This is the instruction manual for building a λ/2 wavelength dipole.
Material used is aluminium pipe of diameter 16mm for the radiator, aluminium pipe of diameter 10mm for the gamma match and 25mm aluminium square profile for the boom.
The clamp for the gamma match is made of 12mm aluminium full material profile.

So first we have to calculate the length for the radiator and the match using a shortening factor of 5%

The standard formula for calculating the wavelenth will be

$$\lambda_{[m]} = \frac{c}{f\,[Hz]}$$

Thus, the formula for a λ/2 radiator with above mentioned shortening factor:

$$L_{rad\,[mm]} = \frac{c * 475}{f\,[Hz]}$$

which will give us a radiator length of 1338mm for a frequency of 106.45Mhz

The match uses the same formula but adapted for λ/8 using the same shortening factor:

$$L_{rad\,[mm]} = \frac{c * 950}{f[Hz] * 8}$$

which will give us a length for the match of 334mm

Based on these calculations we will cut the pipes and the boom which will be 1000mm long

As we will solder the radiator to the boom, we will first drill all the holed for the pipes, connectors etc… first. then we have to make sure the oxidized outer layer is removed from all parts on the soldering area and in the match adjusting area.

Soldering aluminium is a bit a tricky. You will need special solder and flux but standard blowtorch.
The problem is that when heating up aluminium, the material won't change its colour with the temperature.
So being too low in temperature won't make it, being to high will risk the assembly to simply collapse.
So maybe it's best you try it first on a piece of waste to get accomodated to this task.

All screws used in this project are stainless steel type.

figure 1 and 2 show the radiator soldered to the boom.

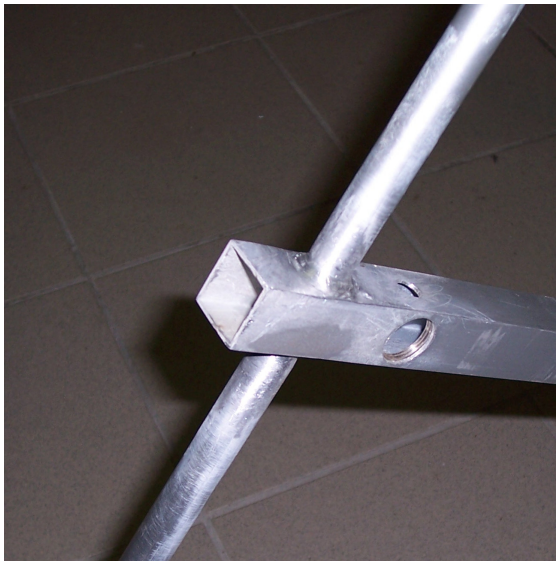
fig. 1


fig. 2

Maybe we shall discuss the distances for the holes first:

- the 16mm hole for the radiator will be drilled at 30mm
- the 10mm hole for the passthrough of the coax center core and its dielectric insulator will be drilled at 72.5mm
- on the lateral to this passthrough we will drill a 20mm hole for the PG13,5 cover.
- the mounting clamp will be centered at 925mm with a distance of 75mm.
- the 16mm hole for the N-socket will be located at 840mm.
- the 16mm hole for accessing the socket will be drilled at 850mm on the opposite side

The PG13.5 access hole is necessary for threading in the coaxial cable ans for soldering the shield to the tail coming from the radiatorconnetion. Inside the boom well glue a PG13.5 nut serving as thread for the cover.
Next well secure the radiator with 2 screws on each side, fasten the connection to the radiator and thread the tail to the PG13.5 compartment. (fig. 3)
Now we can fill the front of the boom with silicone compound and put the covers on their places. (fig. 4)

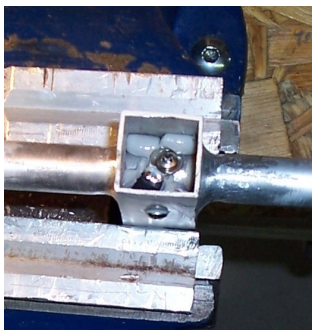
fig. 3


fig. 4

So here an overview of what area has to be filled with silicone compound. (fig. 5)

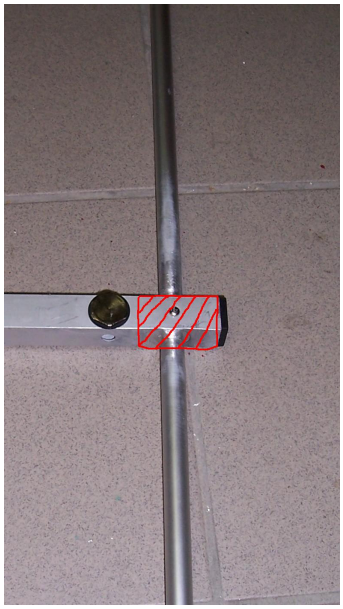

fig. 5

Next we'll thread the coax center core through the 10mm hole. (fig. 6)
Note the small white plastic bush at the hole in the boom. It's fitted from the inside with silicone compound. The coax is cut then to an approximate length of 145mm.

