

# Initial Tuning Test on Desktop MLA

4/17/24

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At March 2024 trip to Japan, I acquired a Desktop MLA unit from JR1OAO.

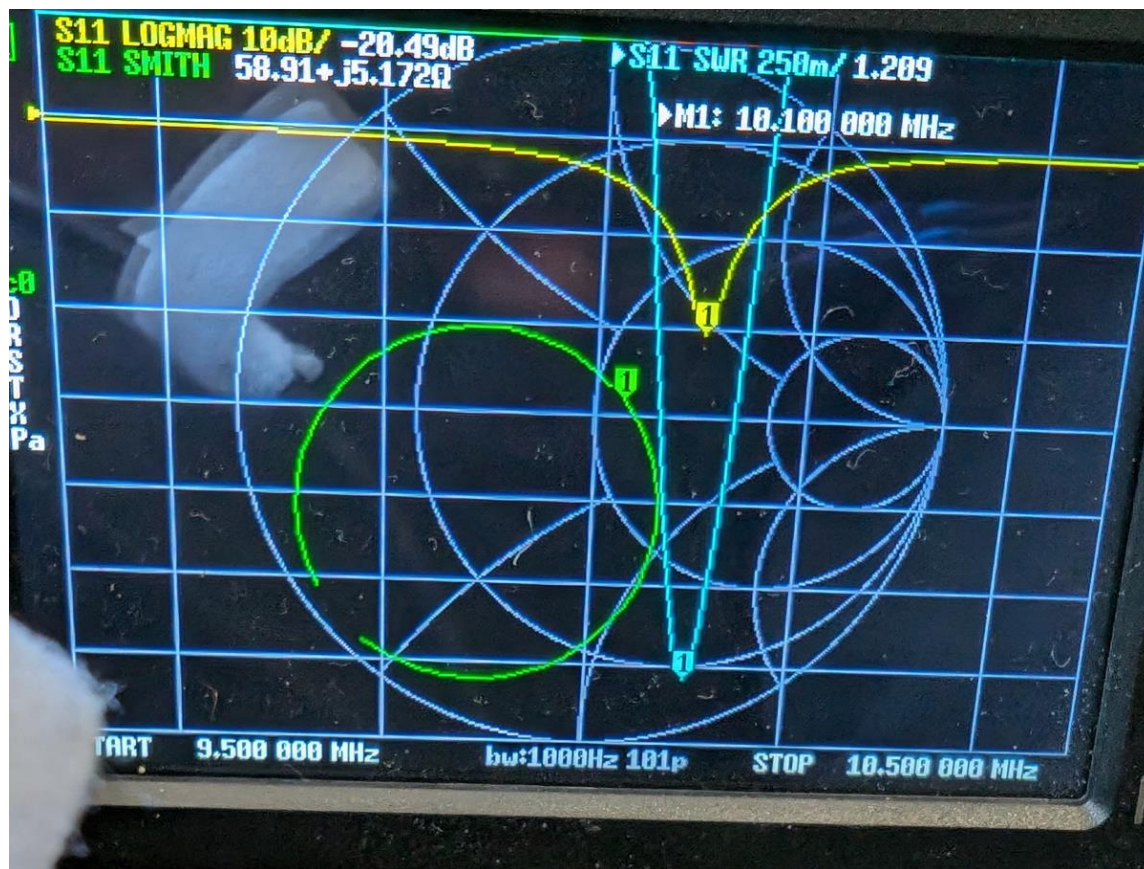
In his recommended configuration, I built a pair of 1m diameter loop using LMR400 coax cable.

I also created a set of plastic spacers between the two loop elements as well as the top support.

It has a pair of remote / manual control inputs to drive the motors. A manual remote control is built to match the resonance and impedance.

To test it initially (indoor), I tuned the MLA to 10MHz, probably the lowest amateur band I can tune to in this configuration.

