

2m & 70cm ribbon aerials.

Simple VHF & UHF aerials may be made from ribbon cable. These may be used as purely portable aerials, which may be wound-up and carried in a case or bag for holiday use, or for home base use by inserting into a plastic tube.

These are of the Slim-Jim variety and have such, only have a gain of around 1.5, to 2.5db, depending on which book you read. i.e. slightly more than a dipole.

Advantages against dipole.

Slight gain – 1-8 to 2.5db – figures from two different books.

The overall length being over a full wavelength long, produces the gain.

Can be made from one piece of metal, or in our case, a piece of ribbon feeder.

Coax does not affect the performance of the aerial.

If a centre feed dipole is used vertically, the bottom half is affected by the Coax feeder.

The bottom ¼ wave stub acts as a Balun / impedance matching device.

With the dipole you would need a proper matching device such as a Pawsey –Stub.

Parts required:-

- 1 **Ribbon cable.** 300 ohm for 2m version and 450 ohm for the 2m/70cm version. See diagrams.
- 2 **Coax cable with suitable plug.**
- 3 **Piece of cord to tie to top of ribbon cable – portable use only.**
- 4 **Bull dog clip or a hook – tied to above cord – portable use only.**
- 5 1 inch (2.54cm) diameter or 3/4inch (18mm) x 6 foot 6 inches (2m) long plastic pipe.
Select plastic tube size in conjunction with item 8 – metal tube.
- 6 End cap to fit over the top.
- 7 Short length of about 12 SWG wire – used as internal support for the ribbon.
Also 6 inches, (150mm) extra for the 2m/70cms version for the phasing line.
- 8 1 to 2 foot (300mm to 600mm) Ali or copper tube, large enough for the plastic pipe to slide into.
Select length as required
- 9 1 x small bolt with nut, to go through bottom of above metal pipe, or bend over ends.
- 10 Foam or rubber to fit into bottom of the metal tube to keep out bugs etc.

Construction on next page

Construction

- A Cut the length of ribbon cable as per the diagram, ensuring that twice the width of the cable is also included in this measurement. This is the turnover length for both ends.
- B Starting from the top – measure the width of the cable, down the cable, and remove the insulation from both sides.
- C Solder the ends of these two ends – then fold them over so that they touch – solder them together.
- D Make a small hole through the ribbon just below the above solder join. About 1/8 inch diameter. This hole is to be used to support the ribbon.
- E Measure down the cable from the top to the bottom, the correct length, (1507mm). When this point is found – remove the insulation as we did at the top end. Solder, fold over and solder together.
- F Measure down one side and cut out the gap.
- G Measure up from the bottom to where the Coax will be attached.
- H Remove the insulation about ¼ inch, (5mm).
- I Lay the Coax **FLAT** against the ribbon and then **Solder** the Coax onto the ribbon, as per the diagram. See **G** above. (Make the ends slightly longer, about ½ inch, (12mm) so that they can be hooked around the bare wire on the ribbon cable before soldering).
- J Tape the Coax to the ribbon – this prevents the solder joints being pulled apart.

This completes the construction of this aerial, all that is needed now is to check it with a SWR meter to ensure that the SWR is low, and then it is ready for portable use.

