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The M.N.C.A.R.G. Inc.

*proudly presents the*  
**OZI-POLE KIT**  
**A Multiband Portable Antenna**



A Collapsible, Coax fed, Multi-tap  
Loaded Dipole for Balcony, Pedestrian, & portable H.F. Operations.  
(6 - 40 metre bands.)

## **Users Assembly Manual**

<http://www.mncarg.org/>

For HELP Email: [mncarg@yahoo.com.au](mailto:mncarg@yahoo.com.au)

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**Congratulations on purchasing the Ozi-pole Kit  
and thereby assisting the MNCARG Inc.  
fund better repeater coverage in the Mid North Coast Area.**

The following is a guide for Radio Amateurs to construct a portable dipole antenna capable of to 100 watts PEP (30 watt carrier) and covering the 40, 20, 15, 10, & 6 metre bands. (30, 17 & 12mx with ATU)

- The kit was designed to create an easy to build project, only requiring basic wire cutting and soldering skills.

The tubing components are pre-cut and drilled ready for assembly. The builder is required to wind and solder the coils, cut and thread wire, As well as fit and solder the crocodile clips.

All required components for the actual aerial are supplied, including, wire, brass bolts & nuts, solder tags, Crocodile clips, telescopic whips, zippy box, tubing and fittings.

With the **exception of the stand/support and feed line** the kit is ready for assembly.

By reading this instruction booklet, using the methods described, winding coils as recommended and observing the precautions suggested, you will be the proud constructor/owner of a light weight, portable, Ozi-pole HF Dipole Antenna.

For assistance please email: [mncarg@yahoo.com.au](mailto:mncarg@yahoo.com.au)

**TOOLS REQUIRED.**

Wire cutters, wire strippers, long nose pliers', small adjustable spanner, Screw driver, solder & soldering iron, insulation tape and patience.

**Disclaimer.**

The M.N.C.A.R.G. Inc. will not be liable for incorrect assembly or construction of this kit, injury or damage caused by misuse of the kit parts, and injury due to poor workshop practice. We have fully explained construction methods in the manual with safety, ease of building and finished product quality in mind. We will provide further instruction, advice or written help to assist the builder complete the project. The kits are new and enough components are provided for completion. The builder is responsible for his/her own workmanship, replacement of parts cut in error or broken due to incorrect assembly, or misuse of finished product.

How the owner uses this product is his/her responsibility.

**What to do first.**

1. **Unpacking the kit.**

The first and most important rule of building kits is to check that all parts or components of the kit have been supplied. To make this part easier we have provided the check list below and part diagram next page. Check your parts and if incorrect contact MNCARG Inc. so we can assist you to get your project completed with minimum delay.

<b>Kit Parts Checklist.</b>	<b>Required</b>	<b>Supplied</b>
A. 55cm lengths of PVC pipe. (pre-drilled)	2	
B. 45cm lengths of PVC pipe. (pre-drilled)	2	
C. PVC "T" Joint to suit pipe. (pre-drilled)	1	
D. PVC joiners to suit pipe.	2	
E. PVC end caps to suit pipe. (pre-drilled)	2	
F. 100cm 5 section Telescopic whips.	2	
Brass bolts 1/8 x 30mm.	12	
Brass bolts 1/8 x 15mm.	2	
Brass nuts 1/8 thread.	18	
Solder tags suit 1/8 bolts.	16	
Screws small self tapping.	2	
Insulated crocodile spring clips.	4	
3 metres 5 amp insulated wire.	1	
16 metres 1 amp insulated hook up wire.	1	
BNC RF socket.	1	
Black Zippy Box.	1	

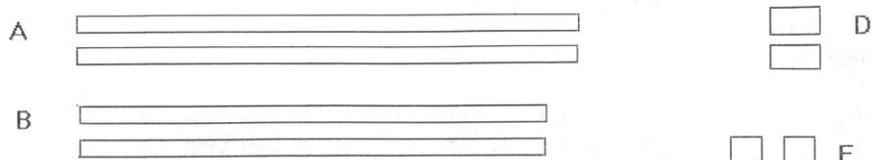
NOTE: For easier identification of these parts see diagram on next page.