Figure 1 NanoVNA screen shot for Desktop MLA tuned to 30meter band



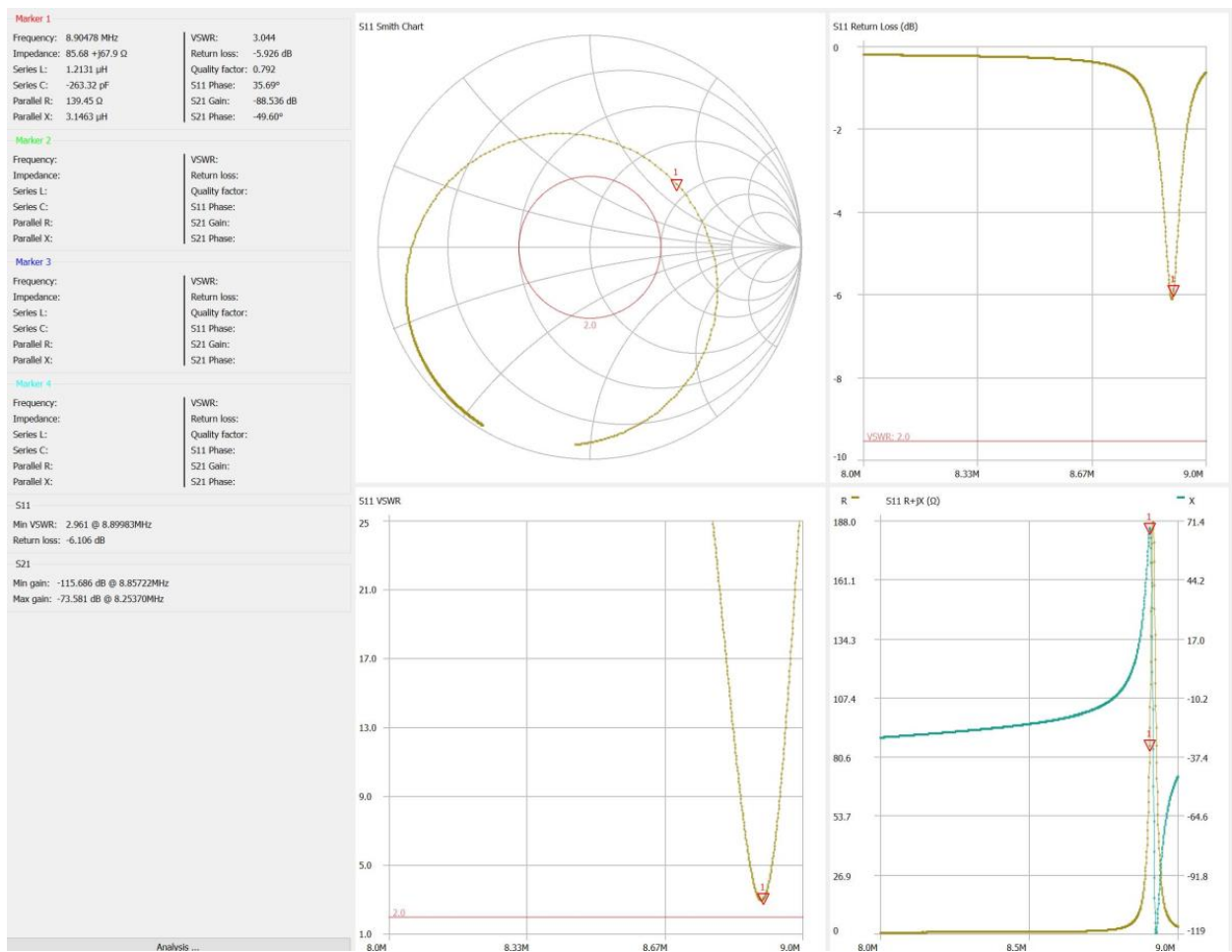


Outside tuning test then is performed.  
It is performed in my backyard, with the antenna set on a picnic table.



## Two Parallel Single-Turn Loop (diameter 1m) Configuration

First, two single-turn parallel-1m-diameter-loop configuration is tested.  
The lowest tunable frequency is **8.90MHz**. It could actually resonate down to 8.5MHz, but matching VC did not have enough capacitance to provide impedance match.



