB for wide bandwidths. Details are listed below:

- L1 5T 16 B&S wound on 5/16" dia. former, 1/2" long, air wound, tapped at 1 1/4T from earthy end.
- L2 12T 30 B&S enamelled close wound on 5mm Neosid former, with F20 tuning slug.
- L3 5T 16 B&S wound on 5/16" dia. former, 1/2" long, air wound, tapped at 1T from earthy end.
- C1, C2 1 - 10pF good quality piston trimmers
- Q1 2N5245 running under Idss conditions : measure drain current which should be 5 - 10mA. If not, select another FET. Out of 14 different FETs tested, all but one had an Idss between 5 - 10mA, and all noise figures were between 1.4 and 1.8 dB.

## TUNING UP AND NEUTRALISING PROCEDURE

1. Connect pre-amp as shown in Fig. 3a  
Obtain a weak signal source and adjust C1 and C2 for max. signal.  
It is possible that the pre-amp may oscillate, if so...
2. Reverse pre-amp as shown in Fig. 3b  
With pre-amp in this configuration, we obtain a fairly strong signal - strong enough to give a good signal strength reading. Adjust only neutralizing coil L2 for a minimum signal strength reading. This adjustment should be well pronounced and easily identifiable. The minimum notch should be quite deep (e.g.) for a given input signal there should be at least a forward/backward signal difference of 45 - 50dB
3. Repeat the above until no significant adjustments are necessary. In this state of tune, the pre-amp should be unconditionally stable, i.e.) stable under all input conditions.

**NOTE:** When using a pre-amp to improve receiver performance it is better to replace the existing front end stage (or by-pass it) with the new one, rather than put the pre-amp in front of an existing stage. That is to say, it is good design to have only sufficient gain necessary for low noise figure ahead of the mixer.

**NOTE:** Two of these units can be cascaded without problems ahead of a diode demodulator for r.f. sniffing purposes etc.

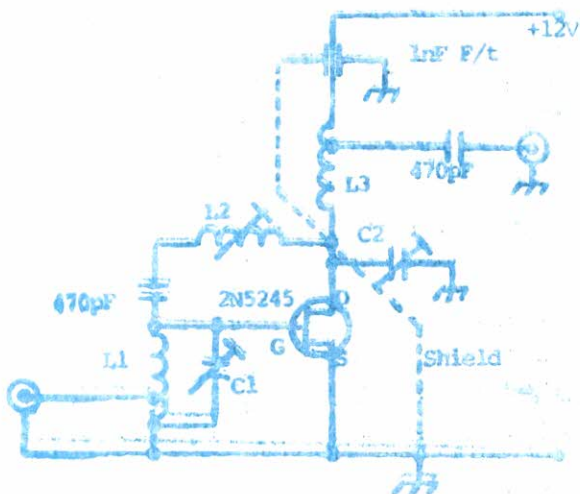


Fig. 1 Basic pre-amp circuit.

FROM  
Forward Bias May 1978

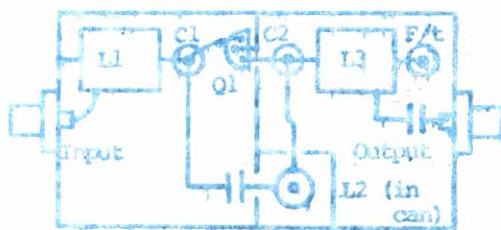
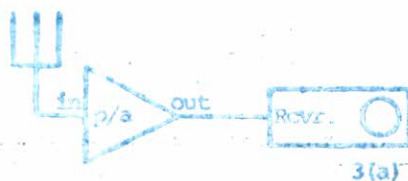
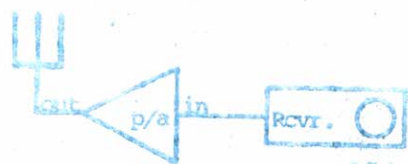


Fig. 2 Layout. For dimensions see text.



3(a)



3(b)

Fig. 3 Neutralizing procedure.

Note: The above first appeared in "The Lyrebird", newsletter of the Mid South Coast Amateur Radio Club, Issue 2, Autumn 1978:



# HELICAL WHIP ANTENNA CLUB.

A 40 metre to 10 metre MOBILE aerial without taps, traps or retuning.

+ Adapted from an original article by H.L. Booth ZE6JP.

Acknowledgement: Reprinted by courtesy of Westlakes Radio Club.

The aerial about to be described must be the biggest advance in mobile aerials since mobile aerials were invented.

The aerial features little initial tuning and no adjustment required when changing bands, it being necessary only to reload the transmitter on 40, 20, 15 or 10 metres.

With only one operation the whole 10 metre band is also available (within a second or two) while 40 to 10 can be used again just as easily.

The performance is exceptional and the author indicates contacts over 1600 km on 80 (using 40W); 1000 km mobile to mobile on 40; world range on 20, 15 and 10 mobile.

