

# EE 375 Section 3 Lab C Design and Construction of a Shorted Stub Impedance Matching Network

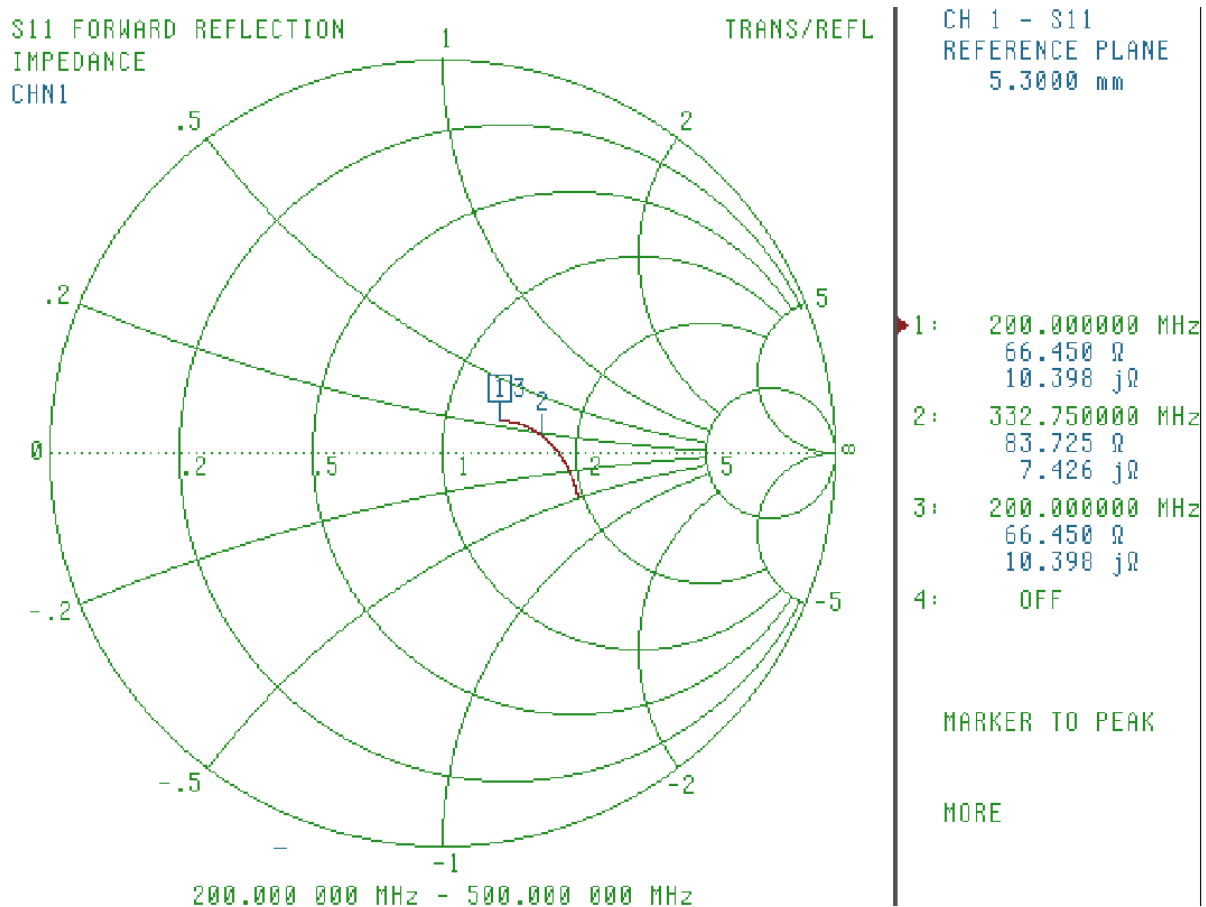
