Official Bulletin

MHz to GHz

The West Australian VHF Group Bulletin

AUGUST 2006

THE WEST AUSTRALIAN VHF GROUP (INC)
PO BOX 189 APPLECROSS e-mail editor to: piengineering@westnet.com.au

President	Luigi	VK6YEH	Vice President	Murray	VK6HL
Secretary	Terry	VK6ZLT	Treasurer	Chris	VK6KCH
Activities			Materials		
Publicity					
Librarian	Al	VK6ZAY	Museum Rep	Tom	VK6ZAF
Trustee	Wally	VK6KZ	Trustee	Don	VK6HK

AUG	21	COMMITTEE MEETING	NOV	20	COMMITTEE MEETING
	28	GENERAL MEETING		27	GENERAL MEETING
SEPT	18	COMMITTEE MEETING	JAN	15	COMMITTEE MEETING
	25	GENERAL MEETING		22	GENERAL MEETING
OCT	16	COMMITTEE MEETING	FEB	19	COMMITTEE MEETING
	23	GENERAL MEETING		26	GENERAL MEETING

General Meeting Place: Wireless Hill Museum Lecture Room. Entry via corner of Almondbury and McCallum Cresent Ardross.
Meeting Time: 8pm.

Editors Note:

Welcome to the 2006 issue of the VHF Group bulletin.

There has been a flurry of activity behind the scenes by the group and much has transpired in the last twelve months. Before going onto those items, the group needs to be advised of the up and coming annual general meeting in September. The committee is up for renewal and you will find a nomination form in the Club Activities section. If you wish to be come more involved in the day to day running of the group, or wish to nominated someone else, please fill in the form before the Annual General meeting. The group requires more people to become involved in its activities so we can keep a constant flow of new ideas and activities.

In line with the end of the 2005-2006 financial year, the memberships are up for renewal. If you haven't yet paid you subscriptions, please fill in the attached form and forward a cheque to the address shown above. Alternatively, one can pay at one of our general meetings. For any persons wishing to become new members, an application form is attached to the end of the bulletin.

If you are unsure as to your membership status, you can check your callsign at the groups web site at http://vhf.wirelessplanet.com.au/Membership/financial20062007.

This bulletins technical articles include, a T/R switch for mast head amplifiers and the construction of a simple 2M square loop antenna for field day activities.

Finally the editor wishes to thank all those who contributed to the bulletin.

Club Activities:

Results of the April 2006 Field Day

The number of logs received = 7. Of these there were x 3 base stations & 4 portables.

Base Stations	Portables
VK6CN = 159 points	VK6KCH = 286 points
VK6DXI = 172 points	VK6HRC = 630 points
VK6ZWZ = 319 points	VK6ZLT = 788 points
	VK6ZKO = 790 points

The day turned out to be an excellent field day with 7 portable operatives in the field.

Unfortunately x 3 portable operators have not submitted any logs

One of the outstanding differences in this year was the inclusion by many participants of the maidenhead locators which made distances and bearing more believable.

This provided participants with a generalized distance record without having the exact co-ordinates of latitude & longitude. It must be realized that the use of the maidenhead locator accuracy must be a priority if any sense is to be retained about distances between locations.

I myself used a program called "Tiny Locator" which is in the internet site of ON6MU @ http://users.belgacom.net/hamradio/tinylocator.htm

By the way if the whereabouts of an individual is known on a map without co-ordinates, use "Google Earth" whereby the cursor on the relevant picture will readout the lat/long which can be recorded and inserted into such a program as "Tiny Locator" to find out the maidenhead locator hence distances and bearing can obtained.

Some interesting stats

Base Stations	6m	2m	70cm	23cm		Total Contacts	Max Distance
VK6CN		23	6		=	29	198

VK6DXI	2	14	9		=	25	214.6
VK6ZWZ	6	19	15	4	=	44	191

Portables	6m	2m	70cm	23cm		Total Contacts	Max Distance
VK6KCH	5	6	1		=	12	111.5
VK6HRC		21	17		=	38	210
VK6ZLT	3	19	10		=	32	148
VK6ZKO	9	23	15	2	=	49	178

In review the emphasis becomes obvious that in this of type of competition participants have to be:….

