

WHY SHOULD I CARE ABOUT CLIPPING?

by Chuck McGregor

CLIPPING AND DRIVER FAILURE:

Clipping means that the tops of the signal are "clipped off" or "flat-topped" when the signal level is exceeding the maximum capability of the power amplifier or some other piece of equipment in the system. During the times when a signal is flat-topped, loudspeaker cones are not being "instructed" to move as it is receiving essentially a DC signal. This means all power goes into heating up their voice coils instead of producing sound. In other words, during the times the signal is flat-topped a loudspeaker is 100% efficient at converting power into heat. Ironically, the more efficient the driver, the worse the problem. A horn tweeter (~25% efficient) normally converts 75% of its input power to heat. During clipping it must convert 25% more power to heat. A cone woofer (~3% efficiency) normally converts 97% of its input power to heat. During clipping, it has to convert a mere 3% more to heat. Now you know why tweeters burn out much more easily.

THERMAL INERTIA:

A hidden consequence of clipping is that, while high frequency drivers are more efficient in converting electrical power to sound, they have less mass than low frequency drivers. Mass translates into thermal inertia. The higher the thermal inertia the more it takes to change the temperature of the mass. This means that high frequency drivers can heat up faster than low frequency drivers. This is especially true during clipping because the driver is converting all its input power from the amplifier into heat while the signal is clipped.

CLIPPING FACTS:

ANY CLIPPED SIGNAL CAN BLOW A LOUDSPEAKER. It does NOT matter if it is caused by the mixer, amplifier OR any other piece of equipment in the system OR whether the amp is at full output.

A MAJOR CAUSE OF DRIVER FAILURES is using too small an amplifier. If the amplifier is driven into clipping, it can burn out a loudspeaker that has a power rating **HIGHER** than the amplifier.

CLIPPING CANNOT BE DETECTED by electronic or built-in loudspeaker protection circuits and therefore cannot prevent damage from clipping.

LOUDSPEAKER POWER RATINGS are valid on for un-clipped input signals.

WATCH THOSE CLIP INDICATORS on every piece of equipment to avoid ANY clipping.