

AVENUE™

Signal Processing and Infrastructure Gear for Broadcast

Product Catalog 2009



New!
3Gb/s

Purveyors of Fine Video Gear - Loved by Engineers Worldwide

ENSEMBLE
DESIGNS

Who is Ensemble Designs?

By Engineers, For Engineers

In 1989, a former television station engineer who loved designing and building video equipment, decided to start a new company. He relished the idea of taking an existing group of equipment and adding a few special pieces in order to create an even more elegant ensemble. So, he designed and built his first product and the company was born.

Focused On What You Need

As the company has grown, more former TV station engineers have joined Ensemble Designs and this wealth of practical experience fuels the company's innovation. Everyone at the company is focused on providing the very equipment you need to complete your ensemble of video and audio gear. We offer those special pieces that tie everything together so that when combined, the whole ensemble is exactly what you need.

Notably Great Service for You

We listen to you – just tell us what you need and we'll do our best to build it. We are completely focused on you and the equipment you need. Being privately held means we don't have to worry about a big board of directors or anything else that might take attention away from real business. And, you can be sure that when you call a real person will answer the phone. We love this business and we're here to stay.

Bricks and Mortar of Your Facility

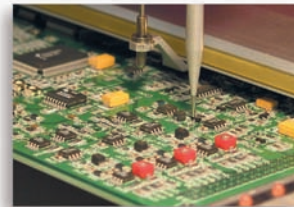
The bricks and mortar of a facility include pieces like up/downconverters, audio embedders, video converters, protection switches and SPGs for SD, HD and 3Gb/s. That's what we're focused on, that's all we do – we make proven and reliable signal processing and infrastructure gear for broadcasters worldwide, for you.



Avenue frames handle 270 Mb/s, 1.5 Gb/s and 3 Gb/s signals



We're focused on processing and gear— 3G/HD/SD/ASI video, audio and optical modules.



Everything is made at our factory in Nevada City, California.



Shipped with care to television broadcasters and video facilities all over the world.



And consider our BrightEye product line for palm sized video and audio conversion.



Come on by and visit us. Drop in for lunch and a tour!

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Video and Audio Infrastructure

Avenue is a tray-based signal integration system housed in a 3RU or 1RU frame. Avenue allows you to populate any combination of 1.5 Gb/s HD, 3 Gb/s HD, SD, MPEG, analog video and audio processing modules in the same frame. It includes up/down conversion, embedding, synchronization, conversion, routing, noise reduction, protection switches, test signal generators and more. All modules are hot swappable and because of the universal backplane no special rear connectors are needed. The Avenue system is perfect for broadcast, mobile, satellite, cable, worship and post applications.

For facilities using both fiber and coaxial, Avenue provides a complete and simple solution. The Avenue Intersection frame is just 1RU and holds 10 optical modules. It can be used independently or tied to an Avenue 3RU frame.

Built-in networking lets you tie your Avenue system together, streamlining control and monitoring. All frames and modules in the system can be accessed from multiple locations in a facility, including remote locations via the Internet. Comprehensive management and control is achieved by using any combination of Avenue Control Panels and/or Avenue PC software. Front edge or local controls are also available for each module.

Frame Control

Modules can be configured locally or controlled and configured remotely with the optional Avenue Control Panels or the Avenue PC Control Application Software. Both remote control options require a System Control module in each remotely controlled frame.

Local Frame Operation

Each Avenue frame can operate in stand-alone mode. Settings can be configured locally from the front edge controls of the modules. Parameters that have no local control will default to a standard setting. Modules used in local mode do not need a System Control module installed in the frame but will be unable to communicate with other Avenue frames. The Remote/Local switch must be set to Local on each module for the on-board settings to be enabled.

Remote Frame Operation

Modules can be controlled and configured remotely using some or all of the optional remote control options: Avenue Touch Screens, Express Panel, Avenue PC Control Application Software and SNMP. Any number of frames may be linked together and controlled by a single control panel or a PC running the Avenue software. The number of control points is expandable to suit the needs of the facility. Our protocol is also available for interfacing to automation and other third-party control systems.

Once module parameters are set remotely, the information is stored on the module so it may be moved to a different cell or frame without losing configuration. It does not require a System Control module for operation after configuration. A System Control module must be installed in each frame to be part of the network and the Remote/Local switch on each module must be set to Remote to change settings on a module. PC control is available through a serial or Ethernet connection.

Features

- » Control and monitor all modules in the system from one or many locations—locally or worldwide
- » Easily adjust video levels, timing, audio delay, and other parameters
- » Customize module menus
- » Alarm generation and log
- » Download new module software—free for the life of the product!
- » User Levels for security
- » Module lockout for critical paths
- » Use any combination of Control Panels and PCs for control and monitoring
- » Avenue's user friendly protocol is available for interfacing to automation and other third-party control systems
- » SNMP Monitoring and Control

System Control Modules: 5030/5035

When a System Control module is installed in each Avenue frame in the system, all frames can be connected together on a network. Frames can be daisy-chained together with AveNet (our proprietary Local Area Network communication), using simple twisted pair cable. Ethernet can be used instead of, or in conjunction with, AveNet.

Any combination of 3RU frames, 1RU frames, Intersection frames and Touch Screens can be used together on the network. The optional 5030 (3RU Frame) or 5035 (1RU Frame) System Control module provides the Serial, Ethernet and AveNet interface connections to an Avenue frame. The module is required for remotely controlling and configuring the frame modules from the Avenue remote control options which include the Touch Screen panels, Express Panel, and the Avenue PC Control Application Software. In addition, the System Control module provides the genlock reference input for the frame and distributes a master timing reference to all modules throughout the frame. The module is required for making adjustments on synchronizer module options when they are installed. A Status menu on the front of the module provides Ethernet, Serial and Reference communication indicators. Status menu functions also allow viewing of the current software version, viewing and setting of AveNet and IP Addresses and a Touch Screen reset function.

The 5030 System Control module installs in a dedicated cell to the right of the ten video and audio modules in a 3RU frame. It connects to the front door via a ribbon cable for controlling the Touch Screen Door, if installed. It interfaces to the frame backplane for controlling the serial communications port, the AveNet LAN connection between frames and the 10BaseT Ethernet TCP/IP connection. The 5035 System Control module installs in a dedicated cell to the right of the three video and audio modules in a 1RU frame. It interfaces to the frame backplane for controlling the serial communications port, the AveNet LAN connection between other frames and the 10BaseT Ethernet TCP/IP connection.

The Intersection frame includes a 5070 System Control Module that is installed in a dedicated cell in the intersection frame. The 5070 interfaces to the frame backplane for controlling the serial communications port, the AveNet LAN connection between other frames and the 10BaseT Ethernet TCP/IP connection.

Avenue Touch Screens

The Avenue Touch Screen options include a stand-alone Tabletop Touch Screen Control Panel and a Touch Screen installed in the front door of the 3RU frame. The Touch Screen menus provide the means to configure and monitor module and system parameters. All remote control features can be controlled by a Touch Screen. Each frame or one frame in a group of frames can have an integrated Touch Screen Door or Tabletop Control Panel to control any of the frames on the AveNet bus. This versatility can be useful when control of frames installed in different rooms is desired.

Avenue Express Panel

The Express Panel is a 1RU control panel for configuring and monitoring module and system parameters. It can be used instead of or in conjunction with Avenue Touch Screens and Avenue PC. It is particularly well suited for ingest and remote applications as it has dedicated knobs for proc adjustments.

Avenue PC Software

Using Avenue PC Software, modules can be controlled and configured remotely. Any number of frames may be linked together and controlled by a PC running the Avenue software, even from remote locations via the Internet. The number of control points is expandable to suit the needs of the facility. Our protocol is also available for interfacing to automation and other third-party control systems.

Virtual Modules

You can create custom menus for Avenue PC and Touch Screens that combine functionality from any modules in the system. A custom menu could include controls from several different modules, such as an embedder module, a video converter module and an audio delay module. Alternately, a custom menu could include a subset of controls from one module. You can design module menus and parameters to suit your needs. Custom menus are authored using Avenue PC and downloaded to any control point on the network.

Alarms, User Levels and Software Updates

Alarms can be created using Avenue PC. The Alarm menu offers choices specific to the module or frame you want to monitor. For example, you can set an alarm for loss of reference to a particular module or for power failure in a particular frame. If an alarm occurs, you can choose to have a log entry generated, an alarm sound on your PC, an email sent out, or even a page sent. Email and pager choices require using the modem on your PC.

Touch Screens, the Express Panel, and Avenue PC have four user levels: Admin, Level1, Level2, and View Only. User levels can be protected by a four-digit pass code allowing level access to be assigned to different functional groups within your facility. Some groups may need more expert level access to certain parameters while others require read-only access. Critical modules can also be locked out entirely or set so only a single control point has access.

Free Software Updates

Software updates for modules are posted on the Ensemble Designs web site and are available to customers at no charge. After downloading the software, Avenue PC is used to upload the new software into a module. The latest version is always available to you.

Ethernet Topology and PC Control Using AVIP

Large facilities with equipment installed in different locations or involving significant distances can use ethernet as a communication medium. Groups of frames on independent AveNet networks can be linked through Ethernet using a feature called AveNet Over IP (AVIP). AVIP will coexist with other network traffic allowing you to utilize existing ethernet networks.

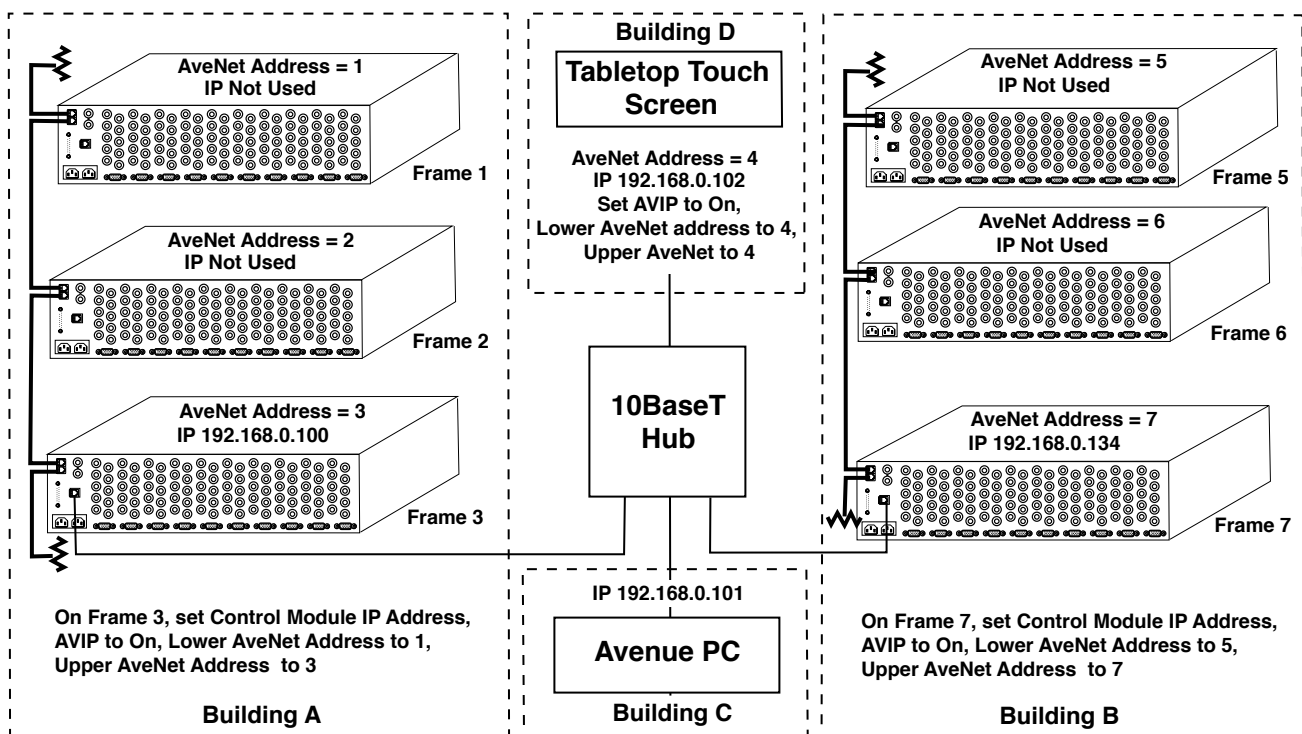
The ethernet topology used to interconnect the frame groups can be a star configuration using a hub. A PC running Avenue PC Application software or an SNMP manager can be connected to the hub to communicate with any of the Avenue devices. Alternately, when only two groups of frames need to be connected, an ethernet crossover (or reversing) cable can be used. Other Avenue control devices can be connected to the AveNet bus, such as a Tabletop Control Panel or a Touch Screen Front Door in a frame.

In each local AveNet network, a single frame is chosen to act as the AVIP connection point. The AVIP feature is enabled on the Control module installed in this frame using the module's local configuration controls or through a Touch Screen option if installed. This Control module is configured with a unique IP Address before being connected to the ethernet network. The lower and upper AveNet addresses are identified in the Control module configuration to define the range of frames in the independent network. This Control module will automatically identify other AVIP-enabled Control modules on the network. Messages originating in one group will be forwarded over ethernet to their destinations in another group.

SNMP

An SNMP manager, such as Statmon's Axxess, can be used to monitor and control Avenue modules. The Avenue MIB provides detailed information about how the manager can interface with the modules. An SNMP client is built into the Avenue system Control module.

Typical Avenue System Using AVIP Over Ethernet for Control



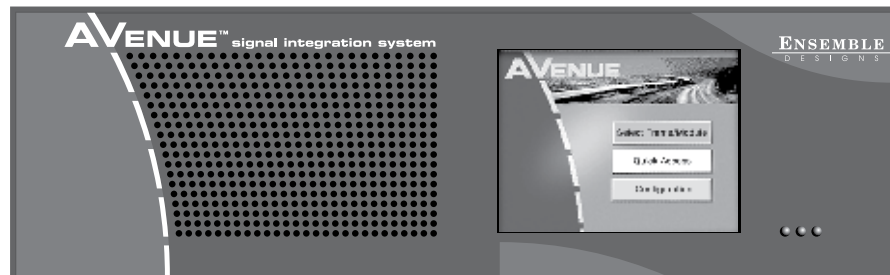
3RU Frame

The 3RU frame is a full-featured chassis that accommodates any ten Avenue modules. Modules plug into a universal motherboard so that rear modules are not needed. In addition to the ten module slots, there is a dedicated slot for the optional 5030 System Control module. One universal power supply comes with each frame. Redundant supply is optional and does not take up a slot in the frame. Touch Screen front door or plain front door are available. Plastic overlays for each module type are provided and slip over the corresponding BNCs on the backplane to identify the input and output designations on each type of module. In addition to the ten audio and video modules, the optional 5030 System Control Module adds a variety of control capabilities. Please refer to System Control Overview for more information.

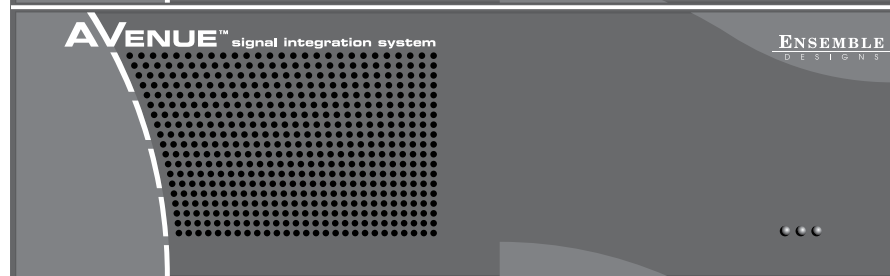
Features

- » Use with 3 Gb/s, HD, SD, MPEG and Audio modules
- » Universal backplane
- » Optional System Control module provides AveNet, ethernet and serial interface
- » Network all frames together for streamlined control
- » Mix ethernet and AveNet for simplified network topology
- » SNMP monitoring and control

Avenue 3RU Frame with Touch Screen



Avenue 3RU Frame with plain door



5020 Power Supply

Each Avenue 3RU frame comes with one 5020 Power Supply module installed. An optional redundant power supply is available if desired to provide backup. Power is provided to all modules in the frame, the front door fan and optional Touch Screen Panel.

Frame Specifications

The Avenue 3RU (5.25 inches) frame fits in a standard 19-inch rack. Any number of frames may be stacked together in any combination.

A fan in the front door of each 3RU frame provides the necessary cooling for the frame. The fan is temperature-sensitive and adjusts its speed accordingly. Should the fan fail, a red LED will light on the front panel. If using a remote control option, an alarm can be set to alert the user of fan failure. All critical components such as fuses, filter and fan are accessible from the front of the unit.

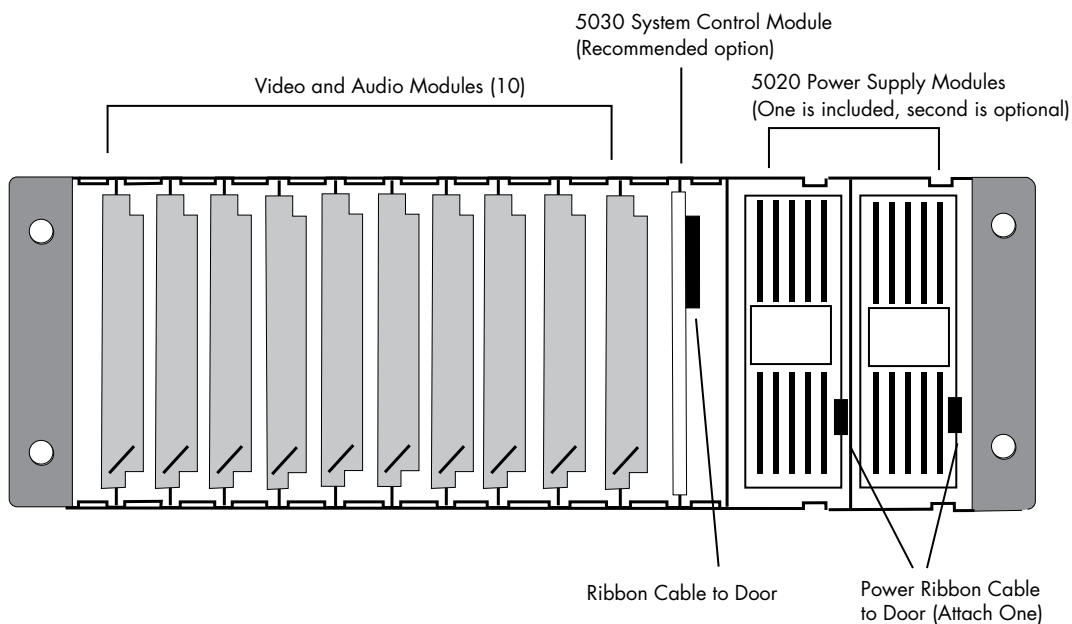
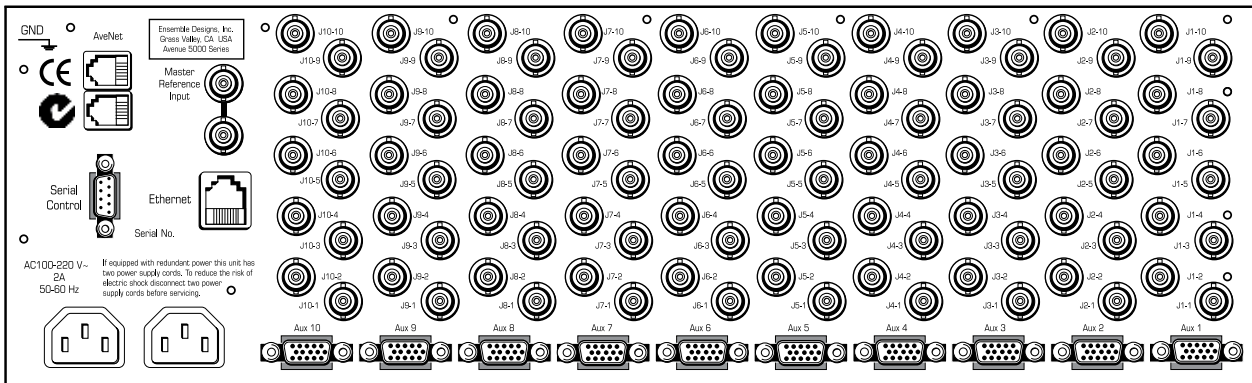
Avenue 3RU Frame Dimensions and Architecture

Frame Dimensions:	Height	Width	Depth	Weight (no modules)
3RU	5.25"/133.4 mm	19"/482.6 mm	15.1"/383.6 mm	26.5 lbs/12.1 kg

Frame Part Number: 3RUFPM, Touch Screen Door Part Number: 5050, Plain Front Door Part Number: 5040

Power required: 150 watt maximum

Front door projects 0.875"/23 mm. Allow minimum additional depth of 2.5"/65 mm for cabling



1RU Frame

The 1RU Avenue frame accommodates any mix of up to three audio or video modules (except for the 5440 Router Expansion module). Modules plug into a universal motherboard; no special rear connectors are needed. In addition to the three module slots, there is a dedicated slot for the optional 5035 System Control module. A universal in-line power supply is provided with each frame.

Video and audio modules for conversion, distribution and synchronization plug into a universal frame motherboard. Plastic overlays for each module type are provided and slip over the corresponding BNCs on the backplane to identify the input and output designations on each type of module. As with the 3RU Frame, the 1RU also can add an optional System Control Module for additional features and capabilities. Please refer to System Control Overview for more information.

Features

- » Use with 3 Gb/s, HD, SD, MPEG and Audio modules
- » Universal backplane
- » Optional System Control module provides AveNet, ethernet and serial interface
- » Network all frames together for streamlined control
- » Mix ethernet and AveNet for simplified network topology
- » SNMP monitoring and control

Avenue 1RU Frame



5010 Power Supply

Each Avenue 1RU frame includes a single 5010 Power Supply module. It installs in the upper right slot of the frame. Power is provided to all modules in the frame where it is regulated to the required voltages for the module.

The Avenue 1RU frame uses an external in-line power supply. There is a single point of connection on the frame for power. For customers who want a redundant power solution, Ensemble offers an external in-line dual power supply with two line cords. This optional power supply auto-switches.

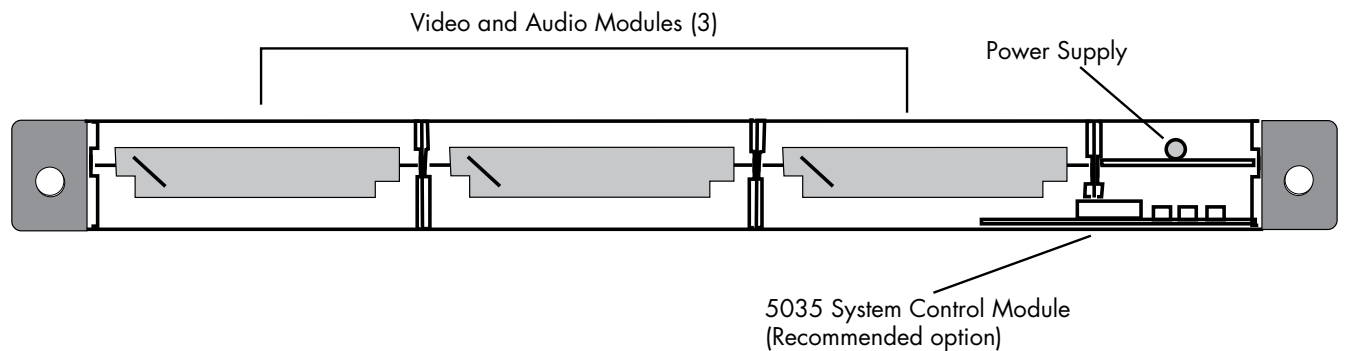
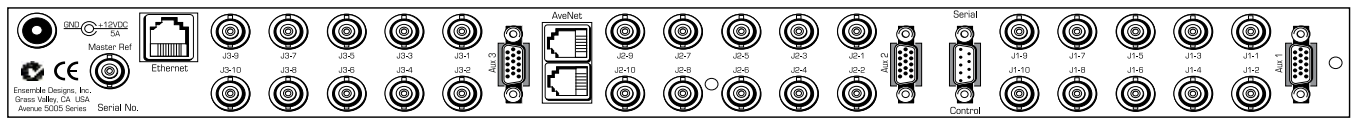
Frame Specifications

The Avenue 1RU (1.75 inches) frame fits in a standard 19-inch rack. Any number of frames may be stacked together in any combination. All critical components such as fuses, filter and fan are accessible from the front of the unit.

Avenue 1RU Frame Dimensions and Architecture

Frame Dimensions:	Height	Width	Depth	Weight (no modules)
1RU	1.75"/44.5 mm	19"/482.6 mm	13"/330 mm	11.2 lbs/5.1 kg

Part Number: 1RUFM
 Power required: 40 watt maximum



Intersection Frame

The compact 1RU Avenue Intersection Frame is high density and holds ten fiber-optic modules. This frame can be used in conjunction with the Avenue 3RU Frame or can be used as an independent optical product, depending on the application.

The front of the frame has LED status indication for power, input signal presence and laser fault. The rear of the frame has one ethernet connector and two AveNet connectors for the Avenue control interface.

The 3710 or 3750 IS electrical-to-optical module or the 3720 or 3760 IS optical-to-electrical module can be used in the Intersection frame. BNCs and SC optical connector are on the modules, not on the frame. Modules plug into the frame from the rear.

Avenue Intersection Frame



Features

- » Use with Optical/Electrical Converter modules
- » Use with 3 Gb/s, HD and SD modules
- » Optional System Control module provides AveNet and ethernet interface
- » Use independently or tie to an Avenue 3RU frame for control
- » SNMP monitoring and control
- » Complete, integrated solution for using optical and electrical signals in the same facility

Integration

The Avenue Intersection Frame can be controlled in conjunction with a matched Avenue 3RU frame or it can be controlled as an independent fiber-optic I/O unit.

The Avenue Intersection Frame includes a 5070 system control module option that enables the frame to tie into the Avenue control system, just like any other frame or control surface. The Avenue Intersection Frame appears as its "own" entity in the Avenue Control System. Control and status in the optical frame are presented to the user through the existing Avenue Control System, through Avenue PC or an Avenue Control Panel.

The Avenue Intersection Frame can also be matched to the modules in an Avenue 3RU Frame through the control system. This matching provides superior integration, allowing the customer to look at a signal path without concern for the use of both frames. For example, a signal might pass through an 8500 converter and frame sync and then through the 3710 electrical to optical converter. This signal could be viewed from one set of menus through Avenue PC or an Avenue Control Panel.

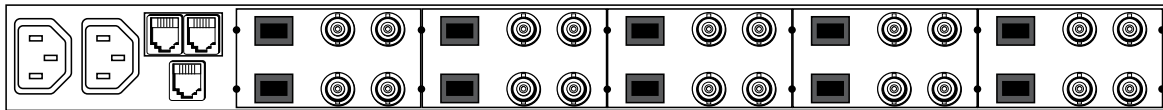
Redundant power is optional and there are two AC line connectors. Redundant power part number is 5065.

Avenue Intersection Frame Dimensions and Architecture

Frame Dimensions:	Height	Width	Depth	Weight (no modules)
1RU	1.75"/44.5 mm	19"/482.6 mm	15.1"/383.6 mm	11 lbs/5 kg

Part Number: ISFRM

Power required: 50 watt maximum



Touch Screen and Tabletop Control Panels

The Avenue Touch Screen Panels and Express Panel options offer remote control capability of any size network of Avenue frames. Any number of frames can be connected together through the AveNet interframe LAN bus to create an Avenue network. These networks can then communicate over ethernet using the AveNet Over IP feature (AVIP). The frames can be controlled by a single Control Panel or any number of Control Panels installed in the network.

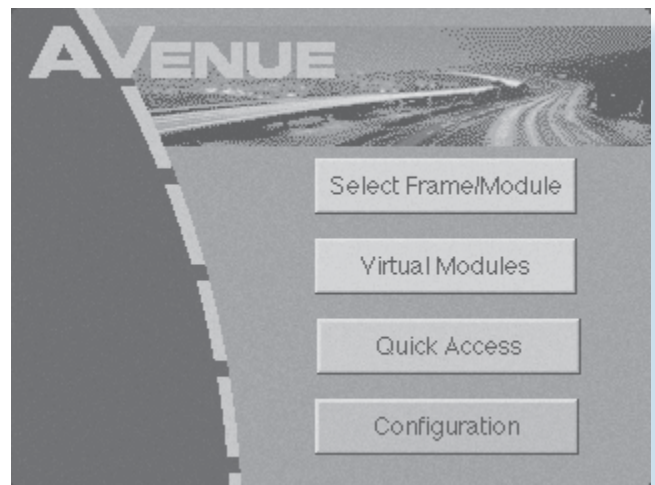
Remote control of Avenue frames is provided through a series of menus for system configuration and for setting parameters for each module installed in the frames. A series of menus allows you to set AveNet and IP addresses, enable AveNet Over IP (AVIP), name and monitor modules, frames and groups of frames and set module parameters in the system.

Features

- » Control and monitor all modules in the system from one or many locations
- » Easily adjust video levels, timing, audio delay and other parameters
- » Customize menus with Virtual Modules
- » User Levels for security
- » Module lockout for critical paths
- » Use any combination of Touch Screen Panels, Express Panels, and PCs for control and monitoring

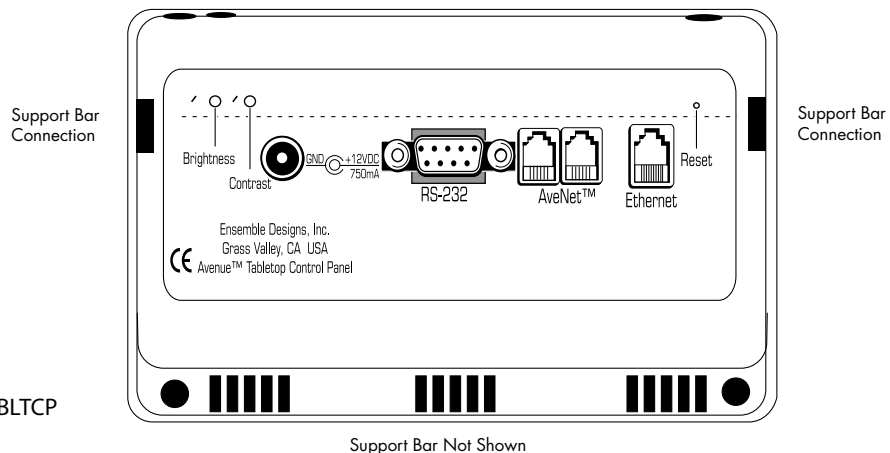
The Avenue Touch Screen Front Door option is installed in the front of the 3RU frame door. A single front door option can control an entire network or front doors can be installed in various frames for access from other rooms or locations.

The Tabletop Touch Screen Control Panel offers intuitive remote control capability with both touch screen and dedicated knobs. Couple the full proc controls in the Avenue conversion modules with the six rotary controls to create a perfect QC station for live shading and adjustments. The small size is great for satellite receiving areas, QC and edit suites. Two configurations are possible: free-standing Tabletop or mounted directly into a standard 3RU half frame of a waveform monitor.



Rear Connectors of Avenue Tabletop Control Panel

Each Tabletop Control Panel comes with a universal in-line power supply.



Part Number: TBLTCP

Support Bar Not Shown

Express Control Panel

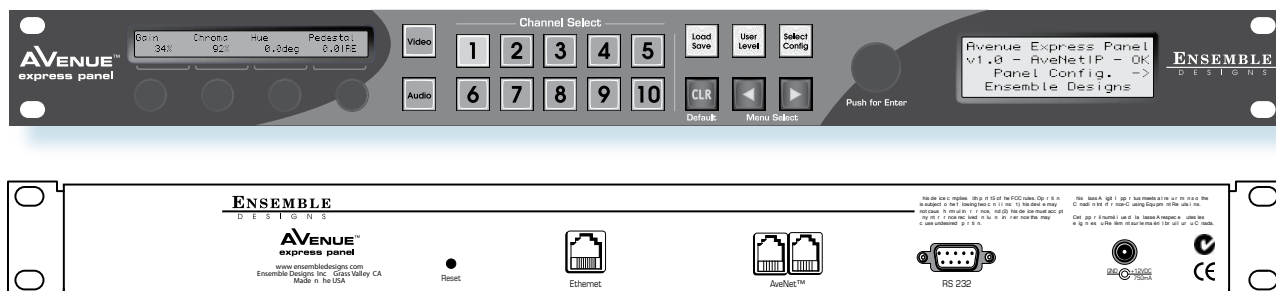
The Express Control Panel is excellent for use in satellite receiving, ingest areas and remote trucks.

While it can be used with any Avenue module, the Express Panel really shines when used with the 7500, 8400, and 8500 Video Processing Frame Sync modules and 7900 series Up/Down/Cross Converters. With dedicated video, chroma, pedestal and hue knobs, live shading is easy. The continuous rotation, velocity-sensitive knobs are responsive and dependable. Audio levels for multiple groups are easily accessed as well. All other parameters, including timing and audio delay, are accessed through an intuitive menu interface.

One Express Panel can control every module in your Avenue system. Alternately, you can have as many Express Panels and Touch Screen Control Panels as you like in your Avenue system. Customize the control system for your needs. Any number of frames can be connected together through the AveNet interframe LAN bus to create an Avenue network. These networks can then communicate over Ethernet using the AveNet Over IP feature (AVIP). The frames can be controlled by a single Control Panel or any number of Control Panels installed in the network. Remote control of Avenue frames is provided through a series of menus for system configuration and for setting parameters for each module installed in the frames. A series of menus allows you to set AveNet and IP addresses, enable AveNet Over IP (AVIP), name and monitor modules, frames and groups of frames, and set module parameters in the system.

Features

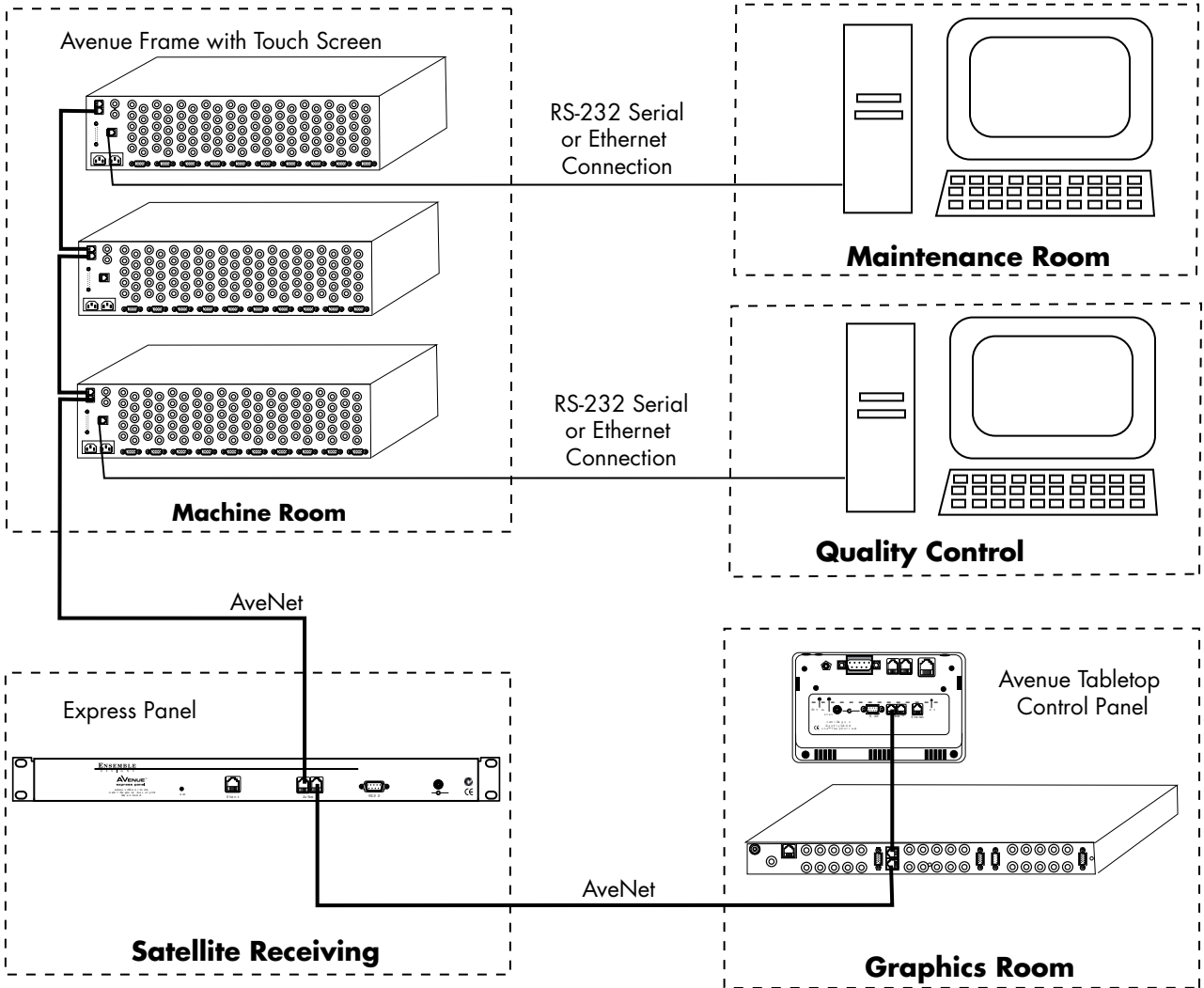
- » Elegant control for the 7500, 8400 and 8500 Video Processing Frame Sync Modules and 7900 Series Up/Down/Cross Converters
- » Dedicated knobs for video, chroma, pedestal, hue
- » Adjust audio levels for multiple groups
- » Control all parameters of all Avenue modules
- » Easily adjust video levels, timing, audio delay and other parameters
- » Intuitive user interface
- » Compact 1RU design
- » Easy to install
- » User Levels for security
- » Module lockout for critical paths
- » Use any combination of Express Panels, Touch Screens and PCs for control and monitoring



Part Number: EXPPNL

Example of an Avenue System Using Tabletop & PC Control

Any number of frames and Touch Screens, or Tabletop Control Panels can be connected via AveNet using twisted pair cable. PCs connect to any frame serially or via ethernet.



Avenue PC Control

Avenue's remote control system does what you want it to do. Along with Touch Screen and Express Panel control, you can also access and control all frames and modules in the Avenue system via Avenue PC Control Software. The Avenue PC application comes on a CD-ROM and is easy to install and configure.

The Control Application Software option is a PC-based remote control application which allows you to completely control, configure and monitor the modules in each of your Avenue frames. Avenue PC can be installed on a PC running all Windows operating systems. PC interface to the Avenue frames can be made through an RS-232 serial connection or through ethernet.

Your PC can be connected to one of the Avenue frames (1RU, 3RU, or Intersection) through a PC serial port or via ethernet on the back of the Avenue frames. Avenue PC only needs to connect to a single frame in an Avenue System. Regardless of the network topology, Avenue PC will have visibility and control over all of the modules.

Features

- » Control and monitor all modules in the system from one or many locations
- » Easily adjust video levels, timing, audio delay and other parameters
- » Store module configurations to another module of the same type
- » Set user-defined alarms to alert you at any time when a fault condition has occurred and to maintain logs. Set email and pager alerts.
- » Download new module software – free for the life of the product!
- » Define access to each module parameter based on User Levels
- » Define security User Levels protected by pass codes for locking out module changes on critical paths
- » Customize module menus by creating "Virtual Modules," custom groups of menus that combine functionality from any modules in the system

Module Control

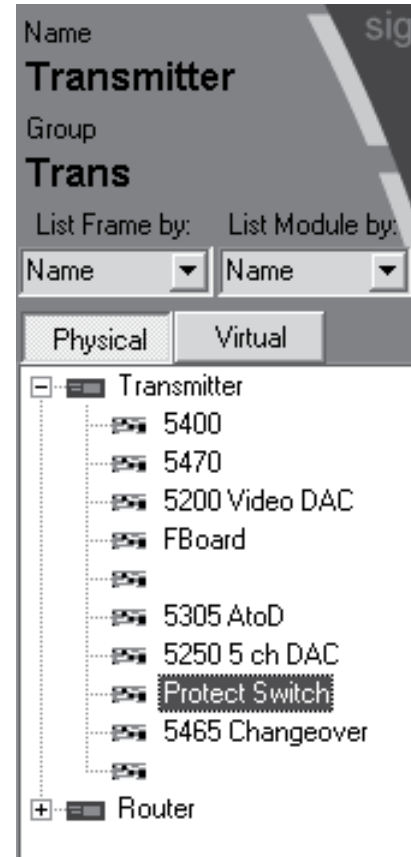
The Module Selection screen is illustrated at right. Available frames on the Avenue network will appear in the window. Expanding each frame will show the Avenue modules present in each frame.

As shown in the List Frame illustration at right, the frames can be listed by Name, Group and Address ID. The modules can be listed by Name, Group, Slot, Model, and Type.

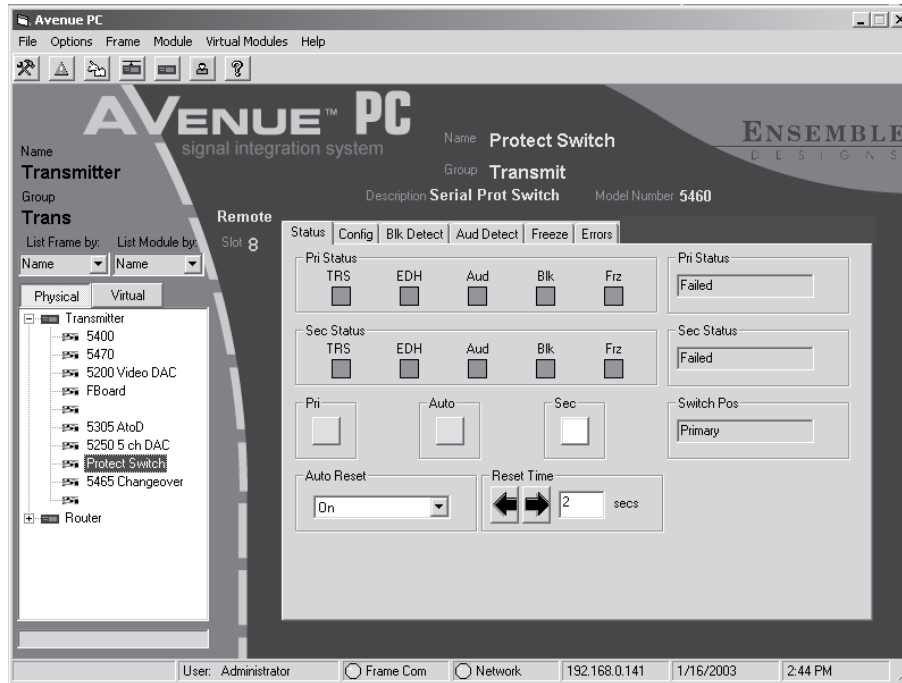
When you select a module from the list the setup menus available for that particular module will be displayed. Also displayed on the Mainscreen above the menus will be the Name and Description of the module, the Group, the Module number and whether the module is set to Remote or Local and if the module is Locked or Unlocked. Make sure the front panel switch on the module is set to Remote to allow it to be controlled by Avenue PC.

Updating Avenue PC and Module Software

Free Avenue software updates can be periodically downloaded from the Ensemble Designs web site. The web site also provides technical bulletins, installation and release notes and frequently asked questions about Avenue PC. From the site you can update Avenue frame software, Avenue module software and PC application software. To download a newer software version, log on to the web site at www.ensembledesigns.com, select Support for Avenue and follow the instructions.



Typical Mainscreen Display



Alarms

Avenue PC gives you the ability to set alarms on a frame or module basis. You can define Low and High Alarms and then set conditions on a frame or module to react with the defined alarms.

Low and High Alarms

The control data from each frame module can be used to alert you when a module indicator becomes active or a module is missing. There are two alarm conditions, Low and High. You may define both types of alarms, making one a higher priority than the other or setting up a higher priority condition in one type of alarm.

Each alarm condition allows you to define the characteristics that will alert you when a module condition changes. Some of the alarm types include Visual Blinking and Audio which allows your PC to sound a Beep or Red Alert. You can also set up an alarm to send an email or page.

Logging Alarms

The Alarms pulldown brings up the Alarms definition menu. To add an alarm, click on the Add Alarm box to bring up the Conditions entry screen. You can select the frame, then the module and choose the control data for the alarm given. You may also enable or disable the alarm with the Enable check box in the Conditions screen.

You can lock modules on Avenue PC and set Module User Levels. Modules in the Avenue system running v2.0 software or later have a User Level assigned to each adjustable control parameter. These levels are assigned to a default according to the type of adjustment. The User Levels of these parameters can be edited by an Administrator if desired using this menu.

Set User Levels

To edit Control User Levels, select an Avenue module from the frame list so its control parameters appear in the Edit Control User Level window. Select the individual Control in the list, then click on the User Level desired for this Control parameter. Select Done when finished to save and close the list.

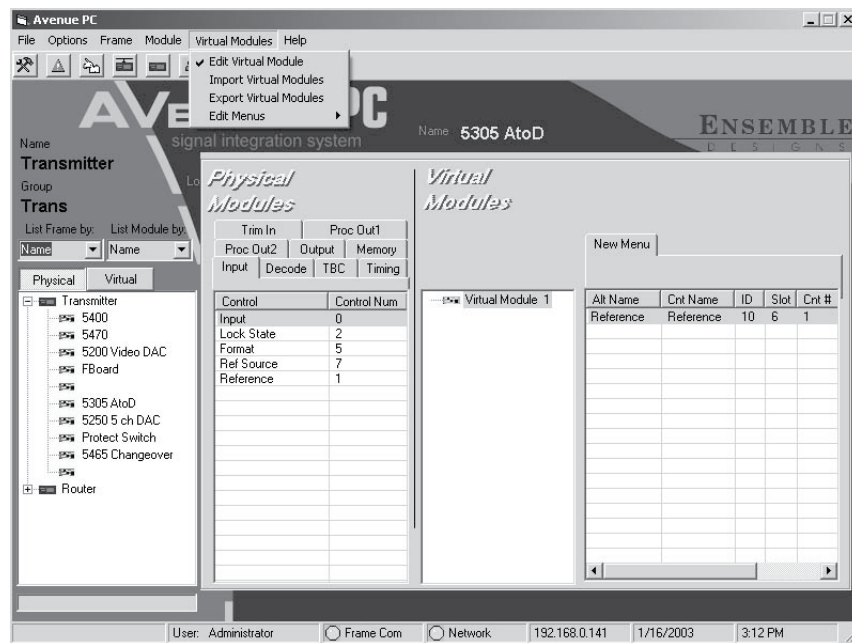
Save and Load Module Configurations

Save Module Configuration: This menu allows you to save a module configuration to a file. All module parameters will be stored and this file may be saved or downloaded to another module of the same type.

Load Module Configuration: Selecting this function brings up a file location menu. The configuration from a stored file can be downloaded to another module of the same type.

Virtual Modules

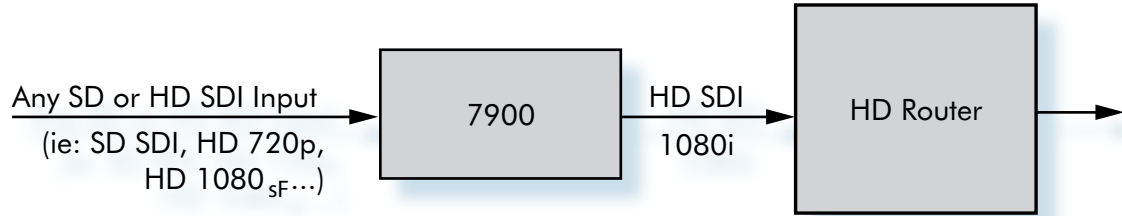
Virtual Modules are custom menus that combine functionality from any modules in the system. Use the Virtual Modules menu to create the combinations of controls from any modules. Virtual modules allow you to customize a module's menu to meet your facility's needs.



How can you use Avenue in your facility? Here are some typical applications.

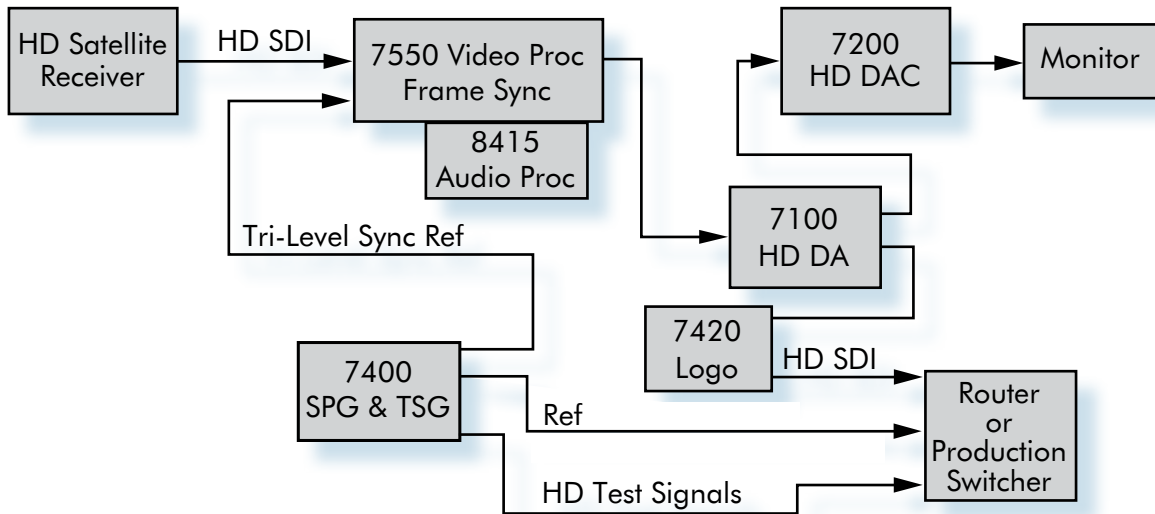
Auto-Sensing Up/Down/Cross Conversion Application

Use Avenue 7900 to bring any type of signal into your plant. Just set the output of the 7900 to whatever SDI standard you use in your facility, then feed any SDI input to the 7900 and the signal will automatically be upconverted, downconverted or cross converted as needed. In the example below, the facility standard is 1080i. If an SD signal is fed to the unit as shown, an upconversion will occur. If a 720p signal is fed to the 7900, a cross conversion will occur.



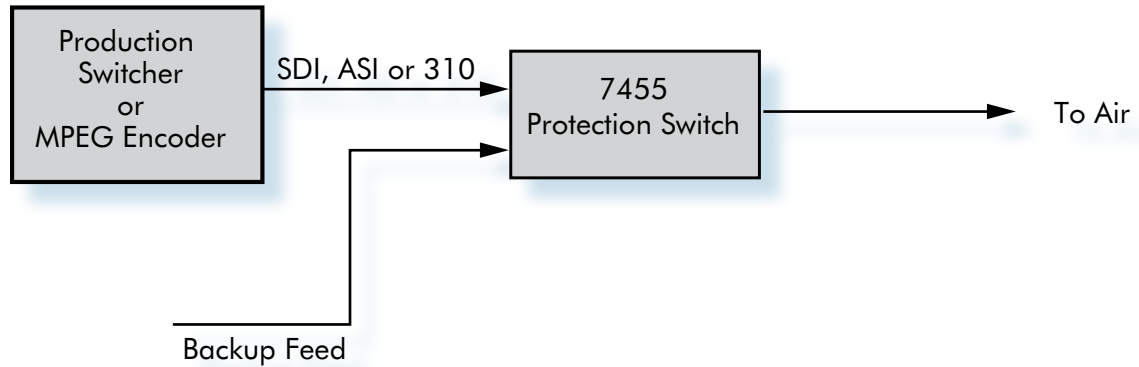
HD Ingest

The 7550 accepts either a high definition or standard definition signal for frame synchronization and signal processing. The 8415 sub module option provides eight channels of audio processing including level adjustment and mixing.



Fail-Safe Bypass Protection Switch for Critical Feeds

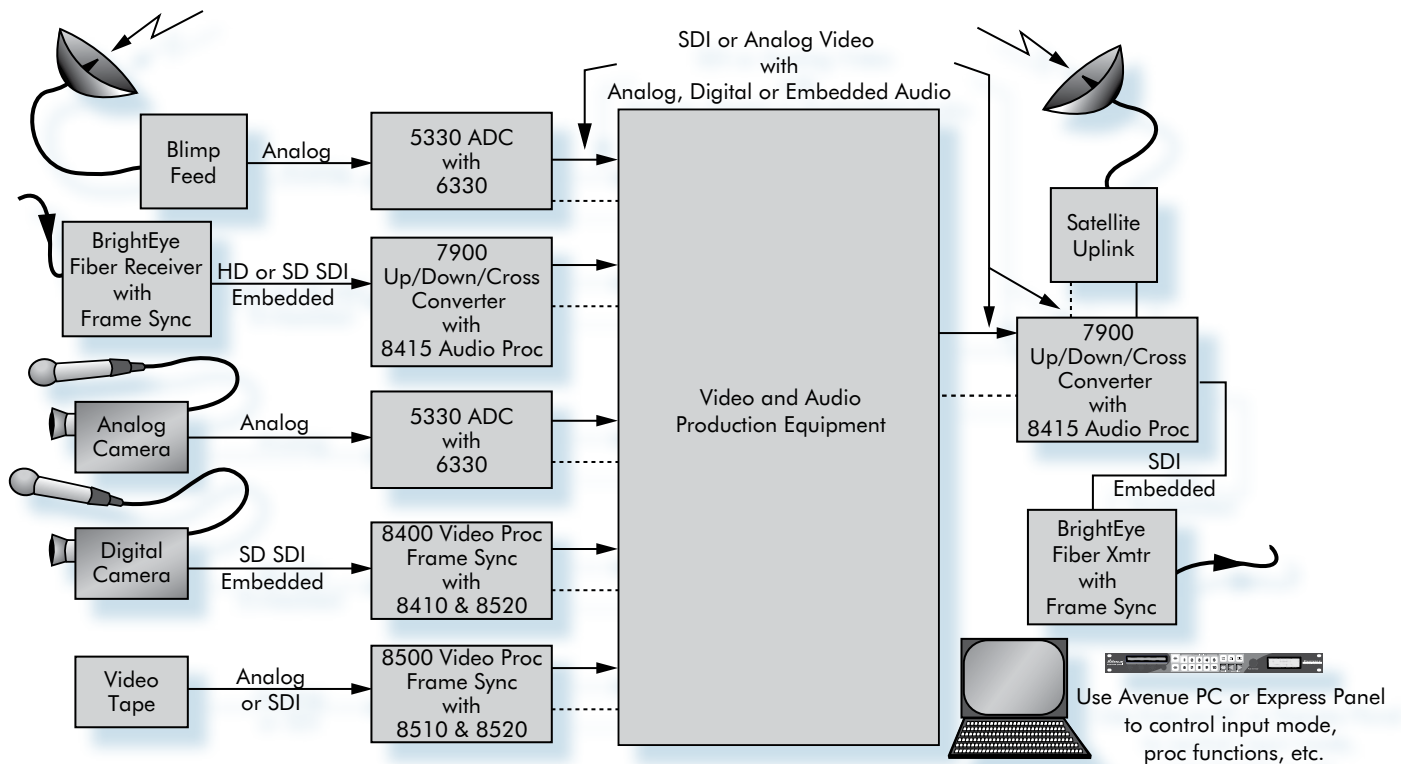
The best insurance for staying on-air is a smart, fail-safe protection switch. The 7455 accepts HD, SD, 310 and ASI signals. Switch parameters for black, freeze, TRS, audio presence, and PIDs are user definable. Different formats can be used on each of the two inputs.



Remote Truck/OB Van Application

Avenue provides convenience and flexibility for signal processing in remote trucks/OB vans. The 5330 analog video to digital converter has a built-in TBC/Frame Sync for handling wild feeds. The optional 6330 daughter card provides analog audio to AES conversion and embedding.

The 7900 will upconvert or cross convert to the standard needed for transmission.

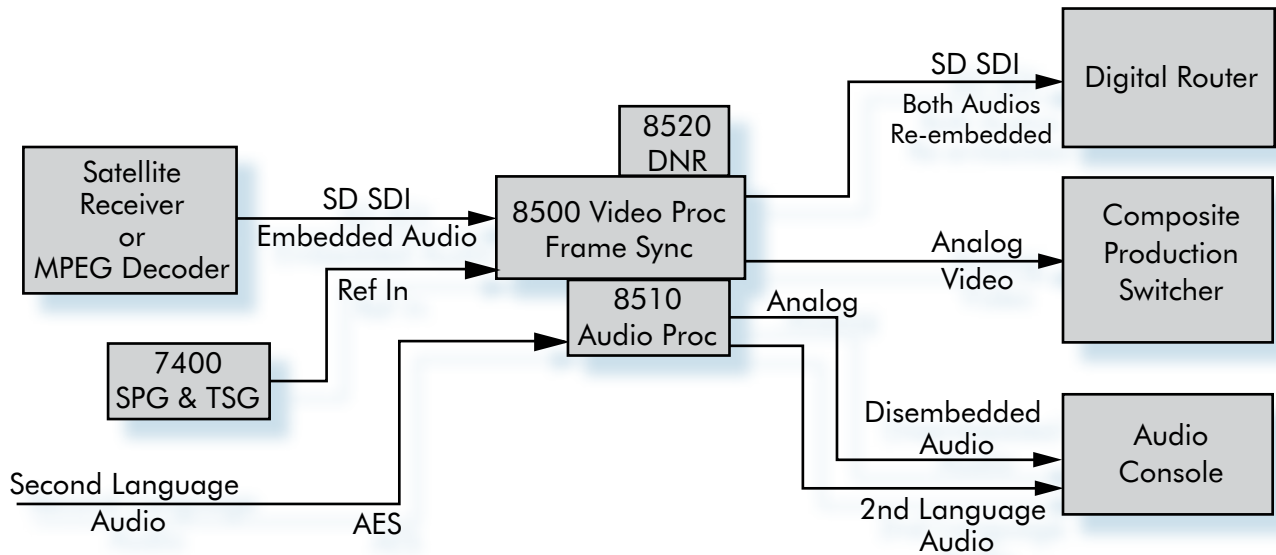


The Avenue Express Panel is especially well suited for remote truck applications. The dedicated knobs for video and audio processing make it easy to adjust levels on the fly.

Satellite or MPEG Ingest for SD and HD

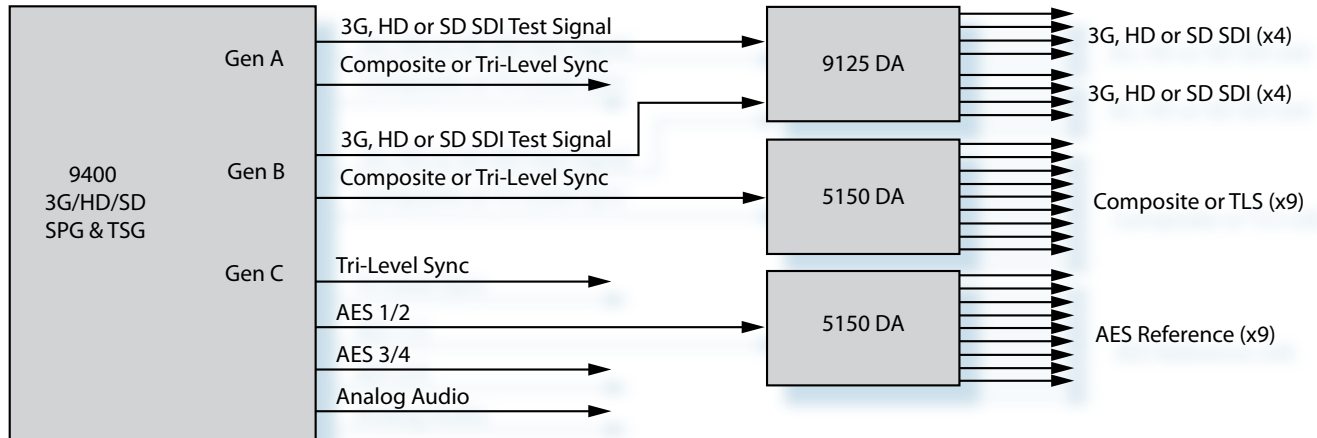
As illustrated in the block diagram below, the 8500 will accept input from either an analog or a serial digital receiver. Both composite video and SDI signals will now be locked to house and fully timeable, and are simultaneously available at the output. The 8520 DNR sub module with its Adaptive Motion Detection can be employed to clean up noisy video.

Proper audio/video timing can be assured when the tracking audio delay of the 8510 Audio Processor is employed. Any timing or delay modifications to the video are tracked by the 8510 whether you wish to use disembedded audio or audio input from an analog or AES source. Properly timed audio from any of these sources is available directly when routed to the analog or AES outputs, or it can be re-embedded back onto the SDI video stream. A fixed delay of up to 1000 msec can be inserted by the 8510 to correct for signals which have previously passed through frame stores without audio delay compensation.



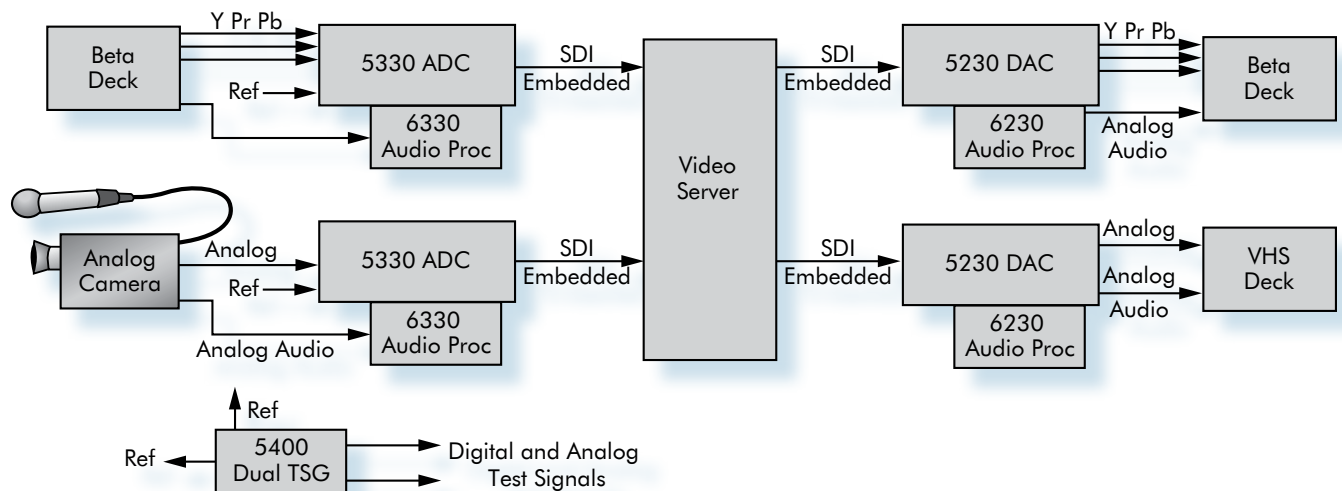
Video and Audio Reference Generation and Distribution

The application shown below illustrates how the 9400 module can provide digital, analog and audio reference outputs which can then be distributed throughout a facility when combined with the 9125 Dual DA and the 5150 DA. Use the 7465 Sync Changeover module for a fully redundant SPG system.



Video Server Application

When integrating a digital video server into an analog facility, Avenue provides video and audio conversion, embedding, disembedding and level adjustments. Built-in audio mixers offer channel mixing and shuffling.



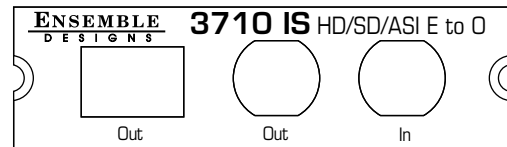
Model 3710 IS

HD/SD/ASI Electrical-to-Optical Converter

The Avenue 3710 IS module is an electrical-to-optical converter that can be used with high definition, standard definition or ASI signals. The video input is converted to an optical signal and presented on an optical SC connector. This optical output can drive single mode fiber to a distance of 20 kilometers. With an optical launch power attenuator, multi-mode fiber can also be used.

The 3710 IS electrical-to-optical module is used with the 1RU Intersection frame.

The Avenue Intersection Frame has a standard, built-in system control module that enables the frame to tie into the Avenue control system, just like any other frame or control surface. The Avenue Intersection Frame can be controlled in conjunction with a matched Avenue 3RU frame or it can be controlled as an independent fiber optic I/O unit.



Features

- » Optical-to-Electrical Converter
- » Use with HD or SD Signals
- » Use with ASI Signals
- » Fits in Avenue Intersection Frame

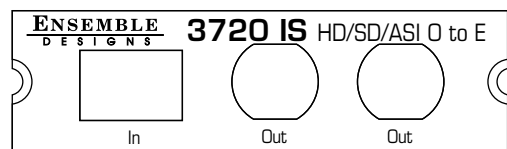
Model 3720 IS

HD/SD/ASI Optical-to-Electrical Converter

The Avenue 3720 IS module is an optical-to-electrical converter that supports HD, SD, and ASI data rates. The optical input is converted to electrical form and the resulting serial digital signal is relocked and delivered to two BNC outputs.

The 3720 IS optical-to-electrical module is used with the 1RU Intersection frame.

The Avenue Intersection Frame has a standard, built-in system control module that enables the frame to tie into the Avenue control system, just like any other frame or control surface. The Avenue Intersection Frame can be controlled in conjunction with a matched Avenue 3RU frame or it can be controlled as an independent fiber optic I/O unit.



Features

- » Optical-to-Electrical Converter
- » Use with HD or SD Signals
- » Use with ASI Signals
- » Fits in Avenue Intersection Frame

Model 3710 IS

HD/SD/ASI Electrical-to-Optical Converter

Serial Digital Input

Number	One
Signal Type	270 Mb/s SD Serial Digital SMPTE 259M or DVB-ASI at 270 Mb/s or 1.485 Gb/s HD Serial Digital SMPTE 274M, 292M or 296M
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	300 meters for 270 Mb/s 100 meters for 1.485 Gb/s
Automatic Cable Input Equalization	

Optical Output

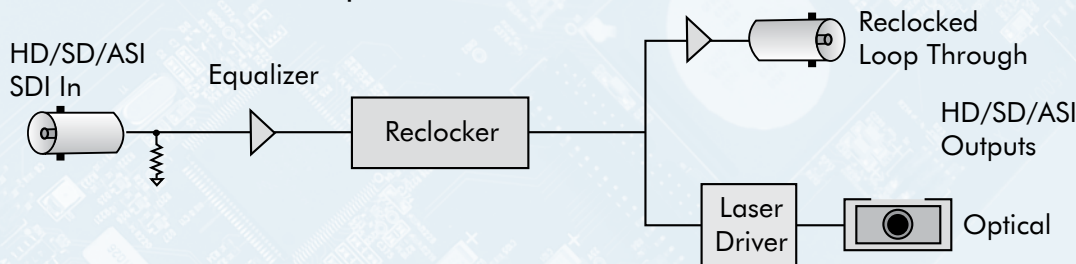
Number	One
Signal Type	HD/SD/ASI SMPTE 297M, optical equivalent of 259M or HD SMPTE 274M, 292M or 296M
Wavelength	1310 nm (1550 by special order)
Power	-7 dBm
Max Cable Length	20 km
Fiber Type	Single mode Multimode compatible with 8 dB attenuation at transmit end
Connector	SC/UPC

Serial Digital Output

Number	One
Signal Type	HD/SD/ASI Serial Digital SMPTE 259M, DVB-ASI at 270 Mb/s or SMPTE 274M, 292M or 296M, follows input
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

General Specifications

Power Consumption	<5.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft



Model 3720 IS

HD/SD/ASI Optical-to-Electrical Converter

Optical Input

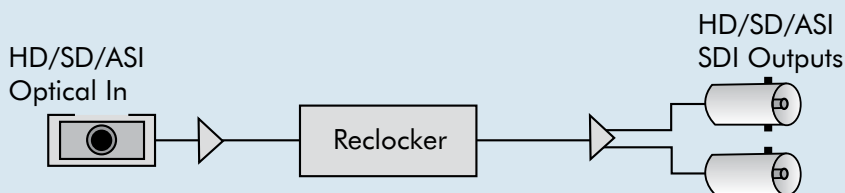
Number	One
Signal Type	SD and ASI SMPTE 297M, optical equivalent of 259M or DVB-ASI at 270 Mb/s or HD SMPTE 274M, 292M or 296M
Wavelength	830 to 1550 nm
Receiver Sensitivity	SD and ASI: -18 dBm HD: -18 dBm
Max Cable Length	20 km
Fiber Type	Single mode Multimode compatible with 8 dB attenuation at transmit end
Connector	SC/UPC

Serial Digital Output

Number	Two
Signal Type	270 Mb/s SD Serial Digital SMPTE 259M or DVB-ASI at 270 Mbps or 1.485 Gb/s HD Serial Digital SMPTE 274M, 292M or 296M
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	300 meters for 270 Mb/s 100 meters for 1.485 Gb/s

General Specifications

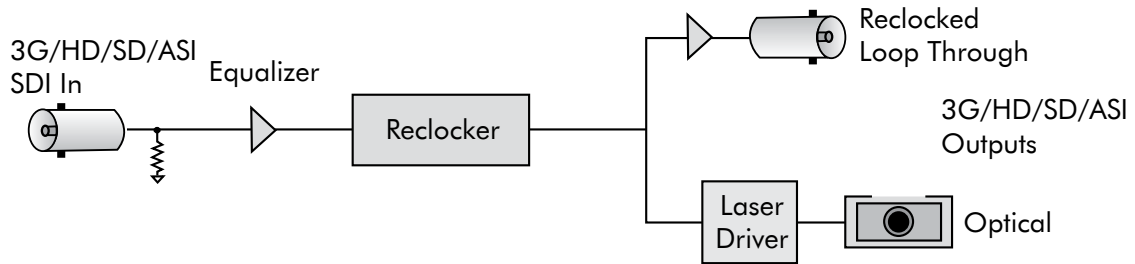
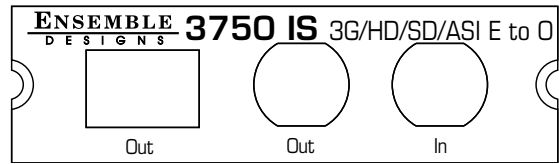
Power Consumption	<5.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, non-condensing
Altitude	0 to 10,000 ft



Model 3750 IS

3G/HD/SD/ASI Electrical-to-Optical Converter

The Avenue 3750 IS module is an electrical-to-optical converter that can be used with 3 Gb/s and 1.5 Gb/s high definition signals, standard definition signals or ASI signals. The video input is converted to an optical signal and presented on an optical SC connector. This optical output can drive single mode fiber to a distance of 20 kilometers. With an optical launch power attenuator, multi-mode fiber can also be used.



