

Technical Note: 0124

Generating AM Signal Using SigGen

Nov. 11, 1996

The example provided in the SigGen User's Guide (page 8-17, Example 3) is not an accurate example. The user should understand the following to produce an AM signal with correct depth of modulation.

Definition:

Depth of modulation is defined by subtracting the ratio of the valley and the peak amplitude of the AM signal from 100%. For example, the peak of the AM signal is 1Volt, and the valley is 0.25Volt, the ratio is 0.25, or 25%, and the depth of modulation is 75%.

General Method:

AM signal requires a carrier and a modulator. The carrier can be any signal to be modulated (a tone, noise, etc.). The carrier can be generated using common SigGen techniques. Here we discuss the technique to generate the modulator.

A separate segment should be used to generate the modulator. For this modulator segment, following parameters must be selected:

Level: 0.0dB

Gen. Meth.: Time

App. Meth.: Multiply

Bearing in mind that when Multiply is selected, signal generation will use basic SigGen calibration, which is 0.0 dB equals 1.0Volt. The first component of this segment is the waveform of this modulator. The Level of this component should be proportional to the depth of modulation with 0.5Volt equals 100% modulation. For example, if the depth of modulation is 50%, amplitude of this component should be 0.25Volt (-12dB). That is, the peak to peak amplitude (in Volt.) of this component is the depth of modulation. The second component is a DC shift, which makes the modulator a positive one. The Level of this DC shift equals the Level of the first component.

The third component is another DC shift, which completes the modulator. The Level of this DC shift equals the dB value of the difference between unity and the depth of modulation. For example, 25% modulation yields 0.75, expressed in dB which will be -2.4988dB

Example:

Generating a AM signal: Carrier is 1000Hz tone (amplitude 2.0Volt), and using sinusoidal amplitude modulation. Frequency of the modulation is 50Hz, depth of the modulation is 25%.

Step 1: Run SigGen, Select calibration and other Signal parameters;

Step 2: Make the carrier: Segment 1, App. Meth.: Add; Component: Tone. Use proper Level value (according to the calibration) to make the amplitude 2.0Volt.;

Step 3: Make the modulator, Segment 2, App. Meth.: Multiply; Level 0.0dB.

Component 1: Tone, Frequency: 50Hz, Level: -18dB (because its peak amplitude is 0.125Volt);

Component 2: DC Shift: Level: -18dB (exactly the same level as that of the tone);

Component 3: DC Shift: Level: -2.4988dB (because the difference of unity and the peak-to-peak amplitude of Component 1 is 0.75).

Step 4: Click OK to see the AM signal. If the signal does not look correct, go back to check each step.