

## Half Wave Dipole with Gamma Match for 4 meter (70 MHz)



**Gamma Match** will be abbreviated with **GM** in this publication

### Foreword:

Before the Euro time I acquired a Sirio Model SD-FM Dipole 87 – 194 MHz antenna.

I bought it because I liked the construction. But I never used it, until the 4 meter band came to the Dutch HAMS.

In 2021 I retrieved it from the cellar and first played with it to see if it would work on 6 meters.

With new aluminum tubes, and studying publications, comparing antennas with GMs, I finally came up with the construction for 4 meters.

Because we have a great hardware store (van den Boogaard) nearby, I started to buy new aluminium tubing. My plan was namely to use all the hardware of the SD-FM Dipole and just replace the tubing.

### Conversion to 6 meters:

As indicated, I first wanted to play with the GM on 6 meters. I retrieved information on the Italian Manufacturer's website for SY 50-3: a three element Yagi Antenna, using a similar GM, be it that this was much larger (of course). The dimensions of the driven element have to be found out. That required some study, as the construction of the SY 50-3 does not use a full size 14mm diameter tube, but both 14 and 12 mm. For the range 50 – 51 MHz, the dipole length is 2765mm.

Because the middle part of the antenna construction, that holds the two aluminium tube halves 'uses' 54mm, I cut the two separate halves to  $(2766 - 54)/2 = 1356\text{mm}$ .

In the next picture, in the lay out of the GM, this middle part that fits around the boom, is shown



The small tube slides into the larger tube of this GM, and is isolated from it. In the experimental phase I wound enough clear tape around the small tube, so that it could just fit in. In fact the exposed parts (inner/outer tube) form the capacitor of the match.

The lengths of the two parts of the GM were established by guessing.... and looking at size differences between the various antennas. In the various instructions, the manufacturer describes adjustments lengths, but no real tube dimensions....



(picture above) The original parts of the GM for use on 145 MHz: 150mm for the outer tube and 220 mm for the inner.



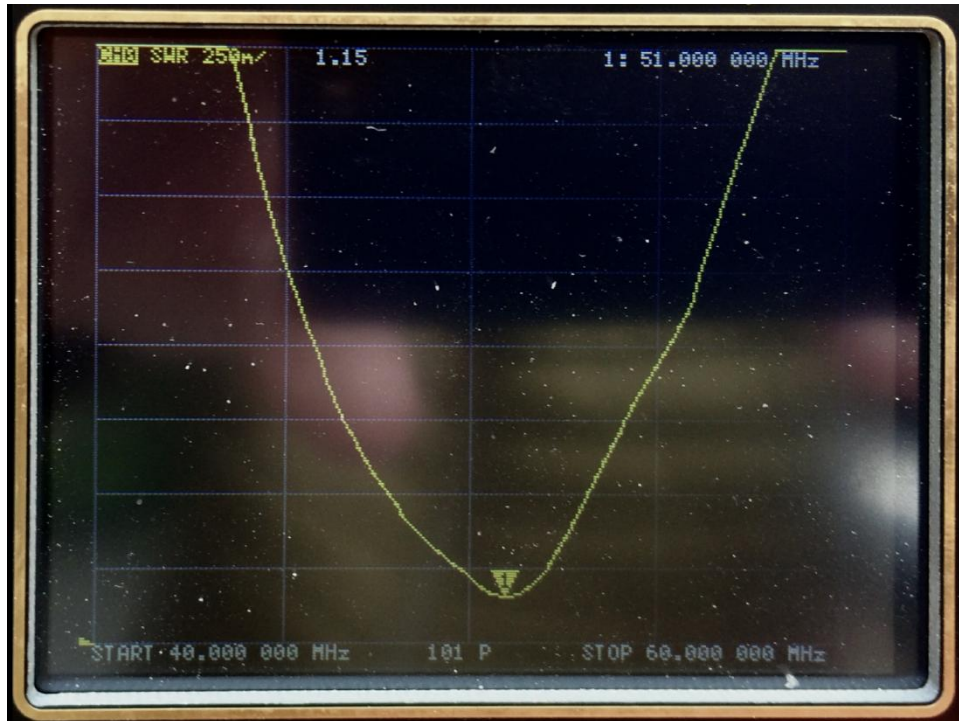
These are the original isolating parts, that I (in the end) transferred to the final version.