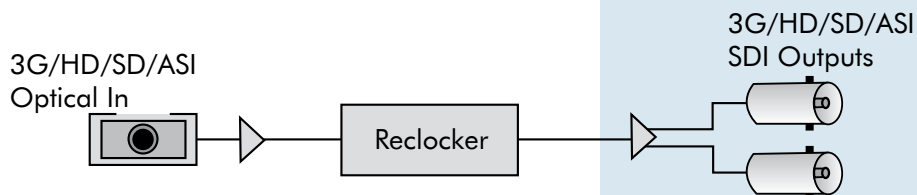
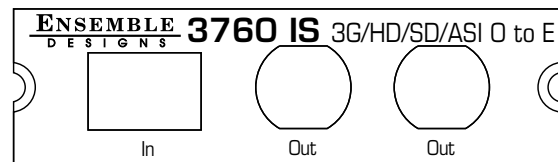
Model 3760 IS

3G/HD/SD/ASI Optical-to-Electrical Converter

The Avenue 3760 IS module is an optical-to-electrical converter that supports 3 Gb/s HD, 1.5 HD, SD, and ASI data rates. The optical input is converted to electrical form and the resulting serial digital signal is reclocked and delivered to two BNC outputs.

The 3750 IS and 3760 IS modules are used with the 1RU Intersection frame.

The Avenue Intersection Frame has a standard, built-in system control module that enables the frame to tie into the Avenue Control System, just like any other frame or control surface. The Avenue Intersection frame can be controlled in conjunction with a matched Avenue 3RU frame or it can be controlled as an independent fiber optic I/O unit.



Model 3750 IS

3G/HD/SD/ASI Electrical-to-Optical Converter

Serial Digital Input

Number	One
Signal Type	270 Mb/s SD Serial Digital SMPTE 259M or DVB-ASI at 270 Mb/s or 1.485 Gb/s HD Serial Digital SMPTE 274M, 292M or 296M 2.97 Gb/s HD Serial Digital SMPTE 424M, 425M
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz >10 dB to 2.97 GHz
Max Cable Length	300 meters for 270 Mb/s 100 meters for 1.485 Gb/s 70 meters for 2.97 Gb/s

Optical Output

Number	One
Signal Type	3G/HD/SD/ASI SMPTE 297M, optical equivalent of 259M or DVB-ASI at 270 Mb/s SMPTE 274M, 292M or 296M SMPTE 424M, 425M
Wavelength	1310 nm (1550 by special order)
Power	-7 dBm
Max Cable Length	20 km
Fiber Type	Single Mode Multi-mode compatible with 8 dB attenuation at transmit end
Connector	SC/UPC

Serial Digital Output

Number	One
Signal Type	270 Mb/s SD Serial Digital SMPTE 259M or DVB-ASI at 270 Mbps or 1.485 Gb/s HD Serial Digital SMPTE 274M, 292M or 296M 2.97 Gb/s HD Serial Digital SMPTE 424M, 425M
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz >10 dB to 2.97 GHz
Output DC	None (AC coupled)

General Specifications

Power Consumption	<5.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft

Model 3760 IS

3G/HD/SD/ASI Optical-to-Electrical Converter

Optical Input

Number	One
Signal Type	3G/HD/SD/ASI SMPTE 297M, optical equivalent of 259M or DVB-ASI at 270 Mb/s or SMPTE 274M, 292M, 296M SMPTE 424M, 425M
Wavelength	830 to 1550 nm
Receiver Sensitivity	SD and ASI: -18 dBm HD: -18 dBm
Max Cable Length	20 km
Fiber Type	Single Mode Multi-mode compatible with 8 dB attenuation at transmit end
Connector	SC/UPC

Serial Digital Output

Number	Two
Signal Type	270 Mb/s SD Serial Digital SMPTE 259M or DVB-ASI at 270 Mb/s 1.485 Gb/s HD Serial Digital SMPTE 274M, 292M or 296M 2.97 Gb/s HD Serial Digital SMPTE 424M, 425M
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz >10 dB to 2.97 GHz
Max Cable Length	300 meters for 270 Mb/s 100 meters for 1.485 Gb/s 70 meters for 2.97 Gb/s

General Specifications

Power Consumption	<5.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft

Model 4110

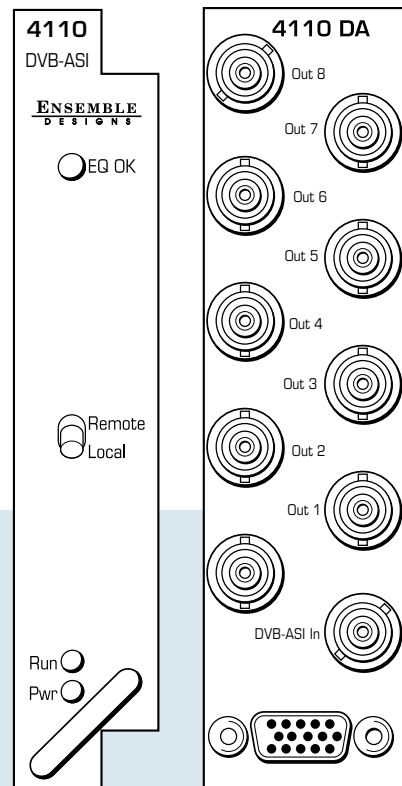
ASI /310 Distribution Amplifier

The 4110 module is an ASI and SMPTE 310M distribution amplifier that handles data rates from 19.39 Mb/s to 270 Mb/s. Use the 4110 for distributing MPEG and ASI signals in your facility. Perfect for use with encoders, servers, and routers.

This module can be monitored locally and remotely. The remote control system is accessed using an Avenue Touch Screen, Avenue PC or your web browser. Modules can be updated with new software as new formats are supported. Software is updated with Avenue's built-in networking capability. Signal status can be monitored via an Avenue Control Panel, and Avenue PC Control Software.

Features

- » Eight outputs
- » Data rates from 19.39 Mb/s to 270 Mb/s
- » Use with DVB-ASI
- » SMPTE 310M signals
- » Use with encoders, servers and other ASI compliant equipment
- » Signal presence detection
- » Local and remote monitoring



Input Signal

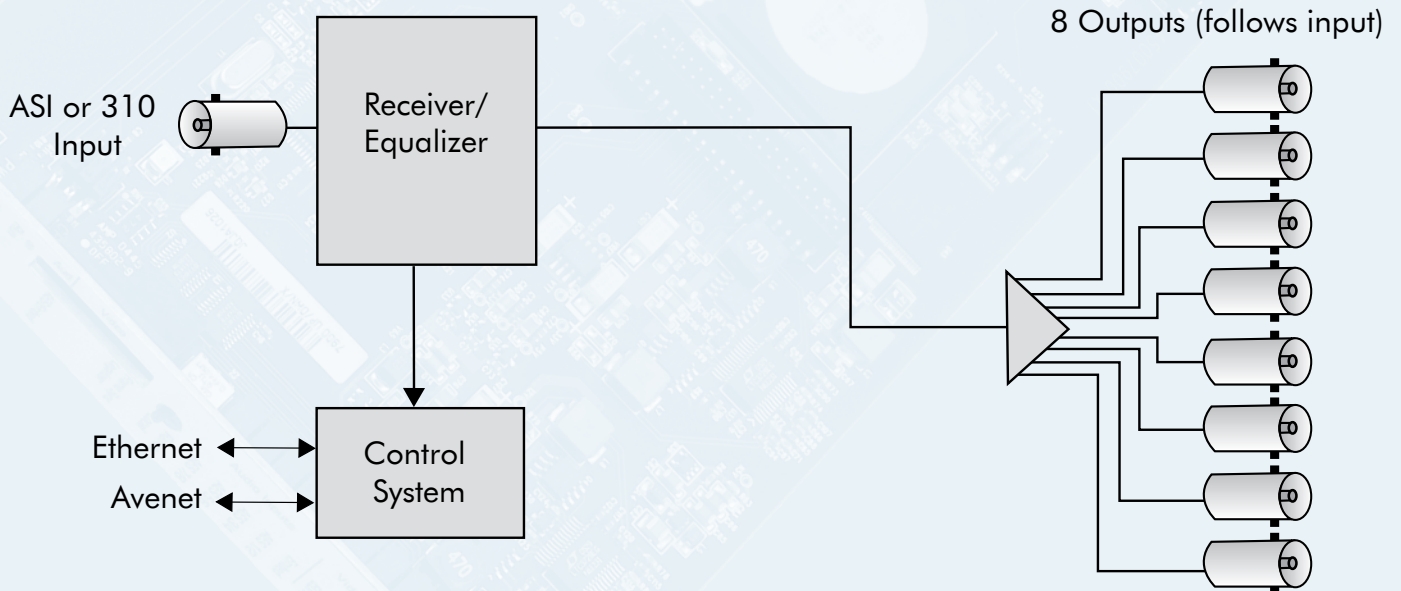
Number One
Signal Type DVB-ASI at 270 Mb/s or SMPTE 310M
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz
Max Cable Length 300 meters

General Specifications

Power Consumption <2.5 watts
Temperature Range 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 1.5 Amp PTC resettable fuse

Output Signal

Number Eight
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz



Model 4430

8x1 ASI/310M Router

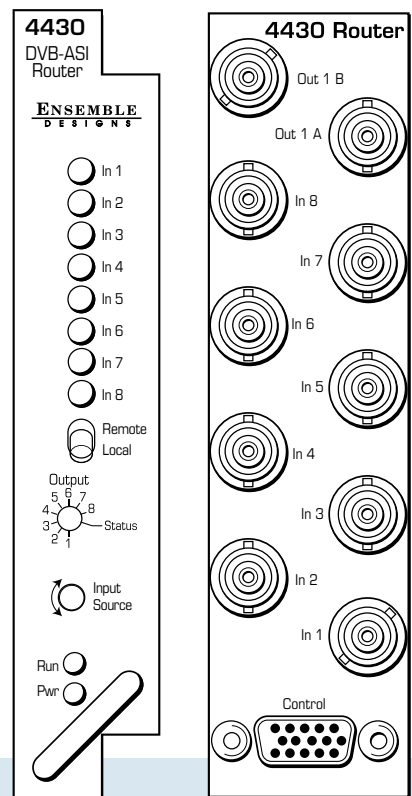
The 4430 is an 8x1 ASI or SMPTE 310M Router that handles data rates from 19.39 Mb/s to 270 Mb/s. This module is perfect for use with encoders, servers and other transport streams. The 4430 fits in any slot of either the 1RU or 3RU Avenue frames.

The router module can be controlled and monitored locally and remotely. The remote control system is accessed using an Avenue Touch Screen, or Avenue PC software. Additionally an external X-Y Router Control Panel or GPIs can be used for control. The X-Y Control Panel connects to the module's rear D connector.

Modules can be updated with new software as new formats are supported. Software is updated with Avenue's built-in networking capability.

Features

- » 8x1 ASI or SMPTE 310M routing
- » Use with encoders, servers, transport streams
- » GPI remote panel
- » RS-232/RS-422-capable remote port
- » Optional X-Y Control Panel



X-Y Router Control Panel



Input Signal

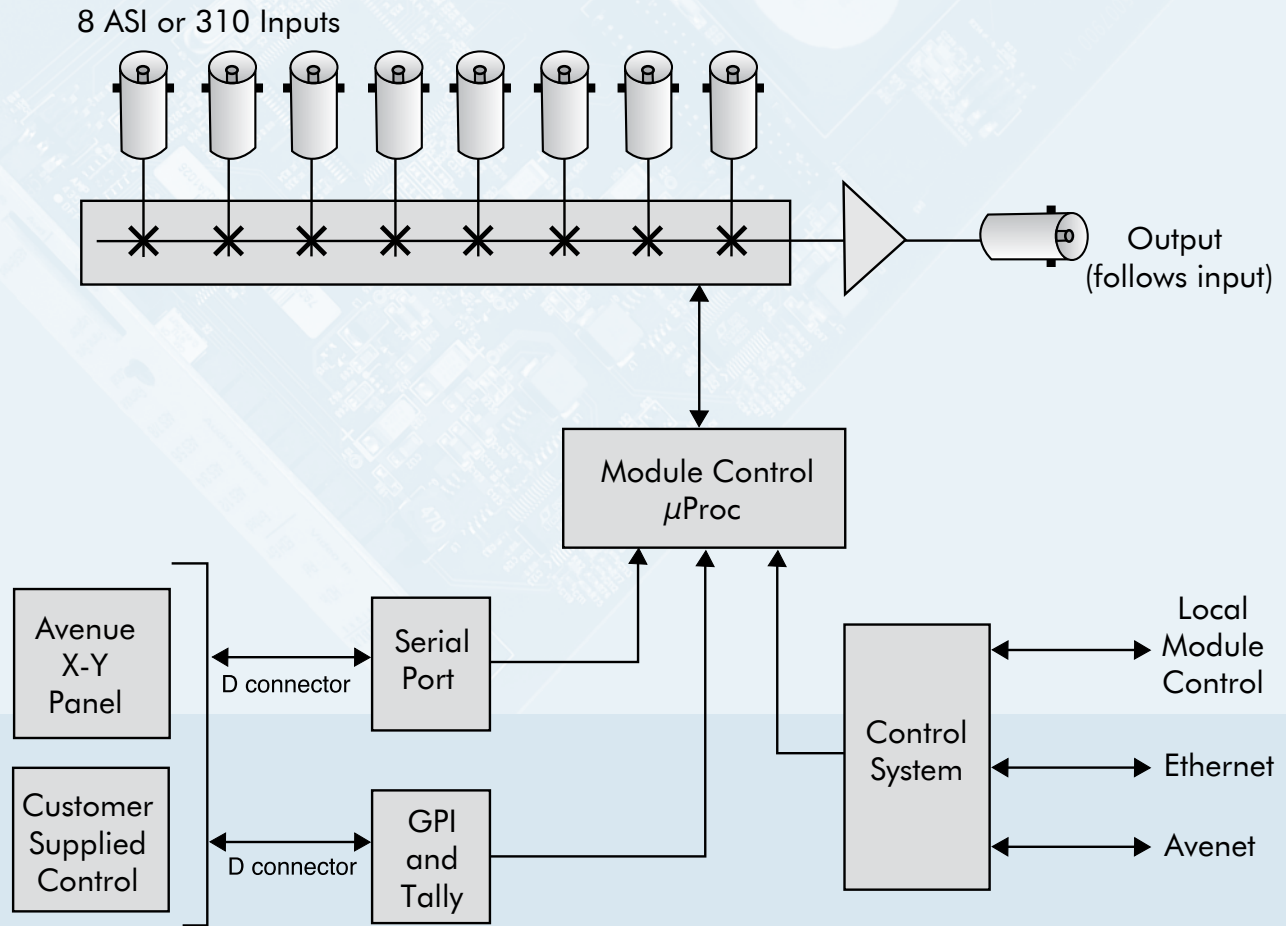
Number: Eight
 Signal Type: DVB-ASI at 270 Mb/s or SMPTE 310M
 Impedance: 75 Ω
 Return Loss: >15 dB DC to 270 MHz
 Max Cable Length: 300 meters Belden 1694A

General Specifications

Power Consumption: <4.0 watts
 Temperature Range: 0 to 40°C ambient (all specs met)
 Relative Humidity: 0 to 95%, noncondensing
 Altitude: 0 to 10,000 ft
 Fusing: 1.5 Amp PTC resettable fuse

Output Signal

Number: One
 Signal Type: Serial Digital DVB-ASI at 270 Mb/s or SMPTE 310M (follows input)
 Impedance: 75 Ω
 Return Loss: >15 dB DC to 270 MHz
 Output DC: None (AC coupled)



SMPTE 310M Protection Switch

The 4450 module is a fail-safe, bypass protection switch for critical SMPTE 310M signals for broadcast or satellite applications. When a fault is detected in the primary input, and the secondary input is verified as good, the switch will activate causing the secondary input to be switched to the module's output. The 4450 includes a passive, fail-safe path that ensures there is an output even in the event of a total power failure.

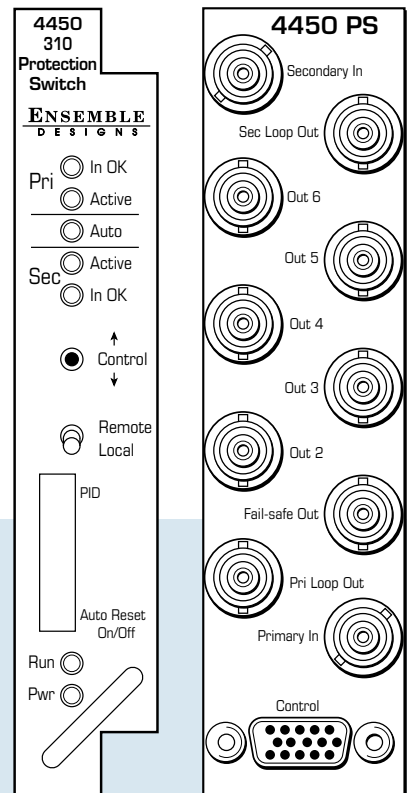
The health of a 310 signal is determined by monitoring digital clock lock, packet presence, and PID presence. The user can configure tests to define the minimum number of video packets and audio packets expected per second in a given service.

The switch can operate in two modes: automatic or nonresetting. In fully automatic mode, the 4450 will automatically switch back to the primary signal once it's been restored. In the nonresetting mode, the secondary input remains routed to the output, even after the primary input has recovered.

Controls are easily accessed through an Avenue Control Panel, Avenue PC, GPIs, or front edge module controls. GPI inputs allow faults detected in upstream equipment to contribute to the switching logic.

Features

- » Fail-safe Bypass Protection Switch for SMPTE 310M signals
- » Detects Signal Presence, Program Packets, PMT, PAT and PIDs
- » Detection specifics are user-programmable
- » Alarm generation
- » Remote control and monitoring



Input Signal

Number Two
Signal Type SMPTE 310M

Loopback

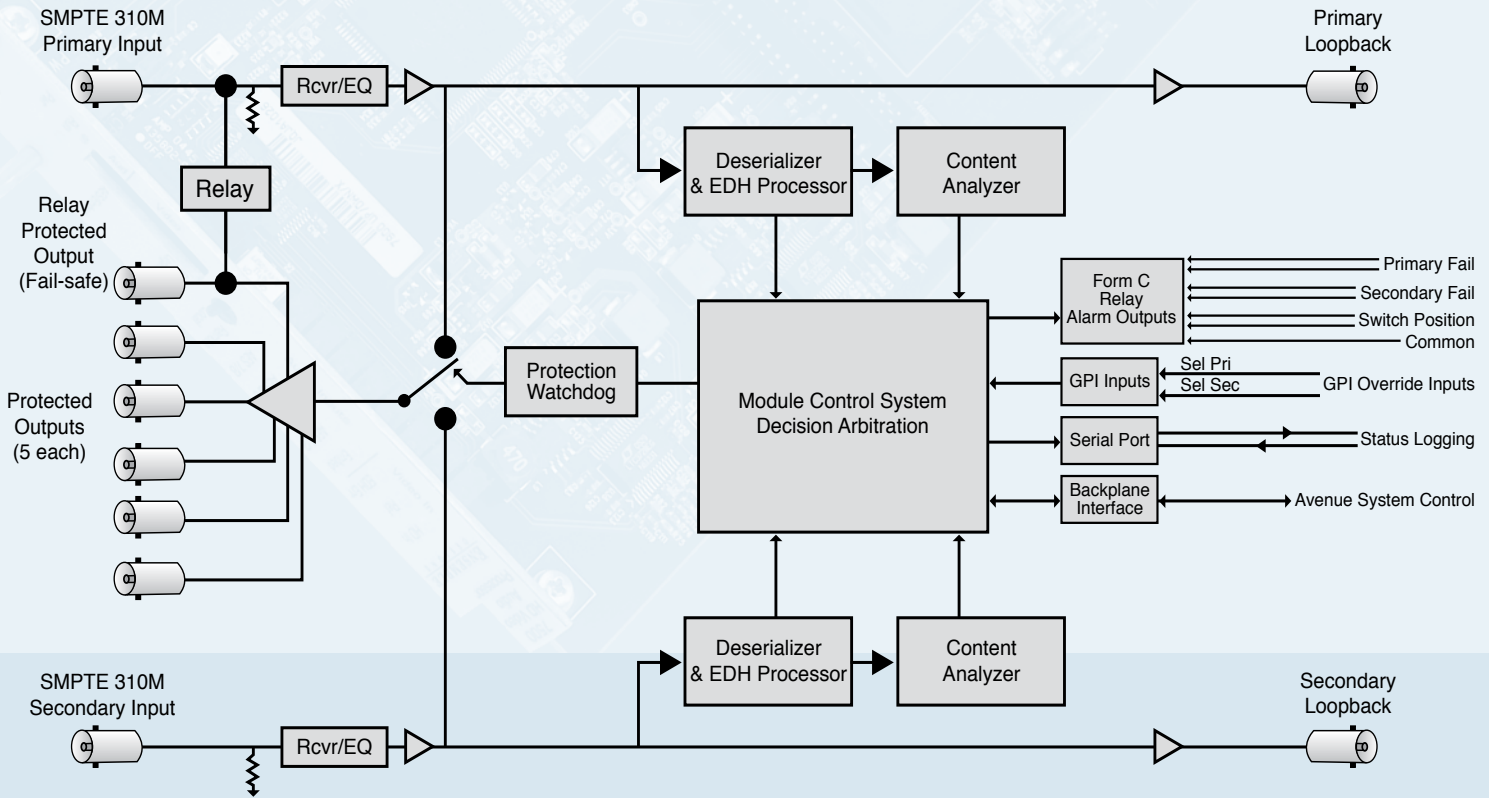
Number Two total
One primary
One secondary
Impedance 75 Ω

Output Signal

Number Six total
One fail-safe bypass output
Five outputs
Signal Type SMPTE 310M
Impedance 75 Ω

General Specifications

Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 4 each 0.75 Amp PTC resettable fuse with each domain of the module independently regulated.



ASI Protection Switch

The 4455 module is a fail-safe, bypass protection switch for critical ASI signals for broadcast or satellite applications. When a fault is detected in the primary input, and the secondary input is verified as good, the switch will activate, causing the secondary input to be switched to the module's output. The 4455 includes a passive, fail-safe path that ensures there is an output even in the event of a total power failure.

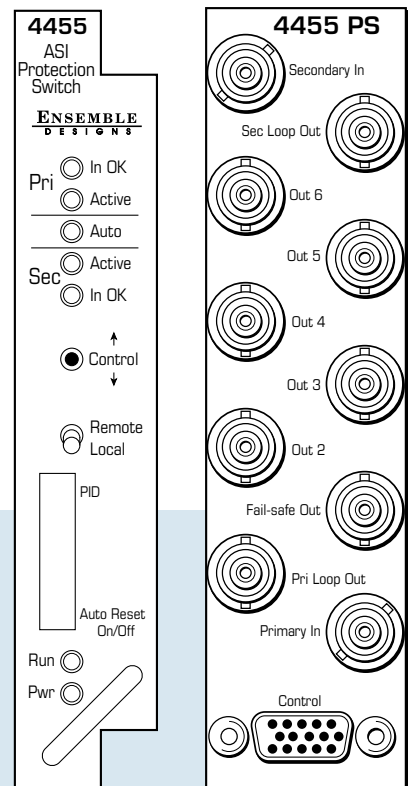
The health of an ASI signal is determined by monitoring digital clock lock, packet presence, and PID presence. The user can configure tests to define the minimum number of video packets and audio packets expected per second in a given service.

The switch can operate in two modes: automatic or nonresetting. In fully automatic mode, the 4455 will automatically switch back to the primary signal once it's been restored. In the nonresetting mode, the secondary input remains routed to the output, even after the primary input has recovered.

Controls are easily accessed through an Avenue Control Panel, Avenue PC software, GPIs, or front edge module controls. GPI inputs allow faults detected in upstream equipment to contribute to the switching logic.

Features

- » Fail-safe Bypass Protection Switch for Critical ASI signals
- » Detects Signal Presence, Program Packets, PMT, PAT and PIDs
- » Detection specifics are user programmable
- » Alarm generation
- » Remote control and monitoring



Input Signal

Number Two
Signal Type DVB-ASI at 270 Mb/s

Loopback

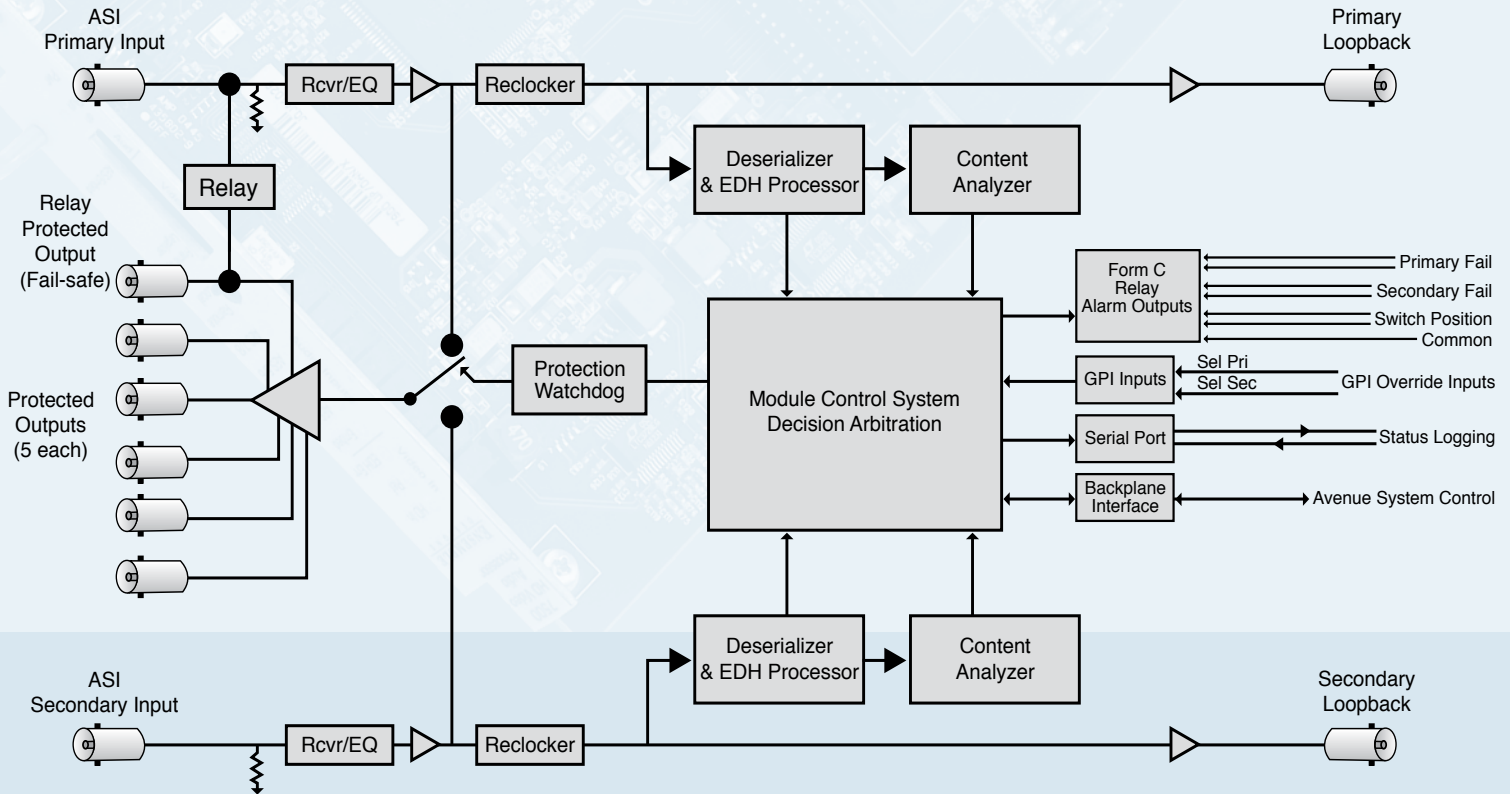
Number Two total
One primary
One secondary
Impedance 75 Ω

Output Signal

Number Six total
One fail-safe bypass output
Five outputs
Signal Type DVB-ASI
Impedance 75 Ω

General Specifications

Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 4 each 0.75 Amp PTC resettable fuse with each domain of the module independently regulated.



Model 4500

ASI and SMPTE 310M Converter MPEG Transport Processor

The 4500 MPEG Transport Stream Processor works with both DVB-ASI and SMPTE 310M bitstreams. It provides stream content analysis with support for both Priority 1 and Priority 2 test protocols of the ETR 290 DVB measurement guidelines. As a converter, it can translate ASI to 310M or 310M to ASI. Using the reference input, the output bitstream can be synchronized to a video or 10 MHz reference signal.

The 4500 module is useful in broadcast and transmission applications. Set the output of the 4500 module to the desired signal type, either ASI or 310M. The module autosenses what type of signal is on the input and converts as needed. Advanced configuration in the Avenue Control System allows choosing which services on the input are passed on to the output.

The built-in transport stream analyzer detects whether the input constitutes a valid signal by checking for PAT, PMT, and PID packets. In addition to the ETR 290 test protocols, the user can configure tests to define the minimum number of video and audio packets expected per second in a given service. Alarms can be generated via SNMP, Avenue PC, and contact closure outputs.

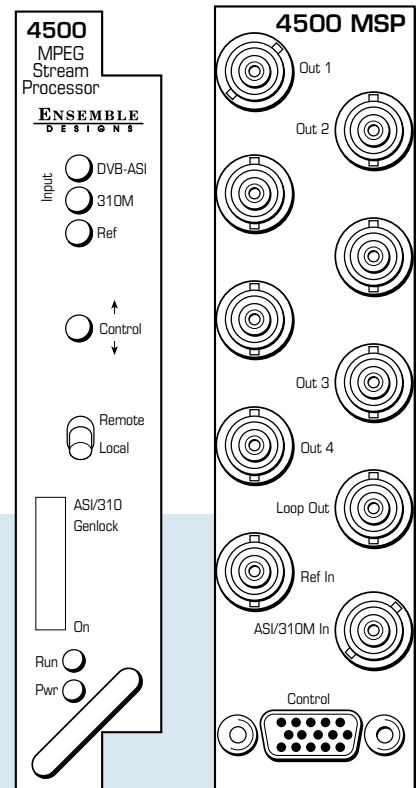
The output bitstream can be synchronized to a video or 10 MHz reference signal. This is of particular importance in 310M applications where the symbol clock frequency acts directly in the transmitter modulation process. By using an Avenue 7400 SPG with the GPS reference option, the 4500 Stream Processor will ensure the highest possible accuracy in transmission.

Controls are easily accessed through an Avenue Control Panel, Avenue PC, GPIs, or front edge module controls.

For critical signals paths, consider using a 4450, 4455 or 7455 bypass protection switch.

Features

- » Convert between SMPTE 310M and ASI signals or ASI to SMPTE 310M for broadcast and transmission
- » Built-in signal analyzer detects Signal Presence, Program Packets, PMT, PAT and PIDs
- » Reference input synchronizes the bitstream clock on the output signal
- » ETR 290 Compliant for both Priority 1 and Priority 2
- » Stream monitor alarms via TCP-IP, SNMP, RS-232 and GPI
- » Remote control and monitoring



Input Signal

Number One
Signal Type DVB-ASI at 270 Mb/s or SMPTE 310M

Loopback

Number One
Impedance 75 Ω

Output Signal (processed)

Number Four
Signal Type DVB-ASI at 270 Mb/s or SMPTE 310M, selectable
Impedance 75 Ω

Reference Input

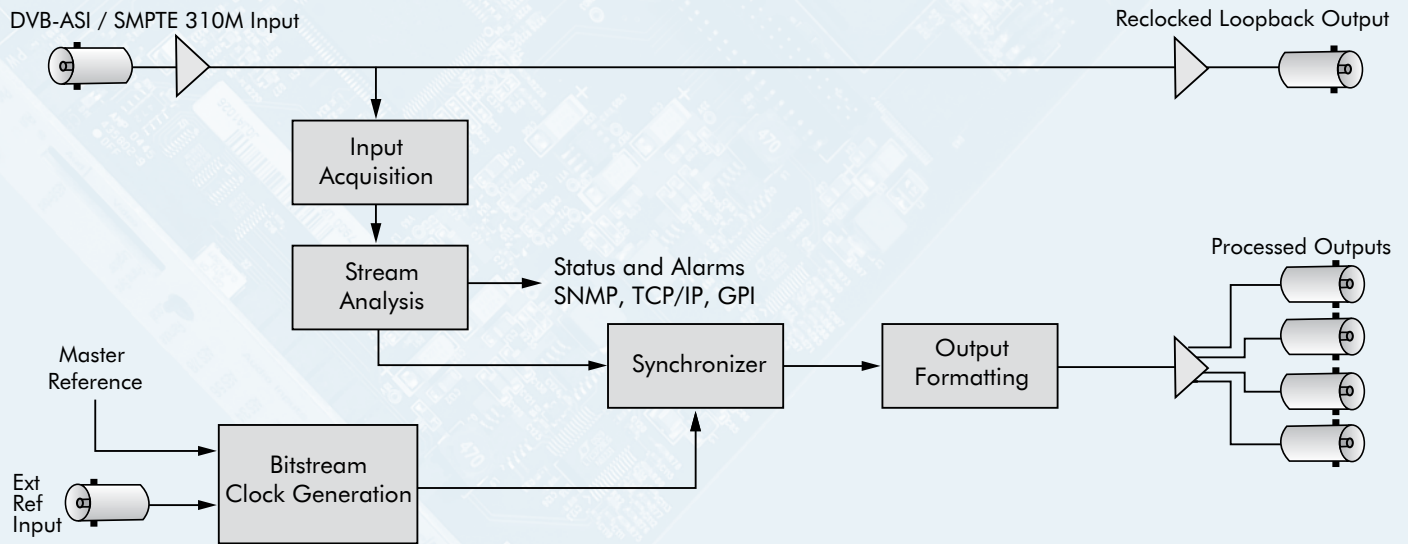
Number Two: External or Frame Master Reference
Signal Type PAL or NTSC composite video or 10 MHz 1V P-P sine or square
Return Loss >40 dB (applies to external ref input)

Signal Analysis

ETR 290 Compliant, Priority 1 and Priority 2

General Specifications

Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft



Dual ASI and SMPTE 310M Converter MPEG Transport Processor

The 4505 is a two channel MPEG Transport Stream Processor that works with both DVB-ASI and SMPTE 310M bitstreams. It provides stream content analysis with support for both Priority 1 and Priority 2 test protocols of the ETR 290 DVB measurement guidelines. As a converter, it can translate ASI to 310M or 310M to ASI. Using the reference input, the output bitstream can be synchronized to a video or 10 MHz reference signal.

The 4505 module is useful in broadcast and transmission applications. Set the outputs of the 4505 module to the desired signal type, either ASI or 310M. The module autosenses what type of signal is on the input and converts as needed. Outputs can be configured independently so that one channel could convert ASI to 310M and the other channel could convert 310M to ASI. Advanced configuration in the Avenue Control System allows choosing which services on the input are passed on to the output.

The built-in transport stream analyzer detects whether the input constitutes a valid signal by checking for PAT, PMT, and PID packets. In addition to the ETR 290 test protocols, the user can configure tests to define the minimum number of video and audio packets expected per second in a given service. Alarms can be generated via SNMP, Avenue PC, and contact closure outputs.

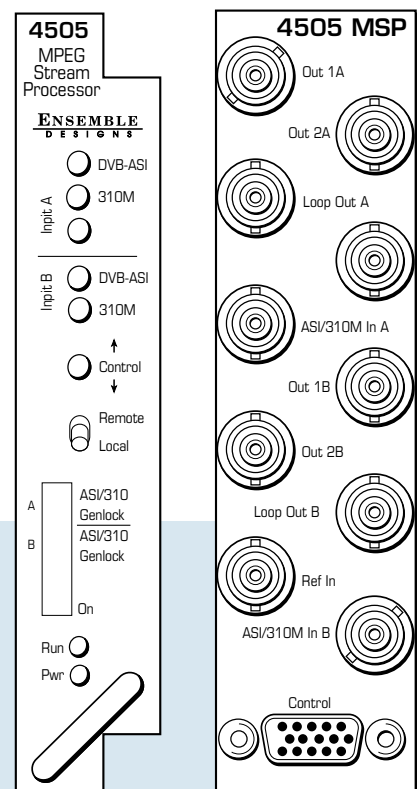
The output bitstreams can be synchronized to a video or 10 MHz reference signal. This is of particular importance in 310M applications where the symbol clock frequency acts directly in the transmitter modulation process. By using an Avenue 7400 SPG with the GPS reference option, the 4505 Stream Processor will ensure the highest possible accuracy in transmission.

Controls are easily accessed through an Avenue Control Panel, Avenue PC, GPIs, or front edge module controls.

For critical signals paths, consider using a 4450, 4455 or 7455 bypass protection switch.

Features

- » Convert between SMPTE 310M and ASI signals or ASI to SMPTE 310M for broadcast and transmission
- » Two channels on one module provide high density conversion
- » Built-in signal analyzer detects Signal Presence, Program Packets, PMT, PAT and PIDs
- » Reference input synchronizes the bitstream clock on the output signals
- » ETR 290 Compliant for both Priority 1 and Priority 2
- » Stream monitor alarms via TCP-IP, SNMP, RS-232 and GPI
- » Remote control and monitoring



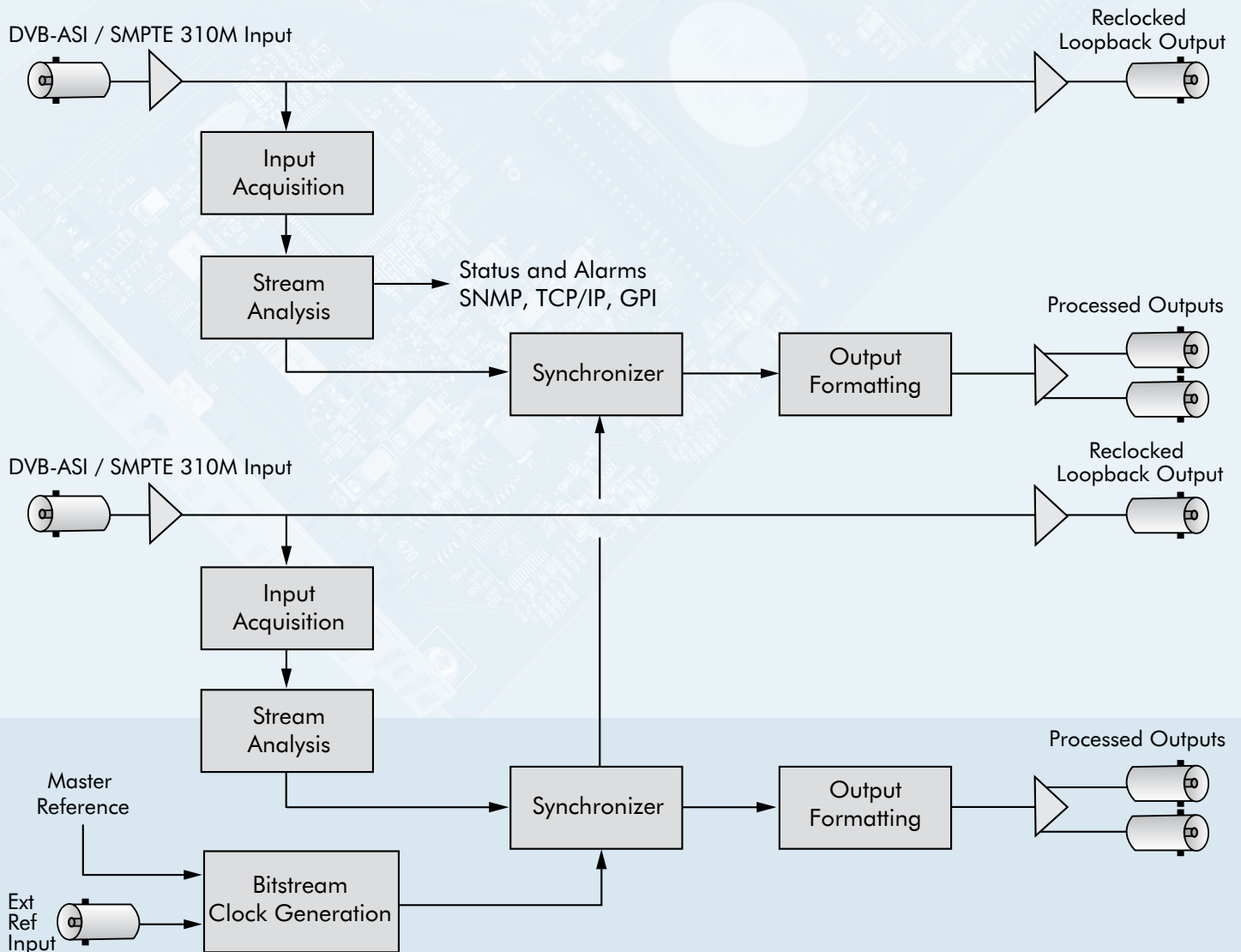
Input Signal	
Number	Two (one per channel)
Signal Type	DVB-ASI at 270 Mb/s or SMPTE 310M
Loopback	
Number	Two (one per channel)
Impedance	75 Ω
Output Signal (processed)	
Number	Four (two per channel)
Signal Type	DVB-ASI at 270 Mb/s or SMPTE 310M, selectable
Impedance	75 Ω
Reference Input	
Number	Two: External or Frame Master Reference
Signal Type	PAL or NTSC composite video or 10 MHz 1V P-P sine or square
Return Loss	>40 dB (applies to external ref input)

Signal Analysis

ETR 290 Compliant, Priority 1 and Priority 2

General Specifications

Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft



Model 5100

Digital Video DA

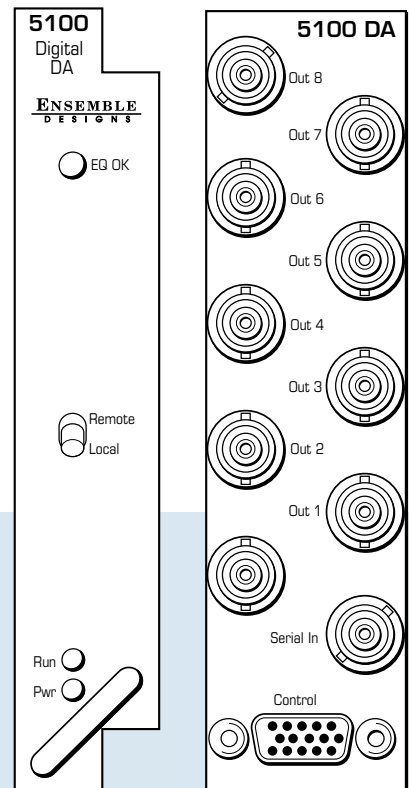
The 5100 module is a digital distribution amplifier with automatic input equalization. Eight outputs are provided. This module can be used for signal distribution where reclocking is not required.

The 5100 can be used to distribute any of the following data rates: 143 Mb/s, 177 Mb/s, 270 Mb/s, 360 Mb/s and 540 Mb/s. Up to 300 meters of cable can be equalized for the three lower data rates and 200 meters for the 360 Mb/s rate.

Signal status and cable length can be monitored and controlled via Avenue Control Panels and with the Avenue PC Control Application.

Features

- » Eight serial digital outputs
- » Automatic input equalization
- » EQ warning circuit
- » Supports 143, 177, 270, 360 and 540 Mb/s
- » Local and remote control of module settings
- » Passes embedded audio



Input Signal

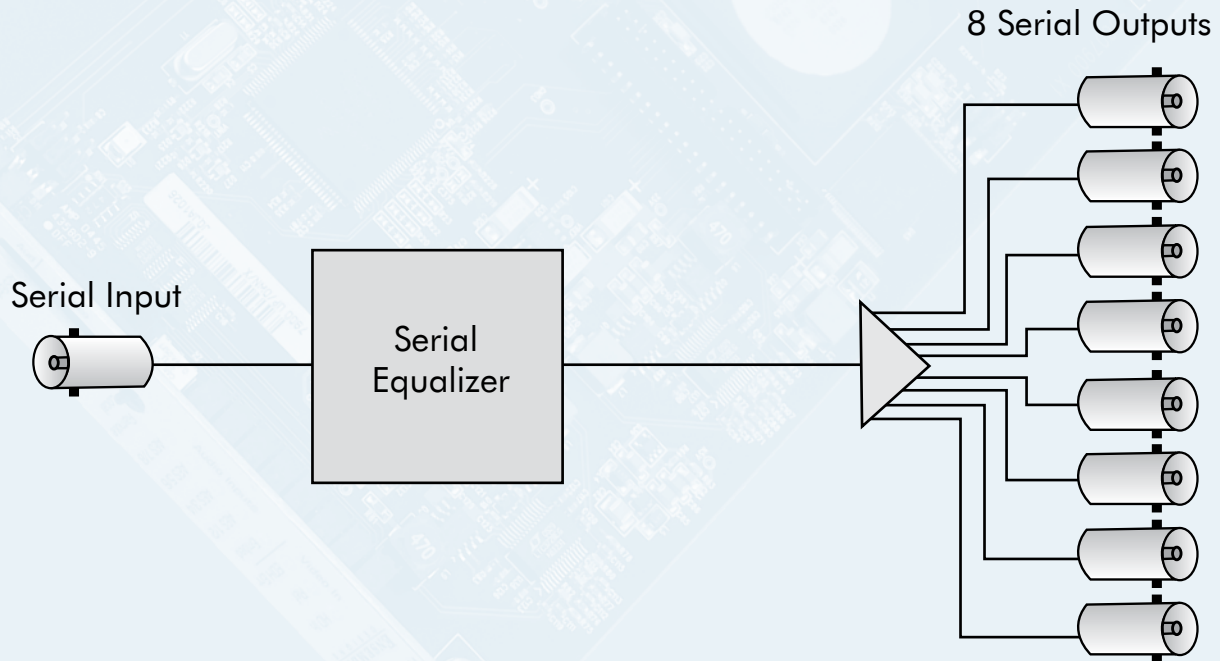
Number One
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss 143, 177, 270 Mb/s >15 dB
360 Mb/s >15 dB
Max Cable Length 143, 177, 270 Mb/s 300 meters
Belden 1694A
360 Mb/s 200 meters

General Specifications

Power Consumption <2.5 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft

Output Signal

Number Eight
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss 143, 177, 270 Mb/s >15 dB
360 Mb/s >15 dB
Output DC None (AC coupled)



Digital Reclocking DA with EDH Monitoring & Insertion

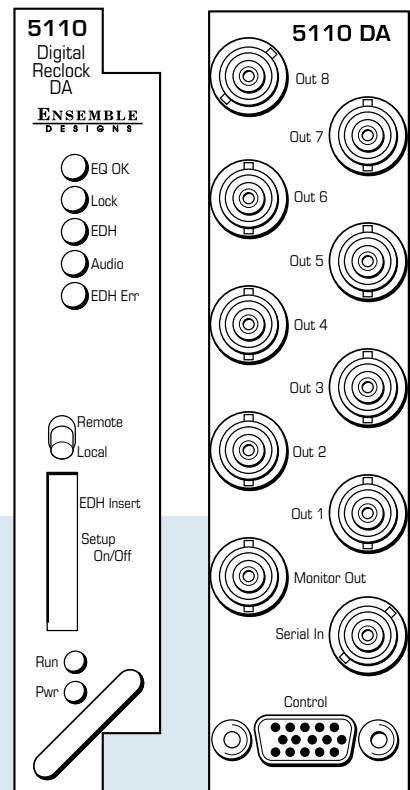
The 5110 module is a digital reclocking distribution amplifier with EDH monitoring and insertion. Jitter reduction makes it perfect for all types of digital signal distribution.

Input EDH errors can be detected and reported and new EDH can be created and incorporated into the output data streams. Flags and CRCs are reported. From the Avenue Touch Screen interface, Avenue PC and from the web browser, EDH error counters can be read and reset to show the frequency of errors.

Module parameters, such as detected line standard, EDH processing options, and maximum input cable length, can be monitored and adjusted locally and remotely. Remote control is accessed via Avenue Panels and the Avenue PC Control Application.

Features

- » Eight serial digital outputs
- » One composite monitor output
- » Reclocking and jitter reduction
- » EDH monitoring and insertion
- » User-definable alarms
- » EQ warning circuit
- » Local and remote control of module settings
- » Passes embedded audio



Input Signal

Number One
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss 143, 177, 270 Mb/s >15 dB
360 Mb/s >15 dB
Max Cable Length 300 meters Belden 1694A

Serial Output Signal

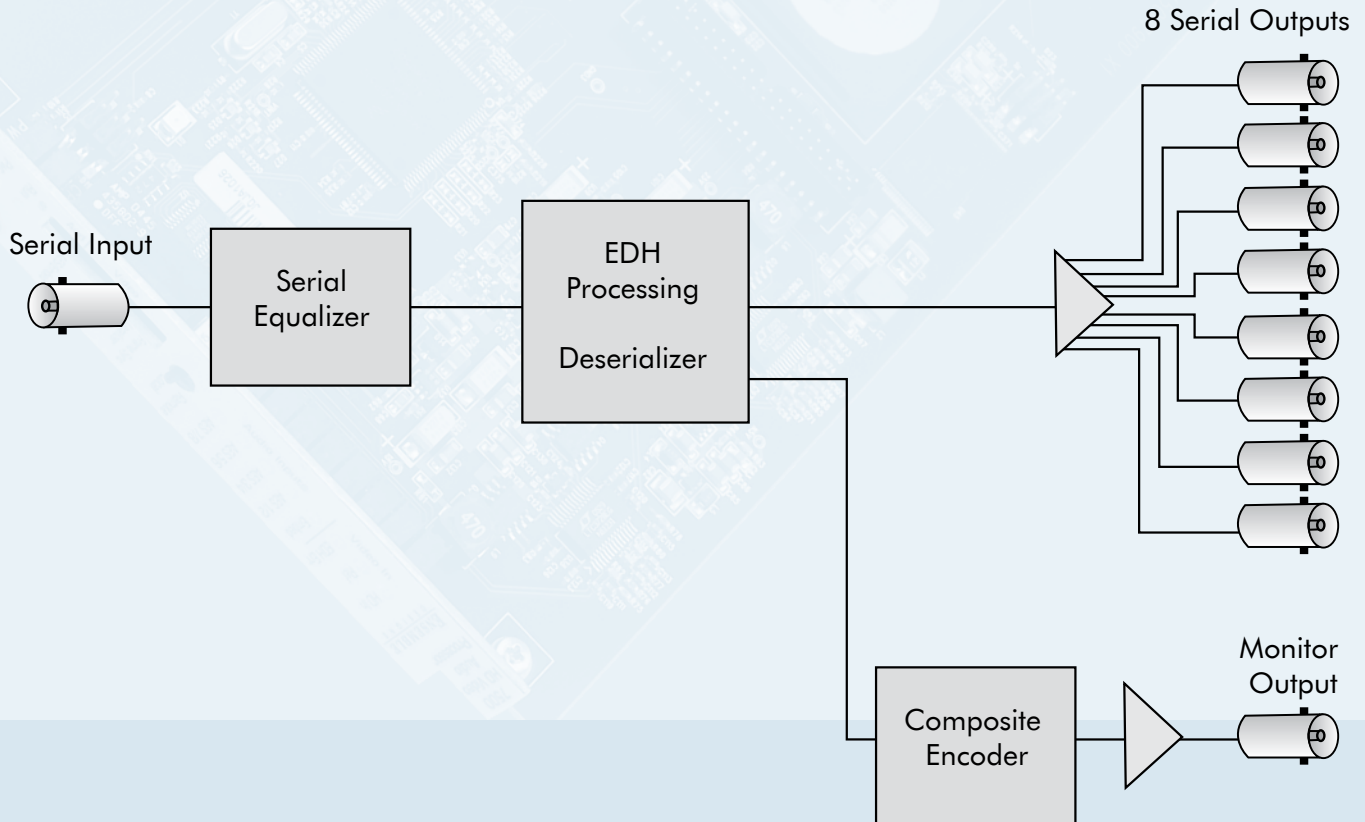
Number Eight
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss 143, 177, 270 Mb/s >15 dB
360 Mb/s >15 dB
Output DC None (AC coupled)

Composite Monitor Output

Number One
Signal Type NTSC/PAL
Impedance 75 Ω
Return Loss >40 dB
Output DC <±200 mV
Response ±0.25 dB,
10 kHz to 5.0 MHz
K Factor <1.5%

General Specifications

Power Consumption <4.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft



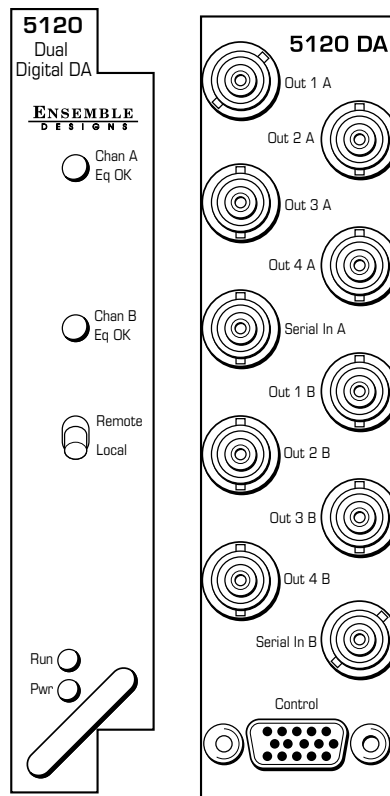
Dual Digital Video Distribution Amplifiers

The 5120 Dual Serial DA Module is a two channel digital video distribution amplifier with four outputs per channel. The 5125 is a Reclocking Dual Serial DA Module. Both modules offer cost-effective distribution as each does double duty.

The 5120 is a nonprocessing DA with cable equalization and signal detection. It accepts SD SDI, DVB-ASI and SMPTE 310M signals.

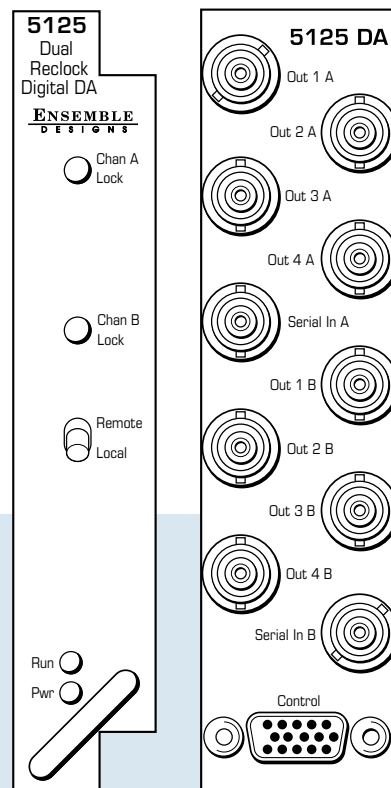
The 5125 handles SD SDI signals and includes reclocking of the serial data stream, thereby improving jitter performance of the outputs where the input has jitter.

Both the 5120 and 5125 can be used to distribute any of the following data rates: 143 Mb/s, 177 Mb/s, 270 Mb/s, and 360 Mb/s. Both DA modules can be controlled through an Avenue Control Panel and through Avenue PC.



Features

- » Two channels of distribution per module
- » Two independent sets of four outputs
- » Use 5120 with SD SDI, ASI and 310M signals
- » Use 5125 with SD SDI signals
- » EQ warning circuit
- » User definable alarms
- » 5125 provides reclocking and jitter reduction
- » Local and remote control of module settings
- » Supports 143, 177, 270 and 360 Mb/s
- » Passes embedded audio
- » 6 DAs in a 1RU Avenue frame



Serial Input

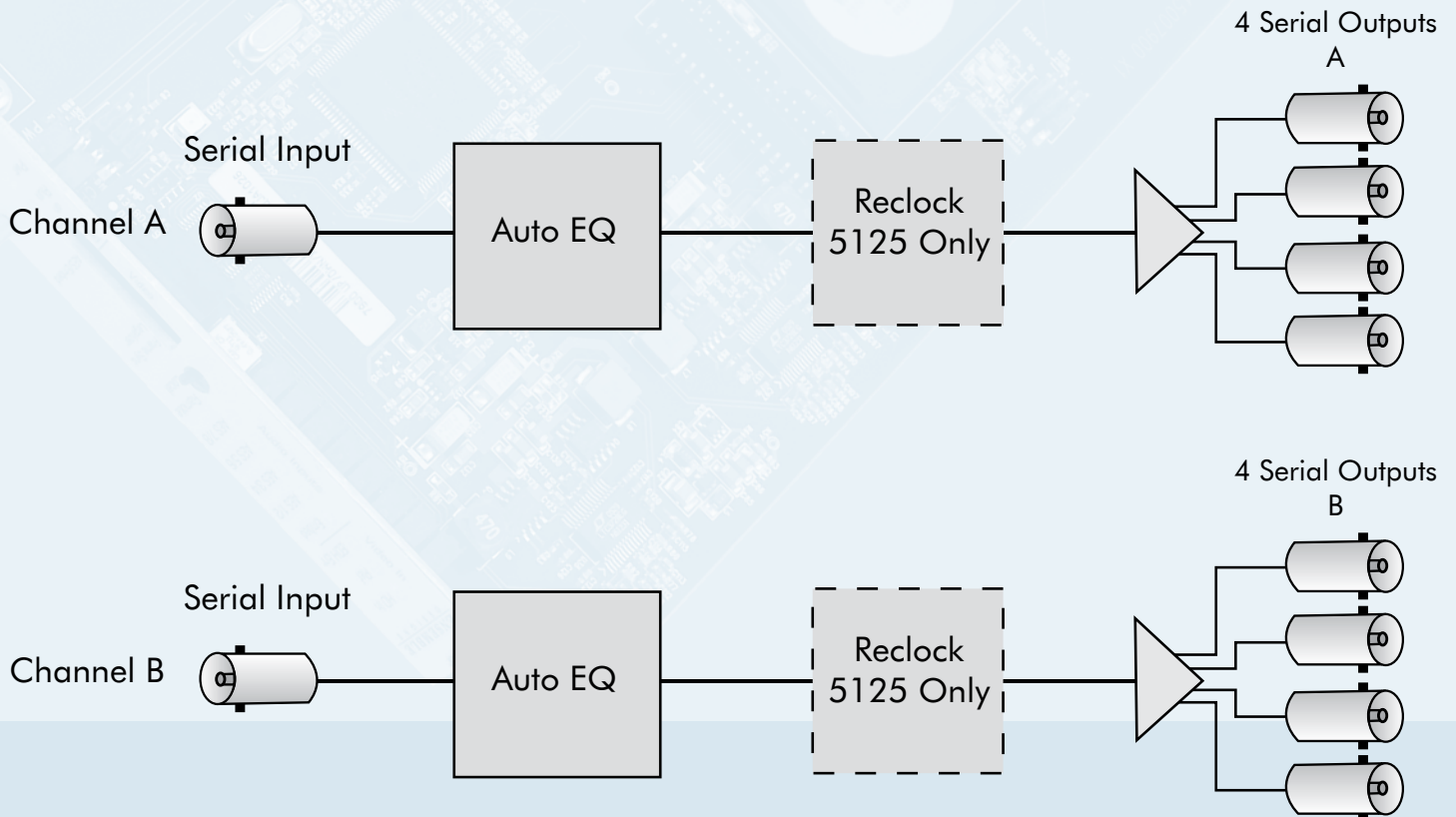
Number Two
Signal Type Serial Digital SMPTE 259M
5120 only - also DVB-ASI and SMPTE 310M
Impedance 75 Ω
Return Loss >15 dB
Max Cable Length 300 meters Belden 1694A
143, 177, 270 Mb/s
360 Mb/s

General Specifications

Power Consumption <4.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 1.5 Amp PTC resettable fuse

Output Signal

Number Four per channel
Impedance 75 Ω
Return Loss >15 dB
Output DC None (AC coupled)



Model 5130

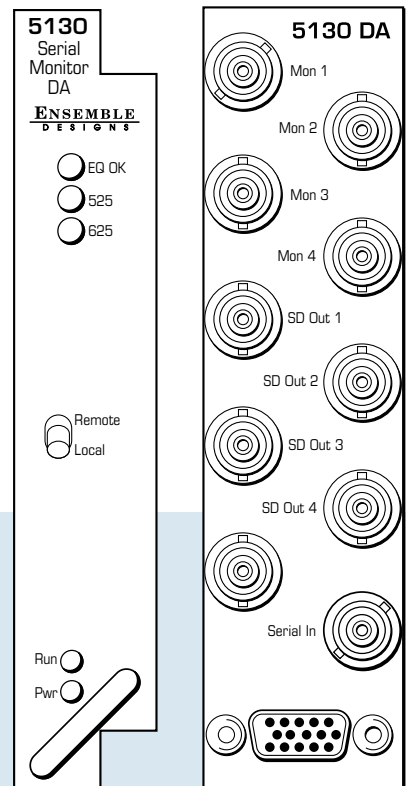
Reclocking Serial DA with Composite Monitor Outputs

Excellent for applications that need video distribution and signal monitoring, the 5130 module is both a serial digital DA and a digital-to-analog converter. The module has one serial digital input with four reclocked serial digital outputs and four composite monitor outputs.

Module status can be monitored through the Avenue Control Panels, Avenue PC and the LEDs located on the front edge of the module.

Features

- » Both a DA and a converter
- » Four serial digital outputs
- » Four composite monitor outputs
- » Reclocking and jitter reduction
- » Front panel indicators and remote monitoring
- » 525 and 625 operation
- » Excellent for facilities transitioning to digital
- » Passes embedded audio & all ancillary data



Input Signal

Number One
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz
Max Cable Length 300 meters Belden 1694A

General Specifications

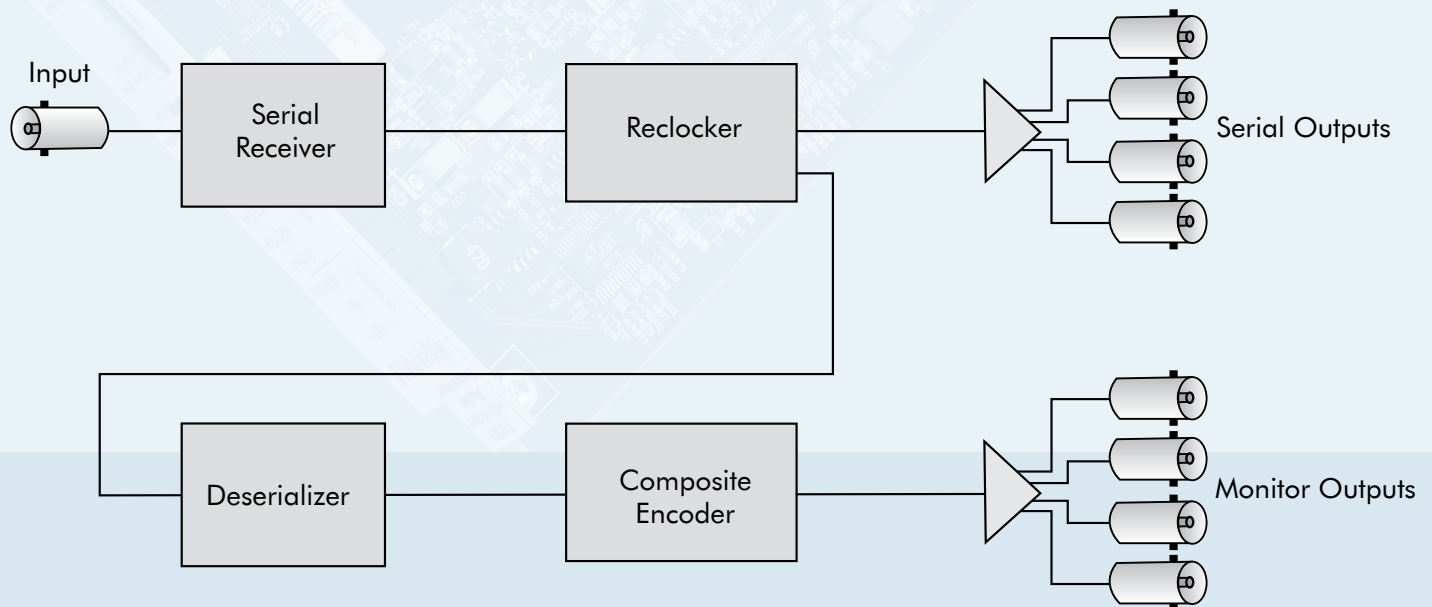
Power Consumption <5.0 watts
Temperature Range 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Setup User selectable

Serial Output Signal

Number Four
Signal Type Serial Digital SMPTE 259M
10 bit
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz
Output DC None (AC coupled)

Composite Monitor Output

Number Four
Signal Type NTSC/PAL
Impedance 75 Ω
Return Loss >40 dB
Output DC <±200 mV
Response ±0.25 dB,
10 kHz to 5.0 MHz
K Factors <1.5%
Quantization 9 bits



Model 5140

Analog Video EQ DA

The 5140 provides analog distribution of NTSC and PAL composite video signals. It can equalize up to 1000 feet (300 meters) of coaxial cable. The purpose of equalization is to compensate for the losses that occur when a video signal travels through a length of coaxial cable. Due to their differing characteristics, different types of cable will require different equalization networks on the 5140. Cable type must be specified when the module is ordered.

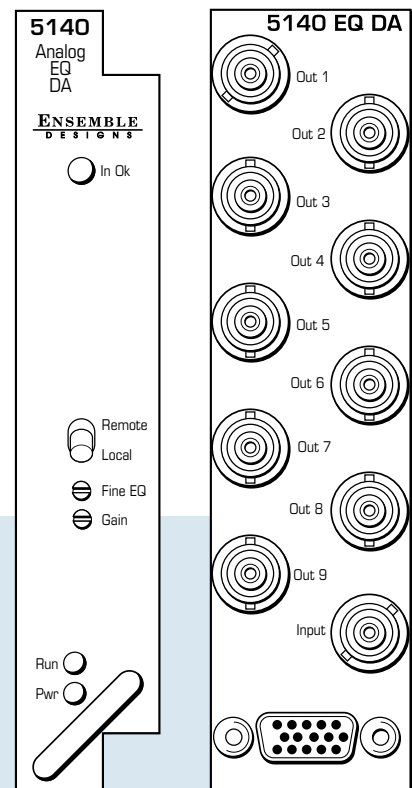
Input signal validity is displayed locally and can be monitored through the Avenue remote control options. Gain and EQ parameters can be adjusted locally as well as remotely. Remote control is accessed via the optional Avenue Touch Screen Control Panel and Avenue PC Control Application.

HumBlocker™ technology on the 5140 will automatically process the analog signal to remove power line hum and other types of interference. This is a superior solution to the problem of recovering analog signals in noisy environments or in the presence of groundloops.

Differential inputs can only provide their full benefit if the shield of the input signal is never connected to local ground. A simple patchbay or cable demarcation box can render differential inputs useless. The HumBlocker feature on the 5140 will actually identify and cancel power line interference within the video waveform itself. Because the HumBlocker system is designed specifically for analog composite video, it must be turned off if the module is being used to distribute other signals (AES, Tri-Level Sync, etc.).

