

DTS Neural Technologies

Licensing Loudness Tools for Broadcast

Fall 2009



dtsTM

Digital Entertainment

Solving loudness problems made easy

- Measure the *Loudness*
 - Use a perceptual loudness measurement
- Correct the *Loudness*
 - Use perceptual loudness correction.
- Understand the Metadata
 - A change to metadata is a change to the audio.
 - A change to the audio is a change to the metadata



Measure the Loudness

- Looking to one standard
 - ITU - BS.1770/1
- Create guidelines for your staff and content contributors. Address:
 - “Target” or dialnorm levels
 - Long-term vs. Short-term variations in content
 - Peak measures (consider your transmission path)



Choose the Right Measurement Tool

DaySequerra iLM8



- Designed to allow both inexperienced and advanced operators comply with the ATSC loudness recommendations.
- Industry-standard ITU-R BS.1770/1 and DTS Technologies Neural Loudness Measure (NLM) algorithms.
- Simultaneous measurement for 5.1 Surround and Auxiliary Stereo inputs.
- 8 input channels of PCM AES and optional HD/SDI (16 Channels total).
- Read-across-the-room display
- Front panel headphone monitor.
- Ethernet interface for software logging and field updates.

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iLM8 - Rear Panel Features



- Four BNC connectors accept an 8 channel AES-3 digital signal.
- Four BNC connectors pass-through the AES-3 digital audio signal.
- Two BNC connectors for HD/SDI, one input and one pass-through (option 01).
- One DB-9 connector outputs TTL 5VDC Max for external alarm monitoring.
- One RJ-45 connector for updating firmware or use with iLM8 software.
- One IEC320 connector for use with any power system worldwide. Internal power supply is auto switching, with a range of 100-260 VAC at 50 or 60 Hz.

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CORRECT THE LOUDNESS

Traditional Broadcast Processors vs. Loudness Correction

- Loudness and Density are related
- Adding density to a signal increases perceived loudness
 - If all signals share similar density, simple RMS power measures can do a good job to measure loudness.
 - Content with varied density requires more elaborate loudness measures for accuracy. (See Critical Band research)
- Many broadcast processors rely on “Multi-Band” approaches to normalize all frequencies in a signal to achieve consistent loudness.
 - This approach was very good for staying close to maximum modulation levels in analog NTSC Television or when mastering rock albums
 - Creates consistent loudness at the expense of reduced dynamics and increased density
 - Recent research shows use of high amounts of multiband compression can impact intelligibility (last month’s AES journal)
- The goal is to manage loudness, not ‘remaster’ the broadcast.

Address Loudness Problems

- Correct Loudness as its own entity
 - Separate changes to equalization and signal density
 - Avoid the ‘artistic license’ debate
- Adhere to the desired dialnorm
 - Make sure you’re metadata and target loudness level agree
 - Let the AC3 system do it’s work
- Leave good audio alone
 - Signal processing will occur at many steps in the transmission chain
 - Too much signal processing will sound as bad as not enough.

DTS Neural Loudness Control

Perceptual Loudness Correction

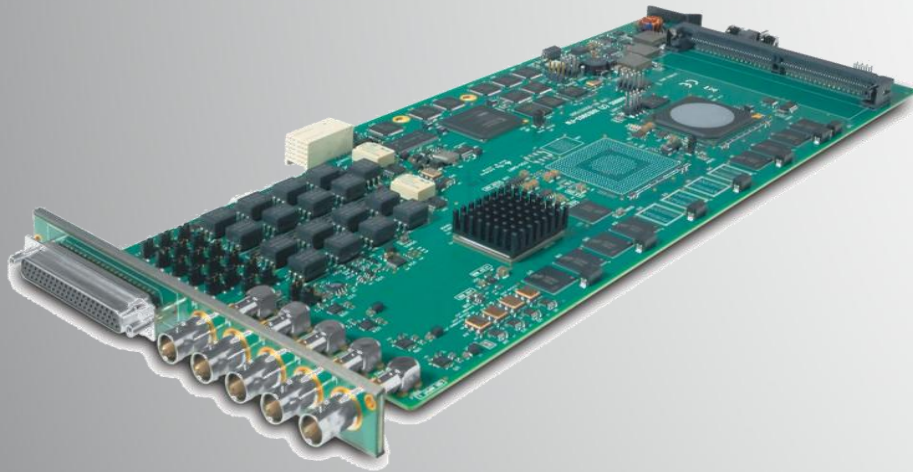
- Manages loudness without impacting audio density
- 1st to the market with Perceptual Loudness Control
- Real-time correction that grooms content while adhering to the ITU BS.1770 loudness measurement
- Equally effective for stereo and 5.1 surround content
- With the use of look-ahead technology, large gain corrections are imperceptible



DaySequerra NLC 5.1ST Surround Loudness Control

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DTS Loudness Technologies in Card Frame Solutions



HARRIS[®]

Harris NEO XHD-3903 Conversion/Frame Sync with DTS Neural Option

- Up, Down, Cross Conversion, supports SD, HD, 1080p
- Video audio synchronization, processing
- 8 AES input/output, 16 channel embedded audio
- DTS Neural Surround Up/Down Mix, Multimerge, DTS Neural Loudness Control options

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