For the 6m version, I came to the following lengths:



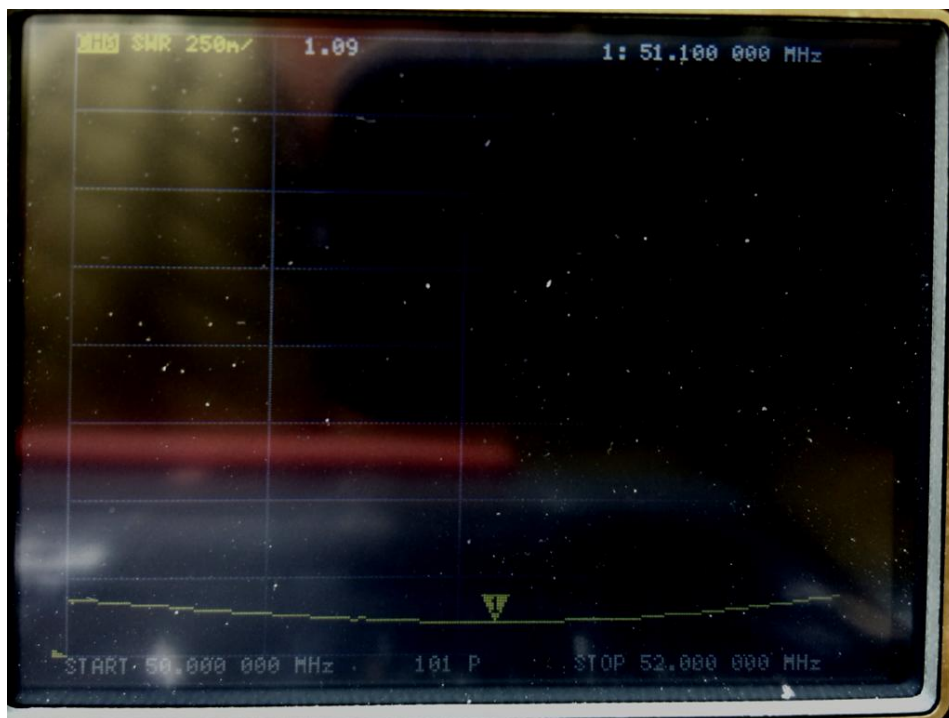
245mm for the outer, and I used 500mm for the inner. Just to be safe, knowing that the part beyond the Short (connecting GM and Dipole) and the dipole has no effect. Note on the left of the inner tube: the applied isolation tape.

With the antenna assembled, I hung it *as free as possible* from obstacles in the backyard. The NanoVNA is the perfect instrument, as you see right away what the effects are of moving the Short, and at various positions of it, playing with the inner tube. The final result for 6 meters:



range 40 – 60 MHz...

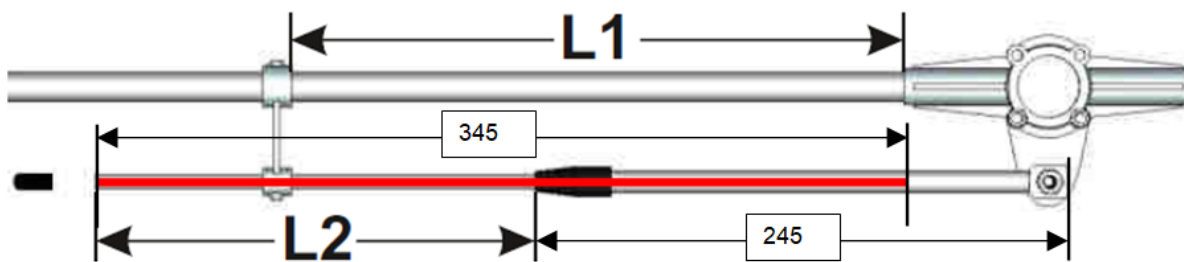
These pictures were taken from the NanoVNA screen in the outside with too much light to create better ones.



