Model 7130
HD Downconverter
and
Distribution Amplifier
Data Pack

ENSEMBLE
D E S I G N S

Revision 1.0   SW v1.0

Contents

MODULE OVERVIEW

The 7130 module has an HD SDI input with HD SDI, SD SDI and composite outputs, serving as both a downconverter and a distribution amplifier. If an SD SDI signal is input to the 7130, SD will pass to the outputs.

The 7130 performs automatic color space and gamma conversion to accommodate the differences between HD and SD. Output aspect ratio is selectable.

Audio Handling

Four channels of analog audio output are provided for monitoring. Any of the sixteen embedded channels can be mapped and mixed to form these outputs.

Embedded audio is safely bypassed around the video with the lip sync preserved. Sixteen channels of embedded audio are supported. Audio processing is performed at 24 bit resolution.

Control

The 7130 can be configured locally or controlled and configured remotely with Avenue Touch Screens, Express Panels, or Avenue PC Software. Alarm generation, configurable user levels, module lock out, and customizable menus are just some of the tools included in the Avenue control system.

Metadata

HD closed captioning is carried in data packets in the vertical interval ancillary data space. The 7130 properly translates HD caption data to traditional SD captioning (line 21 or 23) so that closed captioning content is converted transparently between video standards and formats.

Automatic Aspect Ratio Conversion

The 7130 uses WSS (Wide Screen Signaling) and AFD (Active Format Description) to mark or identify the aspect ratio of the video content. These flags are read at the input of the module.
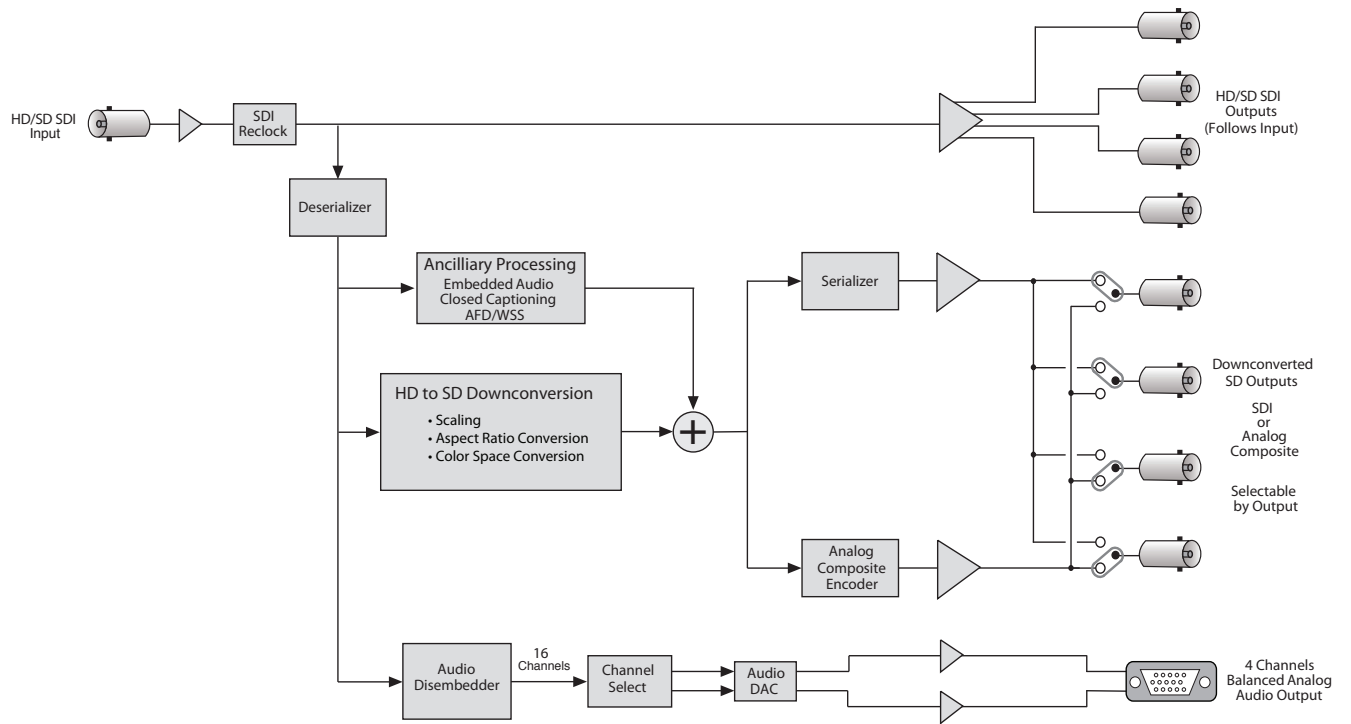
7130 HD Downconverter and Distribution Amplifier Functional Block Diagram, Portrait

HD/SD SDI
Input

SDI
Reclock

Deserializer

Audio
Disembedder

16
Channels

Channel
Select

Audio
DAC

HD to SD Downconversion
• Scaling
• Aspect Ratio Conversion
• Color Space Conversion

Ancilliary Processing
Embedded Audio
Closed Captioning
AFD/WSS

＋

Analog
Composite
Encoder

Serializer

4 Channels
Balanced Analog
Audio Output

Selectable
by Output

SDI
or
Analog
Composite

Downconverted
SD Outputs

HD/SD SDI
Outputs
(Follows Input)