1. Portable,
2. A decent distance from the base stations and as much distance between the portables as well. Preferably involve as many country stations *(more points)*.
3. As many frequencies as possible, try to generate more SHF contacts (it pays off in points).

Radio Contest Manager Terry VK6ZLT

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Wireless Hill Museum Ham Shack Proposal

Members may remember a proposal put forward to the group, towards the end of last year, for the construction of a ham shack at the wireless hill museum. Whilst the proposal itself was defeated due to lack of support amongst the membership, it did have the positive effect of generating discussion amongst the members. As a result several new ideas were generated and accepted by the committee. These are listed in the adjoining sections.

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Member Project Financial Assistance

One of the spin offs of the Ham Shack proposal, was the allocation of funds for the construction of equipment by members. This allows members to design and construct their own equipment, who may be otherwise limited by funding. The documented results of the completed project will be posted on the groups web site. It is hoped that this will stimulate more activity within the group and encourage new members. Details of the requirements for the funding can be found at:

http://www.vhf.wirelessplanet.com.au/papers/VHF%20Group%20project%20financial%20assistance%20requirements%20-%20Draft.pdf

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Beacon Monitoring Project

The committee has been having difficulty obtaining an up to date status of the various beacons around the state. Chris (VK6KCH), submitted a proposal to the committee for a project to monitor the signal strength of the beacons and log it over time. Along with a report as to the operational status of the beacon, path information over time would prove invaluable to those who are interested in propagation studies. Future features included e-mail alerts to members who were active in long distance propagation. Murray (VK6HL) has already begun work on evaluating remotely controlled receivers. A timely talk at the June general meeting by Phil VK6APH on software defined radios, proved interesting enough for the group to be also exploring this avenue. Further participation by other members is welcome and encouraged. Please contact the committee for further details.

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Foundation License

Bob (VK6PO) has been working towards obtaining an assessors accreditation for the foundation license. The group is working towards producing a policy facilitating persons wishing to become Ham operators. This includes providing courses and examinations for obtaining the foundation license.

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Committee Nomination Form

West Australian VHF Group Inc.
Annual General Meeting 25th September 2006

Nominations for Group Representatives

Position nominated:_____

Proposer:_____
Name Signature Date

Seconder: :_____
Name Signature Date

Nominee: :_____
Name Signature Date

Technical Article:

A T/R Switch Interface for PreAmps.

By Alan Woods VK6ZWZ.

Recently several VHF Group stalwarts have purchased kits for some very elegant VHF and UHF preamplifiers. While these can be used alone for satellite reception, most of us would find that half the fun of improved receive performance will be missed unless some method of T/R switching is added. The simplest approach is to use a couple of coaxial relays, but these still need to be controlled by the transceiver somehow. Many modern transceivers have an accessory socket which includes a pin that is grounded internally on transmit via the collector of a switched NPN transistor. Usually this transistor is not capable of handling high currents (no more than 20 mA for my rig) so is NOT suitable for directly controlling most relays. What is needed is a simple interface which is.

The interface circuit described here electronically switches a (nominally) +12 volt supply OFF when the accessory pin is keyed to earth. It can be used in two ways. The first is to run a separate lead carrying the switched supply voltage to the relays and (if desired) preamp. The second (which is particularly convenient for a preamp located remotely near the antenna) is to route the switched supply voltage via the signal coax to the preamp/relays. In the second case especially, it is highly desirable that the interface be short circuit protected. For example, if the driven element of the antenna is a folded dipole, and a "bullet" joiner is substituted for the preamp and relays, then … . The circuit meets this requirement. It is based on a simple regulator design I saw described in the "Readers' Ideas" pages of *Electronics Australia* sometime around the early 1970's. (Adding a zener diode from the base of Tr1 to earth produces a regulator, although the regulation will typically not be as good as expected from a modern IC regulator.) As I recall, the circuit evolved in two stages. It was first described without D1, in which case it has current limiting. Sometime later D1 was added to produce current fold back. Its main disadvantage is that the value of the 6.8 k resistor will most probably need to be varied, as it depends on the beta of Tr2. But that is the fun of experimenting!