... and only the 6 meter band. Region 1: 50 – 52 MHz

I made notes of the final results for 6 meters.





Established GM dimensions for use on **6m** (50 MHz)

This is what the manufacturer advises for adjusting the GM for the SY 50-3. L1 and L2 are leading. But this is information on the GM dimensions *that we don't know*.

L1 appears to be **best at 380mm**. Then I measured L2 for 2 situations: with the inner tube cut at 500mm, L2 is 420mm. Cutting off 150mm of the inner tube gives an L2 of 270mm.

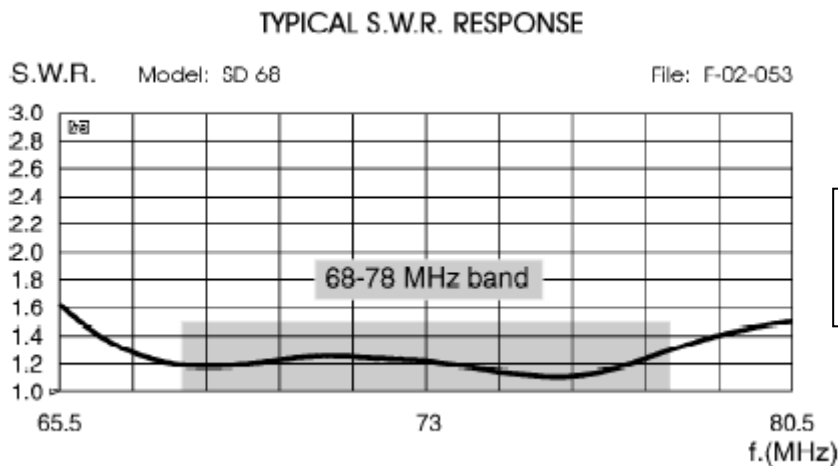
This proves that the part outside the Short does not influence at all. Important is L1, and the part that is exposed internally in the GM, so the capacitive coupling.

Knowing that the Half Wave Dipole works fine with the used GM dimensions, the final countdown started: Making it ready for 4 meters (70 MHz).

### Conversion to 4 meters: SD68

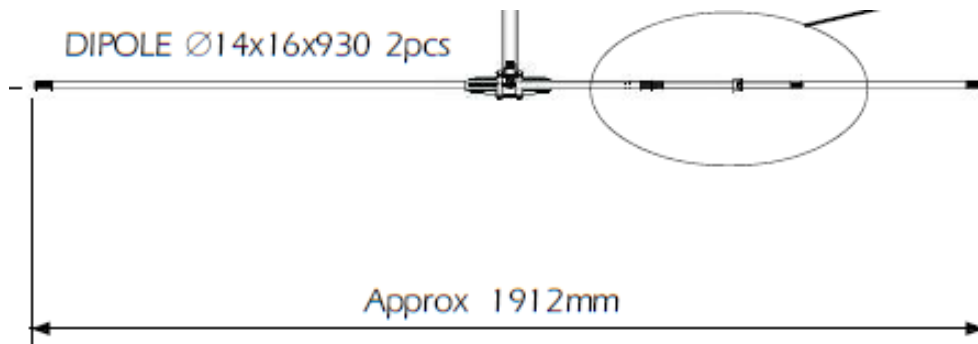
With the experience gained, the dipole halves were reduced in size, and the GM was resized as well. But this time I found valuable information for an (for me) unknown variant, the SD68 dipole.

The SD68 dipole (with GM), as published, is supposed to be wide (68 – 78 MHz). I'm in favour of a wider use, but I can imagine that others prefer a sharp antenna. Choosing for the broadband version, I adapted the Manufacturer's dimensions for the Dipole. They promise:

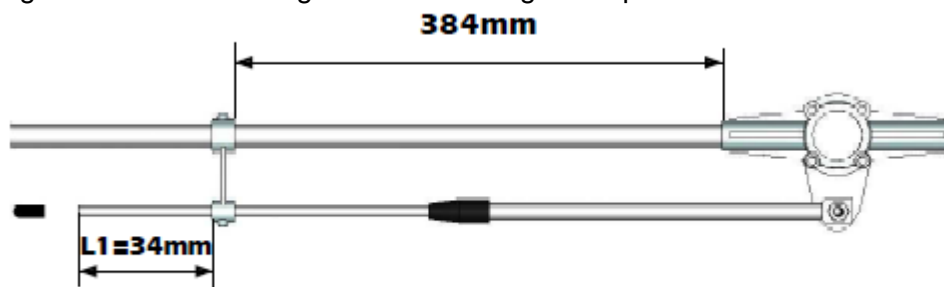


So basically the manufacturer claims an SWR of under 1 : 1,3 in the range 68 – 78 MHz....

The product apparently can be adjusted, but the assembly calls for 2x930mm Ø14mm with Ø16mm end caps. Fitting the tubes in the boom adapter makes the dipole 2x930+52=1912mm, and that is what the picture says



This is straight forward. The GM gives the following description:

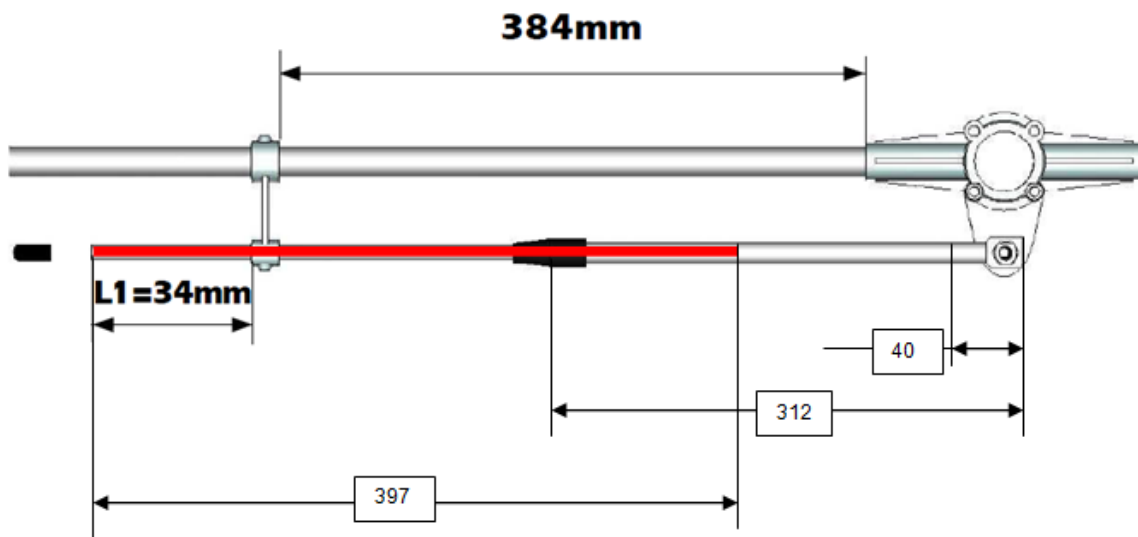


So, no real dimensions of the two tubes, but if you bought the hardware, the kit will have the 12mm and the 8mm tubes in it.

I established the following dimensions, using the depictions of the dipole and the GM next to each other, and then just measuring.

This may be tricky, if the parts are not according scale.

But with the experience of the 6m adventure, this is what I came up with:



As for the 6m GM, the length of the 8mm tube is a gamble, but then again: what is left of the Short, has no function (confirmed before).

This is how the GM for the 4m dipole has been constructed

After first satisfactory measurements in the backyard, I mounted the Dipole on the fiberglass mast on the roof terrace, as this gives no obstacles.



The fiberglass pole is on the roof terrace, which is 3 meters above ground level. It is positioned on top of a parasol cast iron foot with a 2m50 steel pole in it.

At the antenna test position, there are no nearby obstacles, so adjustments can be done simply (using a stair....)

To have best results, I had to reduce the dimensions of the Dipole first, otherwise no good resonance was obtained at 70 Mhz, the frequency to be used.

I cut off one centimetre on each side, so the Dipole length becomes 1890mm.