7130 HD Downconverter and Distribution Amplifier Functional Block Diagram, Landscape

APPLICATIONS

HD Downconversion

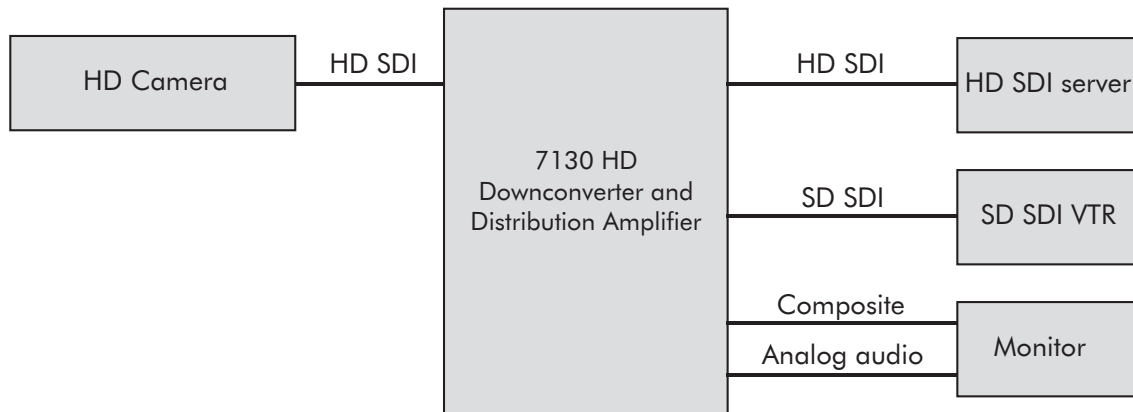In this example the 7130 has an HD input from a camera and is providing HD SDI, SD SDI and analog composite video outputs for recording or monitoring purposes. Two channels of analog audio can be monitored as well.

```
┌──────────────┐              ┌─────────────────┐   HD SDI   ┌──────────────┐
│              │    HD SDI    │                 │────────────│ HD SDI server│
│  HD Camera   │──────────────│                 │            └──────────────┘
│              │              │    7130 HD      │
└──────────────┘              │ Downconverter and│   SD SDI   ┌──────────────┐
                              │Distribution Amplifier│────────│  SD SDI VTR  │
                              │                 │            └──────────────┘
                              │                 │  Composite ┌──────────────┐
                              │                 │────────────│              │
                              │                 │Analog audio│   Monitor    │
                              └─────────────────┘────────────└──────────────┘
```

INSTALLATION

Plug the 7130 module into any one of the slots in the 1RU or 3RU frame and install the plastic overlay provided onto the corresponding group of rear BNC connectors associated with the module location.
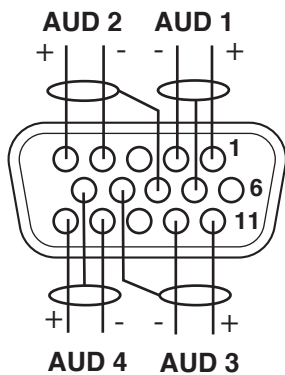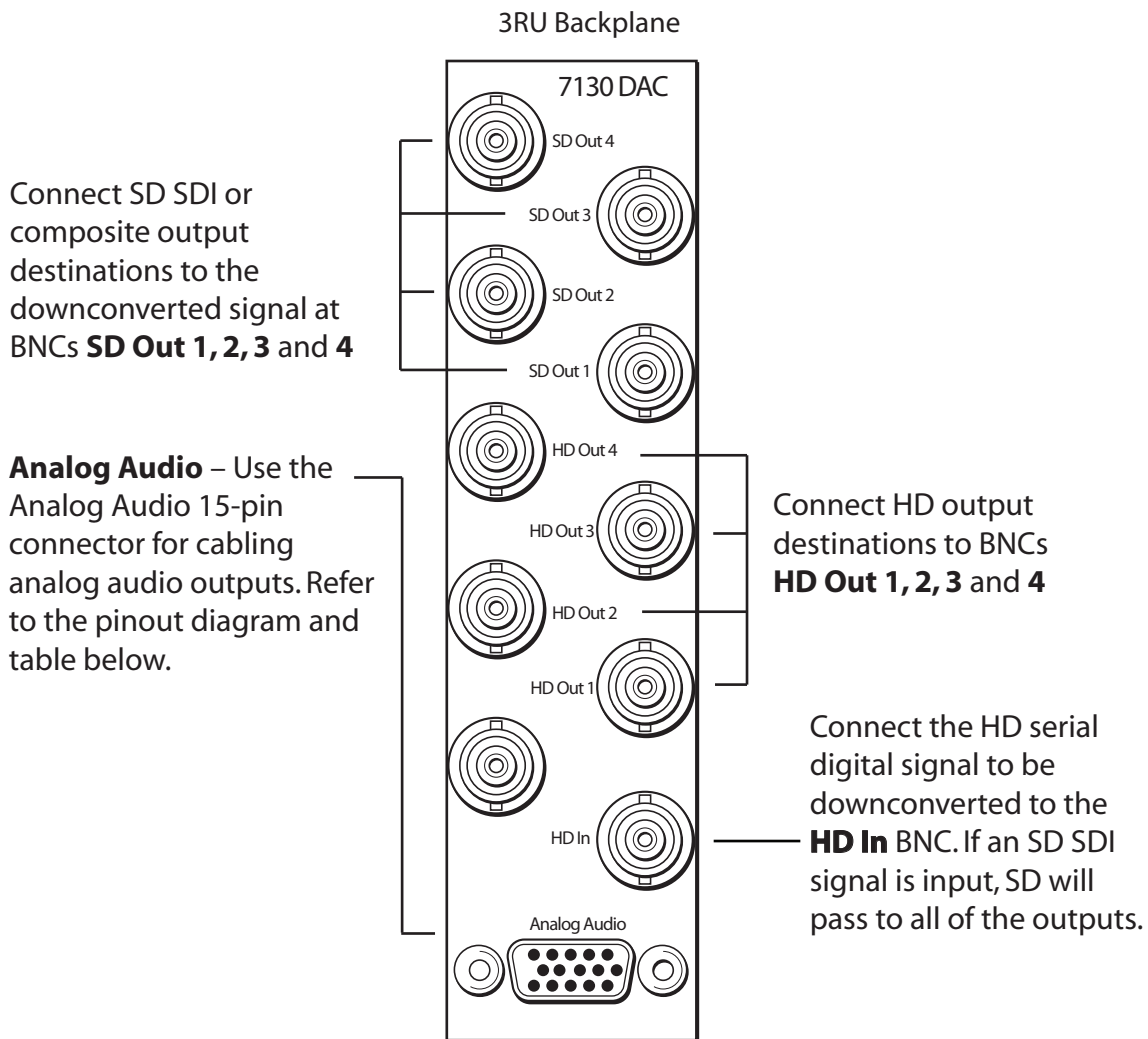
Note that the plastic overlay has an optional adhesive backing for securing it to the frame. Use of the adhesive backing is only necessary if you would like the location to be permanent and is not recommended if you need to change module locations. This module may be hot-swapped (inserted or removed) without powering down or disturbing performance of the other modules in the system.

SD SDI or Composite Out BNC Configuration

The four SD Out BNCs (SD Out 1, 2, 3 and 4) can be configured as either SD or composite outputs by setting switches on the 7130 module. Set each switch independently to the up position for SD SDI and down for composite (CPST).

