It is possible to recover the modulating signal, even with analyzers that do not have a built-in FM demodulator. The analyzer is used as a manually tuned receiver (zero span) with a wide IF bandwidth. However, in contrast to AM, the signal is not tuned into the passband center but to one slope of the filter curve as illustrated in figure 32.

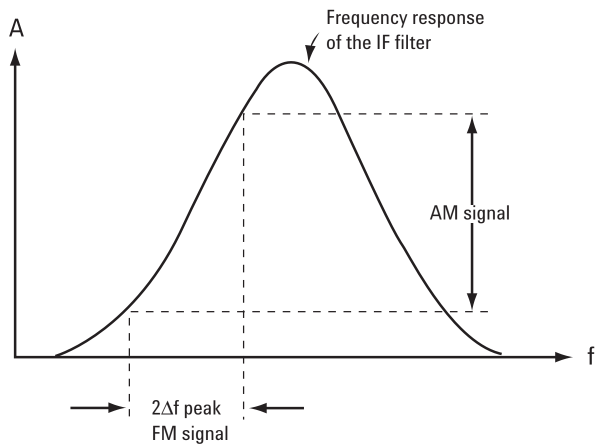

Figure 32. Slope detection of an FM signal

Here the frequency variations of the FM signal are converted into amplitude variations (FM to AM conversion). The resultant AM signal is then detected with the envelope detector. The detector output is displayed in the time domain and is also available at the video output for application to headphones or a speaker. If an analyzer has built-in AM demodulation capability with a companion speaker, we can use this (slope) detection method to listen to an FM signal via the AM system.

A disadvantage of this method is that the detector also responds to amplitude variations of the signal. The Agilent 8560 family of spectrum analyzers include an FM demodulator in addition to the AM demodulator. (The FM demodulator is optional for the E series of the Agilent ESA family of analyzers.) So we can again take advantage of the marker pause function to listen to an FM broadcast while in the swept-frequency mode. We would set the frequency span to cover the desired range (that is, the FM broadcast band), set the active marker on the signal of interest, set the length of the pause (dwell time), and activate the FM demodulator. The analyzer then sweeps to the marker and pauses for the set time, allowing us to listen to the signal during that interval before it continues the sweep. If the marker is the active function, we can move it and listen to any other signal on the display.

AM plus FM (incidental FM)

Although AM and angle modulation are different methods of modulation, they have one property in common: they always produce a symmetrical sideband spectrum.

In figure 33 we see a modulated carrier with asymmetrical sidebands. The only way this could occur is if both AM and FM or AM and phase modulation existed simultaneously at the same modulating frequency. This indicates that the phase relations between carrier and sidebands are different for the AM and the angle modulation (see appendix). Since the sideband components of both modulation types add together vectorially, the resultant amplitude of one sideband may be reduced. The amplitude of the other would be increased accordingly. The spectrum displays the absolute magnitude of the result.

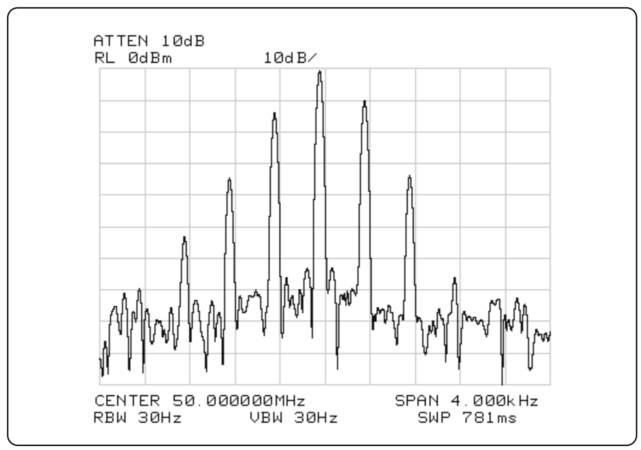

Figure 33. Pure AM or FM signals always have equal sidebands, but when the two are present together, the modulation vectors usually add in one sideband and subtract in the other. Thus, unequal sidebands indicate simultaneous AM and FM. This CW signal is amplitude modulated 80% at a 10 kHz rate. The harmonic distortion and incidental FM are clearly visible.