

The lab write-ups can actually be fairly short. All you need to do is answer the questions in the lab. I have reproduced them here and added some additional (optional) material.

In general the write-ups for these labs should be similar to those you have been doing all semester where you have used measurements to document the performance of your circuits. However, your grade in this lab will also be based upon the quality of the analysis and explanations accompanying your measurements.

Lab 9A – RF Communications

1. Transmitter.

Which circuit did you choose?

What are the values you chose for resistors and supply voltages?

How large a modulated signal did you obtain?

Comments:

- *Was there any reason why you chose the circuit you did? If so, then tell me your reasoning.*
- *The values of resistors and capacitors and a circuit diagram should be included.*
- *The real question is how did you measure the performance of your transmitter? What did the oscilloscope output look like? Was using the AM radio a good method to optimize your output?*

2. Receiver

Which circuit did you choose?

What are the values you chose for resistors and supply voltages?

How large a demodulated signal did you obtain?

How far apart can you place the transmitter and receiver?

Comments:

- *Was there any reason why you chose the circuit you did? If there was then tell me your reasoning.*
- *The values of resistors and capacitors and a circuit diagram should be included.*
- *How did you measure the performance of your receiver circuit? How do you know it worked? How did you test it?*

3. General.

(a) Receivers usually use tuned circuits. State two advantages of using a tuned circuit in a receiver.

(b) Why is 0.5 MHz a better choice of rf than 1.0 MHz?

Comments:

- *These are essay questions and I do not expect a long answer. Answering (a) requires some background reading. For example, pages 2 and 3 of our textbook talk about AM radios. Chapter 11 also contains much information about tuned circuits, q.v., see pages 790-791 for a summary of tuned circuits. You can also get a wealth of information on the Web.*
- *For the choice of frequency think about the RC values that you are using as filters.*

4. PSpice Assignment (OPTIONAL)

Use PSpice to design a different modulator from the one you chose for the transmitter. Sketch your new design indicating the values of the voltages and resistors. How does the performance of this modulator to that of your original design.

COMMENTS

This is a difficult question. You will need to do some reading outside the textbook to help you design a better modulator.

You also need to understand what a modulator does and how to measure the output.

For some additional information on modulators (also called mixers) you might check out my rf electronics Web site at

<http://vorlon.cwru.edu/~flm/eecs397/home.html>

- Pages 1-13 of these notes discuss AM radios and basic AM radio concepts.
- Pages 390-418 of these notes discuss a variety of different modulator circuits.

However, a basic modulator concept is making the circuit non-linear. For example, consider using a non-linear device such as a MOSFET which is inherently non linear (remember that $I_d = K(V_{gs} - V_t)^2$). Using large voltages or biasing the circuit near cutoff or saturation will also make your modulator more non-linear. You can also add tuned circuits to eliminate unwanted frequencies from the output. There are many other possibilities.