CABLING

Refer to the 3RU and 1RU backplane diagrams of the module below for cabling instructions. Note that unless stated otherwise, the 1RU cabling explanations are identical to those given in the 3RU diagram.

3RU Backplane

7130 DAC

SD Out 4

SD Out 3

SD Out 2

SD Out 1

HD Out 4

HD Out 3

HD Out 2

HD Out 1

HD In

Analog Audio

Connect SD SDI or composite output destinations to the downconverted signal at BNCs **SD Out 1, 2, 3** and **4**

Analog Audio – Use the Analog Audio 15-pin connector for cabling analog audio outputs. Refer to the pinout diagram and table below.

Connect HD output destinations to BNCs **HD Out 1, 2, 3** and **4**

Connect the HD serial digital signal to be downconverted to the **HD In** BNC. If an SD SDI signal is input, SD will pass to all of the outputs.

AUD 2 **AUD 1**

+   -   -   +

1

6

11

+   -   -   +

AUD 4 **AUD 3**

Analog Audio Pinouts		
Signal	**Pins**	**Output**
Aud 1 +, -, G	1, 2, 7	Output 1
Aud 2 +, -, G	5, 4, 8	Output 2
Aud 3 +, -, G	11, 12, 9	Output 3
Aud 4 +, -, G	15, 14, 10	Output 4

1RU Backplane
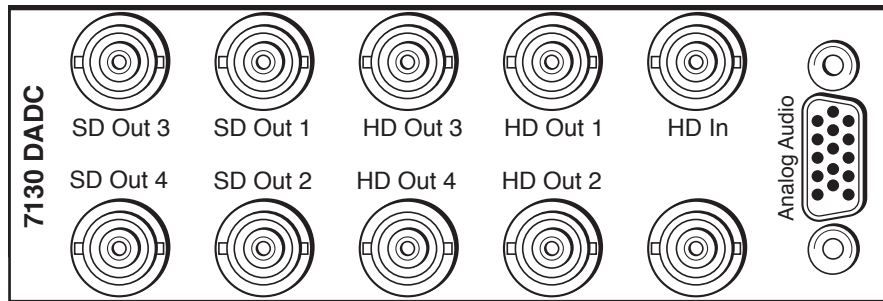
Module configuration and control

The configuration parameters for each Avenue module must be selected after installation. This can be done remotely using one of the Avenue remote control options or locally using the module front panel controls. Each module has a Remote/Local switch on the front edge of the circuit board which must first be set to the desired control mode. The configuration parameter choices for the module will differ between Remote and Local modes. In Remote mode, the choices are made through software and allow more selections.

If you are not using a remote control option, the module parameters must be configured from the front panel switches. Parameters that have no front panel control will be set to a default value. The Local switches are illustrated in the Front Panel Controls and Indicators section. The Local switches are inactive when the Remote/Local switch is in the Remote position.

In the Remote mode, Avenue module parameters can be configured and controlled from one of the remote control options, the Avenue Touch Screen, Avenue Express Control Panel, or the Avenue PC Application. Once the module parameters have been set remotely, the information is stored on the module CPU. This allows the module to be moved to a different slot in the frame at your discretion without losing the stored information.

For setting the parameters remotely using the Avenue PC option, refer to the Avenue PC Remote Configuration section of this document.
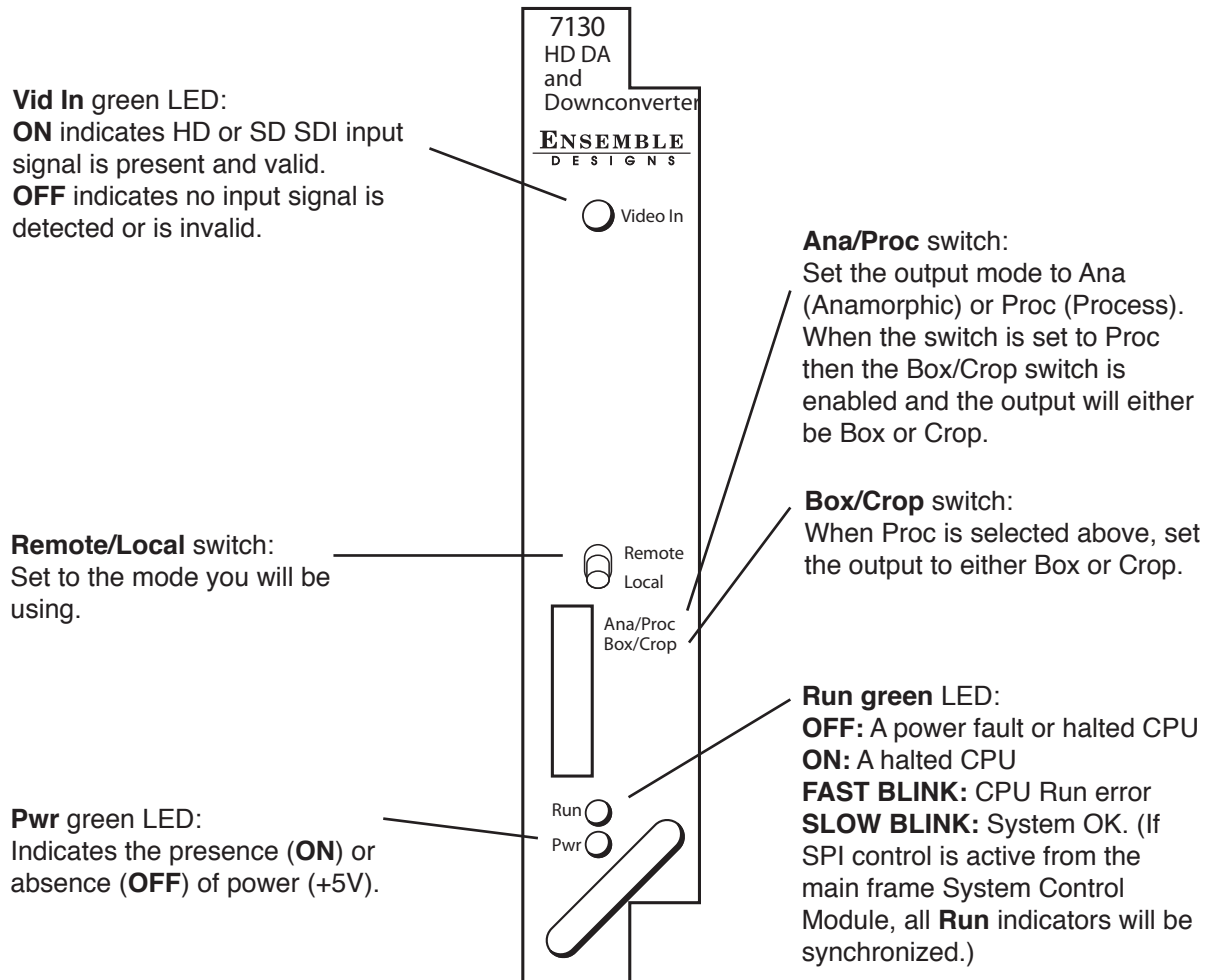
For setting the parameters remotely using the Avenue Touch Screen option, refer to the Avenue Touch Screen Remote Configuration section of this document following Avenue PC.

