BBE K3

BBE High Definition Sound Process
with Professional 3-Band Compressor/Limiter/AGC

For Audio and Video Applications
Car Audio, Background Music System
High-End TV

BBE K3 is a professional-quality Compressor/Limiter/AGC integrated with the BBE High Definition Sound process. The BBE K3 is realized only in the digital process. The compressor algorithm used in BBE K3 is notably small compared to the commonly available 3-band compressors, yet its performance is unequalled. It can be comfortably handled by the standard DSPs used in consumer electronics products. This is done by a unique integration of the BBE and compressor processes.

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1. BBE High Definition Sound

The BBE sound process is used to enhance the compressor-processed sound which otherwise lacks clarity.

2. Compressor/Limiter/AGC (Automatic Gain Control)

- Raises the gain of softer sound while leaving the louder volume level unchanged.

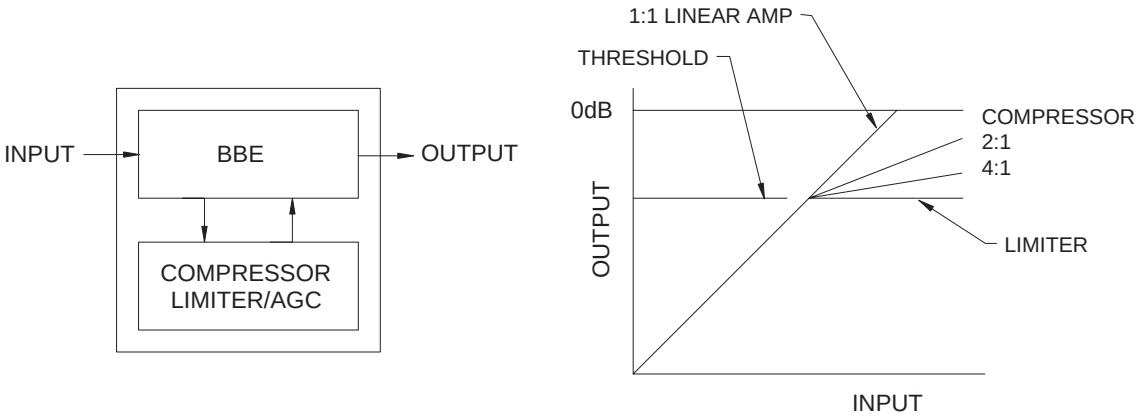
  This is suitable for:
  - A noisy car environment.
  - Low-volume level TV viewing in a quiet environment.
  - Low-level distributed audio (e.g. background music systems)

- Automatically adjusts the audio level fluctuation between different programs, broadcast channels, and CM.
- Minimizes the typical 10dB audio level difference between digital and analog broadcasting.
- BBE's unique 3-Band Compressor/AGC provides professional quality performance with a minimized software. (***BBE* K3**)
- 1-Band Compressor/AGC is available when an even smaller DSP footprint is desired. (Optional ***BBE* K1**)

3. Integration of BBE and Compressor

Configuration

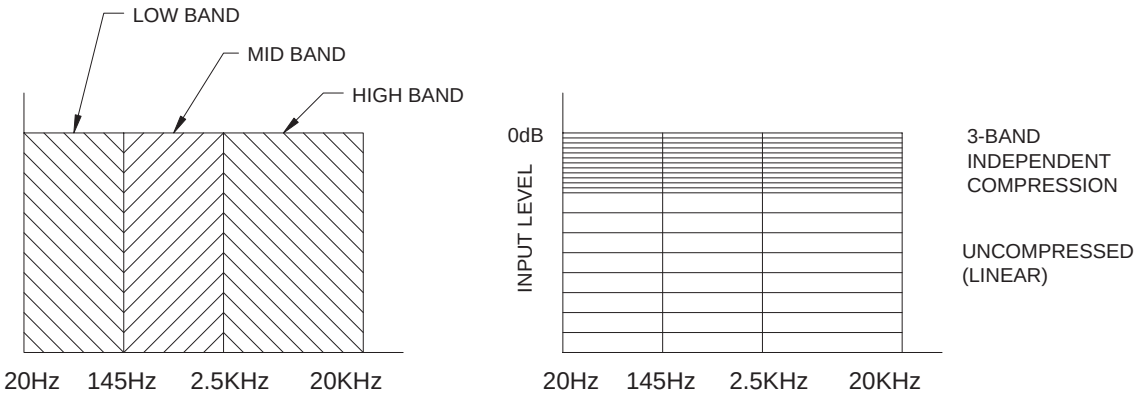
Compressors are normally placed in the serial path of audio signal. Unlike regular compressors, the BBE compressor/limiter/AGC has a unique configuration of being one integrated process as shown in the diagram below left. This greatly simplifies the hardware and reduces the software size.



BBE COMPRESSOR

3-Band Compressor/AGC

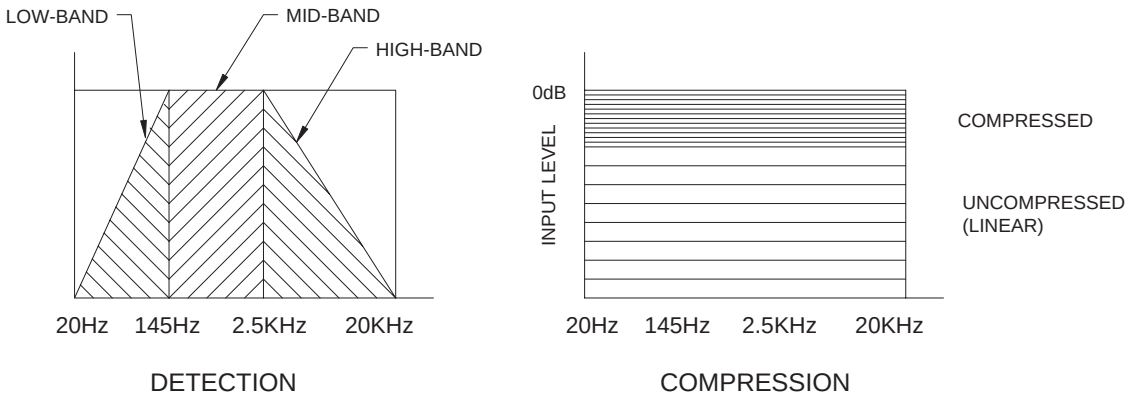
The BBE compressor/Limiter/AGC uses a 3-band crossover which is a part of the BBE sound process. Each band operates the task independently, and one band's activity does not affect other bands at all. This guarantees the minimum compressor related artifacts including pumping.