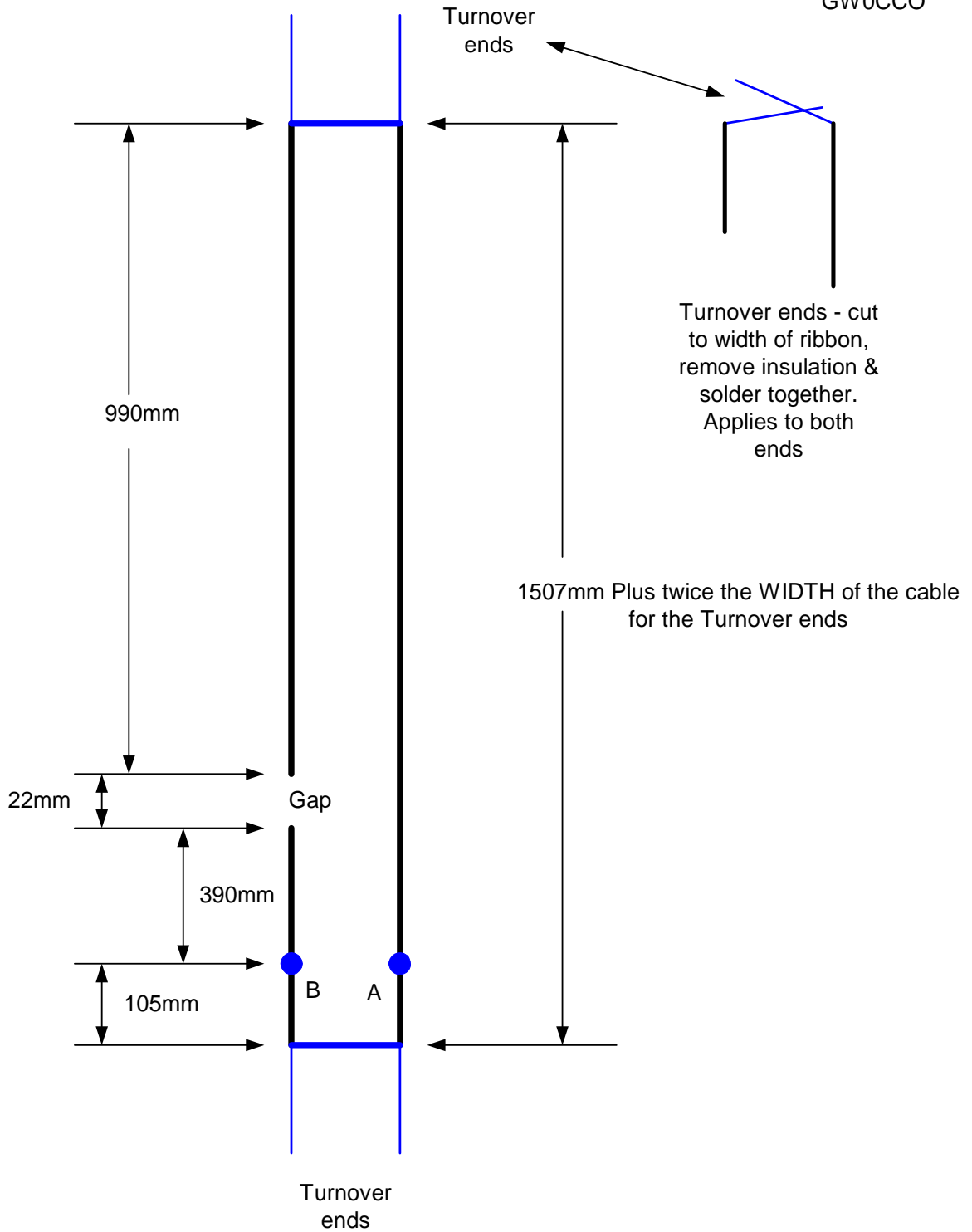
All joints may be covered with Silicon to keep out any damp.

How to make it suitable for a permanent home based unit will be described after the next aerial.

2 metre Ribbon Aerial

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A & B are connections points for the co-axe cable.
A = Co-axe inner
B = Screen

A 2m & 70cms combined aerial – again for either portable or fixed home base use.

Parts required are as per the above list on page 1.

Cut the full length as per the diagram, i.e. 1470mm – PLUS 18mm turnover for soldering, again as per the 1st aerial. Bottom end only.

Remove one side of the wire from the ribbon from the top end downwards, for a distance of 1013mm, (39.7/8inches).

This should leave you with a short wire length on the same side of 457mm, plus the turnover length.

Remove the insulation from the turnover lengths, fold then over and solder them together.