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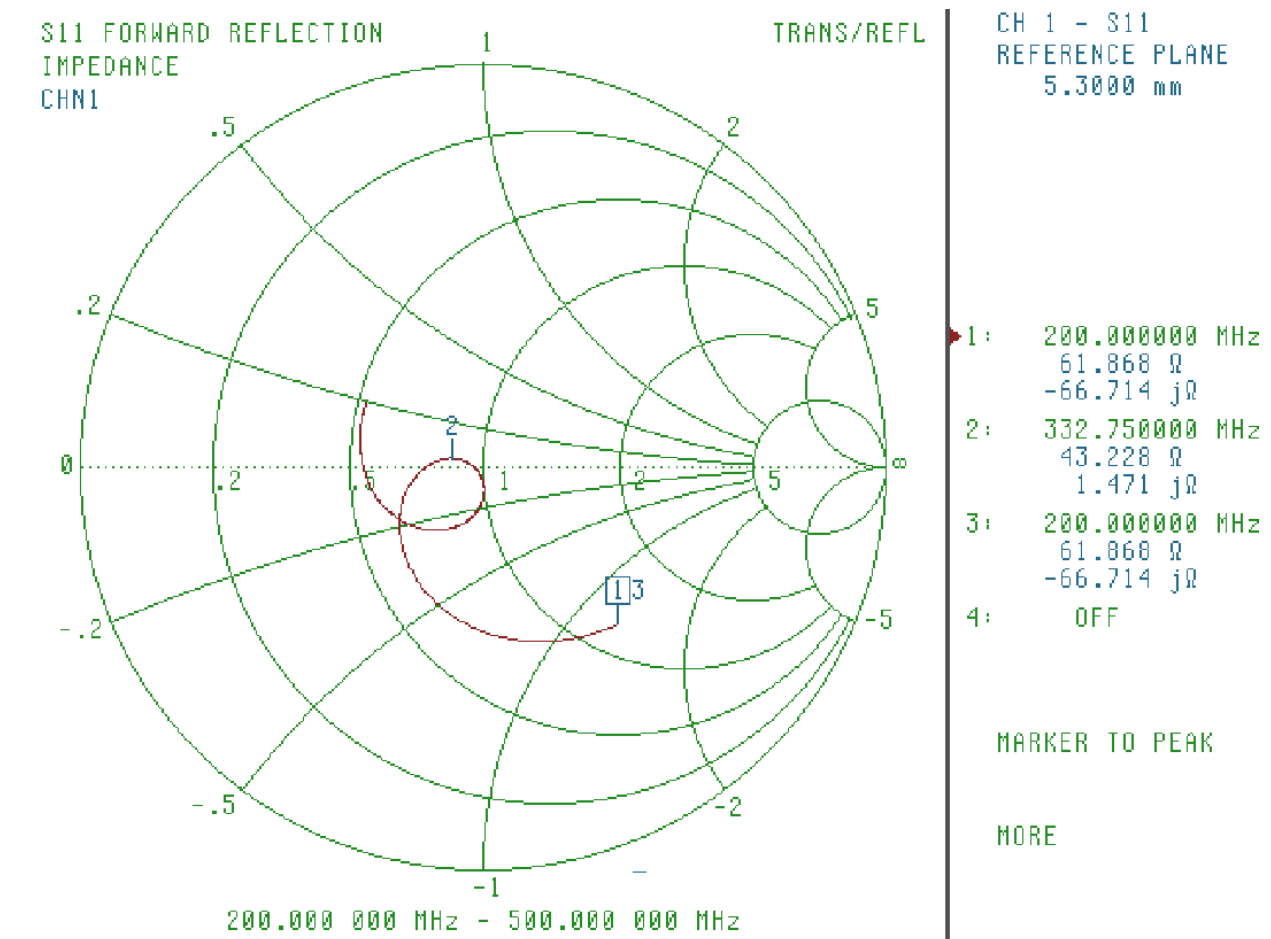
## Procedure:

The goal of this lab was to use single stub impedance matching to reach  $Z = 50 + j0$  ohms @ 333MHz for a network terminated with a random mystery load. For the design, we used a Smith chart and LT spice, and were able to figure out the length of the cable for the load as well as the length of the cable for an open circuit. To build the network we used some of the cables that were given in the lab and cut any that were too big to the size that we needed.

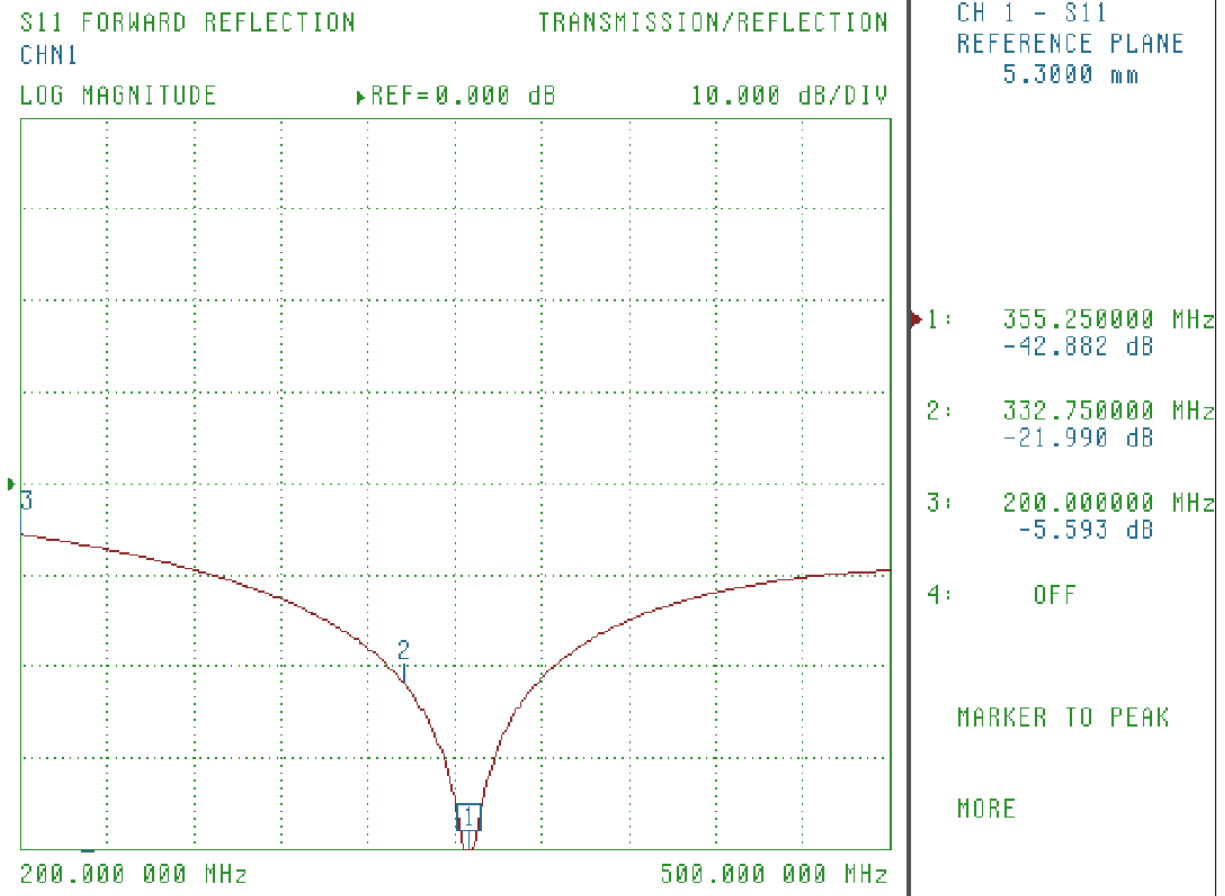
## Results/Analysis:



Mystery load before any matching or tuning.



Mystery load after tuning.



