FM Stereophonic Receiver

Contents

Note on the Stereophonic FM Receiver

- Based on the Federal Communication Commission (FCC) regulations, the spectrum for FM broadcasting is (88 to 108 MHz) with separation of 200 kHz between adjacent stations. The peak frequency deviation is Δf=75 kHz.
- The monophonic FM receiver is similar to the super-heterodyne AM receiver. However, IF=10.7 MHZ and the envelope detector is replaced with the PLL or frequency discriminator followed by a de-emphasizer.
- Stereophonic has to be compatible with monophonic reception *(R+L)*. The total bandwidth is still 200 kHz & Δf=75 kHz.
- See the attached Figure *(L+R)* and *(L-R)*
- The pre-emphasized signal *(L-R)'* uses a carrier of 38kHz =19kHz*2. A small carrier of 19kHz is also used as a pilot carrier.
- The composite baseband signal
- $m(t) = (L + R)' + (L - R)'cos(2\pi(38k)t) + \alpha cos(2\pi(19k)t)$
- Why 19 kHz is used? (No signal component within 4 kHz)
- Monophonic FM consist of the upper branch only (L+R complete signal without stereo effect)
- What is the effect of adding a pilot carrier? Reduction in SNR by 1dB (read the book for full explanation).   If the maximum for *R* and *L* is A_p, then the worst case maximum for *R+L* & *L-R* is $|m(t)|_{max}=2A_p+\alpha$, where α represents the effect of the pilot. The amplitude is reduced approximately by 0.9 and hence the power is reduced by 0.81 which is about 1 dB.
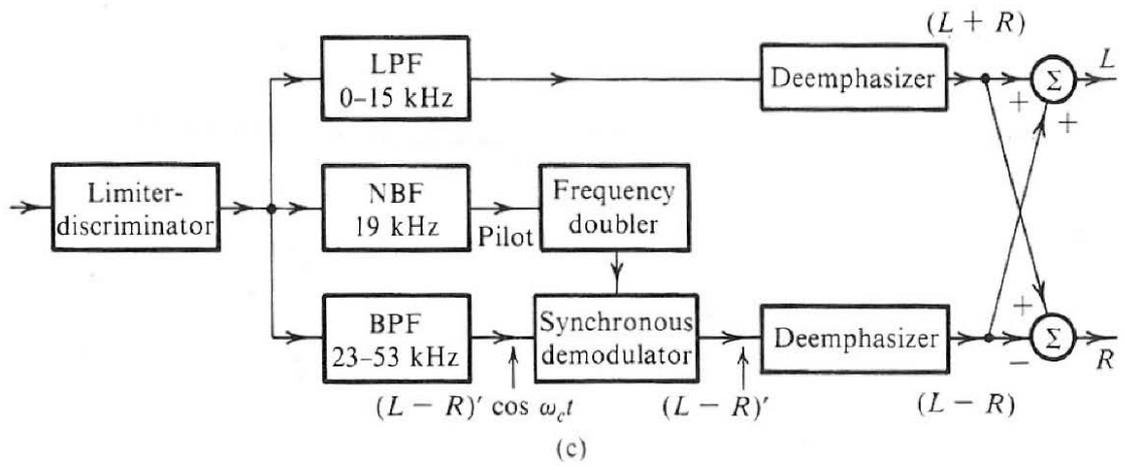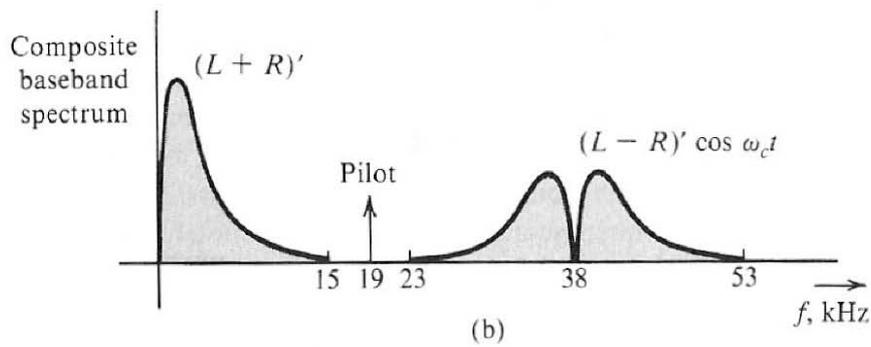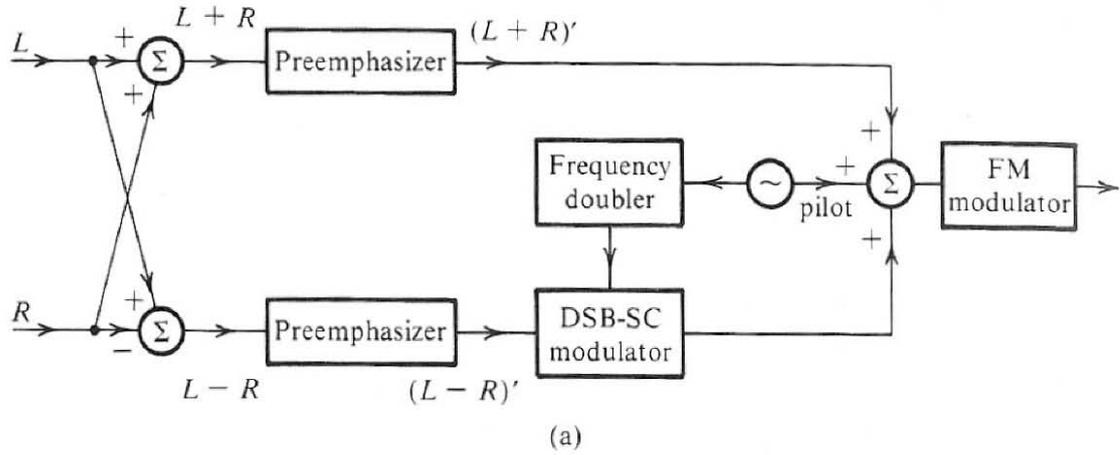
Figure 5.19 (a) FM stereo transmitter. (b) Spectrum of a baseband stereo signal. (c) FM stereo receiver.