On-Site Homework 8
E 2420

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1 Tuning the VCO

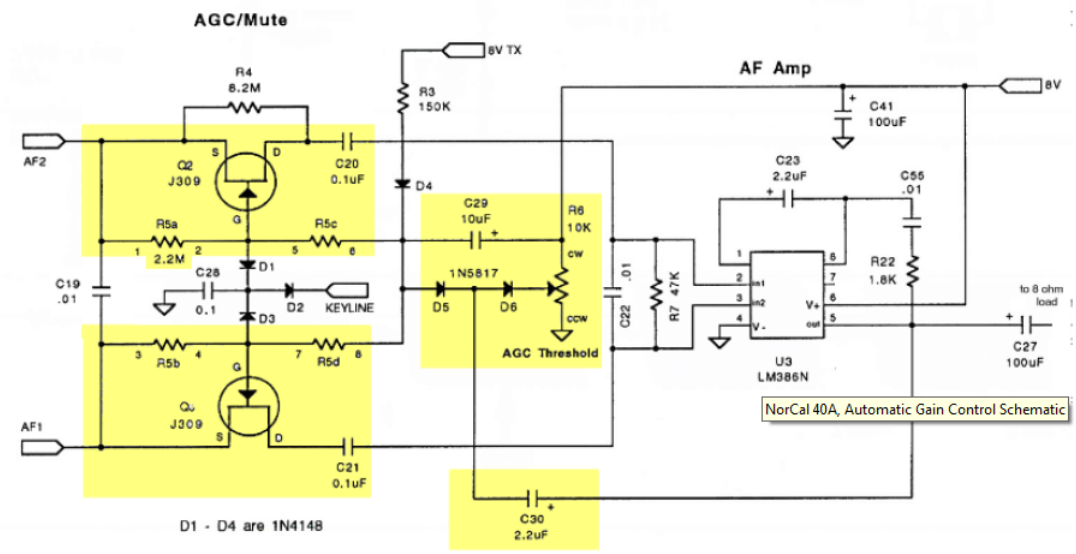

Figure 1: AGC schematic

The following steps were taken in order to tune the VCO:

1. Install a 3kΩ resistor in the C_{19} holes.
2. The function generator was attached to the antenna input, with a 100 mV_{pp} at 7.02 MHz.
3. The beat frequency oscillator was set to its maximum value by tuning the variable capacitor C_{17}.

4. The input RF frequency was tuned to produce a maximum signal to the input of the audio mixer/product detector.

5. This process was repeated at the output of each crystal.

6. The RF mixer potentiometer was set to the middle of its setting.

7. The oscilloscope probe was placed at the 3 kΩ resistor (with one end still connected to ground). The audio signal was kept under 500 mVpp.

8. The potentiometer was varied for the VCO until an audio signal was observed.

1.1 Range of Audio Frequencies

The range of audio frequencies that was obtained by changing the VCO was $\boxed{385Hz - 1.16kHz}$:

2 Building the Automatic Gain Controller (AGC)

The highlighted parts in Figure 1 were soldered:

2.1 Measuring Range of Control Voltages

A multimeter was used to measure the DC voltage at the anode of D_5. For AC measurements, measurements were taken at the 8Ω resistor. Starting with $1V_{RMS}$,measurements were taken of the DC and AC (Audio) output voltages, and is plotted in Figure 2.1.

2.2 Measuring AGC Output on Audio Voltage

The AGC capacitor was C_{29} was then installed followed by C_{30}, the coupling capacitor. The effect of the AGC on the output voltage was measured, and is plotted in Figure 2.2.

The slope of the line before the AGC kicks in was found to be roughly $\boxed{0.563}$ and the slope of the line after the AGC kicks in was found to be roughly $\boxed{0.067}$. Since the units are $\frac{Volts \cdot dB}{Volts \cdot dB}$, there are no units for the slope.

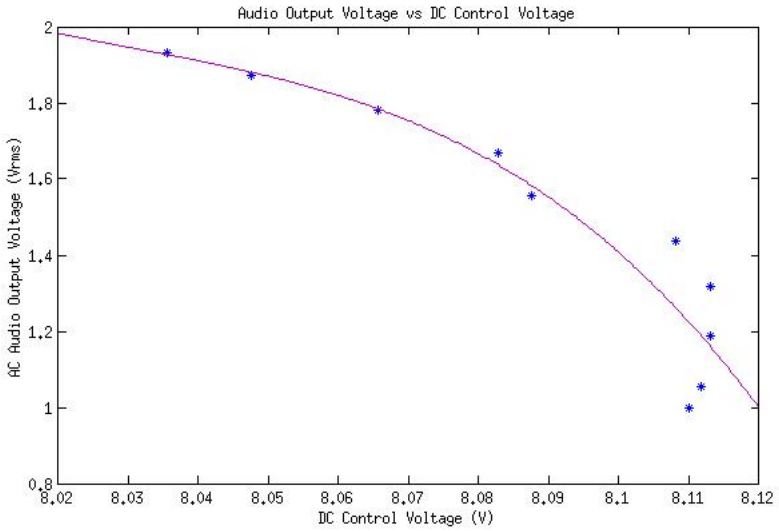

Figure 2: Plot of DV Control Voltages against AC Audio Output Voltages

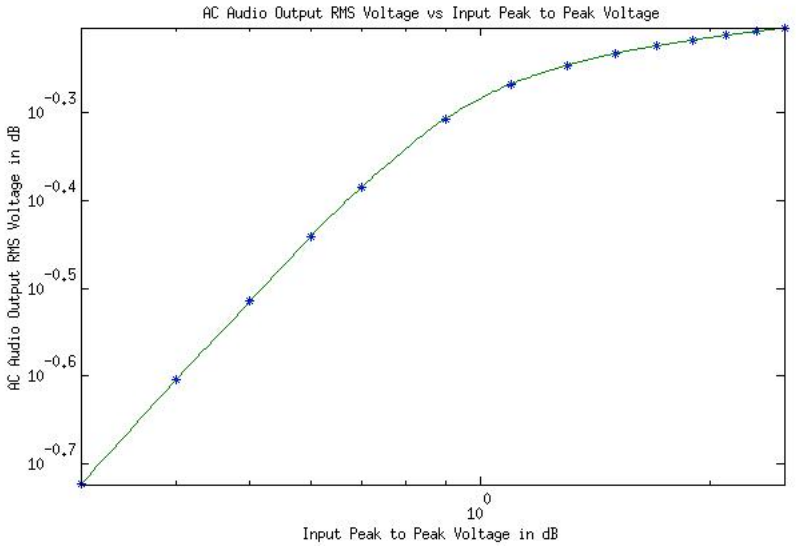

Figure 3: Effect of the AGC on the output audio voltage. The AGC kicks in at about 1.