Features

- » Nine outputs
- » Equalization up to 1000 feet (300 meters)
- » HumBlocker™ circuitry provides a superior solution to differential inputs
- » Local and remote control



Input Signal

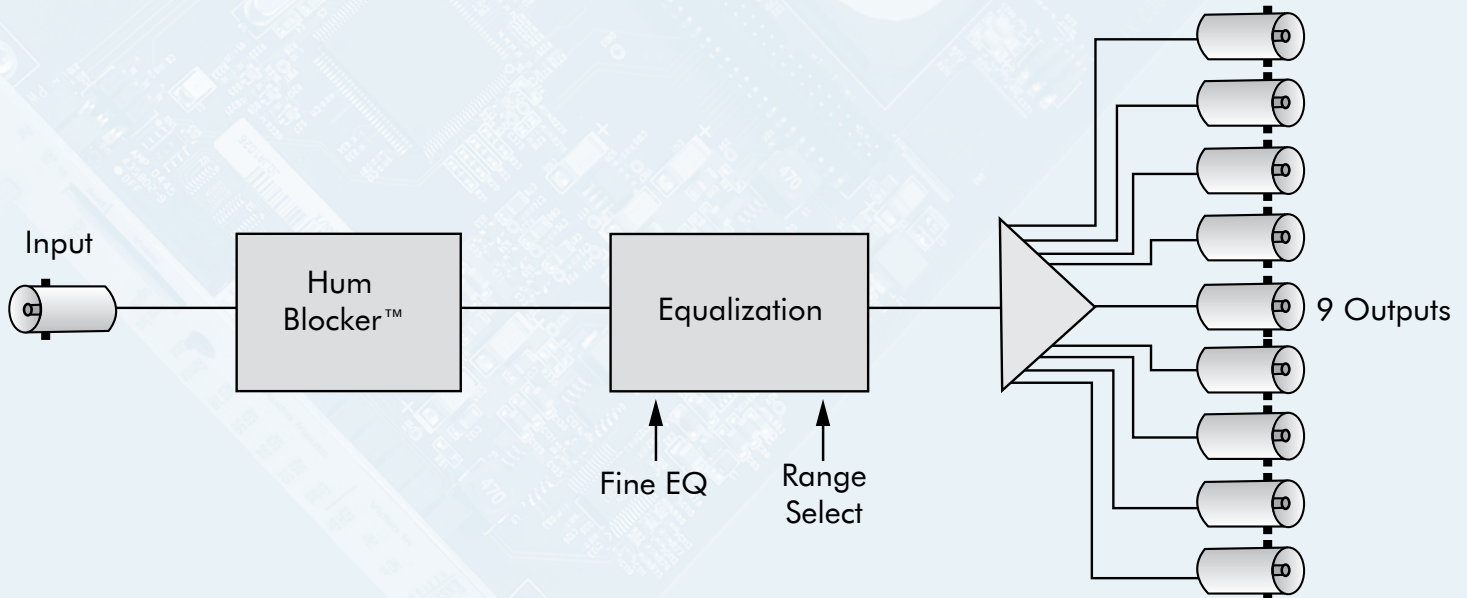
Number One, terminating
Signal Type NTSC/525, PAL/625
Composite Video
Cable Type Belden 1694A
others upon request
Impedance 75 Ω
Return Loss >40 dB to 5 MHz

Output Signal

Number Nine
Signal Type Follows Input
Impedance 75 Ω
Return Loss >40 dB to 5 MHz
DC Offset Follows Input ±50 mV
Delay 10 nsec (14° NTSC, 17° PAL)

General Specifications

Frequency Response ±0.1 dB
0 to 5.5 MHz
Signal to Noise 68 dB
K Factor, 2T Pulse <0.25%
Differential Phase 10-90% APL <0.1 degree
Differential Gain 10-90% APL <0.15%
Gain Stability <0.1 dB variation
over operating temp
Power Consumption <3.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft



Model 5150

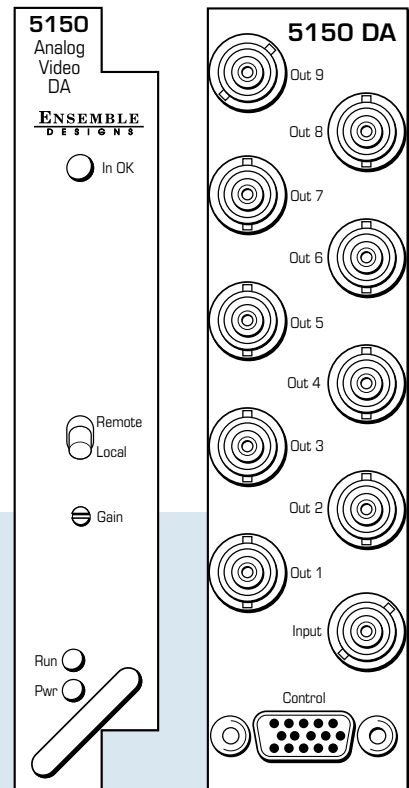
DA for Analog Video, AES and HD Tri-Level Sync

The 5150 module provides analog distribution of composite video signals, PAL or NTSC, AES audio and HD Tri-Level Sync. The 5150 provides one composite video input and nine buffered composite video outputs.

Input signal detection is displayed locally and through the Avenue remote control system. Gain can be adjusted locally as well as remotely. Remote control is accessed via the Avenue Control Panels and the Avenue PC Control Application.

Features

- » Nine outputs
- » Gain adjustment range of $\pm 10\%$
- » Supports PAL and NTSC signals
- » AES digital audio distribution
- » HD Tri-Level Sync distribution
- » Local and remote control



Input Signal

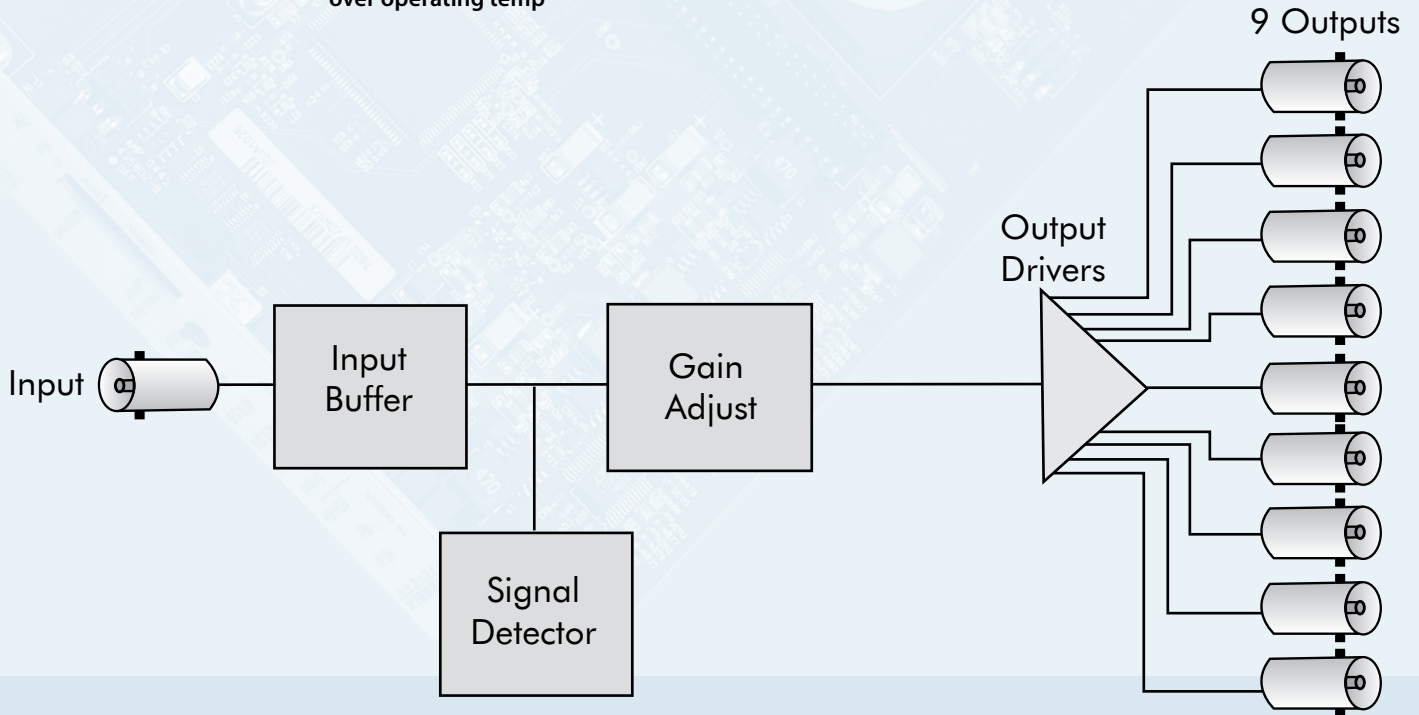
Number One, terminating
Signal Type NTSC/525, PAL/625
composite video, AES digital
audio or HD Tri-Level Sync
Impedance 75 Ω
Return Loss >40 dB to 5 MHz

General Specifications

Power Consumption <3.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft

Output Signal

Number Nine
Signal Type Follows Input
Impedance 75 Ω
Return Loss >40 dB to 5 MHz
DC Offset Follows Input ±50 mV
Delay 10 ns (14° NTSC, 17° PAL)
Frequency Response ±0.1 dB, 0 to 5.5 MHz
Signal to Noise 68 dB
K Factor, 2T Pulse <0.25%
Differential Phase 10-90% APL <0.1 degree
Differential Gain 10-90% APL <0.15%
Gain Stability <0.1 dB variation
over operating temp



Model 5155

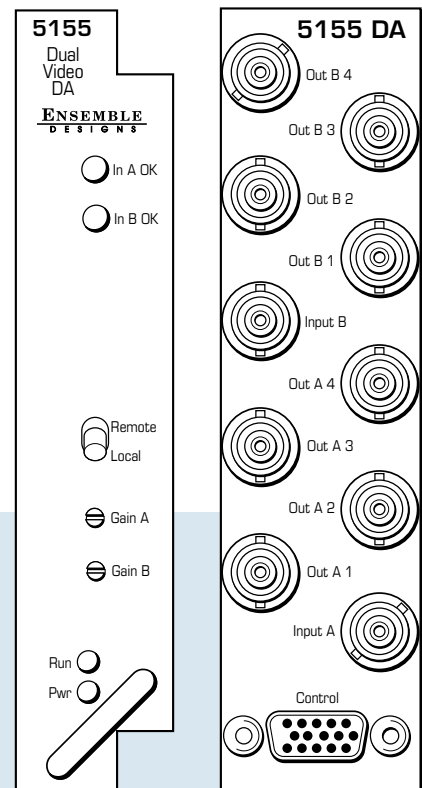
Dual DA for Analog Video, AES and HD Tri-Level Sync

The 5155 module provides analog distribution of composite video signals; NTSC and PAL; and AES audio. This dual distribution amplifier's two inputs are each distributed to four outputs.

Input signal validity is displayed locally and can be monitored through the Avenue remote control options. Gain can be adjusted locally as well as remotely. Remote control is accessed via the optional Avenue Control Panels and Avenue PC.

Features

- » Two channels of distribution per module
- » Supports PAL and NTSC signals
- » AES audio distribution
- » HD Tri-Level Sync distribution
- » Local and remote control



Input Signal Description

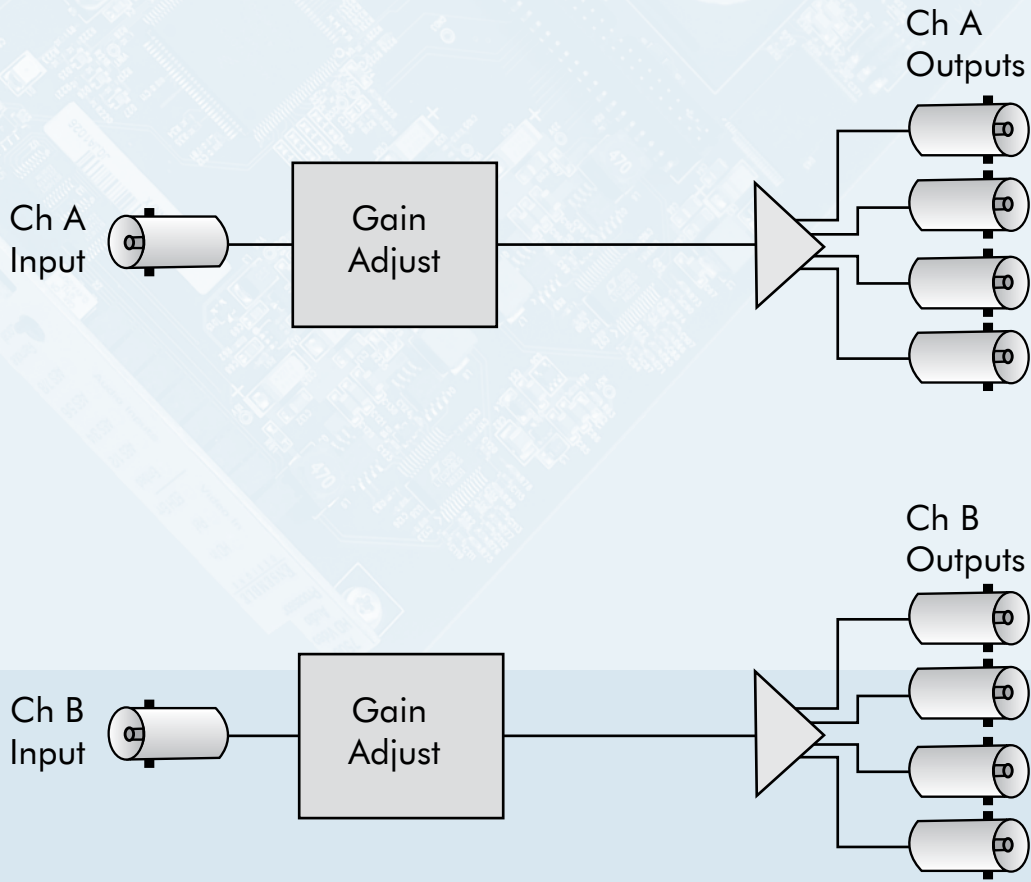
Number	Two, terminating on module
Signal Type	NTSC/525, PAL/625 composite video, AES digital audio, or HD Tri-Level Sync
Impedance	75 Ω
Return Loss	15 k-5 MHz >40 dB

General Specifications

Power Consumption	< 3.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft
Fusing	1.5 Amp PTC resettable fuse

Output Signal Description

Number	Eight (four per input)
Signal Type	Follows Input
Impedance	75 Ω
Return Loss	15 k-5 MHz >40 dB
DC Offset	Follows Input ±50 mV
Delay	10 nsec (14° NTSC, 17° PAL)
Frequency Response	±0.1 dB, 0 to 5.5 MHz
K Factor, 2T Pulse	< 0.25%
Differential Phase	10-90% APL < 0.1 degree
Differential Gain	10-90% APL < 0.15%



Serial Digital Protection DA

The 5160 Serial Digital Protection DA module is a fail-safe bypass protection switch for monitoring and switching critical digital paths. When a fault is detected in the Primary input, the switch will activate, causing the Secondary (backup) input to be switched to the module's distributed outputs. The switch can operate in two modes; automatic or nonresetting.

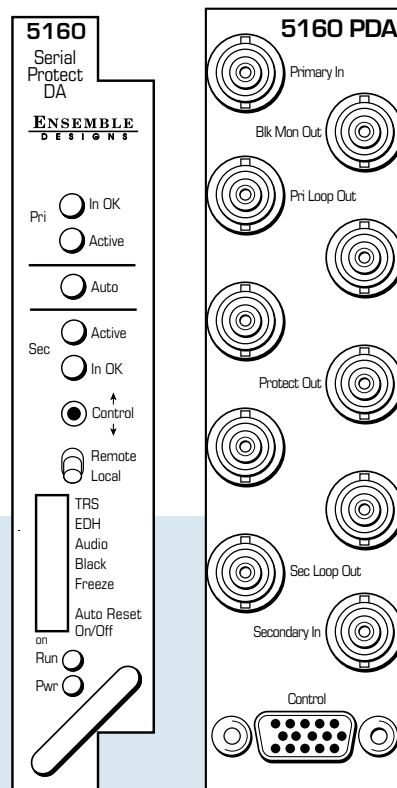
The 5160 monitors the integrity of the Primary serial digital input stream and analyzes the audio and video content. Signal health and fault detection is determined by monitoring any or all of the following parameters: Timing Reference Signal (TRS), Black, Embedded Audio, Error Detection and Handling (EDH), and Freeze.

A sophisticated Black detection system is employed to activate the switch in the event signal is lost. It allows the user to select not only the threshold and percentage of nonblack pixels, but also the portion of the picture to be considered.

The Freeze detection system can be set to detect a clean or noisy source. Freeze Time sets the number of seconds for the 5160 to switch to the secondary input after a video freeze condition is detected in the primary input.

Features

- » Two serial digital inputs, four serial digital outputs
- » Detects Closed Caption Data, TRS, EDH, Black, Silence and Freeze
- » Embedded audio detection
- » Passes embedded audio
- » Alarm generation
- » Remote control and monitoring



Input Signal

Number Two
Signal Type Serial Digital SMPTE 259M
Standard 525/60 or 625/50 auto detect
Impedance 75 Ω
Return Loss >15 dB to 270 MHz

General Specifications

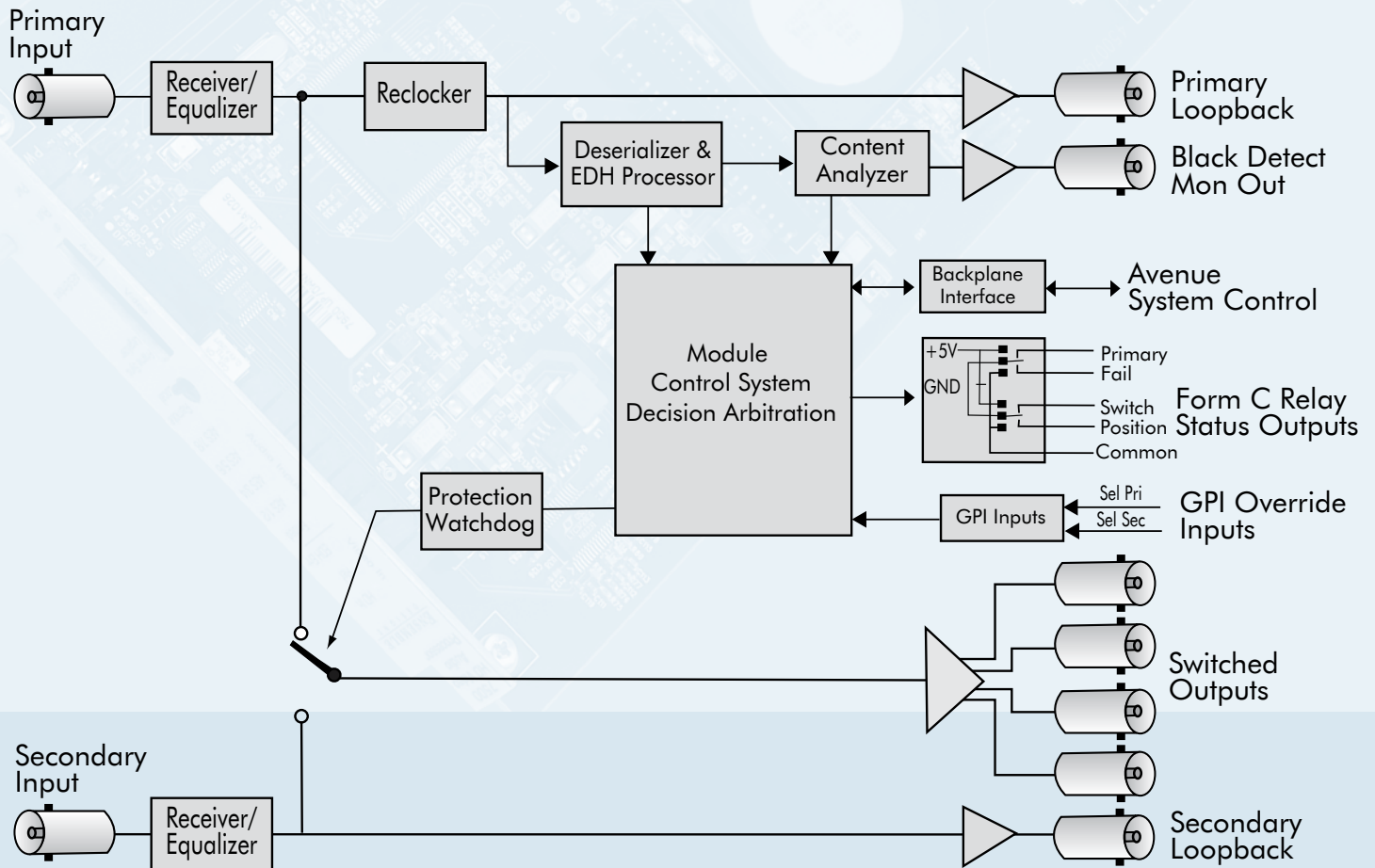
Connectors BNC
Power Consumption <5 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 1.5 Amp PTC resettable fuse

Serial Digital Loopback

Number Two
Impedance 75 Ω

Serial Output Signal

Number Four
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω



Digital to Analog Video Converter and Disembedder

The 5230 converts serial digital component video into either composite or component analog outputs. Its 8 x oversampling and 12 bit processing ensure high quality conversion for use in the most demanding applications.

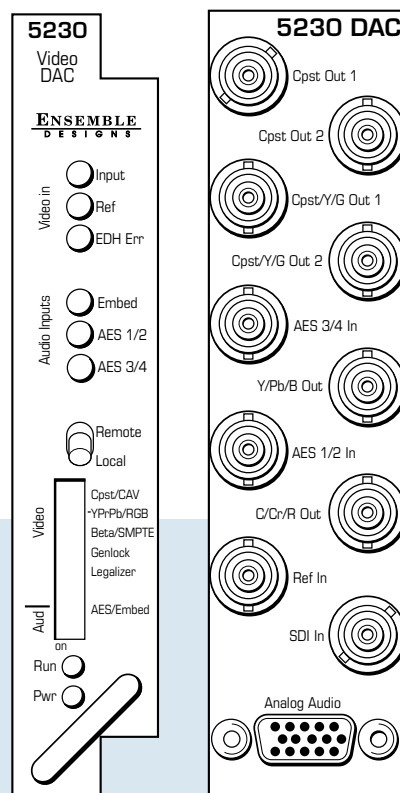
The 5230 has a full-featured Proc Amp for adjustment of every signal parameter. Proc controls include Video and Chroma Gain, NTSC-style hue rotation, Black Balance, and pedestal. Module parameters can be monitored and controlled locally and remotely.

The 5230 provides fully adjustable output timing relative to the reference input signal. Composite outputs can be precisely color timed and will also track color framing of the reference signal. Incorporating a full-frame synchronizer, the 5230 accepts serial inputs that are asynchronous to the reference. On loss of input, the output can mute to black or freeze on the last good frame of video.

The 6230 is an optional sub module for converting AES inputs or embedded audio content to analog. There is a four channel audio mixer for level controls, audio shuffling, and phase inversion. The 6230 also has automatic tracking delay and bulk delay to keep lip sync correct.

Features

- » Component or composite or Y/C (S-Video) outputs
- » 12 bit conversion
- » 8:8:8 video reconstruction with 8 x oversampling
- » Proc Amp adjustments and SC/H timing controls
- » Line selectable toothed blanking
- » Clips and Chroma limiting
- » Composite legalizer
- » Generates color bars
- » Memory registers
- » Genlock/Frame sync
- » Automatic 525/625 switching
- » Optional sub module for disembedding, audio shuffling and adjusting levels
- » 110 Ω option available



Serial Digital Input

Signal Type	SMPTE 259
EDH	Fully compliant
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	300 meters Belden 1694A
Automatic Cable Input Equalization	

Reference Input

Number	One external One internal Master Timing Ref
Type	1 V-P Composite Video, PAL or NTSC
Impedance	75 Ω
Return Loss	>40 dB

Analog Output

Type	PAL or NTSC 4 composite and 1 Y/C or 2 composite and 1 component Y, Pr, Pb or RGB
Impedance	75 Ω
Return Loss	>40 dB
Output DC	<50 mV

SDI to Analog Performance

Bit Resolution	12 bit output reconstruction 8 x oversampling
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%
Color Field Sequence	Locked to selected Ref
Minimum Delay	25 μsec

AES/EBU Digital Inputs (6230 sub module)

Number	Two (total of four channels)
Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 or 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs (6230)

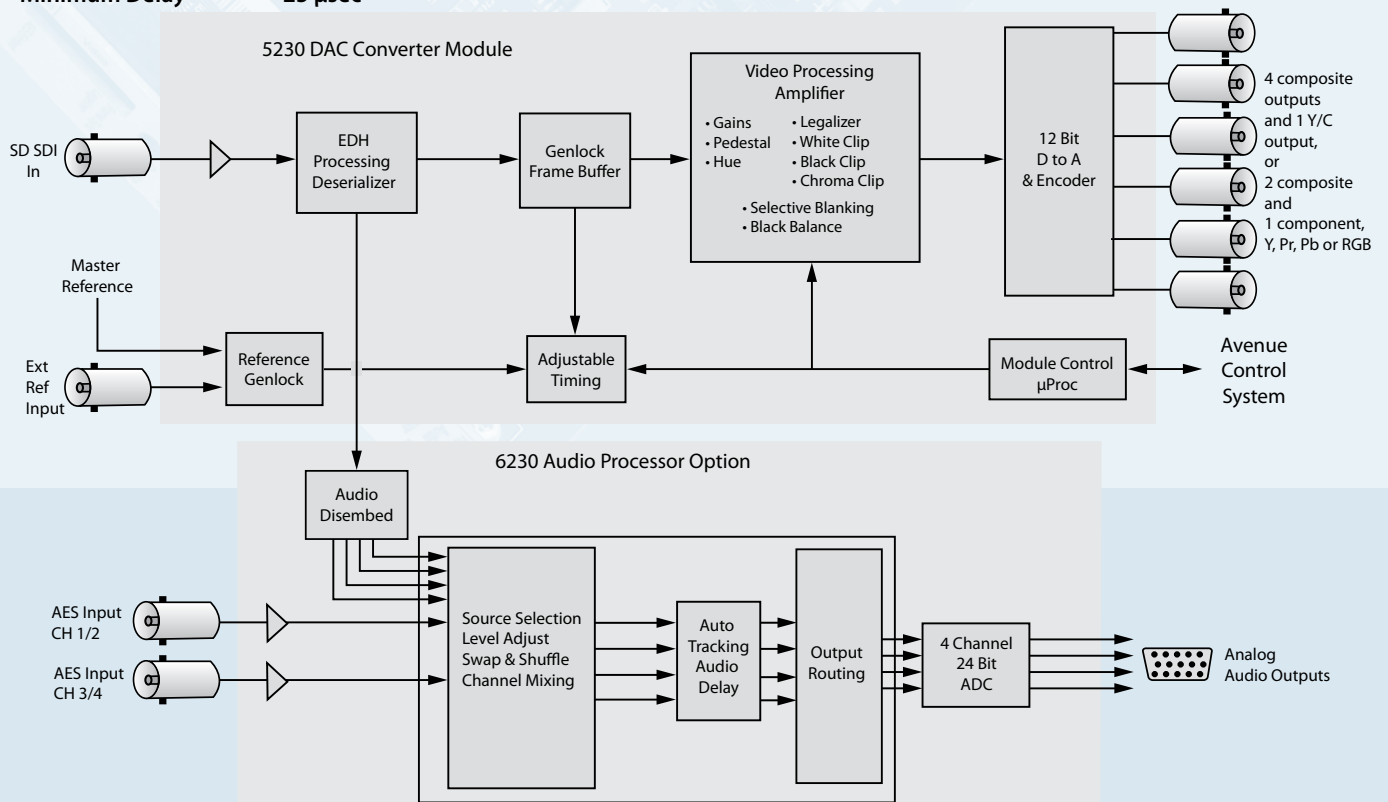
Number	One (from SDI video input)
Type	SMPTE 274M compliant Selectable to any of 4 groups
Channels	Four
Bit Depth	20 and 24 bit

Analog Audio Output (6230)

Analog Output Processing	Four, Balanced Pair
Analog Output Z	24 Bits
Max Output level	30 Ω, balanced, transformerless +24 dBu
Dynamic Range	>106 dB

General Specifications

Power Consumption	10 watts (with both options installed)
Temperature	0 to 40°C, ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing



Analog to Digital Video Converter and Embedder

The 5330 converts a composite or component analog video signal to serial digital component. Its 12 bit processing and 4 x oversampling ensure clean signals that can be used in the most demanding applications. Composite signals are decoded using an adaptive comb filter. An infinitely adjustable timing system genlocks to your house reference.

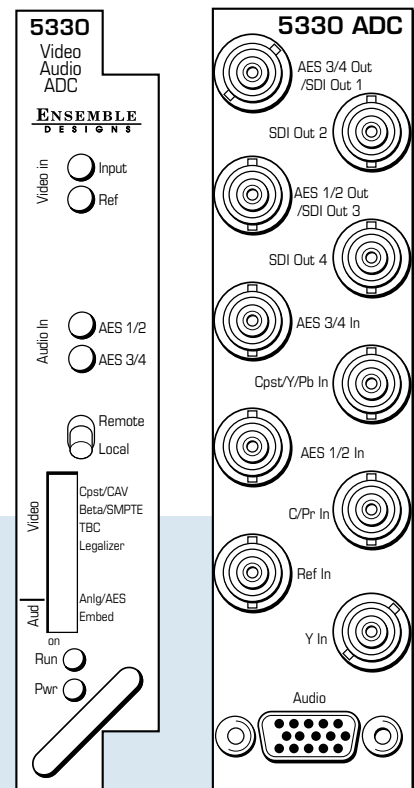
The built-in time base corrector/frame synchronizer allows for removal of time base error present in the composite input. The 5330 accepts asynchronous inputs and delivers serial outputs locked and timed to house reference. Robust signal handling ensures proper time base correction for virtually any source, even a consumer VHS machine. On loss of input, the output can mute to black or freeze on the last good frame of video.

A Detail Enhancer recovers information that has been lost due to poor frequency response in upstream systems. The Predictive Composite Clipper mode identifies picture elements that would be illegal in analog composite, and limits color saturation and luminance excursions. Proc controls are also provided.

The optional 6330 sub module provides embedding of analog or AES audio. Analog inputs are digitized at 24 bits of resolution. Two AES inputs provide four channels of digital audio to the input selector. Sample rate converters can be selected in the AES input path, allowing the use of asynchronous digital sources. A four channel audio mixer provides level control, phase inversion and channel shuffling. The 6330 also has automatic tracking delay and bulk delay.

Features

- » Converts Y, Pr, Pb composite or Y/C (S-Video) to serial digital component
- » Two or four serial digital outputs
- » 12 bit internal processing, 4 x oversampling
- » Complete proc amp adjustments
- » Adaptive comb filter
- » Automatic 525/625 switching
- » Memory registers
- » Line selectable toothed blanking
- » EDH detection and insertion
- » TBC/Frame Synchronizer
- » Optional embedder, audio shuffler and tracking delay
- » 110 Ω option



Analog Inputs	
Signal Type	SMPTE Y/Cr/Cb Beta Y/Cr/Cb NTSC, PAL Composite NTSC, PAL S-Video (Y/C)
Impedance	75 Ω
Return Loss	>40 dB
Input	±1 volt DC
Input Hum	<100 mV

Reference Input	
Number	One external One internal Master Timing Ref
Type	1 V P-P Composite Video PAL or NTSC
Impedance	75 Ω
Return Loss	>40 dB

Analog to SDI Performance	
Bit Resolution	12 bit input quantization 4 x oversampling
Signal to Noise	>62 dB, weighted
Frequency Response	
Composite, Y	±0.1 dB, 0 to 5.5 MHz
Cr, Cb	±0.1 dB, 0 to 2.75 MHz
Minimum Delay	90 μsec

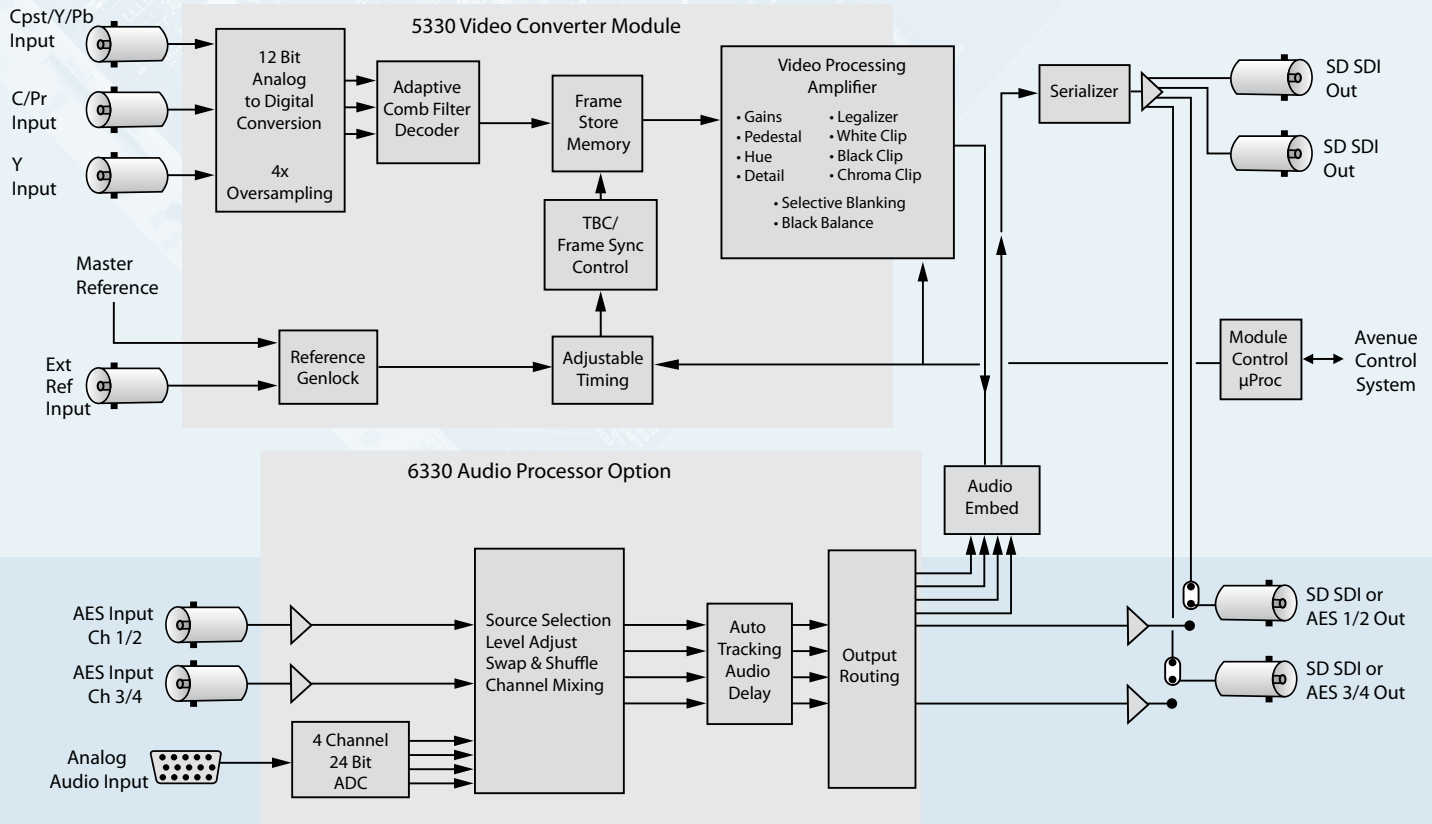
Serial Output	
Number	Two or Four (selectable)
Signal Type	Serial Digital SMPTE 259M
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

Analog Audio Input (6330 sub module)	
Analog Inputs	Four, Balanced Pair
Processing	24 bits
Analog Input Z	>15 k Ω, balanced, transformerless
CMRR	>60 dB, 20 Hz to 10 kHz

AES Input (6330)	
Number	Two AES
Channels	Four total
Signal Type	AES Coaxial
	20 or 24 bit
Impedance	75 Ω

AES Outputs (6330)	
Number	Two AES or none (selectable)
Channels	Four total
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz
	Synchronous to Video output
Reference Level	-18 or -20 dBFS (selectable)

General Specifications	
Power Consumption	10 watts (with both options installed)
Temperature	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft



Four Channel Analog to Digital Video Converters

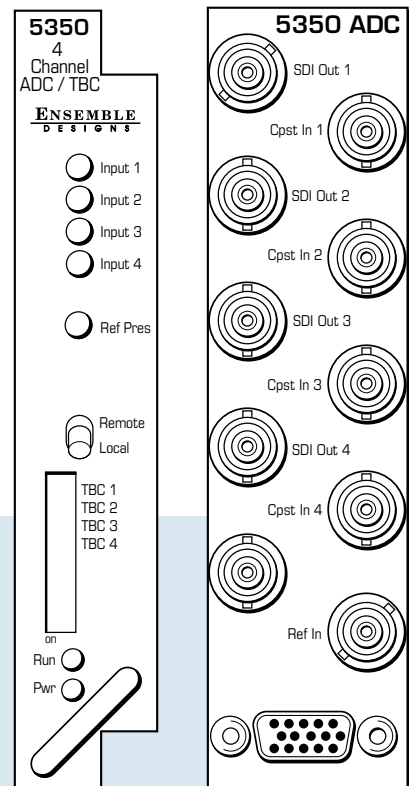
The Avenue 5350 and 5355 modules are four channel analog composite to serial digital video converters. Use these modules with routers, switchers, remote trucks or any application that requires many channels of high quality conversion.

12 bit analog to digital conversion, digital decoding of the composite input, and adaptive comb filtering ensure superior output signals. Proc amp functions allow adjustment of video, chroma, setup and hue.

5350 also has a genlock reference input and a TBC/Frame Sync for each of the four conversion channels. The 5350 can accept noisy inputs and is well suited for feeds from remote trucks and satellite receivers. Additionally, the 5350's outputs are independently timeable.

Features

- » Four channels of conversion on one module
- » Four analog inputs, four SDI outputs
- » 12 bit processing, 4 x oversampling
- » PAL/NTSC auto detect
- » Adaptive comb filter
- » Proc amp
- » 5350 has TBC/Frame Sync, independently timeable outputs
- » 5350 accepts noisy inputs
- » 5350 has an internal color bar generator



Analog Video Inputs (4 each)

Signal Type	NTSC, PAL Composite
Impedance	75 Ω
Return Loss	>40 dB DC to 5.5 MHz
Input DC	±1 volt DC
Input Hum	<100 mV

Reference Input (5350 only)

Signal Type	1 V P-P Composite Video, PAL or NTSC
Impedance	75 Ω
Return Loss	>40 dB

Serial Digital Outputs (4 each)

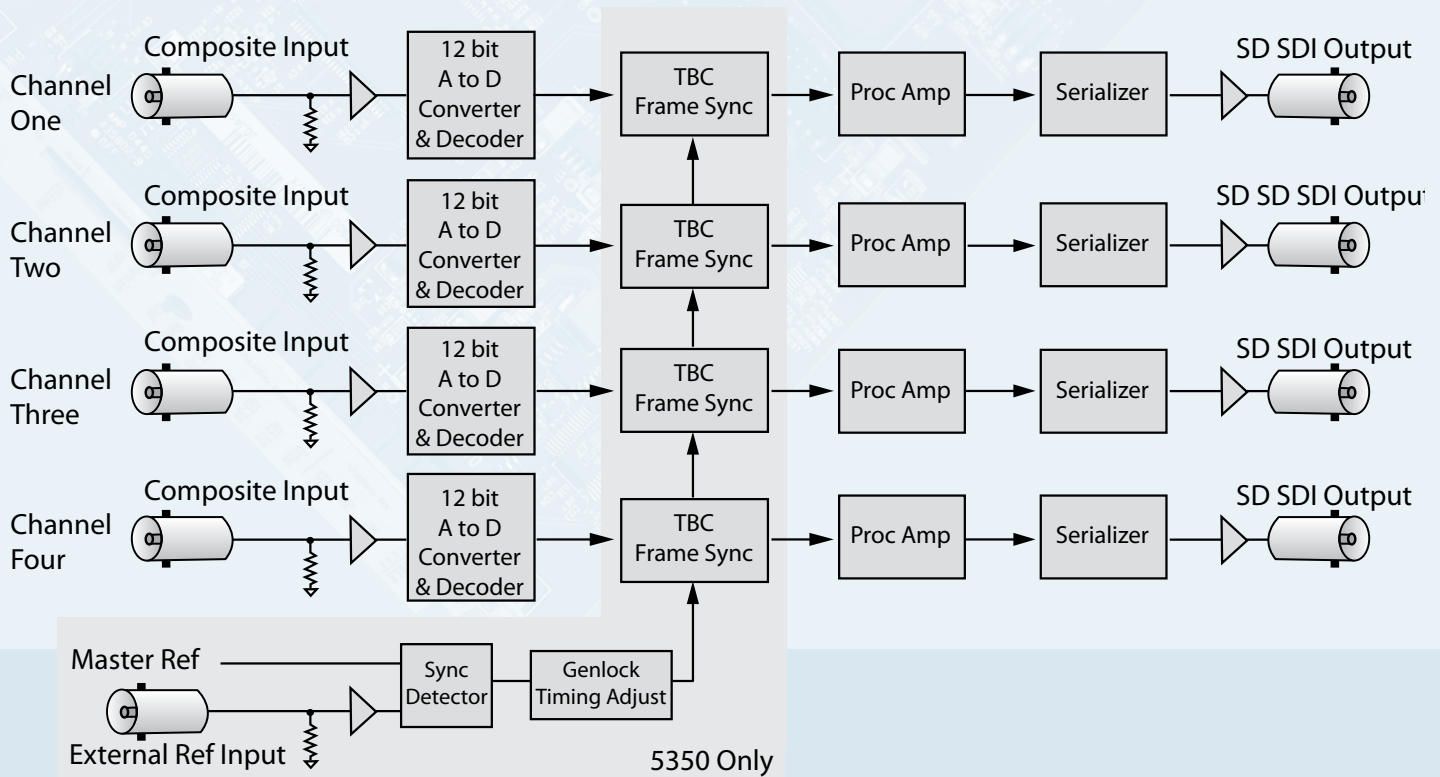
Signal Type	SMPTE 259M-C
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

Analog Video to SDI Performance

Bit Resolution	12 bit input quantization, 4 x oversampling
Decoding	Adaptive Comb Filter, 3 or 5 line selectable
Signal to Noise	>62 dB, weighted
Frequency Response	±0.1 dB, 0 to 5.5 MHz

General Specifications

Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft



Four Channel Analog to Digital Video Converters and Embedders

The Avenue 5360 and 5365 modules convert four channels of analog video and audio to four streams of SD SDI with embedded audio. Use these modules with routers, switchers, remote trucks or any application that requires many channels of high quality video and conversion. This is a perfect solution for satellite installations that need to feed a large number of analog signals from IRDs into a monitor wall.

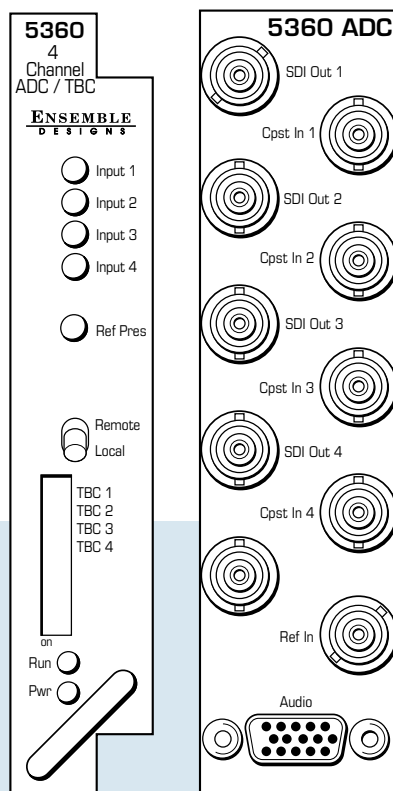
12 bit analog to digital conversion, digital decoding of the composite input, and adaptive comb filtering ensure superior output signals. Proc amp functions allow adjustment of video, chroma, setup and hue.

Analog audio inputs are digitized at 24 bits of resolution and then embedded into the associated video signal.

5360 also has a genlock reference input and a TBC/Frame Sync for each of the four conversion channels. The 5360 can accept noisy inputs and is well suited for feeds from remote trucks and satellite receivers. Additionally, the 5360's outputs are independently timeable.

Features

- » Four channels of conversion and audio embedding on one module
- » Four analog video inputs, four SDI outputs
- » 12 bit processing, 4 x oversampling
- » Analog audio inputs, 1 stereo pair per video input
- » 24 bit, 256x oversampled audio processing
- » PAL/NTSC auto detect
- » Adaptive comb filter
- » Proc amp
- » 5360 has TBC/Frame Sync, independently timeable outputs
- » 5360 accepts noisy inputs
- » 5360 has an internal color bar generator



Analog Video Inputs (4 each)

Signal Type	NTSC, PAL Composite
Impedance	75 Ω
Return Loss	>40 dB DC to 5.5 MHz
Input DC	±1 volt DC
Input Hum	<100 mV

Reference Input (5360 only)

Signal Type	1 V P-P Composite Video, PAL or NTSC
Impedance	75 Ω
Return Loss	>40 dB

Serial Digital Outputs (4 each)

Signal Type	SMPTE 259M-C
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

Analog Video to SDI Performance

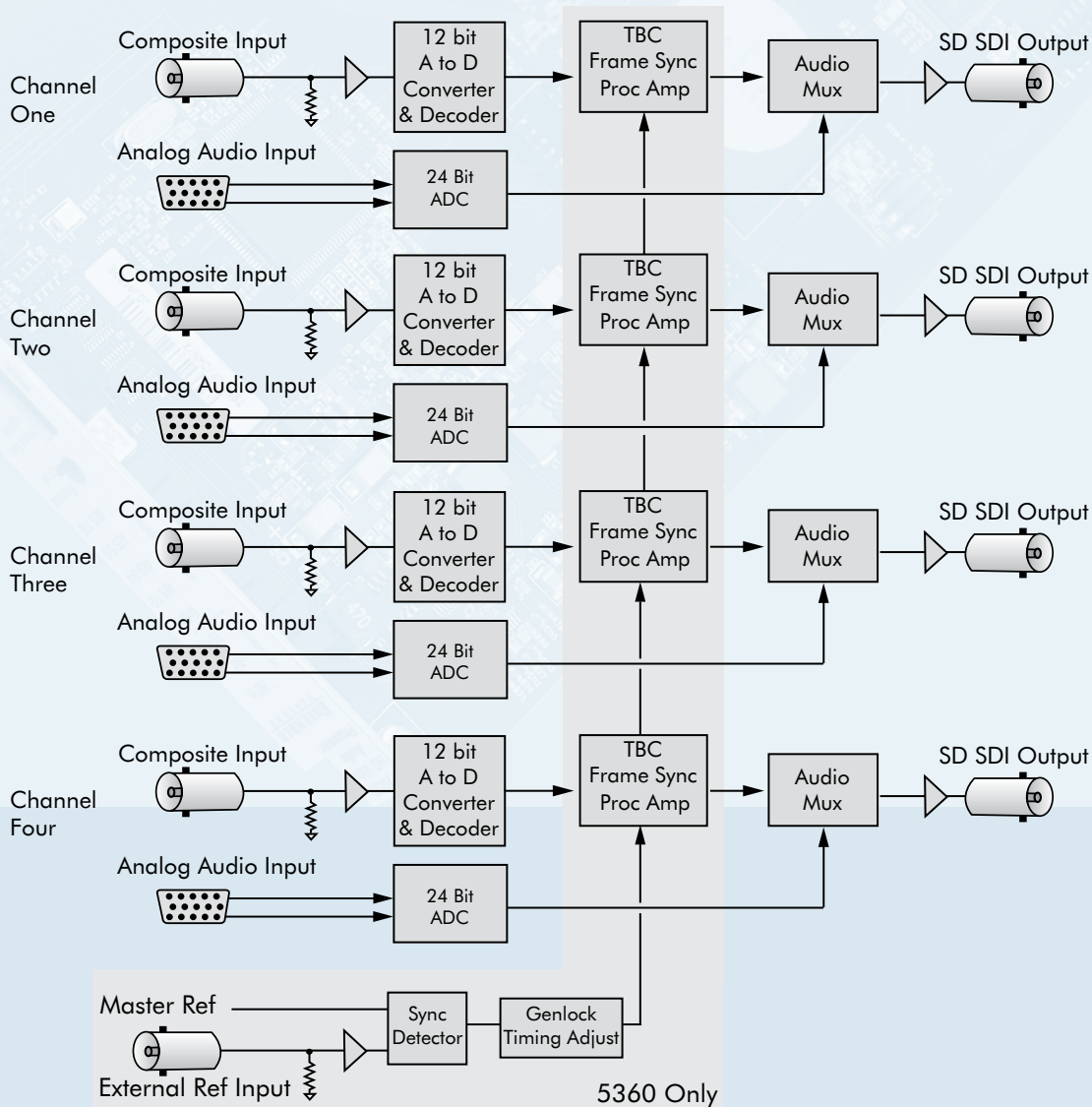
Bit Resolution	12 bit input quantization, 4 x oversampling
Decoding	Adaptive Comb Filter, 3 or 5 line selectable
Signal to Noise	>62 dB, weighted
Frequency Response	±0.1 dB, 0 to 5.5 MHz

General Specifications

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

Analog Audio Input (2 per video input)

Analog Inputs	Eight, unbalanced pair
Processing	24 bits
Analog Input Z	>15 kΩ, unbalanced, transformerless



Analog Composite to Digital Converter

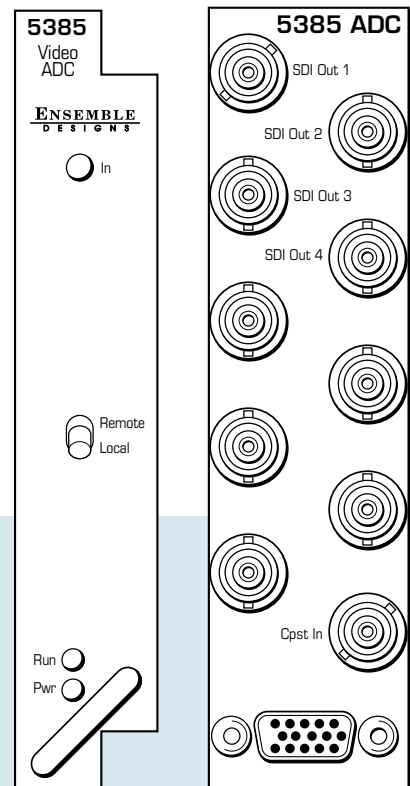
The 5385 module converts analog composite video to serial digital component. Its 12 bit processing and 4 x oversampling ensure clean signals that can be used in the most demanding applications.

The analog input is digitally decoded with sophisticated filtering to cleanly separate chroma and luminance content. The user selectable adaptive comb filter can be set to 3 line or 5 line mode. Complete proc controls provide adjustment for video, chroma, setup and hue. The SDI output is synchronous with respect to the analog video input.

Module parameters can be monitored and controlled both locally and remotely. Remote control is accessed with an Avenue Control Panel or through Avenue PC Software.

Features

- » Converts composite to serial digital component
- » Four serial digital outputs
- » 12 bit processing, 4 x oversampling
- » Complete proc amp adjustments
- » Adaptive comb filtering
- » Memory registers
- » Auto-senses PAL/NTSC
- » Local and remote control



Analog Video Input

Signal Type	NTSC, PAL Composite
Impedance	75 Ω
Return Loss	>40 dB DC to 5.5 MHz
Input DC	±1 volt DC
Input Hum	<100 mV

Serial Digital Output

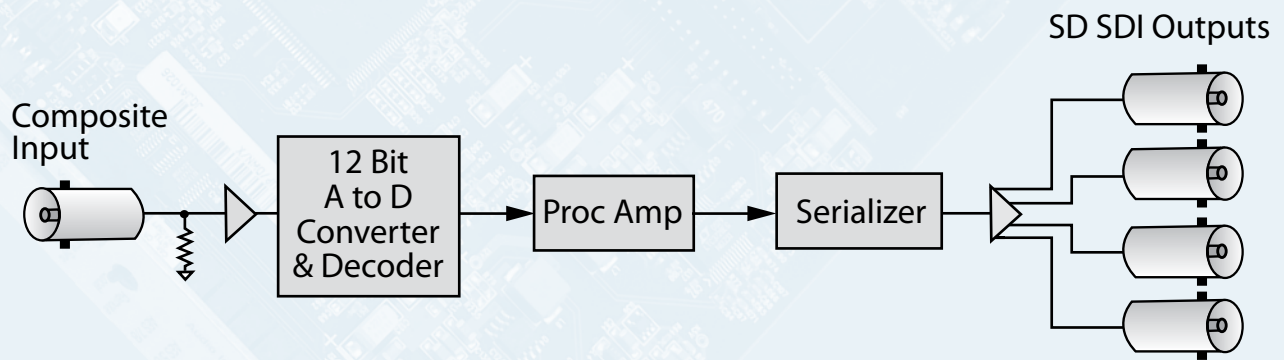
Number	Four
Type	SMPTE 259M-C
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

Analog Video to SDI Performance

Bit Resolution	12 bit input quantization, 4 x oversampling
Decoding	Adaptive Comb Filter, 3 or 5 line selectable
Signal to Noise	>62 dB, weighted
Frequency Response	±0.1 dB, 0 to 5.5 MHz

General Specifications

Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft



Dual Sync Generator and Test Signal Generator with HD Tri-Level Sync

The 5400 Dual Sync Generator/Test Signal Generator is a stable timing source that is perfect for local reference generation in broadcast, remote trucks and post. Dual outputs, simultaneously in analog composite and serial digital, and an HD Tri-Level Sync reference output are generated. Analog and AES audio outputs are optional.

The 5400 can operate from an internal precision frequency reference as a stand-alone Master Sync Generator or lock to a video reference. For the ultimate in precision, the 5400 can lock to an external 10 MHz source, such as an atomic standard or GPS receiver.

Two sets (primary and secondary) of composite outputs and serial outputs are provided. Each output set can be timed with respect to the reference to any point in the television frame. Color framing tracks the reference signal. Timing adjustments for primary and secondary outputs are configured independently. The 5400 can be configured to output 525 and 625 standards simultaneously.

The primary sync generator always outputs the test pattern generator. The Cyclops feature adds a motion element to the video test signal. An ID slate with user-programmable text can overlay the test pattern. The secondary sync generator always outputs color black.

For complex facilities, the 5400 can be paired with the 5405 Dual Analog SPG module, adding two more sets of timeable reference (black burst) outputs.

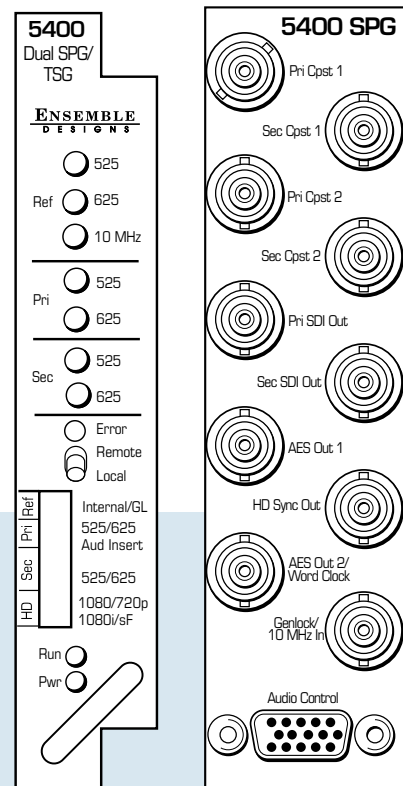
The HD Tri-Level Sync output provides an analog timing reference for high definition applications and is independently timeable. There are a variety of user-selectable formats including: 1080i, 720p, 1080p and 1080sF. When using the sF formats, the Tri-Level output has the proper 4:5 frame relationship with respect to the standard definition output. The 5410 option provides a 6 Hz output which is useful in telecine applications.

AES3id, word clock, analog tone and embedded audio reference outputs are offered with the optional 5410 sub module. The AES outputs are synchronous to the 525 and 625 outputs as they all share the same time base, making the 5400 a perfect fit in multi-standard facilities. With the 5410, the primary 601 output will have EDH checksums inserted.

For HD and 3 Gb/s systems, consider the 7400 and 9400 modules.

Features

- » Use as Master Sync Gen or lock to external reference or GPS
- » Generates 30+ test signals
- » Digital and analog video outputs
- » Primary and secondary outputs can be independently timed
- » HD Tri-Level Sync output
- » Can provide 525 and 625 outputs simultaneously
- » 5410 option provides AES, word clock, analog tone, embedded audio, EDH, EDH error, and 6 Hz pulse outputs
- » Audio Automatic Gain Control option



Reference Input

Number	Two: External or Frame Master Reference
Signal Type	1 V P-P PAL, NTSC, or 10 MHz
Return Loss	>40 dB DC to 5.5 MHz

Composite Outputs

Number	Two Primary, Two Secondary
Signal Type	NTSC/PAL
Impedance	75 Ω
Return Loss	>40 dB DC to 5.5 MHz
Frequency Response	±0.1 dB, 0 to 5.0 MHz
Output DC	±50 mV
K Factor	<1.0%
Differential Phase	<1.0 degree
SCH Phase	±2 degrees
Delay	Adjustable over full frame in sub degree steps
Color Framing	Tracks Ref, user selectable

Accuracy and Timing Stability

Internal TCXO	
PAL Fsc	4.43361875 MHz ±1 Hz
NTSC Fsc	3.579545 MHz ±1 Hz
601 Fs	27.000000 MHz ±5 Hz
Long Term Drift	<1 ppm/year
Analog Jitter	<1 ns
Digital Jitter	<0.2 UI (0.13 UI typical)

Serial Outputs

Number	One Primary, One Secondary
Signal Type	Serial Digital SMPTE 259M
Return Loss	>15 dB DC to 270 MHz

Tri-Level Sync Output

Number	One, 75 Ω
Signal Type	1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
Output DC	±50 mV
Return Loss	>30 dB to 30 MHz

AES Audio Output (Optional with 5410)

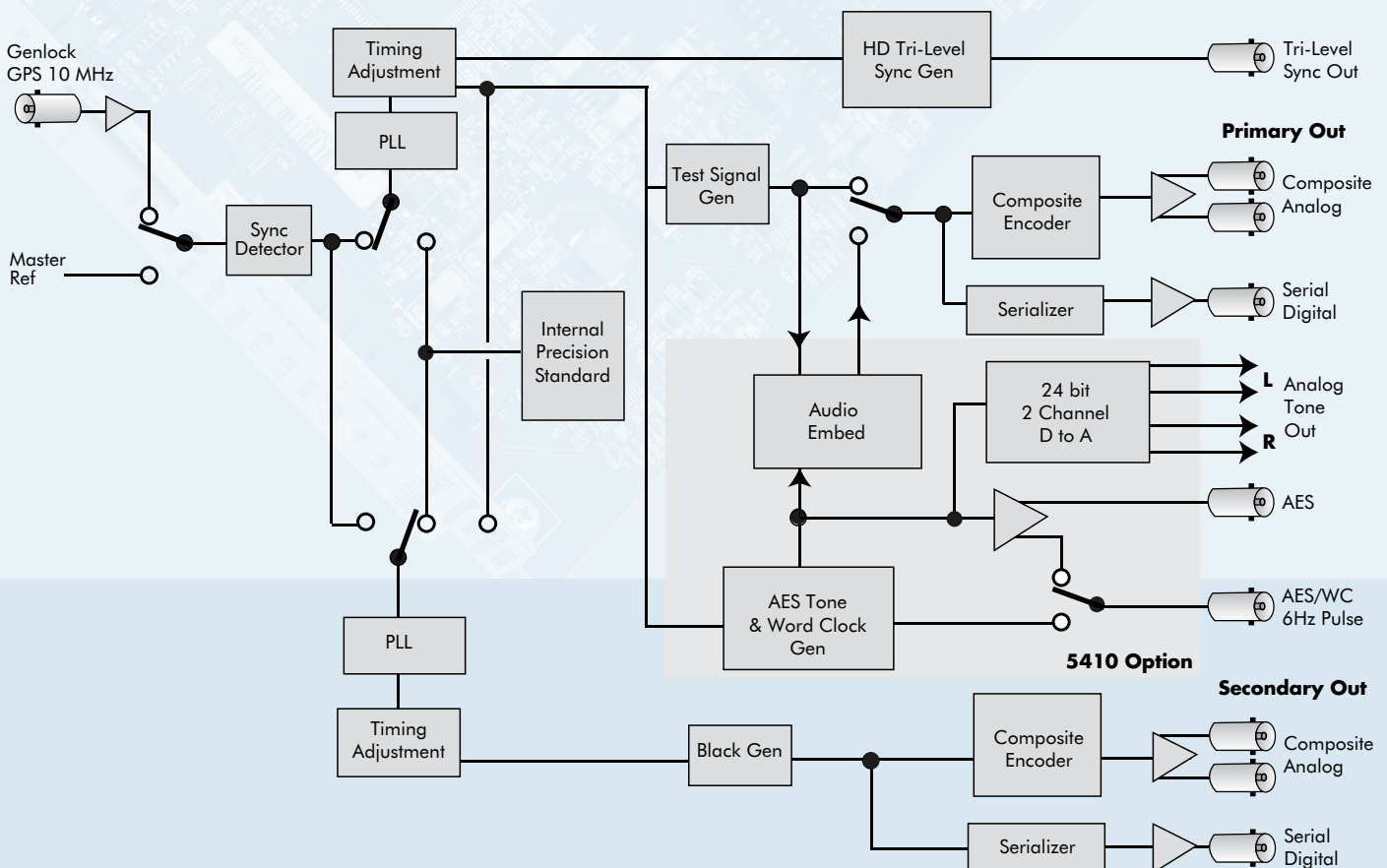
Number	Two
Signal Type	AES3id 1 kHz tone or silent
Resolution	24 bit

Analog Audio Output (Optional with 5410)

Number	One stereo pair or two mono
Signal Type	1 kHz tone or silent
Impedance	30 Ω, balanced
Reference Level	-10 to +8 dBu, adjustable

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



Model 5405

Dual Analog Sync Generator

The 5405 Dual Analog Sync Generator is a stable video timing source that is perfect for local reference generation in broadcast, remote trucks and post. Two dual independent composite reference signals are generated.

The 5405 can operate from an internal precision frequency reference as a stand-alone Master Sync Generator or lock to a video reference. For the ultimate in precision, the 5405 can lock to an external 10 MHz source, such as an atomic standard or GPS receiver.

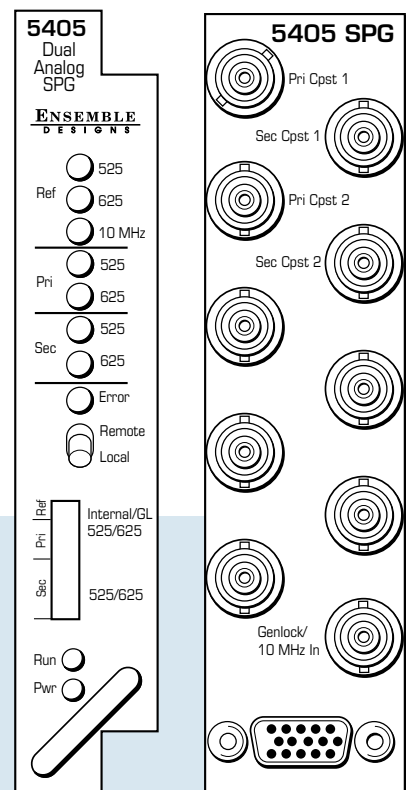
The primary output consists of two identical composite outputs. A separate pair of composite outputs form the secondary sync generator. Facilities that require multiple outputs can use the 5150 Distribution Amplifier module in conjunction with the 5405.

Each output set can be timed with respect to the reference to any point in the television frame. Color framing tracks the reference signal. Timing adjustments for primary and secondary outputs are configured independently. The 5405 can be configured to output 525 and 625 standards simultaneously. The secondary output can also track the primary.

Module control and monitoring is accessed through an Avenue Control Panel, and/or an Avenue PC.

Features

- » Use as Master Sync Gen or lock to external reference or GPS
- » Two pair of composite outputs
- » Primary and secondary outputs are independently timeable
- » Can provide 525 and 625 outputs simultaneously
- » Remote control, monitoring and alarms



Reference Input

Number Two: External or Frame Master Reference
Signal Type 1 V P-P PAL, NTSC, or 10 MHz
Return Loss >40 dB DC to 5.5 MHz

Composite Outputs

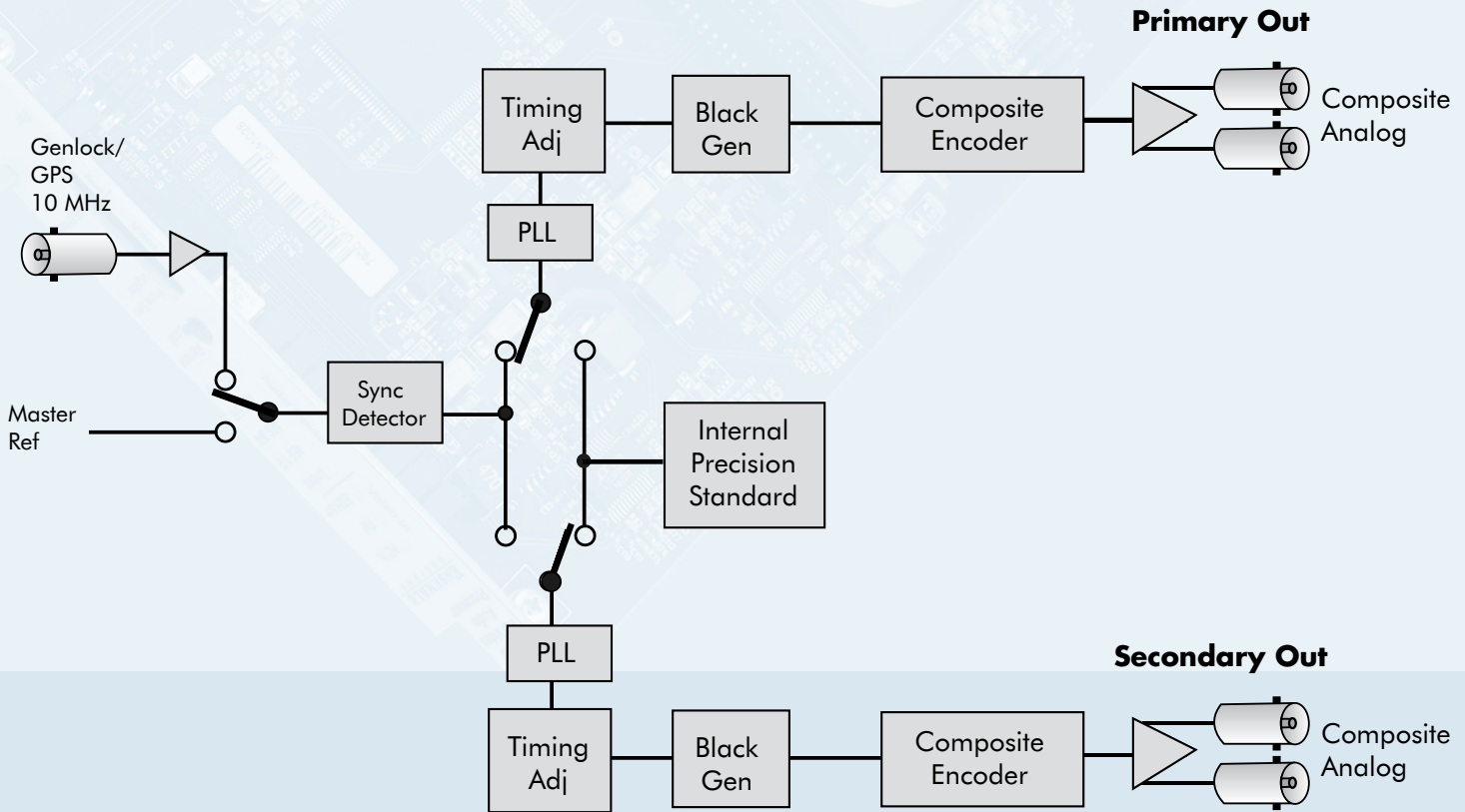
Number Two Primary, Two Secondary
Signal Type NTSC/PAL
Impedance 75 Ω
Return Loss >40 dB DC to 5.5 MHz
Frequency Response ±0.1 dB, 0 to 5.0 MHz
Output DC ±50 mV
K Factor <1.0%
Differential Phase <1.0 degree
SCH Phase ±2 degrees
Delay Adjustable over full frame in sub-degree steps
Color Framing Tracks Ref, user selectable

Accuracy and Timing Stability

Internal TCXO
PAL Fsc 4.43361875 MHz ±1 Hz
NTSC Fsc 3.579545 MHz ±1 Hz
Long Term Drift <1 ppm/year
Analog Jitter <1 ns
Genlock (External or Master Reference)

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



SD Logo Inserter

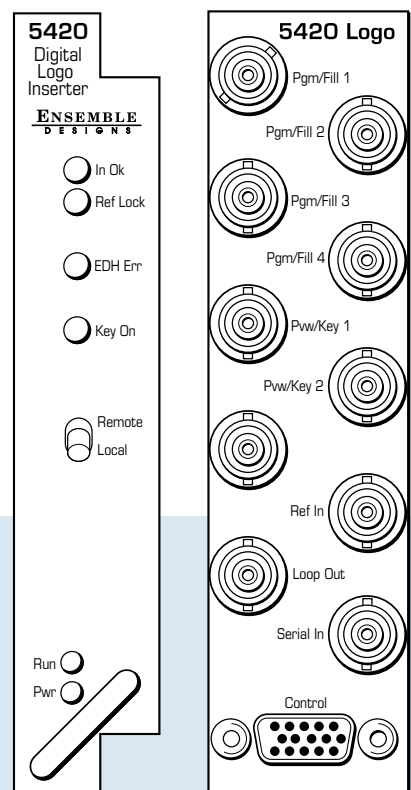
The 5420 Logo Inserter module keys a still logo or an animation over program material. Alternately the 5420 can supply separate fill and key to a production switcher. This module can be used in an Avenue 3RU or 1RU frame.

