

AUDIO VOLUME CONTROL IN THE DIGITAL AGE

The digital revolution has brought us new levels of entertainment and opportunity. But it also presents new challenges to overcome. Many of the problems that were once solved in analog transmissions have re-emerged as new problems in digital transmission.

One of the most noticeable problems is in the area of volume control. Broadcast engineers work very hard to set the signal levels in their systems correctly, but volume levels change from program to program and abrupt loudness changes during commercials are very noticeable and annoying to the listener. There is a tendency for the ad producers to mix the TV spot so that the audio level is "HOT". Commercial advertisers use this volume change "shock factor" to get the attention of the listener.

The "ACOUSTIC SHOCK" of this audio volume change does get the attention of many viewers, but for many more viewers it has a detrimental effect. Viewers will either watch the programming with the TV remote in their hand so they can turn the volume level down during the hot passages and commercials or they will use the remote to change to another channel. Neither of these activities is good for your business.

Audio volume level problems can be solved by the introduction of audio level control into the digital path. One of the most common digital audio formats to use is the AES-3 signal. If you use AES-3 in your system you can install audio gain control in that stream to control the audio volume changes. The two most popular wiring methods for this data format are AES-3id that uses an unbalanced 75 Ohm coax cable with BNC connectors and the other method AES-3ebu that uses Twisted Pair wire and XLR connectors. This signal usually has a sample rate of 44.1KHz or 48KHz and a signal level of 1 Volt p/p.

The consumer version of the AES-3 signal is called S/PDIF and much of the equipment on the market will accept both AES-3id and S/PDIF signals. The data encoding is the same but the S/PDIF standard uses RCA connectors and the data signal level is 0.5 Volts p/p. When selecting a digital (AGC) Automatic Gain Control you should look for a model that will accept both types of input data.

When choosing an audio level control system be sure that it has professional features such as "Program Dependent Time Constants, Noise Gates, and a Decoded Analog Monitor Port". A 30 dB audio control range should be enough for all applications. Most professional audio gain control units use transformer isolation on the digital input and output to prevent unwanted interference from getting into your signal.

Program Dependent Time Constants allow the system to automatically adjust the attack and release time to effect maximum control without producing audible artifacts such as pumping and ducking on loud transients. The effect is to control the audio level without audible compression artifacts, so you get program audio that sounds natural without the annoying level variations.

Program Dependent Gain Hold (Noise Gates) prevent "Noise Rush Up", that occurs when the audio is quiet and the background noise slowly increases to objectionable levels. Noise Gates work by freezing the audio gain when the audio level subsides to prevent an increase of the noise when the program is quiet.

A Decoded Analog Monitor Port is not a necessity but it sure comes in handy when checking levels or when you just want to monitor the audio quality. The converted audio output can also be used to feed other down stream equipment as a back up signal.

An adjustable input control to set the range over which the audio is controlled and an output trim control should be available to match your systems requirements. The input control can be used to set the degree of dynamic range in the audio signal. If a more dynamic sound is desired, drive the unit more lightly (with the display indicating higher gain), as desired.

Some audio gain controllers have a built-in (A/D) Analog to Digital encoder so that it can be used to insert Left / Right base-band audio into the digital stream as a back-up source. This input can be used to insert audio over the top of your existing digital audio. The applications include adding Q-tones, sub-audible tones, or ultra-high frequency control tones to the AES-3 digital output signal. When you have AES-3 program material being processed through the unit you can use the audio input to directly overlay or mix other audio signals with the program material.

Since the audio input can be mixed with the digital input of the AGC gain control system the added tones will be gain controlled to the same level as the original program material. If the insertion level of the audio tone is higher than the original program material then the program material will "duck" (reduce in level) below the tone level. So when a tone is applied to the audio input the background audio programming will reduce in level by the amount of the level difference. The amount of "ducking" the program material does is controlled by the setting of the insertion level of the audio tone.

Some gain controllers are equipped with signal loss indicators and telemetry contact outputs that operate on the loss of signal. These contacts can be used to switch to alternate sources or give you an alarm when the signal fails.

If you are in the market for a broadcast quality, automatic digital audio level control system, built for performance and reliability with the price and quality-conscious audio professional in mind please consider the DLM471 Digital Audio Level Master from FM SYSTEMS, INC.

Digital Stereo Audio Level Master



(MOUNTED IN RMS400 RACK PANEL)

The DLM471 Digital Audio Level Master stabilizes AES-3id digital audio volume so that the level remains constant when the input level varies wildly. This product has both digital and stereo analog inputs and outputs that will correct audio level variations over a range of more than 30dB. This unit will control the encoded audio level on any AES-3id or S/PDIF compatible input signals.

The unit also has balanced analog audio input and output connections. It can serve as a D/A converter, since the analog outputs are active along with the digital output, and these stereo analog outputs can be used as additional outputs, for metering, monitoring or the main program feed. It can also serve as an A/D converter, since the analog inputs can be used to encode analog audio into digital AES-3id output signals.