



LAB 2 - Spectrum Analyzers

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Purpose:

To gain practice using a spectrum analyzer. The student will analyze a carrier, an amplitude and frequency modulated carrier, as well as a range of signals from a CATV broadcast environment.

Equipment:

- Agilent 8647A Spectrum Analyzer RF Generator
- Agilent 33120A Function Generator
- Terrestrial T.V. Antenna or Cable T.V. Source

Please Note: Spectrum Analyzers can be damaged by excessive input levels. The threshold for damage is different for various models. The INPUT setting can be as low as 20dBm (0.1 watts or 2.2 volts) OBSERVE the caution notice on the front panel of the equipment.

THERE ARE TWO PARTS TO THIS LAB. Part A implements a R.F. source with a fixed modulating signal from a function generator while Part B uses the CATV outlets as a signal source.

PART A:

1. Turn on the R.F. signal generator and the Spectrum Analyzer.
2. Connect the R.F. signal generator to the spectrum analyzer and set the source controls for a 50 MHz CW signal with a level of -10dBm. You will use the frequency and amplitude controls for this. Make sure the R.F. ON/OFF button is in the OFF position as indicated on the front panel.

3. Set the spectrum analyzer to a center frequency of 50 MHz with a Span of 100 KHz.

The amplitude reference can be set to 0dBm. Turn the R.F. ON at the R.F. signal generator and observe the Spectrum analyzer display.

What is the level of the signal in dBm? _____

Does it match the source signal? _____

What is the frequency of the signal displayed? _____

NOTE: You can engage the MARKER button and use the Rotary Control to acquire a readout of amplitude and frequency at any position.

4. Before connecting the function generator to the external modulation input of the R.F. Generator set it for an amplitude of 50 mV p-p at a frequency of 15 KHz. PLEASE MAKE CERTAIN THE SIGNAL DOES NOT EXCEED 1 Vp. Engage EXT MOD at the R.F. generator as well as the A.M. button and observe the results at the Spectrum analyzer.

What appears on the display?



Adjust the frequency at the function generator to 25 KHz. Observe and comment on the results. What is the difference in frequency between the CW signal and the upper sideband?_____

The lower sideband?_____

Increase the magnitude of the signal to 200 mV p-p. Comment on any changes on the display.

Repeat step 5 with the F.M. button engaged. Comment on your results.

PART B

1. Connect the Spectrum Analyzer to the CATV outlet.
2. Channel 2 starts at 54 MHz with channel 3 at 60 MHz. Select an appropriate center frequency and span in order to observe the picture, chroma and sound frequencies for channel 2. Provide a sketch that illustrates the location of each signal and label the frequencies. Use your marker for this step.
3. As an exercise locate the band of F.M. stations from 88 to 108 MHz. See if you can locate the carrier of your favorite station.