Fundamentals of FM Audio

Depending on the kind and quality you desire in your broadcasts, a lot can be done with the audio signal before trying to modulate that transmitter with it. To be able to broadcast a stereo signal you must create a stereo composite to be applied to the transmitter. If you want to have that warm full sound of a professional station you can compress the audio signal. Other audio options like limiters, pre-emphasis networks, and filters can also have dramatic effects on how you 'sound' on the audiences receiver.

Stereo Composite Generation

When stereo was introduced it was designed to offer the same program quality as before to the millions of existing monophonic systems and offer stereo to the new receivers. What is done is to generate two separate audio channels. The main channel (L+R) is the sum of both the Left and Right channels. The channel is transmitted as standard audio (0-15kHz). A monophonic receiver will receive this and get the sum of the Left and Right information, not loosing an information. Another channel is also generated. This channel is the difference between the Left and the Right channel (L-R). This is done by subtracting the two channels. If the channels are identical in content, as in a monophonic source, the difference signal will be zero. This channel modulates a subcarrier at 38kHz and the 38kHz subcarrier is transmitted along with the main audio. A monophonic receiver will ignore this channel. The 38kHz subcarrier is suppressed to allow more information to be carried in the channels sidebands and a pilot synchronism signal is transmitted instead at half the frequency of where the 38kHz subcarrier is suppose to be. This 19kHz pilot carrier is used to turn on the receiver stereo decoder and used to reassemble the 38kHz subcarrier in the receiver. Once the signal is in the recever the Stereo Decoder extracts the L+R and L-R signals and recovers the original left and right signals by :

(L+R) + (L-R) = 2L -and-
(L+R) - (L-R) = 2R

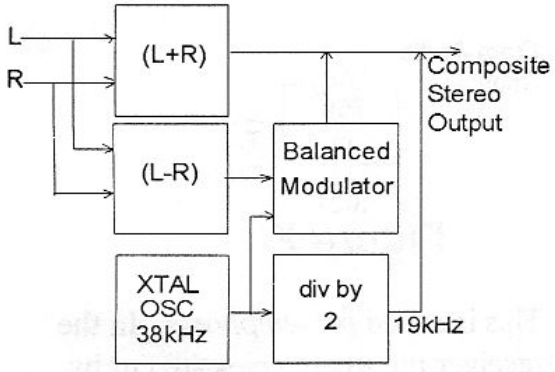

FIG.

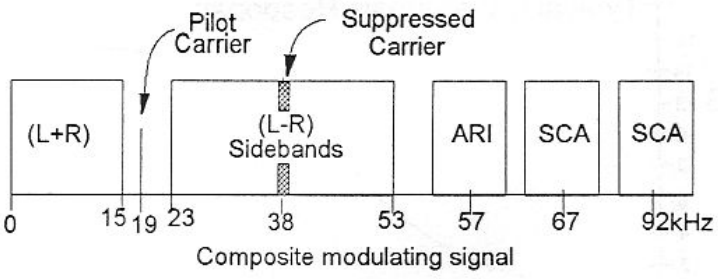

Figure X

Figure X-1 shows a block diagram of a stereo encoder and Figure X-2 shows the layout of a composite stereo signal. Notice that there are three other pieces to the stereo composite signal. These are "hidden" channels used for a number of different things. The SCA (Secondary Communications Authorization) channel is by far the most popular at this time with the 67kHz channel accounting for about 90% of all the SCA broadcasts out there. Often found on the SCA channels is commercial free muzac that department stores use. The ARI subcarrier is a new service called Automobile Radio Information mainly used to give road information to motorists.