Phasing Line - Reference item 7 on page one, 6 inches of 12 SWG wire for the Phasing Line. Cut this to size and shape from the diagram.

Tin the ends where they are to be soldered onto the main ribbon.

Remove the insulation from the ribbon cable at the points where the Phasing Line is to be soldered onto. Tin these points.

Solder the top end of the Phasing Line onto the main ribbon cable. (Phasing Line may be held in place by **Wrapping** a short length of thin wire around the joint and soldering it all together as one joint.

The side of the phasing line is taped to the main feeder, but is insulated from it. There is NO ELECTRICAL CONNECTIONS.

Note – the bottom end of the Phasing Line is **NOT** soldered to the turnover ends of the main cable. **It is actually soldered to the Centre Wire of your Coax feed cable.**

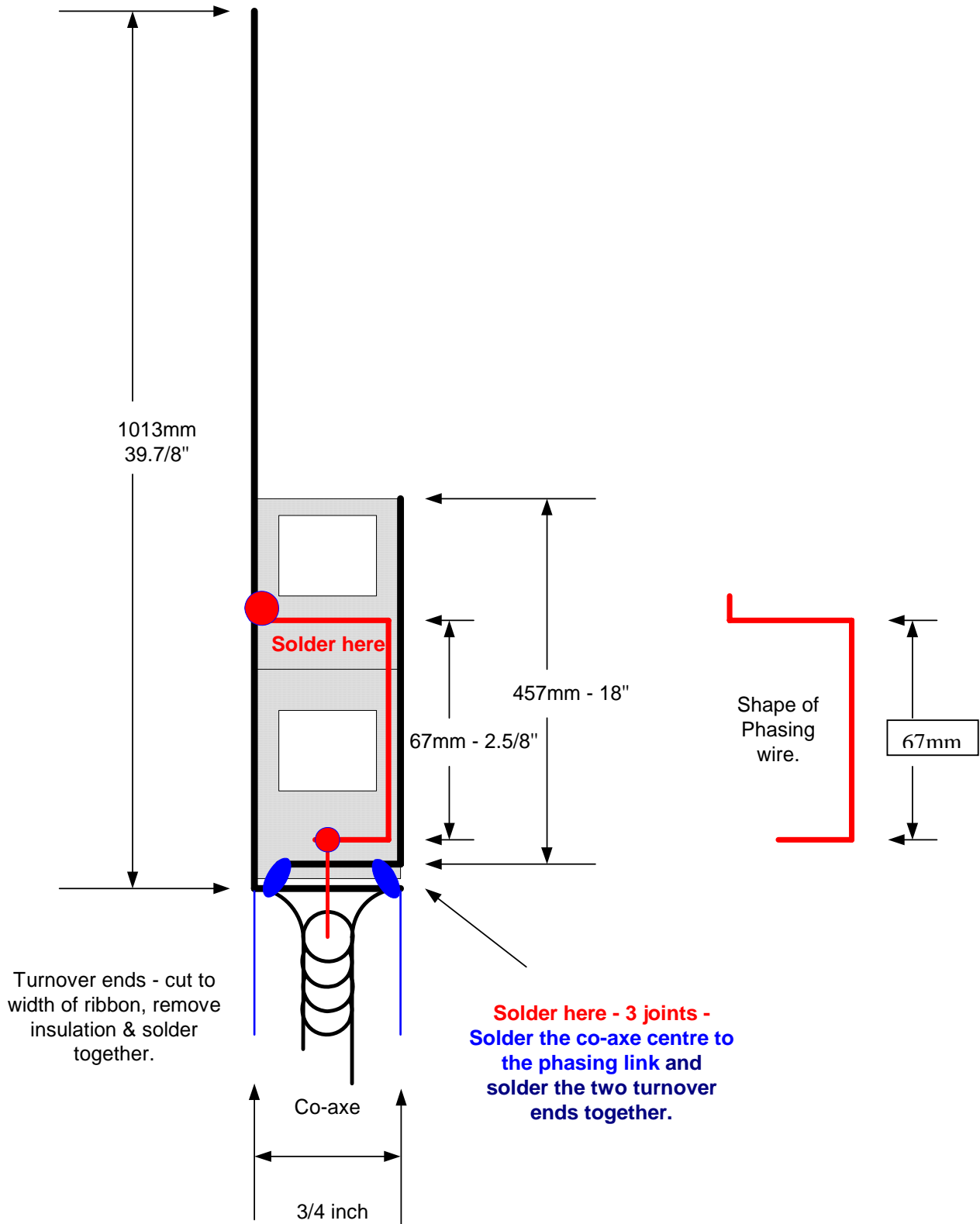
Fixing the Coax cable to the ribbon – remove the outer plastic from the cable and then unwind the outer screen and spread it out to make 2 legs. Cut them long enough so they can be spread out along the bottom of the ribbon cable and solder into place. Tin them well before soldering into place.