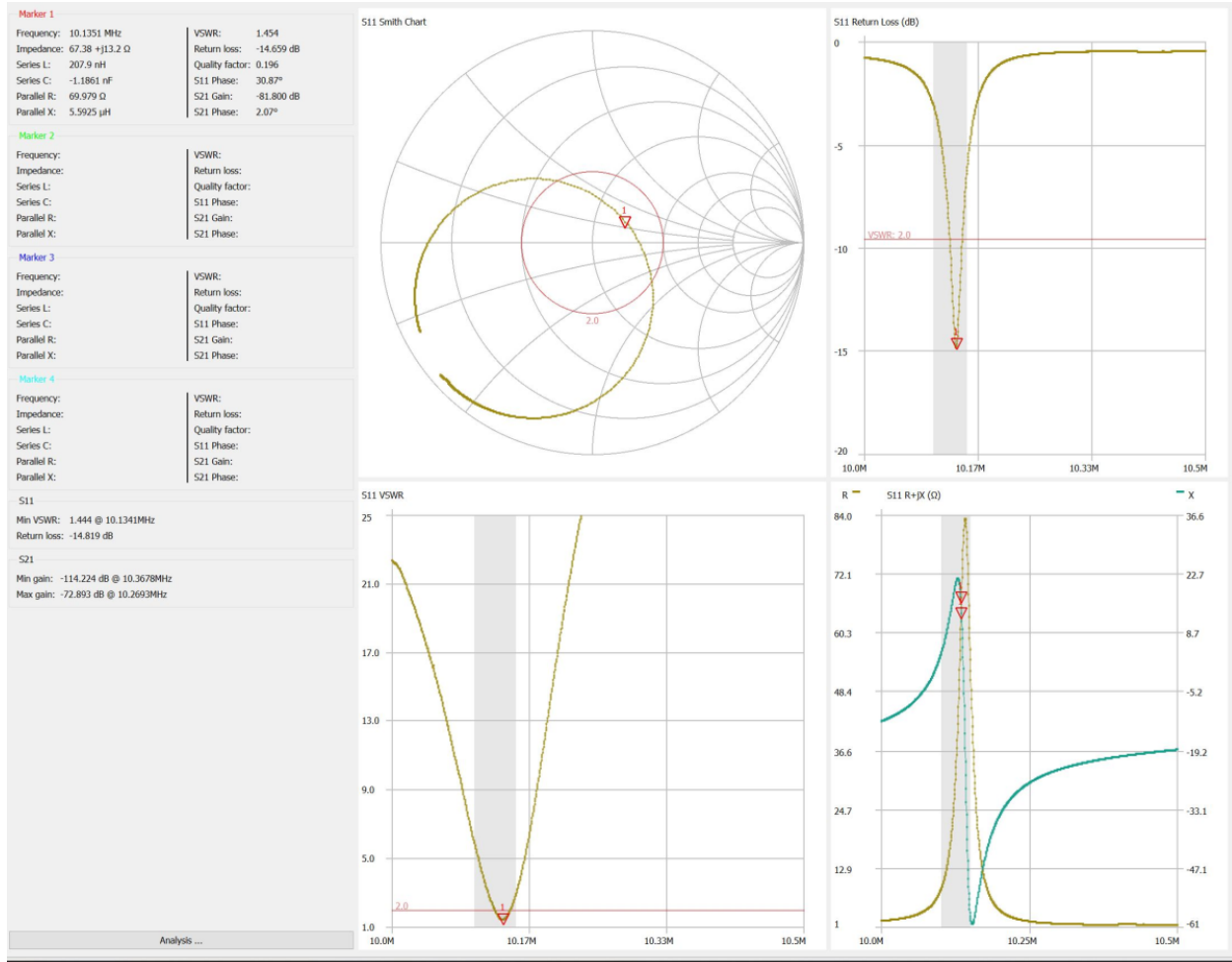
The highest tunable frequency is **24.17MHz**, narrowly missing 12meter band.

Therefore, in this configuration, the antenna is tunable from 10MHz band to 21MHz band, just as indicated by JR10AO.

Below is measured result for ham bands covered. Due to its very hot weather, I could not stand to manually tuned to perfection for each band. I stopped at compromising point, but given some practice, I should be able to tune much better. And once we managed to hook up to our auto tuner, the match should come instantaneously.

