

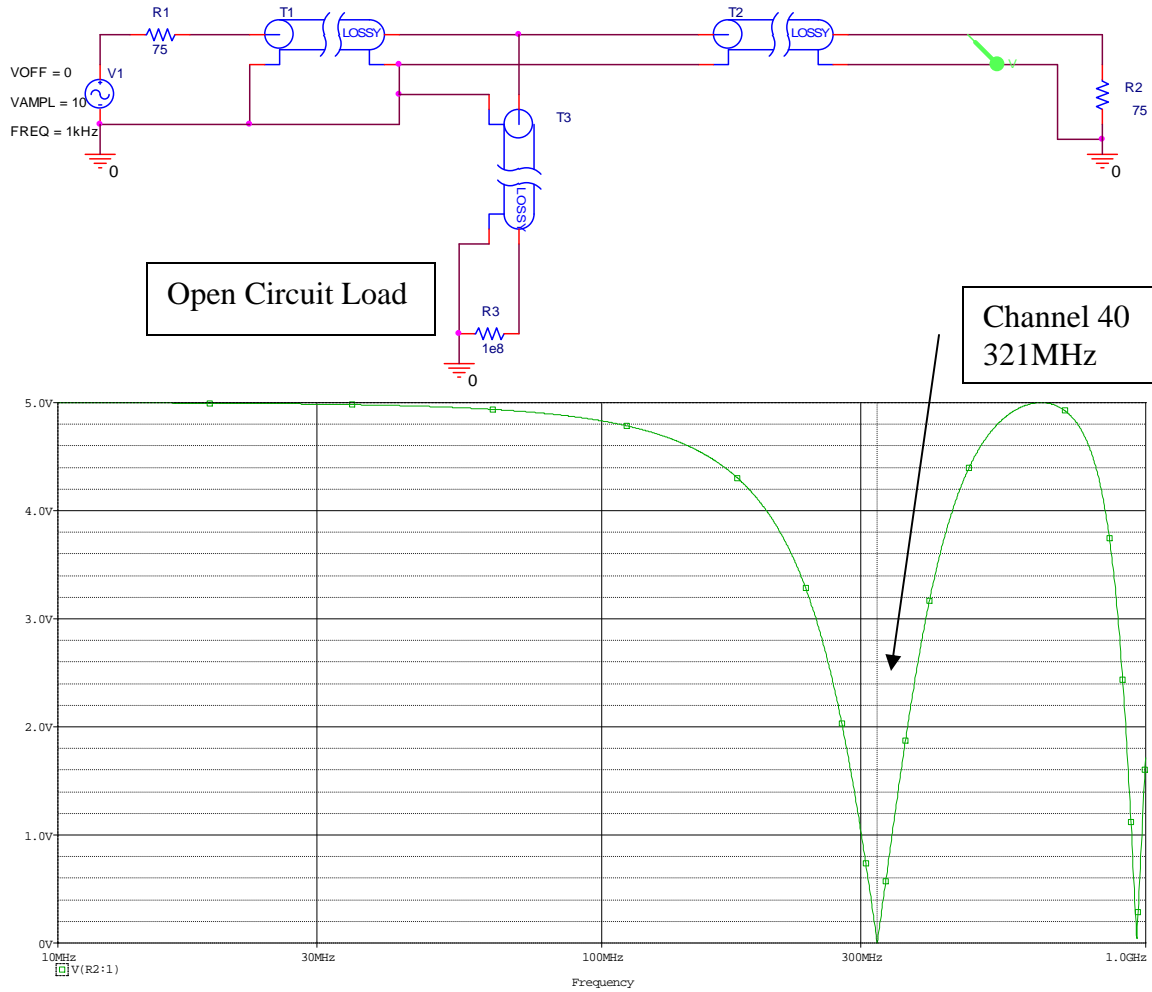


Due 2 June 2010 (Wednesday's class)

Project 1 – CATV Channel Blocker

This is a highly simplified version of the usual first project for Fields. You can still look over the information provided under Projects in the regular webpages. For the project, you should work in one group and turn in one report for all group members.

1. Using two of the short open-circuited stubs from the collection in the classroom, check their effectiveness in blocking frequencies by recording the spectrum observed on the spectrum analyzer and noting the TV channels affected (by watching them on the TV display). For the spectrum analyzer, align the display so that the center frequency is in the minimum of the signal and note the frequency. Also, if you have a camera, take a photo of the display and include it in your report. Measure the length of both stubs. Note that the stubs are left over from a wide variety of times, so they may not be made from the same cable. You will also have to identify the parameters of the cable you are using.
 - a. Case 1
 - i. Frequencies blocked (note only the minimum frequency) and the channel numbers associated with these frequencies. (There may be more than one channel blocked for longer stubs.)
 - ii. The TV channels observed to be affected by the stub.
 - iii. The length of the stub.
 - iv. The characteristic impedance and velocity of the cable used (the velocity is very likely either $2E8$ or $2.55E8$)
 - v. The length of the cable in wavelengths at the lowest blocked frequency.
 - b. Case 2
 - i. Frequencies blocked (note only the minimum frequency) and the channel numbers associated with these frequencies. (There may be more than one channel blocked for longer stubs.)
 - ii. The TV channels observed to be affected by the stub.
 - iii. The length of the stub.
 - iv. The characteristic impedance and velocity of the cable used (the velocity is very likely either $2E8$ or $2.55E8$)
 - v. The length of the cable in wavelengths at the lowest blocked frequency.
2. Do a PSpice simulation of one of the cases you observed. Use the Tlossy line model for which you will have to determine the inductance and capacitance per unit length. You only have to do the lossless case, so R and G are zero. An example PSpice setup is shown on the next page, where the analysis type chosen is AC Sweep. For this analysis, you have to make sure that your V_{sin} source has an AC amplitude specified.



For this case, the first minimum is at 321MHz, which corresponds to channel 40. The length of lines 1 and 2 do not matter. The length of line 3 determines the channel affected.

3. Select a different channel to block and determine the stub length necessary to do so. Do a PSpice simulation of this case to show that it works. It is not necessary to build this stub. However, if you have time, modify one of the stubs you have tested to at least come close matching the conditions necessary to block the new channel.