Cut the centre wire long enough to go over the bottom, and use a piece of the outer sleeve as an EXTRA insulator over the bottom where you have just soldering the outer screen.

Test for SWR and if all is working OK, then cover the joints with Silicon to keep out any damp.

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Making both aerials suitable for permanent external use as a home base aerial.

Both of these aerial may be used for permanent external use by inserting into a plastic tube and sealing the upper end.

Decide on the overall length that you will require for the plastic tube.

This will include the overall length of the ribbon, plus about 3 inches, (150mm), and a suitable length to allow clamping to either a pole or chimney-stack.

If using a pole, then about 12 inches, (300mm) is required.

However if using a chimney stack in conjunction with a TV aerial lashing kit, then depending on the position of the brackets and the height of the chimney pots, you may need a longer extra length included.

Once you have decided on the required length, you can now start the final phase.

Assuming that you have a suitable end-cap for the top of the plastic tube – (this may be an appropriate end-cap purchased to fit the tube, or even a plastic top from a bottle). Proceed as follows:-

Make a small hole through the ribbon cable, just under the top turnover ends. Should have been done earlier.

Make a hole each side of the plastic tube, so that when the end-cap is fitted, the holes will be covered.

Insert the ribbon cable into the tube and when the top is at the top of the tube, **PUSH** a small piece of copper wire, (12SWG), through one of the holes just made. The Coax cable should be hanging out the bottom end.

Line the ribbon cable up, so that the wire can now be pushed through the hole in the top of the ribbon cable and out through the other side.

Cut the wire so that about 1/4inch (3mm) can be bent downwards on both sides.

Put silicon around the top of the plastic tube and around where the wire came out, before fitting the end-cap. This will hopefully keep out the water. Push on the end-cap and ensure a **TIGHT FIT**.

See DIAGRAM on next page.

If you now try to clamp the plastic tube to a pole, etc, the chances are that you will split the bottom. To overcome this and to give strength to the bottom of the complete unit, we insert the bottom 12 inches, (300mm), or as required, into a metal tube, Aluminium or Copper. Alternately, a narrower piece of metal tube may be inserted into the plastic tube.

The plastic tube should just fit into this metal tube without being too tight. If loose, then add silicon along the length of the plastic tube, to take up the slack.

To prevent the plastic tube sliding through the metal tube, either bend the bottom of the metal tube with pliers to form a lip on two sides, or drill a hole through the metal tube and insert a bolt and nut.

Insert a small piece of plastic foam into the bottom of the tube, around the Coax cable, to keep bugs out. Will also allow any moisture that builds up inside the tube to soak out.