Express Panel operation is described in the data pack that accompanies the control panel option.

Front Panel Controls and Indicators

The front edge indicators and switch settings are shown in the diagram below:

Vid In green LED:
ON indicates HD or SD SDI input signal is present and valid.
OFF indicates no input signal is detected or is invalid.

Ana/Proc switch:
Set the output mode to Ana (Anamorphic) or Proc (Process). When the switch is set to Proc then the Box/Crop switch is enabled and the output will either be Box or Crop.

Box/Crop switch:
When Proc is selected above, set the output to either Box or Crop.

Remote/Local switch:
Set to the mode you will be using.

Run green LED:
OFF: A power fault or halted CPU
ON: A halted CPU
FAST BLINK: CPU Run error
SLOW BLINK: System OK. (If SPI control is active from the main frame System Control Module, all **Run** indicators will be synchronized.)

Pwr green LED:
Indicates the presence (**ON**) or absence (**OFF**) of power (+5V).

7130
HD DA and Downconverter

ENSEMBLE
DESIGNS

Video In

Remote
Local

Ana/Proc
Box/Crop

Run
Pwr

Avenue PC Remote Configuration

The Avenue PC remote control menus for this module are illustrated and explained below. The Configuration Summary gives tips and general background information on setting the parameters. For more information on using Avenue PC, refer to the Avenue PC Control Application Software data pack.
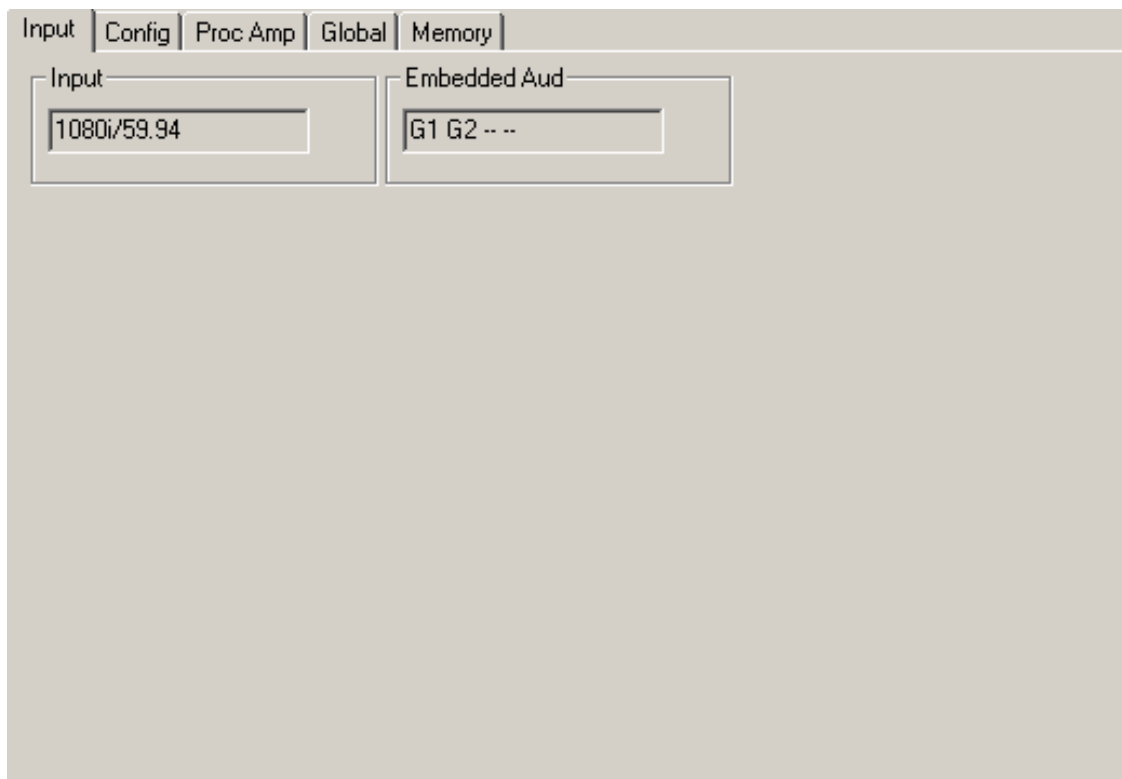
Parameter fields that are grayed out can indicate one of the following conditions:

- An option is not installed.

- The function is not active.

- The module is locked.

- The User Level set with Avenue PC is not accessible from the current User Level.

Avenue PC Menus

The **Input** menu shown below allows you to configure the following:

- **Input** – reports the HD input format detected by the module.

- **Embedded Aud** – reports which of the four groups are present in the embedded audio on the video input.