Here is a crude description of how the circuit works. Tr1 has an "emitter follower" action. In normal operation, this combined with "DC negative feedback" via the forward biased diode D2 keeps the output voltage close to that at the base of Tr1. Unless the keying line is grounded, this will be close to the input DC supply voltage. But if the transceiver is keyed to transmit, it drops to a low value. Note

that in any event, the current though the 6.8 k resistor cannot be more than the input supply voltage (13.8 V) divided by 6.8 k (Ohm's law!), that is, approximately 2 mA. Under normal operating unkeyed conditions it will be close to this. But the current through the 6.8 k resistor *includes* the emitter current of Tr1, which is approximately the same as its collector current, and that is of course the same as the base current of Tr2. So the collector current of Tr2 is at most 2 mA times the beta of Tr2. If the beta is 50 (a typical value) then the output current can never be more than 100 mA. On the other hand, up to nearly this much current can be supplied without appreciable voltage drop. My preamp and relays draw about 80 mA so this is what I needed, but you can increase the current available by reducing the 6.8 k resistor!

Now what happens under short circuit conditions? Suppose the resistance of the load is so low that it would draw more than 100 mA were the full supply voltage applied to it. Well as we've just seen, it can't draw that much current from the interface output! By Ohm's law (again) something must have restricted the voltage across the load. That something is of course Tr2. With this lower voltage, D2 is turned off. And as a bonus, below an output voltage threshold, D1 will be turned on, dropping the voltage at the base of Tr1 and consequently (by essentially the same chain of reasoning) the output current supplied by Tr2. So the output current "folds back" to a low value.

The 1 k resistor and diode in series with the keying input are not strictly speaking necessary. They are part of my effort to "fool proof" the design. At my QTH the resistor lives inside the accessory plug housing, so that even if the keying line inadvertently comes into contact with 13.8 V the dissipation rating of the rig's internal switching transistor won't be exceeded. Their inclusion has the drawback that on transmit the supply output voltage doesn't quite drop to zero. However the voltage across the relays will be quite low if a silicon diode is included in series with the supply line at the relays/preamp for reverse polarity protection. (You do have polarity protection in your preamp, don't you?)

