Part 2 – Field Guide to Mobile Wireless Interference Testing

Now that we have become familiar with the tools and techniques, let's look at some examples of typical signal types with descriptions of some of the possible sources. Any of these signals, or related ones, may show up as interference to your system. These descriptions may also be generally useful in simply identifying your RF neighbors.

Analog Signals

Broadcast signals have some telltale characteristics. FM signals for voice or music vary in width. During quiet times, FM appears as a CW carrier without modulation. At other times it will vary in width up to the approximate maximum shown in Table 2.

This changing width is its most distinguishing feature. While AM also varies, it is narrower than FM. The best way to confirm this type of interference is to demodulate it and listen to it – you might also pick up the station identification.

Table 2. Spectrum Width Characteristics of Selected Analog Signals

Signal Type	Width
2-Way FM	15 kHz
Analog Cellular	7 – 30 kHz
Paging FM	15 kHz
FM Broadcast	250 kHz
TV Sound	70 kHz
Broadcast Audio STL	250 kHz
Broadcast Video STL	15 or 30 MHz
AM Voice	6 kHz
SSB Voice	3 kHz

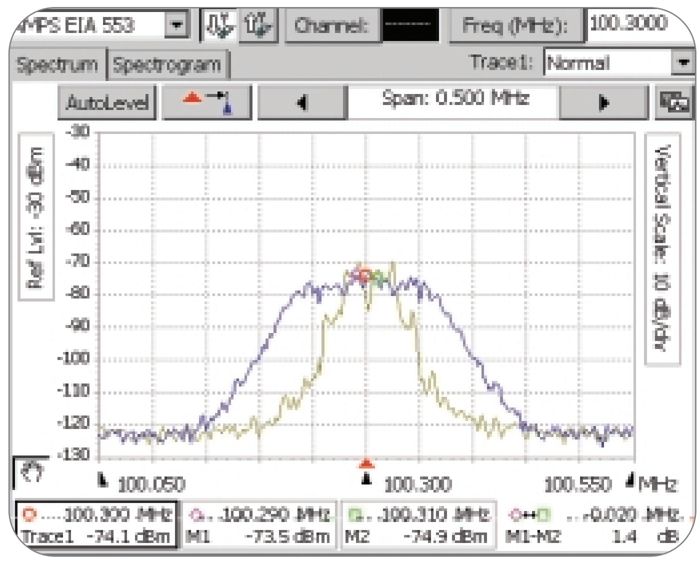
FM Broadcast

Figure 16 shows signals from an FM broadcast station that is playing rock-and-roll music. The signal varies rapidly from full-width to a much narrower one and sometimes to a signal with very apparent sidebands. The orange trace shows a more quiet time and the blue trace was taken during a louder passage.

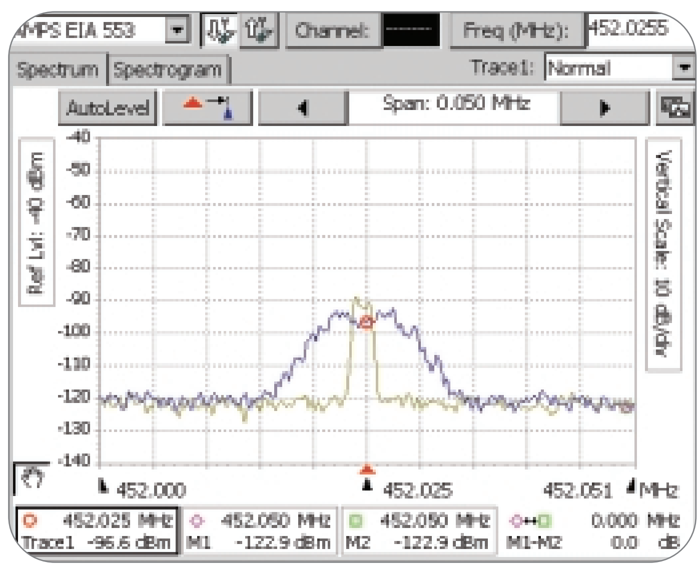
FM Two-Way Radio

The signal from an FM two-way radio is shown in Figure 17. The signal width varies with the loudness of the voice of the radio user. The orange trace was saved while the user was not talking at all (and there was no background noise). Only occasionally did the signal collapse into a completely quiet carrier. Many two-way radios have either a continuous low-frequency tone squelch such as shown in the orange trace, or they have a digital squelch modulation, which has a similar appearance.

The blue trace is the spectrum of the signal when the user was talking loudly and with lots of high frequency energy (such as the spoken "S" sound.) This type of FM communications signal will be continuously varying between the two widths shown and will have no steady state.