**Actually starting to build the kit.**

2. **Mounting the telescopic whips.**

Take the shorter 1/8" x 15mm brass bolts and thread them into the mounting holes in the end of the telescopic whips. Place the two spacer nuts over the bolt end and tighten. There is a single hole 11.5cm from the end of the 45cm tube and this is where the bolt end locates. By holding the PVC pipe with the hole upwards and by tilting the whip to allow the bolt to

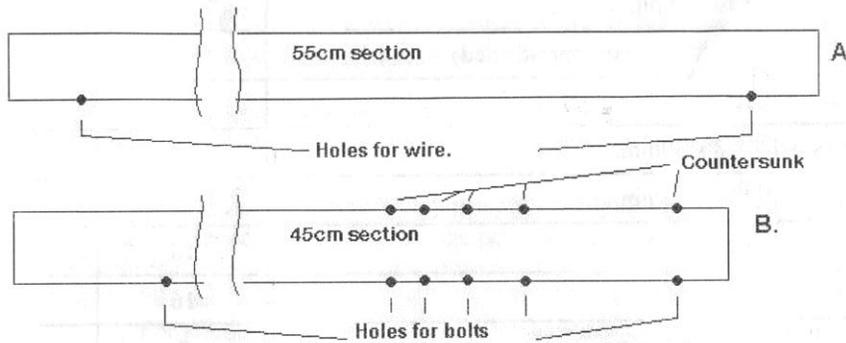
M.N.C.A.R.G Inc. Ozi-pole Kit



Parts.

- A. 2 x 55cm PVC pipe
- B. 2 x 45cm PVC pipe
- C. 1 x "T" piece PVC
- D. 2 x pipe joiners PVC

- E. 2 x endcaps PVC
- F. 2 x 1 metre Telescopic 5 section aerials.

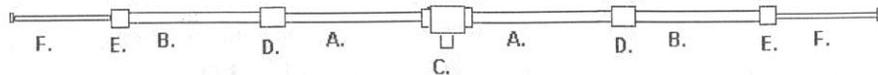


Kit also contains:-

- 3 Metres insulated 5A wire.
- 16 Metres insulated hookup wire.
- 12 brass bolts & nuts 1/8" x30mm
- 2 brass bolts & nuts 1/8" x15mm
- 4 extra brass nuts as spacers
- 1 Black Zippy Box
- 1 BNC antenna socket
- 2 Self Taper screws.

16 solder tags

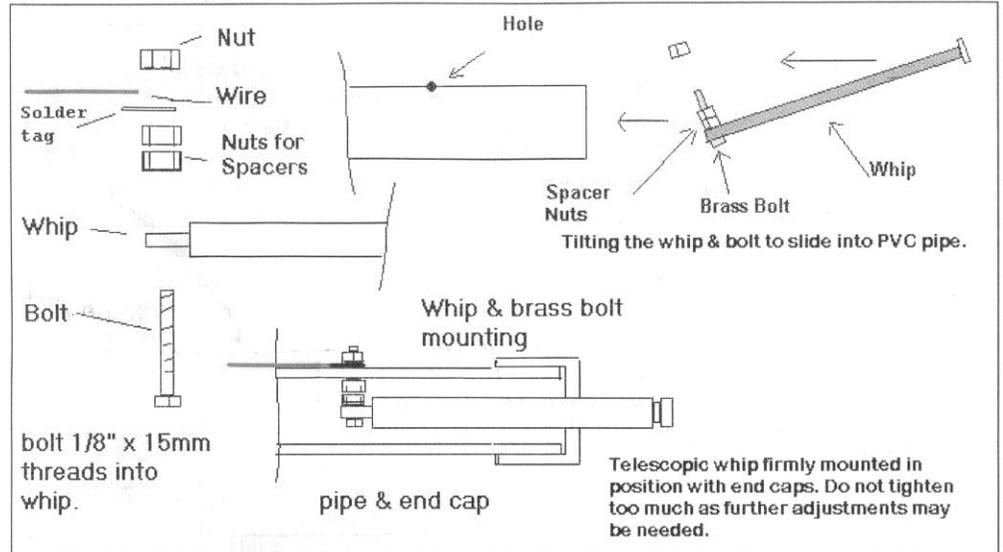
hole drilled in endcap for telescopic aerial.



dipole showing component assembly order.