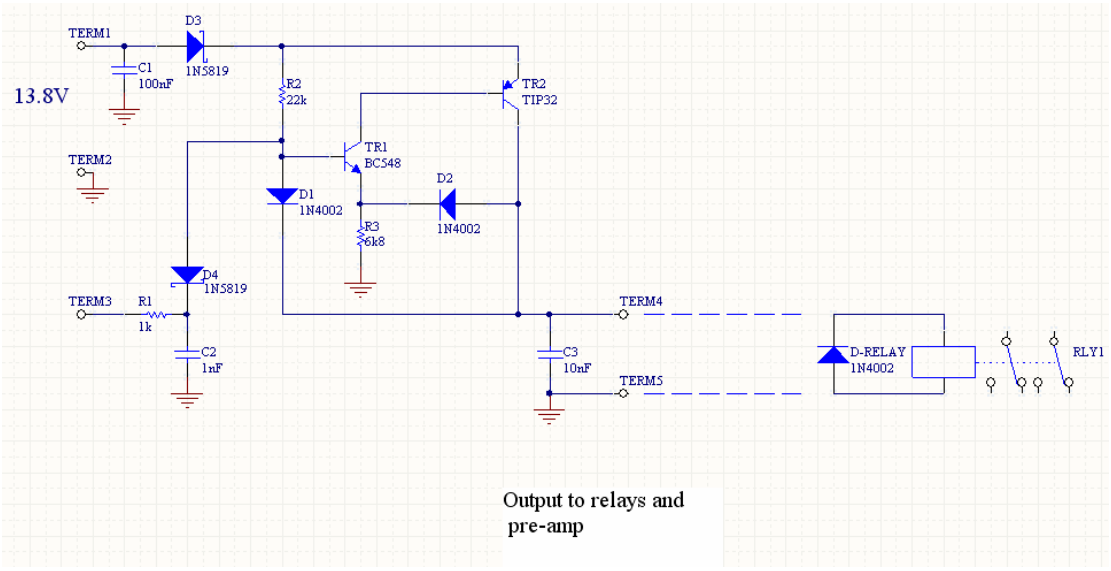

Figure 1 - T/R Switch Circuit

While on the subject of protection, a pair of back-to-back diodes at the output of the preamp (possibly followed by a low value attenuator if the coax loss from the rig to the preamp is low) may save the preamp transistor, should a brief squirt of RF get past the coaxial relay on changeover. But be warned that unless you have built in VOX switching for the relays, *nothing is likely to save the preamp should you have DC on the supply line and then transmit without the interface's keying line being earthed. This could occur if the keying input of the interface somehow becomes disconnected from the accessory socket.* If you use a phono plug on the keying lead from the transceiver, a self shorting jack at the interface may give some protection, but there is always the problem of the other end of the lead!

If you do decide to feed DC up the coax, be aware that it is vital to test that the RF loss in the decoupling circuits is acceptably low. A loss of 1.5 dB at each end (which doesn't sound like *that* much) means you are loosing *half* your precious transmit power. High quality blocking capacitors capable of handling RF power are essential. These can be scrounged from the output boards of ex-commercial service FM transceivers. (The VHF Group probably still has a few of these for sale.)

Suitable RF chokes can often be found there too, if you don't want to wind your own. On 1296 MHz, quarter wavelength pieces of thin wire supported above a ground plane (and multiply bypassed at the "supply" end) can be used in place of chokes. Presumably you will want to house the circuitry for putting DC on the coax in a metal box as I have done. You should run coax (or 50 ohm stripline) between the RF input and output, with the coax outer conductor (or stripline ground plane) earthed directly to the N types *at each end*, and with a minimal interruption in the inner conductor to accommodate any blocking capacitor. As usual, the minimum possible length of shield should be removed at each end.

Editors Note: Remember to put a flyback diode, in close proximity, and across each relay as shown on the circuit.

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A Field Day 2M Antenna.

By Luigi Iemi VK6YEH.

I was inspired by efforts of Terry (VK6ZLT) to have a look at the 2M square dipole antenna originally detailed in an article George K0FF and replicated by Mike Gunter AF4NR. The respective web sites are listed below. Terry wanted to build this antenna for use in the up and coming field day and I decided to follow suit.

http://www.eham.net/articles/4319?ehamsid=89bf12badc6d56c1ecbf8e8607b1f5a8
http://www.hamuniverse.com/loop.html

I tried obtaining the desired parts from the local Bunnings store. Unfortunately their selection of plumbing fittings were somewhat limited, so I had to improvise. In addition there is a discrepancy between the combination of metric and imperial units used in Australia and the imperial units used in the USA. To a novice, this may be daunting and some effort is taken here to show both dimensions.

I had a 25mm diameter x 3m length aluminium pole on which I wished to mount the antenna. I was unable to find any suitable threaded fittings which would allow me to secure the antenna to the mast. As this was only for filed day use and the mount was temporary, I consequently decided to use a coupler to simply sit the antenna on top of the mast. The figure below shows the junction of the antenna where a T-piece was located.

Figure 2 - Antenna T-Piece Assembly

I then converted the diameter of the T-piece hole to the size of my mast by using a section of ½'' water pipe followed by a 25 to 15mm reducer and finally by a 25mm coupler. See the diagram below.

Figure 3 - Mast Coupling

As it turned out later, the 25mm copper coupler was replaced by a PVC one.

Materials:
1200m length 12.7mm (1/2") copper pipe.
300mm length 9.5mm (3/8") copper pipe.
4 off 15mm copper 90 degree elbows
1 off 15mm copper T-piect

6 off 1/8" brass metal thread nuts
6 off 1/8" x 25mm brass metal thread screws
12 off 1/8" brass washers
3 off 3/16" brass metal thread nuts
3 off 3/16" x 20mm brass metal thread screws
6 off 3/16" brass washers
4 off 1/4" brass metal thread nuts
2 off 1/4" x 25mm brass metal thread screws

1 off 60 x 30 x 1.6mm brass strip.

