EECS 562

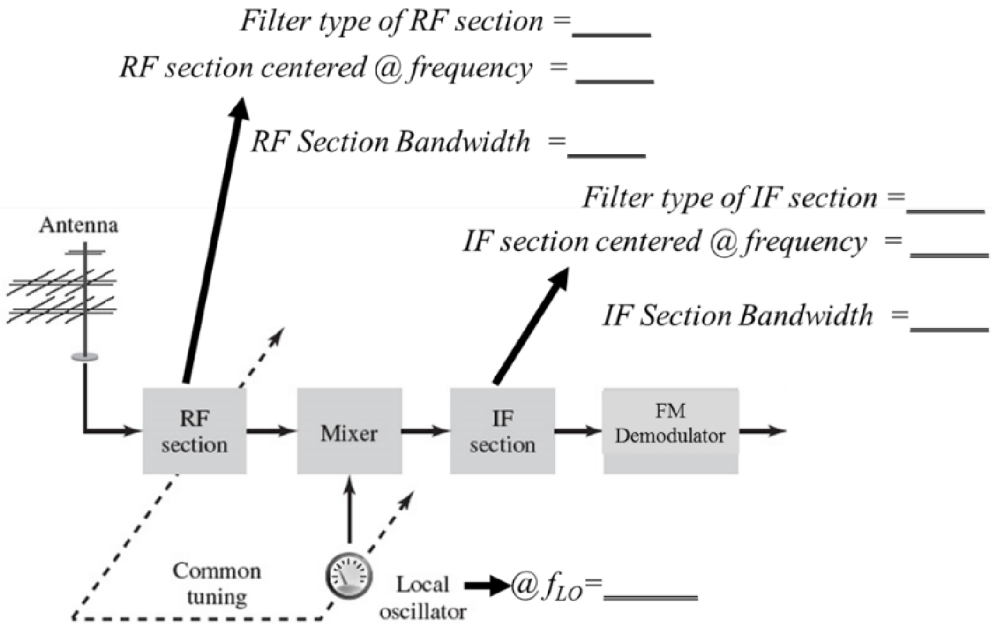
Homework 10

1. (Concept: Superheterodyne frequencies) The IF frequency of a commercial broadcast FM superheterodyne receiver is 10.7 MHz. Suppose we wish to "tune in" an station FM at 96.2 on the dial.

a. What are the two possible frequencies for the local oscillator?

b. For each LO frequency in part a, what is the corresponding image frequency?

2. (Concept: Superheterodyne frequencies and bandwidths) The commercial AM radio station KLWN in Lawrence operates at 1320 kHz. In commercial AM the baseband signal bandwidth is 5 kHz. Commercial AM receivers uses an f_{IF} = 455 kHz. Fill in the blanks below.

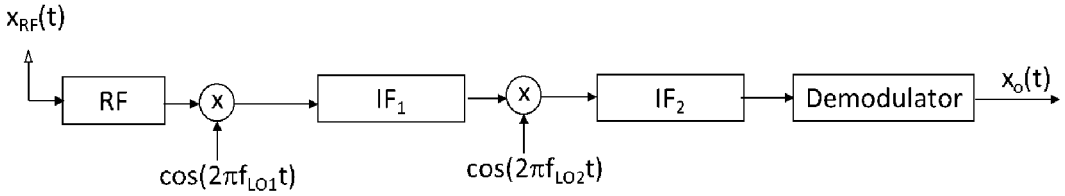


3. (Concept: Superheterodyne frequencies and bandwidths) A radar operates at f_c = 10 GHz the bandwidth of the baseband radar signal is 10 MHz. The receiver uses an f_{IF}=100 MHz.

a. In a superheterodyne radar receiver what frequency is the local oscillator set at to receive this signal?

b. What is the bandwidth of the IF filter in this case?

4. (Concept: Superheterodyne frequencies with multiple IF's) A receiver uses a dual conversion receiver, i.e., with two IF sections, as shown below.



*A*ssume

$f_c = 900\,\text{MHz}$

$f_{IF_1} = 400\,\text{MHz}$

$f_{IF_2} = 10.7\,\text{MHz}$

$B_{RF} = 200\ \text{kHz}$

a. What is the bandwidth of the RF section?

b. What is the bandwidth of the IF_1 section?

c. What is the bandwidth of the IF_2 section?

d. What is f_{LO1}?

e. What is f_{LO2}?