Generate logos and animations in your favorite graphics software and then upload them into the 5420's nonvolatile flash memory. Multiple logos and animations of varying sizes can be stored.

Logo position and logo density can be adjusted from the Avenue control system, using an Avenue Touch Screen or Avenue PC. GPIs, serial interface and ethernet are also available for control. Sequences of logos, animations and transitions can be programmed.

Features

- » Key still logos and animations
- » User upload of logos over serial or ethernet
- » Store multiple logo and animations of varying sizes
- » Logo H & V positioning
- » Density (Transparency) control of logo
- » Fade or cut keys on/off
- » Digital linear additive keying
- » Program and preview outputs or key and fill outputs
- » 10 bit uncompressed logo storage in flash memory
- » Full 10 bit keying and processing
- » Includes software for logo management
- » Program sequences of logos, animations and transitions
- » Control through RS-232 serial, ethernet, GPI triggers (8), or the Avenue Control System
- » User defined input failure logo
- » EDH monitoring and insertion
- » 525 and 625 operation



Serial Input

Number One
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz
Max Cable Length 300 meters Belden 1694A

Memory and File Specifications

Nonvolatile flash memory
2 million pixels (approximately 5 frames)
Any size/mix of targa stills and animations
(i.e.: 200 logos that are 100 x 100 pixels)

Serial Output

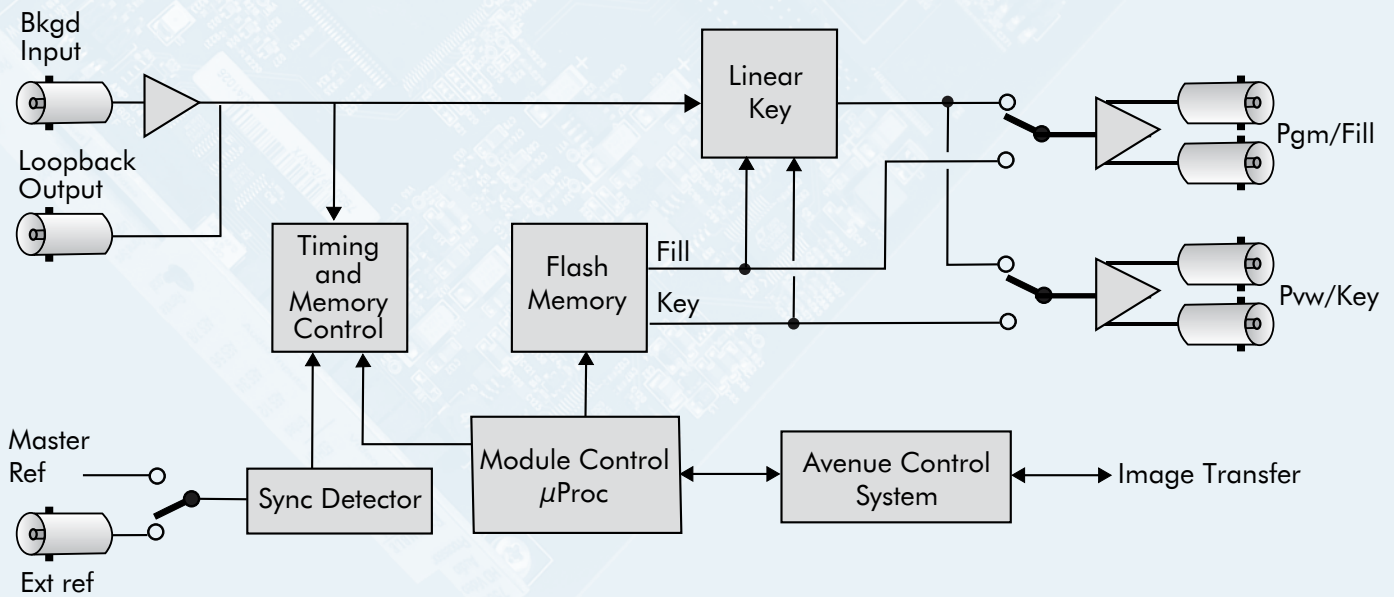
Number Two Program/Fill, Two Pvw/Key
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz
Output DC None (AC coupled)

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

Serial Loop Thru Output

Number One, relocked
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB
Output DC None (AC coupled)
Delay <10 clocks or <740 ns

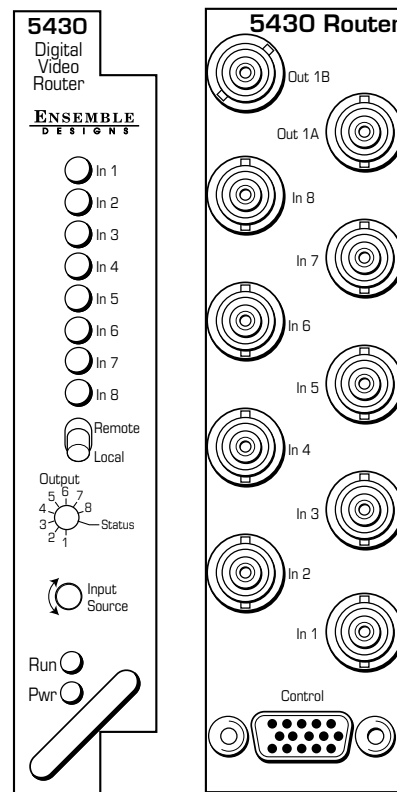


8x1 and 8x8 Digital Video Routers

The 5430 is an 8x1 Digital Video Router module that fits in any slot of either the 1RU or 3RU Avenue frames. This module is perfect for small routing applications such as monitoring, QC and graphics rooms.

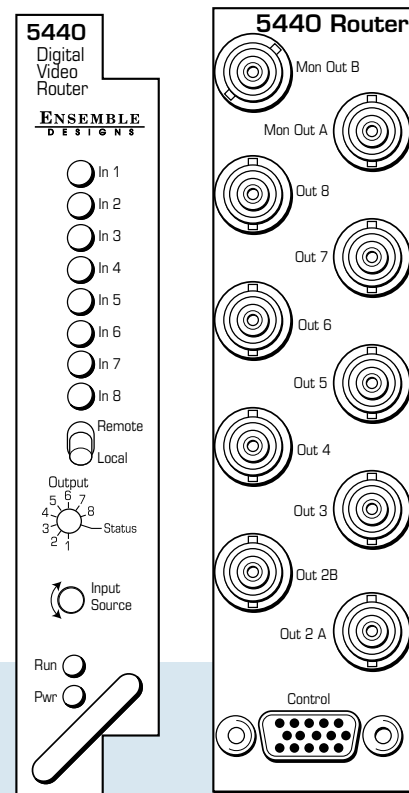
The 5440 module physically connects to the 5430 to make an 8x8 Digital Video Router and can be used in the Avenue 3RU frame. The 5440 also provides an analog monitor output which can track any of the eight serial output buses. An On Screen Display (OSD) text overlay indicates source and destination names and crosspoint configuration.

The router modules can be controlled through a Touch Screen Panel, Web Browser, Avenue PC or the Avenue external X-Y Router Control Panel. The X-Y Control Panel interfaces to the 8x1 or 8x8 configuration, connecting to the module's rear D connector.



Features

- » 8x1 or 8x8 video routing
- » Vertical Interval switching
- » Reclocking and Equalizing
- » Passes embedded audio
- » GPI remote panel-capable interface
- » RS232/422-capable remote port
- » Optional X-Y Control Panel
- » Expandable to 8x8 with 5440 module occupying the adjacent slot
- » 8x8 has additional composite monitor output
- » 8x8 provides ID for source and destination



X-Y Router Control Panel



Input Signal

Number 5430 – Eight/5440 – Eight
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss 143, 177, 270 Mb/s >15 dB
360 Mb/s >15 dB

Max Cable Length
143, 177, 270 Mb/s 300 meters Belden 1694A
360 Mb/s 200 meters
540 Mb/s not specified

Serial Output Signal

Number 5430 Two Identical Outputs /
5440 – Eight
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss 143, 177, 270 Mb/s >15 dB
360 Mb/s >15 dB
540 Mb/s not specified
Output DC None (AC coupled)

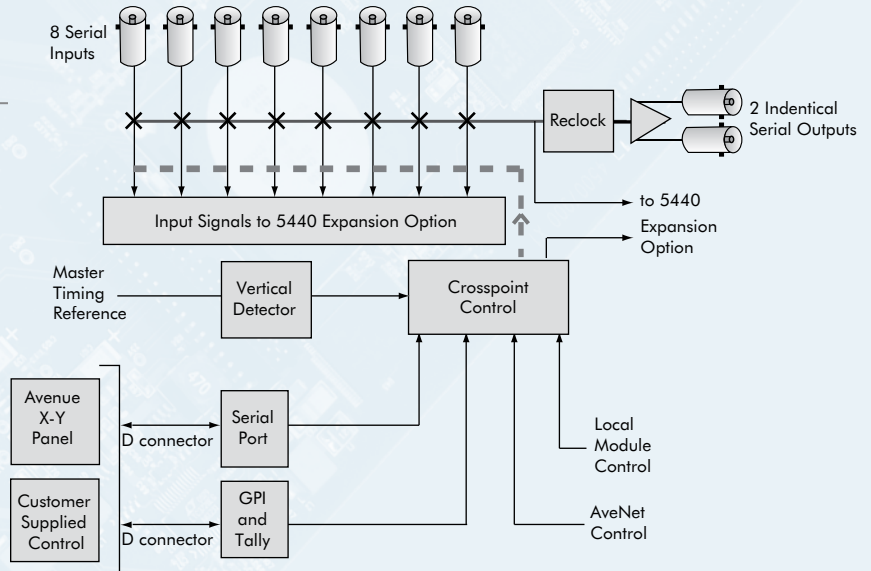
Composite Monitor Output - 5440 Only

Number Two identical
Signal Type NTSC/PAL
Impedance 75 Ω
Return Loss >40 dB
Output DC <±200 mV
Response ±0.25 dB, 0 to 5.0 MHz
K Factor <1.5%

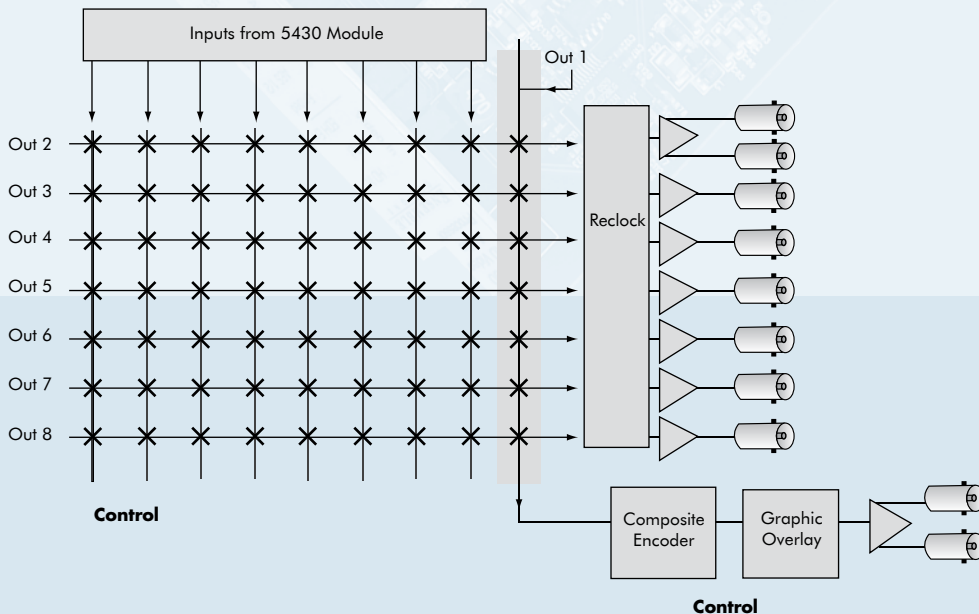
General Specifications

5440 compatible with 3RU frame only
Power Consumption <4.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 1.5 Amp PTC resettable fuse

5430



5440



SD Protection Switch

The 5455 module is a fail-safe, bypass protection switch for critical standard definition serial digital paths for broadcast or satellite applications. When a fault is detected in the primary input, and the secondary input is verified as good, the switch will activate causing the secondary input to be switched to the module's output. The 5455 includes a passive, fail-safe path that ensures there is an output even in the event of a total power failure.

The health of the video signal is determined by monitoring crucial parameters in order of increasing complexity: Timing Reference Signal (TRS), or a persistent loss of digital sync is tested first. Black, Embedded Audio and Freeze are also evaluated. Each test can be configured by the user. For example, the sophisticated Black Detector includes configurable parameters for black level threshold, pixel count, and duration time.

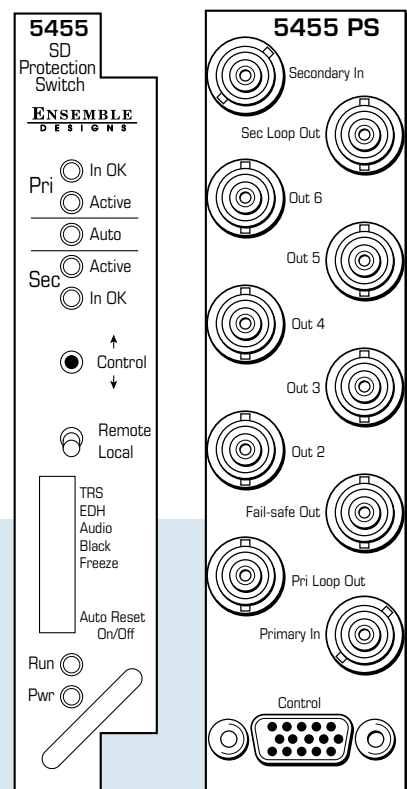
The Freeze detection system can be set to detect a clean or noisy source. Freeze Time sets the number of seconds for the 5455 to switch to the secondary input after a video freeze condition is detected in the primary input.

The switch can operate in two modes; automatic or nonresetting. In fully automatic mode, the 5455 will automatically switch back to the primary signal once it's been restored. In the nonresetting mode, the secondary input remains routed to the output, even after the primary input has recovered.

Controls are easily accessed through an Avenue Control Panel, Avenue PC, GPIs, or front edge module controls. GPI inputs allow faults detected in upstream equipment to contribute to the switching logic.

Features

- » Fail-safe Bypass Protection Switch for Critical SD SDI Signals
- » Detects Closed Caption Data, TRS, Black, Silence, and Freeze
- » Detection specifics are user programmable
- » Passes embedded audio
- » Alarm generation
- » Remote control and monitoring



Serial Digital Input

Number Two
Type SD Serial Digital 270 Mb/s SMPTE 259M
 625i 50 or 525i 59.94
Automatic Cable Input Equalization

General Specifications

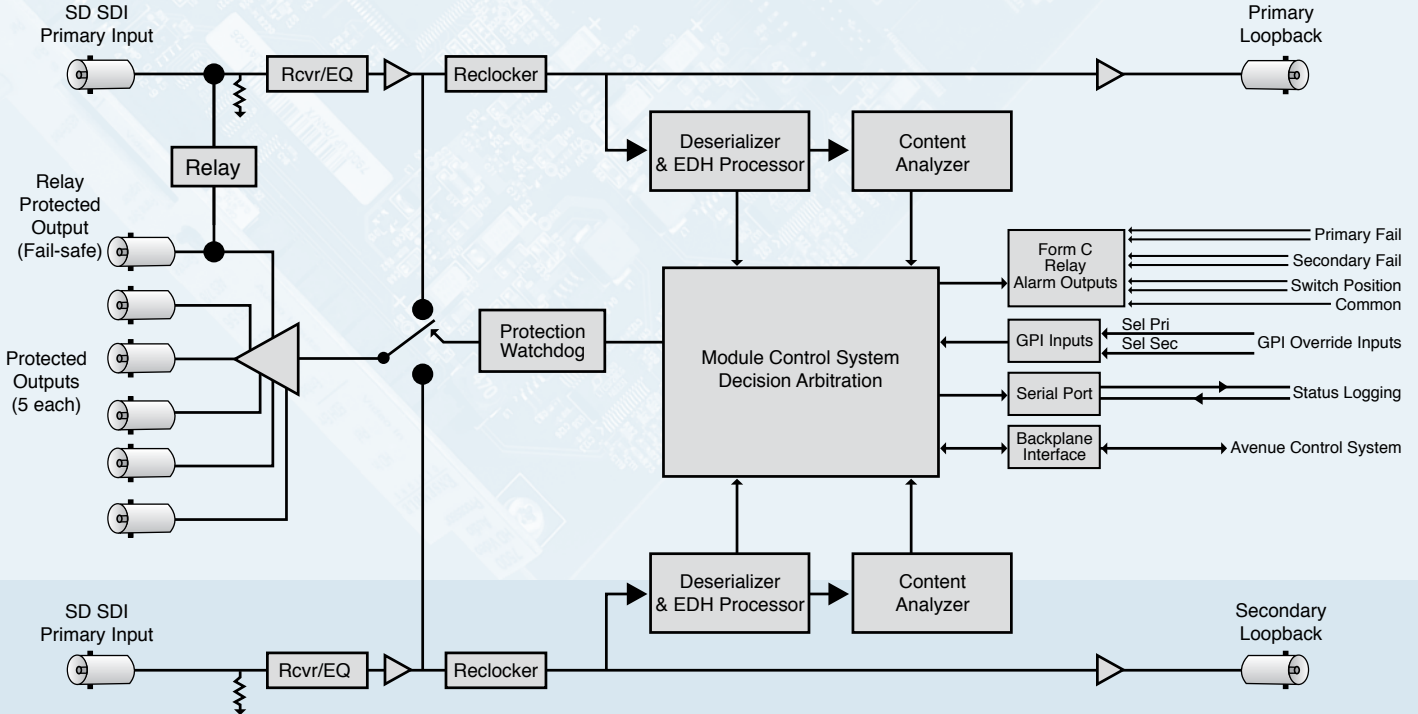
Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95% noncondensing
Altitude 0 to 10,000 ft
Fusing 4 each 0.75 Amp PTC resettable fuse with each domain of the module independently regulated

Serial Digital Loopback

Number Two total
 One primary
 One secondary
Impedance 75 Ω

Serial Output Signal

Number Six total
 One fail-safe bypass output
 Five outputs
Signal Type SD Serial Digital 270 Mb/s
Impedance 75 Ω



Sync Changeover Switch

The 5465 Sync Changeover Switch module can be used with Avenue's 5400 SPG module, 5405 SPG module, or with third party sync pulse generators. In the event of a failure of the primary sync source, the 5465 changes to the secondary source.

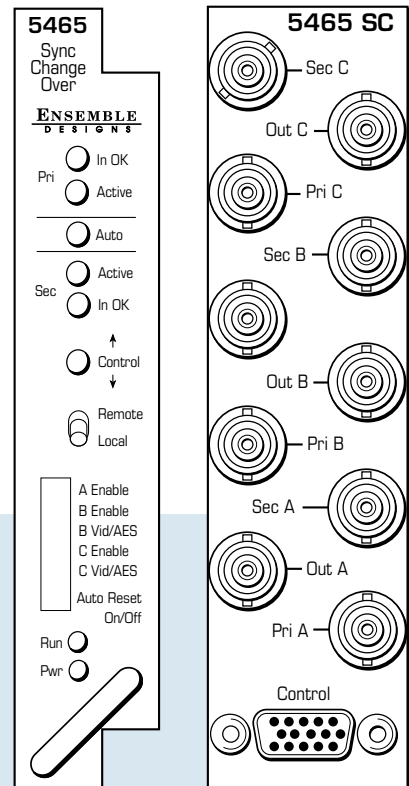
There are three poles or sections on the 5465. All three accept SD SDI, analog composite, AES digital audio or Tri-Level Sync signals.

Pole A tests serial digital component signals, while Poles B and C can test analog composite, AES or Tri-Level Sync signals. A drop in signal amplitude below a predetermined auto threshold will trigger the switch.

Multiple changeover switches can be ganged together through the control system. Depending on the application, two or more 5465s may be required to handle all signals that need to be protected.

Features

- » 3 poles for signal testing
- » Use with serial digital component, analog composite, AES audio and Tri-Level Sync signals
- » Passes embedded audio
- » Gang multiple 5465s together as needed
- » GPI inputs for remote manual override
- » GPI outputs to indicate signal status and switch position



Input Signals

Number Six
Signal Type Serial Digital SMPTE 259M, Analog Composite, AES Digital Audio, or Tri-Level Sync, selectable
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz

Switcher Characteristics

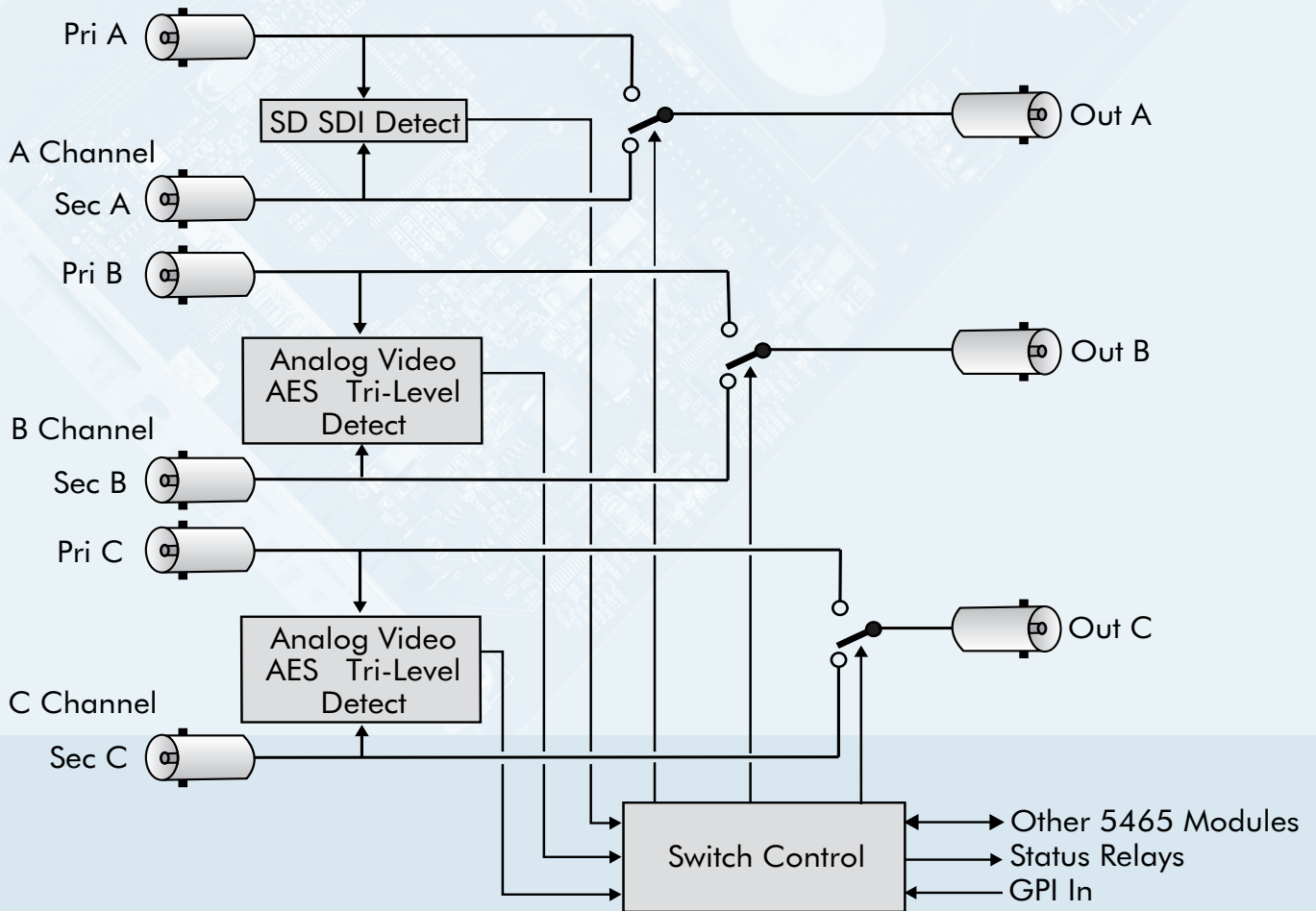
Type 75 Ω RF Relay
Insertion Loss <0.5 dB

General Specifications

Connectors BNC
Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 1.5 Amp PTC resettable fuse

Output Signals

Number Three
Signal Type Follows input
Impedance 75 Ω
Return Loss >15 dB DC to 270 MHz



Digital Processing Amplifier and Legalizer

The 5470 is a full featured serial digital processing amplifier that is perfect for adjusting and legalizing SD SDI sources. All processing is done in the digital domain, ensuring a pristine output. When set to unity, the 5470 is completely transparent.

Proc controls include level adjustment, NTSC style hue rotation, along with video, chroma and setup. Black and White clips can be set as desired. The Detail Enhancer recovers information that has been lost due to poor frequency response in upstream systems. A Split Screen mode allows you to compare the processed output with the original nonprocessed input.

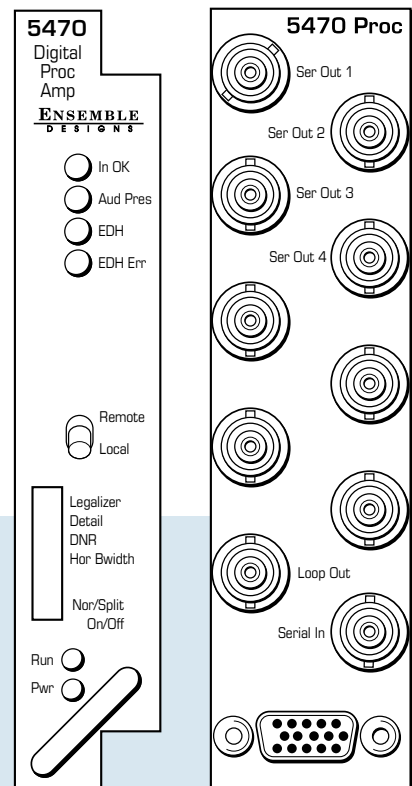
Certain values represented in serial digital component may be illegal in the PAL or NTSC domains. The 5470's Predictive Composite Clipper mode looks for and alters those values that would be illegal in analog composite, ensuring the output can be used for transmission.

Embedded audio and ancillary data are passed. If the video processing path has any delay, the embedded audio is delayed accordingly.

As with all Avenue modules, extensive remote control options are available with an Avenue Control Panel and Avenue PC.

Features

- » Video, chroma, setup and hue controls
- » Predictive Composite Clipper for legalizing signals
- » Black and white clips, hard and soft
- » Offset adjustments for Cr and Cb for black balance correction
- » Split Screen comparison mode
- » Sharpness filter for detail recovery
- » 10 bit processing
- » Passes embedded audio
- » Passes or strips ancillary data
- » EDH monitoring and insertion
- » Memory registers
- » Auto 525/625 operation
- » Remote control and card edge control
- » Optional Digital Noise Reducer can be added



Serial Input

Number One
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB
Max Cable Length 300 meters Belden 1694A

Serial Output

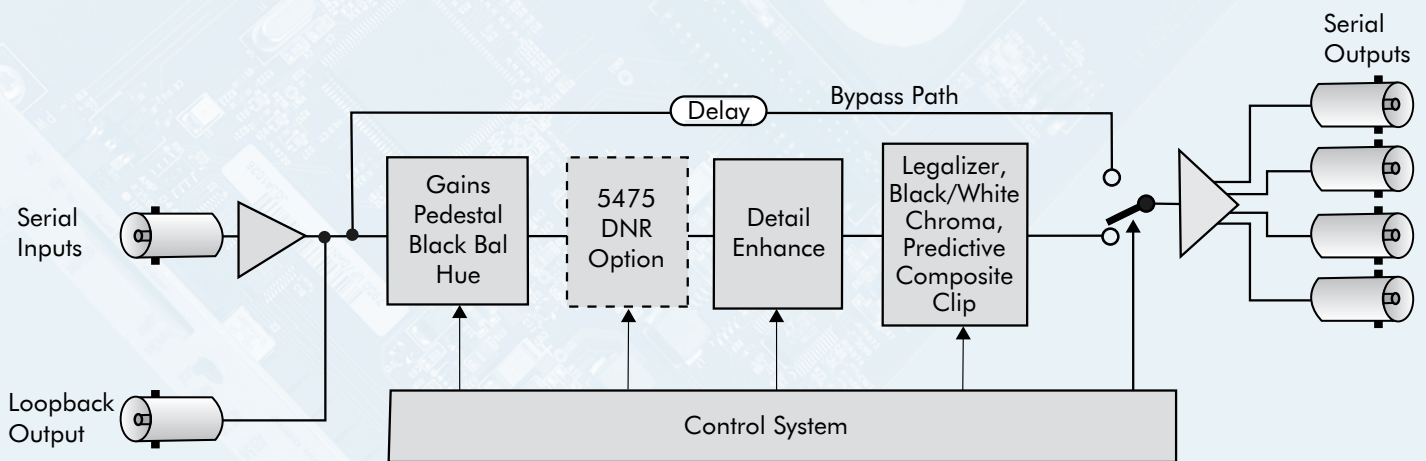
Number Four
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB
Output DC None (AC coupled)

Serial Loop Thru Output

Number One, relocked
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB
Output DC None (AC coupled)
Delay <10 clocks or <740 nsec

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
Fusing 1.5 Amp PTC resettable fuse



Digital Video Noise Reducer

The 5475 Digital Video Noise Reducer is an optional sub module that can be added to the 5470 Digital Proc Amp module. The 5475 is motion and scene adaptive. It removes unwanted noise and artifacts, making it perfect for MPEG compression preprocessing and satellite feeds.

Several forms of noise reduction are employed to ensure the best possible performance. Horizontal Filtering is used to remove high frequency and impulse noise and to limit bandwidth for MPEG encoding. Recursive Temporal Noise filtering includes Simple Recursive, Motion Adaptive and Motion Adaptive with Impulse filter. Controls are provided for maximum signal-to-noise improvement and for noise threshold. These can be set manually or run in automatic mode.

Motion Adaptive Recursive Noise filtering works on a pixel-by-pixel basis, comparing the current frame to frames that have already been filtered. If the change that is detected is small, it is considered noise, while if it is large, it is considered motion or a scene change. The detection process uses an LMMSE (Linear Minimum Mean Square Error) filtering algorithm to evaluate the presence of motion. Combining this algorithm with recursive temporal filters preserves fine detail while reducing noise in the presence of motion, including rapidly moving objects and scene changes. Motion trails are minimized while avoiding hard-motion failures that some adaptive noise filters can exhibit.

User controls for the Motion Adaptive Recursive Filter include a Noise Threshold, based on how much noise is present in the incoming signal, and Maximum Signal to Noise Improvement, based on how much noise removal is desired. The threshold setting can be automatic or user-adjustable. When set to automatic, the noise level of the input signal is measured and the threshold is set accordingly. This simplifies the setup of the noise reducer and makes it responsive to varying input signal-to-noise levels. This minimizes the need for operator intervention to accommodate feeds of differing quality.

When the combined Motion Adaptive Recursive and Impulse Noise Filter is selected, temporal impulse noise filtering is used to remove high level, narrow noise impulses, without reducing fine stationary detail. Since the 5475 is used in conjunction with the 5470 Proc Amp, all the controls you need for level adjustments and clipping are included.

The Show Noise output mode displays what areas of the picture are being affected by the noise reducer. Noise is represented by white or black, while unaffected areas are represented in gray. This handy mode makes it easy to set optimum adjustments for the material being processed. The Split Screen mode lets you compare the processed output to the original signal.

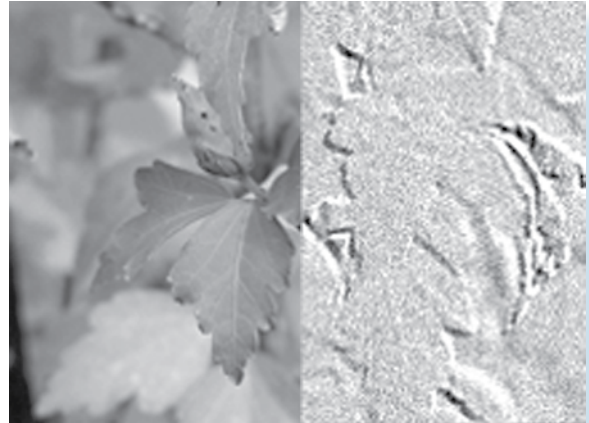
Features

- » Motion Adaptive Recursive and Horizontal filtering
- » Frame based recursion
- » Temporal Impulse Filtering
- » Motion and Scene Adaptive
- » Spatial and temporal modes
- » Preprocessing for MPEG
- » 12 bit processing
- » Minimal processing delay
- » Automatic Noise Level sensing
- » Automatic or Manual Reduction and Threshold setting
- » Luma and Chroma Processing with separate controls
- » Split Screen and Show Noise mode
- » Luma Tie reduces cross-color artifacts
- » Used in conjunction with 5470 Proc Amp – includes proc adjustments and detail enhancer
- » Remote control and alarms
- » Use with 525 or 625 signals

In addition to the 5475 motion-adaptive temporal filters, horizontal bandwidth filtering and luma chroma delay filters are provided. Sixteen tap 3/4, 1/2 and 1/4 luma bandwidth filters can be selected. Also sixteen tap 3/4 and 1/2 chroma bandwidth filters can be selected. These filters can be used to limit bandwidth before MPEG encoding. Simultaneously, the luma path delay can be adjusted relative to chroma path delay in approximately 2 nsec subpixel steps, providing the ability to correct luma-chroma delay errors in serial digital signals.

Since the 5475 is used in conjunction with the 5470 Proc Amp, all the controls you need for level adjustments and clipping are included.

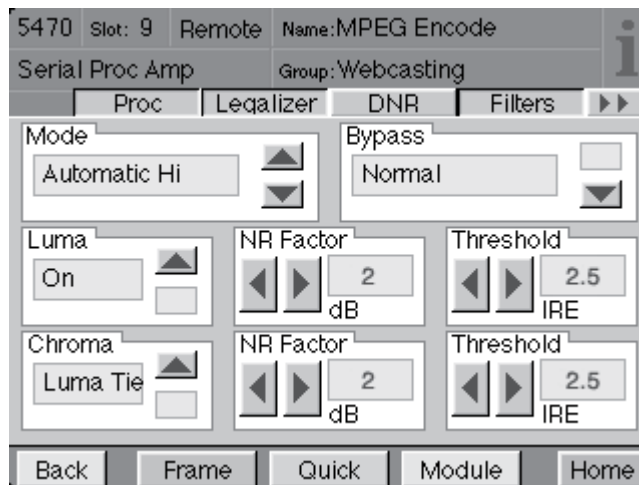
The Show Noise feature displays the detected noise and residual motion which will be removed from the video.



Split Screen displays the noise-reduced output next to the original scene.



Complete control over all DNR functions.



Embedder/Disembedder with Channel Mix and Shuffle

The 5600 module is a user-selectable embedder or disembedder. The 5600 handles four channels of audio through AES inputs and outputs. Analog I/O is available as an option. AES inputs are sample-rate converted, allowing the use of asynchronous audio.

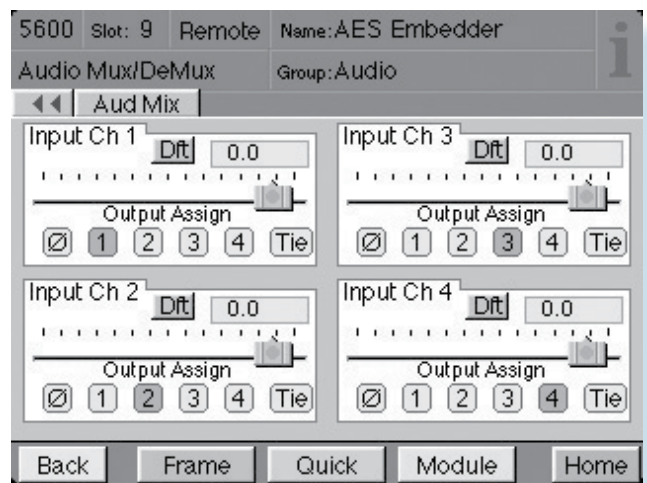
When configured as a multiplexer, the 5600 has one SD SDI video input and two AES audio inputs. These two AES streams are embedded into the serial digital video stream. The output of the module is a video digital stream that contains the original signal and two AES pairs.

When configured as a demultiplexer, audio signals present in the incoming signal are extracted and delivered as standard AES digital audio streams. In both modes, full channel swaps/shuffles can be made on the four embedded audio channels.

Module parameters, such as audio level and channel assignment, can be adjusted with an Avenue Touch Screen or Avenue PC. Individual control is provided over level and phase invert for each channel. Output channels are configurable as the combination (mix) of any input channels.

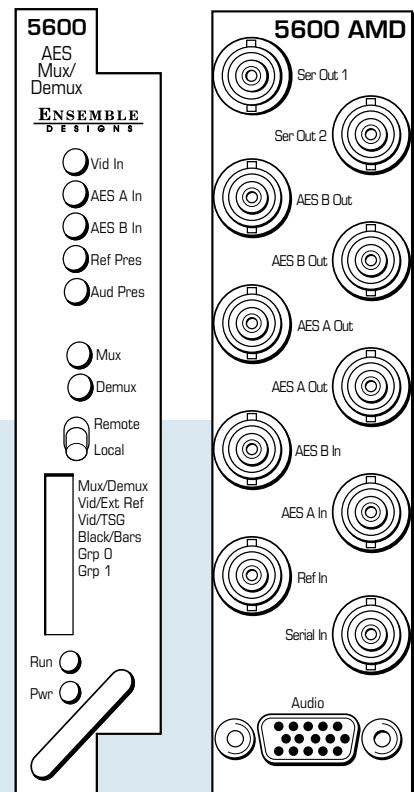
Analog audio I/O options include the 5610 Four Channel Analog Input sub module, the 5611 Four Channel Analog Output sub module, and the 5612 Two Channel Analog I/O sub module. The analog audio options can be used in addition to the AES I/O. A sub module can be plugged onto the 5600 and does not take up a slot in the frame.

Control Menus accessed via Touch Screen & Avenue PC



Features

- » User-selectable embedder and disembedder modes
- » Channel mixer and shuffler
- » Built-in sample rate converter accepts asynchronous inputs
- » Four channel with two AES inputs and two AES outputs
- » Optional analog audio inputs and outputs
- » 20 or 24 bit inputs with 26 bit processing resolution
- » Remote control and alarms
- » Memory registers can be remotely recalled



Video Input Signal

Number One
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB
Max Cable Length 300 meters Belden 1694A

Video Output Signal

Number Two
Signal Type Serial Digital SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB
Output DC None (AC coupled)

Audio Input Signal

Number Two AES
Channels Four total
Signal Type AES Coaxial
 20 or 24 bit
Impedance 75 Ω

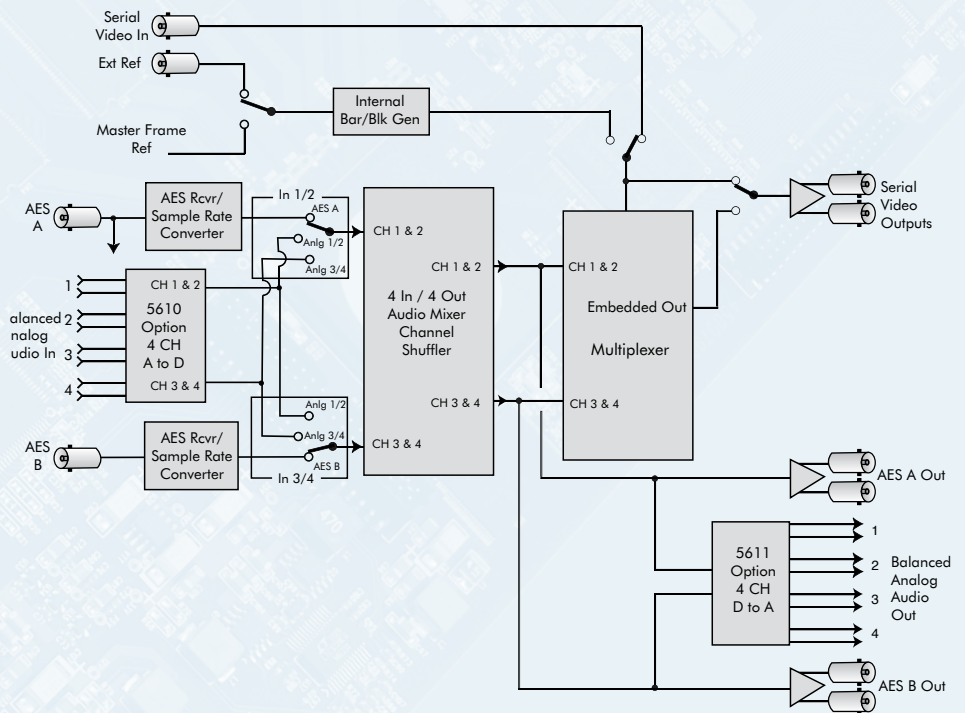
Audio Output Signal

Number Two, AES A and AES B
Channels Four total
Signal Type AES 24 bit
Impedance 75 Ω

General Specifications

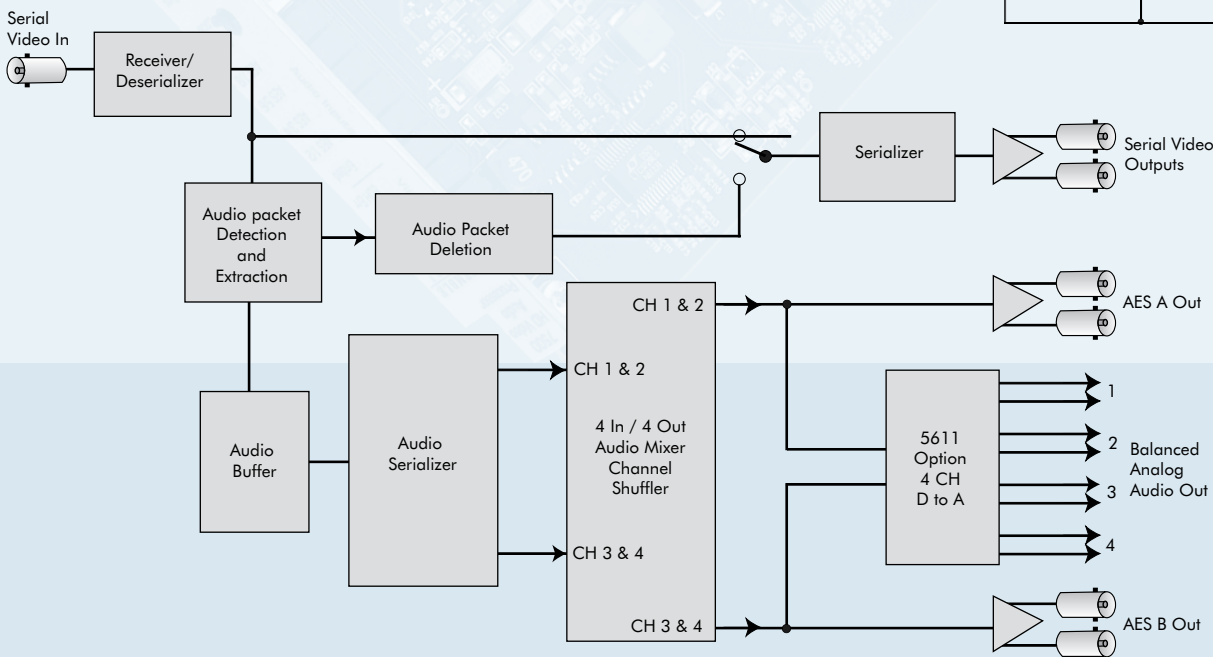
Power Consumption 10 watts
Temperature Range 0 to 40°C ambient
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft

Multiplexer Mode



5600 can accommodate one of the following:
 5610 4 Channel A to D
 5611 4 Channel D to A
 5612 2 Channel A to D
 2 Channel D to A

Demultiplexer Mode



Optional Analog Audio I/O Sub Modules for the 5600 and 5640 Modules

The 5610, 5611 and 5612 are optional sub modules that provide analog inputs and outputs for the Avenue 5600 Embedder/Disembedder module and for the 5640 Audio Shuffler and Mix module. Sub modules plug directly onto the main module and do not take up a slot in the Avenue frame.

The 5610 sub module provides four balanced pairs of analog inputs. The 5611 sub module provides four balanced pairs of analog outputs. The 5612 provides two analog inputs and two outputs. See data sheets on the 5600 and 5640 modules for more details.

Model 5610 Analog Input

Analog Inputs	Four, Balanced Pair
Processing	24 bits
Analog Input Z	>15 k Ω , balanced, transformerless
CMRR	>60 dB, 20 Hz – 10 kHz

Model 5611 Analog Output

Analog Output	Four, Balanced Pair
Processing	24 bits
Analog Output Z	30 k Ω , balanced, transformerless
Max Output level	+24 dBu (bridging load), +22 dBu (600 Ω load)

Model 5612 Analog Input and Output

Analog Inputs	Two, Balanced Pair
Processing	24 Bits
Analog Input Z	>15 k Ω , balanced, transformerless
CMRR	>60 dB, 20 Hz – 10 kHz

Analog Outputs	Two, Balanced Pair
Processing	24 Bits
Analog Output Z	30 k Ω , balanced, transformerless
Max Output level	+24 dBu (bridging load), +22 dBu (600 Ω load)

General Specifications common to all three sub modules

Analog Reference Level	-10 dBu to +8 dBu for -20 dBFS output
Frequency Response	+0/-0.1 dB, 20 Hz – 20 kHz
Crosstalk	<-84 dB, 20 Hz – 20 kHz
Dynamic Range	>=95 dB

110 Ohm – 75 Ohm Interfaces for Avenue Digital Audio Modules

Interfacing Avenue digital audio modules with existing twisted pair cabling is easy. Simply plug the appropriate interface adapter into the Avenue backplane and connect existing twisted pair cables to it. Several different adapters are available for conversion between balanced 110 ohm cabling and the unbalanced 75 ohm I/O on Avenue digital audio modules. The front of the interface has 3-position plug-in terminal blocks that make it simple to terminate the twisted pair cable and then plug it into the adapter. BNC connectors on the rear of the interface plug directly into the Avenue backplane.

The 5080 is a 5 Port AES 110 Ohm Adapter for use with:

- 5150 as an AES DA
 - Requires one per 5150 to provide 1 in/4 out
 - Requires two per 5150 to provide 1 in/9 out
- 5155 as a Dual AES DA
 - Requires two per 5155 to provide 2 x 1 in/4 out

The 5082 is a 4 Port AES 110 Ohm Adapter for use with:

- 8500 with any of 8510, 8410, 8415 Audio Sub modules when all four AES ports are desired
 - Requires one per 8500
- 8400 with any of 8510, 8410, 8415 Audio Sub modules when all four AES ports are desired
 - Requires one per 8400
- 5330 with 6330 Audio Sub module when all four AES ports are desired
 - Requires one per 5330



The 5084 is a 2 Port AES 110 Ohm Adapter for use with:

- 8500 with any of 8510, 8410, 8415 Audio Sub modules when only two AES ports are desired (in order to allow access to four SDI outputs); Requires one per 8500
- 8400 with any of 8510, 8410, 8415 Audio Sub modules when only two AES ports are desired (in order to allow access to four SDI outputs); Requires one per 8400
- 5330 with 6330 Audio Sub module when only two AES ports are desired (in order to allow access to four SDI outputs); Requires one per 5330
- 5230 with 6230 Audio Sub module
 - Requires one per 5230
- 7500 with 8415 Audio Sub module
 - Requires two per 7500 for full access to all four AES ports (just one for two ports)
- 7600 HD Mux/Demux
 - Requires two per 7600 for full access to all four AES ports (just one for two ports)
- 7900 with 8415 Audio Sub module
 - Requires two per 7900 for full access to all four AES ports (just one for two ports)
- 7910 with 8415 Audio Sub module
 - Requires two per 7910 for full access to all four AES ports (just one for two ports)
- 7920 with 8415 Audio Sub module
 - Requires two per 7920 for full access to all four AES ports (just one for two ports)
- 7930 with 8415 Audio Sub module
 - Requires two per 7930 for full access to all four AES ports (just one for two ports)

The 5092 is a 4 Port AES 110 Ohm Adapter for use with:

- 5600 Mux/Demux

The 5094T is a 5 Port AES 110 Ohm Adapter for use with:

- 6010 ADC. It provides two copies each of outputs 1/2 and 3/4. A fifth plug-in terminal block is provided for the AES reference input.

The 5094S is a 4 Port AES 110 Ohm Adapter for use with:

- 6010 ADC providing two copies each of outputs 1/2 and 3/4. The 5094S is physically shorter than the 5094T, which allows the 6010's coaxial AES reference input to be used.
- 6030 AES Reference Generator providing two AES reference outputs. The 5094S is physically shorter than the 5094T, which allows the 6030's video reference input to be used.

The 5096 is a 2 Port AES 110 Ohm Adapter for use with:

- 6020 DAC providing for inputs 1/2 and 3/4

The 5098 is a 5 Port AES 110 Ohm Adapter for use with:

- 6040 Audio Delay module

Audio Mix and Shuffle

The 5640 module is a fully featured audio mixer with channel shuffling. Perfect for audio signal handling, the 5640 can be used in a router path or with a server for reorganizing the outputs of multichannel sources. Other applications include use with a DVD authoring system where level adjustments are needed.

Flexible control of input and output options, with both analog and digital audio I/O available, this module is useful in all types of audio applications.

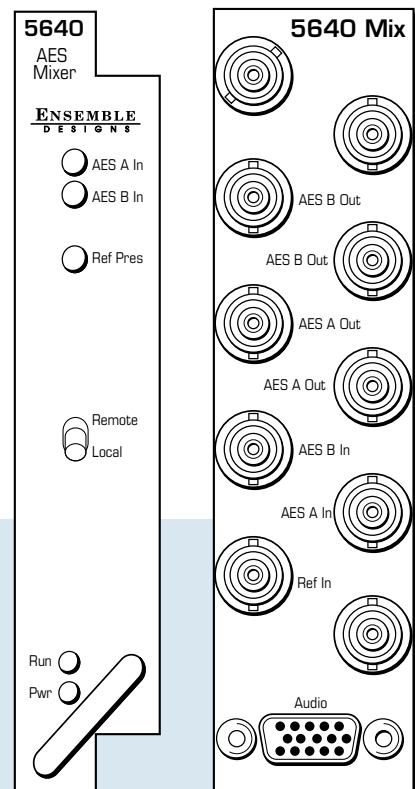
The 5640 can take four track material and mix down to a two track stereo output. There's no need to tie up a console for a mix down of multichannel material.

Module parameters, such as levels and channel routing, can be controlled with an Avenue Touch Screen or Avenue PC. There are individual level controls over the input and output channels. Each of the four output channels has a source selector. It's simple to correct audio phase inversion, even on a single channel within an AES pair. Five nonvolatile memory registers store your favorite presets.

The 5640 is a four channel device with AES inputs and outputs. Analog audio I/O options include the 5610 Four Channel Analog Input sub module; the 5611 Four Channel Analog Output sub module; and the 5612 Two Channel Analog I/O sub module. The analog audio options can be used in addition to the AES I/O. A sub module can be plugged onto the 5640 and does not take up a slot in the frame.

Features

- » Four channel mixer and shuffler
- » Reorganize outputs of multichannel sources
- » Perfect for channel swapping with secondary audio processing
- » Mix down multichannel material
- » Excellent for level adjustment applications
- » Two AES inputs, two AES outputs
- » Optional Analog inputs and outputs
- » 20 or 24 bit inputs with 26 bit processing resolution
- » Data mode allows AC-3 to be passed
- » Remote control and alarms
- » Memory registers can be remotely recalled



Audio Input Signal

Number Two, AES A and AES B
Channels Four total
Signal Type AES
Impedance 75 Ω

Audio Output Signal

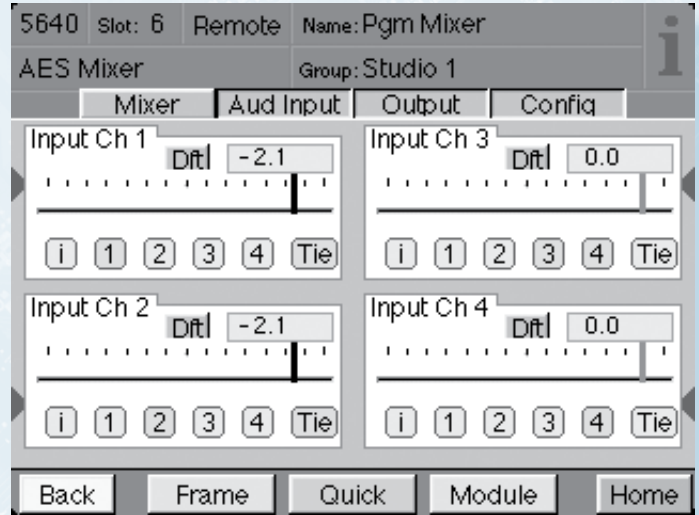
Number Two AES A and AES B
Channels Four total
Signal Type AES
Impedance 75 Ω

Adapters available for 110 Ohm balanced AES

General Specifications

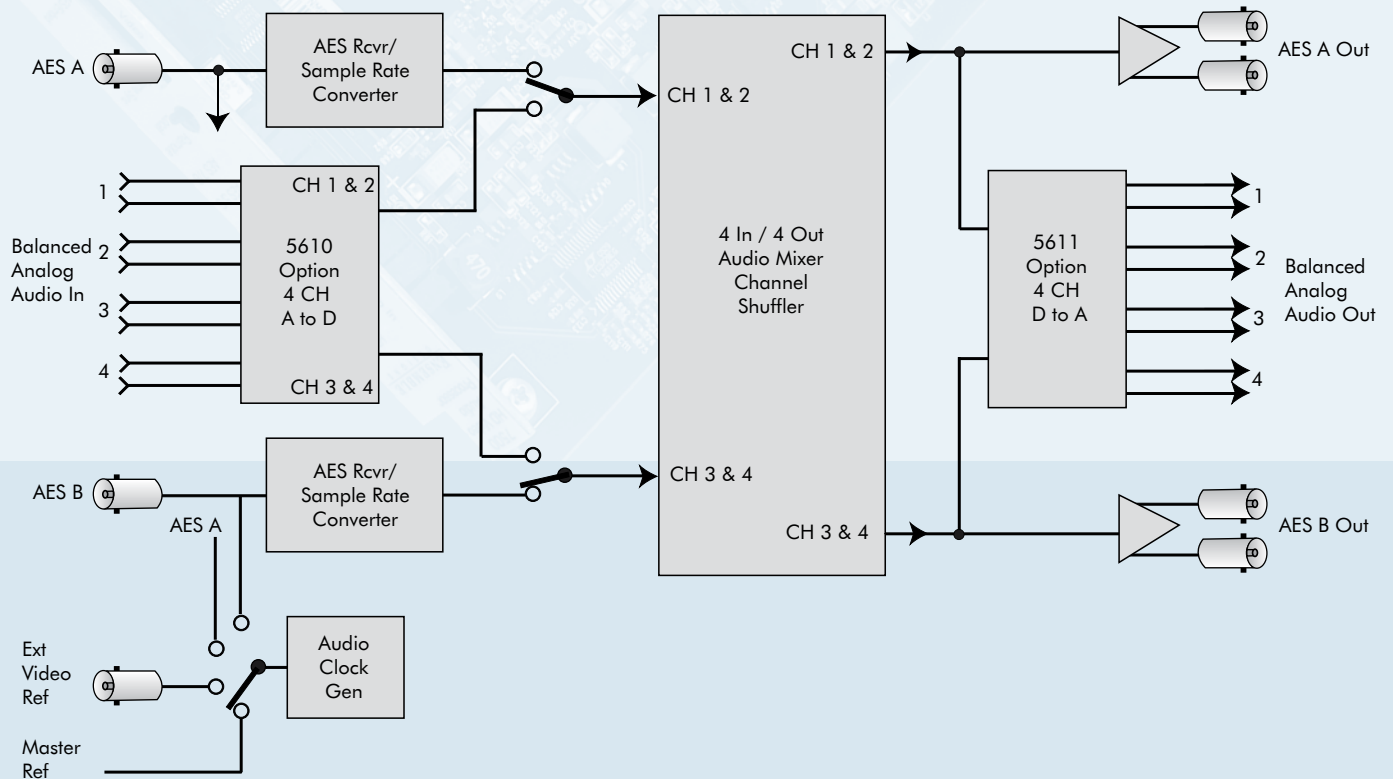
Power Consumption 10 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft

Control Menus are accessed via Avenue
Control Panel and Avenue PC



5640 can accommodate one of the following:

- 5610 4 Channel A to D
- 5611 4 Channel D to A
- 5612 2 Channel A to D, 2 Channel D to A



GPI/Serial Interface

The 5820 GPI/Serial Interface module extends the capability of the Avenue control system enabling third party equipment to control Avenue modules. The 5820 provides General Purpose Interface control (GPI contact closure) over modules located anywhere in an Avenue system. It also provides RS-232/RS-422 serial interface access for use with show controllers and automation systems.

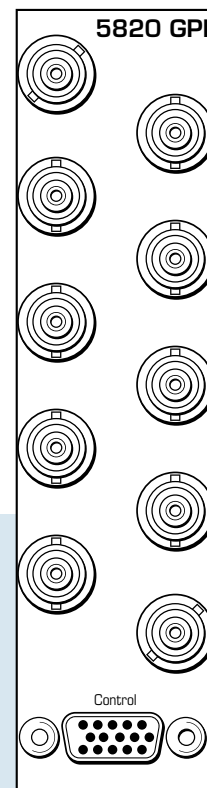
To use the 5820, just install it in any Avenue frame in the system and connect the 5820's GPIs or serial interface to your automation system or other third party device. Using the Avenue control system, the 5820's GPIs and serial inputs can be mapped to any Avenue module in the system. When a GPI or serial command is received by the 5820, a message is sent to the corresponding Avenue module. That module then recalls the specified memory register.

The 5820 module takes full advantage of the Avenue control system and is able to communicate with any other module located in any Avenue frame. Using M2M™ (Module To Module) communication, the 5820 acts on GPI contact closures, or serial commands, by sending configuration recall commands to another module. From the serial interface port of the 5820, an external device can also activate the same recall functions. Supporting both RS-232 and RS-422 interfaces, the simple ASCII-based protocol allows easy interconnection to any control system.

The 5815 is an optional 1RU control panel that serves as a shot box. It has eight illuminated status push buttons that can also be used for manual override and status in automated systems. Configuration and monitoring of the 5820 is also available through an Avenue Control Panel and Avenue PC software.

Features

- » Enables third party equipment to recall memory registers of any Avenue module
- » GPI and RS-232/RS-422 control of any Avenue module
- » Eight GPI ports, each independently configurable
- » Serial interface for use with show controllers and automation systems
- » One 5820 module can serve multiple purposes, multiple modules
- » Easily integrate Avenue into existing control systems

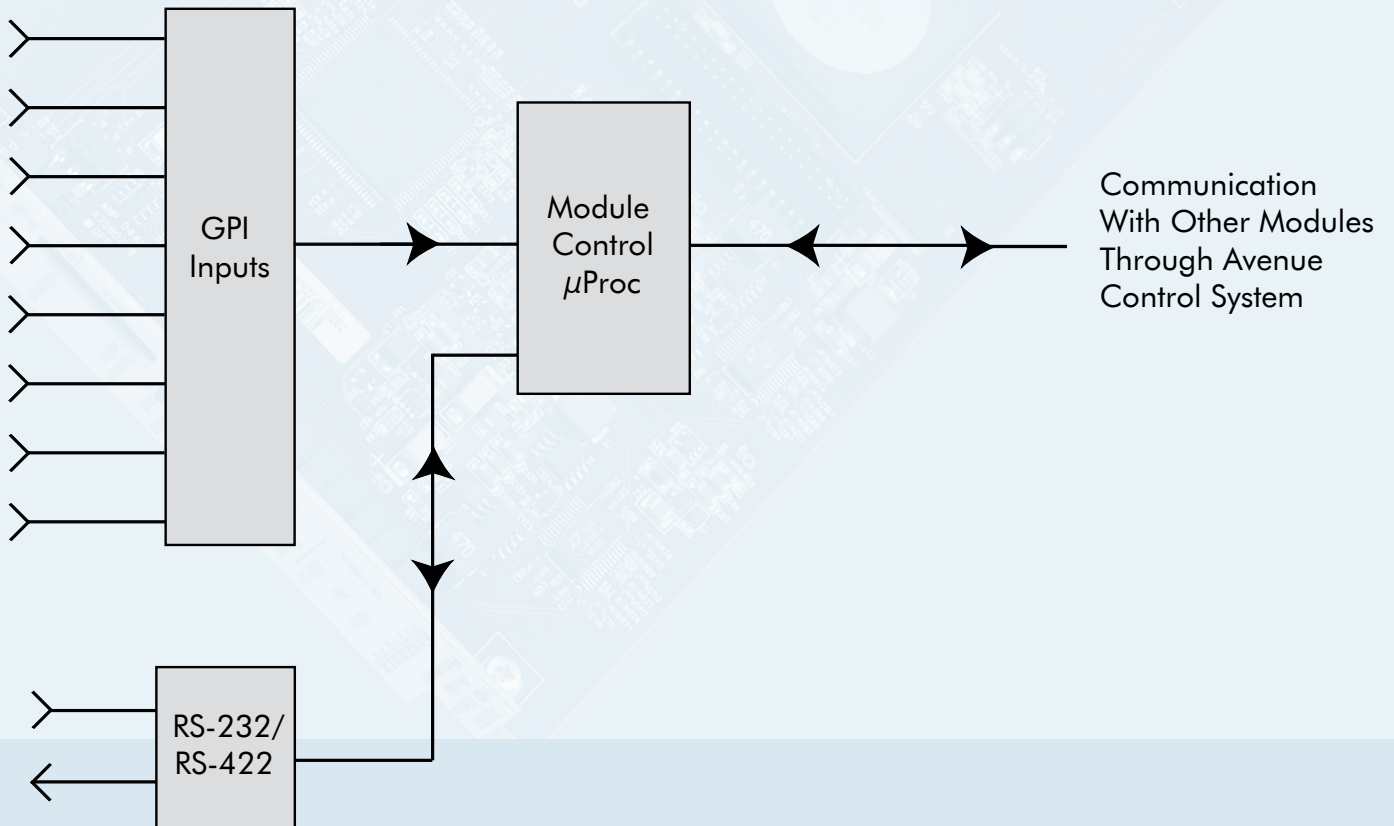


**Input Signal
Number**

Eight GPI,
One RS-232/RS-422

General Specifications

Power Consumption <5.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 1.5 Amp PTC resettable fuse



Four Channel 24 bit Audio ADC

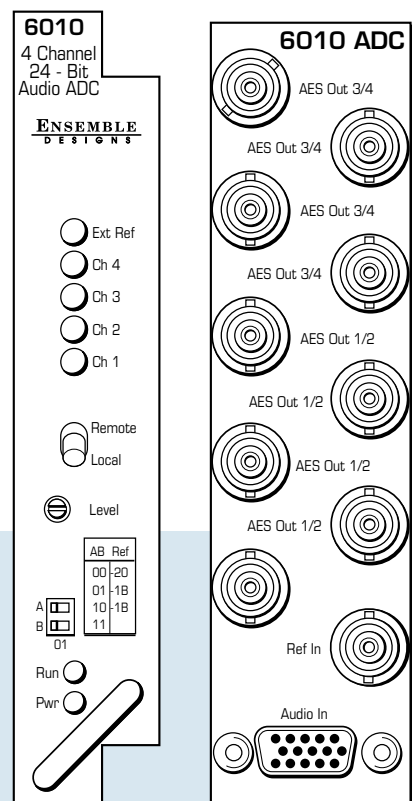
The 6010 module converts four channels of analog audio to two AES digital audio streams. Analog to digital conversion is performed with 24 bit precision for outstanding sonic performance. Use the 6010 to convert the audio outputs of your existing analog VTRs or any other high quality analog audio source. Like all modules in the Avenue series, the 6010 may be controlled either locally or remotely. Alternately, consider using the 5330/6330 and 8500 series.

Four high impedance balanced analog inputs are provided on a high density 15-pin D connector. Two AES outputs (four copies of each) are provided on BNC connectors. The module has a built-in 48 kHz crystal-controlled sample rate clock, or it may be locked to an external AES3id reference. An LED is provided on the front of the module to indicate the presence of a valid external reference.

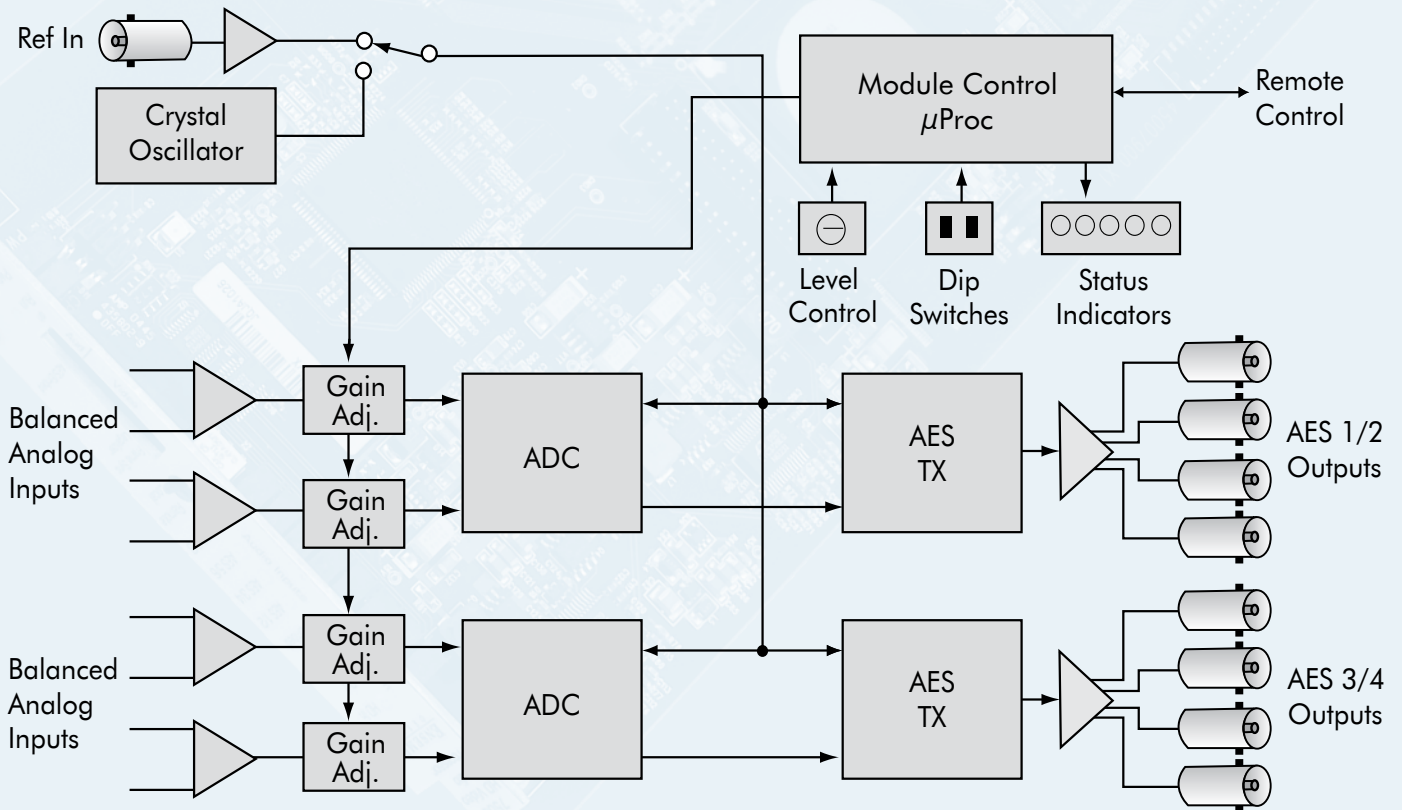
Four additional LEDs illuminate when the analog input signals reach reference digital output level. A dip switch allows reference digital output level to be set to -16, -18, or -20 dBFS. A rotary control is provided to set the gain of the analog input stages. All local controls and status indicators are available via the Avenue remote control system.

