DA-MAX ™
By ProMax Systems, Inc.
Bridges The Gap Between Analog and Digital
Dated: July 10, 2000

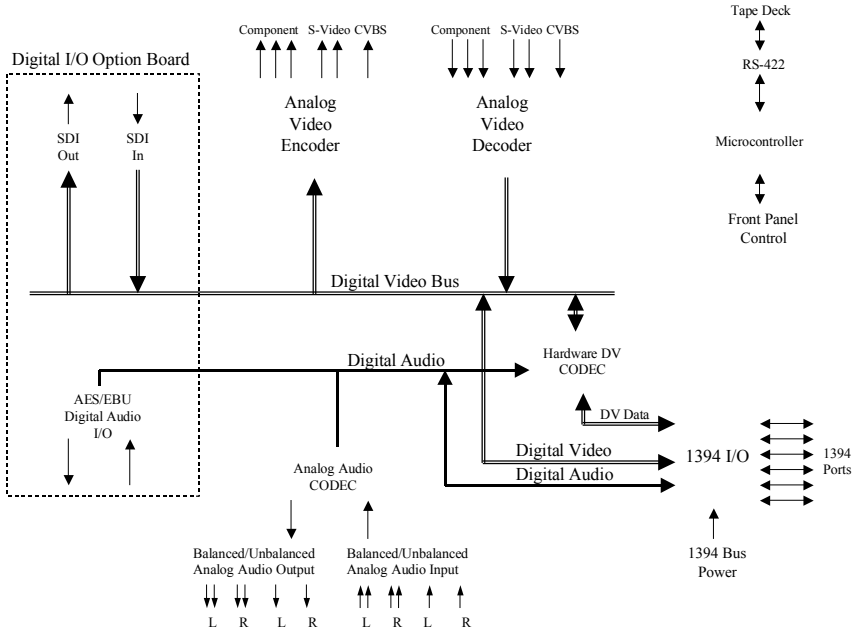
Summary: This report summarizes the key features of DA-MAX, a comprehensive breakout-box, format converter designed to bridge the gap between analog and digital video and audio formats. This low-cost, rack-mountable box features analog video and audio I/O, optional digital video (SDI) and digital audio (AES/EBU) support as well as standard DV over 1394/FireWire.

Unique features include uncompressed video and audio over FireWire™, tape deck control including time-code, powered 6-port FireWire Hub, and its low-cost.

Multi-Format Conversions: DA-Max was designed to meet these various format needs. DA-MAX supports input and output from all the major formats, bridging the gap between the analog and digital world. Furthermore, DA-MAX adds the unique features of tape deck control and uncompressed video/audio over FireWire.

A simplified block diagram below shows the major subsystems, including: a Analog Video Decoder, Analog Video Encoder, Optional SDI Video I/O, Audio CODEC, Analog Audio I/O, Optional AES/EBU Digital Audio I/O, 1394 I/O, Hardware DV CODEC and MicroController with RS-422 interface and front panel control.

DA-MAX Block Diagram



The analog video decoder, converts CVBS (BNC), S-Video (4-pin DIN) or Component (BNC x 3) analog video input into an 8-bit digital video stream. The video decoder features two 10-Bit A/D converters and provides genlock capability via the CVBS (composite) video input. The complimentary analog video encoder converts the digital video stream to CVBS (BNC), S-Video (4-pin DIN) and Component (BNC x 3) video outputs. (All analog video outputs are simultaneously active). The digital I/O option board adds 270 MBit SMPTE 259M SDI capabilities. This digital video I/O makes possible conversions to and from DV to SDI as well as composite, S-Video and component video to and from SDI. Note that, the SDI connection only includes video and not embedded audio information.

Motivation For DA-MAX: The need to convert analog video and analog audio in all its various formats to digital video (SDI) and digital audio (AES/EBU) has been a requirement in the video industry for the past 10-15 years. However, with the introduction of FireWire and DV, the added need for compressed DV support has added new conversion requirements. Additionally, most computer manufacturers, notably Apple, have reduced the number of internal PCI slots while making FireWire and USB the only external connectors. One possible solution to these issues is an external FireWire-based DV converter box, which would not require any PCI slots and support DV, as well as SDI and AES/EBU.

However, while DV camcorder sales continue to climb, there still exists a large installed base of analog Betacam™ and MII based tape decks. These formats still find many applications in studios and post-production facilities. So while a simple FireWire based DV converter box is attractive, the box also needs to support the older analog component video as well as uncompressed video (SDI) and digital audio (AES/EBU).

DA-MAX processes analog audio via a high-resolution two-channel (stereo) 16-bit audio CODEC. The audio CODEC is fed by either balanced (XLR) or unbalanced (RCA) analog audio inputs. The CODEC outputs analog audio simultaneously in both balanced and un-balanced formats. Sampling rates of either 32, 44.1 or 48 kHz are supported. Additionally, the digital I/O option board includes an AES/EBU connection with both balanced (XLR) and unbalanced (RCA) connections.