**Note: This antenna is not intended to be weather-proof because it is designed as a temporary / portable device. Dew or moisture will not damage it but may effect or vary the tuning of the antenna. Only use high power when antenna is dry to avoid damage to antenna from arcing etc.**

slide into the pipe and you should be able to move it to the hole. When it is visible through the hole, a little careful wiggling should pop it through. Next place a solder tag (large in some kits) over it and screw the nut into place. Now you can slide the PVC end cap over the telescopic whip (the hole maybe slightly smaller but a little filing will fix it) and push onto the end of the pipe. If the brass bolt refuses to stay in the end of the telescopic whip when you are attempting to align it you have forgotten to fit or tighten the spacer nuts.



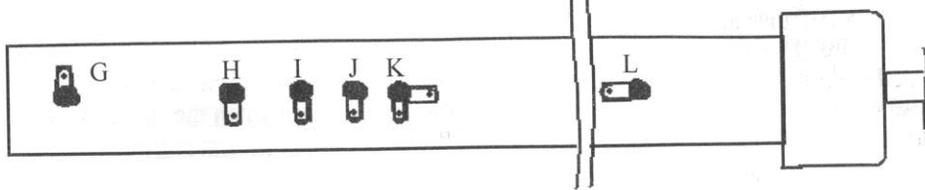
Well done that's the second part of this project completed. It maybe time for a cool drink or a cup of tea/coffee and a nice biscuit while you read the next section of this project.

## Winding the coils.

### 3. Preparing to wind the coils (use thin insulated 1A hookup wire).

Putting the brass bolts into position on the 45cm tubing is the next part of this project. You will notice the holes are countersunk on one side so they will accept the screw heads. Insert the screws into this side and poke the threaded shaft through to the other side. Now place a solder tag (2 on screw "K" near the whip, 1 big & 1small in some kits) and tighten a brass nut on to secure it. Orientate the solder tags as in the picture next page, to allow for easy coil winding. Starting from the bolt "G" strip and solder the end of the coil winding wire to the tag. Now commencing in a clockwise direction wind eighty (80) turns of wire tightly onto the tube. Some may find it easier to hold the tube in one hand (telescopic whip into stomach) while rotating it and firmly guide the wire with the other. Eighty turns should almost fill the space between bolts. ( G & H) Slide all the turns together tightly with no gaps. Count your turns carefully as a mistake will leave you short of wire. Measure the wire to the end of solder tag "H" and leaving a little extra, cut and strip the tip for soldering. Carefully solder the end of the coil to tag "H" maintaining the tension to keep the coil tight. Count only completed turns, bolt "G" will be zero and bolt "H" will finish at eighty.

The six brass bolts & nuts fitted with Note: only use SMALL solder tags for soldering Coils and LARGE for whips & zippy boxes as some kits have both.



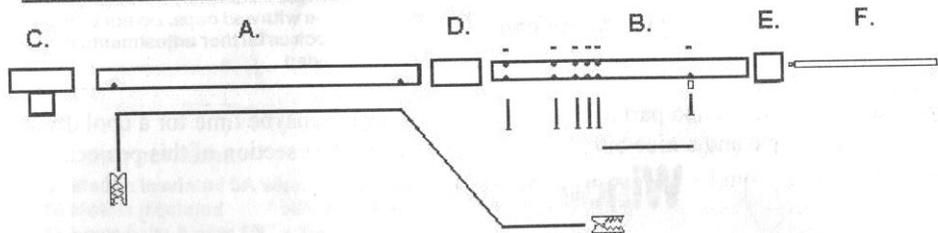
Seven solder tags per side mounted as shown ready to wind coils.

Repeat the process for the second coil winding eighteen (18t H-I) turns this time. Attempt to keep all coils firmly wound. The third coil consists of nine (9t I-J) turns and six (6t J-K) turns for the fourth. Of course you will need to repeat this procedure on the second 45cm pipe. The total number of turns on each 45cm section should be one hundred and thirteen. (113) Re-check your turns count as the incorrect number will make tuning difficult later.