Features

- » Four high impedance balanced analog inputs
- » Two AES outputs (four copies of each)
- » Selectable external AES reference or on-board crystal oscillator
- » Gain trims on all four analog inputs
- » Switch selectable digital reference level
- » 24 bit processing
- » Local or remote control of all module settings



Analog input Z	>15 k Ω , balanced, transformerless
CMRR	>60 dB, 20 Hz – 10 kHz
Input gain range	-10 dBu to +8 dBu for -16, -18, -20 dBFS output
AES3id reference input	1 V P-P, terminated in 75 Ω
AES3id outputs	1 V P-P, 75 Ω source terminated
Sample rate	48 kHz
Frequency response	+0/-0.1 dB, 20 Hz – 20 kHz
Crosstalk	<-84 dB, 20 Hz – 20 kHz
Dynamic range	95 dB



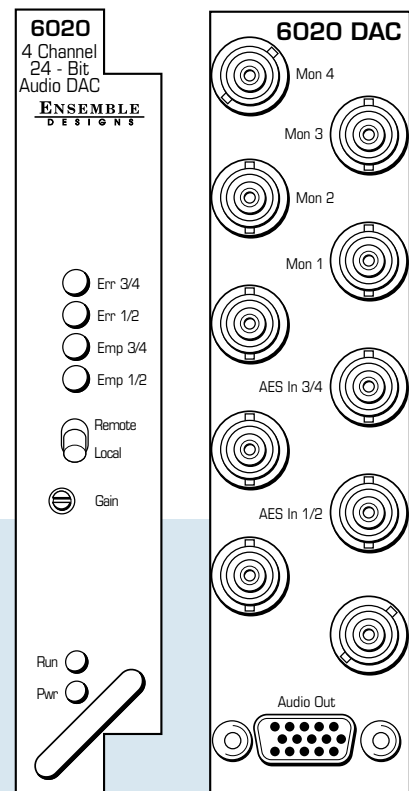
Four Channel 24 bit Audio DAC

The 6020 module converts two AES digital audio streams to four channels of analog audio. Digital to analog conversion is performed with 24 bit precision for outstanding sonic performance. Use the 6020 to input digital audio signals to your existing analog VTRs or for any other application where digital audio signals must be fed to equipment with analog inputs. Like all modules in the Avenue series, the 6020 may be controlled either locally or remotely. Alternately, consider using the 5230/6230 and 8500 series.

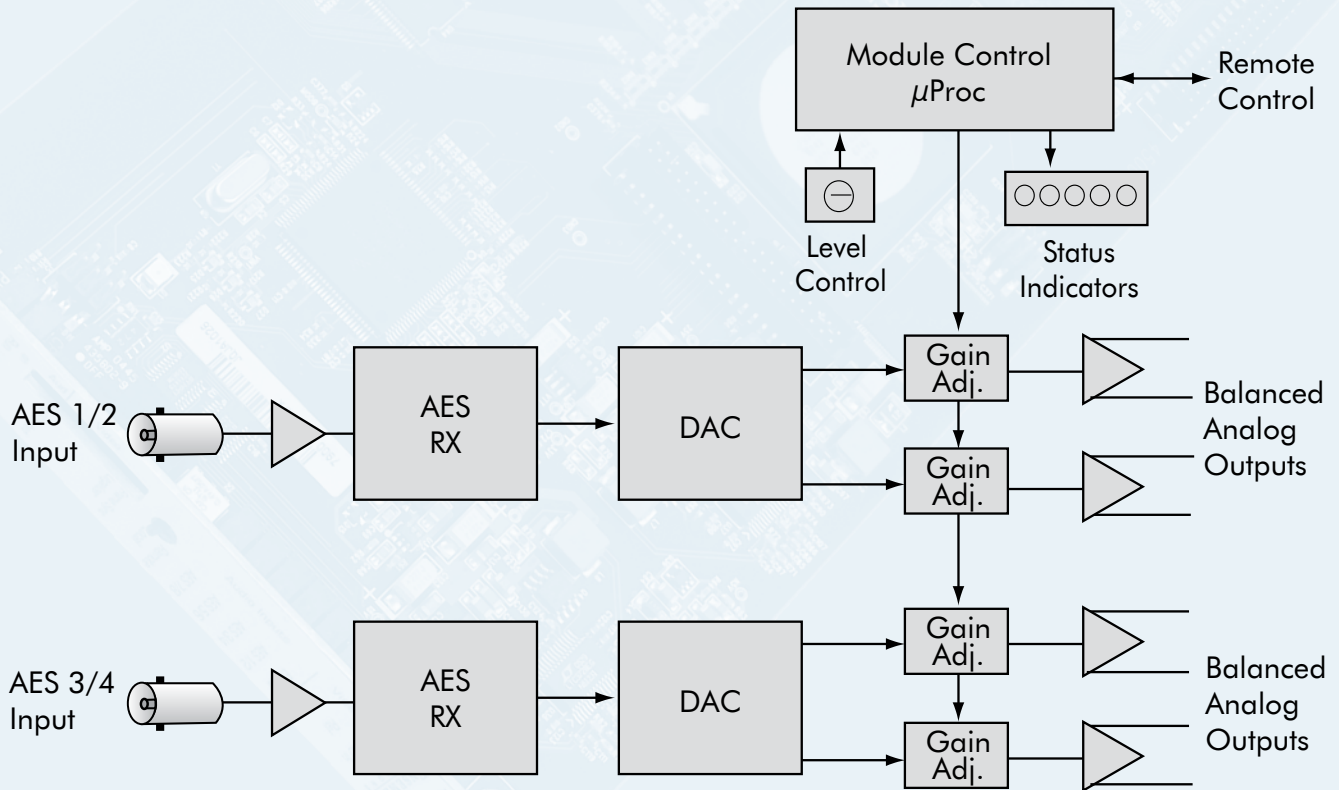
Two AES inputs are provided on BNC connectors. Four low impedance balanced analog outputs are provided on a high density 15-pin D connector. Two LED indicators are provided on the front of the module to indicate the presence of a valid AES input signal. Two additional LEDs indicate whether the emphasis flag is set on either of the digital inputs. If the emphasis flag is set, de-emphasis is automatically applied. A rotary control is provided to set the level of the analog outputs. All local controls and status indicators are available via the Avenue remote control system.

Features

- » Two AES3id inputs
- » Four balanced low impedance analog outputs
- » Gain trims on all four analog outputs
- » Operates with any sample rate from 30 to 50 kHz
- » Detection and indication of input signal errors
- » Detection and indication of input signals with the emphasis flag set
- » 24 bit processing
- » Local or remote control of all module settings



AES inputs 1 V P-P, terminated in 75 Ω
Sample rate 30 kHz - 50 kHz
Analog output Z 30 Ω, balanced
Output level Adjustable from -10 dBu to +8 dBu
 for -20 or -18 dBFS input
Max output level +24 dBu (bridging load), +22 dBu
 (600 Ω level)
Frequency response +0/-0.2 dB, 20 Hz - 20 kHz
Crosstalk <-84 dB, 20 Hz - 20 kHz
Dynamic range 95 dB



Video-Reference AES/Word Clock Generator

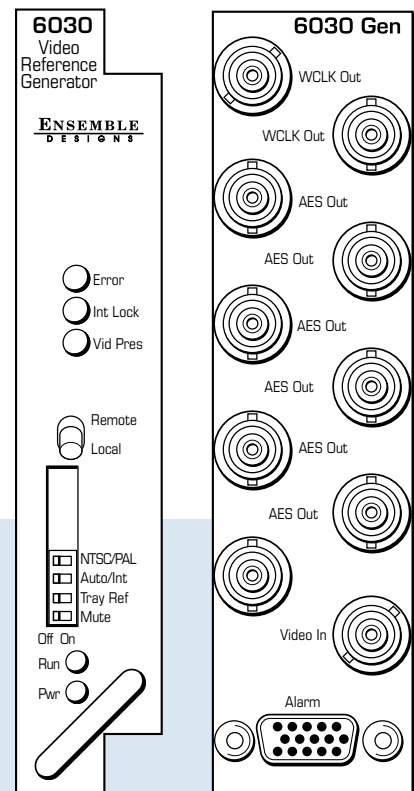
The 6030 module provides silent AES and word clock outputs that are locked to a reference video input such as house color black. The 6030 is indispensable in video installations with digital audio equipment. Use it to generate digital audio “black” and to lock A/D converters, sample rate converters, audio workstations, or any other digital audio equipment that accepts an AES or word clock signal as a reference. Like all modules in the Avenue series, the 6030 may be controlled either locally or remotely. Alternately, consider using the 5400/5410 series.

The 6030 module produces silent AES and word clock outputs ($F_s=48$ kHz) which are derived from a PAL or NTSC video input signal. The module has an on-board crystal oscillator which may also be used to drive the AES and word clock outputs.

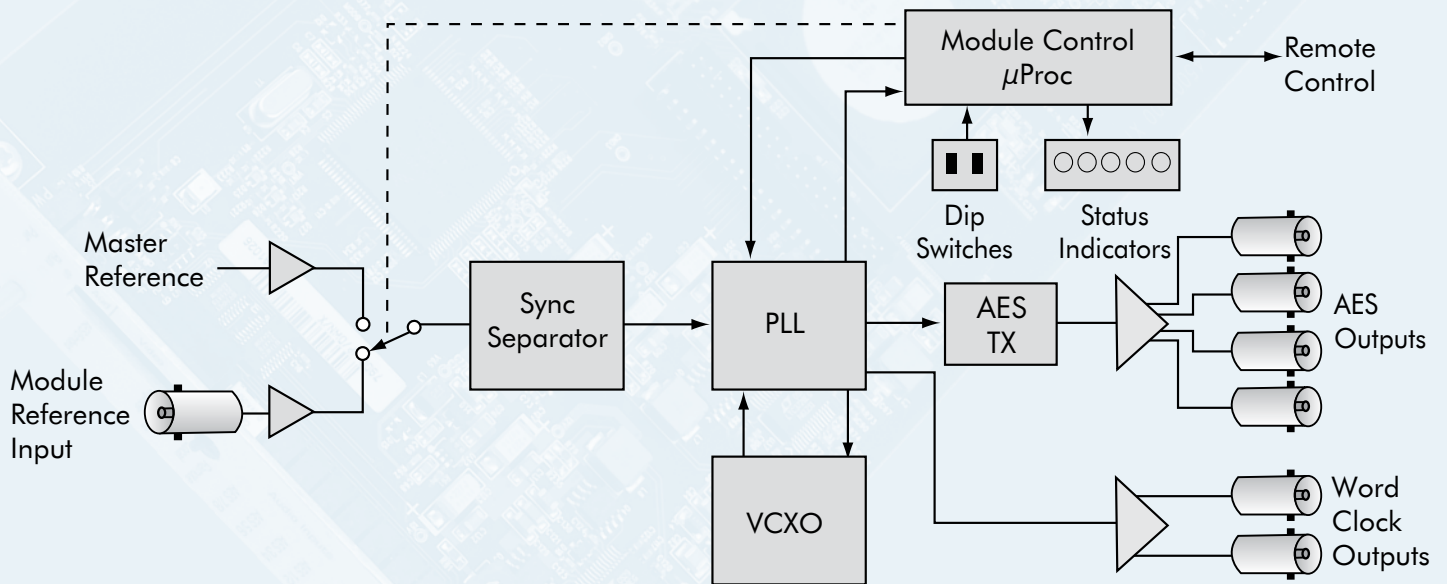
The user may select one of the following references for the module outputs: the video input on the module, the master video reference input on the Avenue tray, or the on-board crystal oscillator. There is an alarm output to warn of loss of the video reference, and the user may program the module to either mute the outputs or automatically revert to the on-board oscillator upon loss of the video reference. All local controls and indicators are available via the Avenue remote control system.

Features

- » Video reference input accepts video, color black or sync
- » Switch-selectable PAL or NTSC operation
- » Six AES3id outputs
- » Two word clock outputs
- » Detection and indication of input signal errors
- » On-board crystal controlled oscillator
- » Reverts to on-board oscillator upon loss of video reference
- » Alarm output to warn of loss of video reference
- » Local or remote control of all module settings



Reference input	Terminating, 75 Ω PAL or NTSC composite video, color black, or sync Minimum sync level 250mV P-P Maximum signal level 2 V P-P
Frequency lock range	±50 ppm
Internal ref accuracy	±10 ppm (AES "grade 2" reference)
Sample rate	48 kHz
AES3id outputs	1 V P-P, 75 Ω source terminated
Word clock output	4.5 to 5 V P-P



Tracking Audio Delay

The 6040 Tracking Audio Delay module provides both fixed and variable delay to ensure proper synchronization between picture and sound. Ideal for incoming satellite feeds and studio signals, the 6040 provides an elegant solution for lip sync issues. Its 24 bit digital signal processing ensures perfect fidelity.

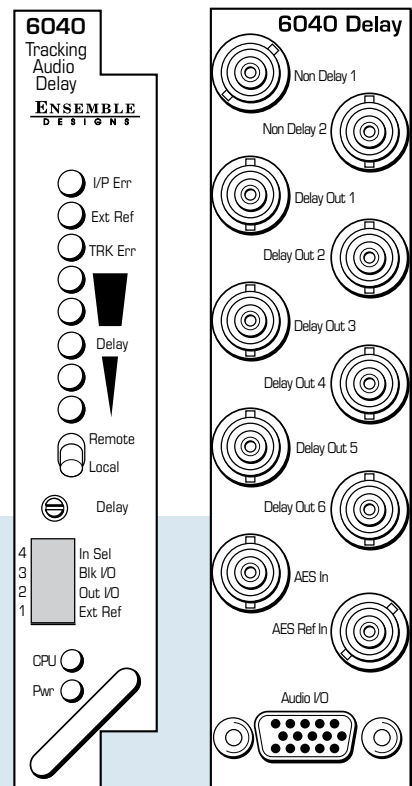
The 6040 can track one or more of the video synchronizer modules in the Avenue system and respond when a frame is dropped or repeated to provide accurate audio tracking. The 6040 has two delay settings: a fixed delay, adjustable up to one second, and dynamic tracking delay that “shrinks” or “stretches” the audio as required.

Avenue’s sophisticated control system makes it easy to tie multiple modules in the system together for automatic tracking. The 6040 module can be tied to one or more of the Avenue video synchronizer modules. Avenue’s Control Panel and Avenue PC provide complete handles over all of the module parameters.

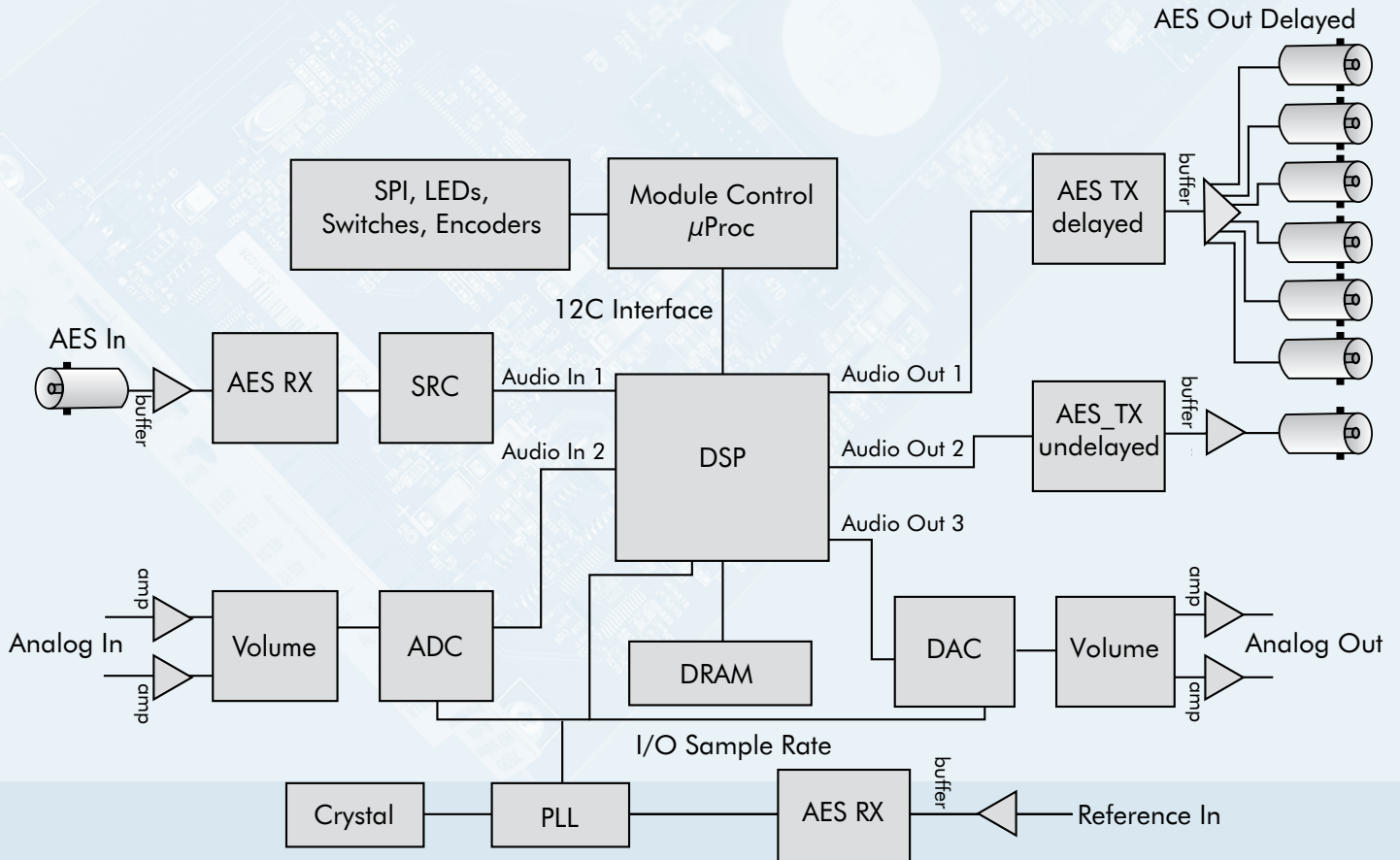
Alternately, consider built-in audio delay in the 5230/6230, 5330/6330, 7500 series, 8500 series, and 7900 series.

Features

- » Adjustable fixed delay plus tracking dynamic delay
- » Track video synchronizer modules
- » Selectable AES or analog input
- » Simultaneous AES and analog outputs
- » Use as AES/analog or analog/AES converter
- » 75 ohm and 110 ohm support
- » 24 bit processing



AES input	1 V P-P, terminated in 75 Ω
AES reference input	1 V P-P, terminated in 75 Ω
AES outputs	1 V P-P, 75 Ω source terminated
Sample rate	30 kHz – 50 kHz
Processing	24 bit
Analog input Z	>15 k Ω, balanced, transformerless
CMRR	>60 dB, 20 Hz – 10 kHz
Input gain range	-10 dBu to +8 dBu for -20 or -18 dBFS output
Analog output Z	30 Ω, balanced, transformerless
Output level	Adjustable from -10 dBu to +8 dBu for -20 or -18 dBFS input
Max output level	+24 dBu (bridging load) +22 dBu (600 Ω load)
Frequency response	+0/-0.2 dB, 20 Hz – 20 kHz
Crosstalk	<-84 dB, 20 Hz – 20 kHz
Dynamic range	>=95 dB
Bulk Delay	0 – 1 second per channel, 10 msec steps
Tracking Delay	Up to 3 modules at one time, maximum delay per module 272 msec
Max Audio Delay	1.12 seconds per channel (module can do 1.82 sec)



Analog Audio

DAs and Frame – Models 6601, 6601R and Frame 6600

The 6601 module is a high performance audio distribution amplifier for the broadcast and recording industry. Exceptional performance features include excellent response, noise and distortion specifications.

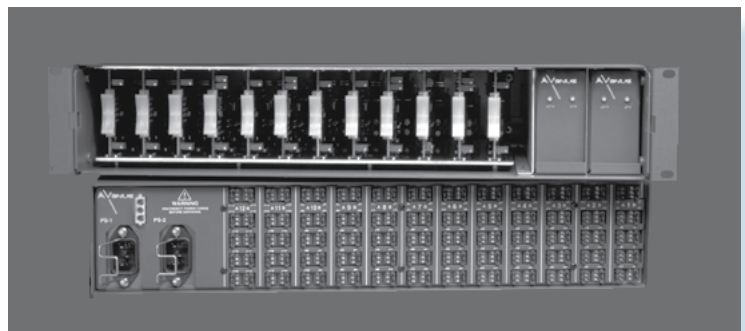
The 6601R module has all the capability of the 6601 plus selectable remote gain control. The amplifier offers a ± 20 dB remotely controlled audio gain, which is selectable to either remote or local.

Both DA modules can be configured as mono or stereo with 8 balanced outputs (mono) or 4 balanced outputs per channel (stereo). Mode selected with a jumper on the module.

Up to twelve 6601 or 6601R audio amplifiers can be mounted in the 2RU Avenue 6600 frame. The 6600 frame is dedicated to audio distribution and pluggable terminal strips are standard on every frame. There is no need for rear modules or special adapters. Redundant power is an option. Power supplies are accessed from the front of the frame. This is a simple device and it does not tie into the Avenue control system.

Features

- » High performance analog audio distribution amplifiers
- » 8 mono outputs or 4 stereo outputs, jumper selectable
- » Remote Gain Control available from rear of each module
- » 2RU frame with pluggable terminal strip connectors
- » Optional redundant power



Model 6601

Input

Impedance	>30 kW, balanced
Maximum level	+30 dBu (66 Ω), +24 dBm (600 Ω)
Common Mode Range	±20 V
Common Mode Rejection (CMRR)	>90 dB @ 60 Hz, >60 dB @ 20 kHz

Outputs

Channels	1 (mono) or 2 (stereo)
Outputs per channel	8 (mono) or 4 (stereo)
Output impedance	66 Ω or 600 Ω balanced
Output isolation	>70 dB, 20 Hz to 20 kHz
Maximum level	+30 dBu (66 Ω), +24 dBu (600 Ω) by special request

Performance

Gain Range	-6 dB to +33 dB (±6 dB on pot, 0, +9, +18, +27 dB on jumpers)
Frequency response	<±0.05 dB, 20 Hz to 20 kHz, relative to 1 kHz, up to +30 dBu (66 Ω), +24 dBm (600 Ω)
Total Harmonic Distortion	<0.001%, 20 Hz to 20 kHz @ +30 dBu (66 Ω), +24 dBm (600 Ω)
S/N ratio	>100 dB @ unity gain 20 Hz to 20 kHz, relative to +8 dBu, unweighted
Intermodulation distortion	<0.02% SMPTE @ +18 dBu (66 Ω)
Isolation between modules	>100 dB, 20 Hz to 20 kHz
Performance temperature	5 – 40°C
Max operating temperature range	0 – 50°C
Power dissipation	<2 W

Frame 6600

Audio DA Mounting Frame Specifications

Number of modules	12 (maximum)
Dimensions	3.5 in x 19 in x 12 in
Nominal weight (with modules)	Approximately 16 lbs
Power Supply	Input voltage 90–260 VAC, automatic selection
Frequency	50/60 Hz
Power dissipation	40 W
DC output	±24 V

Power Supply 6600R

Redundant Power supply is optional

Model 6601R

Input

Impedance	>30 kW, balanced
Maximum level	+30 dBu (66 Ω), +24 dBm (600 Ω)
Common Mode Range	±20 V
Common Mode Rejection (CMRR)	>90 dB @ 60 Hz, >60 dB @ 20 kHz

Remote Gain

Control	Local/remote, switch selectable Accessed from rear of module
Type	DC control
Range	±20 dB

Outputs

Channels	1 (mono) or 4 (stereo)
Outputs per channel	8 (mono) or 3 (stereo)
Output impedance	66 Ω or 600 Ω balanced
Output isolation	>70 dB, 20 Hz to 20 kHz
Maximum level	+30 dBu (66 Ω), +24 dBm (600 Ω)

Performance

Gain range	±20 dB
Frequency response	<±0.05 dB, 20 Hz to 20 kHz, relative to 1 kHz, any level up to +30 dBu (66 Ω), +24 dBm (600 Ω)
Total Harmonic Distortion	<0.001%, 20 Hz to 20 kHz @ +30 dBu (66 Ω), +24 dBm (600 Ω)
S/N ratio	>80 dB @ unity gain 20 Hz to 20 kHz, relative to +8 dBu, unweighted
Intermodulation distortion	<0.02% SMPTE @ +18 dBu (66 Ω)
Isolation between modules	>100 dB, 20 Hz to 20 kHz
Performance temperature	5 – 40°C
Max operating temperature range	0 – 50°C
Power dissipation	2.5 W

Model 7100

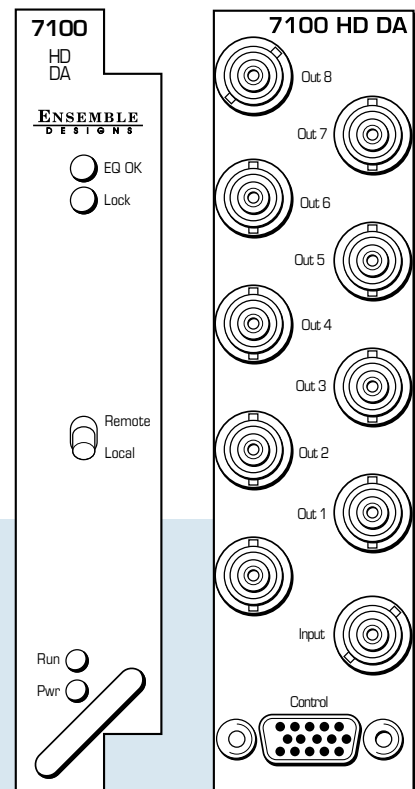
HD Reclocking Distribution Amplifier

The 7100 HD Distribution Amplifier module can be used in the Avenue 3RU and 1RU frames. HD, SD, ASI and audio modules can be mixed in the same frame.

The module can be monitored locally and remotely. The remote control system is accessed using an Avenue Control Panel and/or Avenue PC. Modules can be updated with new software as new formats are supported. Software is updated with Avenue's built-in networking capability. On loss of signal, the 7100 can generate an alarm that is monitored through Avenue PC.

Features

- » High Definition DA
- » Supports all HD standards
- » Eight HD serial digital outputs
- » Reclocked outputs
- » Use HD, SD, ASI and audio modules in same frame
- » Auto EQ
- » One or more alarms on loss of signal
- » Passes embedded audio



Input

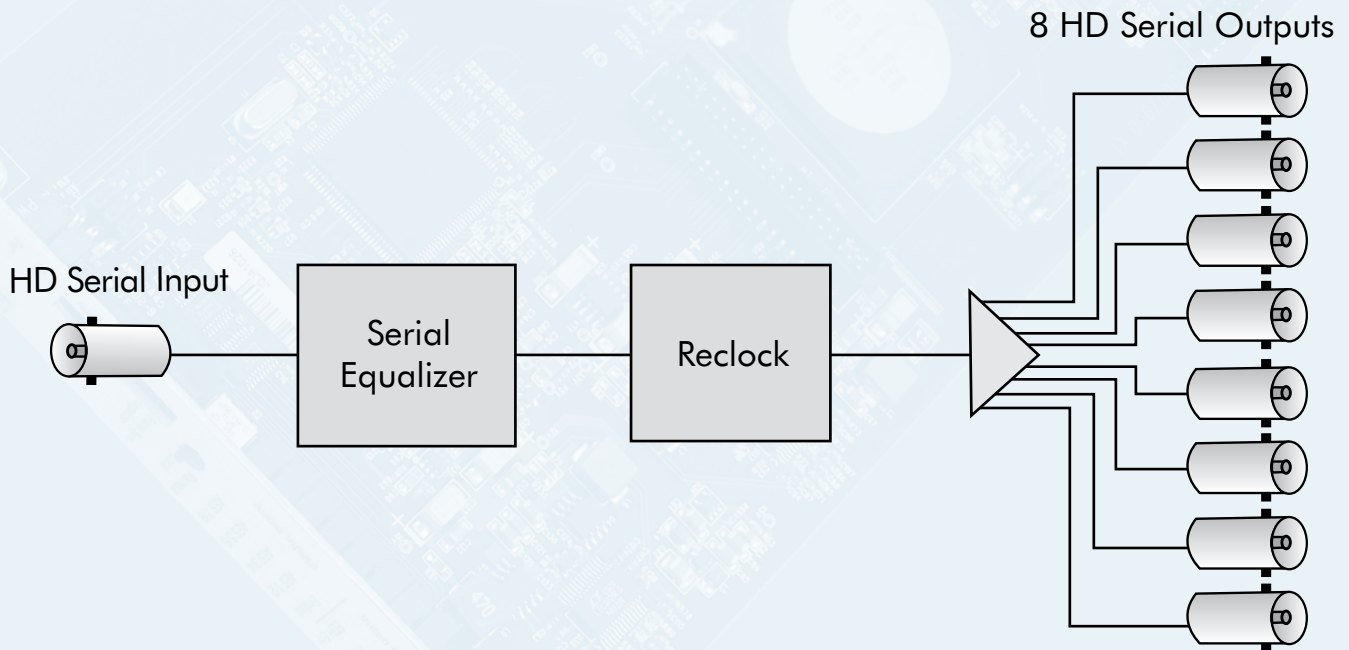
Number One
Signal Type HD Serial Digital
SMPTE 274M, 292M & 296M
Impedance 75 Ω
Return Loss >15 dB, DC to 1.5 GHz
Max Cable Length 100 meters Belden 1694A
Automatic Cable Input Equalization

General Specifications

Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft

Output

Number Eight
Signal Type HD Serial Digital
SMPTE 274M & 296M
Impedance 75 Ω
Return Loss >15 dB, DC to 1.5 GHz
Output DC None (AC coupled)



Model 7110

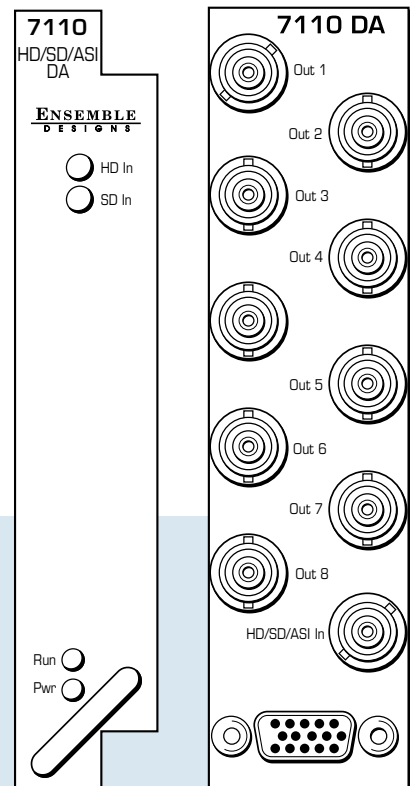
HD /SD /ASI Reclocking Distribution Amplifier

The Avenue 7110 module is dual-rate serial digital distribution amplifier with automatic cable equalization and reclocking. It automatically detects and operates at 270 Mb/s for Standard Definition (525 or 625) signals and at 1.485 Gb/s for High Definition signals. It also can be used with DVB-ASI signals. The module has one input and eight outputs. The module can be used in either the 3RU or 1RU Avenue frame.

Input signal presence and bit rate can be monitored through the Avenue Control System and it is also indicated by LED indicators on the front edge of the module. On loss of signal, the 7110 can generate an alarm that is monitored through Avenue PC.

Features

- » HD/SD/ASI Distribution Amplifier
- » Supports all HD, SD and ASI standards
- » Auto-senses standard definition or high definition input
- » Reclocked outputs
- » Auto EQ
- » Alarm on loss of signal
- » Passes embedded audio



Serial Digital Input

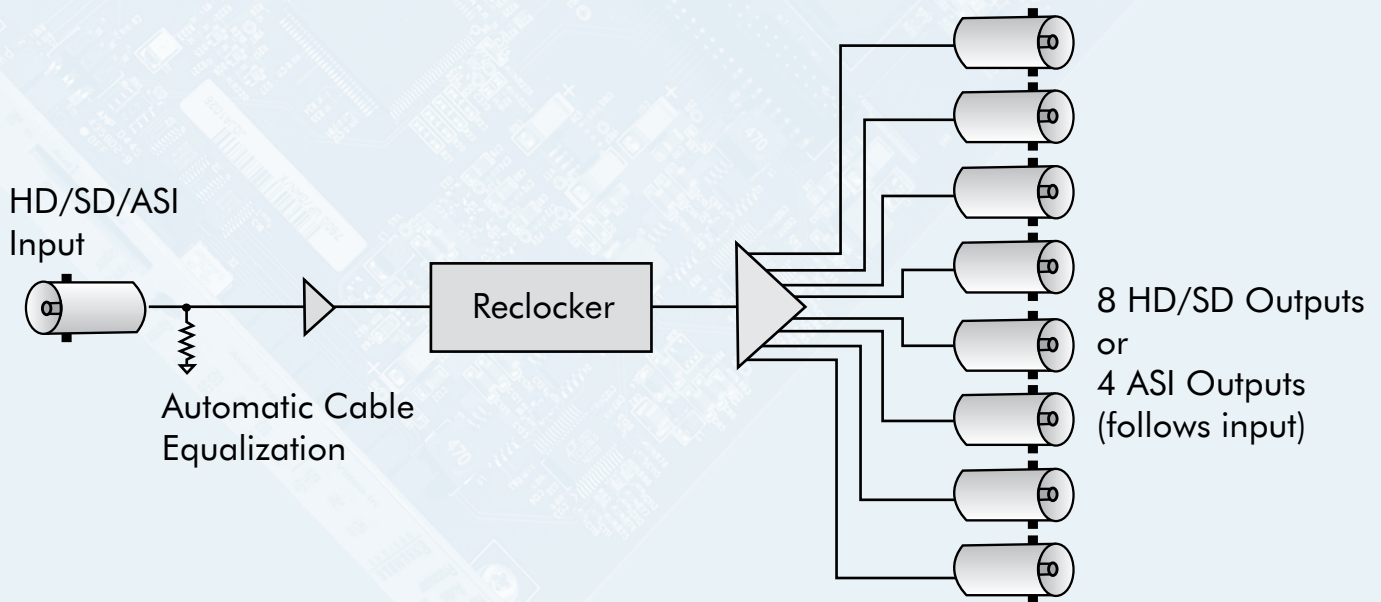
Number One
 Signal Type HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M or SD Serial Digital 270 Mb/s SMPTE 259M or DVB-ASI 270 Mb/s
 Impedance 75 Ω
 Return Loss >15 dB
 Max Cable Length 270 Mb/s 300 meters Belden 1694A
 1.485 Gb/s 100 meters Belden 1694A
 Automatic Cable Input Equalization

General Specifications

Power Consumption <7.0 watts
 Temperature Range 0 to 40°C ambient (all specs met)
 Relative Humidity 0 to 95%, noncondensing
 Altitude 0 to 10,000 ft

Serial Digital Output

Number Eight (SD, HD) or Four (ASI)
 Signal Type ASI on outputs 2,4,6, 8
 Follows input
 Impedance 75 Ω
 Return Loss >15 dB
 Output DC None (AC coupled)



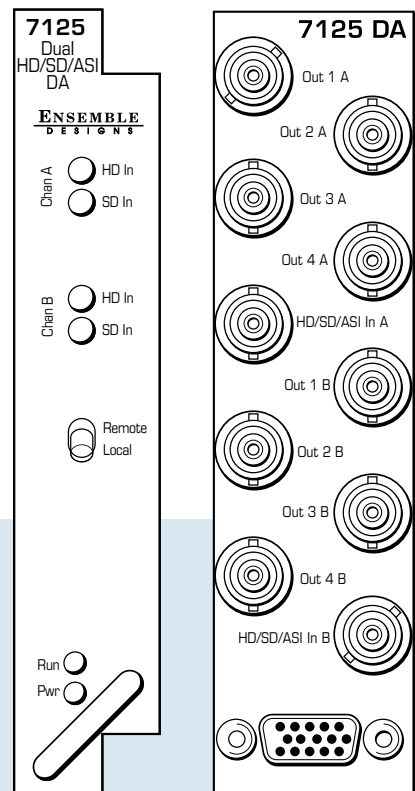
HD /SD /ASI Dual Reclocking Distribution Amplifier

The Avenue 7125 module is a two channel video distribution amplifier that handles high definition, standard definition and ASI video signals. It automatically detects and operates at 270 Mb/s for Standard Definition (525 or 625) signals and at 1.485 Gb/s for High Definition signals. It also can be used with DVB-ASI signals. The 7125 has automatic cable equalization and reclocking. The module can be used in either the 3RU or 1RU Avenue frame.

Input signal presence and bit rate can be monitored through the Avenue Control System and it is also indicated by LED indicators on the front edge of the module. On loss of signal, the 7125 can generate an alarm that is monitored through Avenue PC.

Features

- » HD/SD/ASI Distribution Amplifier
- » Supports all HD, SD and ASI standards
- » Two channels of distribution per module
- » Auto-senses standard definition or high definition input
- » Reclocked outputs
- » Auto EQ
- » Alarm on loss of signal
- » Passes embedded audio



Serial Digital Input

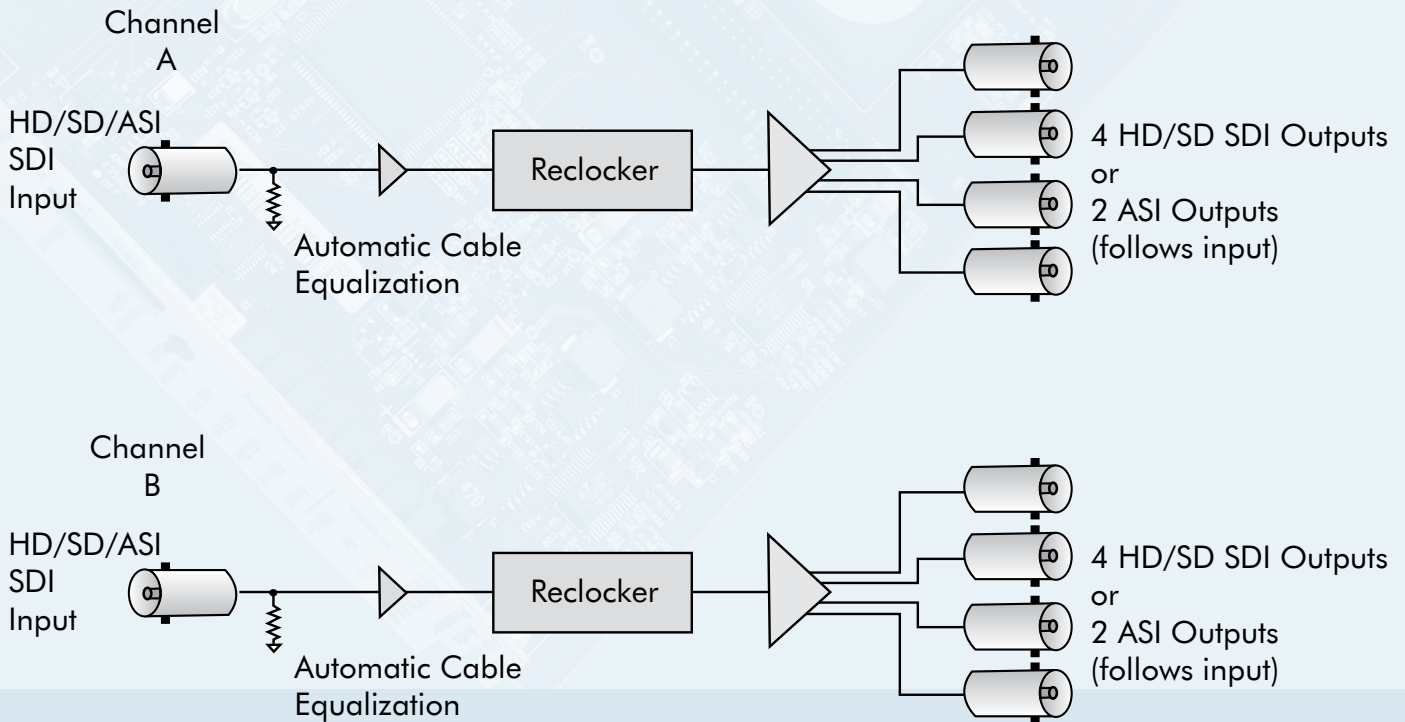
Number	Two
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M or SD Serial Digital 270 Mb/s SMPTE 259M or DVB-ASI 270 Mb/s
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	300 meters Belden 1694A 100 meters Belden 1694A
Automatic Cable Input Equalization	

Serial Digital Output

Number	Eight (SD, HD) or Four (ASI) ASI on outputs 2A, 4A, 2B, 4B
Signal Type	Follows input
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

General Specifications

Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95% noncondensing
Altitude	0 to 10,000 ft



Model 7130

HD DA and Downconverter

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

Two 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.

Features

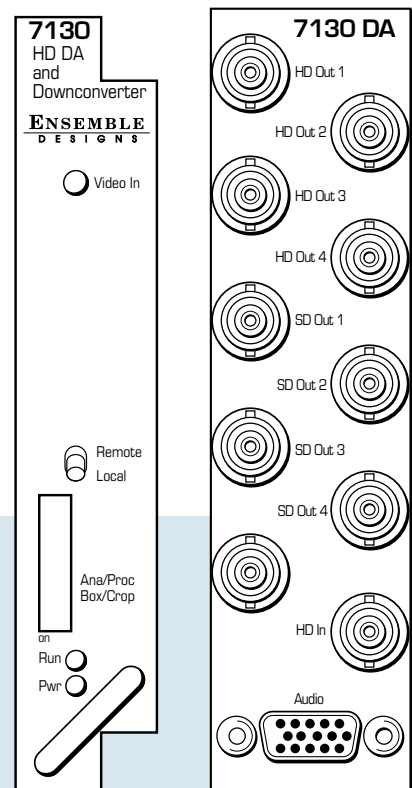
- » HD Downconverter and Distribution Amplifier
- » Up to four processed SD SDI outputs
- » Four SDI DA outputs
- » Up to four composite outputs
- » Analog Audio output for monitoring
- » Downconverts HD 720p or 1080i to SD
- » Distribution Amplifier for any HD or SD signal
- » Supports WSS and AFD
- » Translates HD closed captioning to SD closed captioning
- » Passes 16 channels of embedded audio
- » 2 channels of analog audio for monitoring
- » Auto detection of input standard and frame rate
- » Local and remote control

Meta Data

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.



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
Automatic Cable Input Equalization	

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	Up to four 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

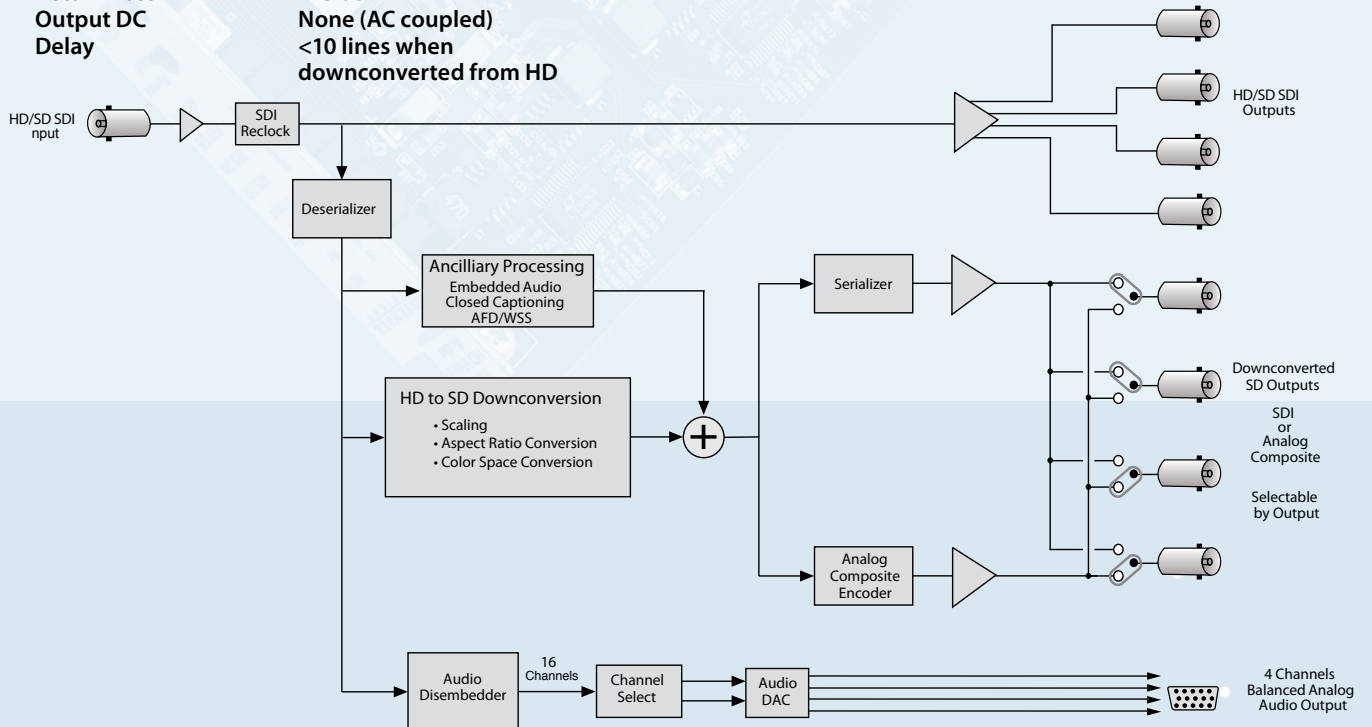
Number	Four (selectable from sixteen)
Signal Type	Balanced, transformerless
Impedance	30 Ω
Maximum Output Level	24 dBu
Resolution	24 bits, 128x Oversampled
Reference Level	-10 dBu to +4 dBu
Frequency Response	±0.1 dB, 20 Hz to 20 kHz
Crosstalk	<102 dB
Dynamic Range	>106 dB

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



Serial Digital Protection DA

The 7160 Serial Digital Protection DA module is a fail-safe bypass protection switch for monitoring and switching critical SD and HD paths in broadcast and satellite applications. When a fault is detected in the Primary input, the switch will activate, causing the Secondary (backup) input to be switched to the module's distributed outputs. The switch can operate in two modes; automatic or nonresetting.

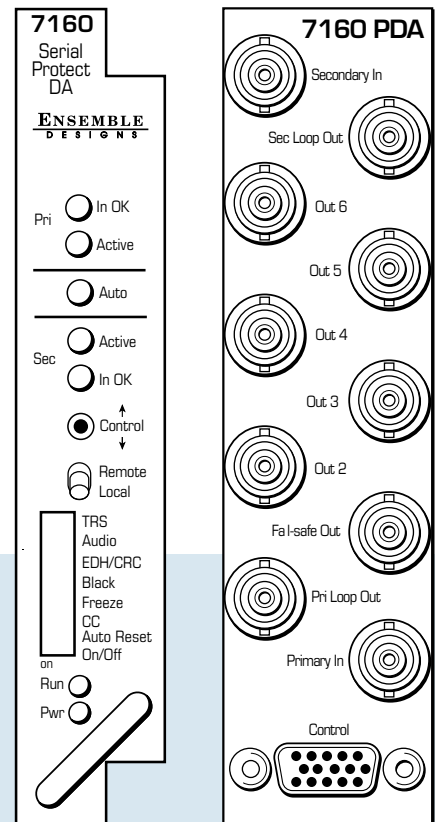
The 7160 monitors the integrity of the Primary serial digital input stream and analyzes the audio and video content. Signal health and fault detection is determined by monitoring any or all of the following parameters: Closed Caption Data, Timing Reference Signal (TRS), Black, Embedded Audio, Error Detection and Handling (EDH), CRCs, and Freeze.

A sophisticated Black detection system is employed to activate the switch in the event signal is lost. It allows the user to select not only the threshold and percentage of non-black pixels, but also the portion of the picture to be considered.

The Freeze detection system can be set to detect a clean or noisy source. Freeze Time sets the number of seconds for the 7160 to switch to the secondary input after a video freeze condition is detected in the primary input.

Features

- » Use for critical paths in broadcast and transmission to ensure staying on-air in case of primary signal fault
- » Two serial digital inputs, four serial digital outputs
- » Accepts SD and HD SDI inputs
- » Detects Closed Caption Data, TRS, CRCs, EDH, Black, Silence and Freeze
- » Embedded audio detection
- » Passes embedded audio
- » Alarm generation
- » Remote control and monitoring



Input Signal

Number Two
Signal Type HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M or SD Serial Digital 270 Mb/s SMPTE 259M
Impedance 75 Ω
Return Loss >15 dB to 1.485 GHz
Automatic Cable Input Equalization

Serial Output Signal

Number Six
Signal Type Includes One Fail-safe bypass output
Impedance Follows selected input 75 Ω

Standards Supported (auto-detected)

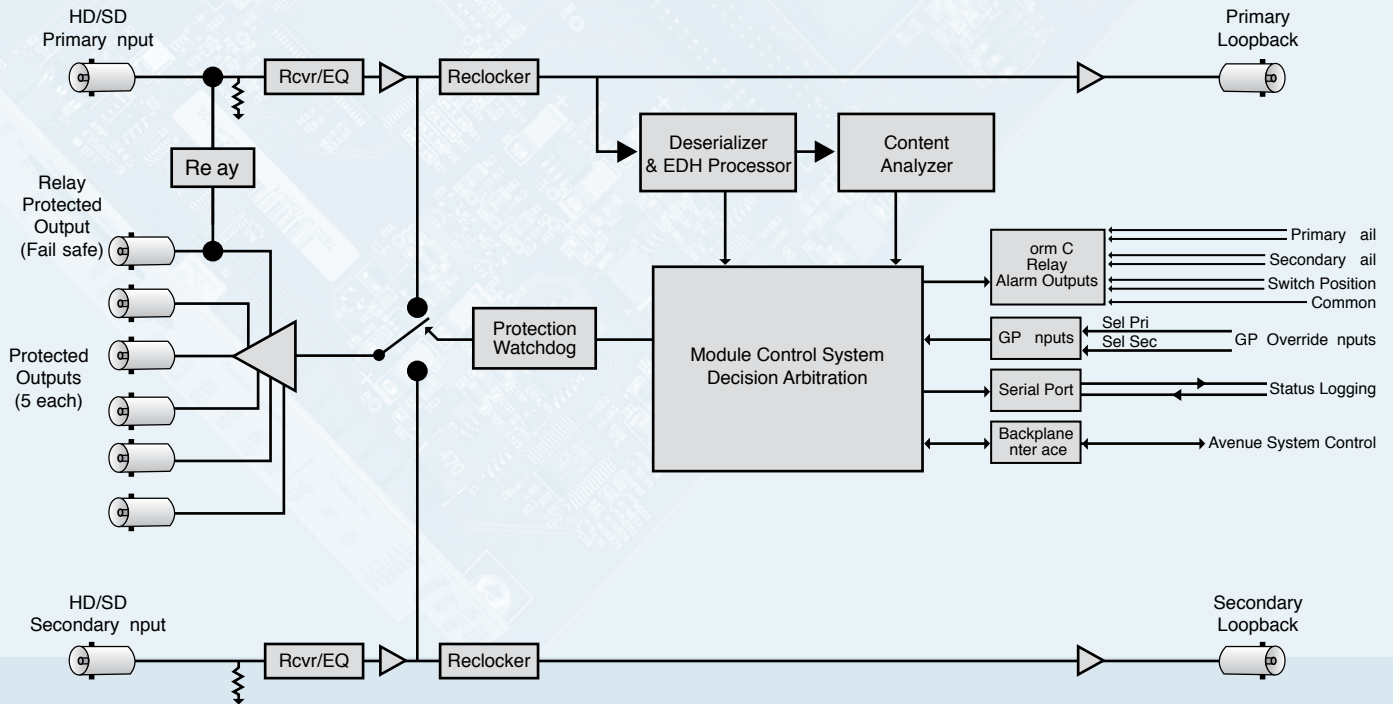
1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
 625i 50
 525i 59.94

General Specifications

Connectors BNC
Power Consumption <5 watts
Temperature Range 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft
Fusing 1.5 Amp PTC resettable fuse

Serial Digital Loopback

Number Two total
 One primary
 One secondary
Signal Type Follows input
Impedance 75 Ω



Model 7200

HD Digital to Analog Converter

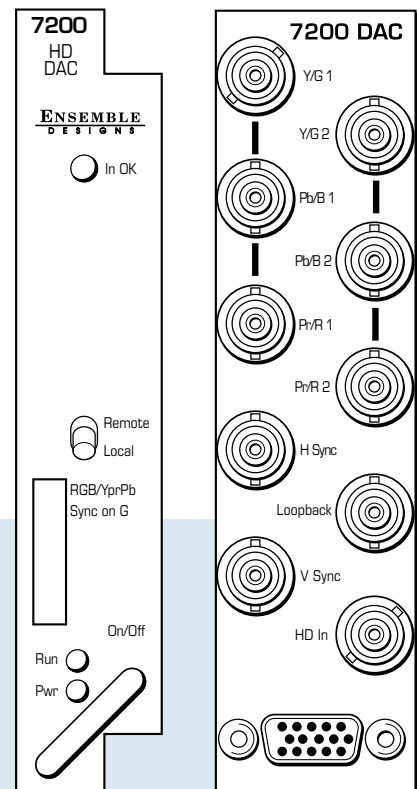
The 7200 is an HD Serial Digital to HD Analog Component converter. It can be used with HDTV monitors and multiscan computer monitors.

This module takes advantage of 14 bit Sigma Delta digital to analog conversion, providing extremely accurate analog outputs. Level adjustments for video, chroma, and setup allow the 7200 to be easily integrated into any HD system.

Standards supported include: 720p, 1080i, 1080p and 1080sF. All Avenue modules can be monitored and controlled through the Avenue remote control system.

Features

- » Use with HDTV monitors and multiscan monitors
- » 14 bit internal processing, 14 bit outputs, 2x Oversampled
- » Sigma Delta digital to analog conversion
- » Y/Pr/Pb, RGB, or SVGA (RGB – H/V) selectable
- » Level adjustments for video and chroma
- » Sharpness filter
- » Reclocked loopback output
- » Auto standard detection for 525 and 625
- » Local or remote control



Input

Number One
Signal Type HD Serial Digital 1.485 Gb/s
SMPTE 274M, 292M or 296M
Impedance 75 Ω
Return Loss >15 dB to 1.485 GHz
Automatic Cable Input Equalization

General Specifications

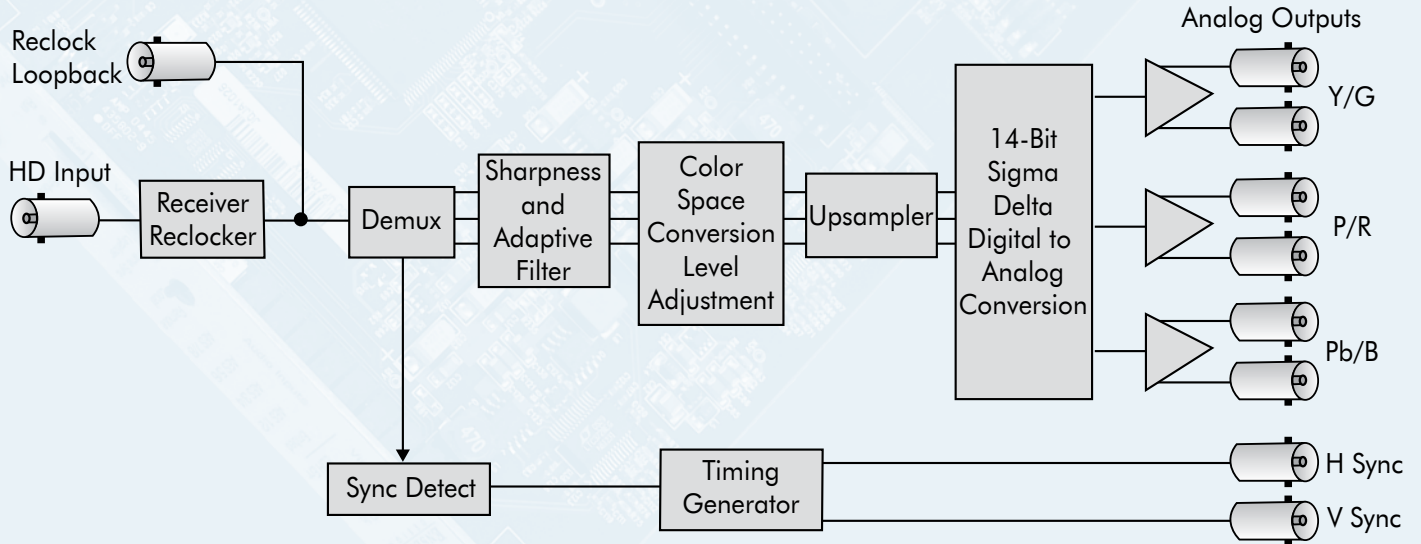
Power Consumption 10 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft

Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz

Output

Number Two Y, Pr, Pb, or RGB
or One SVGA (RGB HV)
Signal Type Analog Component HD



Sync Pulse Generator and Test Signal Generator

7400 SPG/TSG - Reliable and Easy-To-Use

The 7400 HD/SD Sync Generator and Test Signal Generator is a stable timing source that is perfect for local reference generation in broadcast, remote trucks and post. HD SDI, SD SDI, analog composite, HD Tri-Level Sync, timecode, AES audio and analog audio reference outputs are generated.

The 7400 can operate from an internal precision frequency reference as a stand alone Master Sync Generator or lock to a video reference or 10 MHz precision reference. Alternately, the 7400-GPS option can be used.

The 7400 can output multiple formats of tri-level sync, HD SDI test signals, SD composite and SDI test signals, and color black reference. The 7400 can simultaneously deliver both 525 (NTSC) and 625 (PAL) based signals. Color framing tracks the reference signal. All of the video outputs are derived from the same time base and can be timed with respect to each other. The 7400 has two identical generators, Generator A and Generator B, each with a variety of outputs. Each set of outputs can be timed with respect to the reference to any point in the television frame. All of the Outputs from a particular Generator must be selected within the same frame rate family.

The Avenue Frame features a retainer bar to ensure that modules remain properly seated even in the most demanding mobile environments.

Favorite Test Patterns

There are over 30 test signals including: Full and Split Field Bars at 75% and 100% with Pluge; Black; Flat Field; Pulse and Window; Ramp; Crosshatch; Safe Title; Blanking Markers; Cosite; Checkfield, Pathogenic, and 5 Step. The Cyclops feature adds a motion element to the selected video test signal to assist in locating a signal that might be frozen in a frame sync somewhere in the signal chain. An ID slate with user programmable text can overlay the test pattern.

Customizable Test Patterns

In addition to the standard suite of test patterns, users can create custom test patterns on a computer. Simply transfer test patterns to the included Secure Digital flash memory card using Avenue Logo software and a standard card reader, then insert the memory card into the 7400. Test patterns can include motion and an associated audio clip.

Audio Generators

The 7400 provides extensive support for analog and digital audio. Because all of the video outputs can be locked to a common time base, the AES digital audio outputs are always synchronous with all of the video outputs – regardless of format. Multiple tone generators make it easy to identify multi-channel content. With the 7400-EX Expando option, an AES input is provided which can be fed by a multi-channel encoded bitstream. This bitstream will be included in the set of signals that can be embedded into the test signal outputs.

The audio section of each generator supports sixteen audio channels. The content of each channel is independently programmable. Choices include adjustable frequency tone

generators, tone sweeps, Silence, Timecode, Audio Clip playback from Secure Digital Card, and the external AES input. Left/Right Channel ID that synchronizes to the Cyclops feature can also be selected.

All sixteen of these channels can be embedded in the SDI outputs. Each AES output can select from any of the 8 pairs that make up these 16 channels. Similarly, the stereo analog output of each generator can be driven from any of these audio signal pairs.

Multiple Timecode Generators

Multiple time code generators make the 7400 convenient for post applications. Timecode is delivered as LTC both 75 Ohm BNC and 110 Ohm Balanced), VITC, and DVITC. One generator can be configured to produce 525/59.94 drop frame timecode while the other generator is making 1080sF/23.98.

7400-EX Expando Module for Total Flexibility

If your facility seems to need every type of reference signal on earth, the 7400 module with the 7400-EX is just what you need. Two generators provide myriad reference signals including: 12 types of HD SDI black and bars, SD SDI bars and black, composite bars and black, HD Tri-Level Sync, Word clock, AES and analog audio tone, and LTC. The two generators can be independent or one generator can be locked to the other. The control system lets you assign signal types to the 17 output BNCs and 2 high-density D connectors. The 7400-EX option can be installed in the field.

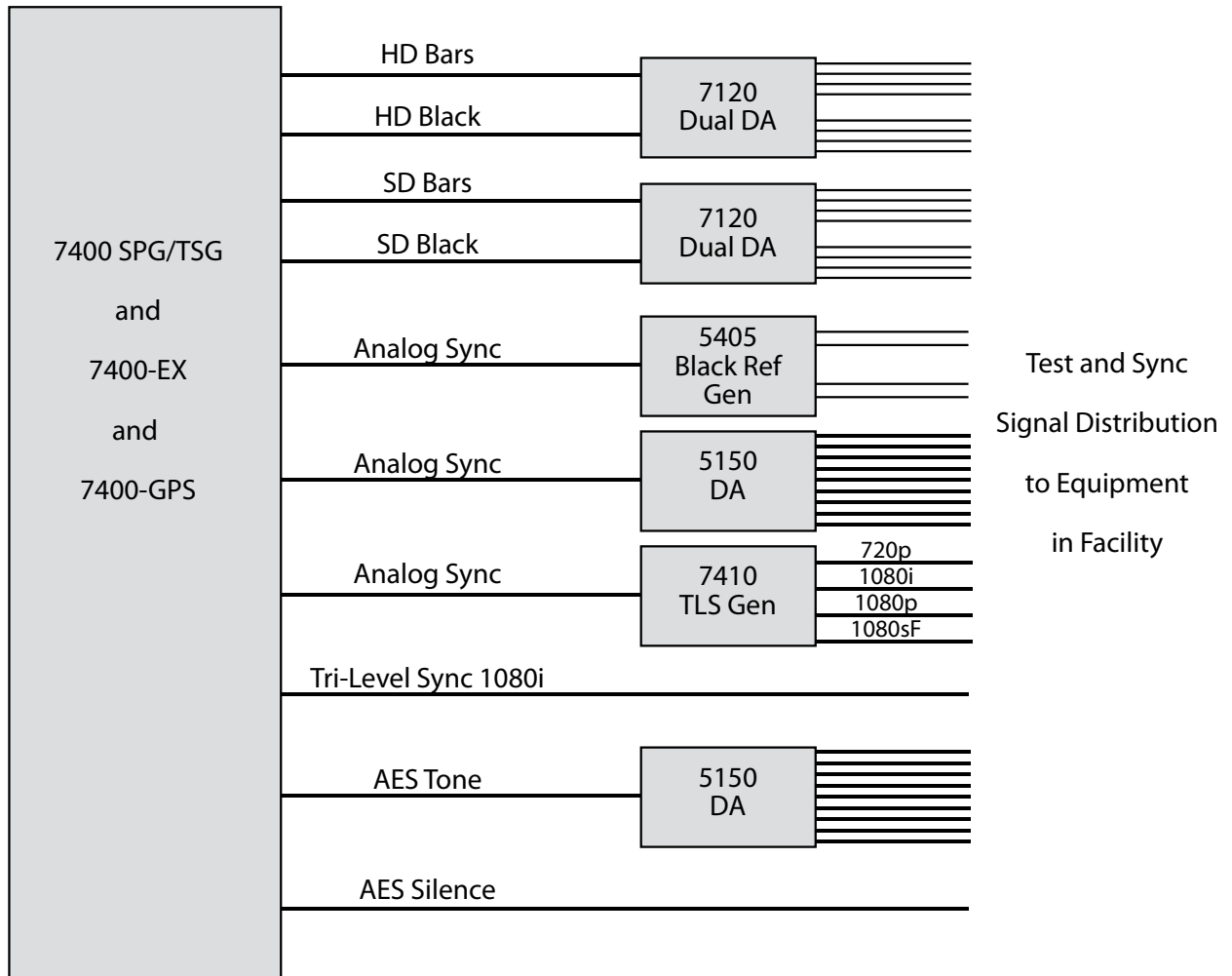
7400-GPS Option for the Ultimate Precision Reference

For the ultimate in precision, the 7400-GPS option can be used with the 7400 module. The purpose of this GPS option is to provide an extremely precise frequency reference. The oscillator on the 7400-GPS is more accurate than a typical internal precision standard and is equivalent in accuracy to an atomic standard. Increased frequency accuracy makes it possible to frame synchronize signals between different facilities with virtually no dropped or doubled frames. The GPS option also provides precise time of day information, which can be used to drive the 7400 module's internal timecode generators.

The 7400-GPS option seamlessly integrates into the Avenue system by plugging directly onto the 7400 module. It can be easily installed in the field. The 7400-GPS option consists of a compact, weatherproof antenna (with internal high-gain pre-amp) and a receiver sub module which mounts directly to the 7400 module. The included GPS antenna mounts onto standard 3/4" threaded pipe, metal or plastic. Connection from the F-style coaxial fitting on the antenna to the appropriate BNC on the Avenue Frame can be made with customer supplied standard 75 ohm cable. The coax cable can be routed through the center of the pipe for a completely waterproof installation. When low loss cable such as Belden 1694A is used, the antenna can be placed up to 200 feet (60 meters) from the frame. Ideally, the antenna is mounted outdoors where it has an unobstructed view of the sky.

A Complete SPG and TSG System

The 7400 can be combined with other Avenue modules to create a complete sync pulse and test signal chain. The 7410 is a four channel HD Tri-Level Sync generator that can output four different types of Tri-Level Sync simultaneously and is very useful in post and hybrid facilities. When additional composite black is needed, the 5405 can be used to provide two independent pairs of composite black outputs. The 5150 distribution amplifier can be used to distribute multiple copies of AES audio, Tri-Level Sync or composite black signals as needed. For HD test signal and black distribution, either the 7110 DA or 7125 DA are a good fit.



Features

- » Use as Master Sync Gen or lock to external reference or GPS
- » Can output SD SDI, HD SDI, composite timecode and audio simultaneously
- » Outputs can be independently timed
- » Generates 30+ test signals
- » Flash memory card for making custom test patterns

Description of Outputs

Generator A

SDI Out A – Outputs HD or SD test signals. Select frame rate family for all of Generator A; 59.94, 50 or 60. Output can include 16 channels of embedded audio – tone, silence, external audio, or audio file. Can also include DVITC.

Programmable Out 1A – Outputs analog composite video (Bars, Black, or Test if Out A is SD), Tri-Level Sync Gen #1. Composite output can include VITC.

Programmable Out 2A – Outputs one of the following: Tri-Level Sync Gen #2, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz (only if locked to internal or GPS reference).

Programmable Out 3A – Outputs one of the following: Tri-Level Sync Gen #2, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz.

Analog Audio – stereo output, 1 of 8 pairs from the audio generator.

When the 7400-EX option is installed, the following additional outputs are available for **Generator A**

Cpst Black Out A – Outputs composite black, 525 or 625 as per the selected frame family for the Generator. Can include VITC. Independently timeable.

SDI Black Out A – Outputs digital black in the same standard and frame family as test signal SDI Out A. Up to sixteen channels of embedded audio. Can include DVITC.

Programmable Out 4A – Outputs one of the following: Tri-Level Sync Gen #3 – within the selected frame rate family, can be different from Out 1, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz (only if locked to internal or GPS reference).

Programmable Out 5A – Outputs one of the following: Tri-Level Sync Gen #3, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz.