### 30meter band measurement

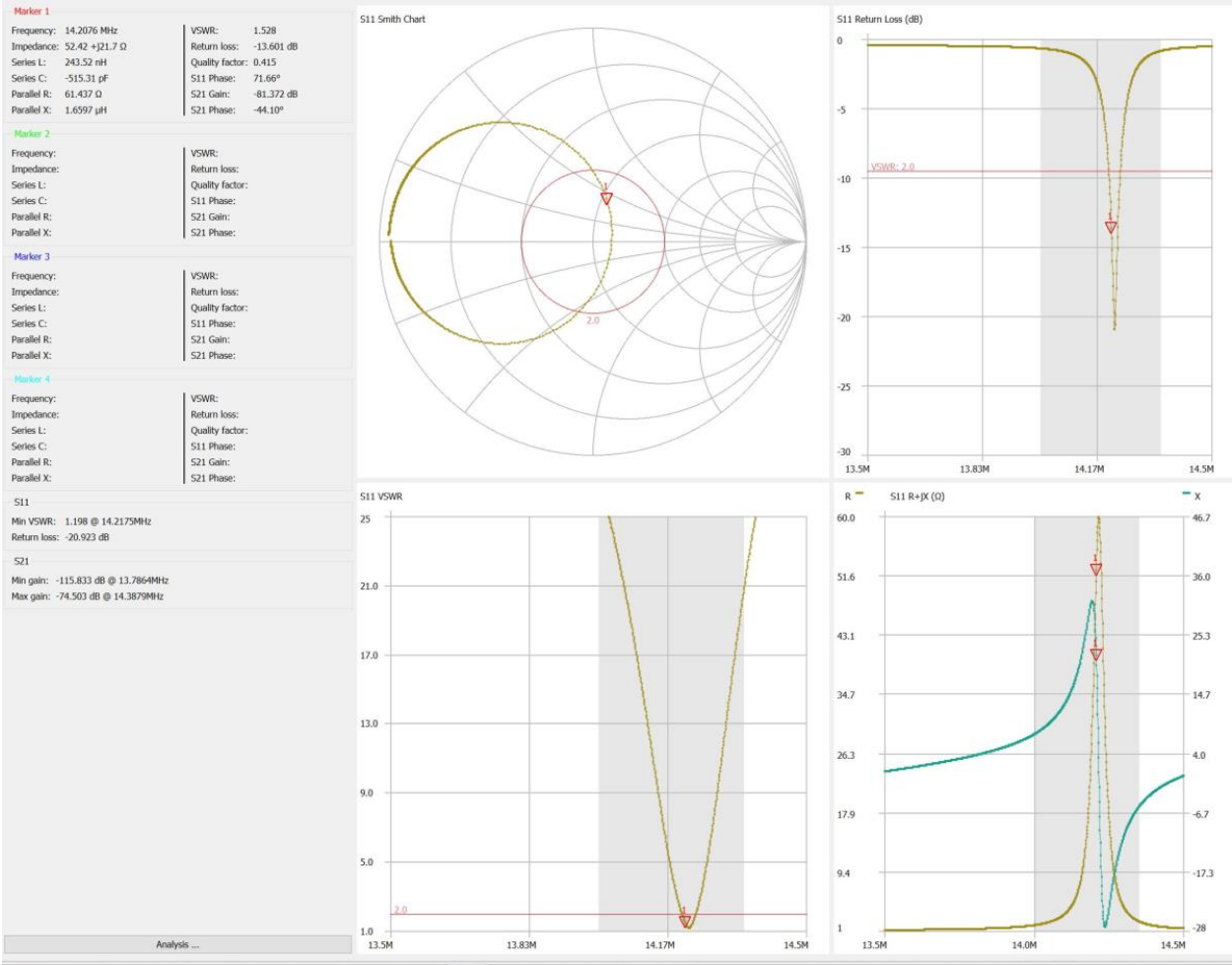
S11 recorded here is only -14.8dB (SWR = 1.44), 2:1 BW of ~15KHz. But the matching could go much better. It is just too severe for a manual tuning. BW is narrow, though not as bad as I expected.