The 1394/FireWire I/O section includes six 6-pin FireWire ports operating at 400 Mbits. These ports provide up to 1.5 Amps of power at 20V, supporting the use of external FireWire drives. Inputs and outputs to the 1394 I/O port include compressed DV as well as uncompressed video and audio.

A Divio™ DV CODEC converts the uncompressed digital video and audio data to and from the DV format. This single chip hardware CODEC performs high-quality encoding (compression) or decoding (de-compression) in either PAL or NTSC, supporting both 48 and 32 kHz audio. Additional circuitry synchronizes the audio and video signals to ensure proper lip sync.

Tape Deck Control: The much-requested feature of tape deck control including time-code re-striping was recently added to DA-MAX. Tape deck commands such as stop, rewind and play can be invoked from the application software program. These commands are sent via FireWire to DA-MAX where they are translated and forwarded to the tape deck over an RS-422 connection. Additionally, during the conversion of analog video to DV the time-code from the analog tape can be re-striped into the DV data stream via the RS-422 connection. This unique feature allows the preservation of the time code as older Betacam and MII footage are brought to the DV domain.

Front Panel or Computer Control: DA-MAX can be controlled via front panel selector switches or by a FireWire connection to a remote computer (desktop or laptop). In front-panel mode, the user can only select the video and audio input (all outputs are simultaneously active). In computer control mode, an Macintosh application program (included with DA-MAX) allows the user to select the input (as in front panel mode). Additionally, the user can control:

1) Analog Video Input Proc Amp: Hue, Brightness, Saturation and Contrast
2) Audio Video Output Proc Amp: Hue, Brightness, Saturation and Contrast, R-Y & B-Y Scaling, Setup
3) Video Format: NTSC or PAL (overrides default)
4) Analog Audio In Volume Level
5) Analog Audio Out Volume Level
6) Tape Deck Control: Rewind, Play, Fast Forward, Stop
7) Tape Code Re-Striping (Analog Tape Time Code -> DV)

Physical Base Unit Specifications

Size: 14.87 inch (width) x 3.4 inch (height) x 5.8 inch (depth)
Weight: 3 Pounds.
Input Voltage Range: 100 – 240VAC, 50/60 HZ
Mounting Option: Detachable, Rack-Mount Brackets
Compliance: FCC Class B and CE

Analog Video Formats: NTSC (525 line / 60 Hz) or PAL (625 line / 50 Hz)
Betacam, SMPTE or MII levels (With or Without Setup)

Analog Video Input
Sampling: Two 10-Bit A/Ds, Hue, Brightness, Saturation and Contrast Control
Composite: (BNC), 75 Ω, 1.0V p-p
S-Video: (4-Pin DIN), 75 Ω, Y: 1.0V p-p, C: 627mV p-p
Component: (BNC x 3), 75 Ω, (Y, R-Y, B-Y), SMPTE or Betacam levels

Analog Video Output
Conversion: Six 10-Bit A/Ds, Hue, Brightness, Saturation and Contrast Control
Composite: (BNC), 75 Ω, 1.0V p-p
S-Video: (4-Pin DIN), 75 Ω, Y: 1.0V p-p, C: 627mV p-p
Component: (BNC x 3), 75 Ω, (Y, R-Y, B-Y), SMPTE or Betacam levels

Analog Audio Sampling/Conversion: 48, 44.1 or 32 kHz at 16-bit resolution, 2-Channel

Analog Audio Input
Balanced: (XLR x 2), +4 dBu nominal, 20 kΩ input impedance
Unbalanced: (RCA x 2)

Analog Audio Output
Balanced: (XLR x 2), +4dBu nominal into 600Ω load
Unbalanced: (RCA x 2)

Audio / Video Sync
Audio and Video are fully synchronized, regardless of the input source

1394 (FireWire)
Six FireWire ports, 6-pin
400 Mbits Speed
Bus Power: 20V @ 1.5 Amps

RS-422 I/O
9-Pin D-Sub, 38.4 Baud

Front Panel Control:
Push-Button Switches and LEDs select the following:
Control: Remote or Local
Audio Sampling: 32 kHz or 48 kHz
Audio Input: RCA, Balanced, or AES/EBU
Video Input: 1394, CVBS, S-Video, Component, or SDI

Digital I/O Option Card:
Digital Video I/O
SDI: (BNC x 2), 75Ω, 10-bit resolution, 270 MBit/sec, SMPTE 259M

Digital Audio:
AES/EBU: (XLR x 2 and RCA x 2), 2-7 V p-p across a 110Ω load

Expected Ship Date: August, 2000

Suggested Retail Price: $1495.00 Base Unit
Digital I/O Option Card: $995.00

For Additional Information Visit www.promax.com or
Call ProMax Sales Department at 949-727-3977 or 1-800-977-6629

ProMax Systems, Inc.
16 Technology Drive #106
Irvine, CA 92618
TEL: 949-727-3977
FAX: 949-727-3546
SALES: 1-800-977-6629