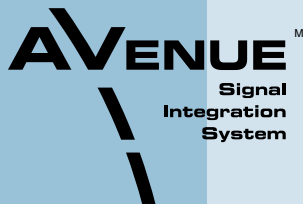
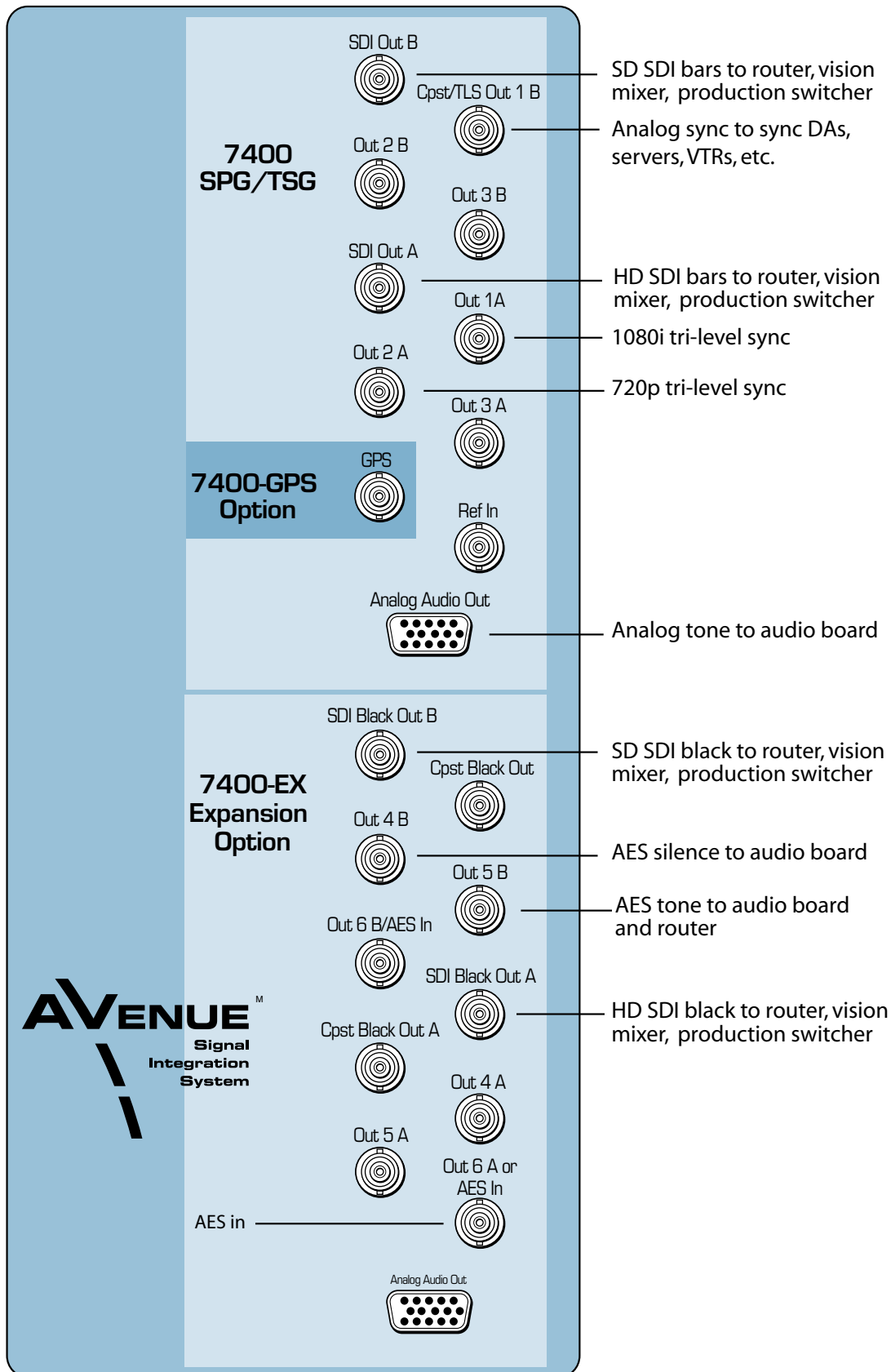
Programmable Out 6A – Outputs one of the following: Tri-Level Sync Gen #3, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz.

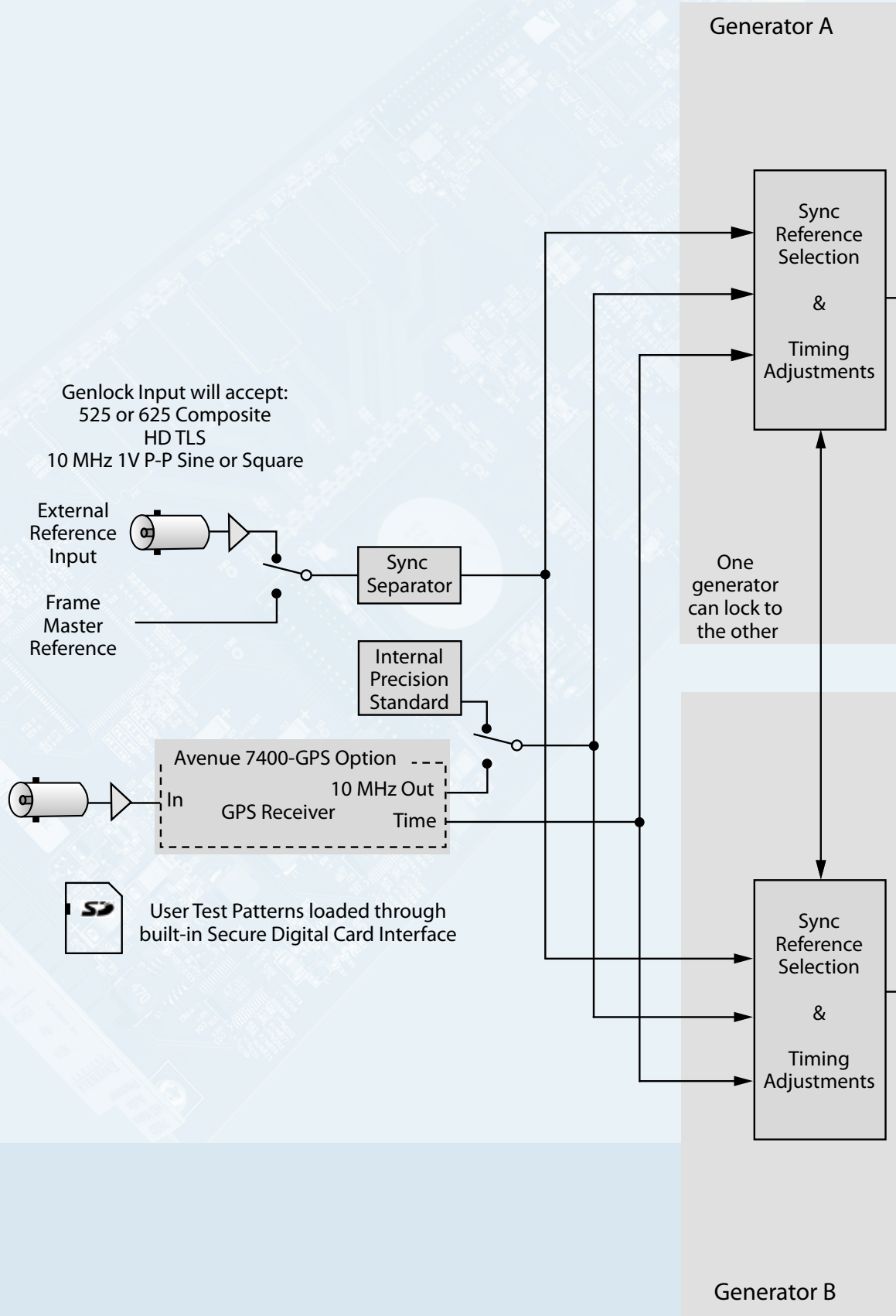
Expanded Analog Audio – provides an additional stereo output, 1 of 8 pairs from the audio generator.

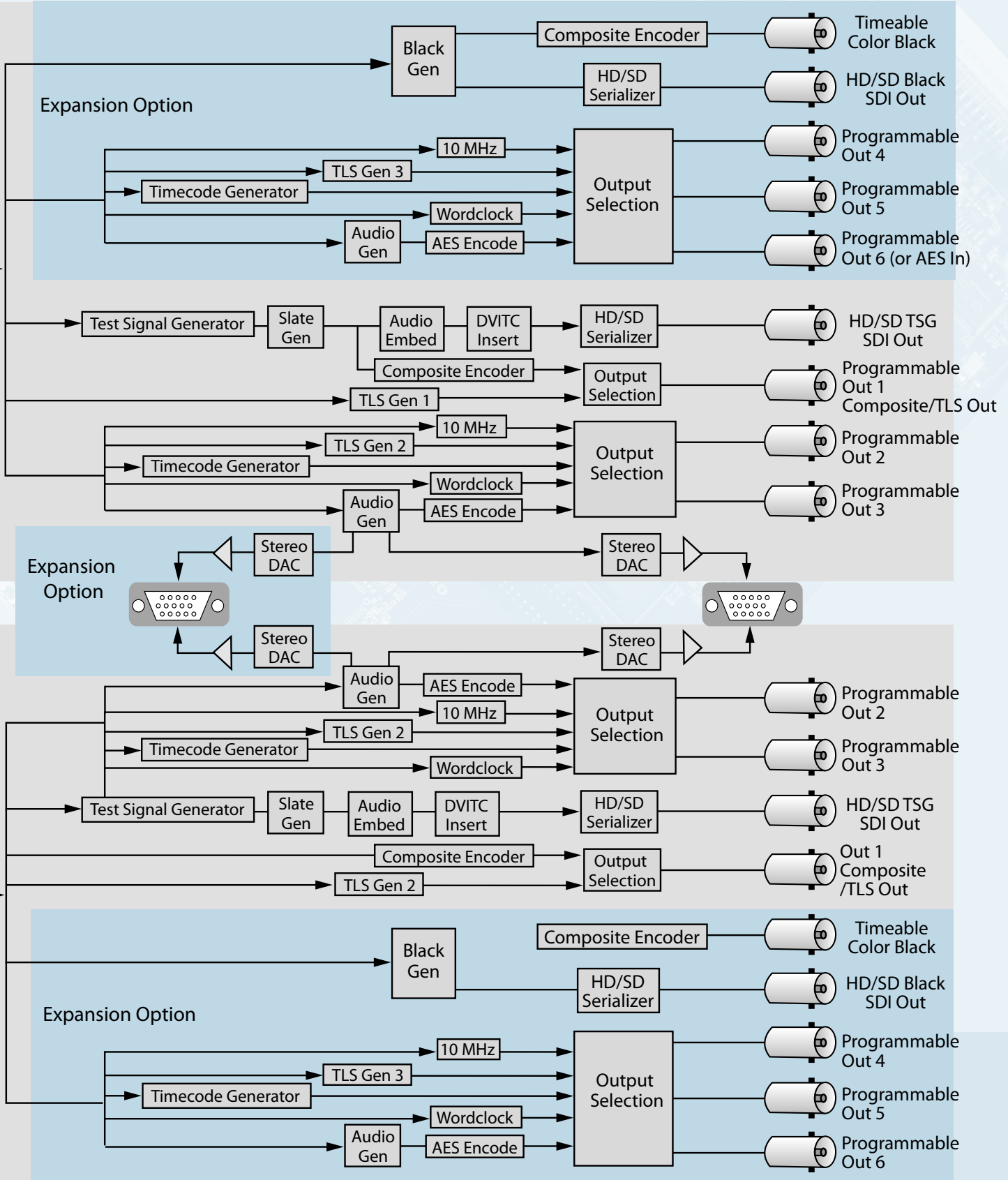
Generator B

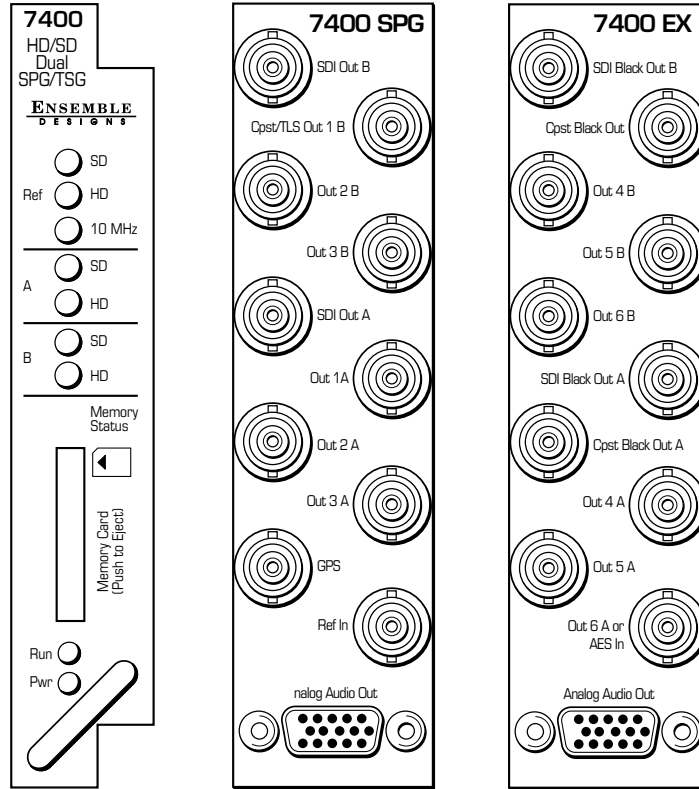
Has the same outputs as noted for Generator A. Generator B is completely independent from Generator A. Generator B can operate in a different frame rate family and its set of outputs can be timed independently.

Broadcast Application Configuration Example









Order Info:

7400

SPG/TSG Module (Takes up one slot in Avenue frame)

7400-EX

Expansion module to be used in conjunction with 7400 (Takes up one slot in Avenue frame)

7400-GPS

GPS receiver option that plugs onto 7400 module. (Does not take up a slot in Avenue frame)

Includes weatherproof antenna. Antenna mounts onto standard 3/4" pipe. Customer to provide 75 Ω 1694A coax up to 60 m/200 ft with F connector for antenna connection and BNC for Avenue frame connection.

Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
625i 50
525i 59.94
Composite PAL, NTSC

Frame Rate Families

Each 7400 has 2 identical Generators, each with a variety of outputs. All of the outputs from a particular Generator must be selected within the same frame rate family.

50 Hz (625) Derived Family: 1080i/50, 720p/50, 1080p/25, 1080sF/25, 625i/50
59.94 Hz (525) Derived Family: 1080i/59.94, 720p/59.94, 1080p/23.98, 1080sF/23.98, 525i/59.94
60 Hz Derived Family: 1080i/60, 720p/60, 1080p/24, 1080sF/24

Reference Input

Number	Two: External or Frame Master Reference
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync or 10 MHz 1V P-P sine or square
Return Loss	>40 dB (applies to external ref input)

Serial Digital Outputs

Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M or SD Serial Digital 270 Mb/s SMPTE 259M
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	270 Mb/s 300 meters 1694A 1.485 Gb/s 100 meters 1694A

Tri-Level Sync Outputs

Signal Type	HD Tri-Level Sync
Output DC	±50 mV
Return Loss	>30 dB to 30 MHz

Composite Outputs

Signal Type	NTSC / PAL
Impedance	75 Ω
Return Loss	>40 dB DC to 5.5 MHz
Frequency Response	±0.1 dB 0 to 5.0 MHz
Output DC	±50 mV
K Factor	<1.0%
Differential Phase	<1.0 degree
SCH Phase	±2 degrees
Delay	adjustable over full frame in sub degree steps
Color Framing	Tracks ref

Accuracy

Internal Reference (TCXO)	
Freq Error	<10 ⁻⁷ < ±1 Hz F _{sc}
GPS Option	
Freq Error	<10 ⁻¹²

Stability

Analog Jitter	<1 ns
Digital Jitter	<0.2 UI (0.13 UI typical)
AES Jitter	<1 ns

AES Audio Outputs

Type	AES3id tone, 50 Hz to 20 KHz, or silent
Resolution	24 bit

Analog Audio Outputs

Number	Two stereo pairs or four mono tone, 50 Hz to 20 KHz, or silent
Type	30 Ω, balanced
Impedance	
Reference Level	-10 to +4 dBu, selectable

Additional Output Choices

Timecode	DVITC on the SDI outputs LTC on the composite outputs LTC on BNC unbalanced or on HD-15 balanced, 1 V P-P drop or non-drop for NTSC
6 Hz Pulse Word Clock	10 MHz
	when locked to internal or GPS reference

Flash Memory

Number	One
Type	Secure Digital SD Flash Memory Card
Size	1 GB card included

File Type

Video	.tga
Audio	.wav, .mp3, .wma

General Specifications

Power Consumption	10 watts for 7400 10 watts for 7400-EX
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft

Model 7405

HD Test Signal Generator

The 7405 HD Test Signal Generator has simultaneous test signal and black outputs.

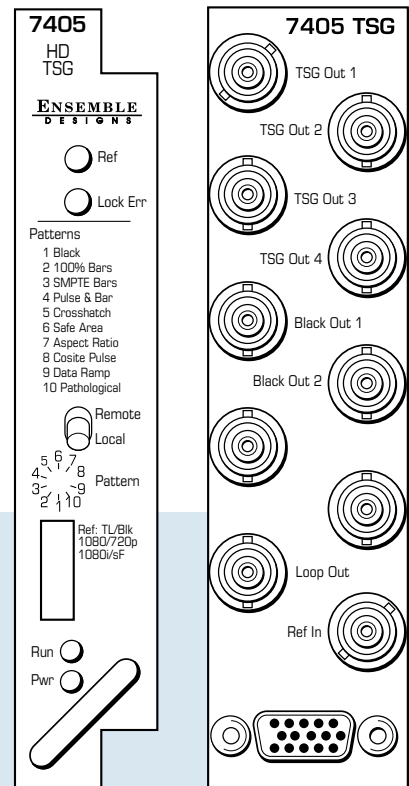
The 7405 genlocks to either composite video (PAL or NTSC) or to HD Tri-Level Sync. The module can lock to the frame's master reference, or reference can be connected directly to the module's external reference BNC.

Test signals include: Full and Split Field Bars at 75% and 100% with Pluge; Black; Flat Field; Pulse and Window; Ramp; Crosshatch; Safe Title; Blanking Markers; Cosite; Checkfield; and 5 Step. There are independent enables for each component so that Y, Cr, and Cb can be controlled separately, along with HD black outputs.

Test signals are selected from the module front edge or through the remote control system using an Avenue Control Panel and/or Avenue PC. Modules can be updated with new software as new formats are supported and test signals are added. Software is updated with Avenue's built-in networking capability.

Features

- » High Definition TSG
- » Simultaneous test signal and black outputs
- » Wide range of signals to choose from
- » Four HD serial digital outputs
- » Two HD black outputs
- » Use HD and SD modules in same frame
- » Genlock to Tri-Level Sync or Composite Video
- » Easy to configure and use



Output

Number Six (4 test signals, 2 black)
Signal Type HD Serial Digital
SMPTE 274M, 292M & 296M
Impedance 75 Ω
Return Loss >15 dB DC to 1.5 GHz

Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz

Reference Input

Number One external (module's BNC)
One internal (frame master ref BNC)
Signal Type PAL or NTSC composite video
or HD Tri-Level Sync
Return Loss >40 dB
(applies to external ref input)

Accuracy and Stability

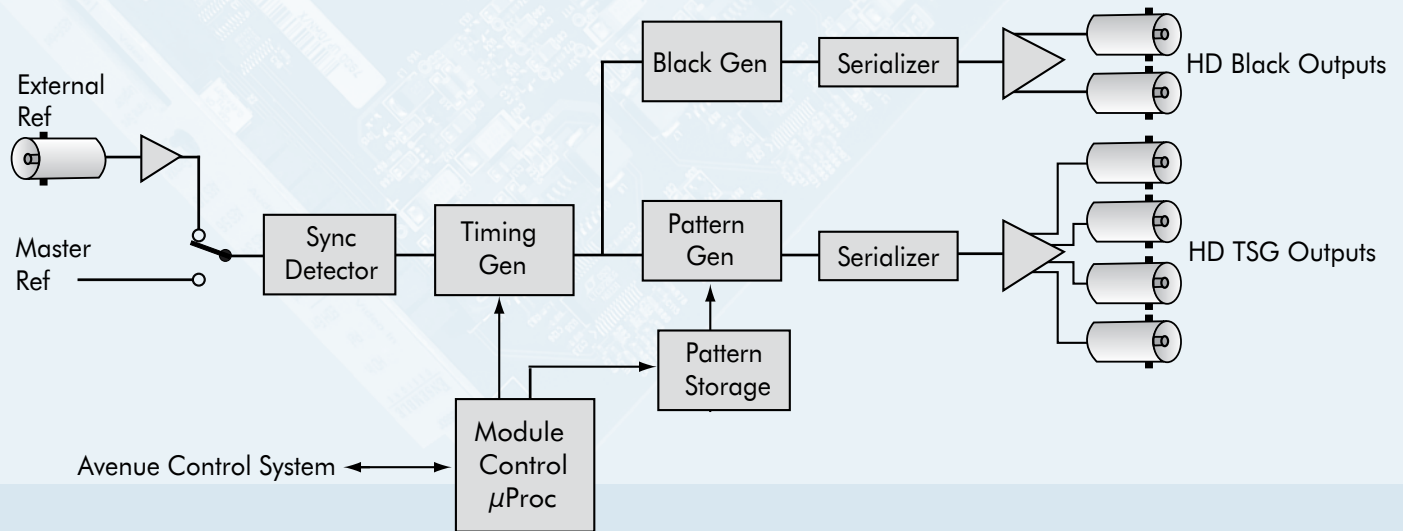
Stability Based on reference input
Jitter <0.2 UI (0.13 UI typical)

Test Signals

Black; Ramp; Bars 75 FF; Bars 75; Monitor Align;
Bars 100 FF; Bars 100; 5 Step; Window; Aspect;
Blanking; Cosite; Crosshatch; Safe Title; 50% Grey;
Checkfield

General Specifications

Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient
(all specs met)
Relative Humidity 0 to 95%, noncondensing
Altitude 0 to 10,000 ft



Model 7410

Quad HD Tri-Level Sync Generator

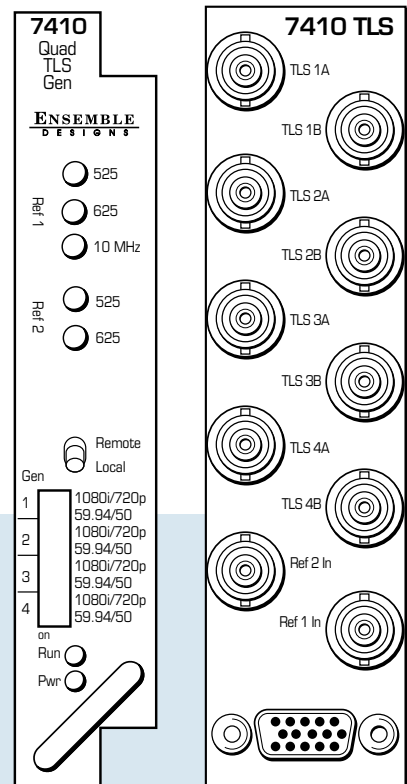
The 7410 Quad Tri-Level Sync Generator is for use in high definition television and post applications. Two reference inputs allow the module to lock to any two PAL, NTSC, or 10 MHz references. The 7410 can also operate as a stand-alone master generator.

Each of the four outputs is independent and can be set to output a different Tri-Level Sync signal. The timing of each generator can be set independently. A variety of user-selectable formats are supported including: 1080i, 720p, 1080p and 1080sF. The 7410 is well suited for facilities that need the flexibility of having simultaneous 720 and 1080 Tri-Level Sync outputs.

Use this module in conjunction with the 7400 SPG/TSG for a complete reference solution.

Features

- » Eight HD Tri-Level Sync outputs
- » Simultaneously outputs four different Tri-Level signals
- » Can provide 50 Hz and 60 Hz outputs simultaneously
- » Locks to two references or can be a master generator



Reference Input

Number Two on module
(and one alternate:
Frame Master Reference)

Signal Type 1 V P-P PAL, NTSC, or 10 MHz

Return Loss >40 dB DC to 5.5 MHz

Tri-Level Sync Output

Number Eight, 75 Ω

Signal Type 1080i (SMPTE 274M -4,5,6)
50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3)
50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11)
23.98, 24, 25 Hz
1080sF (RP211 -14,15,16)
23.98, 24, 25 Hz

Output DC ±50 mV

Return Loss >30 dB to 30 MHz

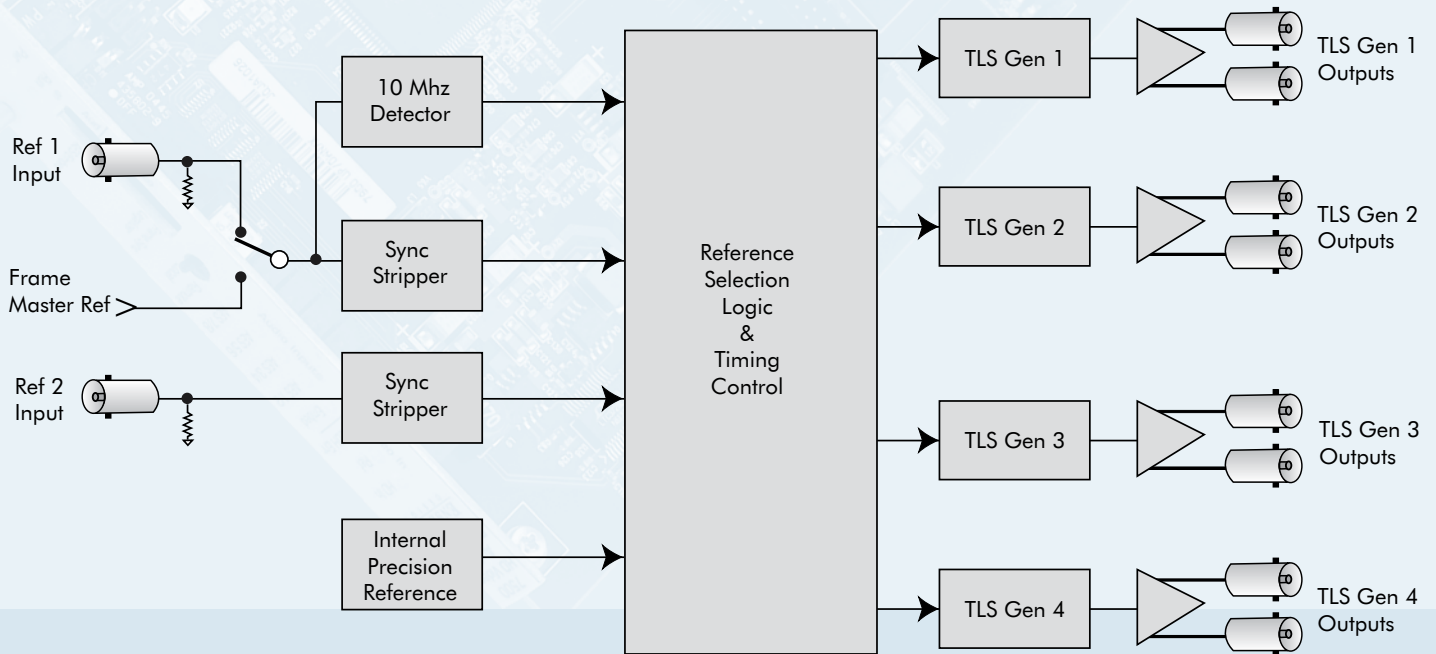
General Specifications

Power Consumption <7.0 watts

Temperature Range 0 to 40°C ambient
(all specs met)

Relative Humidity 0 to 95%, noncondensing

Altitude 0 to 10,000 ft



HD /SD Logo Inserter

HD and SD Logo Insertion and Branding

The 7420 is a dual rate logo inserter that can accept either an SD or HD video input and key still logos and animations over program material. The logo insertion capability can be used to add letterbox framing. It can also be used to key sports or event logos, or to source a virtual set background. The on-board memory can play back almost a minute of uncompressed video. Alternately, the 7420 can supply separate fill and key outputs to a production switcher for keying there.

Handy Flash Memory

The 7420 is fitted with a Secure Digital flash memory card in order to provide an extremely fast and easy way to transfer material. This is a particularly convenient method for pre-building material off-line. Simply transfer logos and animations to a Secure Digital flash memory card using a standard card reader, then insert into the 7420.

The 7420's flash memory card can be removed and reinstalled without interrupting logo playback. Alternately, logos can be loaded into one or more 7420s over ethernet. The flash memory card is used for transfer while the actual logo and animation playback comes from the 7420's DDR2 memory.

Linear Keying

The 7420 provides two cascaded, full linear keyers with transparency and a programmable transition rate. Each keyer is independently controllable and each has independent access to up to 2 GB of stored video and sound files.

Standard configuration is Keyer 1 and 2 each populated with 512 MB of DDR2 (SODIMM) memory. Users can upgrade to 2 GB of DDR2.

Features

- » Key still logos and animations with audio
- » HD and SD operation
- » HD Up/Down/Cross converter options
- » Fail-safe bypass in case of power failure
- » Flash memory card for transferring logos
- » Includes Avenue Logo Authoring and Management software
- » Program sequences of logos, animations and transitions
- » Control through RS-232 serial, ethernet, GPI triggers (8), or the Avenue Control System
- » 16 channel audio support, passes embedded audio
- » Program/Preview outputs or Key/Fill outputs
- » Full 10 bit linear keying and processing

Audio Support

Sounds and voice-overs can be associated with logos and clips. Each keying channel can play back a stereo sound file simultaneously with video. Audio is mixed into the user-selected output channel. Faders and unders (audio ducking) are programmable and can be sequenced.

The 7420 supports all sixteen channels of embedded audio. Compensation delay is provided in the audio path when one of the 7490 series options is being used.

Avenue Logo Authoring Environment

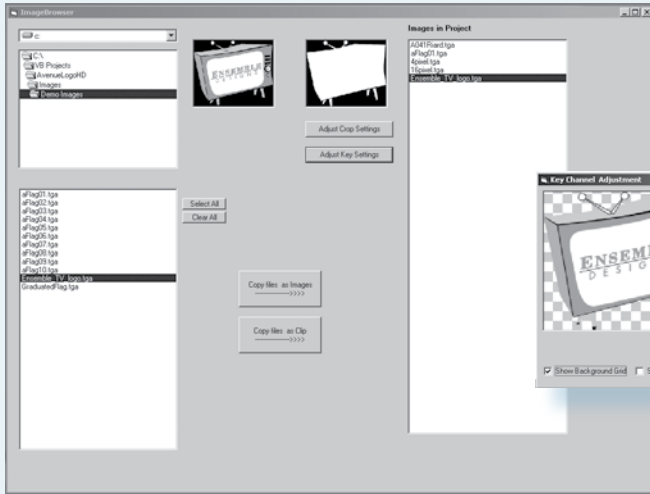
The Avenue Logo authoring environment provides a means to import graphics, animations and sound files. Video files are converted to the appropriate SD or HD color space, adjusted for proper aspect ratio, and organized in a form suitable to download into the 7420. Lossless compression ensures logos, animations and clips look as good in the program output as when they were created. The authoring system allows importing sound files which can be associated with one or more still or animated logos. Video and audio files are associated through the Avenue Logo Playback Sequence interface. Avenue Logo software can be provided to your clients so they can build sports or event logos off-line.

Upconversion and Logo Insertion with One Module

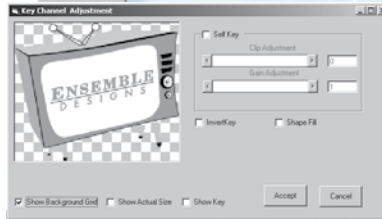
You can bring in SD background material, upconvert to HD, key logos, and output HD – all with one module. The 7490 series submodule options for the 7420 provide HD upconversion, downconversion, cross conversion and aspect ratio conversion. When the 7490 is installed, simply set the 7420 to output the facility's preferred HD or SD standard. The 7420 will accommodate whatever input is provided – any type of SD SDI or HD SDI signal. After setting the output standard, the input will be converted to the correct standard, logos and animations will be keyed, and the program out will be in the correct standard for the facility.

Control

Playback of sequences can be issued through a variety of methods. All Avenue modules can be accessed via ethernet with Avenue Logo software, Avenue PC software, or through third-party support using TCP/IP or SNMP protocols. Automation interfaces can be made through the ethernet port or through a simple ASCII protocol via the RS-232 port specific to the module. Single GPI contact closures can be used to initiate program sequences.



Avenue Logo User Interface



7420 Sub Module Options

7490 Up/Down/Cross Converter

This option offers total flexibility. Simply set the HD or SD output standard desired. Then feed any SD SDI or HD SDI signal to the input. Up, down, cross, or aspect ratio conversion is automatic. Use logo insertion capability to add letterbox framing.

7491 Upconverter

This option provides a very cost-effective, convenient way to handle both branding and upconverting to HD. Feed an SD SDI or HD SDI input to the module and output HD SDI in your selected standard.

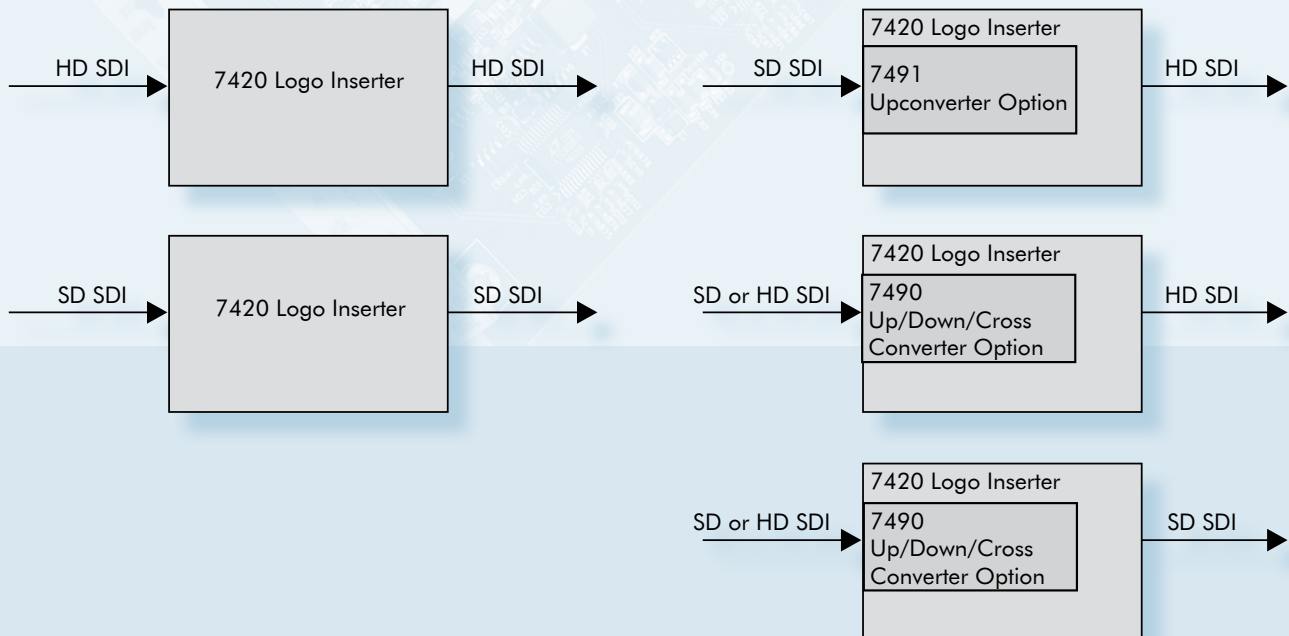
7492 Downconverter

Feed an HD SDI input to the module and get an SD SDI output.

7494 Aspect Ratio Converter

Feed a 4:3 SD SDI signal to the input and get a 16:9 SD SDI output. Or the reverse, 16:9 to 4:3.

Popular Configurations



HD / SD Logo Inserter

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
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	
270 Mb/s	300 meters Belden 1694A
1.485 Gb/s	100 meters Belden 1694A
Automatic Cable Input Equalization	

Standards Supported

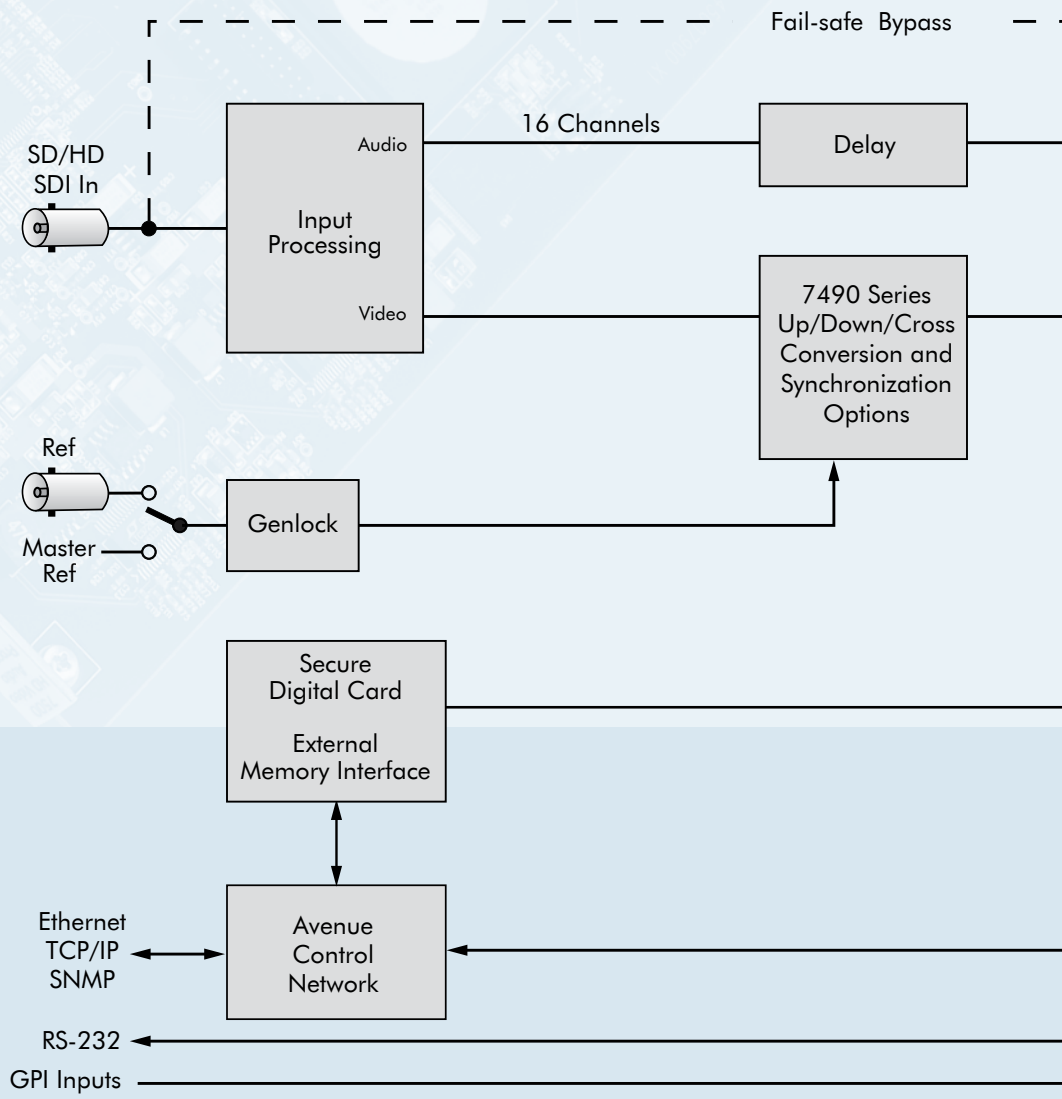
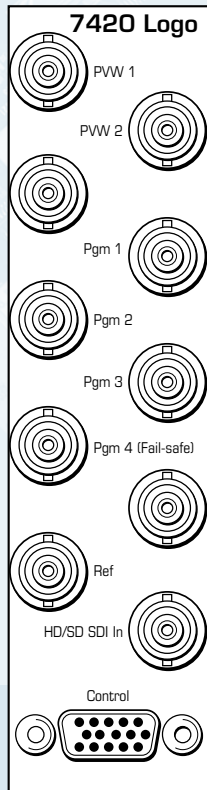
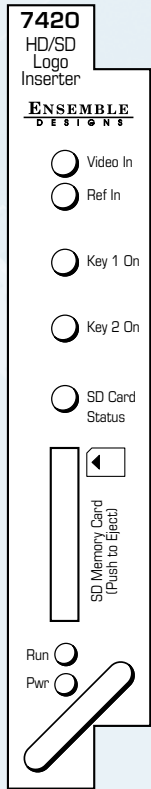
- 1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
- 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
- 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
- 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
- 625i 60
- 525i 59.94

Serial Digital Output

Number	Four Program/Fill (includes one fail-safe bypass)
Signal Type	Two Pvw/Key HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M or SD Serial Digital 270 Mb/s SMPTE 259M
Impedance	75 Ω
Return Loss	>15 dB
Output DC Delay	None (AC coupled) 4 μSec (without 7490 series option installed)

Reference Input

Number	One external (module's BNC) One internal (frame master ref BNC)
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync
Return Loss	>40 dB (applies to external ref input)



Sub Module Options

7490 Up/Down/Cross Converter
7491 Upconverter
7492 Downconverter
7494 Aspect Ratio Converter
Fits onto the 7420 and does not take up a slot in the frame.

Conversion Directions

Up/Down Conversion between
525 (NTSC) and 1080i/59.94, 720p/59.94, 1080p/23.98, 1080sF/23.98
625 (PAL) and 1080i/50, 720p/50, 1080p/25, 1080sF/25
Cross Conversion within frame rate families
525 Derived Family: 1080i/59.94, 720p/59.94, 1080p/23.98, and 1080sF/23.98
625 Derived Family: 1080i/50, 720p/50, 1080p/25, 1080sF/25

Flash Memory

Number	One
Type	Secure Digital SD Flash Memory Card
Size	1 GB card included

Playback/Keyer Memory

Comes standard with 512 MB in Keyer 1 and Keyer 2 positions. Must install equal amount of memory in both Keyer positions.

Number	Two positions max
Type	DDR2 SODIMM, 200 pin Type PC4200 or faster

Memory Capacity with 2 GB DDR2 Installed

One or a combination of the following:

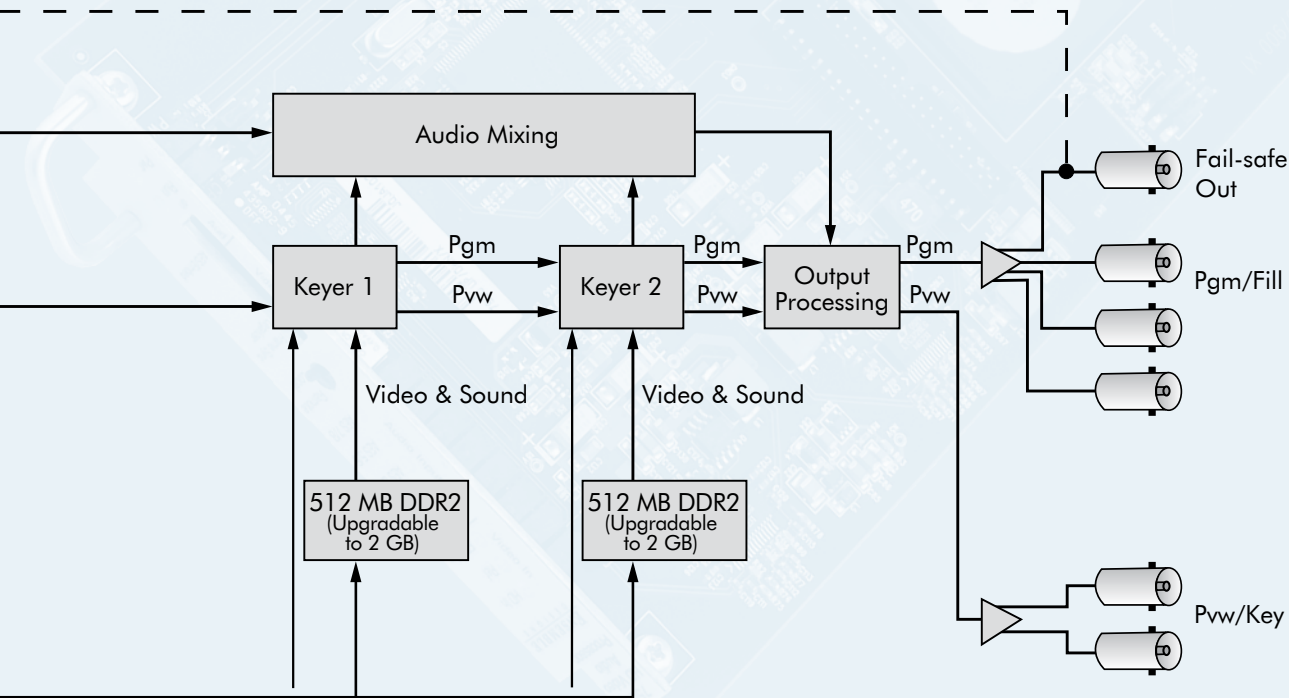
8.5 sec	HD video
53 sec	SD video
256	HD full screen image
1595	SD full screen images
768+	HD lower thirds
4785+	SD lower thirds
3600+	HD still corner bug 300x300 px
18,000+	SD still corner bug 300x300 px
120+ sec	HD animated corner bug 300x300 px
600+ sec	SD animated corner bug 300x300 px

Capacity numbers above calculated at 60 Hz frame rate.

Any combination of logos, animations and audio files can be stored.

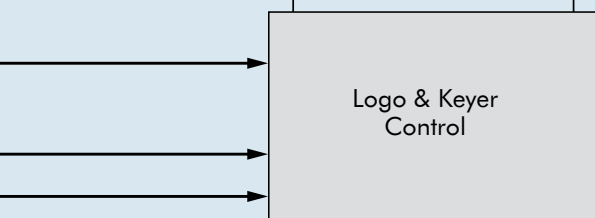
File type

Video	.tga
Audio	.wav, .mp3, .wma



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



HD Protection Switch

The 7450 module is a fail-safe, bypass protection switch for critical digital paths for broadcast or satellite applications. When a fault is detected in the primary input, and the secondary input is verified as good, the switch will activate, causing the secondary input to be switched to the module's output. The 7450 includes a passive, fail-safe path that ensures there is an output even in the event of a total power failure.

The 7450 supports HD SDI signals. Different types of signal testing (vetting) can be enabled on the 7450 and it will apply the tests automatically and independently for the Primary and Secondary inputs.

The health of a high definition video signal is determined by monitoring crucial parameters in order of increasing complexity; Timing Reference Signal (TRS), or a persistent loss of digital sync is tested first. Black, Embedded Audio and Freeze are also evaluated. Each test can be configured by the user. For example, the sophisticated Black Detector includes configurable parameters for black level threshold, pixel count, and duration time.

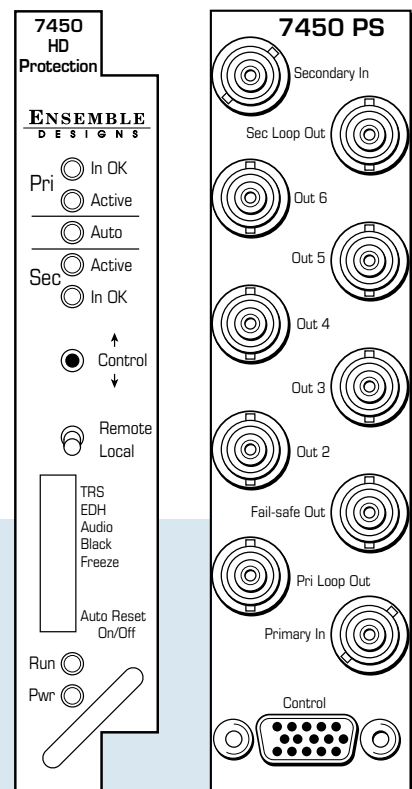
The Freeze detection system can be set to detect a clean or noisy source. Freeze Time sets the number of seconds for the 7450 to switch to the secondary input after a video freeze condition is detected in the primary input.

The switch can operate in two modes: automatic or non-resetting. In fully automatic mode, the 7450 will automatically switch back to the primary signal once it's been restored. In the non-resetting mode, the secondary input remains routed to the output, even after the primary input has recovered.

Controls are easily accessed through an Avenue Control Panel, Avenue PC software, GPIs, or front edge module controls. GPI inputs allow faults detected in upstream equipment to contribute to the switching logic.

Features

- » Fail-safe Bypass Protection Switch for Critical Signal Paths
- » Use with HD SDI signals
- » Detects Closed Caption Data, TRS, Black, Silence, Freeze
- » Detection specifics are user programmable
- » Passes embedded audio
- » Alarm generation
- » Remote control and monitoring



Serial Digital Input
Number Two
Type HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M

Max Cable Length 100 Meters
 Belden 1694A

Automatic Cable Input Equalization

HD Standards Supported:

- 1080i (SMPTE 274M -4, 5, 6) 50, 59.94 or 60 Hz
- 720p (SMPTE 296M -1, 2, 3) 59.94 or 60 Hz
- 1080p (SMPTE 274M -9, 10, 11) 23.98, 24, 25 Hz
- 1080sF (RP211 -14, 15, 16) 23.98, 24, 25 Hz

Serial Digital Loopback

Number Two total
 One primary
 One secondary

Impedance 75 Ω

Serial Output Signal
Number Six total

Signal Type

Impedance

One Fail-safe bypass output
 Five DA outputs
 HD Serial Digital
 Follows input
 75 Ω

General Specifications

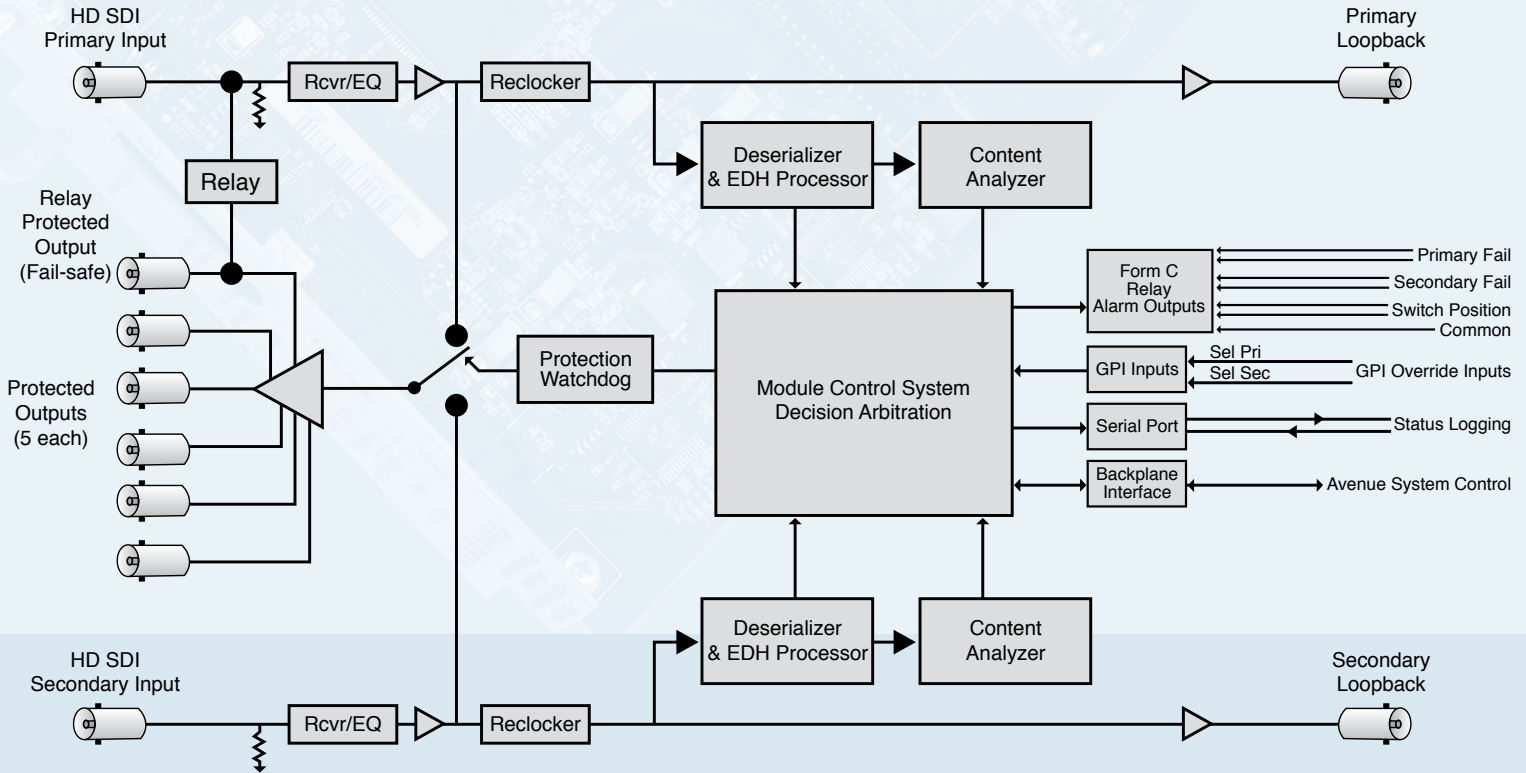
Power Consumption <7.0 watts
Temperature Range

Relative Humidity

Altitude

Fusing

0 to 40° C ambient
 (all specs met)
 0 to 95% noncondensing
 0 to 10,000 ft.
 4 each 0.75 Amp PTC
 resettable fuse with
 each domain of the module
 independently regulated.



HD /SD /ASI /310M Protection Switch

The 7455 module is a fail-safe, bypass protection switch for critical digital paths for broadcast or satellite applications. When a fault is detected in the primary input, and the secondary input is verified as good, the switch will activate, causing the secondary input to be switched to the module's output. The 7455 includes a passive, fail-safe path that ensures there is an output even in the event of a total power failure.

The 7455 supports SD SDI, HD SDI, SMPTE 310M and DVB-ASI signals. Different types of signal testing (vetting) can be enabled on the 7455 and it will apply the tests according to the type of input that is present. This happens automatically and independently for the Primary and Secondary inputs. This means that the Primary input of the module could be HD SDI while the Secondary input is SD SDI. It is also possible to mix SDI, ASI and 310 signals, or receive the same standard on both the Primary and Secondary inputs.

The health of a high definition or standard definition video signal is determined by monitoring crucial parameters in order of increasing complexity; Timing Reference Signal (TRS), or a persistent loss of digital sync is tested first. Black, Embedded Audio and Freeze are also evaluated. Each test can be configured by the user. For example, the sophisticated Black Detector includes configurable parameters for black level threshold, pixel count, and duration time.

The Freeze detection system can be set to detect a clean or noisy source. Freeze Time sets the number of seconds for the 7455 to switch to the secondary input after a video freeze condition is detected in the primary input.

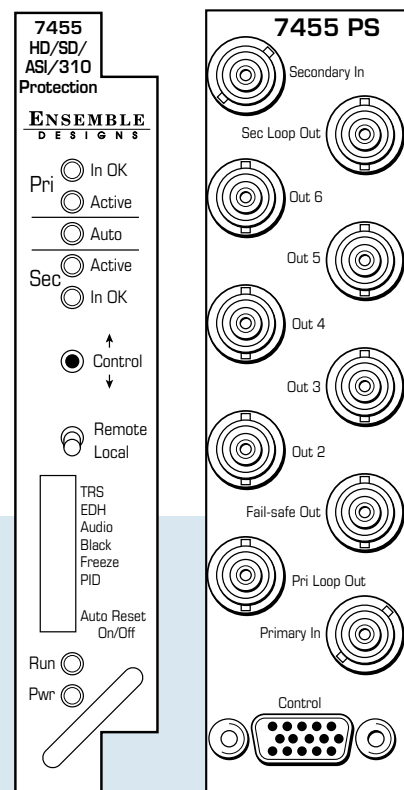
The health of an ASI or 310 signal is determined by monitoring digital clock lock, packet presence, and PID presence. The user can configure tests to define the minimum number of video packets and audio packets expected per second in a given service.

The switch can operate in two modes: automatic or nonresetting. In fully automatic mode, the 7455 will automatically switch back to the primary signal once it's been restored. In the nonresetting mode, the secondary input remains routed to the output, even after the primary input has recovered.

Controls are easily accessed through an Avenue Control Panel, Avenue PC software, GPIs, or front edge module controls. GPI inputs allow faults detected in upstream equipment to contribute to the switching logic.

Features

- » Fail-safe Bypass Protection Switch for Critical Signal Paths
- » Use with HD, SD, ASI and 310 signals
- » Detects Closed Caption Data, TRS, Black, Silence, Freeze for HD and SD Signals
- » Detects Signal Presence, Program Packets, PMT, PAT and PIDs for ASI and 310 signals
- » Detection specifics are user-programmable
- » Passes embedded audio
- » Alarm generation
- » Remote control and monitoring



Serial Digital Input

Number Two
Signal Type HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M or SD Serial Digital 270 Mb/s SMPTE 259M or DVB-ASI 270 Mb/s or SMPTE 310M
Impedance 75 Ω
Return Loss >15 dB to 1.485 GHz
Automatic Cable Input Equalization

Serial Digital Loopback

Number Two total
 One primary
 One secondary
Impedance 75 Ω

Serial Output Signal

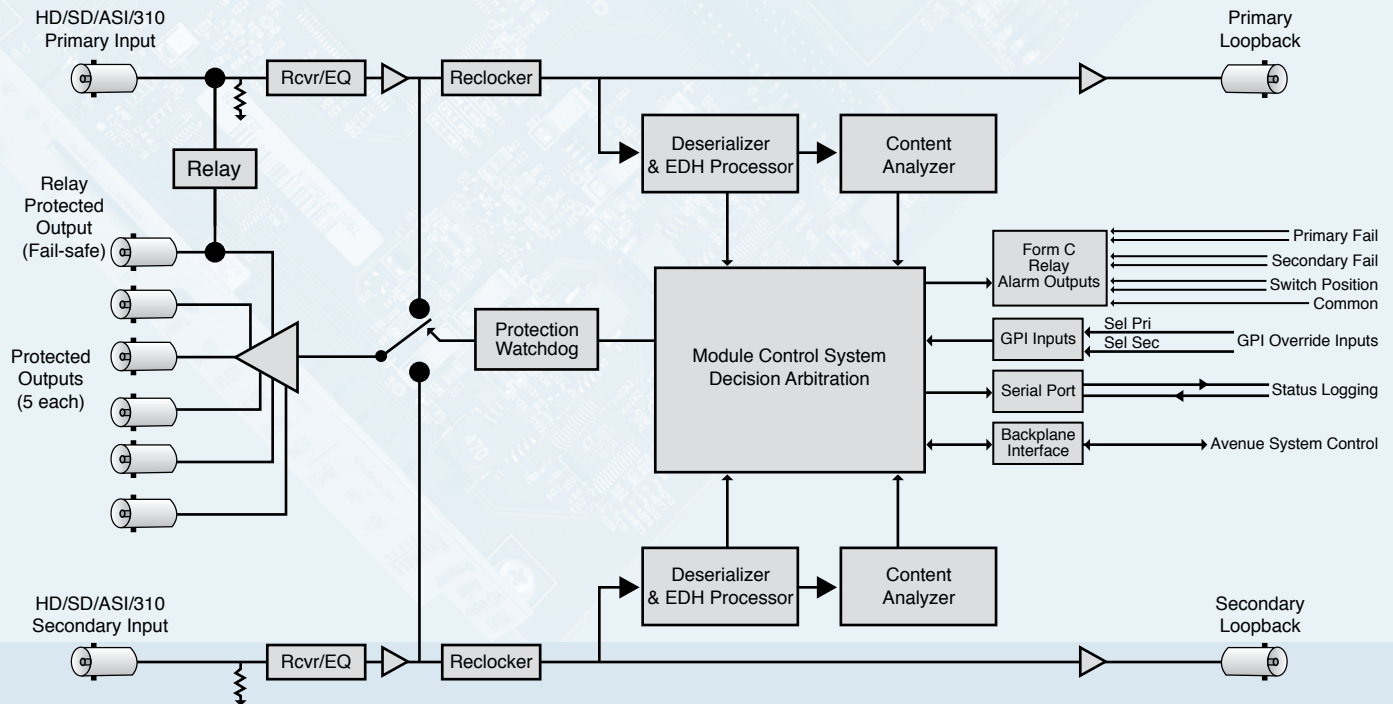
Number Six total
 One fail-safe bypass output
 Five DA outputs
Signal Type Follows selected input
Impedance 75 Ω

Standards Supported (auto-detected)

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
 625i 50
 525i 59.94
 DVB-ASI
 SMPTE 310M

General Specifications

Power Consumption <7.0 watts
Temperature Range 0 to 40°C ambient (all specs met)
 0 to 95% noncondensing
Relative Humidity 0 to 10,000 ft
Altitude 4 each 0.75 Amp PTC resettable fuse with each domain of the module independently regulated



Sync Changeover Switch

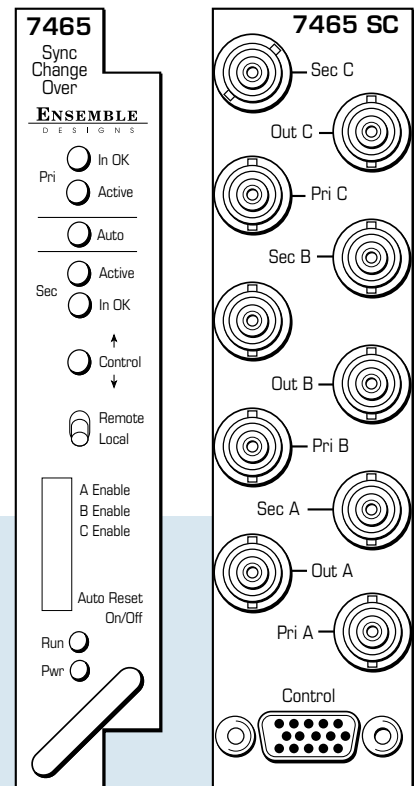
The 7465 Sync Changeover Switch module can be used with Avenue's 7400 SPG module, 5400 SPG module, or with third party sync pulse generators. In the event of a failure of the primary sync source, the 7465 changes to the secondary source.

There are three poles or sections on the 7465. One pole tests for HD SDI, SD SDI, ASI and SMPTE 310M signals. The other two poles test for AES audio, Composite video, Bi-Level Sync and Tri-Level Sync. A drop in signal amplitude below a predetermined auto threshold will trigger the switch.

Multiple changeover switches can be ganged together through the control system. Depending on the application, two or more 7465s may be required to handle all signals that need to be protected.

Features

- » 3 poles for signal testing
- » Use with HD SDI, SD SDI, analog composite, AES audio, DVB-ASI, SMPTE 310M, Bi-Level Sync and Tri-Level Sync signals
- » Gang multiple 7465s together as needed
- » Passive design
- » GPI inputs for remote manual override
- » GPI outputs to indicate signal status and switch position



Input Signals

Number	Six
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M, SD Serial Digital 270 Mb/s SMPTE 259M, Analog Composite, DVB-ASI, SMPTE 310M, AES Digital Audio, Bi-Level Sync or Tri-Level Sync, selectable
Impedance	75 Ω
Return Loss	>15 dB DC to 1.485 Gb/s
Automatic Cable Input Equalization	

Output Signals

Number	Three
Signal Type	Follows input
Impedance	75 Ω
Return Loss	>15 dB DC to 270 MHz

Switcher Characteristics

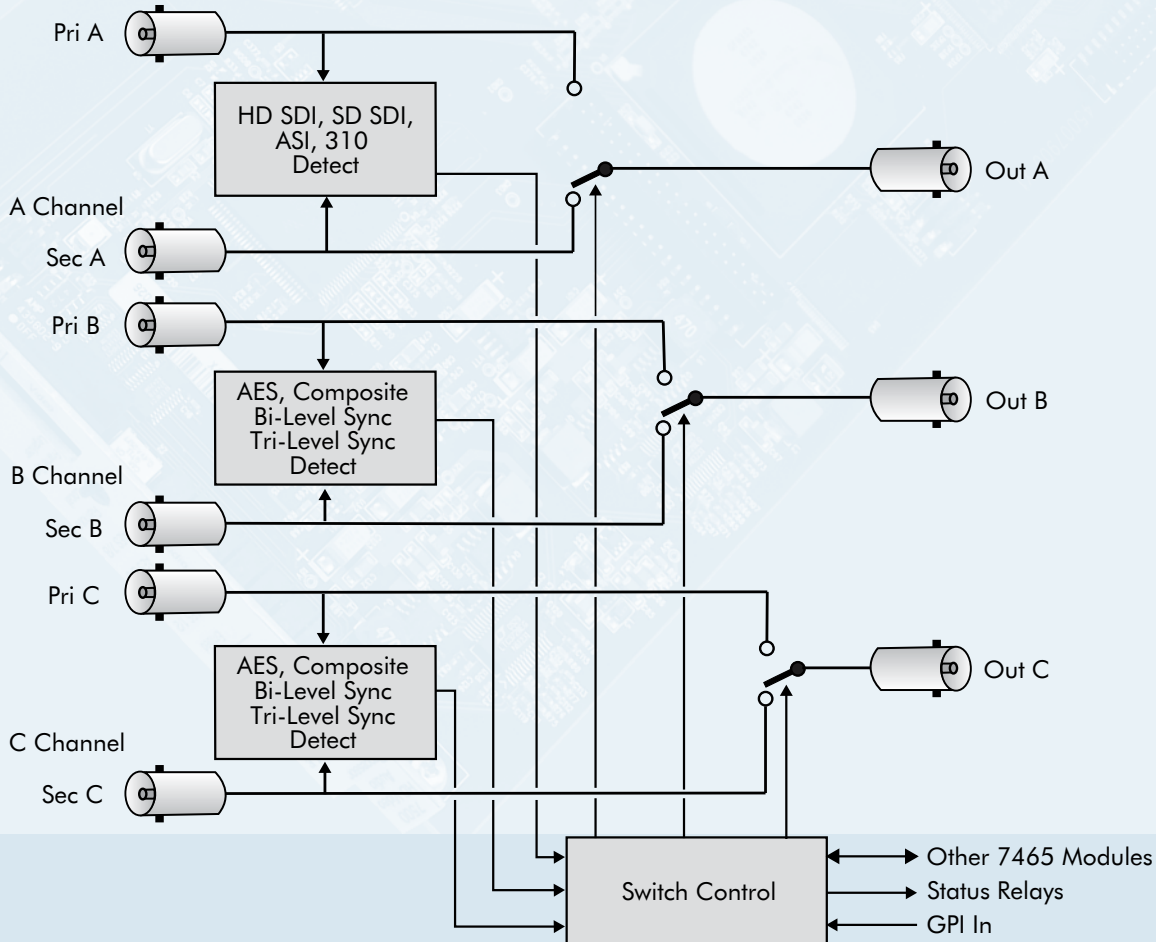
Type	75 Ω RF Relay
Insertion Loss	<0.5 dB

General Specifications

Connectors	BNC
Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft
Fusing	1.5 Amp PTC resettable fuse

HD Standards Supported

- 1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
- 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
- 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
- 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz



HD /SD Video Processing Frame Synchronizer

The 7550 HD Processing Frame Sync accepts a high definition or standard definition video signal for processing, synchronization and timing.

Flexible Synchronization

An infinitely adjustable timing system genlocks to your house reference. The 7550 genlocks to either composite video (PAL or NTSC) or to HD Tri-Level Sync. The module can lock to the frame's master reference or reference can be connected directly to the module's external reference BNC. The serial output timing can be set anywhere within a frame of the selected input reference, which can be the module's external BNC reference or the frame's master timing reference.

Upon loss of signal, the 7550 provides freeze frame or black until the signal is recovered. In freeze mode, audio can be muted or passed as desired.

Uncompromised Pictures

The HD or SD SDI input is carried at full, uncompressed bandwidth throughout the entire module, and EDH monitoring of the digital input alerts you to any incoming problem. EDH detection, monitoring and insertion are standard on the 7550. Flags are reported through Avenue PC.

Complete Proc Amp Functions

The 7550 has a full-featured Proc Amp for adjustment of every signal parameter. Proc controls include Video and Chroma Gain, NTSC-style hue rotation, Black Balance, and Pedestal.

Audio Tracking

The 8415 Audio Processing option can be added to the 7550 module. The 8415 is an eight-channel processor that has been designed to provide superior handling of embedded audio. Embedded audio is safely bypassed around the video framestore with the lip sync properly preserved.

Total Control

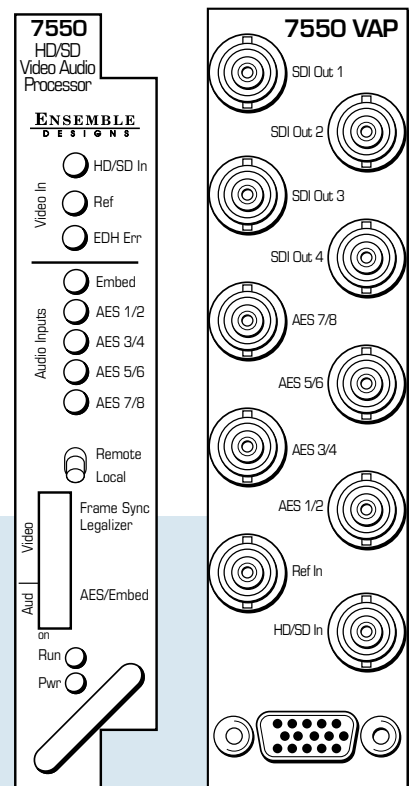
Every function and parameter on the 7550 and 8415 can be controlled from an Express Panel, Avenue Touch Panel, or the Avenue PC Control Application. Memory registers can be used to save the complete configuration of the module, making it easy to change instantly between different configurations.

