

3.3.1 RF Input Versus RF Output

A plot of the RF output power versus the RF input drive at a given frequency is called a "gain transfer" or "compression" curve. A sample is shown in Figure 3.2.

There are two regions where the traveling-wave tube can be operated properly. These are the linear and saturation areas, as indicated in Figure 3.2. The linear region is that part of the compression curve where a change in RF drive will cause an equal and corresponding increase in the RF output. This is called the "small signal gain" region and is the area where maximum gain is achieved. As the amplifier is driven toward saturation, the gain will be compressed to the point where further increases in the RF input drive will not result in a corresponding increase in the RF output. At this point, the amplifier will provide its maximum RF output at that particular frequency and is operating at "large signal" or saturation." It should be noted that the saturation area is rather broad and small changes in input power will result in almost no change in output power. If the RF drive is further increased, the amplifier's RF power output will begin to decrease. This is called the "overdrive" area. In this region, the traveling-wave tube's beam will begin defocusing with increased current intercepting the helix

+Saturation gain is typically 6 dB less than small signal gain due to the gain compression.

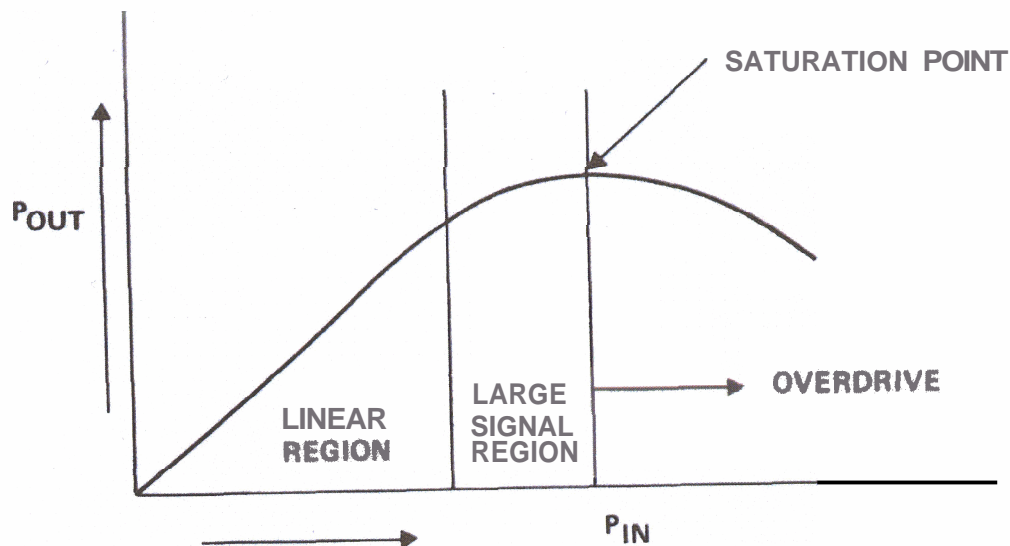


Figure 3.2 Sample "gain transfer" or "compression curve".