

Design criteria for a simple 440 MHz antenna:

They can be made using various materials and in various sizes.

We want to keep the design simple.

We want to use readily available materials.

We want enough forward gain to hit the local repeater.

We want enough beam width so aiming is not critical.

It must be inexpensive.

We will look at two antennas a 4 element and 6 element yagi

The BOOM:

The boom can be made from ANY NON-METALLIC material. We do not want to use aluminum or we will have to change the dimensions that we have – and mounting will be much more difficult, since we would then have to isolate the driven element.

Wood is easy to work with, but not weather resistant. 1/2 inch PVC pipe and couplings are our best choice.



The ELEMENTS:

Wire coat hangars (for inside use – they will rust)

**#8 Copper wire ~1/8” diameter - cheap and available
(from Home Depot)**

**1/8 Inch aluminum tube or aluminum welding rod
(local aluminum supplier)**

Bronze brazing rod (welding supplier)

The basic dimensions are:

70 Centimeter 4 element yagi

70 Centimeter 4 element beam 1/8" diameter tubing	Element Length	Element spacing from Reflector
Reflector	13"	0
Driven	12"	8-1/16"
Director 1	11-7/8"	16-3/4"
Director 2	11-3/4"	23-3/8"

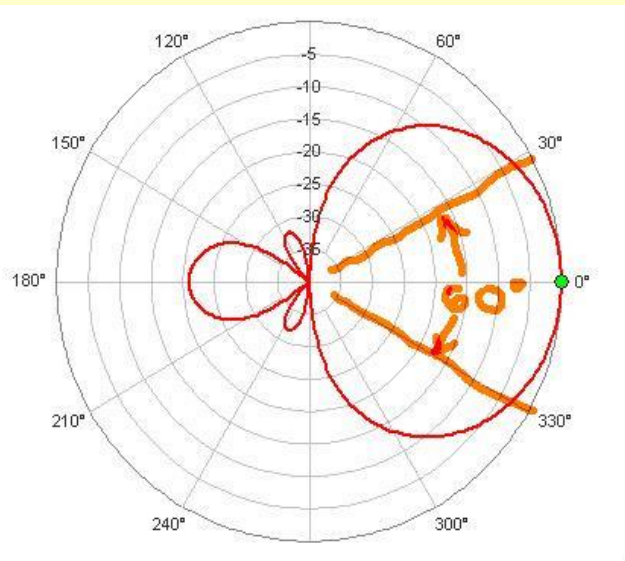
70 CM 4 element yagi dimensions:

Element	Length	Dist. From R
Reflector	13"	0
Driven Element	Special	2.5"
Director. 1	12.1"	5.5"
Director. 2	11.75"	11"
Director. 3	11.75"	18"
Director. 4	10.75"	28.5"

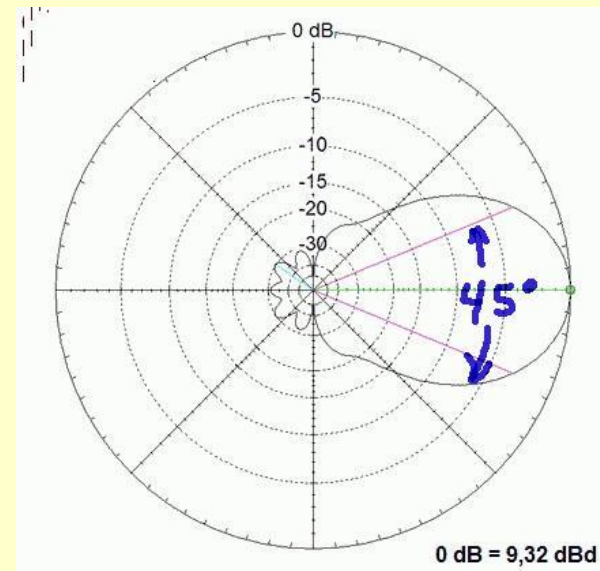
What are the differences?

4 Element yagi has less gain (~8 dBi) but a wider beamwidth for a wider pattern

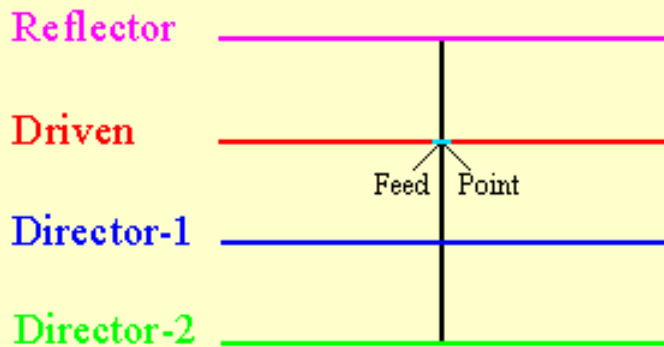
6 Element yagi has more gain (~11 dBi) but is narrower and needs more precise aiming.