20 meter band measurement

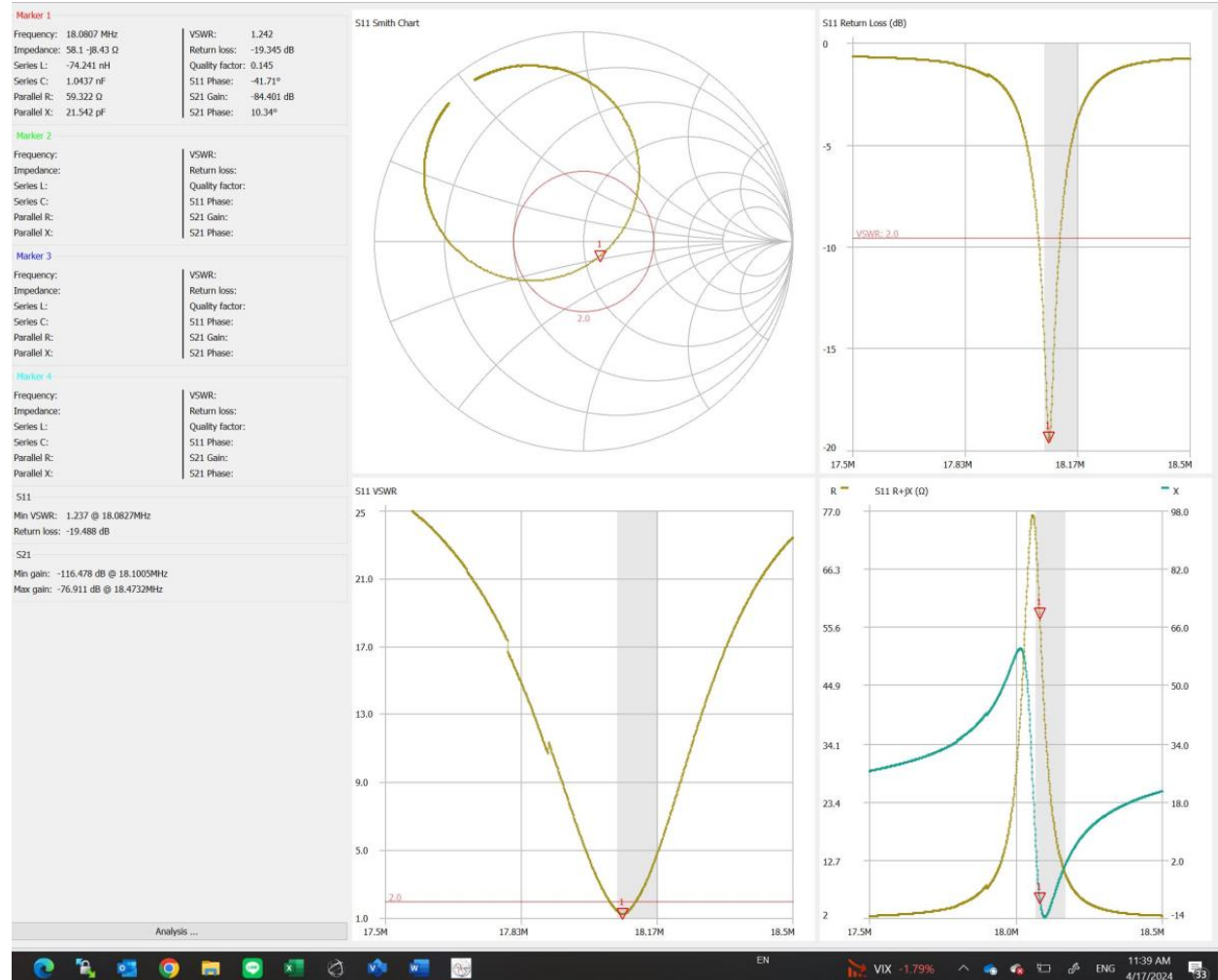
S11 recorded here is -21dB (SWR=1.19), 2:1 BW of maybe 40KHz. The matching could go much deeper.



Analysis ...

