

COMS3100/7100 Introduction to Communications Semester 1, 2011

Tutorial 8

Problem 1

Consider a PLL in steady state with $\epsilon_{ss} \ll 1$ for $t < 0$. The input frequency has a step change at $t = 0$, so $\phi(t) = 2\pi f_1 t$ for $t > 0$. Solve eq [5] to find and sketch $\epsilon(t)$, assuming that $K \gg |\Delta f + f_1|$.

$\dot{\epsilon}(t) + 2\pi K \sin \epsilon(t) = 2\pi \Delta f + \dot{\phi}(t)$	[5]
$K \triangleq K_v K_a$	

Problem 2:

Modify the FM stereo receiver in Fig. 7.2-5 to incorporate a PLL with $f_v \approx 38\text{kHz}$ for the subcarrier. Also include a dc stereo indicator.

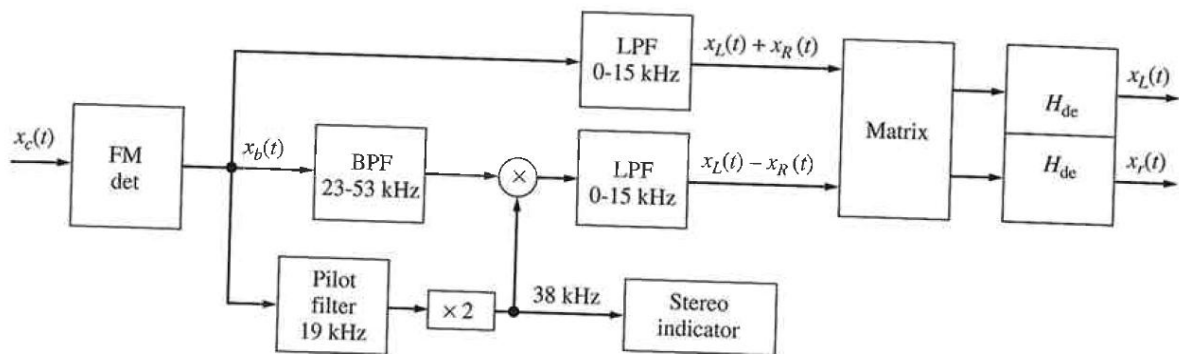


Figure 7.2-5 FM stereo multiplex receiver.

Problem 3:

Given a 100 kHz master oscillator and two adjustable divide-by-n counters with $n = 1$ to 10, devise a system that synthesizes any frequency from 1kHz to 99kHz in steps of 1 kHz. Specify the nominal free-running frequency of each VCO.

Problem 4:

Referring to Table 7.1-1, devise a frequency synthesizer to generate $f_{LO} = f_c + f_{IF}$ for an FM radio. Assume you have available a master oscillator at 120.0 MHz and adjustable divide-by-n counters with $n = 1$ to 1000.

Parameter	FM
Carrier frequency	88.1-107.9 MHz
Carrier spacing	200 kHz
Intermediate frequency	10.7 MHz
IF bandwidth	200-250 kHz
Audio bandwidth	15 kHz

Table 7.1-1