4 element yagi pattern

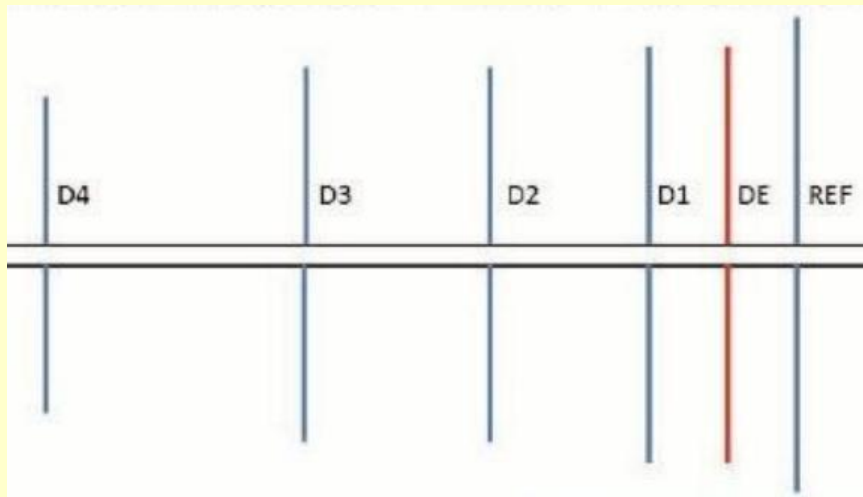


6 element yagi pattern



4 element yagi easy to build and feed directly with 50 ohm coax.

Center of boom has no element and makes for easy mounting.



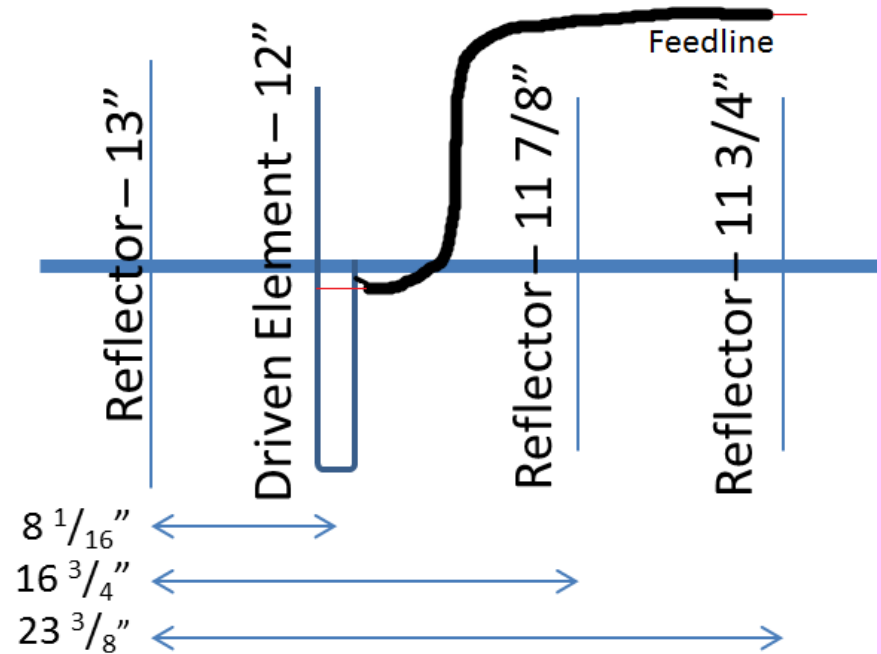
6 el. Yagi a bit more work to build. Directly fed with 50 ohm coax

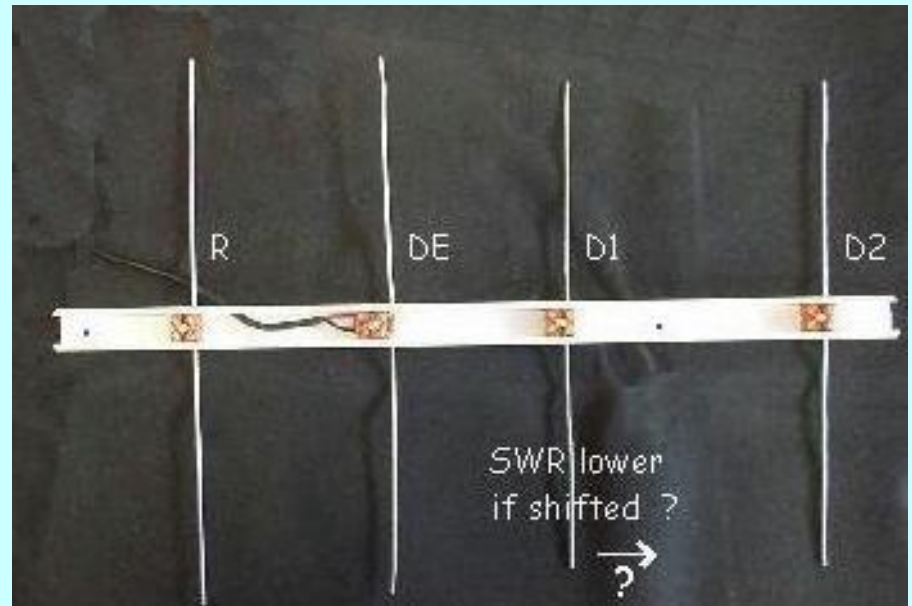
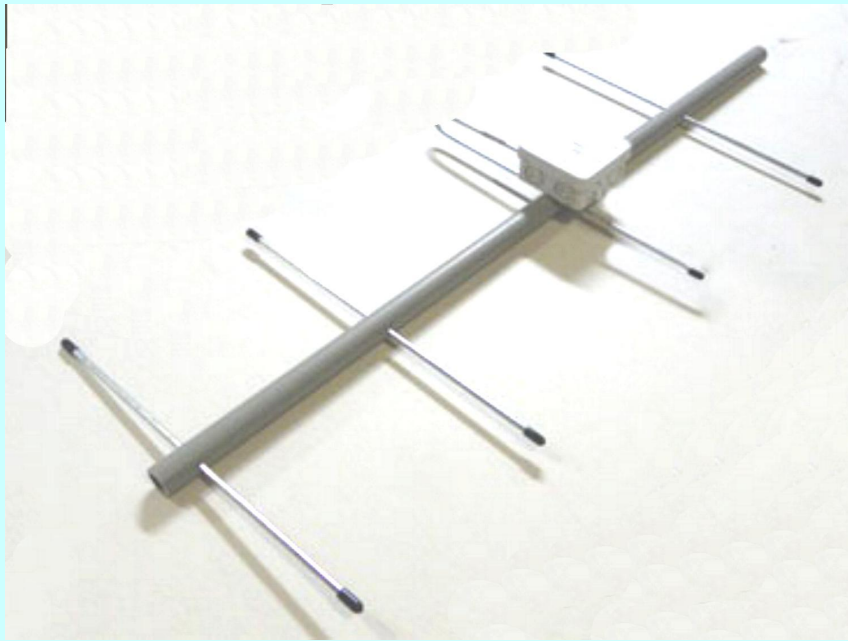
Must decide where the balance point is for mounting.