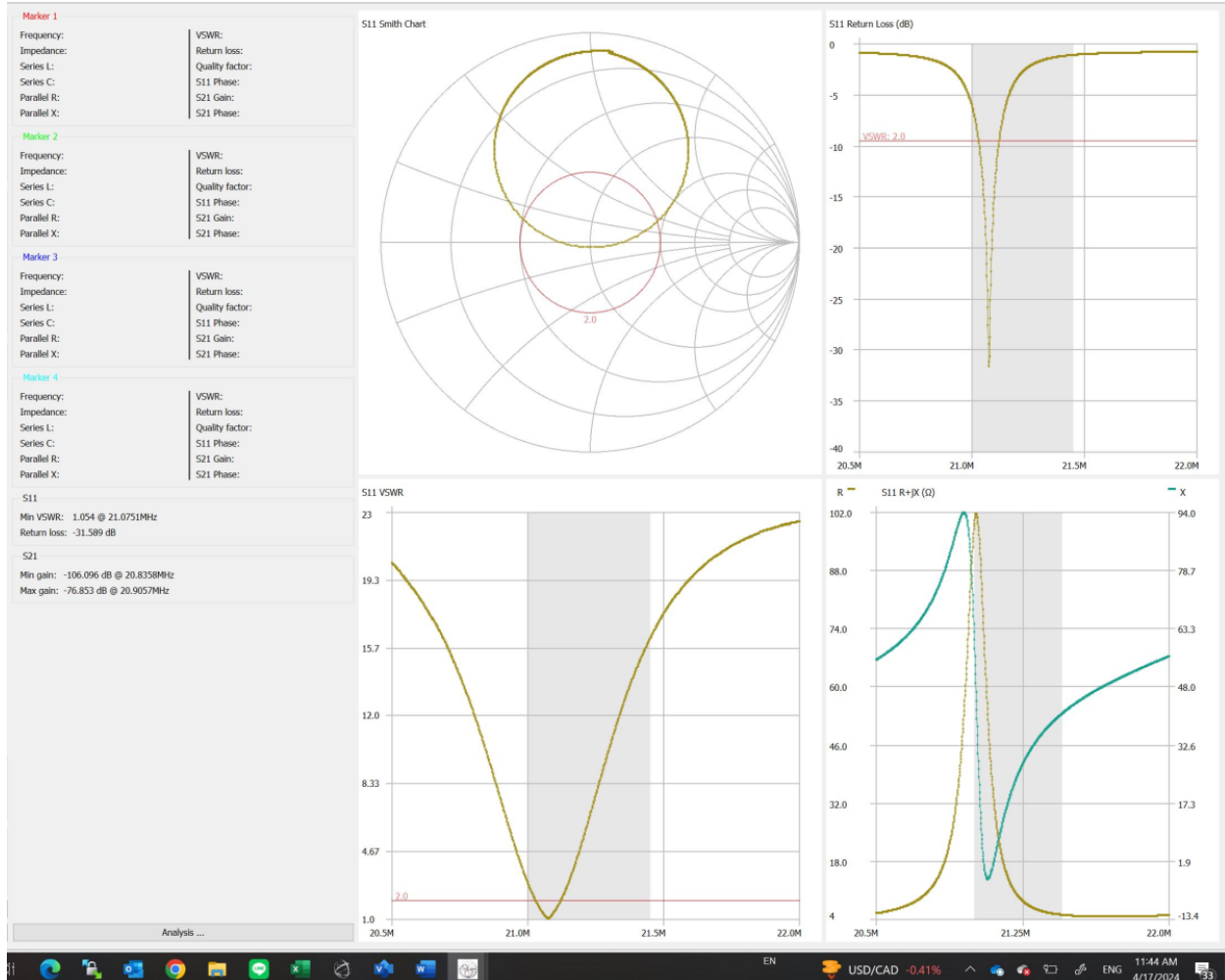
## 17 meter band measurement

S11 measured is -19.4dB (SWR=1.24). Again, 2:1 BW of maybe 50KHz. Again, the matching could go deeper, but manual tuning has its limitation.



