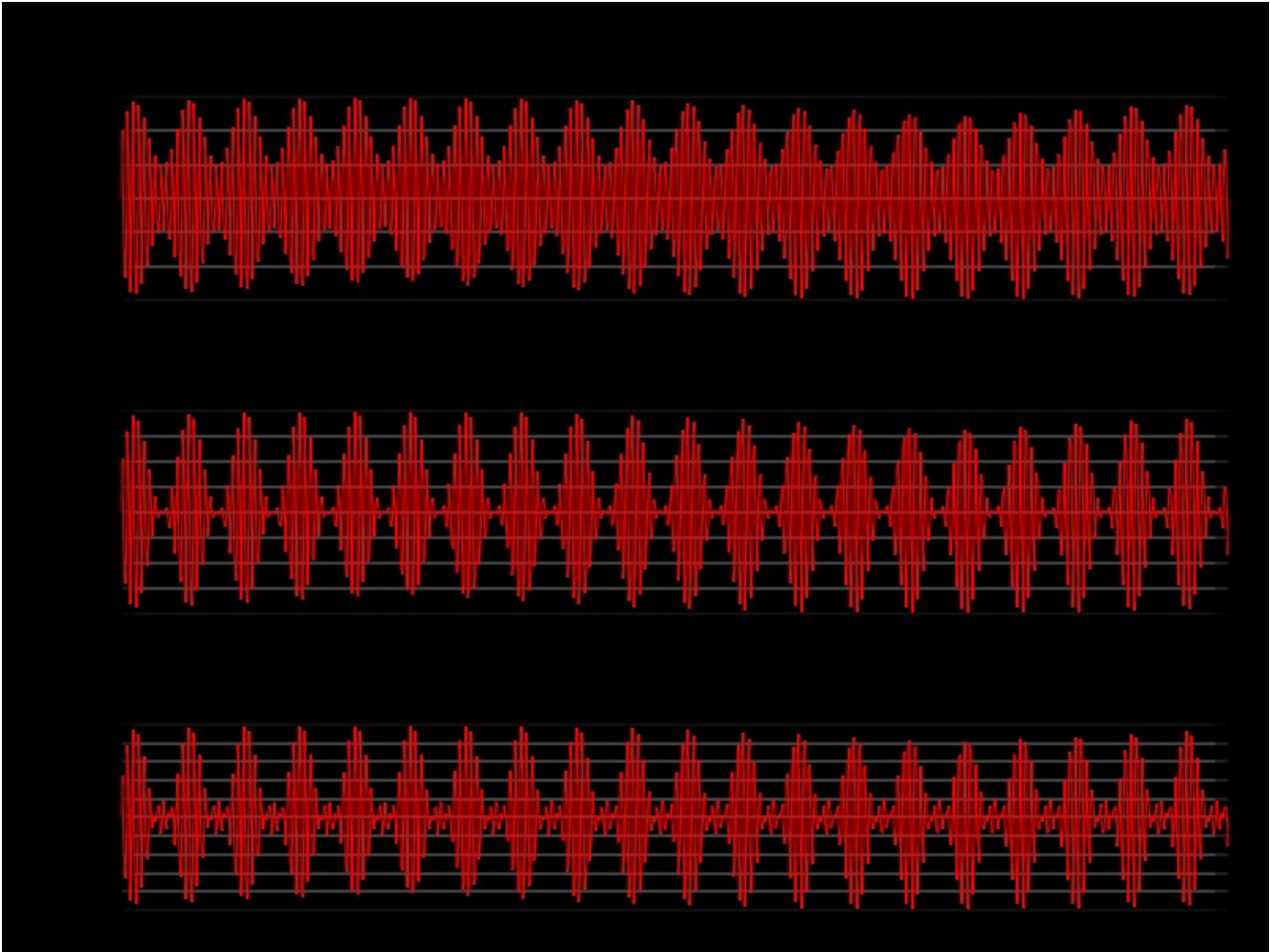


## Amplitude Modulation (AM)

In the period between the late 1920s to the mid-50s, AM was the primary method of voice communications for the amateur radio operator.

AM is formed by varying the amplitude of the transmitter's output carrier.



In the drawing above, a carrier is modulated at 50% (top figure), 100% (middle) and 150% (bottom). In amateur radio, in order to prevent unwanted sidebands, modulation is limited to 100%. The information is recovered in the receiver by detecting the audio signal and removing the carrier.

Here is a link that shows how AM is generated: [http://www.williamson-labs.com/480\\_am.htm](http://www.williamson-labs.com/480_am.htm)

**Why Did AM Fall Out of Favor?** Without going into the math, it takes half of the RF power to modulate the power of the transmitters carrier at 100%. As an example, my Viking II nominally outputs an un-modulated RF carrier of 90 Watts. Therefore, the modulator must be capable of producing 45 Watts of audio. Where does this audio power go? In actuality, the audio power is further divided by  $\frac{1}{2}$  and creates an upper and a lower sideband. Therefore each sideband only contains 22.5 Watts.

Since the power rating of a transmitter is determined by its components, if all of the power capacity could be converged into a single sideband instead of being used by the carrier and the other sideband, a transmitter could be built 4 times more efficient. This is called single sideband (SSB) transmission. In the mid 1950s SSB was beginning to come into favor with amateur radio operators since it was more efficient. When SSB was adopted by the Air Force for their worldwide communications system under the leadership of General Curtis LeMay, it advanced the manufacture and sale of commercial products for amateur SSB. For this reason SSB is the most popular and widely used voice modulation technique of the HF amateur bands today.

**Why Use AM Now?** With the increase in efficiency, why do amateurs still use AM? For one thing, many of the vintage transmitters made prior to the mid-50s will only employ AM as their voice mode. Another is the better fidelity that AM provides. By convention, most of the SSB transmitters produced since the 1950s limited the audio bandwidth to 3 kHz. Many of the vintage transmitters have audio bandwidths that are on the order of 6-9 kHz.

**Measuring % of Modulation:** Many hams use oscilloscopes. If you measure the un-modulated carrier and then apply audio, the 'voltage' will increase by a factor of 2 on voice peaks. It is easy to see any clipping or over driving using an oscilloscope.

I use a slightly different method. Using a peak 'power' meter, the relationship between the un-modulated carrier to a modulated carrier is a factor of 4 for 100% modulation. Therefore, I adjust my audio drive control such that my 90 Watts RF carrier will produce a 360 Watt 'peak power' on my voice peaks.