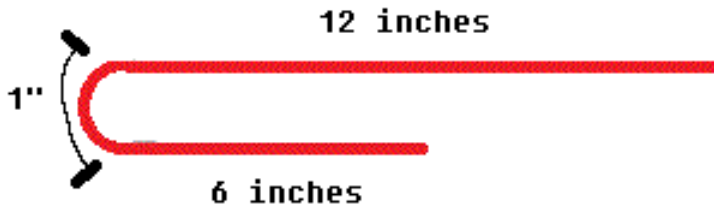
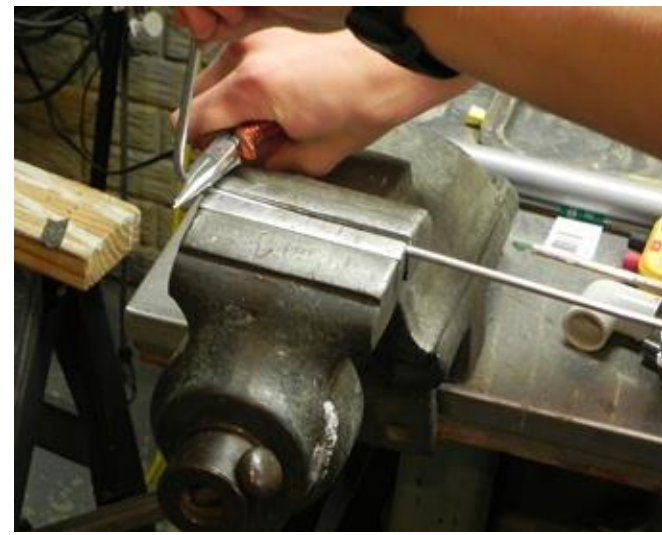
NOTE: Coax must be led away from the antenna at 90 degrees from the boom and elements.

If led from the driven element to the back, it still must leave the antenna at 90 degrees from the elements.





The driven element can be straight or in a half folded dipole configuration. Either way it is fed directly with 50 ohm Coax.



There are many ways to bend the driven element.

The important thing is to have the two parts parallel and spaced correctly when done.