For the GM, best results came with the Short at 410mm and with the inner tube almost at its most outward (upward ☺) position, so with the lowest capacity

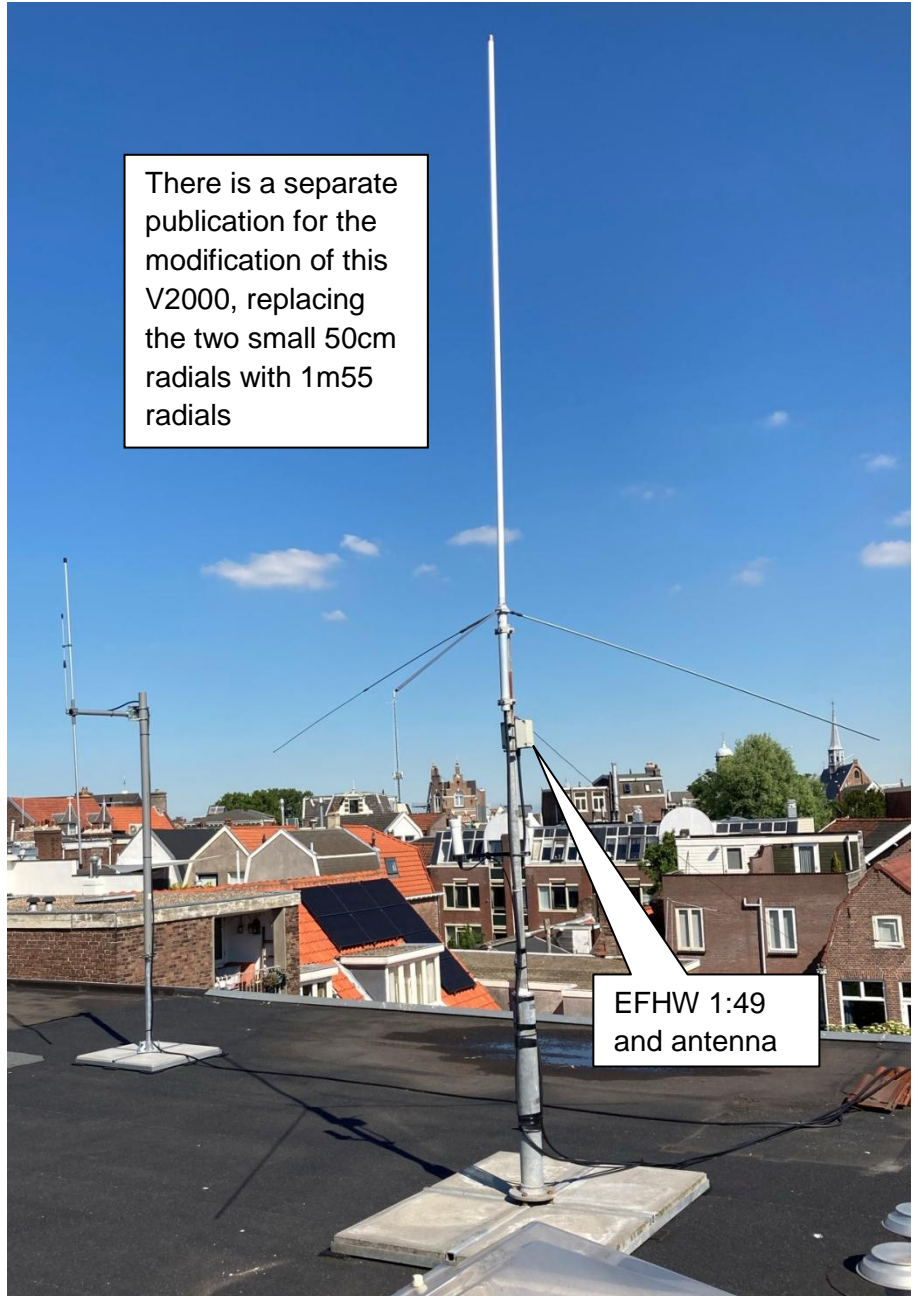
With this established, I removed the non metallic hardware from the original SD-FM Dipole (the insulators, rubbers and end caps) from GM and Antenna. That worked fine with hot water, so no mechanical heavy forces had to be used. These part were installed on the final concept.