The **Config** menu shown below allows you to configure the following:
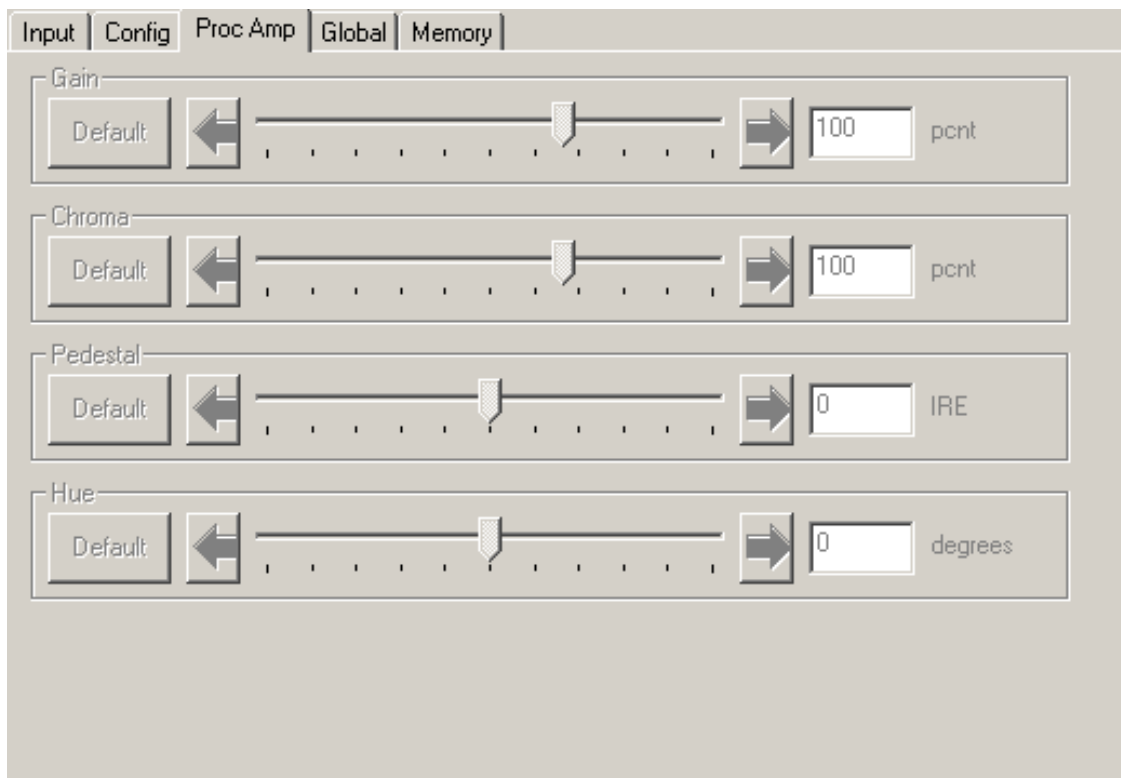
- **Mode** – use this control to set the aspect ratio for the downconverted SD video output. Choose between Anamorphic, Letterbox 16:9, Letterbox 14:9, Letterbox 13:9, or Center Cut.

- **Detail** – adjust the amount of picture detail enhancement on the output from Low, Medium, or High.

- **Cpst Out Setup** – turn setup on the output on or off.

- **Test Pattern** – select a test pattern to be sent to the video output of the module. Choose Bars, Black or Off.

- **Captions Out** – use this control to determine if closed captions are passed through to the output. Choose On or Off.

- **Output Embed** – use this control to determine if audio in embedded into the video output stream. Choose On or Off.

- **Anlg Audio Out 1/2** – use this control to select which channel pair to be routed to the analog output on the module's D connector.

- **Anlg Audio Out 3/4** – use this control to select which other channel pair to be routed to the analog output on the module's D connector.
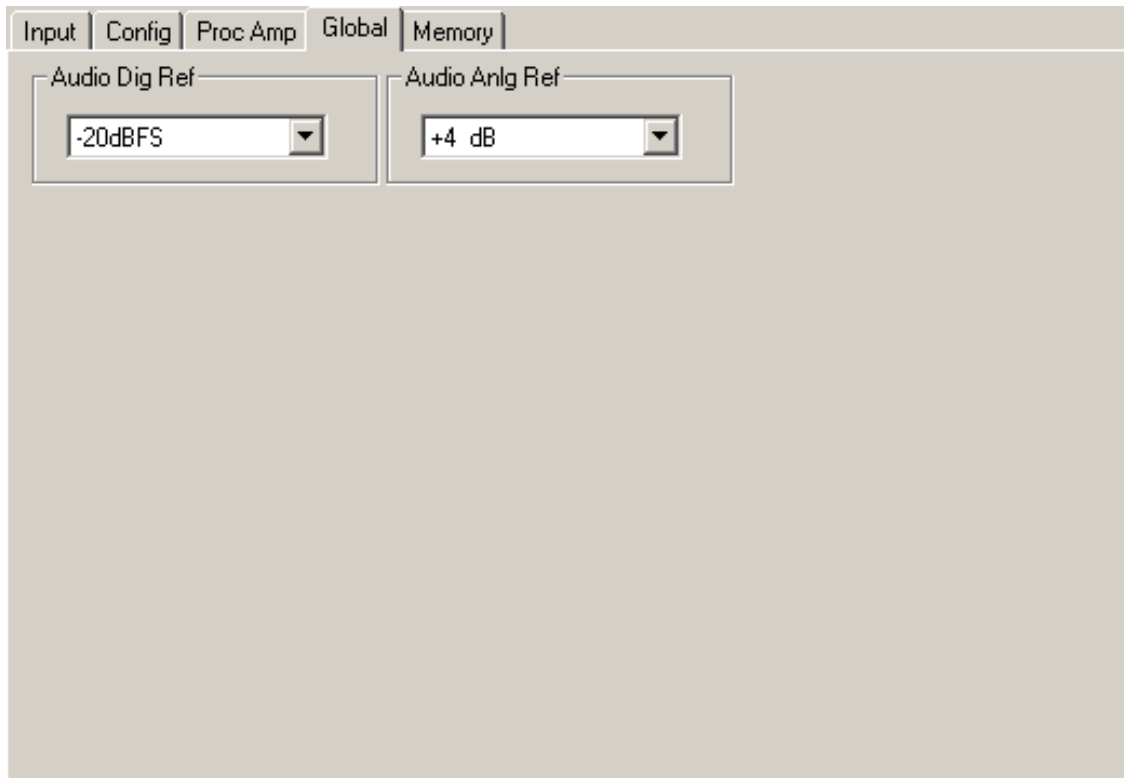
The **Proc Amp** menu shown below allows you to adjust the following video processing parameters for the signal:

- **Gain** – adjust the percentage of overall gain (luminance and chrominance).

- **Chroma** – adjust the percentage of chroma amplitude.