**Tip:** When aerial is finished, and after tuning is completed, a light spray of clear lacquer will secure the coils.

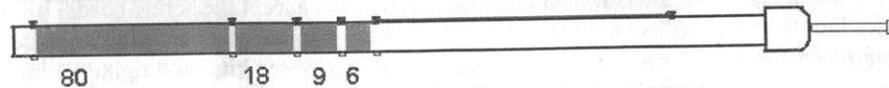
Perhaps another break is in order now as a tired worker makes mistakes more easily.

### Ozi-pole exploded view



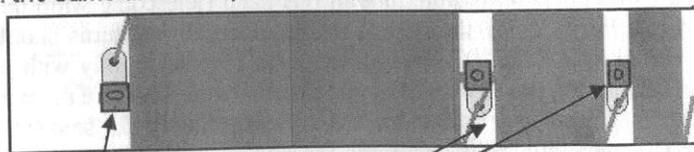
Loading coil details.

A total of 113 turns divided as below for bands 10,15,20&40.



Number of turns between brass bolts of Red hookup wire.

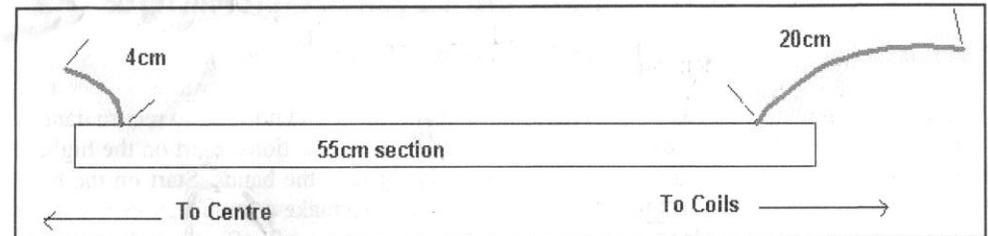
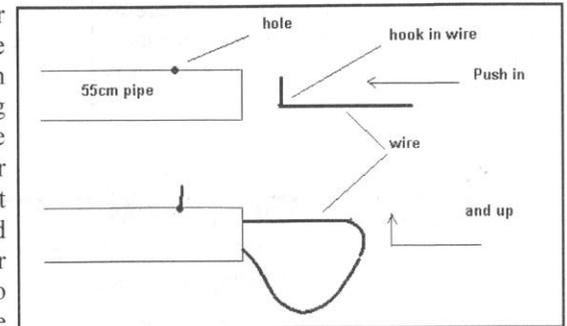
Both halves of antenna have coils wound exactly the same and both wound in the same direction (clockwise). Each coil tightly wound then is soldered to tags.



Brass nuts & bolts and solder tags

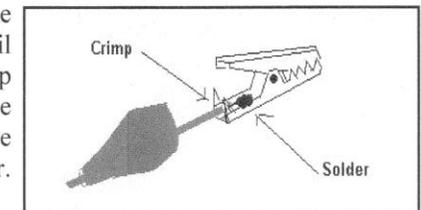
### 4. Inserting wire (Larger 5amp insulated) & fitting Croc Clips.

Take the 2.5 metre length of thick antenna wire and fold it carefully in half, i.e. Having both ends together and pulling the centre out taut. Cut it at the centre and you will have ample wire for each half of your loaded dipole. Thread one wire through each 55cm section and then fold the ends to form a hook. Using this hook poke the wire back into the tube and catch the tip in the hole near that end. A little wiggling should get it to poke through to where you could grab it to pull it out. Alternately a pair of needle nose pliers may reach into the tube, allowing you to poke the wire out. When you do pull the wire through the holes you should leave a 4cm tail at the centre end of the pipe and you require a 20cm length at the coil end. Make sure the wire is pulled tight through the tube before measuring and cutting the flying leads. If the lengths



are incorrect the dipole will not tune correctly so it is wise to double check measurements.

Strip the ends of the leads (about 5mm), slip the plastic insulation from the clip (clip it onto a pencil to remove insulation boot) over the wire then crimp the crocodile clip onto the wire before soldering the joint. Now you can simply repeat the operation three more times and that part of construction is over. Perhaps another cup of tea/coffee and a biscuit?