Channel Density

Ten 7550 Video Processors (including the 8415 Audio Option) can be accommodated by the Avenue 3RU Frame. Now that's an efficient use of real estate!

Features

- » HD or SD SDI I/O
- » Full-featured Frame Synchronizer
- » Comprehensive Proc Amp controls
- » External genlock reference input
- » EDH detection and insertion
- » Internal Color Bar Generator
- » Memory Registers
- » Passes embedded audio
- » Accepts the 8415 Audio Processor option for tracking audio delay, audio mixing, shuffling



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
Impedance 75 Ω
Return Loss >15 dB DC to 1.5 GHz
Automatic Cable Input Equalization

Reference Input

Number One external (modules BNC)
 One internal (frame master ref BNC)
Signal Type PAL or NTSC composite video or HD Tri-Level Sync
Return Loss >40 dB
 (applies to external ref input)

Standards Supported

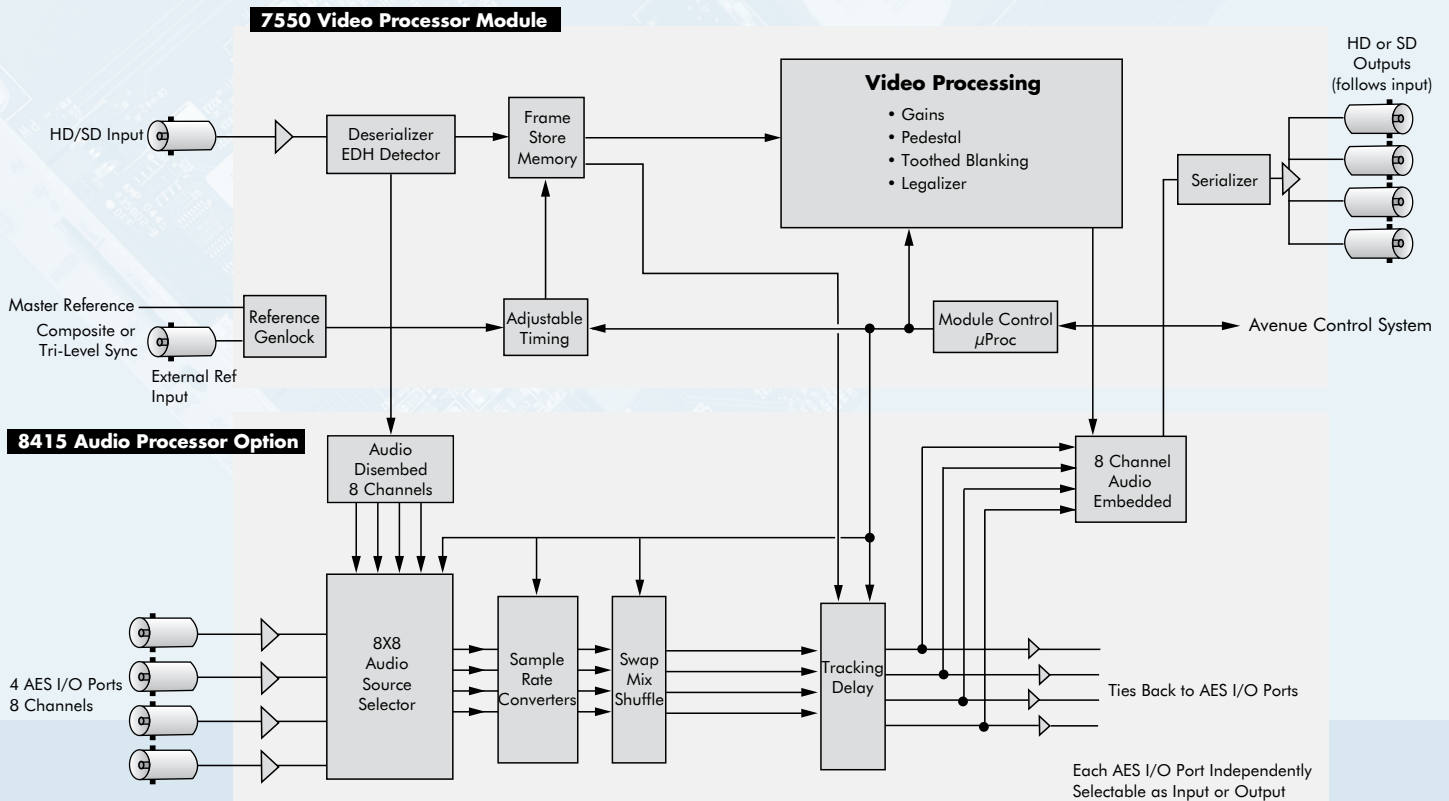
1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
 525i 59.94, 625i 50

General Specifications

Power Consumption 10 watts (with both options installed)
Temperature 0 to 40°C ambient (all specs met)
Relative Humidity 0 to 95%, noncondensing
Standard Avenue Module
Occupies one slot in 3RU or 1RU Frame
 (including the 8415 Audio Processor)

Output

Number Four
Signal Type HD or SD Serial Digital, follows input
Impedance 75 Ω
Return Loss >15 dB DC to 1.5 GHz



HD /SD Embedder / Disembedder

The 7600 module is a dual rate eight-channel audio embedder or disembedder for 1.5 Gb/s high definition video signals or for 270 Mb/s standard definition signals. Four AES ports automatically configure as inputs or outputs depending on if the module is configured as mux or demux.

Configurable Mux or Demux

When configured as a multiplexer, the 7600 has one serial digital video input and four AES audio inputs. These four AES streams are embedded into the video stream. AES inputs are sample rate-converted, allowing the use of asynchronous audio. The output of the module is a digital stream that contains the original video signal and four AES pairs.

When configured as a demultiplexer, audio signals present in the incoming video signal are extracted and delivered as standard AES digital audio streams.

The 7600 includes a full-featured, eight-channel audio mixer. The channel swap and shuffle capability allows you to completely rearrange and remix audio channels. It provides precise control over audio level, with up to 12 dB of gain to compensate for low level sources. All audio processing is performed at full 24 bit resolution by a digital signal processor (DSP). Delay is adjustable up to one second. Dolby E decoding is supported by adding the 7620 module.

In-Line Shuffler

Because the 7600 has simultaneous disembedding and embedding, it is an in-line processor for embedded audio. It can take embedded content, adjust levels and remap channels, and deliver it to the output as an embedded signal.

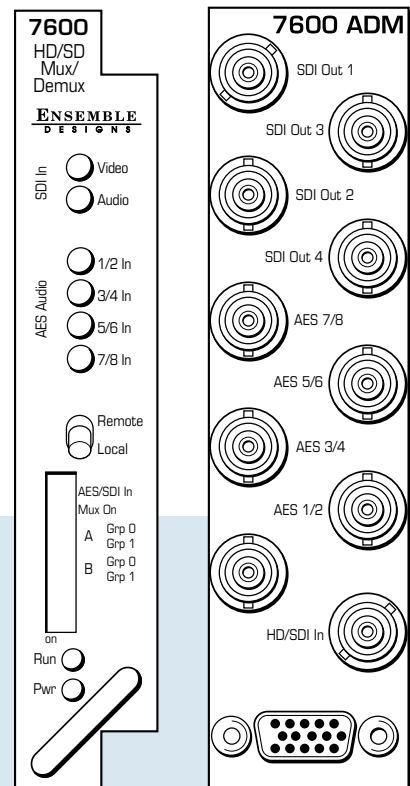
The 7600 can be configured locally or controlled and configured remotely with Avenue Touch Screens, Express Panels, or Avenue PC Software. Alarm generation, configurable user levels, module lockout, and customizable menus are just some of the tools included in the Avenue control system.

Automatic Gain Control Option

The 9670 Audio Automatic Gain Control software key can be added as an option. This option provides control for keeping audio levels consistent in program material.

Features

- » Audio embedder or disembedder for HD or SD signals
- » Handles 4 AES streams/8 channels
- » Up to one second of delay
- » In-line processor for embedded audio
- » Supports Dolby E and AC-3 data
- » Dolby E decoding option
- » Audio Automatic Gain Control option
- » Built-in audio mixer
- » Phase inversion selectable on a channel basis
- » Built-in sample rate converter accepts asynchronous inputs
- » 26 bit processing resolution
- » Memory registers
- » Local and remote control



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
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	100 meters Belden 1694A

Automatic Cable Input Equalization

Standards Supported

- 1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
- 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
- 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
- 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
- 525i 59.94, 625i 50

Serial Digital Output

Number	Four
Signal Type	Follows input
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

AES/EBU Digital Inputs

Number	Four (total of eight channels)
Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs

Number	Four AES Streams (from video input)
Channels	Eight channels from any two of four groups
Bit Depth	20 and 24 bit

AES/EBU Digital Outputs

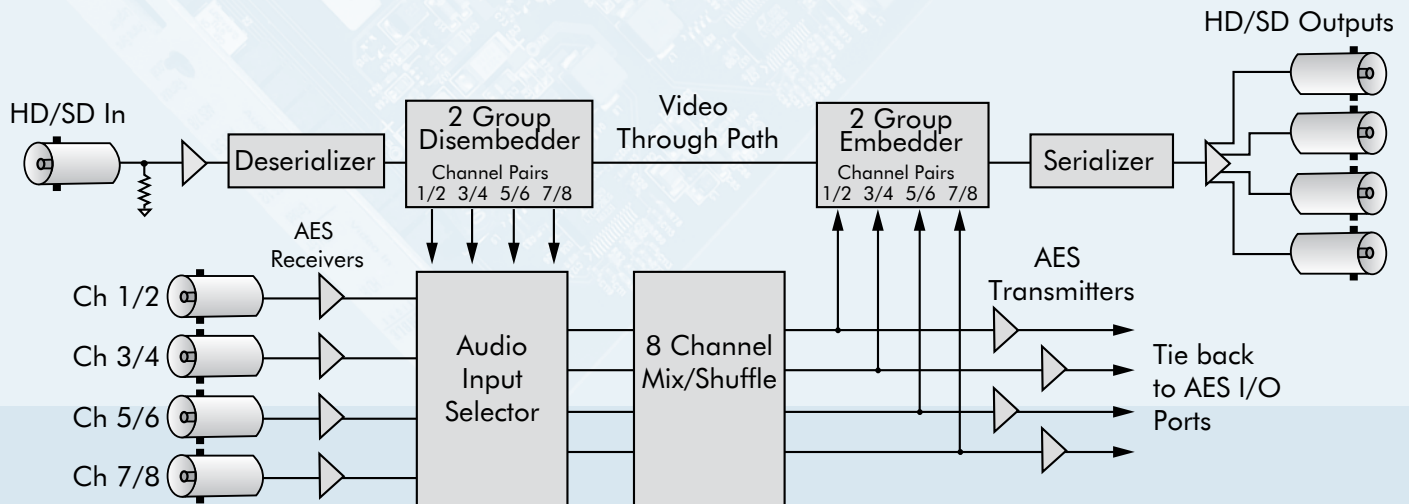
Number	Four (total of 8 channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz
Reference Level	Synchronous to Video output -18 or -20 dBFS (selectable)

Embedded Output (In SDI Outputs)

Group Assign	Cascade, or Replace any two of four groups
Channels	Eight
Bit Depth	24 Bit

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



Model 7610

8 Channel Audio Processor Sub Module for 7900 Series without AES I/O

Audio Processing

The 7610 is an eight-channel sub module for use with the Avenue 7900 Series Up/Down/Cross Converters. It provides processing for signals with embedded audio. No audio I/O is provided. Audio is disembedded, delayed and then reembedded into the video stream. All audio processing is performed at full 24 bit resolution by a digital signal processor (DSP).

Lip Sync Preservation

The 7610 has been designed to provide superior handling of embedded audio. The disembedder on the input side follows the timing of the video input, even if that input is asynchronous to the house reference. The embedder on the output side is synchronous to house. This allows embedded audio to be safely bypassed around the video framestore with lip sync properly preserved.

Avenue Module	Compatible Audio Sub Module
7500 7550	7615, 8415
7600	7620
7900 7910 7920 7930 7940	7610, 7615, 8415
8400 8500	8410, 8415, 8510

Model 7615

Dolby E Audio Sub Module for 7900 series with AES I/O

Audio Processing

The 7615 is an eight-channel sub module for use with the Avenue 7900 Series Up/Down/Cross Converters. It offers all the functionality of the 8415 sub module plus the ability to decode Dolby E signals. The 7615 has four channels of AES I/O. Embedded AES and Dolby E signals are disembedded, decoded if applicable, and presented on four BNCs. Alternately, AES and Dolby E can be re-embedded into the video stream. Dolby E, Dolby Digital/AC-3 and PCM are all supported. All audio processing is performed at full 24 bit resolution by a digital signal processor (DSP).

Lip Sync Preservation

The 7615 has been designed to provide superior handling of embedded audio. The disembedder on the input side follows the timing of the video input, even if that input is asynchronous to the house reference. The embedder on the output side is synchronous to house. This allows embedded audio to be safely bypassed around the video framestore with lip sync properly preserved.

Mix, Swap, and Shuffle

The 7615 provides a full-featured, eight-channel audio mixer for AES audio. It provides precise control over audio level, with up to 12 dB of gain to compensate for low level sources. The channel swap and shuffle capability allows you to completely rearrange and remix audio channels. Because the 7615 has simultaneous disembedding and embedding, it is an in-line processor for embedded audio. It can take embedded content, adjust levels and remap channels, and deliver it to the output as an embedded signal. In addition to the tracking delay functionality, audio delay can be manually adjusted through the Avenue control system.

Model 7620

Dolby E Audio Sub Module Option for 7600

Audio Processing

The 7620 is an eight-channel sub module for use with the Avenue 7600 HD/SD Embedder/Disembedder. The 7620 is the Dolby E decoding option for the 7600. Dolby Digital/AC-3, Dolby E, and PCM are all supported. All audio processing is performed at full 24 bit resolution by a digital signal processor (DSP).

The 7600 module accepts an SD or HD video signal. When configured as a demultiplexer, the 7600 decodes two groups of audio and presents the signals on four BNCs. If Dolby E is present, the 7620 will disembed and decode that signal and present the individual audio channels in AES form.

When the 7600 is configured as an in-line shuffler, AES and Dolby E signals can be disembedded, adjusted and then reembedded into the video stream.

HD Up /Down /Cross Converter

Do It All With One Module

The 7900 is a flexible, configurable Up and Downconverter for use in broadcast and post. It can process SD (Standard Definition) signals into HD, downconvert HD signals into standard definition, and perform Format and Aspect Ratio Conversion on both SD and HD signals. The 7900 and one of the optional audio sub modules together only occupy one slot in an Avenue frame – now that's efficient use of space.

It's Smart – No Need for Configuration

The 7900 can be configured to continually output your facility's preferred HD format. Just connect any HD or SD signal to the input and the 7900 will convert it to the appropriate format for output. And, if the 8415 audio option is installed, the audio will have automatic delay compensation.

Upconversion

When configured as an upconverter, the 7900 has a standard definition SDI input and four HD SDI outputs. Excellent for on-air use, the 7900 is equally at home in an HD island, in a signal ingest installation, or in a production application.

The 7900 uses sophisticated Edge and Motion Adaptive Noise Reduction, ensuring delivery of a pristine output that is excellent for use in broadcast. All processing is performed on progressive signals at full bandwidth 4:4:4, for optimum signal quality. Signals are interlaced and deinterlaced as required with motion adaptation and edge interpolation. Aspect ratio conversion choices include: Letterbox, Anamorphic, Crop and Zoom.

Input standard and frame rate are auto-detected. The 7900 automatically performs 16 bit SD and HD color space conversion. The built-in Proc Amp provides adjustment of signal parameters with controls for Video, Chroma, Setup and Hue. Vertical interval data is faithfully preserved and is passed from SD to HD. The upconverted output is timeable with respect to the reference input.

Downconversion

When used as a downconverter, the 7900 has an HD SDI input and four outputs that can be configured as two SDI and two composite outputs, or four SDI outputs. Whether it's providing digital feeds to production switchers and routers, or analog monitoring – the 7900 handles it all.

The downconversion process includes Picture Detail Enhancement and Anti-Alias Filtering, which makes for a pristine SD output. The Aspect Ratio Conversion process offers Resizing and Repositioning with choices for: Letterbox, Anamorphic, Crop and Zoom. The 7900 automatically adjusts between HD and SD color space and gamma. Proc amp controls are provided in the form of Video, Chroma, Setup and Hue.

Both the digital and analog outputs are timeable with respect to the reference input. Composite outputs can be timed into house with proper subcarrier and Sch phase.

Cross Conversion

The 7900 provides cross conversion between HD 1.5 Gb/s formats, processing all popular variations of 1080 and 720, making it simple for every facility to ingest any type of HD signal.

All popular variations of 720p, 1080i, 1080sF and 1080p are supported. The 7900 converts between any HD signals within the 59.94/23.98/29.97 family, within the 50/25 fps family, or within the 60/30 fps family. 3:2 pulldown is used when converting between 59.94 and 23.98. Film mode is automatically detected.

Metadata

HD closed captioning is carried in data packets in the vertical interval ancillary data space. The 7900 properly translates between HD caption data and 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 7900 supports WSS (Wide Screen Signaling), and AFD (Active Format Description) and other methods used to mark or identify the aspect ratio of the video content. These flags are generated at the output of the module, and they are read at the input. This allows the up and downconversion process to adapt automatically to material that is already in letter or pillarbox form in order to produce the most appropriate conversion.

Audio Options

When an audio sub module is installed, audio is automatically delayed as needed to compensate for the video processing in the 7900. For complete audio processing, choose from three different audio sub modules. Sub modules plug onto the 7900 board and do not take up a slot in the frame.

The 8415 is an eight-channel audio sub module with AES I/O that provides management of embedded audio in the processing path, or supports audio embedding/disembedding alongside the video processing elements. Embedded audio is safely bypassed around the video frame store with the lip sync preserved. Level adjustments and channel shuffling are accessed through the built-in audio mixer. The 9670 Automatic Gain Control option can be added to the 8415. All audio processing is performed at full 24 bit resolution.

The 7610 provides carriage of up to eight channels of embedded audio through the format conversion process. Embedded audio in the input signal is delayed to match the video delay and preserve lip sync. The delayed content is reinserted in the video output. No level adjustment or channel swapping is provided.

In addition, the 7615 provides processing for signals with eight channels of embedded audio. It offers the same processing and AES I/O as the 8415 plus the ability to decode Dolby E signals.

Complete Control System

The 7900 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.

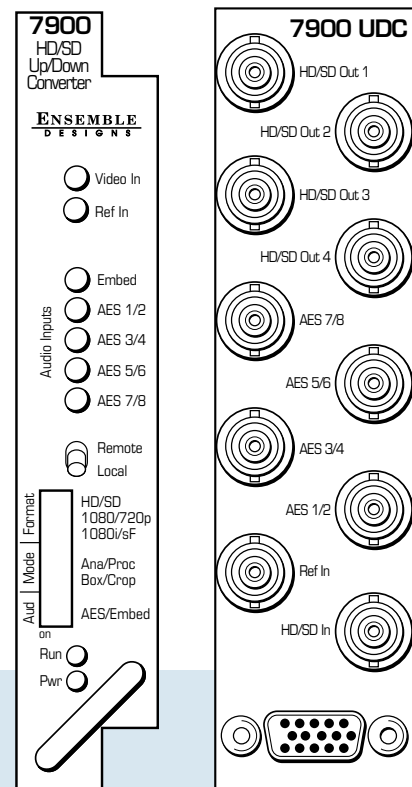
Features

- » Upconverter
- » Downconverter
- » Crossconverter
- » Aspect Ratio Converter
- » Smart auto-config – set output, then feed any input
- » Proc Amp and Frame Sync

- » Audio Mux/Demux optional
- » Audio Automatic Gain Control optional
- » Add audio sub module option for delay and processing

- » All processing performed on 4:4:4 progressive signals
- » Accepts asynchronous signals
- » Reference input – output is timeable
- » Automatically adjusts between SD/HD color space and gamma
- » 16 bit processing
- » Edge and Motion Adaptive Noise Reduction
- » Picture Detail Enhancement
- » Anti-Alias Filter
- » Passes closed captioning
- » Auto detection of input standard and frame rate
- » 3:2 pulldown

- » Built-in test pattern and tone
- » Local and remote control
- » Occupies one slot in frame, even with audio option



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
Return Loss	>15 dB
Max Cable Length	
270 Mb/s	300 meters Belden 1694A
1.485 Gb/s	100 meters Belden 1694A
Automatic Cable Input Equalization	
HD Standards Supported	
1080i (SMPTE 274M -4,5,6)	50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3)	50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11)	23.98, 24, 25 Hz
1080sF (RP211 -14,15,16)	23.98, 24, 25 Hz
525i	59.94, 625i 50

Serial Digital Output

Number	Two, Three or Four Selectable
Signal Type	SMPTE 274M, 292M or 296M when HD SMPTE 259M (525 or 625) when SD
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

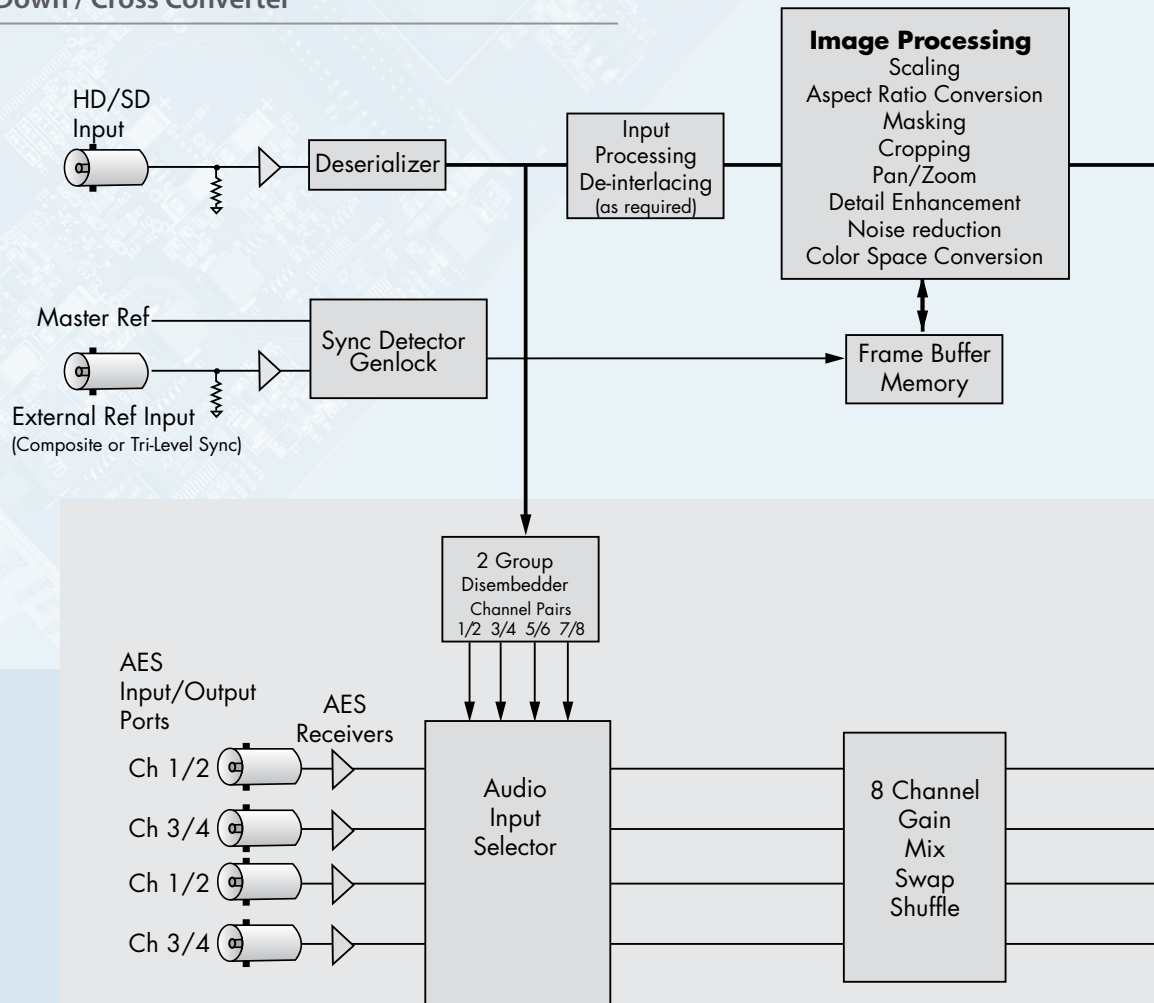
Reference Input

Number	One external (modules BNC) One internal (frame master ref BNC)
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync
Return Loss	>40 dB (applies to external ref input)

Analog Output (available when output is SD)

Number	Two max (BNCs shared with SD SDI outputs)
Signal Type	PAL or NTSC composite Standard matches SDI output
Impedance	75 Ω
Return Loss	>40 dB
Output DC	<50 mV
Bit Resolution	12 bit output reconstruction 8 x oversampling
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%

Avenue 7900 HD Up / Down / Cross Converter



Conversion Directions

Up/Down Conversion between

525 (NTSC) and 1080i/59.94, 720p/59.94, 1080p/23.98,
1080sF/23.98
625 (PAL) and 1080i/50, 720p/50, 1080p/25, 1080sF/25

Cross Conversion within frame rate families

525 Derived Family: 1080i/59.94, 720p/59.94,
1080p/23.98, and 1080sF/23.98
625 Derived Family: 1080i/50, 720p/50,
1080p/25, 1080sF/25

AES/EBU Digital Inputs (with 8415 sub module option)

Number	Four (total of 8 channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs

Number	Four AES Streams (from video input) Eight channels from any two of four groups Selectable to any of four groups
Channels	Eight
Bit Depth	20 and 24 bit

AES/EBU Digital Outputs

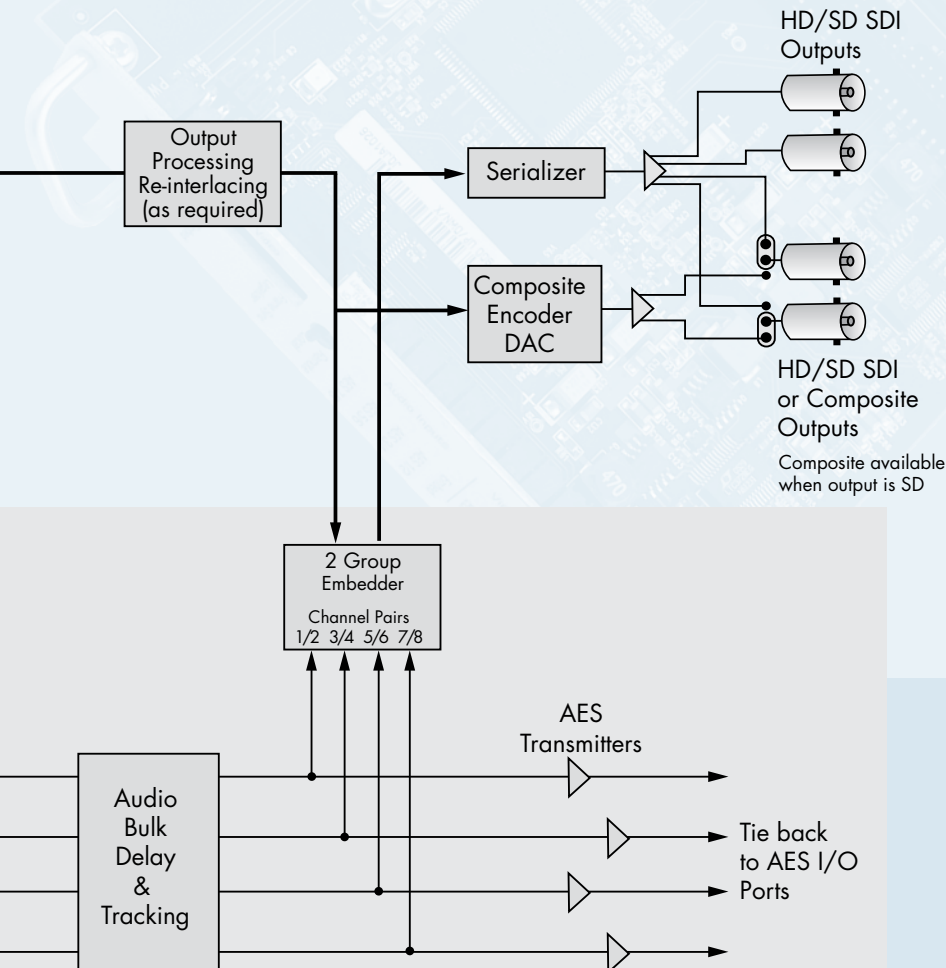
Number	Four (total of eight channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz
Reference Level	Synchronous to video output -18 or -20 dBFS (selectable)

Embedded Output

Number	Four or two depending on configuration
Group Assign	Cascade, or Replace any two of four groups
Channels	Eight
Bit Depth	24 bit

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



8415 8 Channel Audio Processing Option

HD Upconverter and Cross Converter

The 7910 module accepts an SD or HD SDI input and has four HD SDI outputs. Excellent for on-air use, the 7910 is equally at home in an HD island, in a signal ingest installation, or in a production application. Since the 7910 functions as either an Upconverter or Cross Converter, it's useful on the output of a server when material may switch between HD programming and SD commercials. It's also convenient in a dual-rate master control environment.

Sophisticated Adaptive Noise Reduction ensures delivery of a pristine output that is excellent for use in broadcast. Additionally, Picture Detail Enhancement is used to recover information that has been lost due to poor frequency response upstream. Aspect ratio conversion choices include: Letterbox, Anamorphic, Crop and Manual Zoom.

Input standard and frame rate are auto-detected. The 7910 automatically adjusts from SD to HD color space and gamma. The built-in Proc Amp provides adjustment of signal parameters with controls for Video, Chroma and Pedestal. The upconverted output is timeable with respect to the reference input. When converting to film rate (1080sF/23.98) formats, 3:2 pulldown cadence is automatically detected and backed out when present in the input.

The 7910 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 7910 properly translates between traditional SD captioning (line 21 or 23) and HD caption data so that closed-captioning content is converted transparently between video standards and formats.

Features

- » Upconverter and Cross Converter
- » Proc Amp and Frame Sync
- » 16 bit processing
- » Accepts asynchronous signals
- » Reference input – output is timeable
- » Automatically adjusts between SD/HD color space and gamma
- » Adaptive Noise Reduction and Picture Detail Enhancement
- » All processing performed in progressive
- » Auto-detection of input standard and frame rate
- » Built-in test pattern and tone
- » Audio Mux/Demux optional
- » Audio Automatic Gain Control optional
- » Add audio sub module for delay and processing
- » Occupies one slot in frame, even with audio option

Automatic Aspect Ratio Conversion

The 7910 supports WSS (Wide Screen Signaling), and AFD (Active Format Description) to mark or identify the aspect ratio of the video content. These flags are generated at the output of the module, and they are read at the input. This allows the up and downconversion process to adapt automatically to material that is already in letterbox or pillarbox form in order to produce the most appropriate conversion.

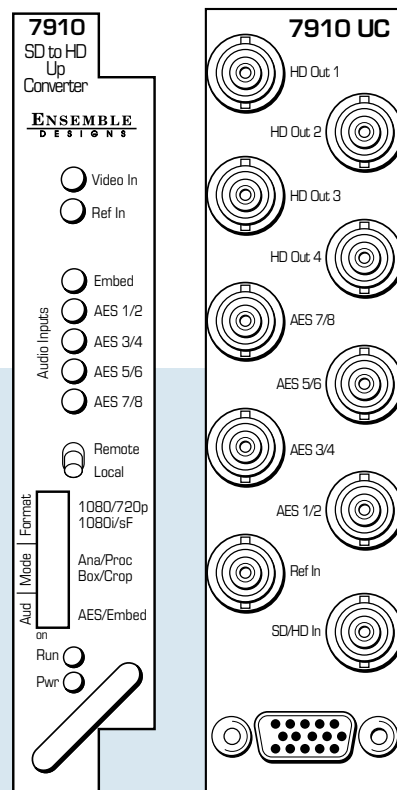
Audio Options

When an audio sub module is installed, audio is automatically delayed as needed to compensate for the video processing in the 7910. For complete audio processing, choose from three different audio sub modules. Sub modules plug onto the 7910 board and do not take up a slot in the frame.

The 8415 is an eight-channel audio sub module with AES I/O that provides management of embedded audio in the processing path, or supports audio embedding/disembedding alongside the video processing elements. Embedded audio is safely bypassed around the video frame store with the lip sync preserved. Level adjustments and channel shuffling are accessed through the built-in audio mixer. The 9670 Automatic Gain Control option can be added to the 8415. All audio processing is performed at full 24 bit resolution.

The 7610 provides carriage of up to eight channels of embedded audio through the format conversion process. Embedded audio in the input signal is delayed to match the video delay and preserve lip sync. The delayed content is reinserted in the video output. No level adjustment or channel swapping is provided.

The 7615 also provides processing for signals with eight channels of embedded audio. It offers the same processing and AES I/O as the 8415 plus the ability to decode Dolby E signals.



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
Return Loss	>15 dB
Max Cable Length	
270 Mb/s	300 meters Belden 1694A
1.485 Gb/s	100 meters Belden 1694A
Automatic Cable Input Equalization	

HD Standards Supported
 1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
 525i 59.94, 625i 50

Reference Input

Number	One external (module's BNC) One internal (frame master ref BNC)
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync
Return Loss	>40 dB (applies to external ref input)

Conversion Directions

Upconversion from
 525 (NTSC) to 1080i/59.94, 720p/59.94, 1080p/23.98, 1080sF/23.98, and 625 (PAL) to 1080i/50, 720p/50, 1080p/25, 1080sF/25

Cross Conversion within frame rate families
 525 Derived Family: 1080i/59.94, 720p/59.94, 1080p/23.98, and 1080sF/23.98
 625 Derived Family: 1080i/50, 720p/50, 1080p/25, 1080sF/25

AES/EBU Digital Inputs (with 8415 sub module option)

Number	Four (total of eight channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs

Number	Four AES Streams (from video input)
Channels	Eight channels from any two of four groups
Bit Depth	Selectable to any of four groups
	Eight
	20 and 24 bit

AES/EBU Digital Outputs

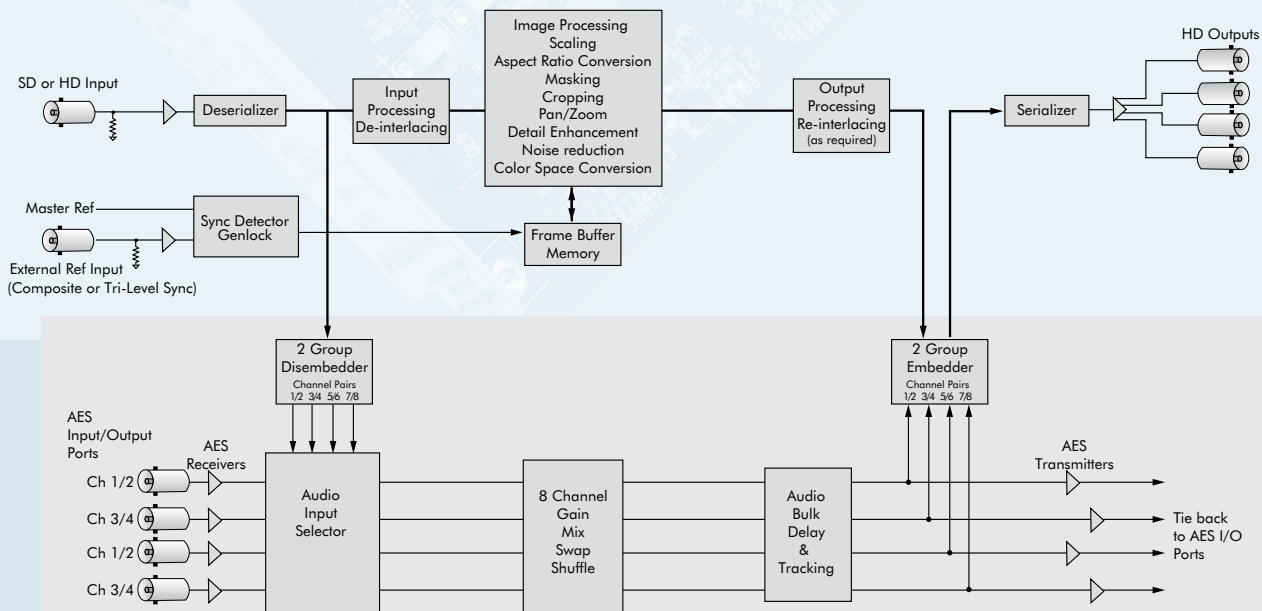
Number	Four (total of eight channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz
Reference Level	Synchronous to video output
	-18 or -20 dBFS (selectable)

Embedded Output

Number	Four or two depending on configuration
Group Assign	Cascade, or Replace any two of four groups
Channels	Eight
Bit Depth	24 bit

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



8415 8 Channel Audio Processing Option

HD Downconverter

The 7920 module has an HD SDI input and four outputs that can be configured as two SDI and two composite outputs, or four SDI outputs. Whether it's providing digital feeds to production switchers and routers or analog monitoring, the 7920 is right at home.

The Downconversion process includes Picture Detail Enhancement and Anti-Alias Filtering, which make for a pristine SD output. The Aspect Ratio Conversion process offers Resizing and Repositioning with choices for: Letterbox, Anamorphic, Crop and Zoom. The 7920 automatically adjusts from HD to SD color space and gamma. Proc amp controls are provided in the form of Video, Chroma and Pedestal.

The 7920 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 7920 properly translates between HD caption data and 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 7920 supports WSS (Wide Screen Signaling), and AFD (Active Format Description) to mark or identify the aspect ratio of the video content. These flags are generated at the output of the module, and they are read at the input. This allows the

up and down conversion process to adapt automatically to material that is already in letterbox or pillarbox form in order to produce the most appropriate conversion.

Audio Options

When an audio sub module is installed, audio is automatically delayed as needed to compensate for the video processing in the 7920. For complete audio processing, choose from three different audio sub modules. Sub modules plug onto the 7920 board and do not take up a slot in the frame.

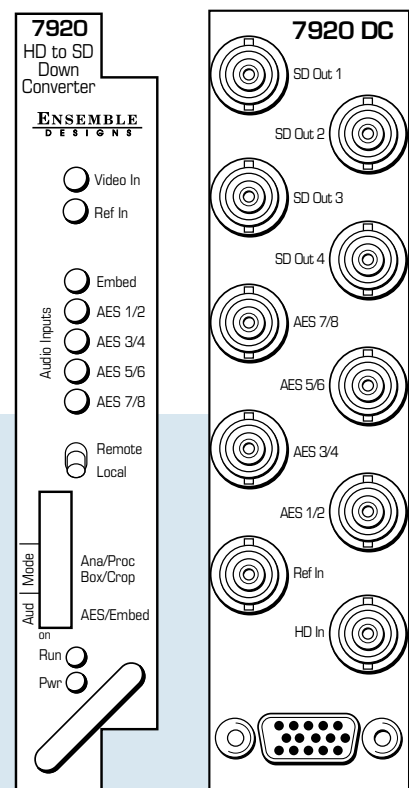
The 8415 is an eight-channel audio sub module with AES I/O that provides management of embedded audio in the processing path, or supports audio embedding/disembedding alongside the video processing elements. Embedded audio is safely bypassed around the video frame store with the lip sync preserved. Level adjustments and channel shuffling are accessed through the built-in audio mixer. The 9670 Automatic Gain Control option can be added to the 8415. All audio processing is performed at full 24 bit resolution.

The 7610 provides carriage of up to eight channels of embedded audio through the format conversion process. Embedded audio in the input signal is delayed to match the video delay and preserve lip sync. The delayed content is reinserted in the video output. No level adjustment or channel swapping is provided.

The 7615 also provides processing for signals with eight channels of embedded audio. It offers the same processing and AES I/O as the 8415 plus the ability to decode Dolby E signals.

Features

- » Downconverter for 720p, 1080i, 1080sF and 1080p
- » Proc Amp and Frame Sync
- » 16 bit processing
- » Accepts asynchronous signals
- » Reference input – output is timeable
- » Automatically adjusts between SD/HD color space and gamma
- » Anti-Alias Filter and Picture Detail Enhancement
- » All processing performed in progressive
- » Passes closed captioning
- » Auto detection of input standard and frame rate
- » 3:2 pulldown
- » Built-in test pattern and tone
- » Audio Mux/Demux optional
- » Audio Automatic Gain Control optional
- » Add audio sub module for delay and processing
- » Occupies one slot in frame, even with audio option



Serial Digital Input

Number	One
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M 75 Ω, BNC
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	100 meter Belden 1694A
1.485 Gb/s	
Automatic Cable Input Equalization	

HD Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz

Serial Digital Output

Number	Four max
Signal Type	SD Serial Digital 270 Mb/s SMPTE 259M (Both 525 and 625 SD standards)
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

Reference Input

Number	One external (modules BNC) One internal (frame master ref BNC)
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync
Return Loss	>40 dB (applies to external ref input)

Analog Output

Number	Two max (BNCs shared with SD SDI outputs)
Signal Type	PAL or NTSC composite Standard matches SDI output
Impedance	75 Ω
Return Loss	>40 dB
Output DC	<50 mV
Bit Resolution	12 bit output reconstruction 8 x oversampling
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%

Conversion Directions

Downconversion from
525 (NTSC) to 1080i/59.94, 720p/59.94,
1080p/23.98, 1080sF/23.98, and
625 (PAL) to 1080i/50, 720p/50, 1080p/25, 1080sF/25

AES/EBU Digital Inputs (with 8415 sub module option)

Number	Four (total of eight channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs

Number	Four AES Streams (from video input) Eight channels from any two of four groups Selectable to any of four groups
Channels	Eight
Bit Depth	20 and 24 bit

AES/EBU Digital Outputs

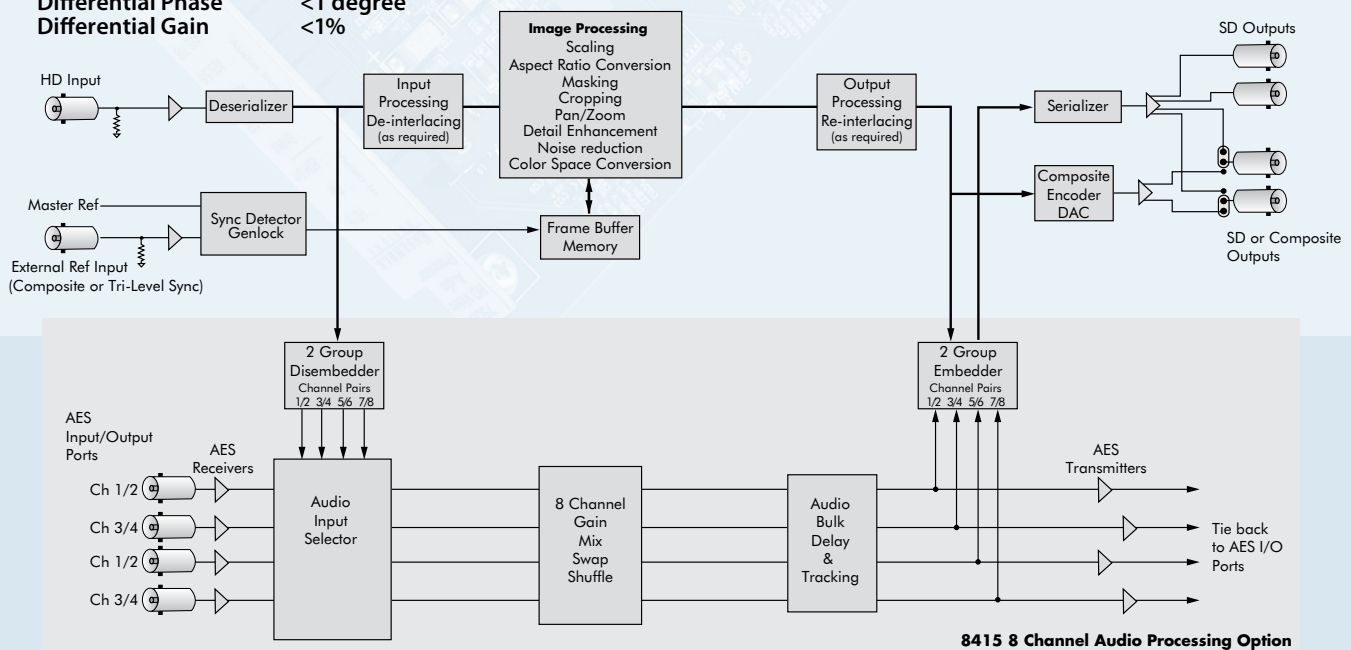
Number	Four (total of 8 channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz Synchronous to Video output
Reference Level	-18 or -20 dBFS (selectable)

Embedded Output

Number	Four or two depending on configuration
Group Assign	Cascade, or Replace any two of four groups
Channels	Eight
Bit Depth	24 bit

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



Dual HD Downconverter

The 7925 module is a two-channel, dual downconverter with HD and SD outputs that can be used in the most demanding broadcast applications. With two downconverters on one module, the 7925 provides high efficiency with excellent picture quality. The downconverted outputs are timeable with respect to the reference input and can feed production switchers and routers.

The 7925 accepts 720p, 1080i, 1080sF and 1080p inputs that are synchronous or asynchronous. If an SD SDI input is received, SD is passed to the output.

Motion-adaptive deinterlacing of the video signal enables all internal processing to occur in progressive.

The 7925 performs automatic color space and gamma conversion to accommodate the differences between HD and SD. The Aspect Ratio Conversion process offers resizing and repositioning with choices for: Letterbox, Anamorphic, Crop and Zoom.

Proc amp controls are provided in the form of Video, Chroma and Pedestal. Video outputs can be timed with respect to the reference input.

Audio Handling

The 7925 supports 16 channels of embedded audio (without the need for any sub module). Embedded audio in the input is safely bypassed around the video processing, delayed to preserve lip sync, and reembedded in the SD SDI output. Any two of those audio channels can be selected for conversion to analog form. These balanced outputs can be used with the composite video output to feed analog equipment, or for signal monitoring. All audio processing and conversion is performed at full 24 bit resolution.

Control

The 7925 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

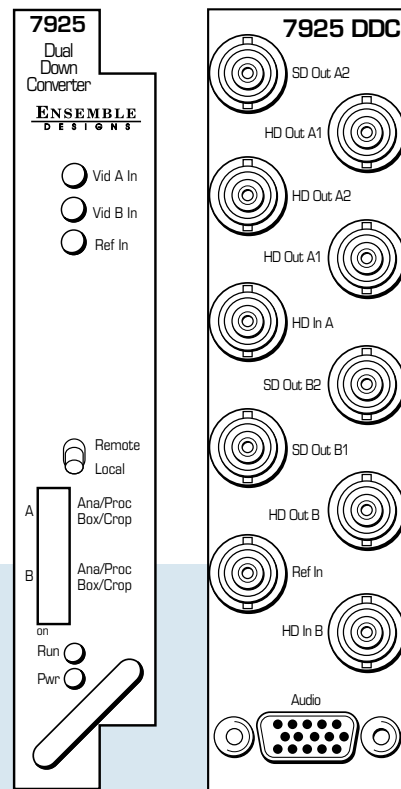
HD closed captioning is carried in data packets in the vertical interval ancillary data space. The 7925 properly translates HD caption data to traditional SD captioning (line 21 or 23) so that closed captioning content is converted transparently between video standards and formats.

Automatic Aspect Ratio Conversion

The 7925 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 to determine the type of Aspect Ratio Conversion to perform. Subsequently, these flags are properly updated in the output signal to reflect its format and presentation.

Features

- » Two HD downconverters on one module
- » Accepts asynchronous HD inputs
- » Each channel has SD SDI and/or composite outputs
- » HD loop-back outputs
- » Downconverts 720p, 1080i, 1080sF or 1080p to SD
- » Passes SD 525 or 625 if received on input
- » Reference input
- » Outputs can be locked and timed to reference for use with switchers and routers
- » Internal processing in progressive
- » Proc Amp and Frame Sync
- » Built-in test pattern and tone
- » Supports WSS and AFD
- » Translates HD closed captioning to SD closed captioning
- » Passes 16 channels of embedded audio
- » 2 channels of analog audio for monitoring
- » Auto detection of input standard and frame rate
- » Local and remote control



Serial Digital Input

Number	Two (one per channel)
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M
Impedance	75 Ω, BNC
Return Loss	>15 dB
Max Cable Length	100 meter Belden 1694A
Automatic Cable Input Equalization	

Standards Supported

1080i (SMPTE 274M -4,5,6)	50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3)	50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11)	23.98, 24, 25 Hz
1080sF (RP211 -14,15,16)	23.98, 24, 25 Hz
525i	59.94, 625i 50

Conversion Directions

Downconversion from	
1080i/59.94, 720p/59.94, 1080p/23.98, 1080sF/23.98 to 525 (NTSC), or	
1080i/50, 720p/50, 1080p/25, 1080sF/25 to 625 (PAL)	

Reference Input

Number	One external (modules BNC) One internal (frame master ref BNC)
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync
Return Loss	>40 dB (applies to external ref input)

HD Serial Digital Output

Number	Three Ch A has two HD SDI loop-back outputs and Ch B has one HD SDI loop-back output.
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M, SD Serial Digital 270 Mb/s SMPTE 259M, (Both 525 and 625 SD standards)
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)
Delay	0 for HD outputs

SD Serial Digital Output

Number	Four max Jumper selectable, BNCs shared with composite outputs Each channel has two SD outputs, selectable as two SD SDI, or two composite, or one SD SDI and one composite
Signal Type	SD Serial Digital 270 Mb/s SMPTE 259M (Both 525 and 625 SD standards)
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)
Delay	16.6 msec in 59.94 Hz systems 20 msec in 50 Hz systems

Analog Video Output

Number	Four max Jumper selectable, BNCs shared with composite outputs Each channel has two SD outputs, selectable as two SD SDI, or two composite, or one SD SDI and one composite
Signal Type	PAL or NTSC composite
Impedance	75 Ω
Return Loss	>40 dB
Output DC	<50 mV
Resolution	16 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	16.6 msec in 59.94 Hz systems 20 msec in 50 Hz systems

Analog Audio Output

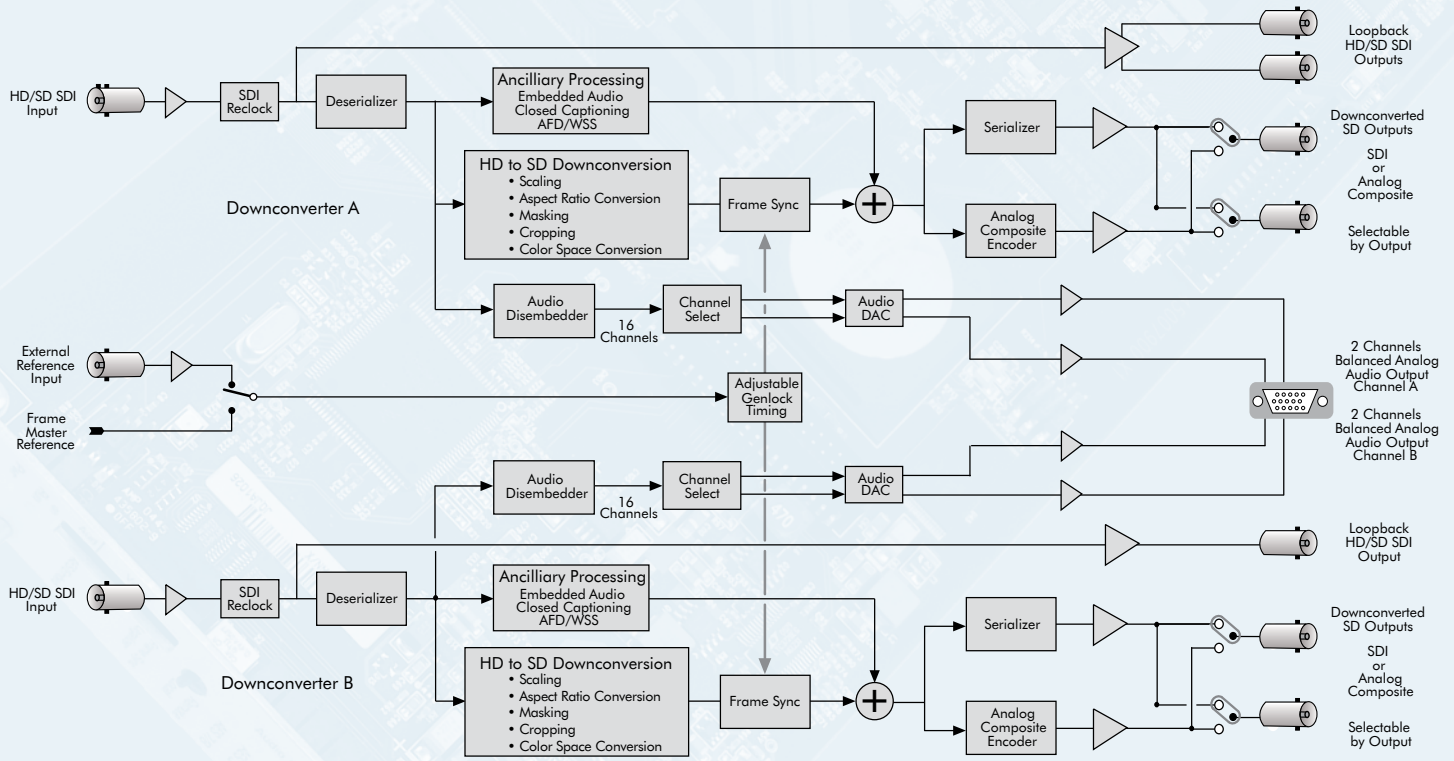
Number	Two (selectable from sixteen)
Signal Type	Balanced, transformerless
Impedance	30 Ω
Maximum Output Level	24 dBu
Resolution	24 bits, 128x Oversampled
Reference Level	-10 dBu to +4 dBu
Frequency Response	±0.1 dB, 20 Hz to 20 kHz
Crosstalk	<102 dB
Dynamic Range	>106 dB
Delay	Automatic to match video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

Embedded Output

Support for all four groups (16 channels) from input to output. Audio in SD output is delayed appropriately to compensate for conversion.

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



HD Cross Converter

The 7930 module provides cross conversion between HD 1.5 Gb/s formats, processing all popular variations of 1080 and 720, making it simple for every facility to ingest any type of HD signal.

All popular variations of 720p, 1080i, 1080sF and 1080p are supported. The 7930 converts between any HD signals within the 59.94/23.98/29.97 family, within the 50/25 fps family, or within the 60/30 fps family. When converting from 59.94 to 23.98 formats, the 3:2 cadence of any existing film material in the input is automatically detected and backed out.

The 7930 can be configured to continually output your facility's preferred HD format. Just connect any HD signal to the input and the 7930 will cross convert it to the appropriate format for output. And, if the 8415 audio option is installed, the audio will automatically be processed as well.

The 7930 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 7930 converts this caption data transparently between video standards and formats.

Automatic Aspect Ratio Conversion

The 7930 supports WSS (Wide Screen Signaling), and AFD (Active Format Description) to mark or identify the aspect ratio of the video content. These flags are generated at the output of the module, and they are read at the input. This allows the up

Features

- » HD Cross Converter for 720p, 1080i, 1080sF and 1080p
- » 16 bit processing
- » All processing performed in progressive
- » Accepts asynchronous signals
- » Reference input, output is timeable
- » Auto detects input standard and frame rate
- » Proc Amp
- » Passes closed captioning
- » Built-in test pattern and tone
- » Audio Mux/Demux optional
- » Audio Automatic Gain Control optional
- » Add audio sub module for delay and processing
- » Occupies one slot in frame, even with audio option

and downconversion process to adapt automatically to material that is already in letterbox or pillarbox form in order to produce the most appropriate conversion.

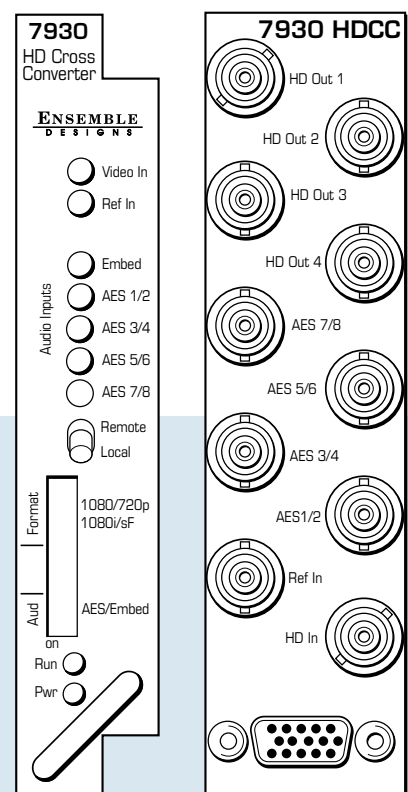
Audio Options

When an audio sub module is installed, audio is automatically delayed as needed to compensate for the video processing in the 7930. For complete audio processing, choose from three different audio sub modules. Sub modules plug onto the 7930 board and do not take up a slot in the frame.

The 8415 is an eight-channel audio sub module with AES I/O that provides management of embedded audio in the processing path, or supports audio embedding/disembedding alongside the video processing elements. Embedded audio is safely bypassed around the video frame store with the lip sync preserved. Level adjustments and channel shuffling are accessed through the built-in audio mixer. The 9670 Automatic Gain Control option can be added to the 8415. All audio processing is performed at full 24 bit resolution.

The 7610 provides carriage of up to eight channels of embedded audio through the format conversion process. Embedded audio in the input signal is delayed to match the video delay and preserve lip sync. The delayed content is reinserted in the video output. No level adjustment or channel swapping is provided.

The 7615 also provides processing for signals with eight channels of embedded audio. It offers the same processing and AES I/O as the 8415 plus the ability to decode Dolby E signals.



Serial Digital Input

Number	One
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	100 meters Belden 1694A
Automatic Cable Input Equalization	

HD Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz

Serial Digital Output

Number	Four
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M or 296M
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

Reference Input

Number	One external (modules BNC) One internal (frame master ref BNC)
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync
Return Loss	>40 dB (applies to external ref input)

Conversion Directions

Cross Conversion within frame rate families:
 525 Derived Family: 1080i/59.94, 720p/59.94,
 1080p/23.98, and 1080sF/23.98
 625 Derived Family: 1080i/50, 720p/50, 1080p/25,
 1080sF/25

AES/EBU Digital Inputs (with 8415 sub module option)

Number	Four (total of eight channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs

Number	Four AES Streams (from video input) Eight channels from any two of four groups Selectable to any of four groups
Channels	Eight
Bit Depth	20 and 24 bit

AES/EBU Digital Outputs

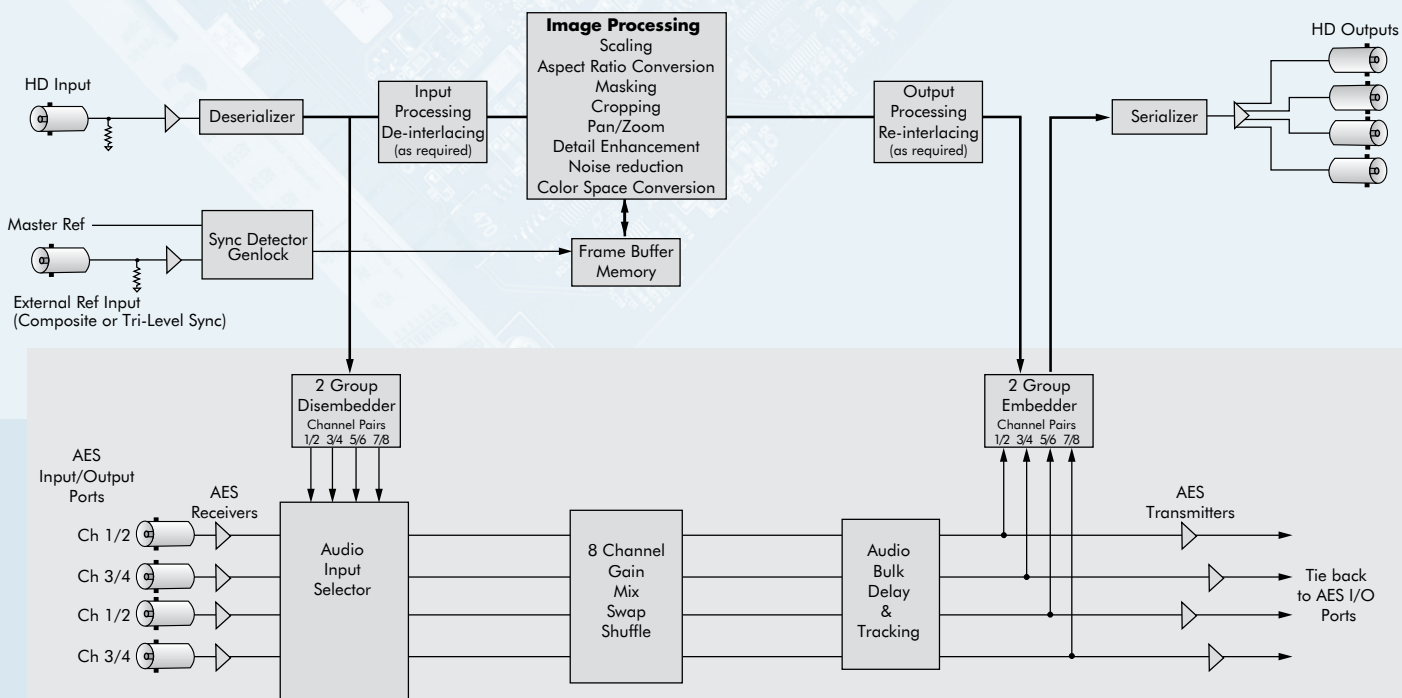
Number	Four (total of 8 channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz
Reference Level	Synchronous to Video output -18 or -20 dBFS (selectable)

Embedded Output

Number	Four or two depending on configuration
Group Assign	Cascade, or Replace any two of four groups
Channels	Eight
Bit Depth	24 bit

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



8415 8 Channel Audio Processing Option

SD Aspect Ratio Converter

The 7940 is an aspect ratio converter for standard definition signals. Resizing and Repositioning includes choices for: Letterbox, Anamorphic, Crop and Zoom. Proc amp controls are provided in the form of Video, Chroma and Pedestal.

The 7940 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.

Automatic Aspect Ratio Conversion

The 7940 supports WSS (Wide Screen Signaling), and AFD (Active Format Description) to mark or identify the aspect ratio of the video content. These flags are generated at the output of the module, and they are read at the input. This allows the up and downconversion process to adapt automatically to material that is already in letterbox or pillarbox form in order to produce the most appropriate conversion.

Audio Options

When an audio sub module is installed, audio is automatically delayed as needed to compensate for the video processing in the 7940. For complete audio processing, choose from three different audio sub modules. Sub modules plug onto the 7940 board and do not take up a slot in the frame.

The 8415 is an eight-channel audio sub module with AES I/O that provides management of embedded audio in the

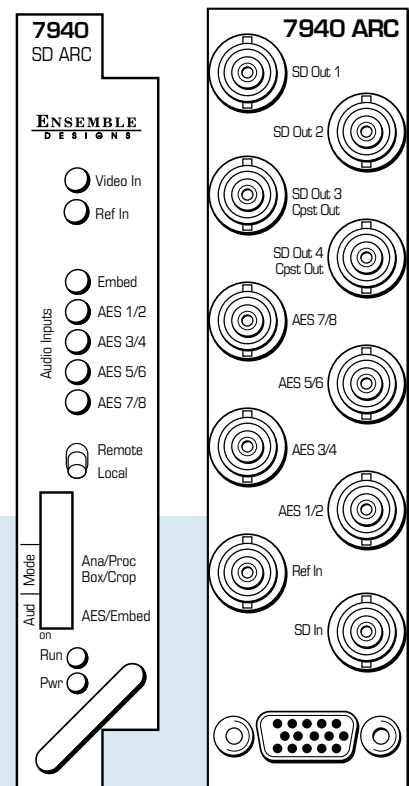
processing path, or supports audio embedding/disembedding alongside the video processing elements. Embedded audio is safely bypassed around the video frame store with the lip sync preserved. Level adjustments and channel shuffling are accessed through the built-in audio mixer. The 9670 Automatic Gain Control option can be added to the 8415. All audio processing is performed at full 24 bit resolution.

The 7610 provides carriage of up to eight channels of embedded audio through the format conversion process. Embedded audio in the input signal is delayed to match the video delay and preserve lip sync. The delayed content is reinserted in the video output. No level adjustment or channel swapping is provided.

The 7615 provides processing for signals with eight channels of embedded audio. It offers the same processing and AES I/O as the 8415 plus the ability to decode Dolby E signals.

Features

- » SD Aspect Ratio Converter
- » 16 bit processing
- » Accepts asynchronous signals
- » Reference input – output is timeable
- » Auto-detects input standard and frame rate
- » Passes closed captioning
- » Proc Amp
- » Built-in test pattern and tone
- » Audio Mux/Demux optional
- » Audio Automatic Gain Control optional
- » Add audio sub module for delay and processing
- » Occupies one slot in frame, even with audio option



Serial Digital Input

Number One
Signal Type SD Serial Digital 270 Mb/s SMPTE 259 (both 525 and 625 SD standards)
Impedance 75 Ω
Return Loss >15 dB
Max Cable Length 300 meters Belden 1694A
Automatic Cable Input Equalization

Serial Digital Output

Number Four max
Signal Type SD Serial Digital 270 Mb/s SMPTE 259
Impedance 75 Ω
Return Loss >15 dB
Output DC None (AC coupled)

Reference Input

Number One external (module's BNC)
 One internal (frame master ref BNC)
Signal Type PAL or NTSC composite video
Return Loss >40 dB (applies to external ref input)

AES/EBU Digital Inputs (with 8415 sub module option)

Number Four (total of eight channels)
Signal Type AES3id
Connectorization Coaxial, 75 Ω
Bit Depth 20 and 24 bit
Sample Rate 30 KHz to 100 KHz (sample rate converted internally to 48 KHz)
Crosstalk <144 dB
Dynamic Range >144 dB
Reference Level -18 or -20 dBFS (selectable)
AC-3, Dolby E Supported when inputs are synchronous

Embedded Inputs

Number Four AES Streams (from video input)
 Eight channels from any two of four groups
 Selectable to any of four groups
Channels Eight
Bit Depth 20 and 24 bit

AES/EBU Digital Outputs

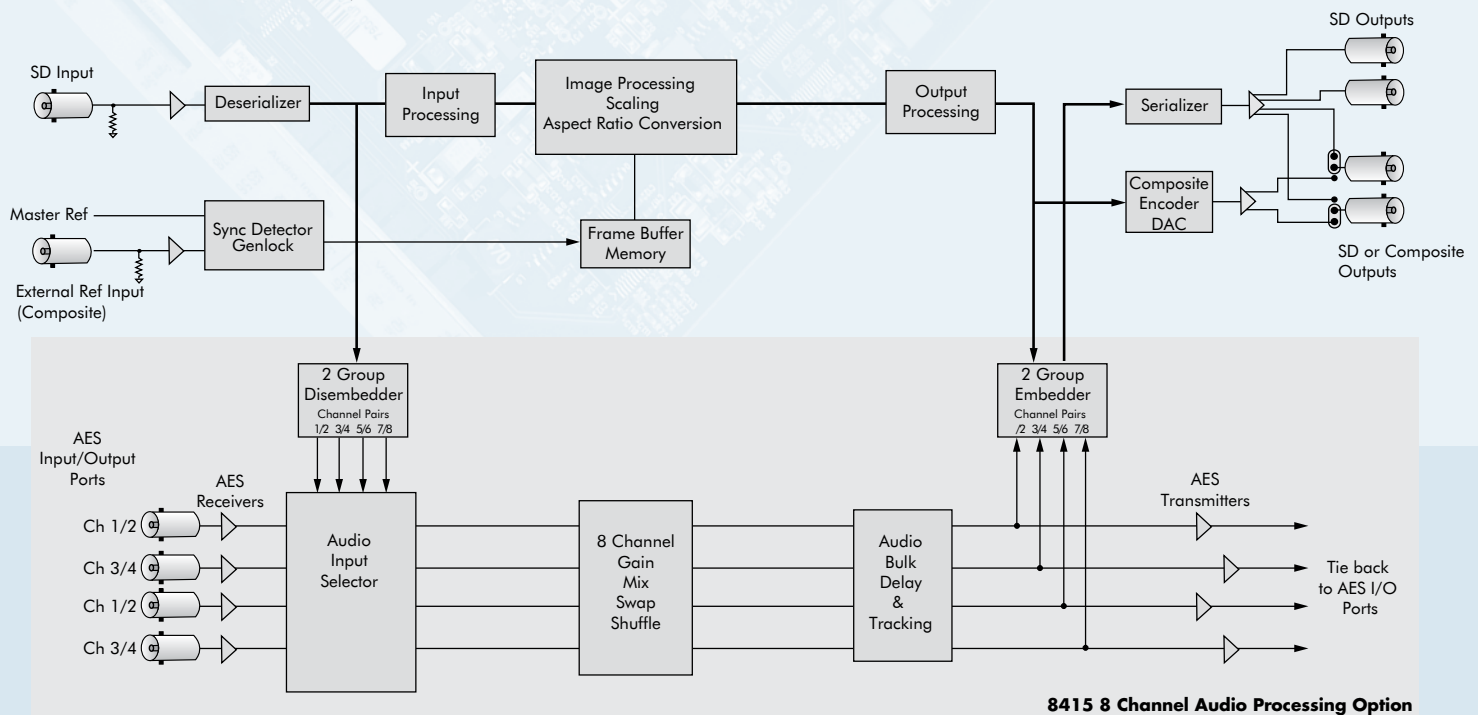
Number Four (total of eight channels)
Signal Type AES3id
Connectorization Coaxial, 75 Ω
Bit Depth 20 and 24 bit
Sample Rate 48 KHz
 Synchronous to Video output
Reference Level -18 or -20 dBFS (selectable)

Embedded Output

Number Four or two depending on configuration
 Cascade, or Replace any two of four groups
Channels Eight
Bit Depth 24 bit

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



8415 8 Channel Audio Processing Option

Video Processing Frame Synchronizer

The 8400 Digital Video Processing Frame Synchronizer is the total solution for standard definition digital video and digital audio processing.