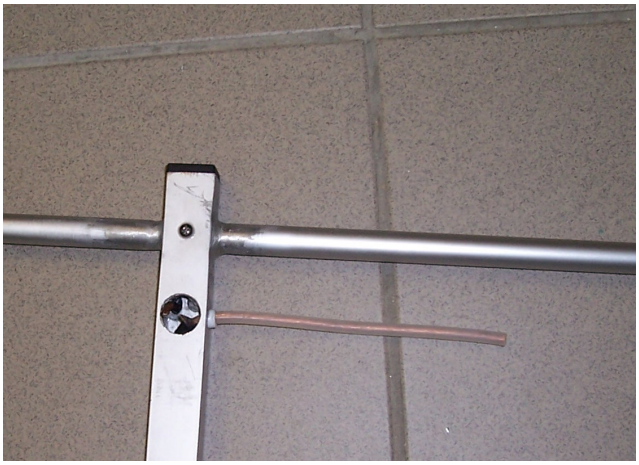

fig. 6

Next we'll put some heat shrinking tubing around and fill up the top of the sleeve with silicone compound. (fig. 7)

fig. 7

This is the match clamp (fig. 8) made of 12mm sqare aluminium rods. The holes are 15.5mm and 9.5mm in order to give good contact.
An M6 thread is cut into one rod for the clamping screw. An additional secure nut will mahe sure the clamp will remain on the right place.

fig. 8

As said before, the oxide layer has to be removed. (fig. 9)
Otherwise the contact won't be assured. Next to the boom a heat shrinking tubing with hotmelt glue inside will provide additional stability and waterresistance.

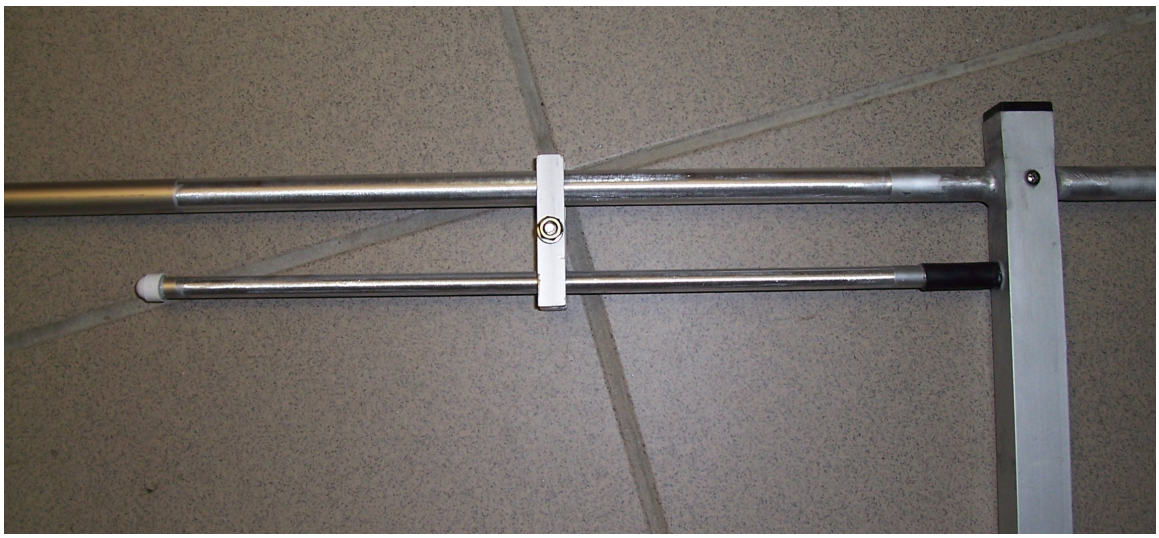
fig. 9

And finally the whole assembly (fig. 10). The match clamp for 106.45MHz is located at 195mm measured from top of the boom to the middle of the clamp. It gives the best SWR reading of 1.3:1 during my testings with a 20m cable and measured as always at the antenna. My test conditions were not the best as I had to access the antenna for the SWR reading. I expect a VSWR of 1.1 - 1.2:1 when mounted in free space.

fig. 10

So finally I'll indicate the places in figure 11 where silicone compound was applied in order to get a maximum of compartments. It's unbelieveable how many flooded dipoles I've seen during the past years. So I'm really aiming to get the best weatherproof assembly possible.

fig. 11

I have to make up my mind now on how to design an additional rain cover or protection for the connector area. I'll put this update into this document as soon as a final concept is available.