Basically this is a helical on a fibreglass rod but with the exception that careful design causes a near normal distribution of voltage and current along the aerial.

Ideally a parallel rod would be best but it is possible by some easy calculations to find the winding for a tapered rod.

Theory: The basic formula for any helical whip, whatever the frequency (3 - 100 MHz) is  $\frac{256}{f}$  metres of wire (where f is the operating frequency)

wound on a rod provided that the top third of the rod is close wound. If less than one third's close wound more wire will be needed; if more than one third, less wire.

Winding: The length of the rod represents a quarter wavelength aerial (90 electrical degrees). To facilitate winding, divide the rod (whatever its length) into nine sections. Now refer to the form table (diagram 1). Use this table, ignoring the 10 and 20 percent turns.

Gauge of wire: One third of the rod (which must be close wound) needs 71% of the total turns or length of wire (parallel rod).

Since the rod circumference is 3.14 times its diameter, dividing 71% of the length of the wire by the circumference will give the number of turns to be close wound.

Example:

40M rod, length (say) 2.7 metres.

Wire length (total) =  $\frac{256}{7.1} = 36.05$  metres.

Assume 13mm rod diameter then circumference =  $13 \times 3.14 = 40.82$ mm.

Now each turn uses 40.82mm and the top third of the rod must take 71% of the wire. So 71% of 36.05M = 25.6M.

If each turn takes 40.82mm, then there are =  $\frac{25.6 \times 1000}{40.82}$  (mm)  
630 turns.

Now we must find a suitable gauge of wire since we have to wind 630 turns on one third of a 2.7 metre rod.

630 turns in .9 metres.  
= 1.43mm wire (7 turns/cm)  
(about 17 SWG. 15 B & S).

Now what about a tapered rod.

In .9 metres a typical rod will taper from 11.5mm to 6mm (average is 8.75 mm) Using the same formula. Average circumference =

$8.75 \times 3.14 = 27.475$ mm.

So number of turns =  $\frac{25.6 \times 1000}{27.475}$  or 930 turns approx.

In .9 metres with 930 turns each turn will take .96mm. This requires 10.4 turns per cm of 20 SWG 19 B & S.

\* For the purposes of this helical whip it is inadvisable to use a gauge of wire which is thinner than 22 SWG so this tapered rod is the minimum one could use for 40 metres.

Now when winding the remainder of the rod each 10 degrees is taken separately: The next .3 metres takes 9% of the winding length, the next .3 metres 7% and so on (refer form table).

As the taper of the rod is consistent the turns may be calculated by ~~xxxxxxxxxx~~ top and bottom diameters of each section.

9% of 36.05 M = 3.24 M.

So, taking on rod diameter for the section to be 12.25mm circumference is 38.5 approx.

$\frac{3.24 \times 1000}{38.5} = 84$  turns or 2.8 turns per cm average.

Next section:

7% of 36.05 M = 2.52 M or  $\frac{2.52 \times 1000}{44} = 57$  turns. 1.9 turns per cm average. And so on.

P.T.O.