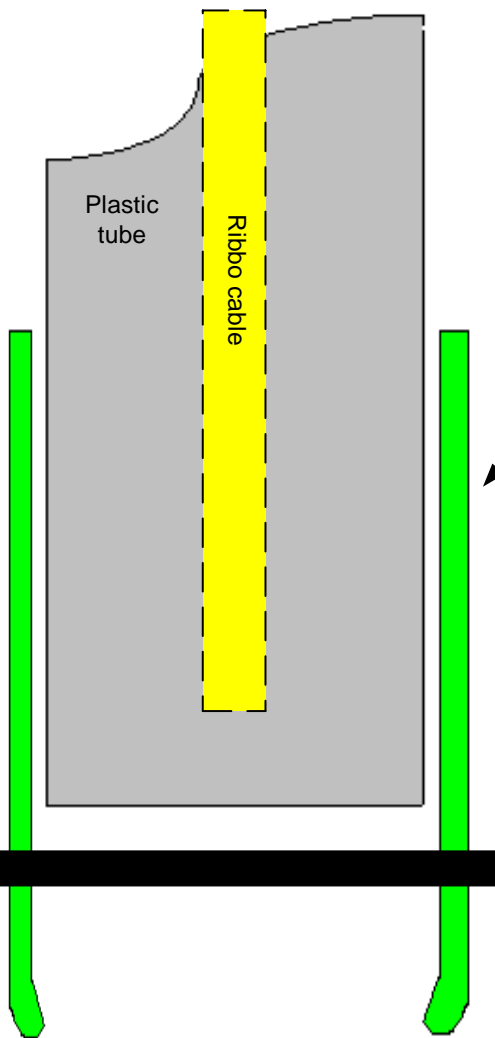
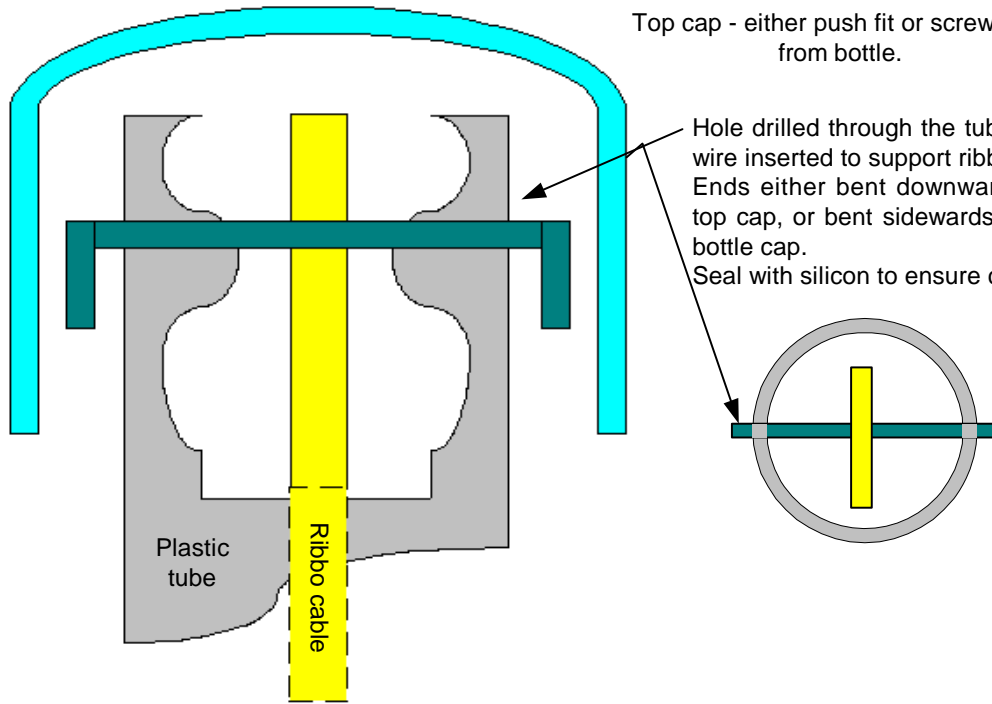
The whole unit may now be clamped into place and should give you years of service.

I used one for over 5 years at my last QTH and regularly made 30 mile skeds, over a 240 foot range of hills just 1 mile from my QTH. I was also able to work GB3WW, some 80 miles away on 20 watts.

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Top cap - either push fit or screw type from bottle.

