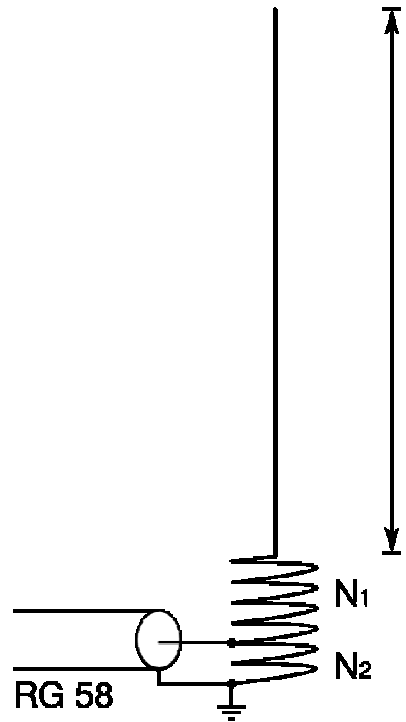


Shortwave Antennas for 40m and 80m

Trying to use the shortwave bands for ham radio usually end up in the need of space for large antennas. Of course, the antenna should be "the larger the better" for these bands but sometimes there is no space available. I have also this problem as I only have a small balcony so I decided in trying to build extremely shortened antennas as this is common for mobile antennas. Here is a sketch of the layout:



I built two antennas, one for 40m and one for 80m and I had access to a professional vector network analyzer. The length of the radiator was chosen arbitrarily, then the parameter N_1 was varied to find the right resonant frequency. After that the parameter N_2 was varied to get 50 Ohm. The resonant frequency is independent of the parameter.

Here the results for the antenna for 40 m:

$l=854\text{mm}$

$N_1=59$

$N_2=16$

total length: 1.15m

And here the results for the 80 m antenna:

$l=1500\text{mm}$

$N_1=98$

$N_2=18$

total length: 2m

I used a PVC wastewater pipe with a diameter of 40mm. The radiator can be either fixed on that pipe too, or it can be installed in a separate pipe (one for electric installations in my case).

Here is a photo of the 40m antenna:



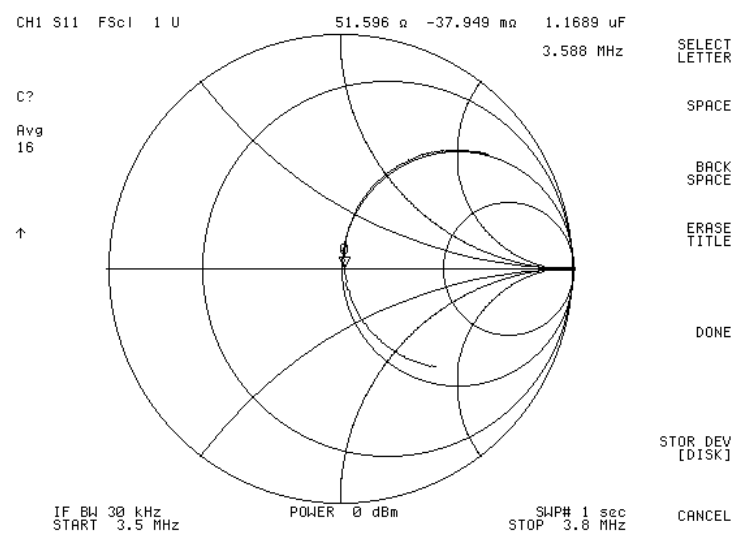
Here is a zoom from the coil of the 40m antenna:



Here is a photo of the installed 80m antenna:

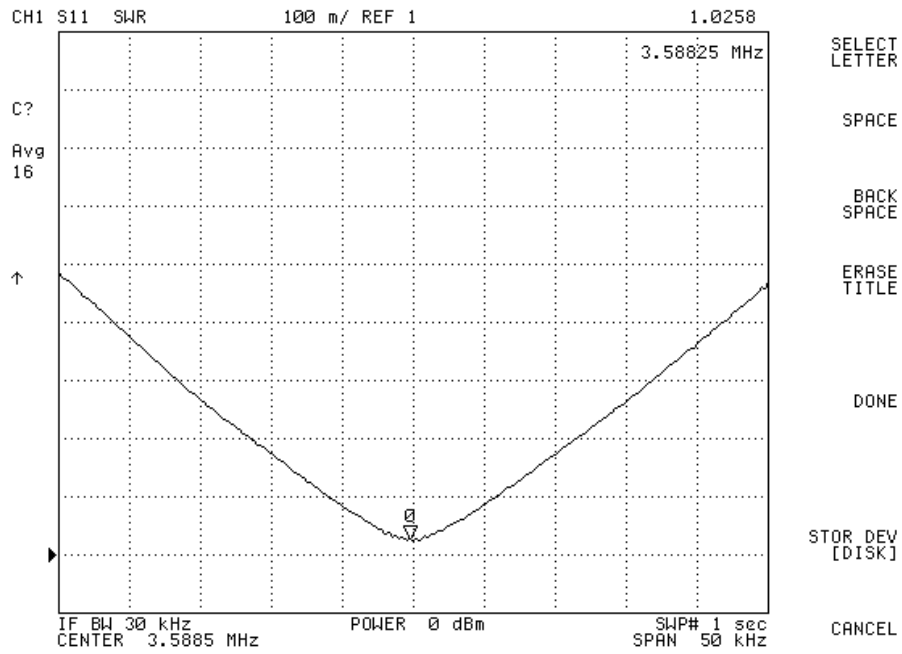


Here are some measurement results of the 80m antenna:

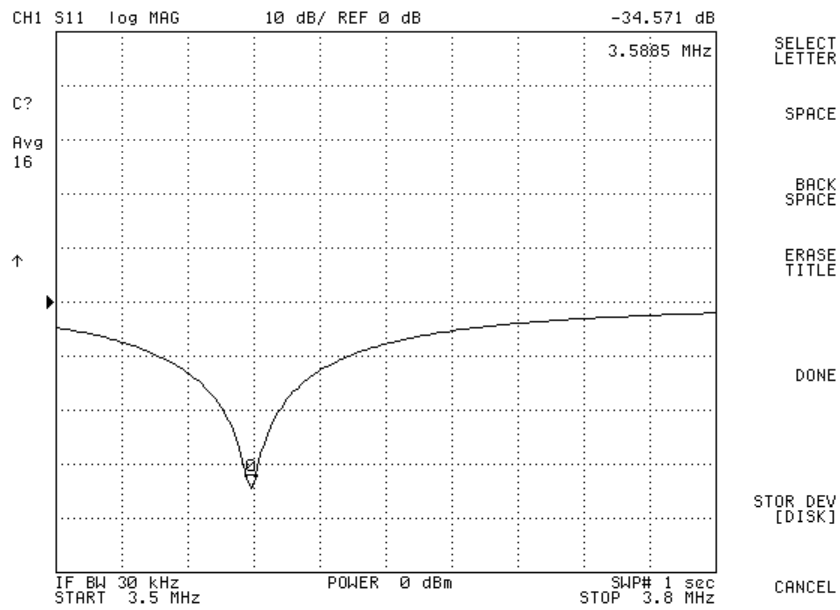


Smith chart:

SWR:



S11 (reflected power) from 3.5 to 3.8 MHz:



S11 (reflected power) with a span of 50kHz:

