

Experiment 10A

1. Modify the bandpass filter designed in Experiment 10 by replacing the input resistor with a 330pF capacitor (C1, circled) as shown below in Figure 10A.1

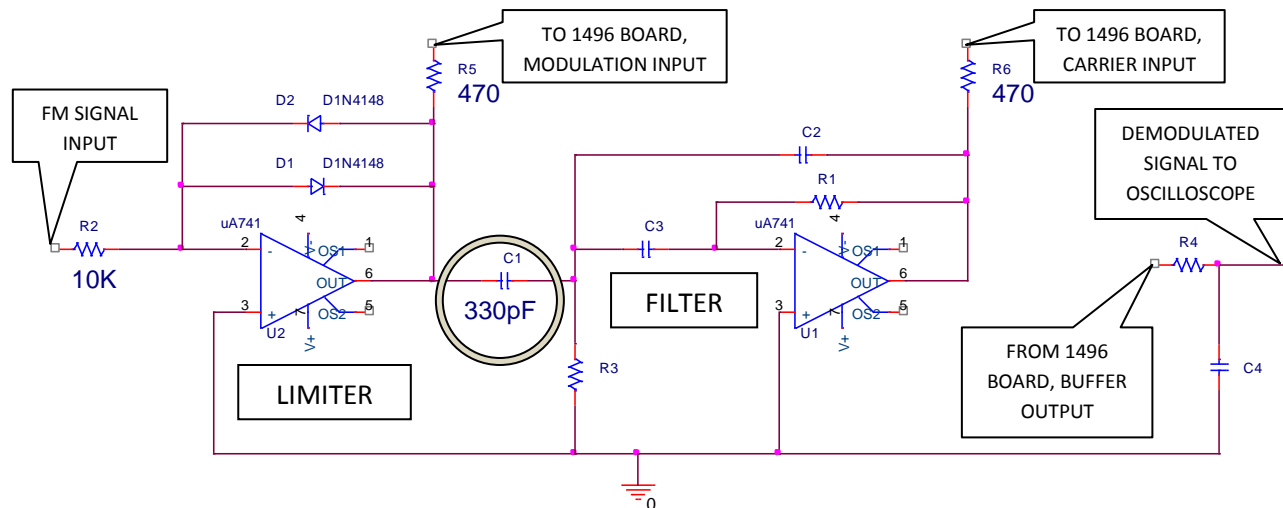


FIGURE 10A.1

2. Measure $|H(f)|$ and phase of $H(f)$ versus frequency by disconnecting the filter from the limiter circuit and inputting the test signal through C1. Sketch both of these responses. Find the peak or center frequency of the bandpass filter.
3. Construct a limiter circuit as shown in Figure 10A.1 and connect its output to the bandpass filter and then to the 1496 balanced modulator as shown.
4. Design and build a simple RC low pass filter for the output of the 1496 balanced modulator (use the buffered output). Set the cutoff frequency to 5 KHz.
5. Apply an FM signal to the input of the limiter with f_c set to the peak or center frequency of the bandpass filter, $f_m = 1\text{KHz.}$, and $\Delta f = 1.5\text{ KHz.}$ What is β ?
6. Observe the output of the RC filter. Use the spectrum measurement capabilities of the oscilloscope and observe the harmonic content of f_m in the demodulated signal. Adjust f_c until the 2nd harmonic of f_m is at a minimum. What is the relative amplitude of the 2nd harmonic of f_m ? How does this compare with the demodulated waveform of experiment 10?
7. Vary the modulated input signal amplitude (i.e. the output amplitude of the signal generator.) Measure and sketch the demodulated output versus the input amplitude of f_c , the modulated signal. At what point does the input amplitude no longer affect the demodulated output magnitude?

8. Vary f_m . Measure and sketch the demodulated output amplitude versus f_m . Over what range of f_m does the demodulator work? Why? (Suggestion: use flat frequency response as a criteria.)
9. Set f_m to 1KHz. Vary Δf . Measure and sketch the demodulated output amplitude versus Δf . Over what range of Δf does this demodulator work? Why? (Suggestion: use linearity as a criteria.)
10. Compare this demodulator with the demodulator in Experiment 10. Which one is superior and why?