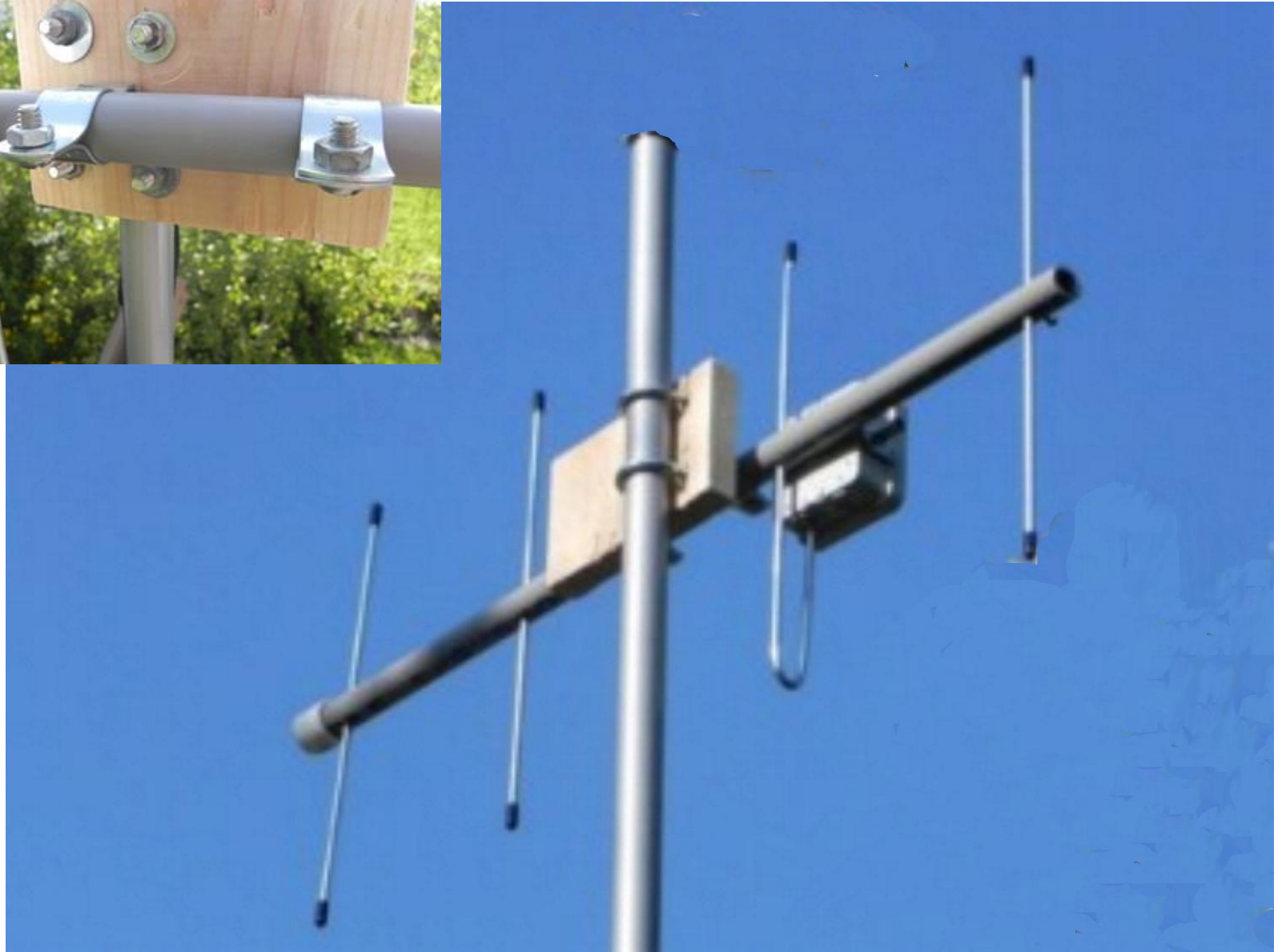


One way to assure proper spacing is to solder the loop part of the driven element directly to a coax or other connector before inserting it into the boom.

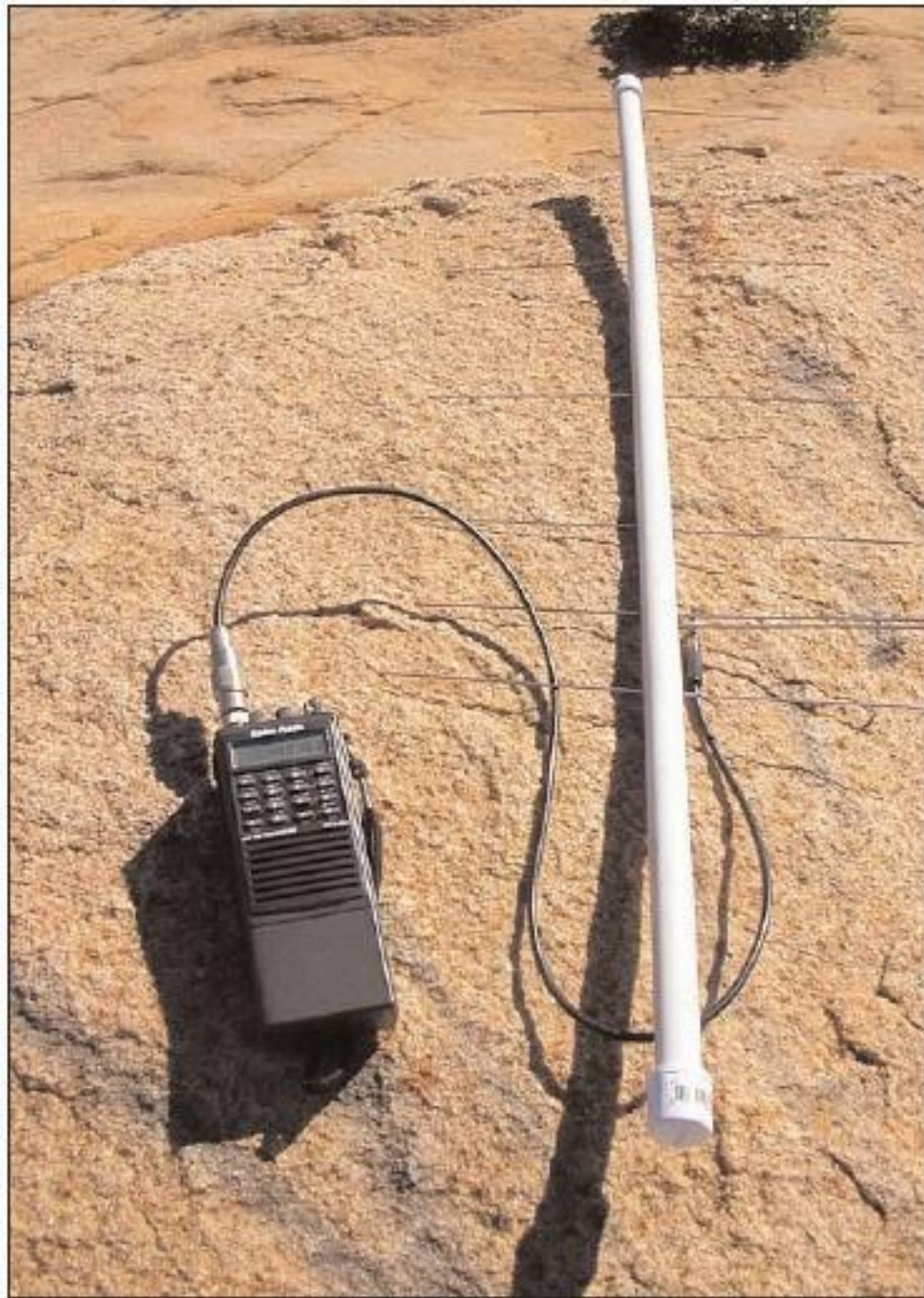
Draw a line the length of the boom to use as a guide for drilling the element holes.

