LC2000 — Motion Adaptive Standards Converter

Technical Data Sheet

LC2000 is a highly cost effective, linear motion adaptive standards converter.

LC2000 Applications
- High Density International Program Distribution
- Low cost frame rate conversion
- International TV and video back-up channels

Features
- Linear motion adaptive SD/HD/3G high density frame rate conversion
- SD/HD/3G up, down and cross conversion
- Independent dual channel conversion and processing
- Flexible video and audio i/o configuration
- 16-channel embedded audio processing for each video channel
- Continuous output when input standard switches
- HDMI monitor output
- Dual PSU as standard
- Relay bypass on primary SDI inputs
- Automatic Aspect Ratio Conversion (AFD, VI, L23)
- Powerful picture enhancement tools
- Front panel and remote control via web interface and RollCall
- Closed caption and timecode handling
- Synchronization
- User chosen line for SMPTE 2016
- GPI support
- Front panel control lock
- SMPTE2020 metadata support
- Dolby delay compensation
- Caption generator
- Logo inserter
- Sidebar keyer
- Clean cut
- Composite input / output

Optional Features
- Fiber input / output

LC2000 Video Processing

LC2000 Video System Diagram

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LC2000 Audio Processing

Technical Specification

**Signal Inputs**
- Serial digital 4 x 75 Ohm SD/HD/3Gb/s serial digital with embedded audio
- Input standards: 3Gb/s SD-SDI, SMPTE425 level A, level B
- 1.5 Gbit/s HD-SDI SMPTE292M/SMPTE299M
- 270 Mbit/s SD-SDI SMPTE259M
- Composite PAL, NTSC, NTSC-J, PAL-M, PAL-N, N4.4, SECAM
- 12-bit ADCs
- Analog component YC
- Reference 1 x loop-through HDTV Trisync/SD Bi-sync (black & burst) SMPTE 240M/274M
- Audio AES 4 x Balanced AES inputs – via 25 way D Type
- 4 x Un-balanced AES inputs – via 4 x BNC
- Audio analog 4 x Stereo Analog inputs via 25 way D Type

**Signal Outputs**
- Serial digital 4 x 75 Ohm SD/HD/3Gb/s serial digital with embedded audio
- Output standards: 3Gb/s HD-SDI, SMPTE425 level A, level B
- 1.5 Gbit/s HD-SDI SMPTE292M/SMPTE299M
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- Composite PAL, NTSC, NTSC-J, PAL-M, PAL-N
- 12-bit DACs
- Analog component YC
- Audio AES 4 x Balanced AES outputs – via 25 way D Type
- 4 x Un-balanced AES outputs – via 4 x BNC
- Audio analog 2 x Stereo Analog outputs via 25 way D Type

**Input standard**
- Input standard (auto detect) 525, 625
  - 720 50/59.94/60p
  - 1080 50/59.94/60p (Levels A and B)
  - 720/1080 23/24/25/29/30p
  - 1080 23/24/25/29psf

**Output standard**
- 525, 625
  - 720 50/59.94/60p
  - 1080 50/59.94/60p (Levels A and B)
  - 720/1080 23/24/25/29/30p
  - 1080 23/24/25/29psf

**Conversion Functions**
- Modes SD/HD/3Gb/s Linear Standards Conversion
- Up Conversion, Down Conversion, Cross Conversion

**Manual or Automatic ARC**
- AF D (SMPTE 2016), VI (RP186), WSS (L23)
- SD input format Normal 4:3, Anamorphic 16:9
- Letterbox 14:9, Letterbox 16:9
- SD output format Normal 4:3, Anamorphic 16:9
- Letterbox 14:9, Letterbox 16:9

**Audio Functions**
- Analog Audio
  - Four pairs of analogue inputs are individually available to any or all processing channels
  - Two groups (2 pairs) of analogue output are separately assignable to any processing channel
  - Headroom +24dBu, balanced connection
- AES Audio
  - Four AES audio inputs are individually available to any or all processing channels
  - Four AES audio outputs (48kHz) are separately assignable to any processing channel
  - AES input is auto-detected as PCM (32-96kHz) or non-PCM (48kHz locked to relevant video input)
- Embedded Audio
  - Each processing channel includes 16-channel embedded audio processing
  - PCM audio processing includes channel level gain and delay compensation, as well as channel level routing/shuffle with audio phase inversion
  - Non-PCM processing features pair level routing and delay compensation.
  - Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat.

**Metadata**
- Closed caption CEA608 <> CEA708
- Timecode conversions
- WST/RDD8 conversion
- SMPTE2020 embed/de-embed

**Enhancement**
- Advanced Horizontal Enhancement
  - Frequency band selection (Low, Med, High)
  - 4 preset enhancement levels (Low, Med, High, Super)
- Custom H Gain and H Noise rejection levels.
- Advanced Vertical Enhancement
  - Frequency band selection (Low, Med, High)
  - 5 preset enhancement levels (Soft 2, Soft 1, Normal, Sharp 1, Sharp 2)
- Horizontal Aperture
  - 5 preset H sharpness levels (Low 2, Low 1, Normal 1, Normal 1, High 2)
  - 5 preset H detail levels (Soft 2, Soft 1, Normal, Sharp 1, Sharp 2)
- Noise reduction : spatial, recursive
- Y/C alignment : corrects for up-stream luma-chroma displacement
### System
- **Pattern Off**, Black, Ramp, Bars
- Proc amp: Black Level +100 to -100mV (0) in 0.8mV steps
- Contrast -6dB to +6dB (0) in 0.2dB steps
- Saturation -6dB to +6dB (0) in 0.2dB steps
- Y Gamma 0.4 to 1.7 (1) in 0.1 steps
- Freeze On/Off
- Genlock Reference lock, Input lock (same format), Follow input (same frame rate), Free run
- Memories: 16 user memories
- Legalizer
- EDH support

### Power (Primary and Secondary)
- Input voltage range 100 – 240 VAC, 50/60 Hz 1.5A (Max) via three pin IEC power socket

### Mechanical
- Temperature range 0 to 45°C operating
- Cooling: Internal Fan, side venting
- Weight: Approximately 4.25kg
- Case type: 1RU, Rack Mounting
- Dimensions: 44mm x 430mm x 400mm (h, w, d)
- Headphones socket with volume control
- GPIO: 8 available

### Communications
- Remote control via web interface and RollCall network (IP)
- Temperature range 0 to 45°C operating
- Cooling: Internal Fan, side venting
- Weight: Approximately 4.25kg
- Case type: 1RU, Rack Mounting
- Dimensions: 44mm x 430mm x 400mm (h, w, d)
- Headphones socket with volume control
- GPIO: 8 available

### Throughput delay
- **Video processing delay**
  - field = 16.7 or 20ms
  - frame = 33.3 or 40ms
  - With scaling active in same frame rate:
    - Ref lock / Free run - Between 3 and 5 fields + ~200us
    - Input lock(SDI) – 3 fields + 1ms
  - With same standard in & out and Sync mode = Enabled:
    - Ref lock / Free run - Between ~200us and 1 frame + ~200us;
    - Input lock(SDI) – ~1ms

### Frame rate conversion:
- Any lock mode – 110ms typical

### Throughput delay
- **Audio processing delay**
  - (Audio delay = 0ms)
  - With scaling active in same frame rate:
    - Ref lock / Free run – 1.5 frames;
    - Input lock – 1 frame + 1ms
  - With same standard in & out and Sync mode = Enabled:
    - Ref lock / Free run – 0.5 frames;
    - Input lock – ~3ms

### Frame rate conversion:
- Any lock mode – 110ms typical

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