### Almost Finished Now!

### 5. Connecting the whips to the coil.

Using the remaining thick aerial wire, cut two lengths just long enough to connect the second solder tag "K" to solder tag "L". (large tags some kits) This wire connects the whips to the coils on each 45cm pipe. Strip end and solder to "L", pull wire tight and solder to "K".

### Final Stages of construction.

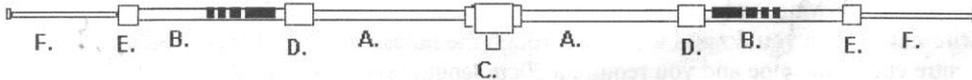
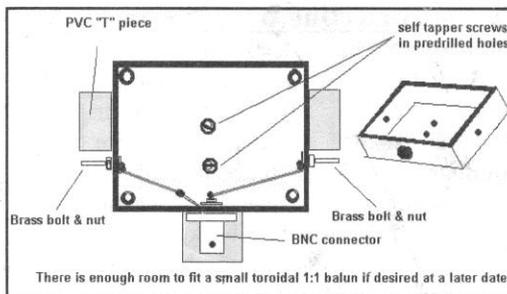
### 6. Feed point assembly.

Finally last section of this project. Remove the lid of the Zippy Box. The BNC terminal is inserted into the centre hole in the box and solder tag, washer and nut are fitted. Solder tags are fitted to the 2 remaining brass bolts, they are inserted into the side holes and nuts

tightened. Wires are soldered from the BNC terminal to the tags on the bolts as shown. The two self tapping screws are the used to secure the box to the "T" piece as shown. The brass bolts become terminals for the crocodile clips when the antenna is used. A small 1:1 toroidal or rod balun can be fitted into the box if required later. The designs are in most Amateur handbooks.

### Congratulations the antenna is completed!

The complete antenna can now be put together. The "T" in the middle, 55cm tubes, Pipe joiner, 45cm tubes with whips extended on both sides. Now, for your first tune up.



### Testing - USE LOW POWER FIRST!! UNTILL TUNED to prevent rig damage.

The starting points for tuning the aerial are shown in the table below. Adjustment is made by telescoping the end of the whips, inwards to raise resonance and outwards to lower it. You need 50 ohm coax (bnc), SWR Meter, transceiver, a ruler and notepad to record data. The aerial needs to be elevated 2.5 - 3 metres and clear of obstructions. Start on the highest frequency first (tap J or K) and work your way down through the bands. Start on the base settings listed below and adjust to suit. 40 metres is sharp so make a frequency verses whip length table for reference. Coax length, height, surroundings etc. will affect aerial tuning.

Frequency	SWR 10W (100W)	Coil Tap	Whip sections out	cm of whip tips out	Bandwidth >2:1
52.000Mhz	1.1:1 (1.1:1)	K	none	5cm	2Mhz
50.000Mhz	1.1:1 (1.1:1)	K	none	15cm	2Mhz
28.000Mhz	1.1:1 (1.4:1)	J	3	17cm	1.5Mhz
21.000Mhz	1.2:1 (1.4:1)	I	3	17cm	250Khz
14.000Mhz	1.3:1 (1.8:1)	H	3	18cm	150Khz
7.000Mhz	1.3:1 (1.5:1)	G	3	16cm	40Khz

Initial tests with 16.5metres 50 ohm RG-58CU with the dipole at a height of 3 metres but 2 metres of RG-58 with antenna at 2 metres performed the same. 12 & 17 Metres (tap I&J) can be tuned fairly close by whip adjustment, 30 metre resonance is too low at about 9.9mhz so an Aerial Tuning Unit (ATU) is required. We hope you enjoy your Ozi-pole.