BBE 3-BAND COMPRESSOR

1-Band Compressor/AGC

BBE 1-Band Compressor/AGC is an alternative solution when the processor power or program space is limited. The 1-Band Compressor/AGC monitors the BBE process' mid-range audio signal with some low and high frequency information to perform the compression. The compression is applied to the entire audio frequency range.



BBE 1-BAND COMPRESSOR

Compressor Parameters

The compressor's threshold, compression ratio, and attack/release time are independently selectable to meet all audio requirements.

More about AGC

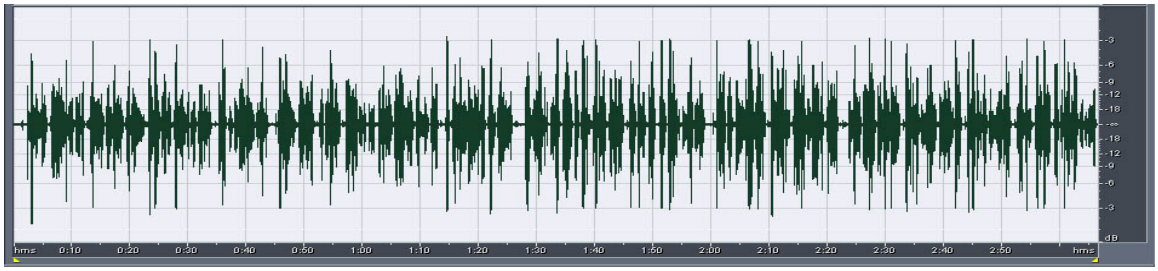
There are two types of AGCs. The regular and simpler AGC is referred to as "auto-volume" (or automatic volume control). It has a relatively short attack and very long release time-constants – as long as five seconds. It works in a wide dynamic range, but it exhibits obvious artifacts which are unacceptable in any hi-fi or critical applications.

The second type, the compressor-based AGC, has a shorter attack and release-time just like BBE Compressor/AGC. It works very quickly and shows no artifacts. Its architecture is normally much more complex than the auto-volume type. BBE Compressor/AGC employs a unique algorithm to simplify the whole process while maintaining its peak performance.

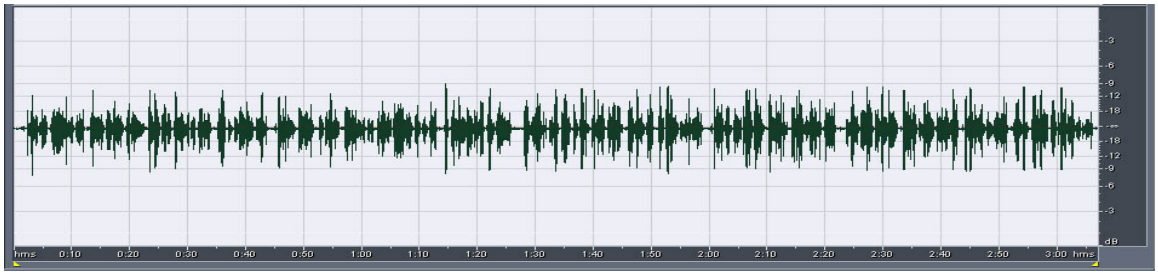
4. BBE K3 Performance

The following three pictures illustrate the performance of the BBE 3-band compressor. The first picture is the waveform of the original 3-minute speech. The second picture is an intentionally -6dB attenuated original signal. The third picture shows the result of the BBE compressor applied on the attenuated signal. The loudness is recovered as strongly as the original.

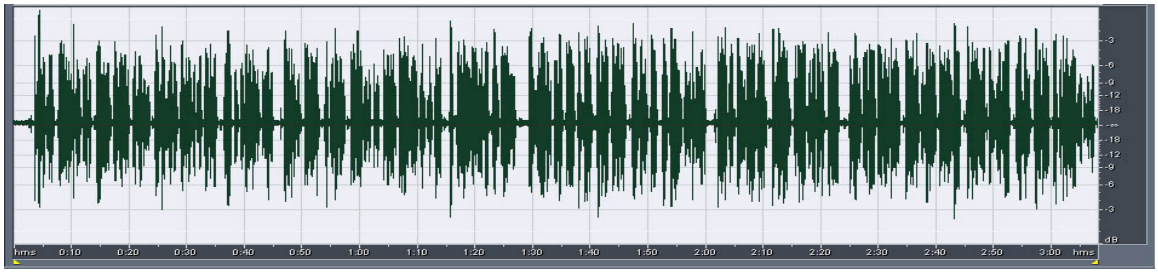
In the real world, broadcast and recorded audio fluctuate between 0 and -10dB across channels or programs. The BBE compressor equalizes these volume differences automatically.



Original 3-Minute Speech



Original, -6dB Attenuated



BBE K3 Applied

5. Solution

Digital only

BBE Sound, Inc. July 21, 2004

www.bbesound.com