Magnitude vs frequency of the mystery load.

a.  $Z_L = 83.725 + j7.426$

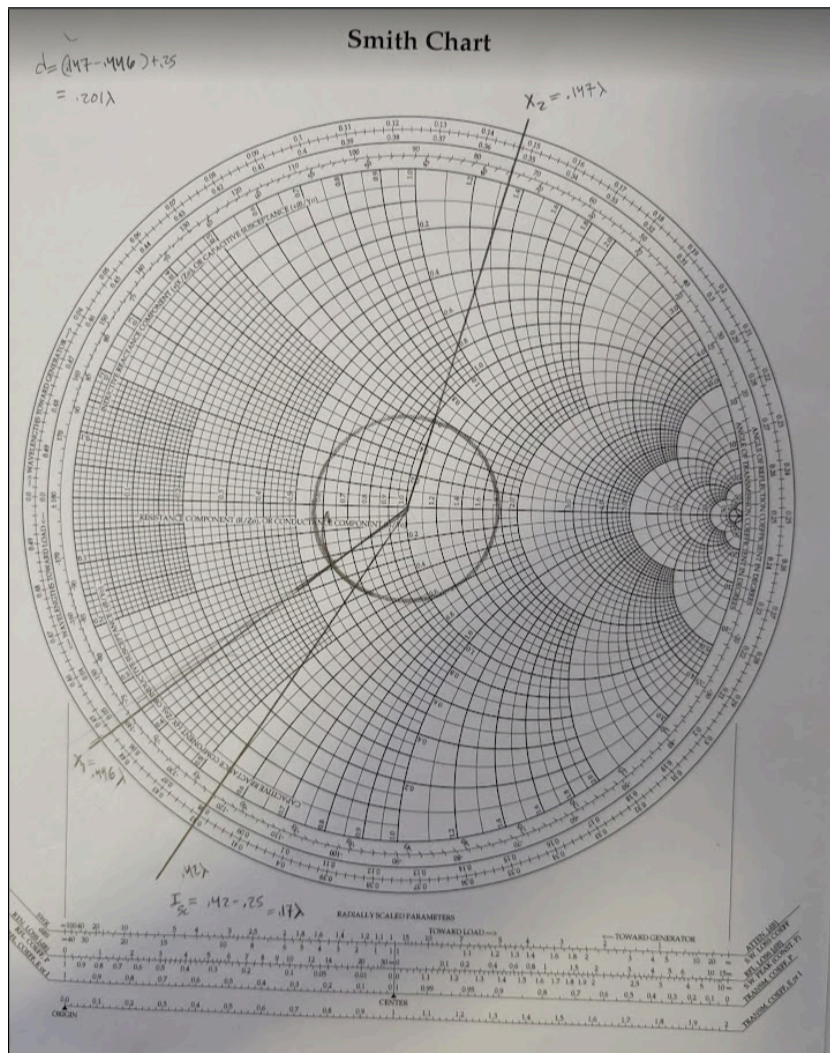
C. Compare the results of your three designs.

**Our experimental result of  $43 + j1$  was 14% off the mark. Again, we knew one of our wires was slightly too short, but were not able to build a longer one because of difficulty crimping the male cap. Our prelab designs however matched within 3% of each other for simulation and Smith chart for a perfect match.**

