

Antennas and Propagation

04 MHz \Rightarrow w/o loading coil \Rightarrow 21.7 MHz - w/ loading coil
SWR: 1.9 \Rightarrow SWR: 1.3

Laboratory Exercise 5

8. Measure and record the resonant frequency of your vertical antenna. Its exact value will be when the SWR is a minimum. As calculated above, it should be around 40 MHz. You might get multiple dips, but choose the one with the lowest frequency (or that closest to 40 MHz). As we have already observed with the dipole, an antenna resonant at frequency $f = f_0$ will also be resonant at its odd harmonics. You will observe that the resonant frequency (where the SWR is lowest) is not at exactly a quarter wavelength of the copper rod.
9. Tabulate the SWR versus frequency using frequencies in the range of ± 20 of the resonant frequency.

Vertical antenna with a loading coil

10. Once you establish the resonant frequency or electrical length of your *unloaded* vertical antenna, construct a loading coil using several turns of #14 AWG wire so that the vertical electrical frequency is at some value between 21 to 28 MHz. It's relatively difficult to specify the exact number of turns for the loading coil, so start with a relatively tightly wound coil of 35 turns at 2" diameter and then cut the number of turns until the antenna has a low SWR for the design frequency. This will be an empirical process.