- **Pedestal** – adjust the pedestal (black) level of the signal in IRE.
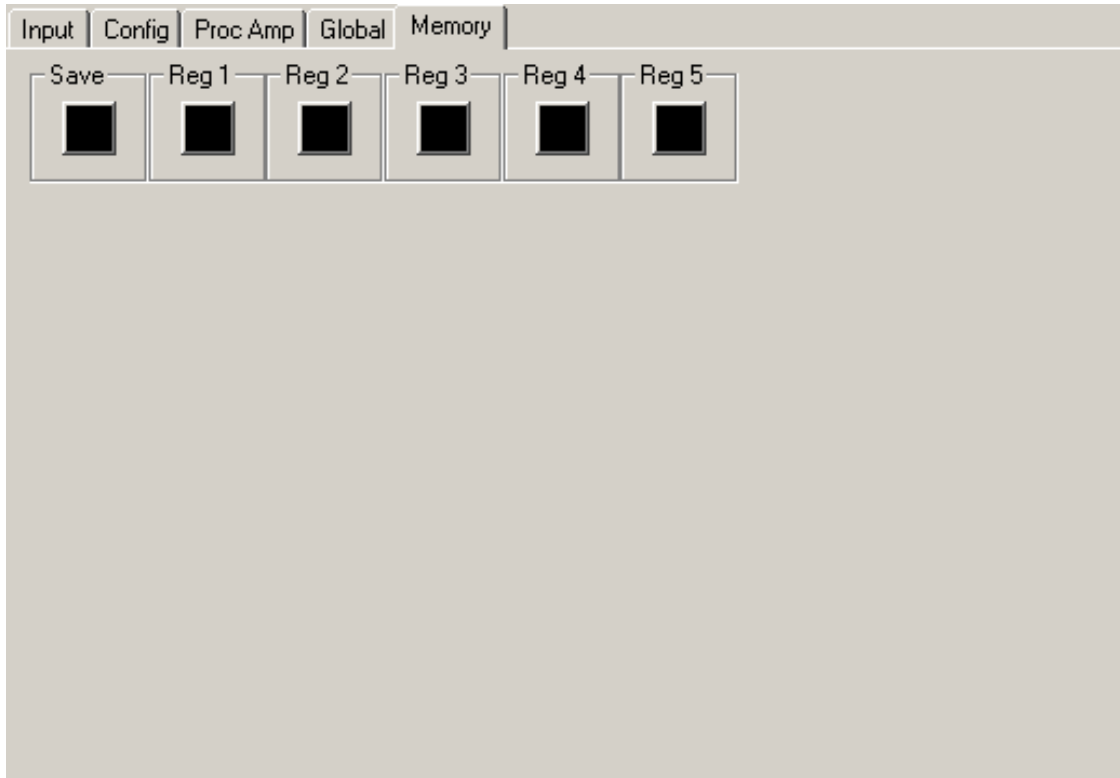
- **Hue** – adjust the hue of the signal ± 180 degrees.

Use the **Global** menu shown below to adjust the following parameters:

- **Audio Dig Ref** – set the digital reference level for the audio output. Select between -20 or -18 dBFS.

- **Audio Anlg Ref** – set the analog audio reference level for the audio output. Select between +4, 0, -4, -6, or -10 dB.

The **Memory** menu shown below allows you to save overall module setups to five memory registers as follows:

- Select **Save**, then one of the five memory registers Reg 1 – 5. The box will turn green. The entire module setup is now saved in the selected register.

- To recall a register, select the **register box**. If there is information saved, the box will turn green. The saved setup will now be loaded to the module. Up to five different module setups can be saved and recalled using the individual registers.

Avenue Touch Screen Remote Configuration

The Avenue Touch Screen remote control menus for this module are illustrated and explained below. The Configuration Summary gives tips and general background information on setting the parameters. For more information on using Avenue PC, refer to the Avenue PC Control Application Software data pack.
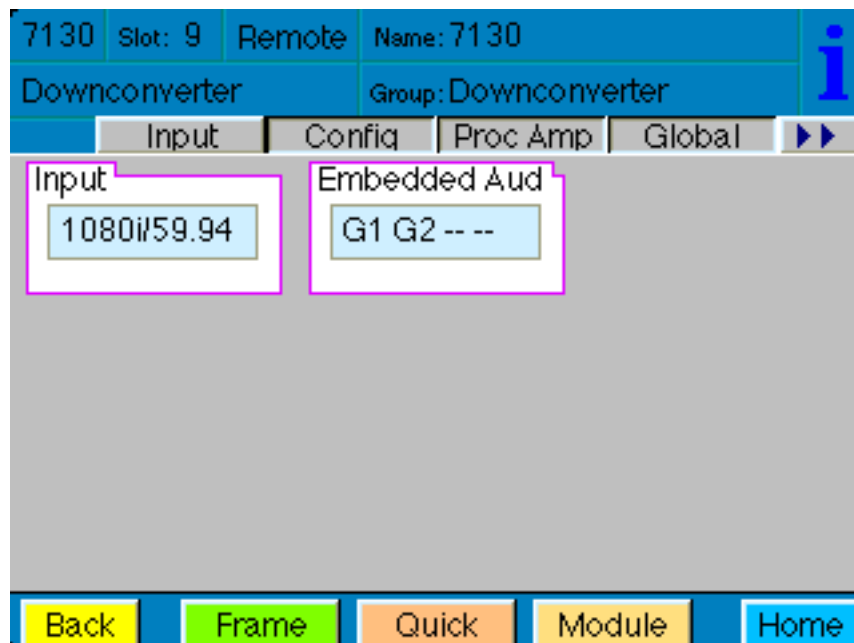
Parameter fields that are grayed out can indicate one of the following conditions:

- An option is not installed.

- The function is not active.

- The module is locked.

- The User Level set with Avenue PC is not accessible from the current User Level.
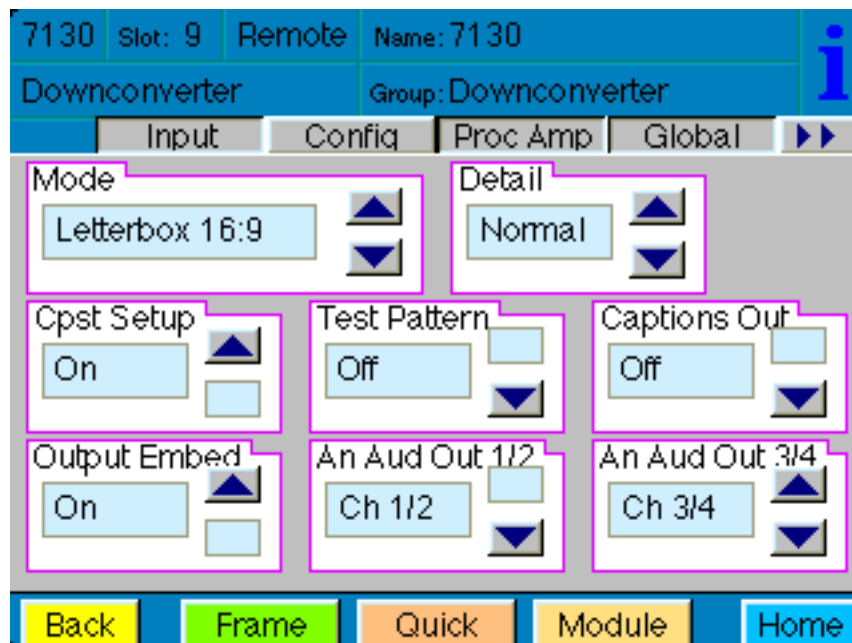
Avenue Touch Screen Menus