150mm length of RG213 inner core and insulation

Tools:
Blow torch.
Flat screw driver..
Small adjustable spanner..
Solder.
Drill.
Drill bits.
Long nose pliers.
Fine saw or dremel tool.

Construction:
The ½" pipe was cut into the following lengths.

2 sections connected to the T-piece of 110mm each.
2 sections for the sides of 245mm each.
2 sections for the open section of the antenna. 75mm each.

Follow the following construction steps

1) Ensure all the copper pipe and fittings that are to be soldered are clean.
2) Layout all the components and ensure they form a 279mm (11") square along the centre line of the pipe sections. DO THIS BEFORE SOLDERING.
3) If you were able to obtain pipe caps, for the soldering the adjustment nuts and bolts, then do this now. If, like me, you were unable to obtain the pipe ends, thrust a pair of long nose pliers into one side of each of the open section pieces of pipe. Enlarge the opening

until the ¼" nut will comfortably fit inside. Crimp the pipe around the nut as well as can be done, and solder into position. See Figure 4.

Figure 4 - Tuning Adjustment Fitting

4) Using the blow torch, start soldering the pips sections, T-piece and elbow fittings, starting with the T-piece.
5) Assemble the mast coupling as shown in Figure 3 without the 25mm coupler and solder to the T-Piece.
6) Cut out the brass strip as shown in Figure 5.

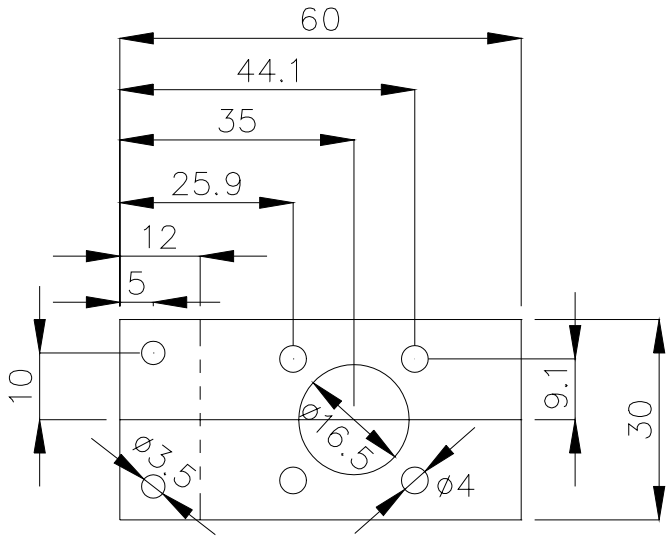

Figure 5 - Brass Strip Dimensions

7) Fold a 90 degree bend along the fold line indicated.
8) The T-piece I obtained had some ridges which did not allow the easy soldering of the brass strip into position. I therefore drilled mounting holes through the T-piece, using the holes on the lip of the brass strip as a guide. The strip was then secured with 1/8" brass screws and washers. The strip was then soldered to provide a firm electrical connection.

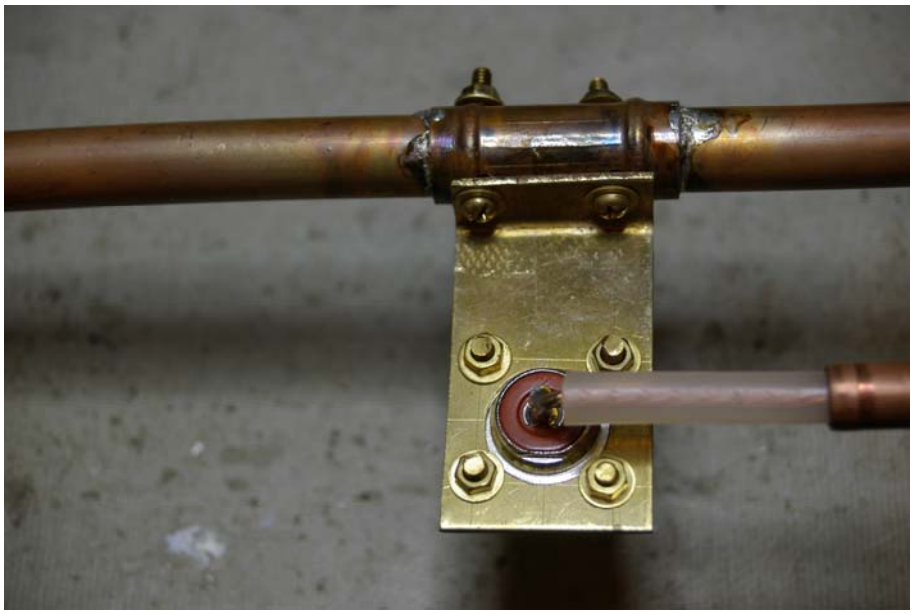

Figure 6 - Securing the Connector

9) Mount he SO-239 connector to the brass strip and secure using 1/8” screws and washers.
10) Using a fine saw or dremel tool, slice a 100mm section of the 9.5 mm pipe length ways. Flatten the two halves to produce two strips for attaching the gamma match elements.
11) Cut a 115mm length of 9.5mm copper pipe. This is the gamma match pipe
12) Folding the previously made strips around the end of the antenna near the first elbow and around the gamma match pipe such that the distance between the centre of it and the centr of the antenna tube is 45mm.
13) Drill 5.5mm holes to the strips to ensure the strip clamps securely to the antenna and the gamma match pipe.
14) Strip a section of the RG213, exposing the core and solder it to the connector.
15) Slide the gamma match pipe over the RG213.

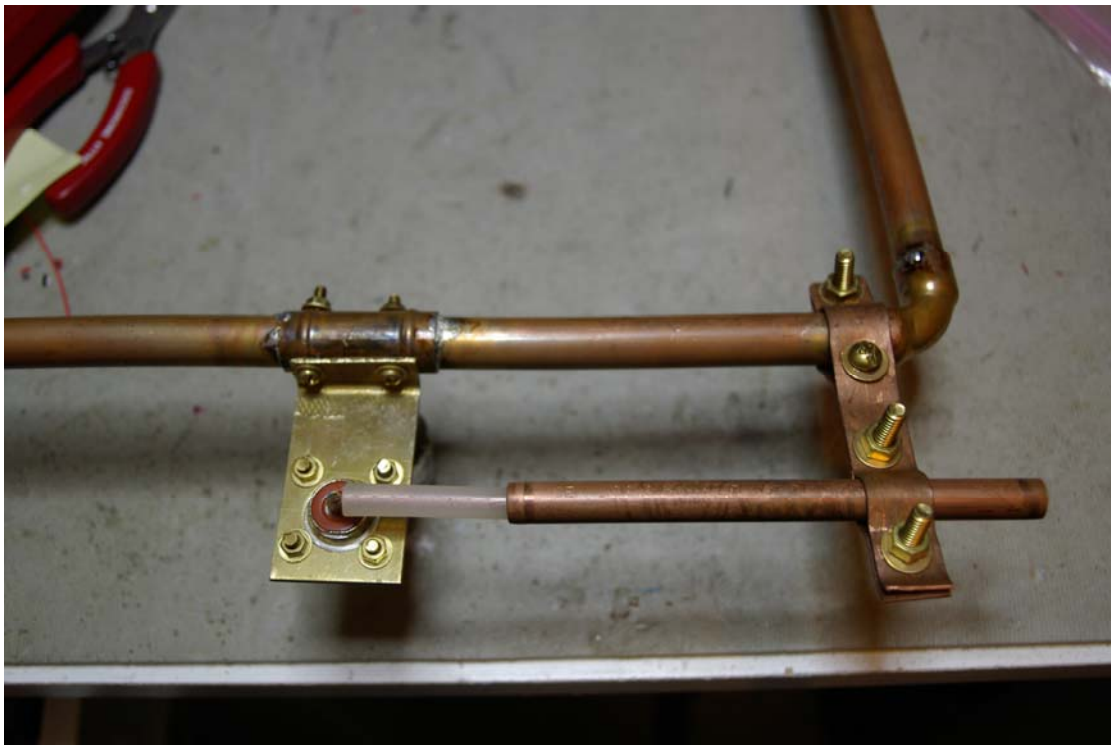

Figure 7 - Gamma Match Section

Tuning:
To tune the unit follow the steps indicated below.

1) Connect a radio and VSWR meter to the antenna.
2) Tune the radio to the frequency of interest.
3) Set the output power to a low setting.
4) Adjust the gamma match element to obtain the lowest VSWR.
5) Adjust the screws at the end of the antenna to obtain the lowest VSWR.
6) Repeat steps 4 and 5 until the antenna is matched.

In the Field:
As it turned out, the group was had a general meeting night in which Chris (VK6KCH) had an RF analyser which allowed me to measure its performance. The antenna was placed on a metal pole and the return path loss was measured. Initial measurements were disappointing. A VSWR of approximately 2:1 at 142MHz was as good as could be obtained, even after adjusting the shorting bar. Experimentation followed and it was found that the resonant frequency could be reduced by opening up the ends of the antenna. Even then, the lowest resonant frequency was approximately 143MHz. Further tests showed the antenna to be very sensitive to orientation and position. One could set up the antenna to its minimum VSWR, rotate it 180 degrees in the same plane and have a completely different reading. I trimmed about 1cm off each end of the antenna. This again increased the resonant frequency to approximately 143.5MHz, but operation was not stable. Terry also reported having difficulty tuning the antenna, due probably to fact that the mast is connected to the ground of the antenna. He overcame this by clamping RF inductors around the cable feeding the antenna. Due to time limitations on the night, I had to leave the testing until later.

Later turned out to be the field day itself. In an act of desperation I removed a further 2cm off each end of the antenna. This time, I placed a piece of PVC reticulation pipe between the antenna and the metal mast to provide electrical isolation. I had my transmitter frequency set to the field day frequency of 144.175MHz and the output power set to 5W. To my surprise, the VSWR meter was not registering. I check the connections and found no fault in my set up. The meter indicated power was being sent to the antenna. The output power was slowly increased to 50W and the VSWR reading barely moved, indicating a VSWR of almost 1:1. Shifting the transmitting frequency a couple of MHz higher, showed a degrade in performance to almost 2:1. Going back to the liaising frequency for the day I was able to transmit from the Perth suburb of Bentley to Terry (VK6ZLT) mobile in Pinjarra. He gave me a report of 5/9, whilst my reception of him was about 1/5. Terry was working at a lower output power.

Overall, I am happy with the performance and compactness of the antenna.

Figure 8 - Completed Antenna

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WESTERN AUSTRALIA 6953
http://vhf.wirelessplanet.com.au

MEMBERSHIP INFORMATION AND APPLICATION FORM

The VHF Group is an association of persons interested in the encourage and scientific development if V.H.F. Radio communications in all its branches, including satellites, Earth-Moon-Earth, long distance (DX), microwaves etc etc etc.

MEETING PLACE Wireless Hill Museum lecture room. (Entry via corner of Almondbury and McCallum Crescent Ardross).

MEETING TIMES General meeting on fourth Monday of each month except December, 8.00 pm at Wireless Hi11. Council meeting on third Monday at 7.30 pm at nominated venues.

ACTIVITIES Monthly meeting.
Swap-meets, junk sales, components sales,
Regular technical lectures at the meetings.
Club station at Wireless Hill Museum with HF and VHF antenna systems.

SUBSCRIPTIONS Metropolitan $20.00 per year payable before the end of June for the next financial year. Country $l8.00 per year for those residing more than 60km from the Perth GP0.

APPLICATION FOR MEMBERSHIP

SURNAME.....OTHER NAMES.....

ADDRESS.....

..... POST CODE .....

CALLSIGN.....PHONE(H).....

(W).....

NOMINATOR.....

SECONDER.....

SIGNATURE.....

DATE.....

Monthly meeting.

APPROVED FOR MEMBERSHIP..... (PRESIDENT)