Hole drilled through the tube with piece of wire inserted to support ribbon cable. Ends either bent downwards for push fit top cap, or bent sideways for screw type bottle cap. Seal with silicon to ensure cap stays on.



Metal tube with plastic tube inserted inside it.

Bottom either bent over to prevent plastic tube falling through, or small bolt with nut, inserted through drilled hole.

Using suitable clamp, attach the completed aerial to either another pole or chimney TV support bracket.

Due to a problem with a faulty connector in my SWR meter, which was causing very high SWR readings, when I checked the above aerials and in particular the 2m/70cms version, I nearly abandoned the talk on it. However I built a 5/8 aerial for 70cms which as will see is a very simple design, and found this also had a very high SWR. It was then that I started to check for faulty connectors etc, and found the problem. This being in the N type connector, where the centre pin and withdrawn inwards.

A simple 5/8 wave aerial for 70cm.

This design is very simple and should take only a couple of hours to produce.

It also appears to have some gain over the 2m/70cm Slim Jim aerial mentioned above. Hanging them both in my bedroom from the lamp shade – (my current shack) – I received a better signal from GB3CM on the 5/8 version.

The extra gain is due to the fact that a 5/8 aerial with a base loading coil looks like a $\frac{3}{4}$ wave electrically – hence the gain.

This aerial, like the ribbon versions, may be hung up indoors, or put into a plastic tube as per the others. Hence the reason for using soft copper wire, instead of brazing rod for the aerial.

Parts required

- 1 **Aerial** - About 1meter of copper wire, 1.5mm – (mains cable with the installation stripped off).
Or 1 metre of 1.5mm brazing rod.
- 2 **Radials** - 4 lengths of either 3mm x 170mm long brazing rod, or thick copper. Maybe 2 or more pieces soldered together to give strength. Possibly thin copper tube will suffice.
- 3 **Base connector** – either a BNC, PL259 or N type female connector. Four hole version.
- 4 **Plastic tubing** – about 1metre of 22mm waste water pipe. Or smaller, but to allow base connector to be fitted into the bottom.
- 5 **Joint/coupler** – one 22mm straight coupler.
- 6 **Top cap** – to fit top of 22mm pipe.
- 7 Suitable Welding paste for the plastic pipe.
- 8 **Metal tube and clamps to suit.**

Radials

These may be either soldered directly to the base of the Base Connector, or solder to tags, which are screwed with nuts and bolts to the base connector. A 3rd way is to use 1 large tag, solder a loop of wire around the base of the connector and then solder the 4 radials to that. Bear in mind, when outdoors, birds may sit on them, and if too weak they will bend.

When soldered, cut to length – 163mm.

Aerial

Take your 1 meter length of wire, and wind 5 turns at one end, using a 4mm drill shank.

Leave a short length for fitting into the base connector.

File the wire if need-be, to fit into the base connector centre pin. This is to be soldered in.

Do this AFTER fitting the radials – saves poking your eyes out.

Measure about 450mm above the top of the coil and cut the excess wire off.

Now solder the aerial into the centre pin.

Setting up.

Connect a suitable Coax cable to the base connector.

Now using a cloths peg or similar non-metal clamp – hang/clamp the aerial to a lampshade or door frame and apply power. Better to test out of doors, as in doors the walls etc will affect the SWR reading.

The SWR should be less than about 1.1:4. To reduce to 1.1:1, then cut 2mm pieces off the top of the aerial wire until it comes down to an acceptable value.

Weather proofing for outside use.

As in the ribbon aerials, we use a 22mm, (1 inch), plastic tube. However to accommodate the radials we need a slightly different approach.

We mentioned a Coupler in the Parts list. This is used to house the base connector and also to connect the top plastic tube and a shorted length below it.