**Use your Ozi-pole with pride but most of all, operate safely,**

### BEWARE OF POWER LINES & OTHER PEOPLES EYES!!!!

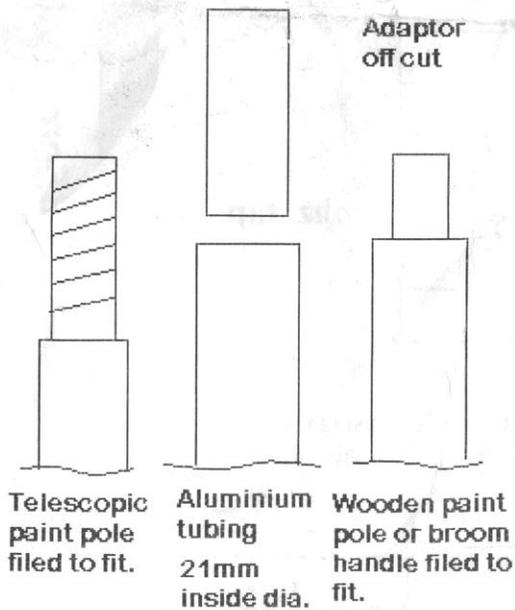
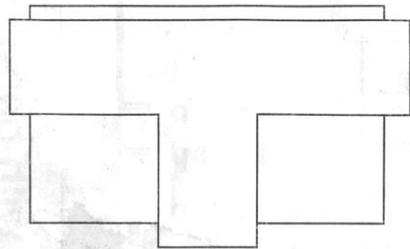
The Ozi-pole Antenna Kit and Manual were developed in 2007 for M.N.C.A.R.G. Inc. by VK2EVB Peter, with the assistance of VK2ZKT Gary and VK2CJC Jack.

## Notes and further information, etc.

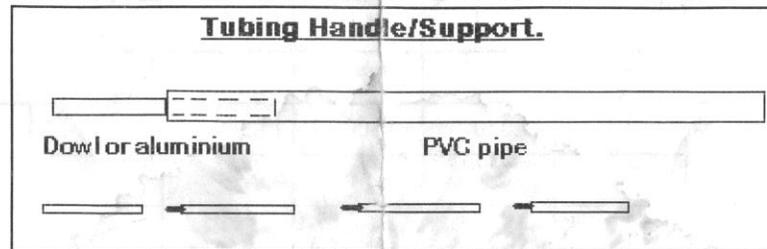
**NO GLUE** : It is recommended that the pipe joiners or Tee sections are not glued in place. This will make any repairs at a later date very difficult. Like the collapsing front and rear of motor vehicles protects passengers (in theory) on impact so the joints of this aerial assist in preventing damage to the antenna.

**HANDLE/SUPPORT** : Making a handle or support for your Ozi-Pole is not that difficult. For fixed station use an old folding projector screen stand, flood light or microphone stand with it's tri-pod base and telescopic mast can be used. By making use of the PVC pipe off cut included in the kit as an after thought you could make an adaptor for any of several methods of support. By adapting a telescopic painters pole (may need filing), a wooden broom handle (more filing) or aluminium tubing as indicated in the diagram (ideal to clamp to railing) is also a possibility. Of course buying more of the PVC pipe from the hardware store, (we got ours from Bunnings) cutting it into 40cm lengths and inserting suitable wooden dowel or aluminium tubing joiners is good possibility. Or perhaps just the normal PVC Joiners would do. It would assemble/dismantle easily and would fit in the same bag as the rest of the kit when travelling. No doubt many other solutions will be thought of for this purpose.

### Mounting or handle solutions.



### Tubing Handle/Support.



**FIXING THE COILS TURNS IN PLACE** : Several ideas have been put forward ranging from heat shrink tubing to super glue. From past experience I have found that heat shrink will lower resonance slightly and considering the brass taps it may not be that simple to apply, also it is not so cheap. Light coats of clear lacquer from a spray pack proved rather good and made the coils look nice and glossy but one must clean it off the band taps to prevent poor connections. The simplest approach was to place very small drops of super glue at end of coils at several points. This dried quickly, didn't impair tuning and was barely noticeable if done carefully. See diagram to right.

**A CARRY BAG** : A carry bag has been suggested and a design is being developed but perhaps your XYL can manufacture one for you if you ask her (beg, grovel or worse) nicely. I would certainly be convenient for travelling having all aerial parts together. Some super markets and other stores sell vinyl bags and plastic tool cases that might be suitable too.