## Appendix of design

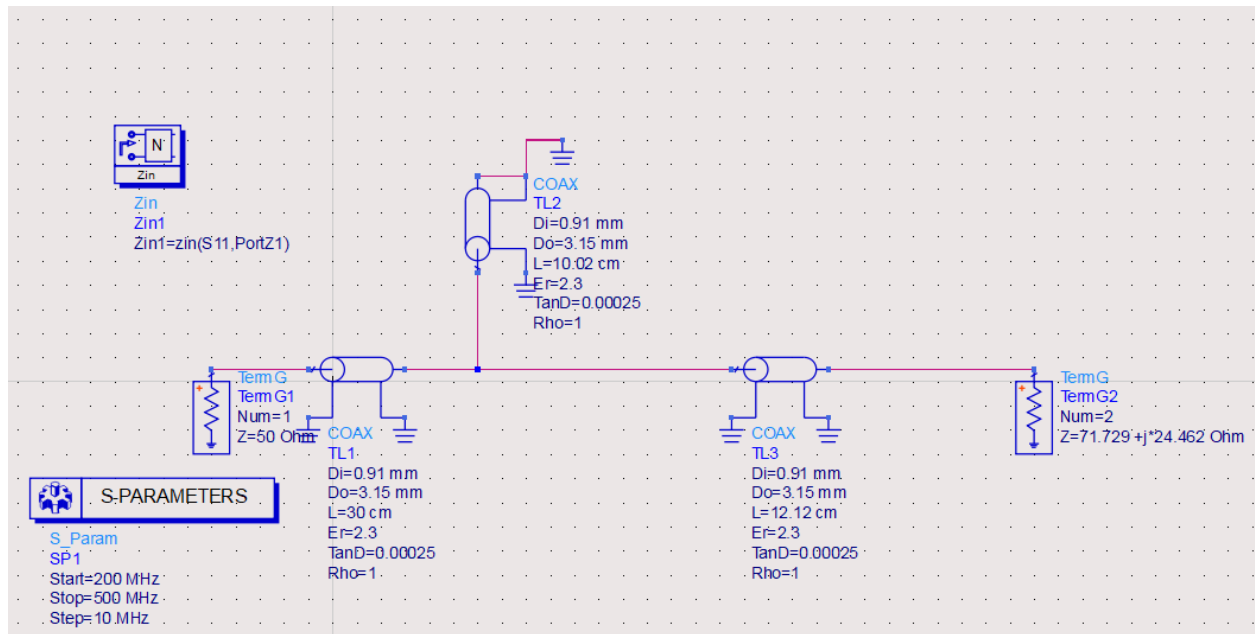
**Prelab Designs (we measured a far different Z value during lab B)**

Design: Distance from load =  $.202\lambda$ , length of stub =  $.17\lambda$

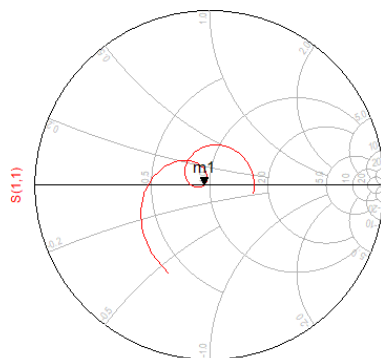


$$Z_I = 71.729 + j24.462$$

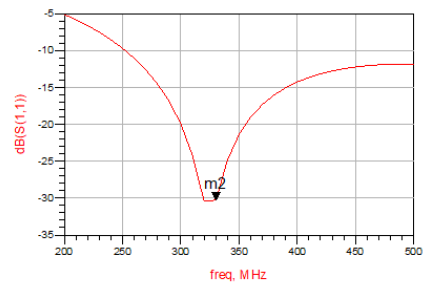
$$R_I = 71.72\Omega$$



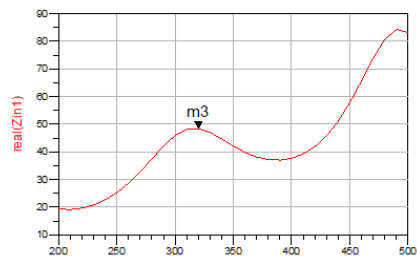
m1  
freq=330.0 MHz  
S(1,1)=0.031 / 179.058  
impedance = Z0 \* (0.941 + j9.479E-4)



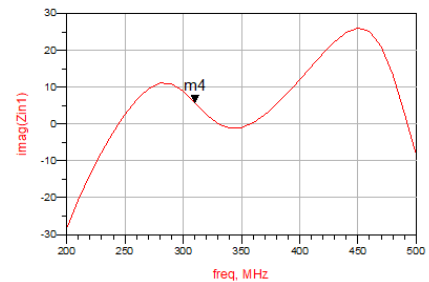
m2  
freq=330.0 MHz  
dB(S(1,1))=-30.282



m3  
freq=320.0 MHz  
real(Zin1)=48.453



m4  
freq=310.0 MHz  
imag(Zin1)=5.821



In lab values via excel after measuring a different  $Z_L$ : Distance from load =  $.1583\lambda$ ,  
lengthof stub =  $.17\lambda$