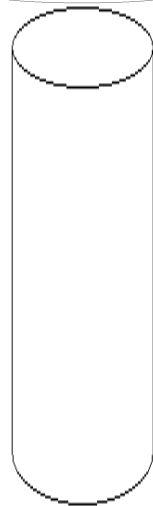
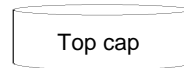
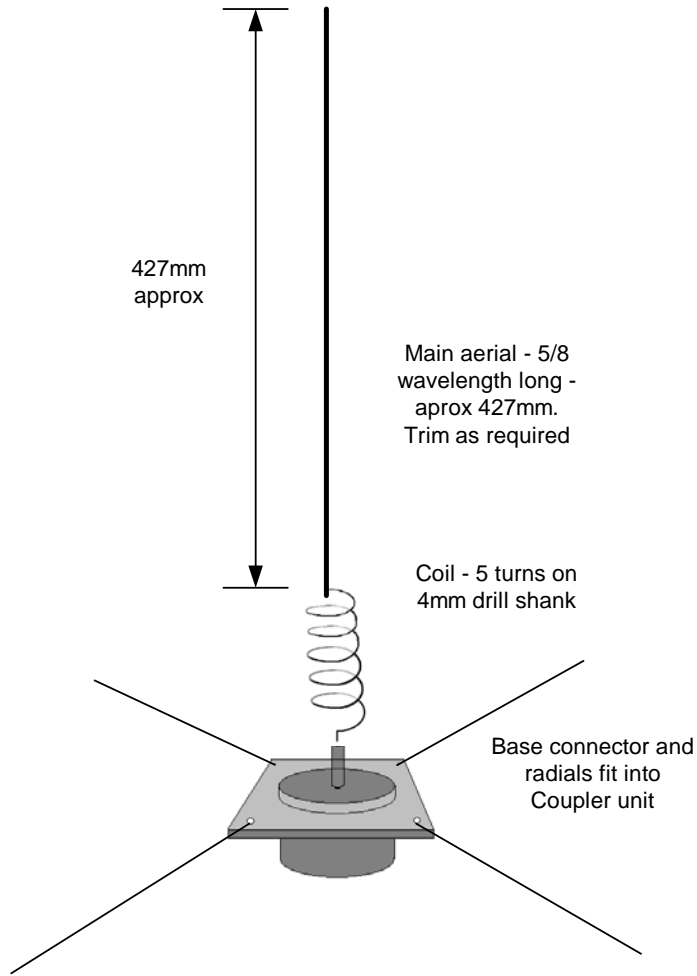
Cut four slots across the Coupler – these are to allow the base connector and its attached radials, to drop down into the Coupler. Use silicon to seal around the radials and a suitable Welding substance for sticking the plastic pipe into the Coupler. (Make sure you have connected your Coax cable before doing this task)!

A shorter length of plastic pipe is also welded into the bottom of the Coupler; this is so that the complete aerial may be clamped to a pole etc. As with the Ribbon aerials, we need to strengthen it by either dropping it into a metal tube, or inserting a narrower one into the plastic lower tube.

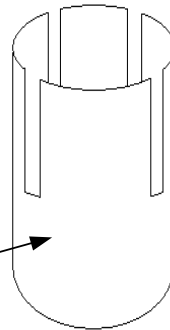
Diagrams for 70cm 5/8 aerial:-

70cm's - 5/8 wavelength aerial

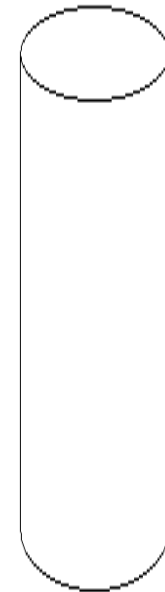
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Upper tube with top cap, fits into the Coupler unit - seal together with welding glue.



Coupler unit fits over the bottom tube and are sealed together with welding glue



Metal tube with plastic tube inserted inside it.

Bottom either bent over to prevent plastic tube falling through, or small bolt with nut, inserted through drilled hole.



Using suitable clamp, attach the completed aerial to either another pole or chimney TV support bracket.

5/8 wave length Collinear for 433Mhz.