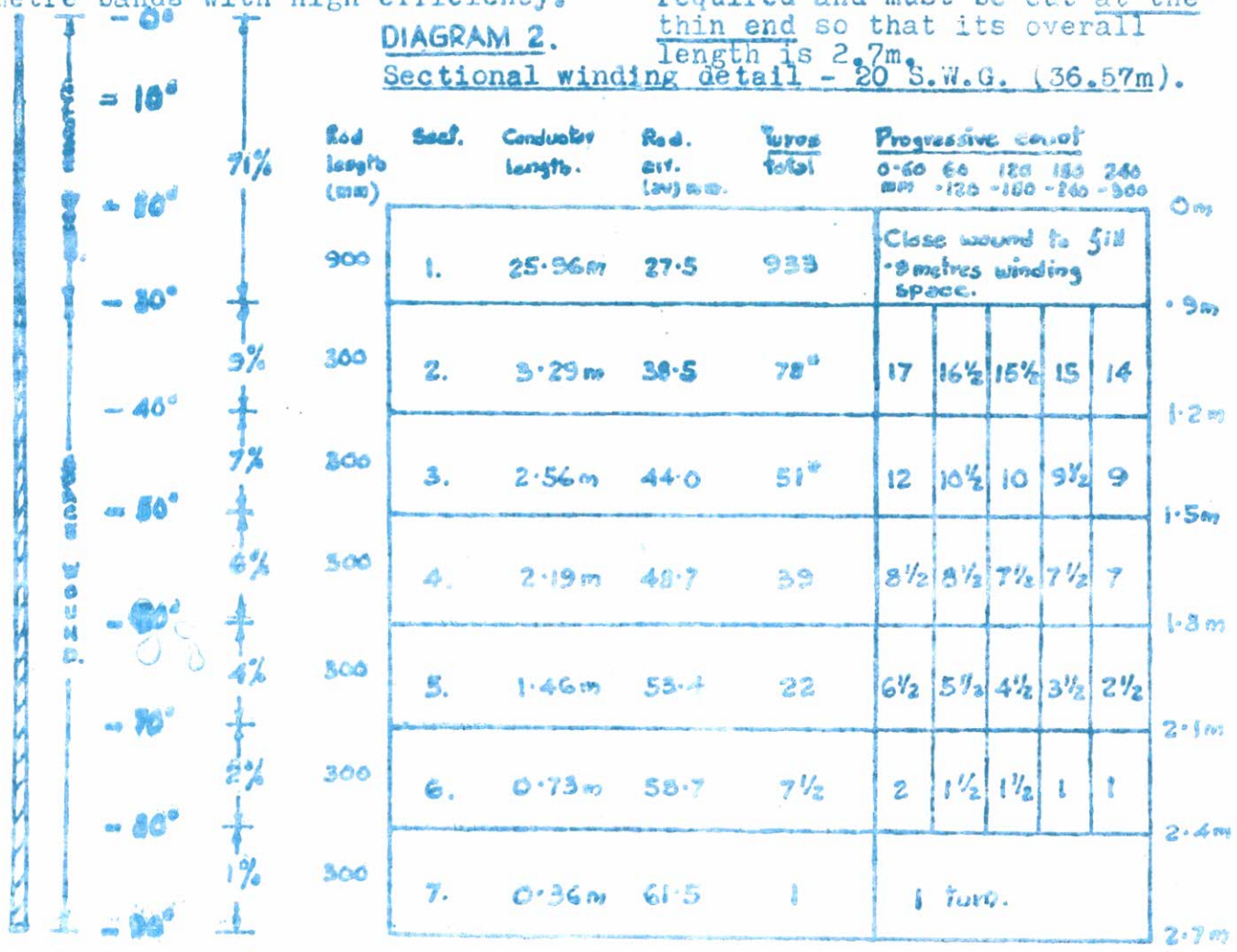
Details for winding will be found in the winding table (diagram 2). When all the winding is complete check all the turns and see if they change of pitch is gradual without any rapid changes. Smooth out any irregularities. Now, except for the top 10 cm, wrap the whole with fibreglass tape and prepare to coat all this with fibreglass resin. At the same time arrange some suitable non-ferrous plug for the base of the rod. This will be left to the individual's own type of requirements.

**Tuning:**  
First the whip must be fitted into the base, attached to the car and fitted with a single turn loop from the aerial to earth (car body). The car should be parked in the clear (away from near metal objects and at least 6 metres clear all round) with the doors shut as well as the boot and bonnet lids. Now lie on the ground and apply a GDO to the 1 turn loop. Look for a dip on 7015 KHz. If there is no dip remove turns, one by one from the top of the whip, until, still by lying on the ground the whip tunes 7015. When this point is reached the tuning is complete. The whip will now tune all 40 metres as well as 20, 15 and 10 metres by loading normally with a pi coupler. To use the whip on 80 metres it is necessary to add, in series a 60 µH (approx.) choke at the base of the aerial. Check resonance after fitting the choke and if the aerial will not tune 3.5 MHz adjust the choke not the aerial.

A basic design for helical whip on 7 MHz which, because of design may be resonant on 20, 15 and 10 metre bands with high efficiency.

Information relates to fibreglass fishing rod blank - type SPORTEX B525. This rod is longer than required and must be cut at the thin end so that its overall length is 2.7m. Sectional winding detail - 20 S.W.G. (36.57m).

**DIAGRAM 2.**  
Sectional winding detail - 20 S.W.G. (36.57m).



Electrical length (meters)  
Winding length (per cent)

**DIAGRAM 1.**

\* No. of turns must allow for a loss of 300 mm in each section as pitch is taken into account - hence variation in table turns with calculation (page 8).

**Note:** When tuning is complete for 7015 the whip may not load at the HF end of 15M. If so, remove turns, one at a time until resonance is achieved.

Because the input impedance of this whip varies from 15 ohms to 30 ohms depending on the band in use, standing waves must appear on the feeder whether it be 50 or 75 ohms. When tuning, it is best to disregard S.W.R. However, if it loads, it will work.



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KENWOOD TS600 6 Metre All Mode Transceiver.....	\$620.00
* We now represent VICOM in Wollongong and have access to the full range of VICOM AMATEUR EQUIPMENT.	
ROYCE SWR-Power Meter Dual Meters 0-10watt and 0 -100W F.S.D.....	\$ 35.00

CONTACT DARRY HARTLEY VK2FE

Prices Subject to Change Without Notice.

Above Items Normally Available Ex Stock.



THE PROPAGATOR

Newsletter of the Illawarra

Amateur Radio Society

Registered for posting as a publication

CATEGORY B.

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WOLLONGONG, NSW 2500

