Homework Assignment No. 5

This homework assignment is due in class on Friday, June 20, 2003.

Problem 1 - (10 points)

Sketch the time variation and frequency spectrum of an RF signal with 75 percent amplitude modulation. Show several cycles of the modulated wave. Make the modulation frequency 1/10 of the carrier frequency. The unmodulated carrier has a peak amplitude of 1.0V.

Problem 2 – (10 points)

The level of an SSB AM spur is observed to be –75 dBc. If the carrier has a peak amplitude of 1V, what is the variation of the carrier in ±V needed to produce the observed spur?

Problem 3 – (10 points)

A pair of 5 kHz PM/FM spurs appear on a 10 MHz carrier. The level of each spur is –50dBc. (a.) What phase deviation in ±degrees is need to produce the spurs? (b.) What frequency deviation in ±Hz is needed to produce the spurs?

Problem 4 – (10 points)

The carrier and spurs of Problem 3 above are passed through a frequency tripler. Make a sketch of the output spectrum of the tripler. Label and show all important features of the spectrum.

Problem 5 – (10 points)

A 100 MHz carrier having a –40 dBc upper sideband at 100.002 MHz and a –47 dBc lower sideband at 99.998 MHz is passed through an ideal limiter followed by a bandpass filter centered at 100 MHz with a 10 kHz total bandwidth. Make a sketch of the spectrum at the output of the filter. Label all frequencies and amplitudes.