ISCE

The Institute of Sound and Communications Engineers

Engineering Note 27.1

Automatic gain control, limiting and compression

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The distinctions between automatic gain control (AGC), limiting and compression seems not to be clearly documented anywhere, not even in the little-known IEC 60268-8. For the purposes of this standard, automatic gain control is characterized by sufficient gain in the control loop to hold the steady-state amplifier output substantially constant for values of sinusoidal source e.m.f above a threshold value, and a release time-constant in the control loop of 1 s or greater. AGC does not, when correctly implemented, change the subjective quality of the programme signals.

Similarly, compression (amplitude compression) is characterized by gain in the control loop set so that the steady-state amplifier output increases with source e.m.f. less than proportionally for values of sinusoidal source e.m.f above a threshold value, and a release time-constant in the control loop of the order of milliseconds. Compression changes the subjective quality of the programme material.

Limiting is similar to compression in that it has a short release time-constant, but it has high control loop gain, so that the amplifier output stays substantially constant for values of sinusoidal source e.m.f above a threshold value, like AGC. Limiting changes the subjective quality of the programme material.

For both techniques, the attack time-constant in the control loop is usually of the order of milliseconds.

The compression ratio is the difference in decibels between an increment of level of source e.m.f and the resulting 1 dB increment of level of output current. There is evidence that compression ratios in the region of 2 can improve speech intelligibility, while values above 3 tend to make the sound quality strident and unpleasant. Compression is not desirable in amplifiers for AFILS, since the need for compression by an individual user, in different acoustic situations, is normally fulfilled by compression in the hearing aid. Compression can depress speech levels undesirably in noisy situations. However, AGC IS highly desirable in AFILS amplifiers, because a reduction in input signal level would otherwise seriously degrade intelligibility.

Figure 1 shows typical steady-state output/input characteristics

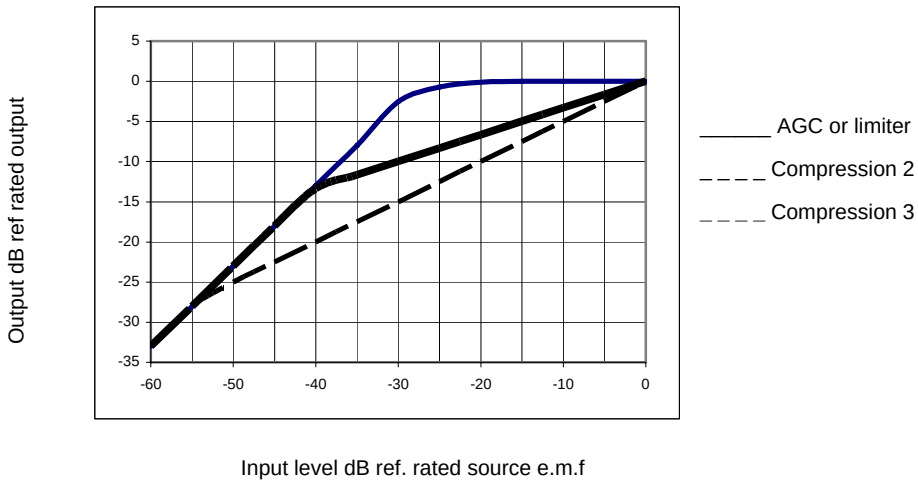

Figure 1 Typical steady-state output/input characteristics