BE SURE the holes are all lined up or your elements will be crooked on the boom.









R

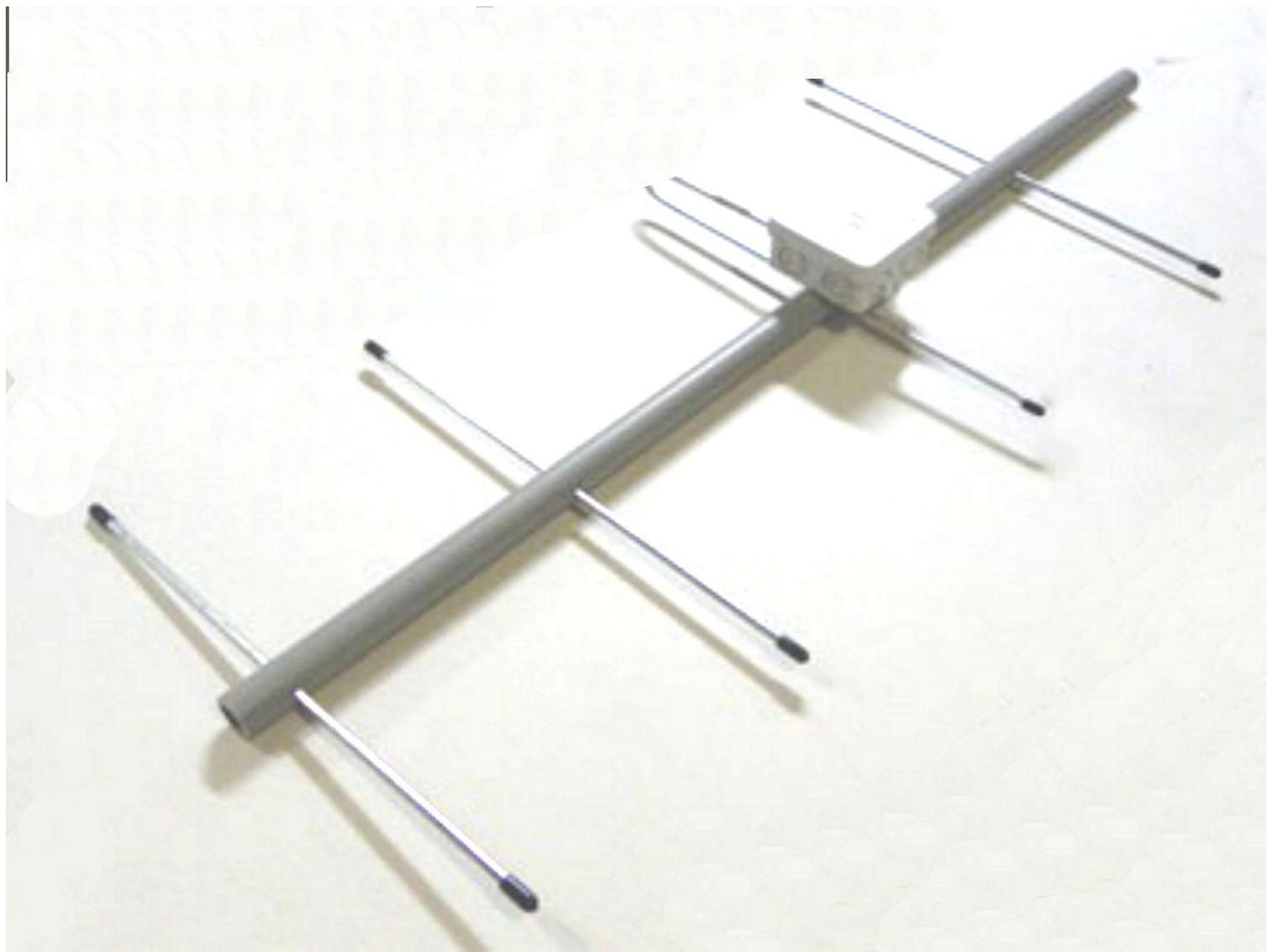
DE

D1