The **Input** menu shown below allows you to configure the following:

- **Input** – reports the HD input format detected by the module.

- **Embedded Aud** – reports which of the four groups are present in the embedded audio on the video input.

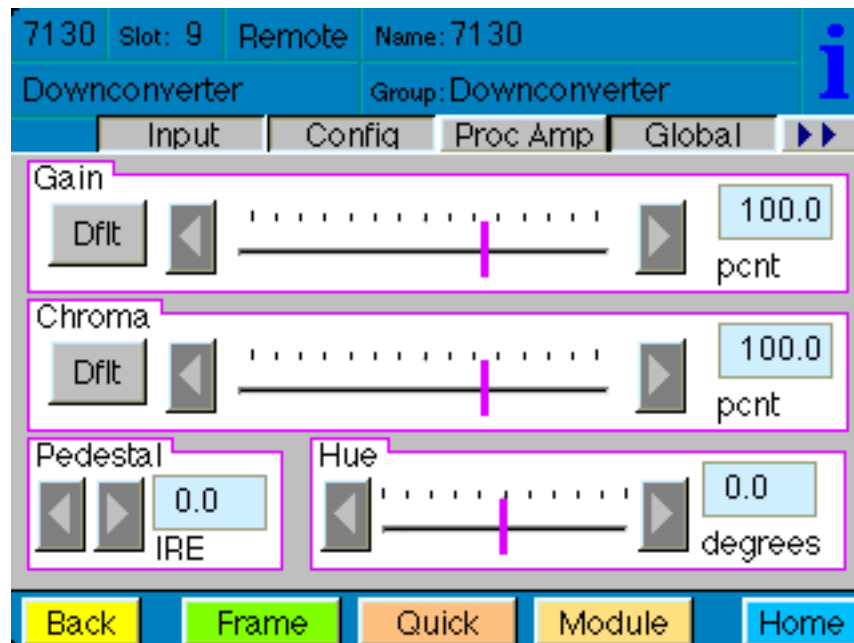The **Config** menu shown below allows you to configure the following:

- **Mode** – use this control to set the aspect ratio for the downconverted SD video output. Choose between Anamorphic, Letterbox 16:9, Letterbox 14:9, Letterbox 13:9, or Center Cut.

- **Detail** – adjust the amount of picture detail enhancement on the output from Low, Medium, or High.

- **Cpst Out Setup** – turn setup on the output on or off.

- **Test Pattern** – select a test pattern to be sent to the video output of the module. Choose Bars, Black or Off.

- **Captions Out** – use this control to determine if closed captions are passed through to the output. Choose On or Off.

- **Output Embed** – use this control to determine if audio in embedded into the video output stream. Choose On or Off.

- **Anlg Audio Out 1/2** – use this control to select which channel pair to be routed to the analog output on the module's D connector.

- **Anlg Audio Out 3/4** – use this control to select which other channel pair to be routed to the analog output on the module's D connector.
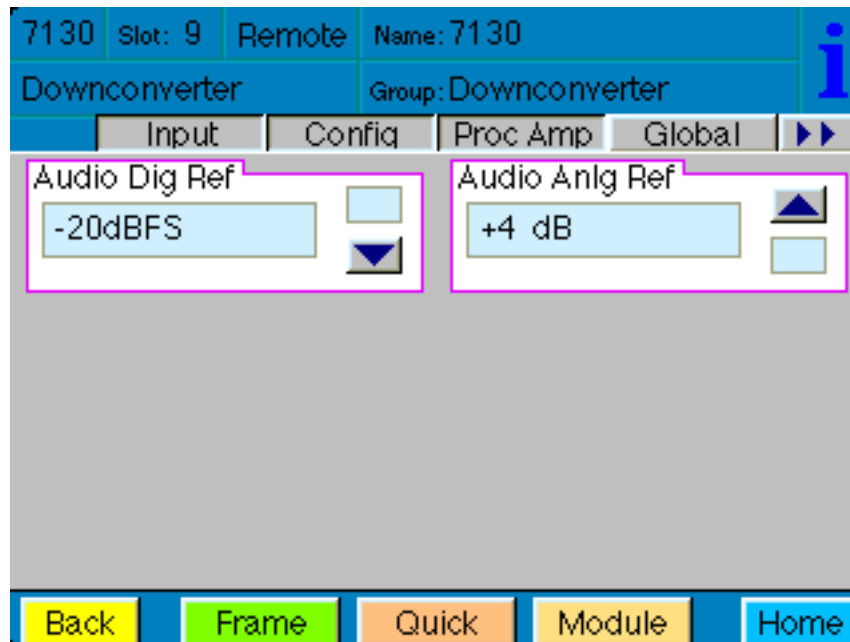
The **Proc Amp** menu shown below allows you to adjust the following video processing parameters for the signal:

- **Gain** – adjust the percentage of overall gain (luminance and chrominance).

- **Chroma** – adjust the percentage of chroma amplitude.

- **Pedestal** – adjust the pedestal (black) level of the signal in IRE.