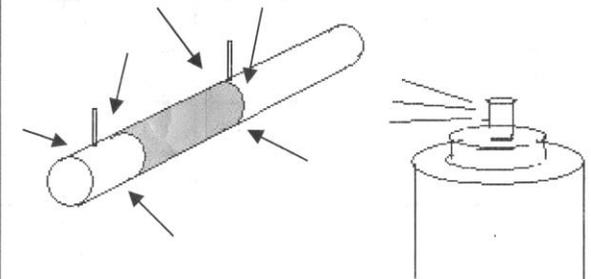
**EXPLOITS AND ADVENTURES** : Most of all we would like to hear of your adventures with your Ozi-Pole. We look forward to your pictures of operations for our website, notes on how and why you use it, and stations worked would be appreciated. Also reports on the kit design, construction, hiccups you discovered, any ideas on the manual and improvements are important to the design team. So keep us informed, 73 & good DX.

Lighting, Movie Screen or Microphone stands are usefull.



### Keeping Coils in Place.

Slide all turns tightly together first!



Very small drops of super glue can be used at these points to secure coil turns.

Or

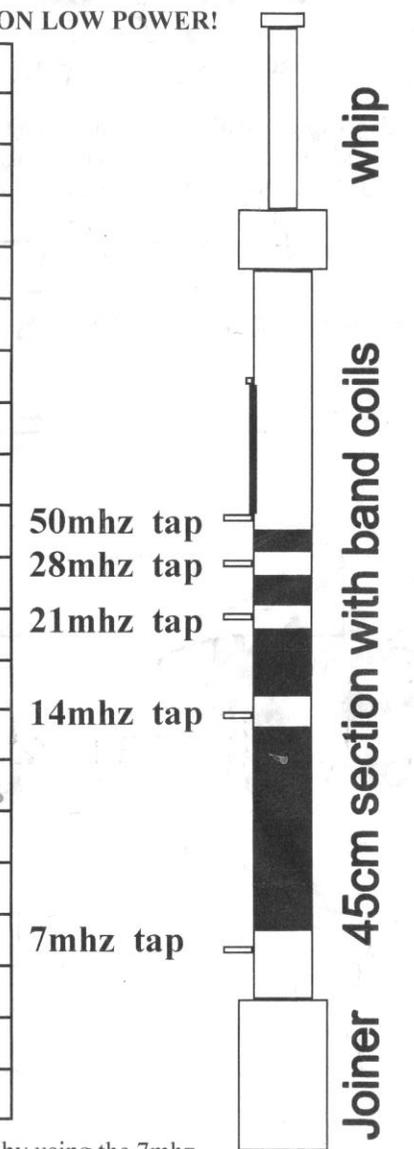
a light spray with CLEAR laquer will seal and hold the coils.

**Make sure the brass taps are clean after spraying clear laquer else a poor connection will result.**

## Frequency, Tap and whip measurement Table

By testing, carefully measuring and recording results on the chart below you will be able to tune the antenna to your favourite frequency with ease. **TEST ON LOW POWER!**

Frequency	50.005	50.100	50.250	52.005	52.500	53.000	53.500	53.999			
Sections out	0	0	0	0	0	-	-	-			
Cm of tip out	5	5	5	0	0	-	-	-			
Frequency	28.005	28.250	28.500	28.750	29.000	29.250	29.500	29.699			
Sections out	3	3	3	3	3						
Cm of tip out	15	15	15	15	15						
Frequency	21.005	21.050	21.100	21.150	21.200	21.250	21.300	21.350	21.400	21.449	
Sections out	3				3		3		3		
Cm of tip out	12				10		8		8		
Frequency	14.005	14.050	14.100	14.150	14.200	14.250	14.300	14.349			
Sections out			3	3	3						
Cm of tip out			20	18	17						
Frequency	7.005	7.015	7.025	7.035	7.045	7.055	7.065	7.075	7.085	7.095	7.105
Sections out	3	3	3							3	3
Cm of tip out	18.0	18.	18							15	14.5
Frequency											
Sections out											
Cm of tip out											
Frequency											
Sections out											
Cm of tip out											



**NOTE:** 18mhz can be tuned by sliding the whips almost completely in using the 14mhz tap. 24.9mhz is the same using the 21mhz tap. 9.9mhz is the same by using the 7mhz tap. A better idea may be to croc clip a dangling wire to the whip tips and trim to frequency using a higher band tap. (ie. 14mhz plus trimmed wire dangling equals 10.1mhz.)