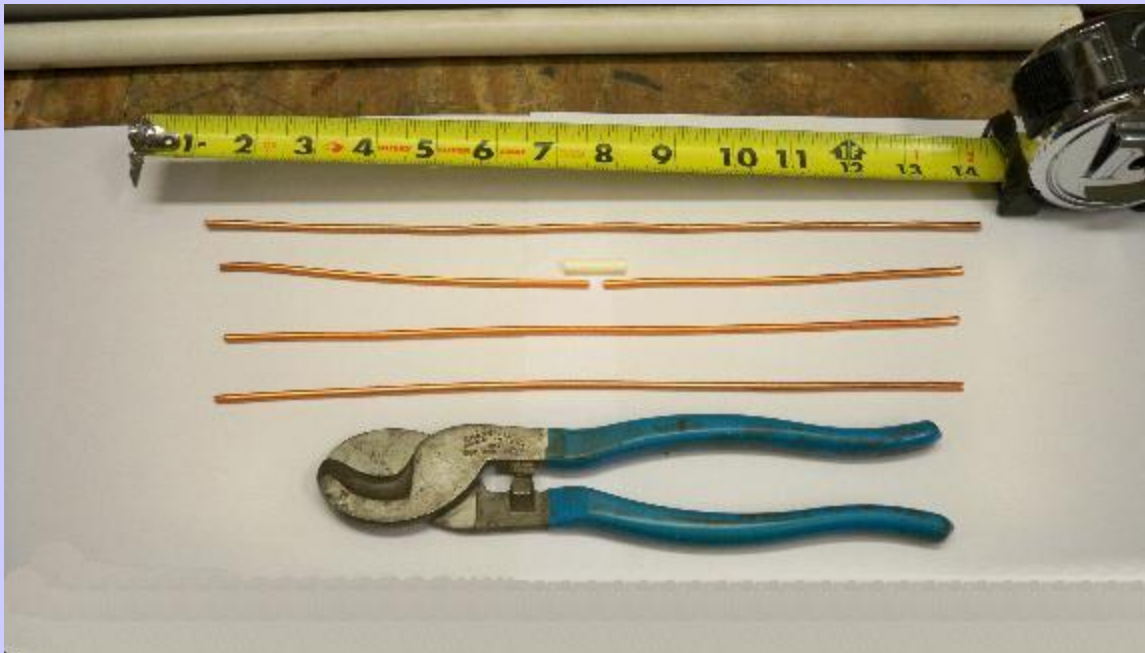
D2

SWR lower
if shifted ?



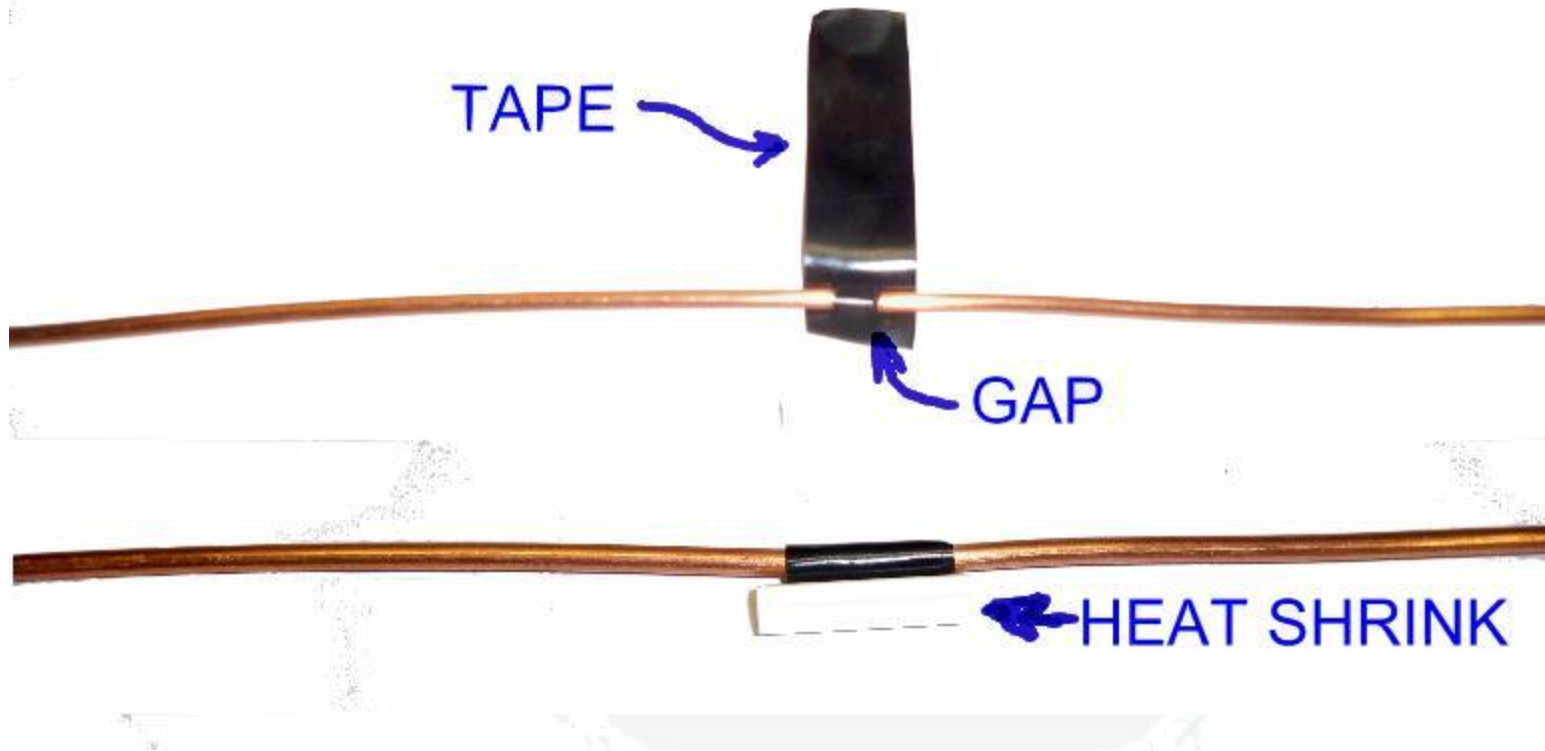


Let's build an antenna !