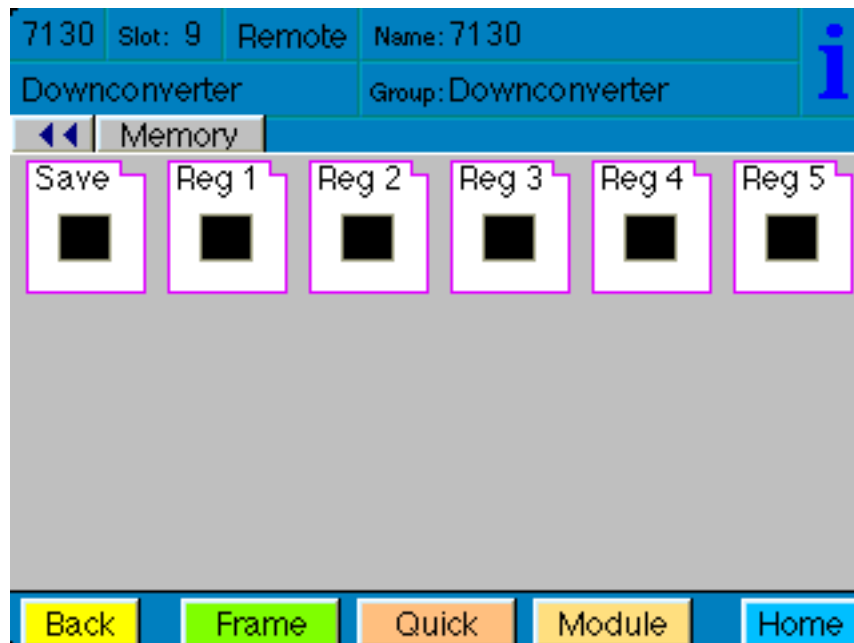- **Hue** – adjust the hue of the signal ± 180 degrees.

Use the **Global** menu shown below to adjust the following parameters:

- **Audio Dig Ref** – set the digital reference level for the audio output. Select between -20 or -18 dBFS.

- **Audio Anlg Ref** – set the analog audio reference level for the audio output. Select between +4, 0, -4, -6, or -10 dB.

The **Memory** menu shown below allows you to save overall module setups to five memory registers as follows:

- Select **Save**, then one of the five memory registers Reg 1 – 5. The box will turn green. The entire module setup is now saved in the selected register.

- To recall a register, select the **register box**. If there is information saved, the box will turn green. The saved setup will now be loaded to the module. Up to five different module setups can be saved and recalled using the individual registers.

TROUBLESHOOTING

As a troubleshooting aid, the signal presence, power and CPU status can be easily monitored from the front panel of this module using the indicators explained in the Front Panel Switches and Indicators section.

The following status items can be monitored using the Avenue Touch Screen Control Panel, Express Panel, or PC Application:

- Input Status

- Slot ID, Software Version and Board Revision

Refer to the overall troubleshooting tips given below for the module:

No status lights are lit on front panel:

- Check that frame power is present (green LEDs on frame power supplies).

- Check that module is firmly seated in frame. Try removing it and plugging it in again.

Can't control module:

- Check status of CPU Run green LED. Should be blinking slowly and in unison with other modules if System module is present. If not, try removing it and plugging it in again.

- System module may not be working properly if installed.

No video or audio signal out of module:

- Check status of In green LEDs. If not lit, check the input signal for presence and quality.

- Check cabling to input of module.

You may also refer to the technical support section of the Ensemble web site for the latest information on your equipment at the URL below:

http://www.ensembledesigns.com/support

SOFTWARE UPDATING

Software upgrades for each module can be downloaded remotely if the optional System Control module is installed. These can be downloaded onto your PC and then Avenue PC will distribute the update to the individual module. (Refer to the Avenue PC documentation for more information.) Periodically updates will be posted on our web site. If you do not have the required System Control Module and Avenue PC, modules can be sent back to the factory for software upgrades.

WARRANTY AND FACTORY SERVICE

Warranty

This Module is covered by a five year limited warranty, as stated in the main Preface of this manual. If you require service (under warranty or not), please contact Ensemble Designs and ask for customer service before you return the unit. This will allow the service technician to provide any other suggestions for identifying the problem and recommend possible solutions.

Factory Service

If you return equipment for repair, please get a Return Material Authorization Number (RMA) from the factory first.

Ship the product and a written description of the problem to:

Ensemble Designs, Inc.
Attention: Customer Service RMA #####
870 Gold Flat Rd.
Nevada City, CA. 95959 USA

(530) 478-1830

Fax: (530) 478-1832

service@ensembledesigns.com

http://www.ensembledesigns.com

Be sure to put your RMA number on the outside of the box.

SPECIFICATIONS

Serial Digital Input

Number	One
Signal Type	HD Serial Digital 1.485 Gb/s
	SMPTE 274M, 292M or 296M, or
	SD Serial Digital 270 Mb/s
	SMPTE 259M
	(Both 525 and 625 SD standards)
Impedance	75 Ω, BNC
Return Loss	>15 dB
Max Cable Length	
270 Mb/s	300 meters Belden 1694A
1.485 Gb/s	100 meters Belden 1694A

Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94
720p (SMPTE 296M -1,2,3) 50, 59.94
525i 59.94, 625i 50

Conversion Directions

Downconversion from
    1080i/59.94 or 720p/59.94 to 525 (NTSC), and
    1080i/50 or 720p/50 to 625 (PAL)

Serial Digital DA Outputs (unprocessed)

Number	Four
Signal Type	HD or SD, follows input
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)
Delay None	

SD Serial Digital Outputs (processed)

Number	Four max
	Zero to four, jumper selectable
	BNCs shared with composite
	outputs
Signal Type	SD Serial Digital 270 Mb/s
	SMPTE 259M
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)
Delay	<10 lines when downconverted from HD

Analog Video Output

Number	Four max
	Zero to four, jumper selectable
	BNCs shared with
	SD SDI outputs
Signal Type	PAL or NTSC Composite
Impedance	75 Ω
Return Loss	>40 dB
Output DC	<50 mV
Resolution	12+ bit processing
Signal to Noise	>65 dB
Frequency Response	±0.1 dB, 0 to 5.5 MHz
K Factor	<1%
ScH Phase error	<±2 degrees
Differential Phase	<1 degree
Differential Gain	<1%
Delay	<10 lines when downconverted from HD

Analog Audio Output

Number	Four (selectable from sixteen)
Signal Type	Balanced, transformerless
Impedance	30 Ω
Maximum Output Level	24 dBu
Resolution	24 bits, 128x Oversampled
Reference Level	-10 dBu to +4 dBu
Frequency Response	±0.1 dB, 20 Hz to 20 kHz
Crosstalk	<102 dB
Dynamic Range	>106 dB

Embedded Output

Support for all four groups (16 channels) from input to output

General Specifications

Power Consumption	10 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft