

EE430 Communications systems - Fall 2005 - quiz #4 - Superheterodyne receivers
Closed book.

Name _____

You are designing a citizens band radio AM transceiver for consumer use. It must tune from 26.965-27.405 MHz in 10 KHz steps. To keep the cost down, you need to use cheap ceramic filters. The only one that is cheap enough and meets selectivity requirements is centered at 455 KHz and is 10 kHz wide. Unfortunately, this frequency is too low to get good image rejection, so a dual-conversion design will be used, with the first IF at 10.7 MHz. Use a variable oscillator to convert the incoming frequency to 10.7 MHz, then a fixed oscillator to convert that to 455 KHz.

1. Draw a block diagram of this receiver.

1 -0
3 -0.5
1 -1
3nd BFO (-15)
1 mixing filter (-5)
1 single conversion.

2. What is the first local oscillator tuning range?

(A) 37.665 - 38.105 ← 2
(B) 16.265 - 16.705 ← 3

3. What is the (fixed) frequency of the second oscillator?

(C) 11.155
(D) 10.245 ← 2
2 said "455 kHz"
1 said "5.5 MHz"

For the remaining questions, assume the radio is tuned to 27.005 MHz,....

4. What is the frequency of the first local oscillator?

(A) 37.705
(B) 16.305
all good.

5. What is the most significant image frequency?

SD -0.5
OK, DB -1.5
FM -2.5
SA -3

(A) 48.405

(B) 5.605

26.095
27.915
based on
455 kHz
IF.

1 correct

1 455 kHz

1 adjacent channel

1 455 below (26.55)