AM Receiver and Laser Displayed Spectrum

Kayla and Jason
Project Overview

- Superheterodyne AM Receiver
- Laser Displayed Sweep across full AM bandwidth
- Spectrum power for entire bandwidth and line to display tuned channel
- Power Amplifier and Audio
Block Diagram

- Ramp Generator
- Local Oscillator
- Horizontal Ctl
- Logarithmic Amplifier
- Galvo Display
- RF Amp
- Anti-Image Filter
- IF Filter
- Detector
- Tuning Line Ctl
- Power Amplifier
- Speaker
- Voltage Source
- Local Oscillator
Block Diagram

AM Spectrum Analyzer

AM Receiver and Audio Player
RF Amplifier

- LNA - Low Noise Amplifier. High bandwidth BJT amplifier to increase the output of antenna
Anti-Imaging Filter

- Band pass filter to isolate only AM spectrum (spectrum of interest)
Mixer and Oscillators

- Mixer - simple diode implementation
- Ramp Generator - fixed frequency sweep variant from lab 6
- Local Oscillator - Voltage controlled oscillator; varactor
IF Filter

- Filter to isolate only the intermediate frequency (for band selectivity)
- Alternating tuned LC networks and amplifiers, isolated by IF transformers
Detector/Demodulator

- Rectifier/LPF from lab 1
- Acts as an envelope detector
Logarithmic Amplifier

- Amplifier whose output is proportional to the log of the input
- Composed of either bjt/diode circuit or a cascade of identical soft-saturated amps (see HP 8552B)
Galvanometer Display and Tuner

- Two mirrors (X,Y) steer laser.
- X - horizontal sweep synchronized to ramp
- Y - amplitude of signal / pulse generator for current tuning.
Power Amplifier and Speaker

- To be able to hear sweet music
- Takes the demodulated signal and amplifies it with a push-pull to drive a speaker.
Challenges

- Creating two local oscillators that track each other (freq vs voltage curve are the same)
- Logarithmic amplifier that meets specs
- RF amplifier with low enough noise figure to retain AM signal at very low voltages
Timeline

- **Week of April 14th** - Project Design Finalized; Parts Ordered
- **Week of April 21st** - Project integration and debugging
- **Week of April 28th** - Project Debugged; fine tuning and adjustments.
- **Week of May 5th** - Project Checkoff