## 15 meter band measurement

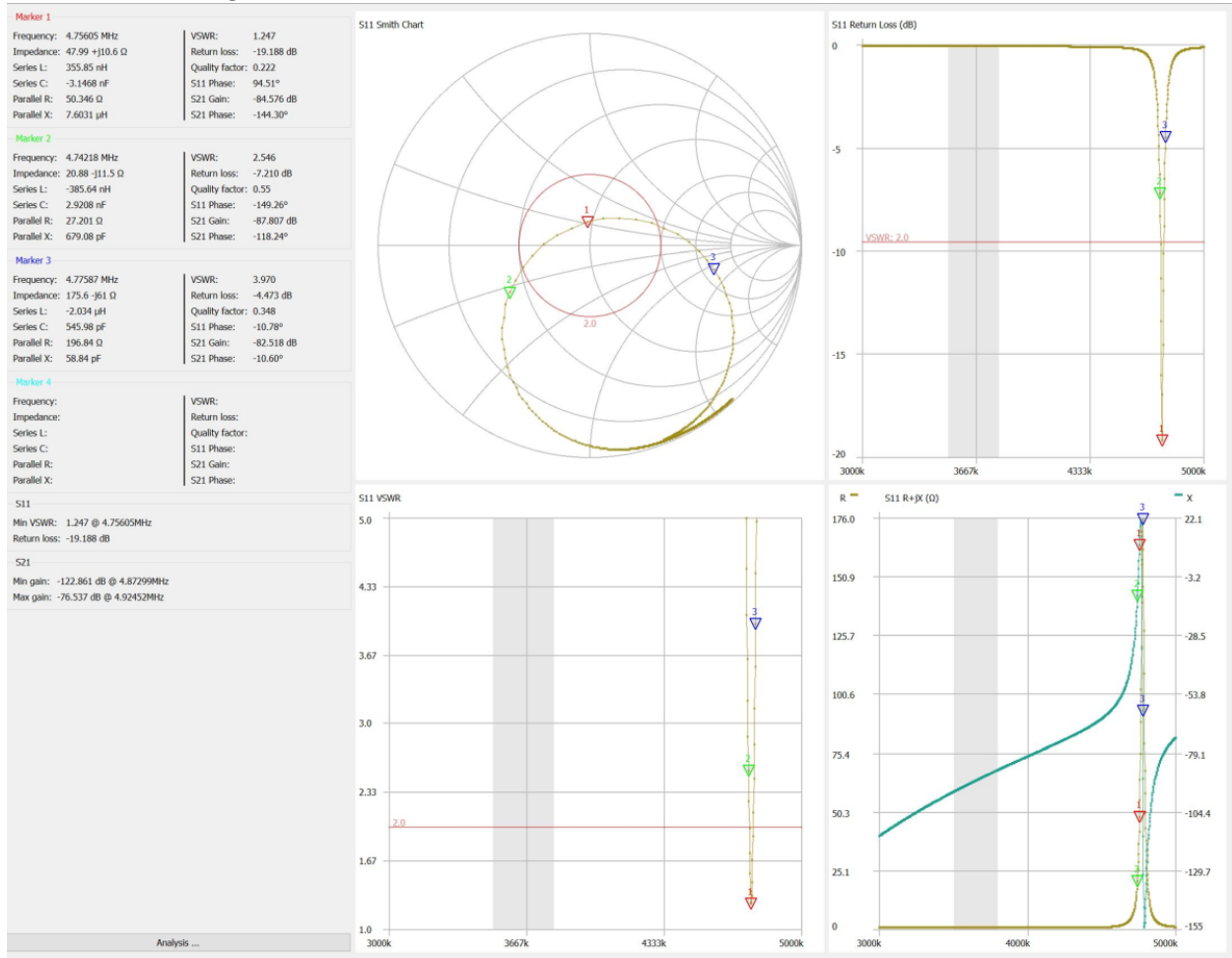
S11 is -31.59dB (SWR=1.054), 2:1 BW of ~75KHz. The match is the best number recorded for this configuration, though it should be possible on other bands as well.



## Single Two-Turn Loop (diameter 1m) Configuration

Next, a **single-two-turn-1m-diameter-loop configuration** is tested. The element length is doubled (~6m) that halves the capacitor requirement.

The lowest tunable frequency is **4.75MHz**. Though I did not test for the band/channel, 60meter band is usable in this configuration.