Remeasured, screws tightened, Antenna to the roof of the house.



The 4m Half Wave Dipole with GM. Installed on a new tile frame with a mast of 120cm. On top of it you see a

PVC tube that just fits over the metal tube, so it raises the Dipole away from the metal pole. Picture on the left: the original position, picture on the right: rotated 90 degrees over left, which gives a less restless view for the next street neighbours.....



There is a separate publication for the modification of this V2000, replacing the two small 50cm radials with 1m55 radials

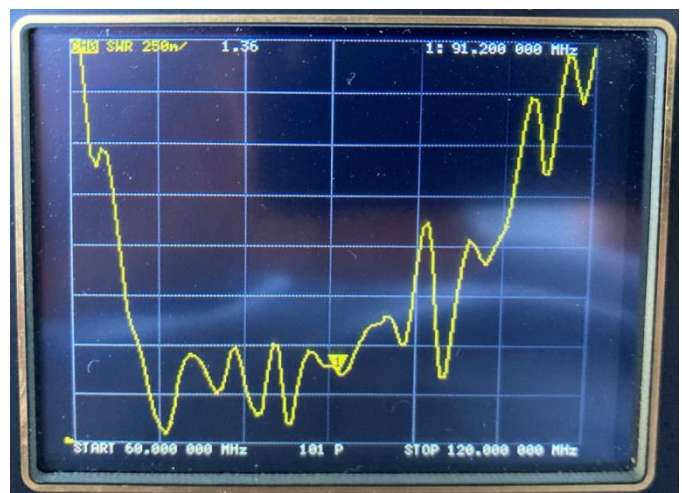
EFHW 1:49 and antenna

Measurements:

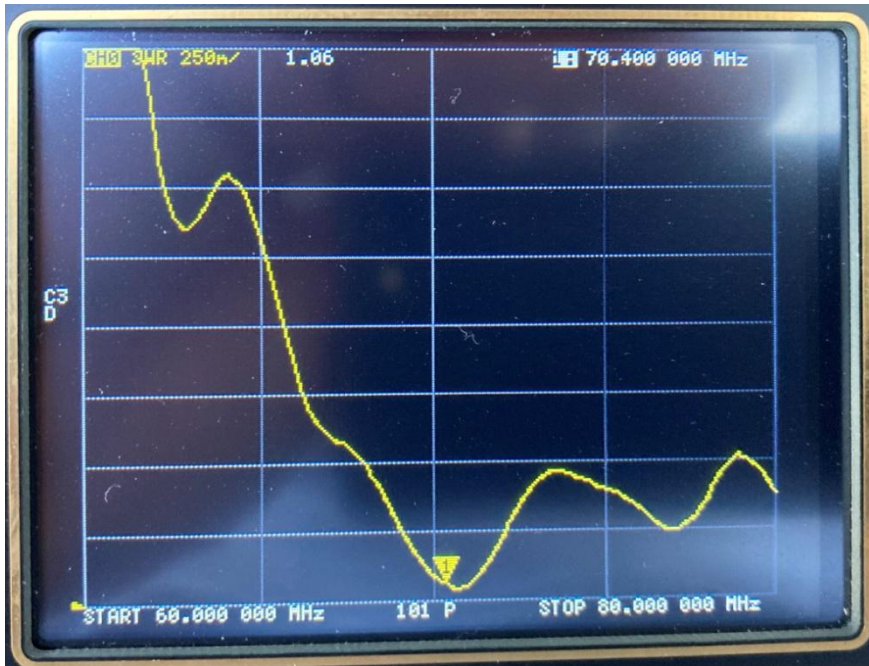
Here a wide spectrum: from 60 – 120 MHz. It shows indeed in what a great range the Dipole can be used safely.

From 68 – 94 MHz, the SWR is well under 1 : 1,5. The manufacturer was more or less correct!

Next page shows a smaller range.







For the 4m band, the SWR is better than 1 : 1,1 (70.0 – 70.5 MHz).

And this is what is left over from the experiments and the original SD FM 87 – 194 MHz Dipole....:



20210619 – PA0SNY