▶ ***Figure 16.*** *Broadcast FM.*



▶ ***Figure 17*** *Two-way radio (FM).*

Tone-Burst Modulated Two-Way Radio

Figure 18 illustrates a tone-burst modulated two-way radio, where the modulating tone is about 800 Hz. A higher modulating frequency would produce more widely spaced sidebands. Most tone-bursts have clearly visible sidebands in this span.

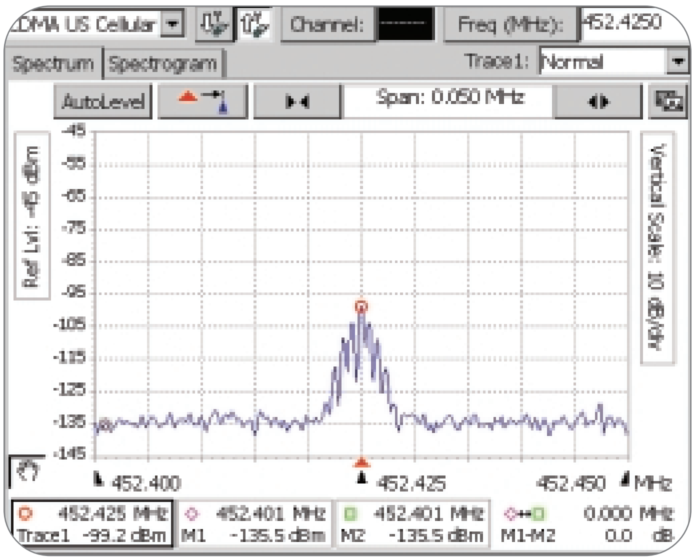


Figure 18. Two-way radio with tone burst.

AM Aircraft Voice Radio

Figure 19 shows an AM aircraft voice communications radio. Like FM voice, this signal is constantly changing with the voice sounds. But unlike the FM signal, it tends to have its wide part move up and down in strength rather than change in width; although it will change width somewhat with the modulating frequency. Again, the two traces shown were stored during the quietest and loudest times of this particular transmission.

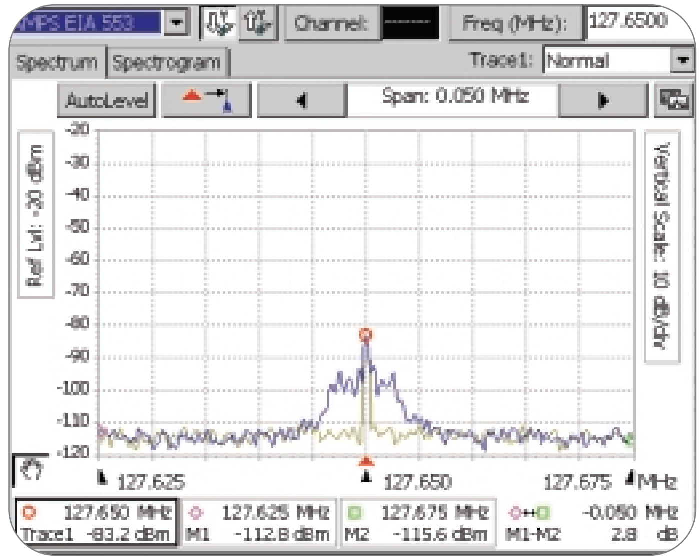


Figure 19. An AM transmission.

Analog Television Broadcast

This signal is quite distinctive. Although there are some differences from one country to another, TV broadcasts usually have both the main video signal (AM) and a separate sound signal at a fixed frequency spacing from the Video. In the United States, the spacing is 4.5 MHz; in much of Europe it is 6 to 7 MHz. The sound is usually FM and can be demodulated to listen for the identification of the station to validate its source. In Figure 20, the video carrier is near the center of the screen and the marker has been placed on the sound carrier about 4.5 MHz higher in frequency.

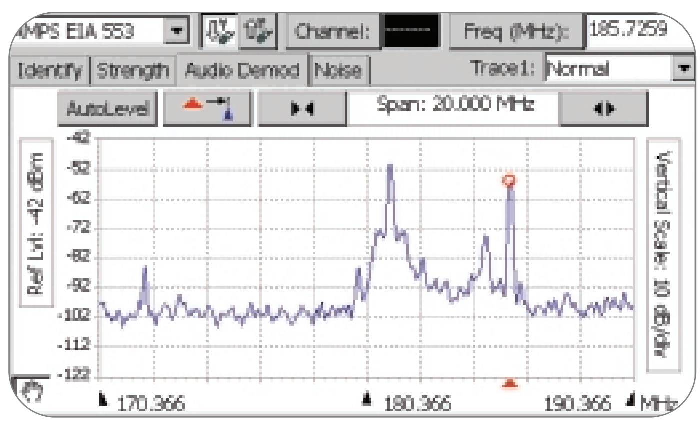


Figure 20. Analog TV (U.S.A. type).