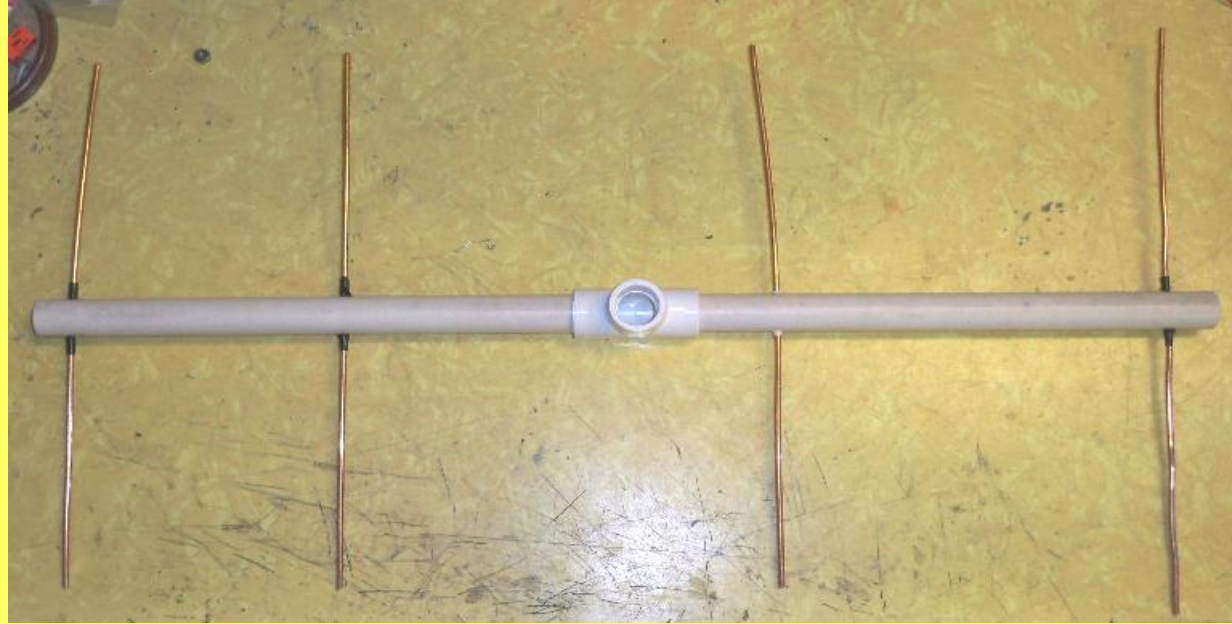
First measure and cut some wire or rod to the dimensions we need.

70 Centimeter 4 element beam 1/8" diameter tubing	Element Length	Element spacing from Reflector
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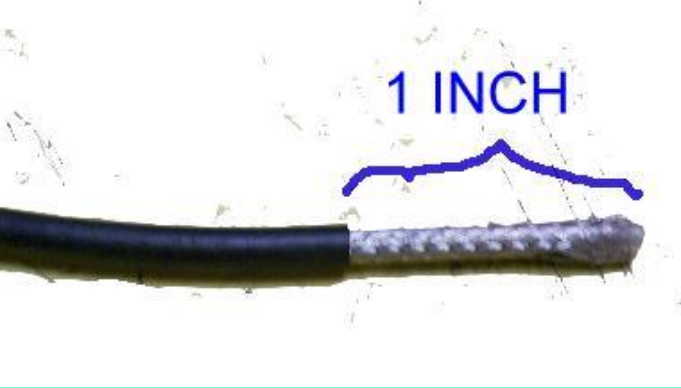
Prepare the driven element leaving a $\frac{1}{4}$ " gap. Tape it and secure it with heat shrink. You may have to re-cut the element to length.

Be sure to re-measure it after this step.



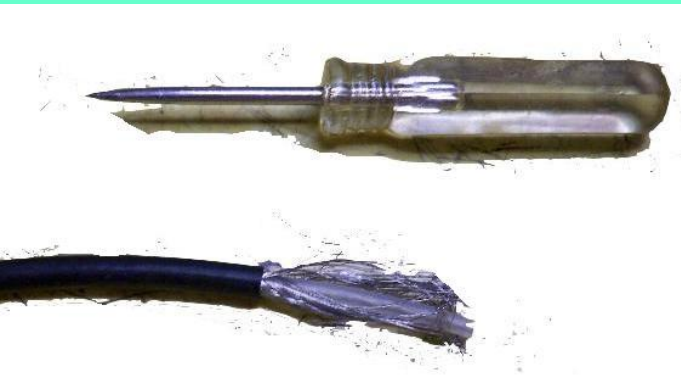
Drill the PVC boom and insert the elements. Note the 'TEE' in the middle for mounting the antenna.





PEPARE THE FEED LINE:

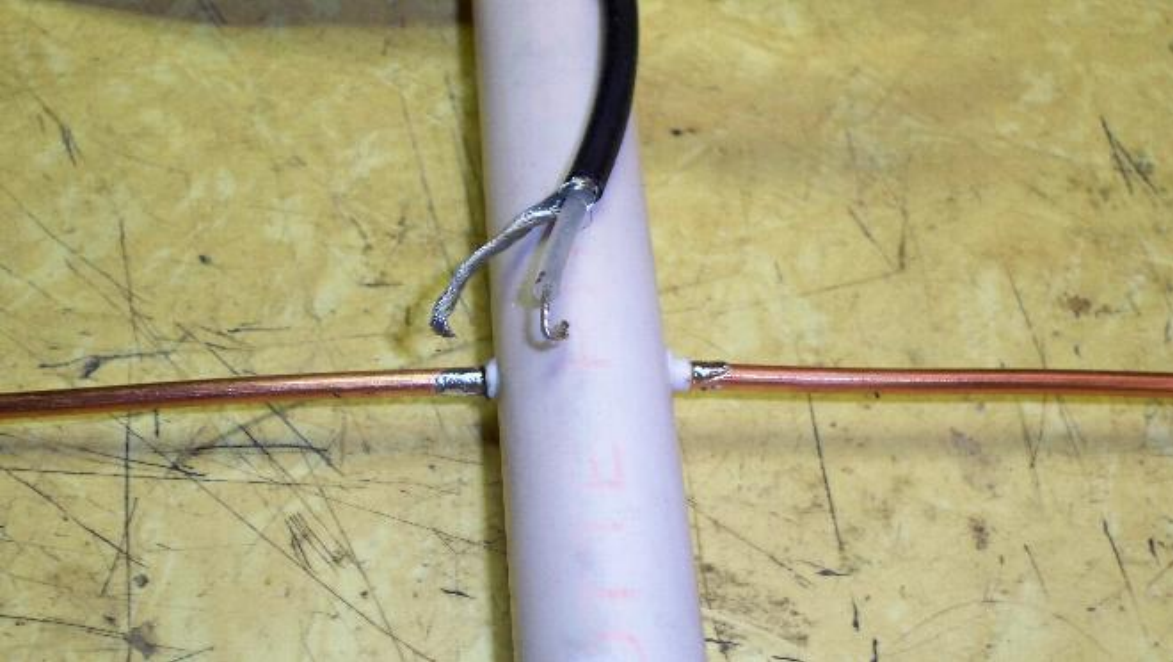
Remove 1” of the outer cover of your Coax - RG-58 or RG-8X 50 Ohm Coax



With a pointed tool, comb out the Braid away from the center conductor.



Twist and tin the braid. Cut 3/8” Off the center insulation and tin The center conductor.

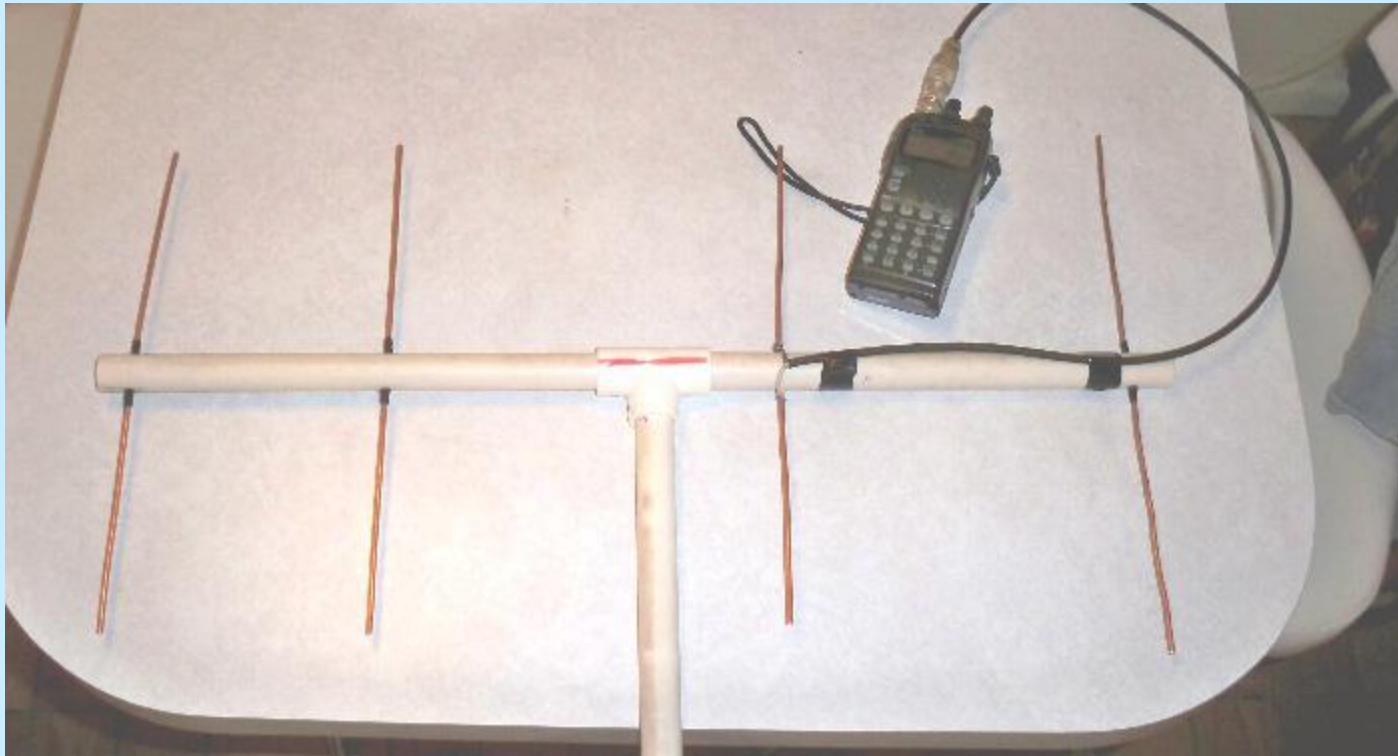


Bend the tinned wires to fit over the driven element... Tin the driven element where you will attach the coax. DO NOT USE EXCESSIVE HEAT !



Solder the coax to the driven element and tape the coax to the boom in two places.

The coax should lead toward the reflector.



Here's the finished antenna...

Any questions???

References:

<http://www.qsl.net/w4sat/antlegn.htm>

<http://www.tristantech.net/articles/yagi/1.php>

<http://picaxe.orconhosting.net.nz/yagi433.jpg>

<http://www.nr6ca.org/70cm/yagi.html>

<http://www.amsat.org/amsat-new/information/faqs/crow/JulAug06AmsatJournal.pdf>