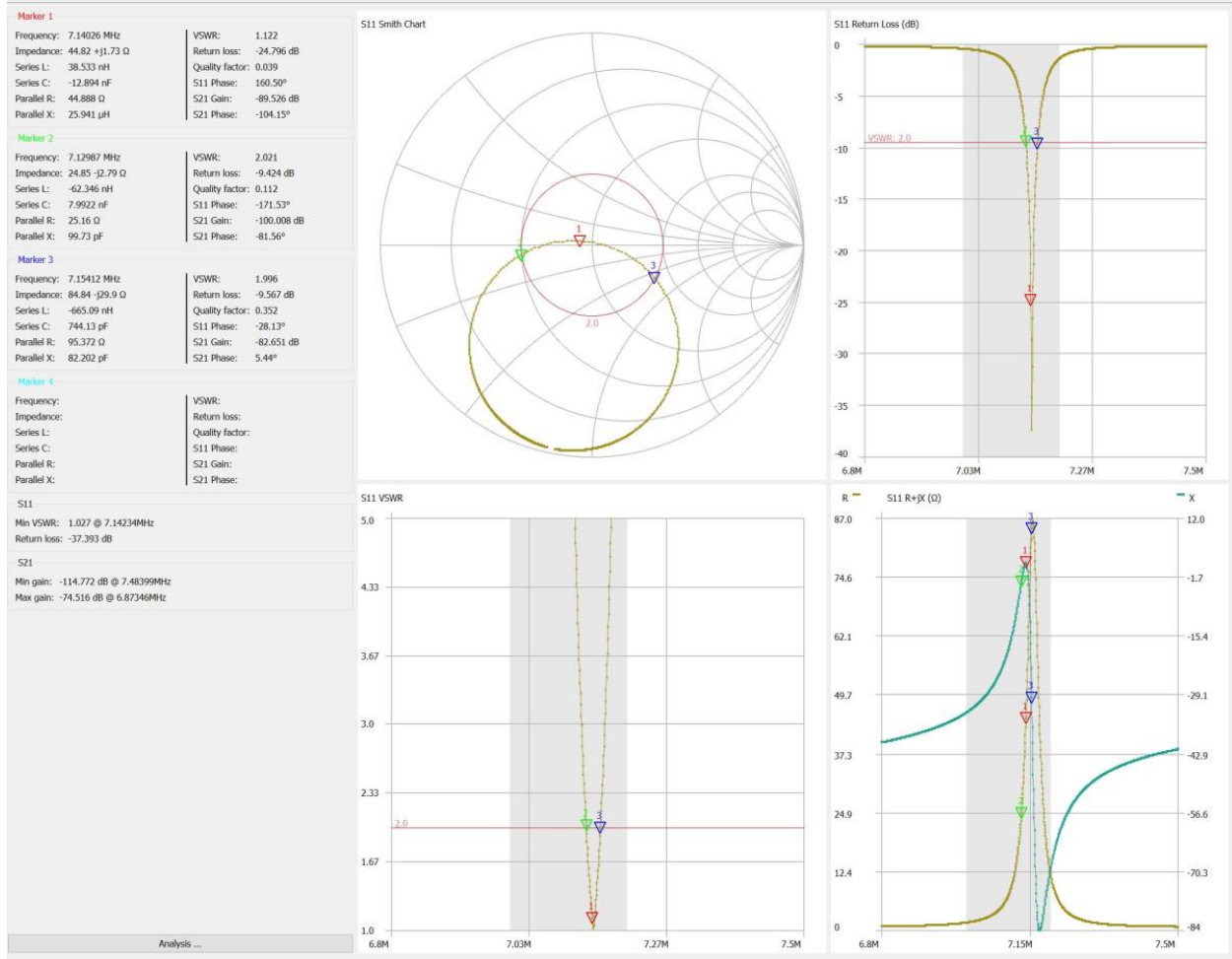


The highest tunable frequency in this configuration was **9.5MHz**. Missing the 30m band narrowly.



## 40 meter band measurement

S11 measured is -37.3dB (SWR=1.027), better than 15m band on two-parallel-loop configuration. This is mainly because at lower bands, tuning is not as critical. I am also getting better at this...



## Summary:

It is shown that the Desktop MLA can successfully tune from 40m band to 15m band, with the two loop configuration (parallel or series).

Note the impedance circle on Smith Charts are rotating clockwise as the target frequencies go higher. This is a function of the location of the tester (nanoVNA), with respect to the feed point of the loop. The Desktop MLA base unit comes with ~3m coax feed line which is where the VNA is placed.

Due to strong sunshine and high temperature, actual QRV test was not performed. (The PC overheated). Will be performed at a later date.

12m, 10m (and 6m) bands need a smaller loop (70cm is shown to work) and perhaps an additional cap on the top to tune, according to JR1OAO. That was not tried on today's test.