Total Flexibility

The flexible architecture of the 8400 makes it a multipurpose, "Do Anything in Digits," module. Uncompromising attention to image quality and fidelity means that it does what you need it to do and keeps your signals pristine.

The 8400 has SDI I/O. In between those inputs and outputs is a rugged frame synchronizer and a powerful proc amp. An infinitely adjustable timing system genlocks to your house reference. An optional audio processor and an optional Digital Noise Reducer round out the 8400 module.

Uncompromised Pictures

The SDI input is carried at full uncompressed bandwidth throughout the entire module, and EDH monitoring of the digital input alerts you to any incoming problem. Complete control over signal levels is provided.

Solid Frame Synchronizer

Input video is synchronized to your house reference by the 8400's built-in Frame Synchronizer. It's the perfect serial digital frame sync. On loss of input, the output can mute to black or freeze on the last good frame of video.

Complete Proc Amp Functions

The 8400 has a full-featured Proc Amp for adjustment of every signal parameter. Proc controls include Video and Chroma Gain, NTSC-style hue rotation, Black Balance, and pedestal. Black and White clips can be set to prevent excessive signal excursions.

A Detail Enhancer recovers information that has been lost due to poor frequency response in upstream systems. Certain values represented in serial digital component may be illegal in the PAL or NTSC composite domains. The Predictive Composite Clipper mode identifies picture elements that would be illegal in analog composite, and limits color saturation and luminance excursions. You can be confident that the work you're doing in digital component will look its best when it's viewed in composite.

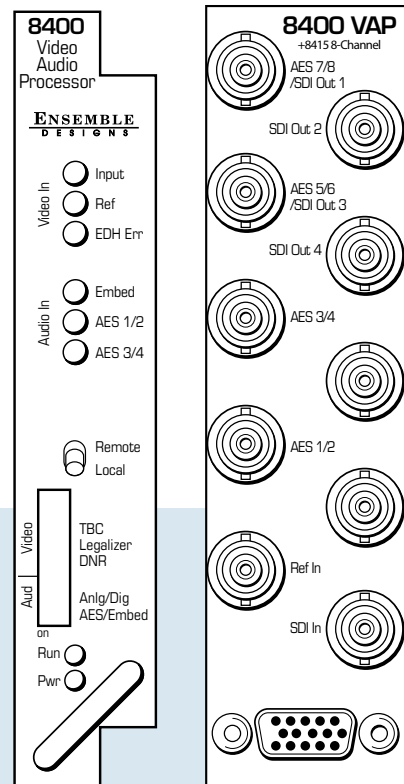
Selective (toothed) vertical blanking lets you choose to pass or strip content in the vertical interval on a line-by-line and field-by-field basis. To help optimize the settings in the Proc Amp, a Split Screen mode allows you to compare the processed output with the original material.

Total Control

Every function and parameter of the 8400 can be controlled from an Express Panel, Avenue Touch Screen, or the Avenue PC Control Application. Memory registers can be used to save the complete configuration of the module, making it easy to change instantly between different configurations.

Channel Density

Ten 8400 Video Processors (including both an audio and DNR Option) can be accommodated by the Avenue 3RU Frame. Now that's an efficient use of real estate!



Serial Digital Input

Signal Type	SMPTE 259M-C
EDH	Fully compliant
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	300 meters Belden 1694A
Automatic Cable Input Equalization	

Serial Digital Output

Number	Two
Signal Type	SMPTE 259M-C
EDH	Fully compliant
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

Reference Input

Number	One external One internal Master Timing Ref
Signal Type	1 V P-P Composite Video PAL or NTSC
Impedance	75 Ω
Return Loss	>40 dB

General Specifications

Power Consumption	10 watts (with both options installed) 0 to 40°C ambient (all specifications met)
Temperature	0 to 40°C ambient (all specifications met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft

SDI to SDI Performance

Passes entire SDI signal from input to output,
including embedded audio and all other ancillary data

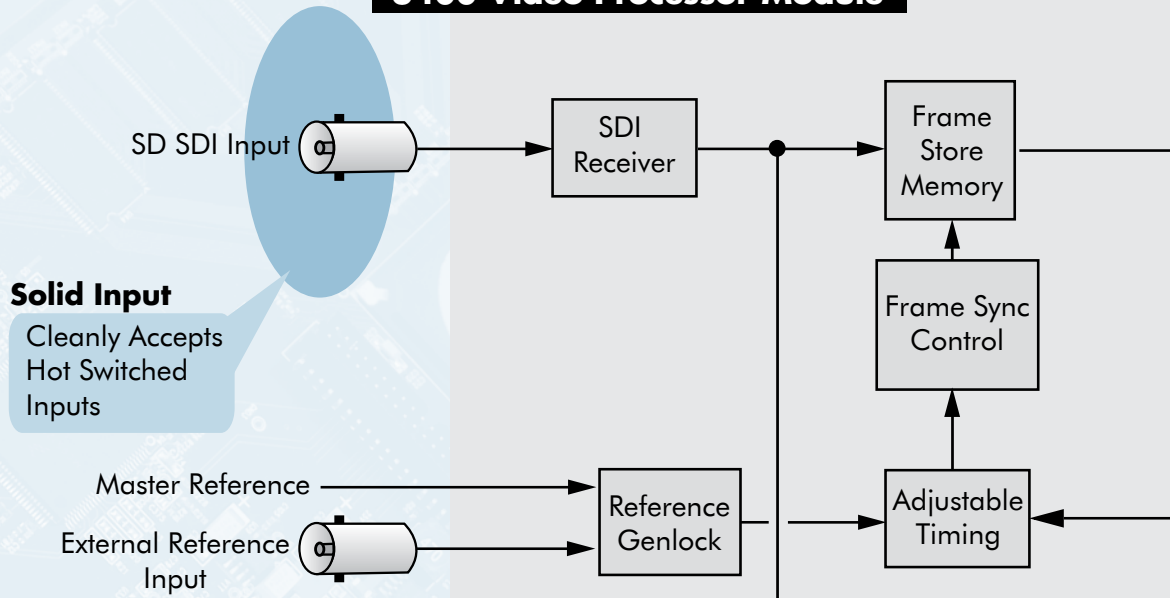
Features

- » SD SDI Serial Digital I/O
- » Full-featured Frame Synchronizer
- » Comprehensive Proc Amp controls
- » Sharpness Filter
- » Black and White Clips
- » Line-Selectable toothed blanking
- » Split Screen Mode
- » External genlock reference input
- » EDH Detection and Insertion
- » Internal Color Bar Generator
- » Automatic 525/625 switching
- » Total control through the Avenue control system
- » Memory Registers
- » Compatible with the full Avenue line
- » 10 complete channels in just 3RU
- » Accepts the 8410, 8415 or 8510 Audio Processor options for tracking audio delay, audio mixing, shuffling
- » 4- or 8-channel Audio option
- » Accepts the 8520 Digital Noise Reducer option

Features

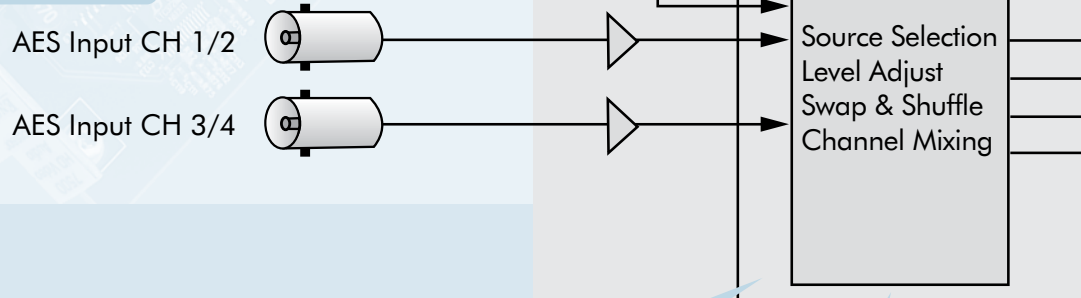
- » Digital input
- » Digital outputs
- » Frame Sync
- » Legalizer
- » Proc Amp
- » Digital Noise Reducer option
- » Passes embedded audio
- » Embedded Audio Processing option
- » 4 or 8 channels
- » Tracking Audio Delay option
- » Audio Automatic Gain Control option

8400 Video Processor Module



8410 Audio Processor Option

4 or 8 Channels
Sub module Choices for 4 or 8 Channel Processing



Input Flexibility

Digital AES and Embedded Inputs

In Line Shuffler

Shuffle and Adjust Embedded Audio

8520 DNR Option

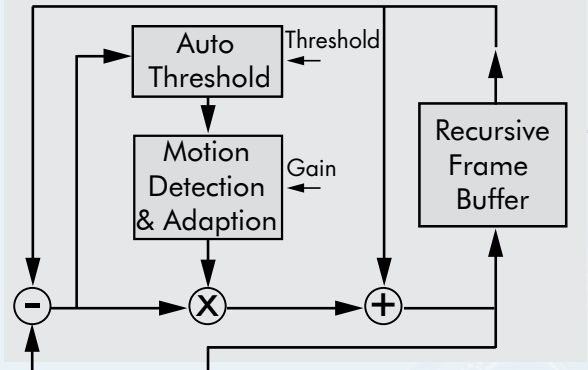


Image Quality

MPEG Preprocessing
Image Cleanup

LOS Handling

On Loss of Input,
Output Can Freeze
or Mute to Black

Video Processing Amplifier

- Gains
- Pedestal
- Hue
- Detail
- Legalizer
- White Clip
- Black Clip
- Chroma Clip
- Selective Blanking
- Black Balance

Serializer

Module Control
μProc

Avenue Control System



Express Panel

Adjust Any Parameter
Dedicated Knobs for
Proc Adjustments

Audio Embed

Auto Tracking
Audio Delay

Output Routing

Perfect Lip Sync

Automatically Tracks the Delay
Imposed by Video Frame Sync

Audio Horsepower

Control All Levels
Mix, Swap and Shuffle
any input to any output

SD SDI Output

SD SDI Output

AES Output Ch 1/2

AES Output Ch 3/4

4 Ch
Analog
Audio

4 Channel Audio Processor Sub Module for 8400 and 8500

Audio Processing

The 8410 Audio Processor is a sub module option for the 8400 or 8500. Its flexible architecture addresses a wide range of audio handling needs. The 8410 handles in-line shuffling perfectly or you can use its AES I/O to bring in digital audio sources. All audio processing is performed at the full 24 bit resolution of the system by a digital signal processor (DSP).

Mix, Swap and Shuffle

The 8410 has a full-featured, four-channel audio mixer for handling embedded audio. Precise control over audio level is provided for each input. A gain of up to +12 dB can be applied to signals with low input levels. Signal phase inversion is selectable on a channel-by-channel basis to correct phase errors in incoming material.

Lip Sync Preservation

The 8410 has been designed to provide superior handling of embedded audio. The disembedder on the input side follows the timing of the SDI input, even if that input is asynchronous to the house reference. The embedder on the output side is synchronous to house. This allows embedded audio to be safely bypassed around the video framestore with the lip sync properly preserved. Embedded audio content is properly resynchronized.

Features

- » AES I/O
- » 24 bit audio processing
- » Embedded Audio Input (Four Channels)
- » Embedded Audio-Friendly Synchronization
- » Resynchronize embedded audio content
- » Mix, Shuffle, Level Adjust of embedded audio
- » Fully adjustable audio levels
- » Complete shuffling and mixing between all channels
- » Phase inversion selectable on a channel basis
- » Tracking Audio Delay
- » User-adjustable Bulk Audio Delay
- » Built-in tone generator
- » 100 MHz DSP
- » Use with 8400 and 8500 modules

AES/EBU Digital Inputs

Number	Two (total of 4 channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs

Number	One (from SDI video input)
Signal Type	SMPTE 274M compliant
	Selectable to any of 4 groups
Channels	Four
Bit Depth	20 and 24 bit

AES/EBU Digital Outputs

Number	Two (total of 4 channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz
	Synchronous to Video output
Reference Level	-18 or -20 dBFS (selectable)

Embedded Output

Number	Two (or more, depending on main module)
Signal Type	SMPTE 274M compliant
Group Assign	Cascade, or Replace any two of four groups
Channels	Four
Bit Depth	24 bit



Model 8415

8 Channel Audio Processor Sub Module for 7500, 7900 Series, 8400 and 8500

Audio Processing

The 8415 is an eight-channel sub module for use with the Avenue 7500, 7900 Series, 8400, and 8500 Video Processing Frame Syncs. The 8415's flexible architecture addresses a wide range of audio handling needs. All audio processing is performed at full 24 bit resolution by a digital signal processor (DSP).

Mix, Swap and Shuffle

The 8415 is a full-featured, eight-channel audio mixer. With built-in disembedding from the SDI input of the Video Processor, and four AES I/O ports, the 8415 can handle any digital audio requirement. It provides precise control over audio level, with up to 12 dB of gain to compensate for low level sources. The channel swap and shuffle capability allows you to completely rearrange and remix audio channels. Because the 8415 has simultaneous disembedding and embedding, it is an in-line processor for embedded audio. It can take embedded content, adjust levels and remap channels, and deliver it to the output as an embedded signal.

Lip Sync Preservation

The 8415 has been designed to provide superior handling of embedded audio. The disembedder on the input side follows the timing of the video input, even if that input is asynchronous to the house reference. The embedder on the output side is synchronous to house. This allows embedded audio to be safely bypassed around the video framestore with lip sync properly preserved.

Automatic Gain Control Option

The 9670 Audio Automatic Gain Control software key can be added as an option. This option provides control for keeping audio levels consistent in program material.

Features

- » Eight-channel audio processing
- » AES I/O
- » 24 bit audio processing
- » Embedded Audio Input (Eight Channels)
- » Embedded Audio-Friendly Synchronization
- » Resynchronize embedded audio content
- » Fully adjustable audio levels
- » Automatic Gain Control Option
- » Complete shuffling and mixing among all channels
- » Mix, shuffle, adjust levels of embedded audio
- » Phase inversion selectable on a channel basis
- » Tracking Audio Delay
- » User-adjustable Bulk Audio Delay
- » Automatic Gain Control option
- » Built-in tone generator
- » 100 Mhz DSP
- » Use with 7500, 7900 Series, 8400 and 8500

Video Processing Frame Synchronizer

The story of the 8500 Video Processing Frame Synchronizer begins with flexibility. This new Avenue module packs more features into a single card slot than anything we've ever offered before.

Total Flexibility

The flexible architecture of the 8500 makes it a multipurpose, "Do Anything," module. Uncompromising attention to image quality and fidelity means that it can do all of these things very well.

With both SD SDI and 12 bit analog inputs (composite, component, or S-Video [Y/C] formats), the 8500 is ready to take on any signal acquisition challenge. And you can deliver that signal simultaneously in both SDI digital component and 12 bit analog composite. In between those inputs and outputs lie a rugged frame synchronizer, and a powerful proc amp. An infinitely adjustable timing system genlocks to your house reference. A choice of an optional audio processor with analog and digital I/O, and an optional Digital Noise Reducer round out the 8500 Series — it's the total solution to signal acquisition and handling. No matter what sources you have — now, or in the future — the 8500 is ready.

Uncompromised Pictures

Whether your input is standard definition SDI Digital Component, Analog Composite or Analog Component, the 8500 handles it with precision and accuracy. The SDI input is carried at full uncompressed bandwidth throughout the entire module, and EDH monitoring of the digital input alerts you to any incoming problem. Analog inputs are 4x oversampled at 12 bits of resolution. Composite signals are decoded using an adaptive comb filter. Complete control over signal levels is provided.

Rock Steady TBC/Frame Synchronizer

Input video is synchronized to your house reference by an agile TBC/Frame Synchronizer. Even noisy and jittery analog sources are faithfully tracked to provide a steady, genlocked output. Robust signal handling ensures proper time base correction for virtually any source, even a consumer VHS machine. Select the SDI input and the 8500 is a serial digital frame sync.

Complete Proc Amp Functions

The 8500 has a full-featured Proc Amp for adjustment of every signal parameter. Proc controls include Video and Chroma Gain, NTSC-style hue rotation, Black Balance, and pedestal. Black and White clips can be set to prevent excessive signal excursions.

A Detail Enhancer recovers information that has been lost due to poor frequency response in upstream systems. Certain values represented in serial digital component may be illegal in the PAL or NTSC composite domains. The Predictive Composite Clipper mode identifies picture elements that would be illegal in analog composite, and limits color saturation and luminance excursions. You can be confident that the work you're doing in digital component will look its best in composite.

Selective (toothed) vertical blanking lets you choose to pass or strip content in the vertical interval on a line-by-line and field-by-field basis. To help optimize the settings in the Proc Amp, a Split Screen mode allows you to compare the processed output with the original material.

Digital and Analog Outputs

The 8500 has simultaneous SDI and analog composite outputs. They are fully timed to your house reference, including the subcarrier and Sch phase of the composite output. The analog output is constructed at 8 x oversampling with 12 bits of quantizing resolution.

This output flexibility of the 8500 makes it easy to handle the digital transition in an existing analog facility. Both digital and analog destinations can be fed from the same source module. On loss of input, the output can mute to black or freeze on the last good frame of video.

Total Control

Because the 8500 is an Avenue module, every function and parameter can be controlled from the Avenue control system. Memory registers can be used to save the complete configuration of the module, making it easy to change instantly between different configurations. Any combination of Express Panels, Touch Screens and PCs can be used to control the 8500. The Express Panel is especially well suited for use with the 8500.

Channel Density

Ten 8500 Video Processors (including both the Audio and DNR Options) can be accommodated by the Avenue 3RU Frame. Now that's an efficient use of real estate!

Features

- » 12 bit composite, component and S-Video analog video input
- » 4x oversampled analog input
- » SD SDI (Serial Digital) input
- » Adaptive Comb Filter decoder
- » Automatic 525/625 switching
- » A to D, and D to A, all in one module
- » Full-featured TBC/Frame Synchronizer
- » Excellent tracking of noisy inputs
- » Comprehensive Proc Amp controls

- » Predictive Composite Clipper
- » Video Legalizer
- » Sharpness Filter
- » Black and White clips
- » Line-Selectable toothed blanking
- » Split Screen mode
- » External genlock reference input
- » EDH detection and insertion
- » Simultaneous SD SDI and analog composite outputs
- » 12 bit, 8x Oversampled analog output
- » Outputs are fully timeable
- » Internal color bar generator
- » Total control through the Avenue control system
- » Memory Registers
- » Compatible with the full Avenue line
- » 10 complete channels in just 3RU
- » Accepts the 8410, 8415, or 8510 Audio Processor options
- » 4- or 8-channel audio options
- » Accepts the 8520 Digital Noise Reducer option
- » Audio Automatic Gain Control option

Analog Inputs

Signal Type	SMPTE Y, Pr, Pb Beta Y, Pr, Pb NTSC, PAL Composite NTSC, PAL S-Video (Y/C)
Impedance	75 Ω
Return Loss	>40 dB
Input DC	± 1 volt DC
Input Hum	<100 mV

Serial Digital Input

Signal Type	ITU-R 601, SMPTE 259M-C
EDH	Fully compliant
Impedance	75 Ω
Return Loss	>15 dB
Max Cable Length	300 meters Belden 1694A
Automatic Cable Input Equalization	

Reference Input

Number	One external One internal Master Timing Ref
Signal Type	1 V P-P Composite Video PAL or NTSC
Impedance	75 Ω , BNC
Return Loss	>40 dB

Analog to SDI Performance

Bit Resolution	12 bit input quantization 4 x oversampling
Signal to Noise	>62 dB, weighted
Frequency Response	
Composite & Y	± 0.1 dB, 0 to 5.5 MHz
Cr, Cb	± 0.1 dB, 0 to 2.75 MHz
Minimum Delay	90 μ sec

SDI to SDI Performance

Passes entire SDI signal from input to output, including embedded audio and all other ancillary data

Analog Output

Signal Type	PAL or NTSC Composite Standard follows input
Impedance	75 Ω
Return Loss	>40 dB
Output DC	<50 mV

Serial Digital Outputs

Number	One, two or four (selectable)
Signal Type	SMPTE 259M-C
EDH	Fully compliant
Impedance	75 Ω
Return Loss	>15 dB
Output DC	None (AC coupled)

SDI to Analog Performance

Bit Resolution	12 bit output reconstruction 8 x oversampling
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%
Color Field Sequence	Locked to selected Ref
Minimum Delay	25 μ sec

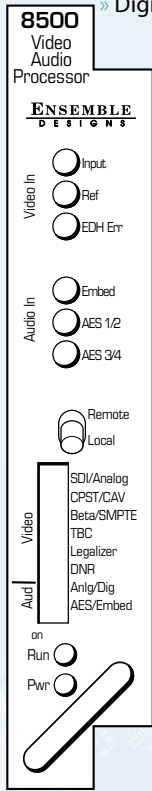
General Specifications

Power Consumption	10 watts (with 2 options installed)
Temperature	0 to 40°C ambient (all specifications met)
Relative Humidity	0 to 95%, noncondensing
Size	Standard Avenue Module Occupies one slot in 3RU or 1RU Frame (including 1 audio and DNR sub module)

Avenue 8500 Video and Audio Processor

Features

- » SD Analog and Digital Inputs
- » SD Analog and Digital Outputs
- » TBC/Frame Sync
- » Legalizer
- » Digital Proc Amp
- » Digital Noise Reducer option
- » Passes embedded audio
- » Embedded Audio Processing option
- » 4 or 8 channels
- » Tracking Audio Delay



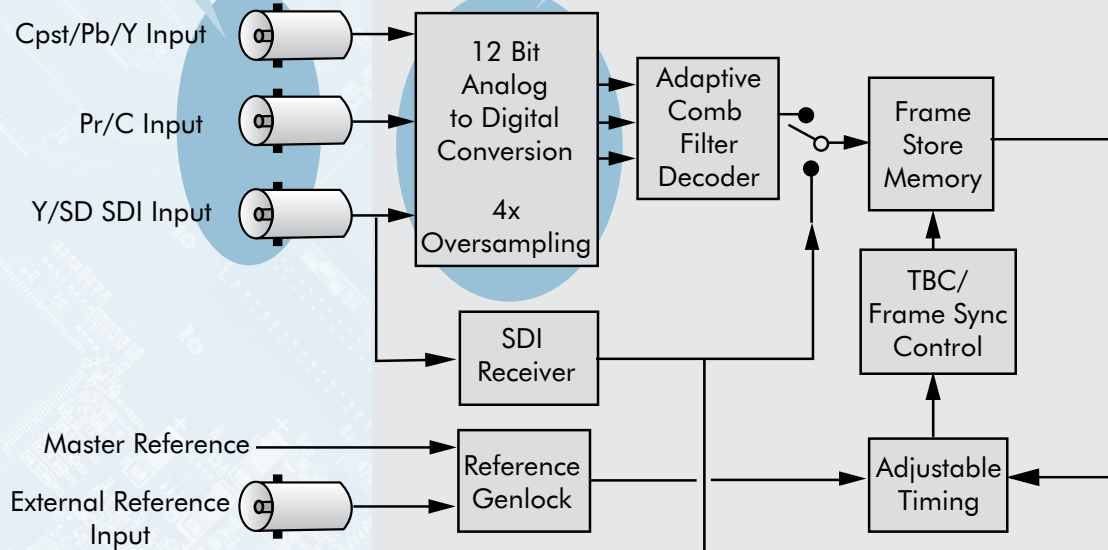
Input Flexibility

Composite and S-Video
 Component
 SD SDI

Image Quality

12 Bit Analog to Digital Conversion
 4x Oversampling

8500 Video Processor Module



8510 Audio Processor Option

4 or 8 Channels

Sub module
 Choices for 4 or 8
 Channel Processing

AES Input CH 1/2

AES Input CH 3/4

Analog Audio I/O

Audio Disembed

Source Selection
 Level Adjust
 Swap & Shuffle
 Channel Mixing

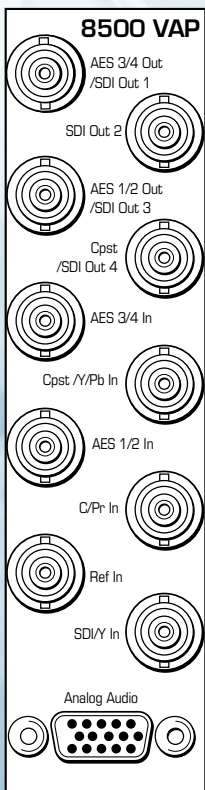
4 Channel
 24 Bit
 ADC

Analog Flexibility

User Configurable as:
 4 Balanced Inputs
 4 Balanced Outputs
 or 2 Inputs and 2 Outputs

Sound Quality

24 Bit Conversion and Processing
 for Fidelity and Accuracy



8520 DNR Option

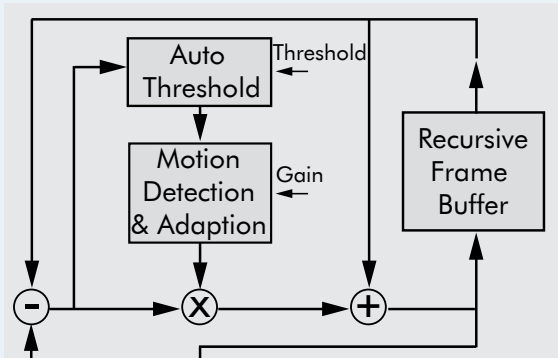


Image Quality

MPEG Preprocessing
Image Cleanup

Output Flexibility

Simultaneous Digital
and Analog Outputs

Video Processing Amplifier

- Gains
- Pedestal
- Hue
- Detail
- Legalizer
- White Clip
- Black Clip
- Chroma Clip
- Selective Blanking
- Black Balance

Serializer

12 Bit D to A & Encoder

Timed Outputs

Fully Timed Outputs
Composite Out is ScH Phased

Module Control
μProc

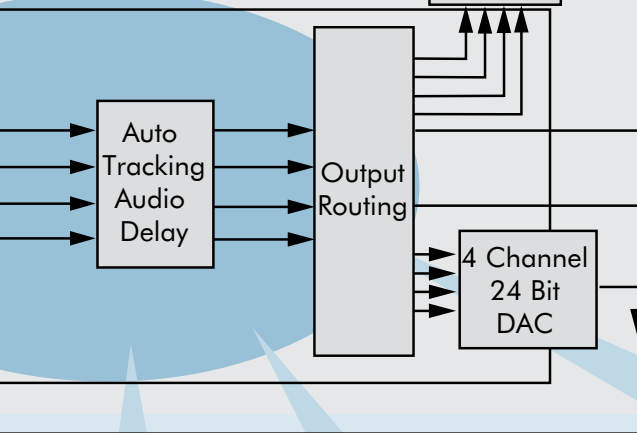
**Avenue
Control
System**



Express Panel

Adjust Any Parameter
Dedicated Knobs for
Proc Adjustments

**Digital
Signal Processing**



Input Flexibility

Balanced Analog
Digital AES
Embedded Inputs

Audio Horsepower

Control All Levels
Mix, Swap and Shuffle
any input to any output

Perfect Lip Sync

Automatically Tracks the Delay
imposed by Video Frame Sync

SD SDI or
AES 1/2 Out

SD SDI or
AES 3/4 Out

SD SDI Out

Composite
or SD SDI Output

4 Channel Audio Processor Sub Module for 8400 and 8500

The 8510 Audio Processor is a sub module option for use with the 8400 and 8500 Video Processing Frame Synchronizer. The 8510 adds both analog and digital audio capability with a flexible architecture that addresses a wide range of audio handling needs.

When the 8500 is being used as a video A to D converter, the 8510 can perform the same function with the associated audio. If the 8500 is being fed an SDI signal with embedded audio, the 8510 can produce an analog output of that audio. When using the 8400 as an SDI frame sync, the 8510 can properly resynchronize the embedded audio content.

Flexible Inputs

The 8510 accepts four channels of balanced analog audio. Analog inputs are digitized at 24 bits of resolution. Two AES inputs provide four channels of digital audio to the input selector. Sample rate converters can be selected in the AES input path, allowing the use of asynchronous digital sources. The 8510 accepts synchronous AC-3 or Dolby E inputs.

An audio disembedder fed by the SDI input to the 8400 or 8500 provides four additional channels of digital audio. The input selector allows any of these four channels to serve as inputs to the audio processing functions.

Mix, Swap and Shuffle

The 8510 has a full-featured, four-channel audio mixer. Precise control over audio level is provided for each input. A gain of up to +12dB can be applied to signals with low input levels. Signal phase inversion is selectable on a channel-by-channel basis to correct phase errors in incoming material.

Assignment of input channel to output channel is completely flexible, making it possible to swap any input to any output, or produce a mix of any input combination on any output.

All audio processing is performed at the full 24 bit resolution of the system by a digital signal processor (DSP).

Tracking Audio Delay

In order to compensate for the delay introduced in the video path by the frame synchronizer function of the 8400 or 8500, a tracking audio delay automatically delays the four audio channels. This prevents the video synchronizing process from causing lip sync errors. The amount of delay required is communicated to the 8510 by the 8400 or 8500 module's microcontroller. Changes in delay are made incrementally over several seconds.

In addition to the automatic tracking delay, the 8510 has an additional bulk delay that is user-adjustable up to one second in length. This delay can be used to correct lip sync errors that were already present in the original signal.

Digital and Analog Output

The four audio output channels can be delivered in both analog and digital form. 24 bit digital to analog conversion produces the analog balanced outputs, with reference level selectable from -10 to +4 dBu.

The output channels are simultaneously available in AES digital form, synchronous to the video reference supplied to the 8500 module. Finally, the four channels may also be embedded into the SDI output of the 8400 or 8500.

Embedded Audio Handling

The 8510 has been designed to provide superior handling of embedded audio. The disembedder on the input side follows the timing of the SDI input, even if that input is asynchronous to the house reference. The embedder on the output side is synchronous to house. This allows embedded audio to be safely bypassed around the video framestore with the lip sync properly preserved.

Features

- » 24 bit processing throughout
- » Up to 4 Balanced Analog Inputs
- » 2 AES Inputs (4 Channels)
- » Embedded Audio Input (4 Channels)
- » Built-in sample rate converter accepts asynchronous inputs
- » Up to 4 Balanced Analog Outputs
- » 2 AES Outputs (4 Channels)
- » Embedded Audio Output (4 Channels)
- » Embedded Audio-Friendly Synchronization
- » Mix, Shuffle, Level Adjust of Embedded Audio
- » Fully adjustable audio levels
- » Complete shuffling and mixing among all channels
- » Phase inversion selectable on a channel basis
- » Tracking Audio Delay
- » User-adjustable Bulk Audio Delay
- » Built-in tone generator
- » 100 Mhz DSP
- » Memory Registers
- » Use with 8400 and 8500 modules

Analog Inputs

Number	Configurable as two or four
Signal Type	Balanced
Impedance	>15 K Ω
Maximum Input Level	24 dBu
CMRR	>60 dB, 20 Hz to 10 kHz
Quantization	24 bits, 128x Oversampled
Sample Rate	48 kHz
Reference Level	-10 dBu to +4 dBu
Frequency Response	\pm 0.1 dB, 20 Hz to 20 kHz
Crosstalk	<102 dB
Dynamic Range	>106 dB

AES/EBU Digital Inputs

Number	Two (total of four channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)
AC-3, Dolby E	Supported when inputs are synchronous

Embedded Inputs

Number	One (from SDI video input)
Signal Type	SMPTE 274M compliant
	Selectable to any of four groups
Channels	Four
Bit Depth	20 and 24 bit

Analog Outputs

Number	Configurable as two or four
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	\pm 0.1 dB, 20 Hz to 20 kHz
Crosstalk	<102 dB
Dynamic Range	>106 dB

AES/EBU Digital Outputs

Number	Two (total of four channels)
Signal Type	AES3id
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz
Reference Level	Synchronous to Video output -18 or -20 dBFS (selectable)

Embedded Output

Number	One (or more, depending on main module)
Signal Type	SMPTE 274M compliant
Group Assign	Cascade, or Replace any
	Two of four groups
Channels	Four
Bit Depth	24 bit

Digital Noise Reducer Sub Module for 8400 & 8500

The 8520 Digital Video Noise Reducer is an optional sub module for use with the 8400 and 8500 Video Processing Frame Synchronizer. The noise reduction process is downstream from the 8400 or 8500 Proc Amp controls. The 8520 can be used with any video input source. It only adds 4 microseconds to the throughput delay of the 8400 or 8500, so it does not introduce problems with system timing.

The 8520 is motion- and scene-adaptive. It removes unwanted noise and artifacts, making it perfect for MPEG compression preprocessing and satellite or ENG feeds.

Several forms of noise reduction are employed to ensure the best possible performance. Recursive Temporal Noise filtering includes Simple Recursive, Motion Adaptive and Motion Adaptive with Impulse Filters. Controls are provided for maximum signal-to-noise improvement and for noise threshold. These can be set manually or run in automatic mode.

Motion Adaptive Recursive Noise filtering works on a pixel-by-pixel basis, comparing the current frame to frames that have already been filtered. If the change that is detected is small, it is considered noise, while if it is large, it is considered motion or a scene change. The detection process uses an LMMSE (Linear Minimum Mean Square Error) filtering algorithm to evaluate the presence of motion. Combining this algorithm with recursive temporal filters preserves fine detail while reducing noise in the presence of motion, including rapidly moving objects and scene changes. Motion trails are minimized while avoiding hard motion failures that some adaptive noise filters can exhibit.

User controls for the Motion Adaptive Recursive Filter include a Noise Threshold, based on how much noise is present in the incoming signal, and Maximum Signal to Noise Improvement, based on how much noise removal is desired. The threshold setting can be automatic or user-adjustable. When set to automatic, the noise level of the input signal is measured and the threshold is set accordingly. This simplifies the setup of the noise reducer and makes it responsive to varying input signal-to-noise levels. This minimizes the need for operator intervention to accommodate feeds of differing quality.

When the combined Motion Adaptive Recursive and Impulse Noise Filter is selected, temporal impulse noise-filtering is used to remove high level, narrow noise impulses, without reducing fine stationary detail.

A special Luma Tie mode reduces dot crawl artifacts from composite originated material by identifying cross-color and cross-luminance effects as unwanted noise. The Show Noise output mode displays what areas of the picture are being affected by the noise-reducer. Noise is represented by white or black, while unaffected areas are represented in gray. This handy mode makes it easy to set optimum adjustments for the material being processed. The Split Screen mode lets you compare the processed output to the original signal.

Complete control of the 8520 is provided through the Avenue Control System. Memory registers allow you to store configurations for easy recall.

Features

- » Motion Adaptive Recursive Filtering
- » Frame-based recursion
- » Temporal Impulse Filtering
- » Motion and Scene Adaptive
- » Spatial and Temporal modes
- » Preprocessing for MPEG
- » 12 bit processing
- » Minimal processing delay
- » Automatic Noise Level sensing
- » Automatic or Manual Reduction and Threshold setting
- » Luma and Chroma Processing with separate controls
- » Split Screen and Show Noise mode
- » Luma Tie reduces cross-color artifacts
- » Use with the 8400 and 8500 Video Processing Frame Syncs

Functional

Modes

Manual Adaptive
Automatic (low gain)
Automatic (high gain)
Temporal, Recursive
Independent Luma/Chroma
Chroma tied to Luma
<4 μ sec
12 bit internal processing

**Processing
Configurations**

**Through Delay
Resolution**

Controls

**Gain
Threshold**

0 to 20 dB
0.1 to 10.0 IRE

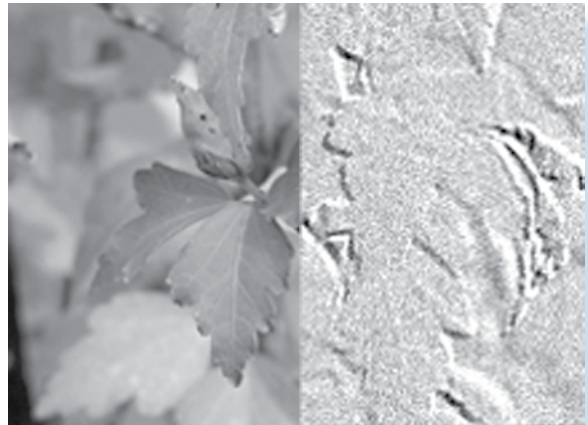
Status & Display

Automatic Mode

Displays derived Gain
and Threshold
Normal
Show Noise
Split Screen

Video Out

The Show Noise feature displays the detected noise and residual motion which will be removed from the video.



Split Screen displays the noise-reduced output next to the original scene.



Model 9110

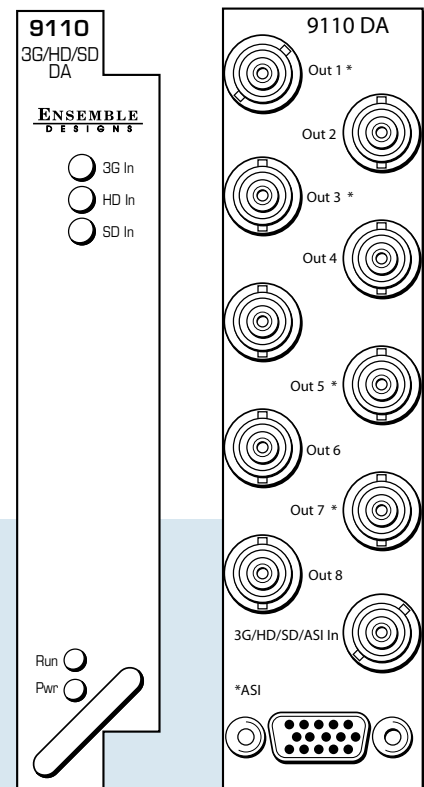
3G/HD/SD/ASI Reclocking Distribution Amplifier

The Avenue 9110 module is multi-rate serial digital distribution amplifier with automatic cable equalization and reclocking. It automatically detects and operates at 270 Mb/s for Standard Definition (525 or 625) signals and at 1.5 Gb/s or 3 Gb/s for High Definition signals. It also can be used with DVB-ASI signals. The module has one input and eight outputs. The module can be used in either the 3RU or 1RU Avenue frame.

Input signal presence and bit rate can be monitored through the Avenue Control System and it is also indicated by LED indicators on the front edge of the module. On loss of signal, the 9110 can generate an alarm that is monitored through Avenue PC.

Features

- » 3G/HD/SD/ASI Distribution Amplifier
- » Supports all HD, SD and ASI standards
- » Supports 3 Gb/s, level A and level B
- » Auto-senses standard definition or high definition input
- » Reclocked outputs
- » Auto EQ
- » Alarm on loss of signal
- » Passes embedded audio



Serial Digital Input

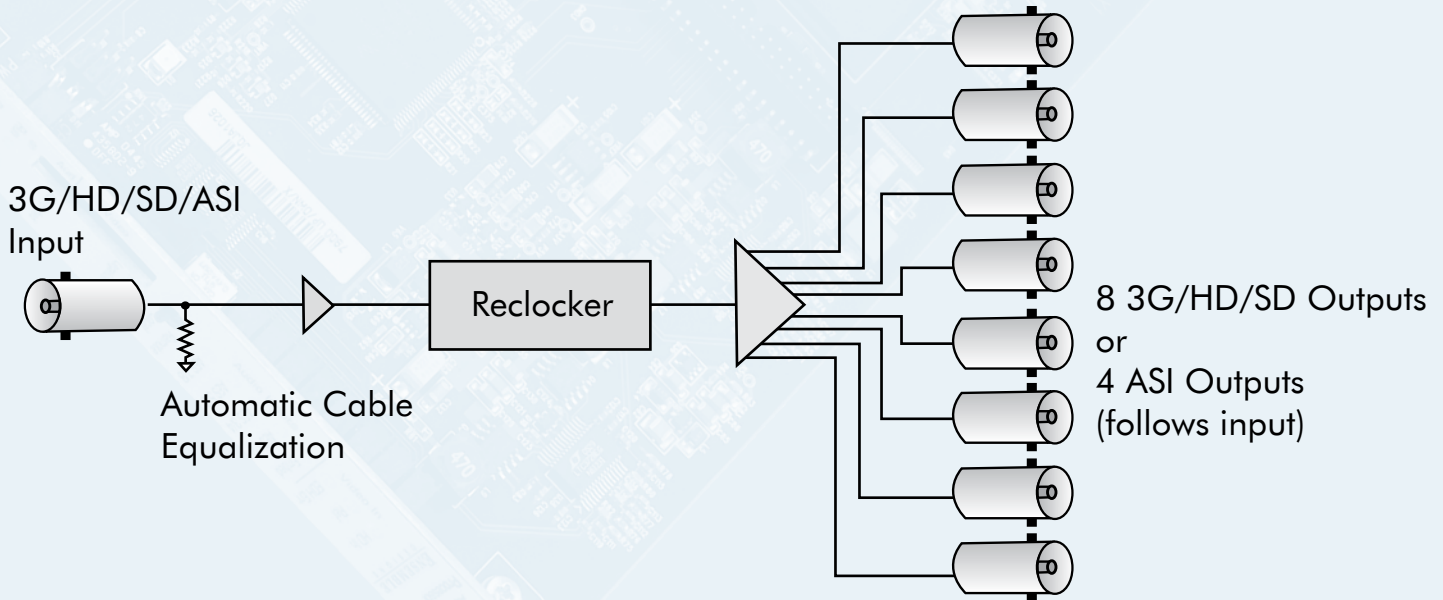
Number	One
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M HD Serial Digital 2.97 Gb/s SMPTE 424M, 425M or SD Serial Digital 270 Mb/s SMPTE 259M or DVB-ASI 270 Mb/s
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz
Max Cable Length	
270 Mb/s	300 meters Belden 1694A
1.485 Gb/s	100 meters Belden 1694A
2.97 Gb/s	70 meters Belden 1694A
Automatic Cable Input Equalization	

General Specifications

Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft

Serial Digital Output

Number	Eight (SD, HD) or Four (ASI)
Signal Type	ASI on outputs 1,3,5,7
Impedance	Follows input
Return Loss	75 Ω
Output DC	>15 dB to 1.485 GHz
	None (AC coupled)



Model 9125

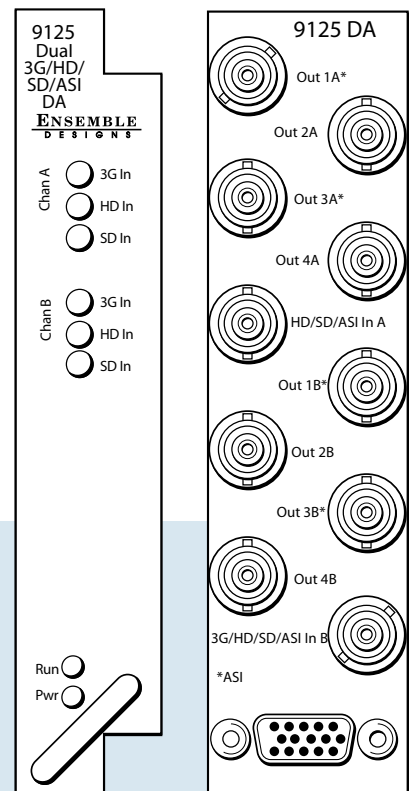
3G/HD/SD/ASI Dual Reclocking Distribution Amplifier

The Avenue 9125 module is a two channel video distribution amplifier that handles 3 Gb/s and 1.5 Gb/s high definition, standard definition and ASI video signals. It automatically detects and operates at 270 Mb/s for Standard Definition (525 or 625) signals and at 1.5 Gb/s or 3 Gb/s for High Definition signals. It also can be used with DVB-ASI signals. The 9125 has automatic cable equalization and reclocking. The module can be used in either the 3RU or 1RU Avenue frame.

Input signal presence and bit rate can be monitored through the Avenue Control System and it is also indicated by LED indicators on the front edge of the module. On loss of signal, the 9125 can generate an alarm that is monitored through Avenue PC.

Features

- » 3G/HD/SD/ASI Distribution Amplifier
- » Supports all HD, SD and ASI standards
- » Supports 3 Gb/s, level A and level B
- » Two channels of distribution per module
- » Auto-senses standard definition or high definition input
- » Reclocked outputs
- » Auto EQ
- » Alarm on loss of signal
- » Passes embedded audio



Serial Digital Input

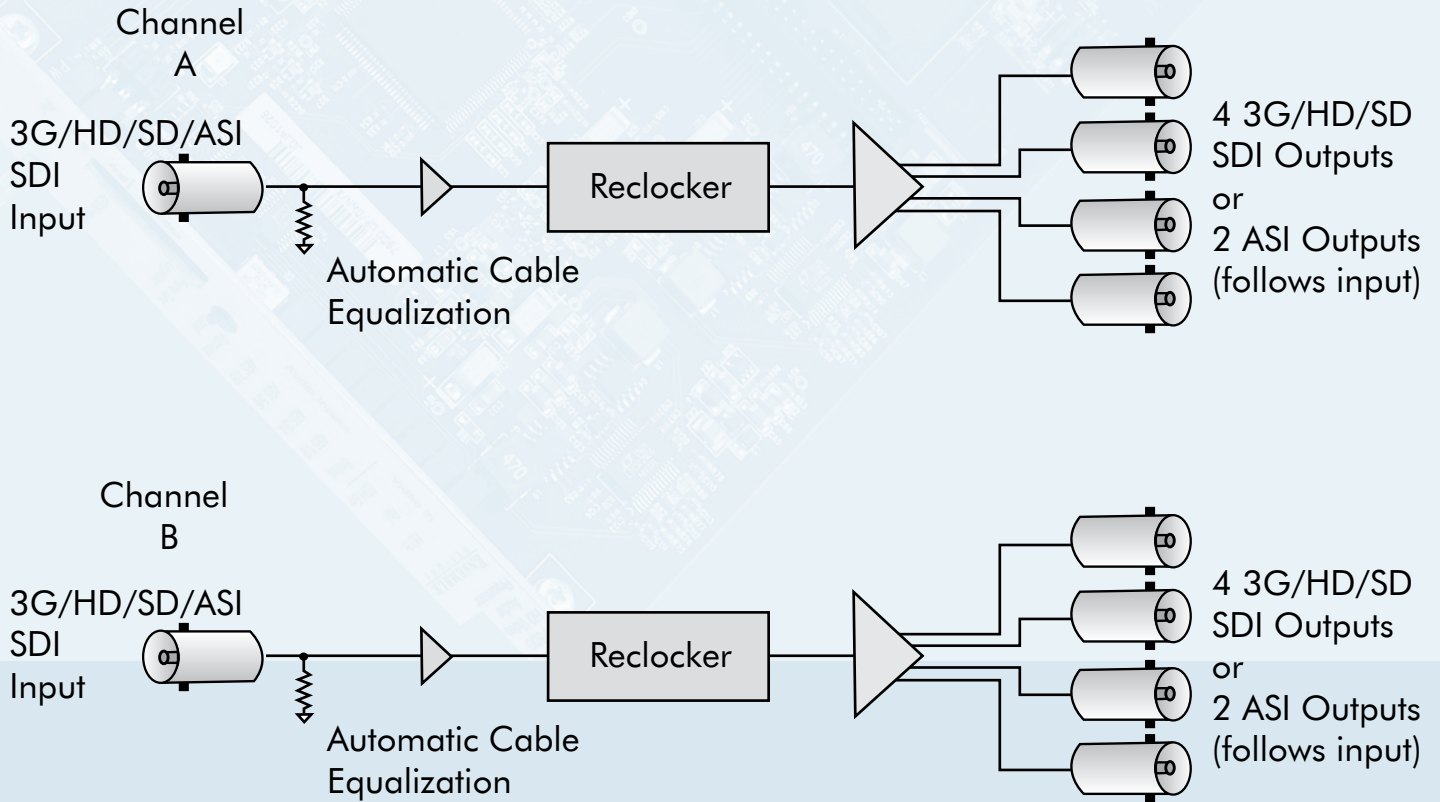
Number	Two
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M HD Serial Digital 2.97 Gb/s SMPTE 424M, 425M or SD Serial Digital 270 Mb/s SMPTE 259M or DVB-ASI 270 Mb/s
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz
Max Cable Length	
270 Mb/s	300 meters Belden 1694A
1.485 Gb/s	100 meters Belden 1694A
2.97 Gb/s	70 meters Belden 1694A
Automatic Cable Input Equalization	

Serial Digital Output

Number	Eight (SD, HD) or Four (ASI)
Signal Type	ASI on outputs 1A, 3A, 1B, 3B Follows input
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz
Output DC	None (AC coupled)

General Specifications

Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95% noncondensing
Altitude	0 to 10,000 ft



Sync Pulse Generator and Test Signal Generator

9400 SPG/TSG - Reliable and Easy-To-Use

The 9400 3G/HD/SD Sync Generator and Test Signal Generator is a stable timing source that is perfect for local reference generation in broadcast, remote trucks and post. HD SDI, SD SDI, analog composite, HD Tri-Level Sync, timecode, AES audio and analog audio reference outputs are generated.

The 9400 can operate from an internal precision frequency reference as a stand alone Master Sync Generator or lock to a video reference or 10 MHz precision reference. Alternately, the 7400-GPS option can be used.

The 9400 can output multiple formats of tri-level sync, 3 Gb/s and 1.5 Gb/s HD SDI test signals, SD composite and SDI test signals, and color black reference. The 9400 can simultaneously deliver both 525 (NTSC) and 625 (PAL) based signals. Color framing tracks the reference signal. All of the video outputs are derived from the same time base and can be timed with respect to each other. The 9400 has two identical generators, Generator A and Generator B, each with a variety of outputs. Each set of outputs can be timed with respect to the reference to any point in the television frame. All of the Outputs from a particular Generator must be selected within the same frame rate family.

The Avenue Frame features a retainer bar to ensure that modules remain properly seated even in the most demanding mobile environments.

Favorite Test Patterns

There are over 30 test signals including: Full and Split Field Bars at 75% and 100% with Pluge; Black; Flat Field; Pulse and Window; Ramp; Crosshatch; Safe Title; Blanking Markers; Cosite; Checkfield, Pathogenic, and 5 Step. The Cyclops feature adds a motion element to the selected video test signal to assist in locating a signal that might be frozen in a frame sync somewhere in the signal chain. An ID slate with user programmable text can overlay the test pattern.

Customizable Test Patterns

In addition to the standard suite of test patterns, users can create custom test patterns on a computer. Simply transfer test patterns to the included Secure Digital flash memory card using Avenue Logo software and a standard card reader, then insert the memory card into the 9400. Test patterns can include motion and an associated audio clip.

Audio Generators

The 9400 provides extensive support for analog and digital audio. Because all of the video outputs can be locked to a common time base, the AES digital audio outputs are always synchronous with all of the video outputs – regardless of format. Multiple tone generators make it easy to identify multi-channel content. With the 9400-EX Expando option, an AES input is provided which can be fed by a multi-channel encoded bitstream. This bitstream will be included in the set of signals that can be embedded into the test signal outputs.

The audio section of each generator supports sixteen audio channels. The content of each channel is independently programmable. Choices include adjustable frequency tone

generators, tone sweeps, Silence, Timecode, Audio Clip playback from Secure Digital Card, and the external AES input. Left/Right Channel ID that synchronizes to the Cyclops feature can also be selected.

All sixteen of these channels can be embedded in the SDI outputs. Each AES output can select from any of the 8 pairs that make up these 16 channels. Similarly, the stereo analog output of each generator can be driven from any of these audio signal pairs.

Multiple Timecode Generators

Multiple time code generators make the 9400 convenient for post applications. Timecode is delivered as LTC both 75 Ohm BNC and 110 Ohm Balanced), VITC, and DVITC. One generator can be configured to produce 525/59.94 drop frame timecode while the other generator is making 1080i/23.98.

9400-EX Expando Module for Total Flexibility

If your facility seems to need every type of reference signal on earth, the 9400 module with the 9400-EX is just what you need. Two generators provide myriad reference signals including: 12 types of 3 Gb/s or 1.5 Gb/s HD SDI black and bars, SD SDI bars and black, composite bars and black, HD Tri-Level Sync, Word clock, AES and analog audio tone, and LTC. The two generators can be independent or one generator can be locked to the other. The control system lets you assign signal types to the 17 output BNCs and 2 high-density D connectors. The 9400-EX option can be installed in the field.

7400-GPS Option for the Ultimate Precision Reference

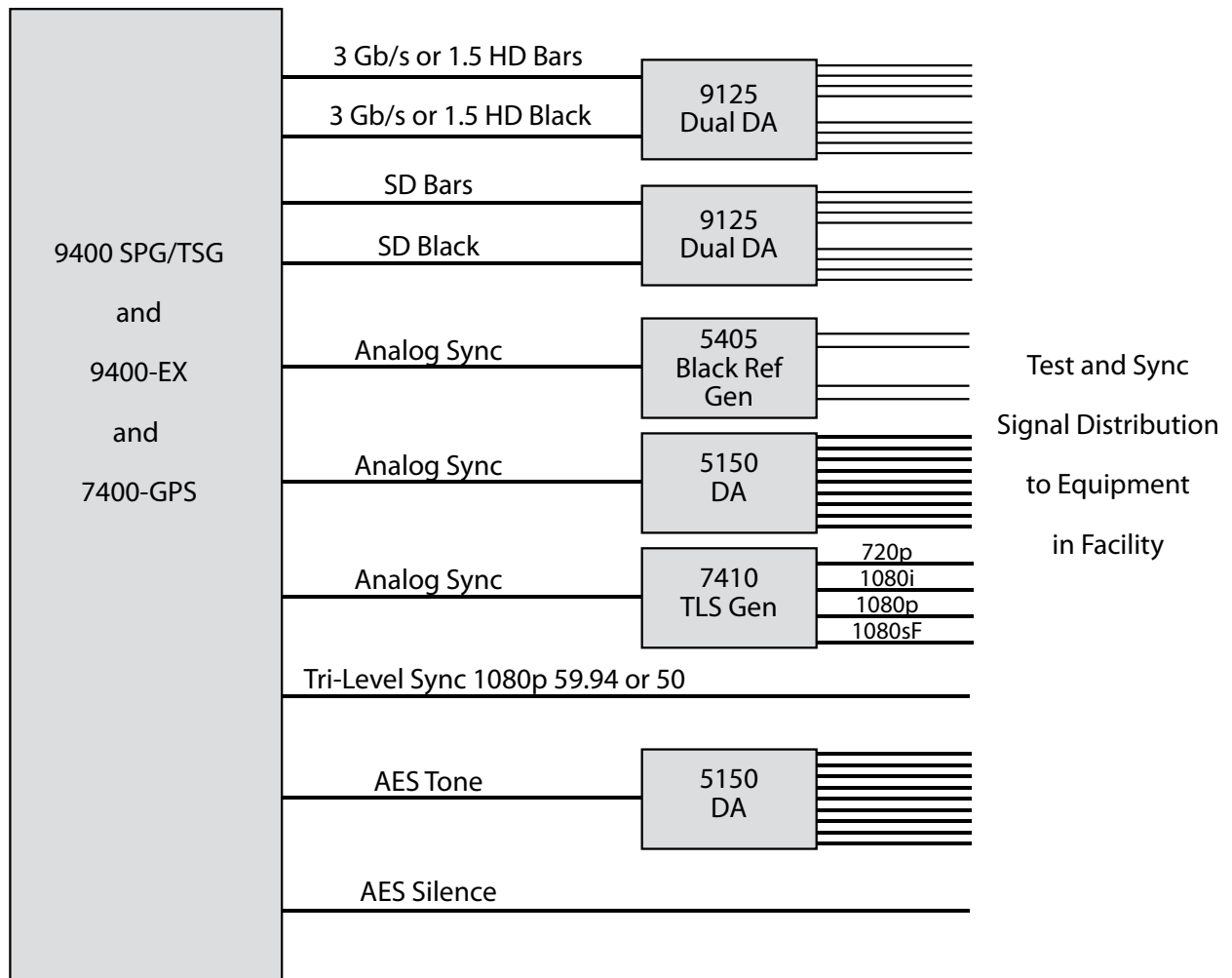
For the ultimate in precision, the 7400-GPS option can be used with the 9400 module. The purpose of this GPS option is to provide an extremely precise frequency reference. The oscillator on the 7400-GPS is more accurate than a typical internal precision standard and is equivalent in accuracy to an atomic standard. Increased frequency accuracy makes it possible to frame synchronize signals between different facilities with virtually no dropped or doubled frames. The GPS option also provides precise time of day information, which can be used to drive the 9400 module's internal timecode generators.

The 7400-GPS option seamlessly integrates into the Avenue system by plugging directly onto the 9400 module. It can be easily installed in the field. The 7400-GPS option consists of a compact, weatherproof antenna (with internal high-gain pre-amp) and a receiver sub module which mounts directly to the 9400 module. The included GPS antenna mounts onto standard 3/4" threaded pipe, metal or plastic. Connection from the F-style coaxial fitting on the antenna to the appropriate BNC on the Avenue Frame can be made with customer supplied standard 75 ohm cable. The coax cable can be routed through the center of the pipe for a completely waterproof installation. When low loss cable such as Belden 1694A is used, the antenna can be placed up to 200 feet (60 meters) from the frame. Ideally, the antenna is mounted outdoors where it has an unobstructed view of the sky.

A Complete SPG and TSG System

The 9400 can be combined with other Avenue modules to create a complete sync pulse and test signal chain. The 7410 is a four channel HD Tri-Level Sync generator that can output four different types of Tri-Level Sync simultaneously and is very useful in post and hybrid facilities. When additional composite black is needed, the 5405 can be used to provide two independent pairs of composite outputs. The 5150 distribution amplifier can be used to distribute multiple copies of AES audio, Tri-Level Sync or composite black signals as needed. For 3 Gb/s or 1.5 Gb/s HD test signal and black distribution, the 9125 DA is a good fit.

Configuration Example



Features

- » Use as Master Sync Gen or lock to external reference or GPS
- » Can output SD SDI, 1.5 Gb/s HD SDI, 3 Gb/s HD SDI, composite timecode and audio simultaneously
- » Outputs can be independently timed
- » Generates 30+ test signals
- » Flash memory card for making custom test patterns

Description of Outputs

Generator A

SDI Out A – Outputs 3 Gb/s or 1.5 Gb/s HD or SD test signals. Select frame rate family for all of Generator A; 59.94, 50 or 60. Output can include 16 channels of embedded audio – tone, silence, external audio, or audio file. Can also include DVITC.

Programmable Out 1A – Outputs analog composite video (Bars, Black, or Test if Out A is SD), Tri-Level Sync Gen #1. Composite output can include VITC.

Programmable Out 2A – Outputs one of the following: Tri-Level Sync Gen #2, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz (only if locked to internal or GPS reference).

Programmable Out 3A – Outputs one of the following: Tri-Level Sync Gen #2, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz.

Analog Audio – stereo output, 1 of 8 pairs from the audio generator.

When the 7400-EX option is installed, the following additional outputs are available for **Generator A**

Cpst Black Out A – Outputs composite black, 525 or 625 as per the selected frame family for the Generator. Can include VITC. Independently timeable.

SDI Black Out A – Outputs digital black in the same standard and frame family as test signal SDI Out A – SD, HD 1.5 Gb/s or HD 3 Gb/s. Up to sixteen channels of embedded audio. Can include DVITC.

Programmable Out 4A – Outputs one of the following: Tri-Level Sync Gen #3, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz.

Programmable Out 5A – Outputs one of the following: Tri-Level Sync Gen #3, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz.

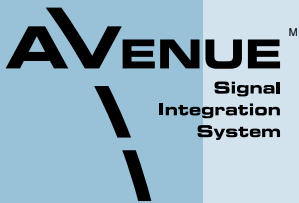
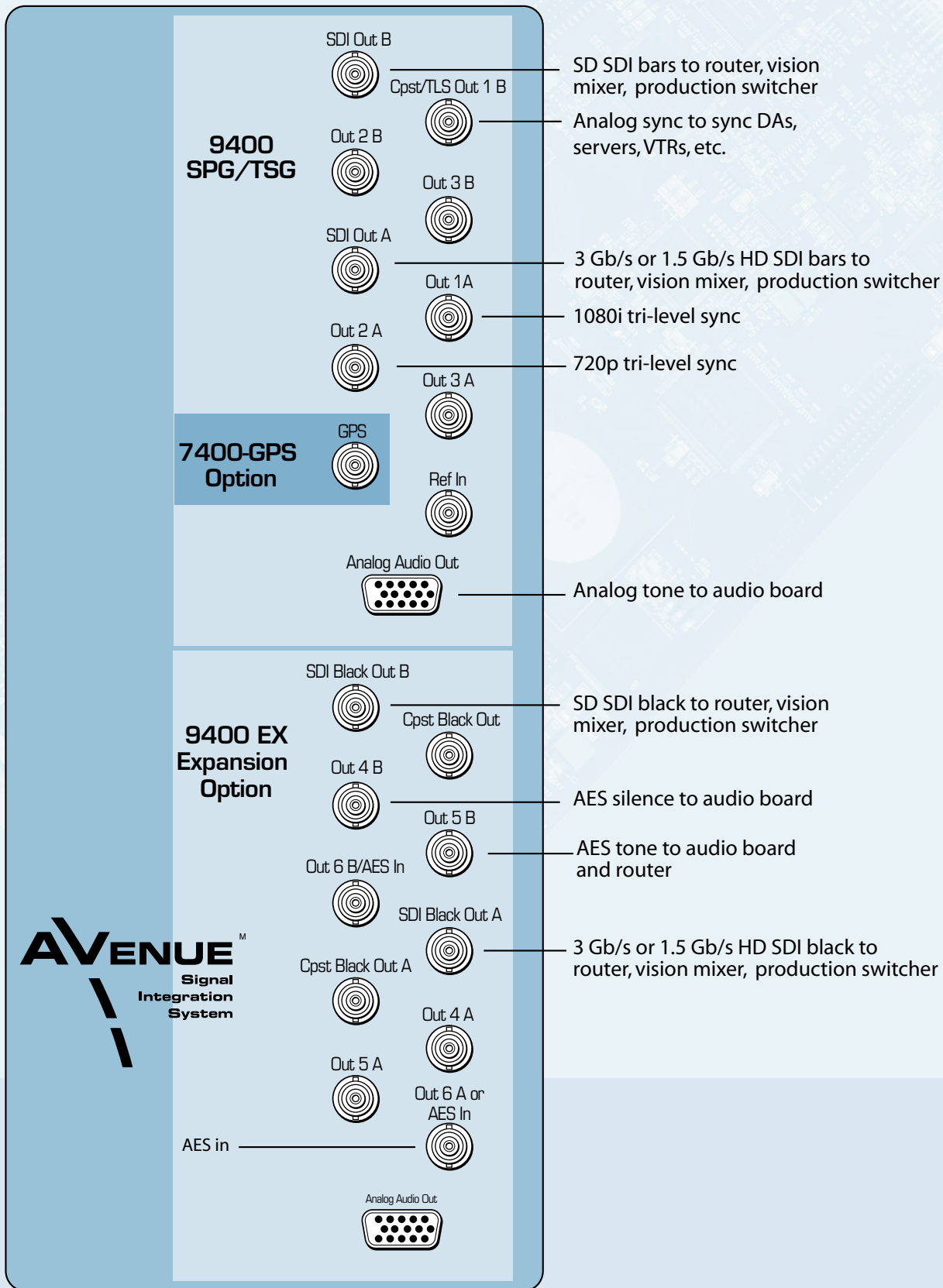
Programmable Out 6A – Outputs one of the following: Tri-Level Sync Gen #3, LTC, AES (any of 8 pairs), AES silence, Word clock, 6 Hz pulse, 10 MHz.

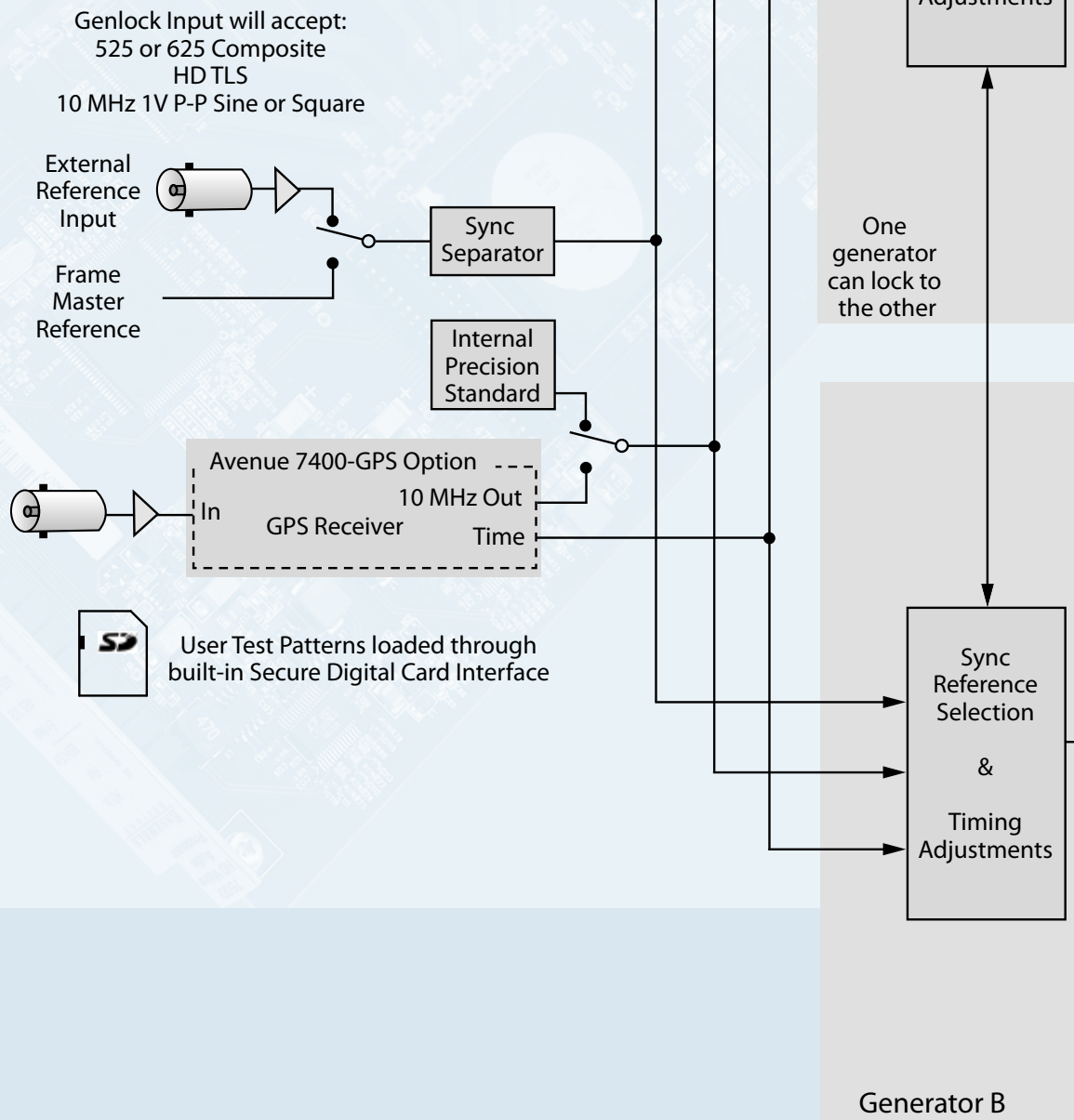
Expanded Analog Audio – provides an additional stereo output, 1 of 8 pairs from the audio generator.

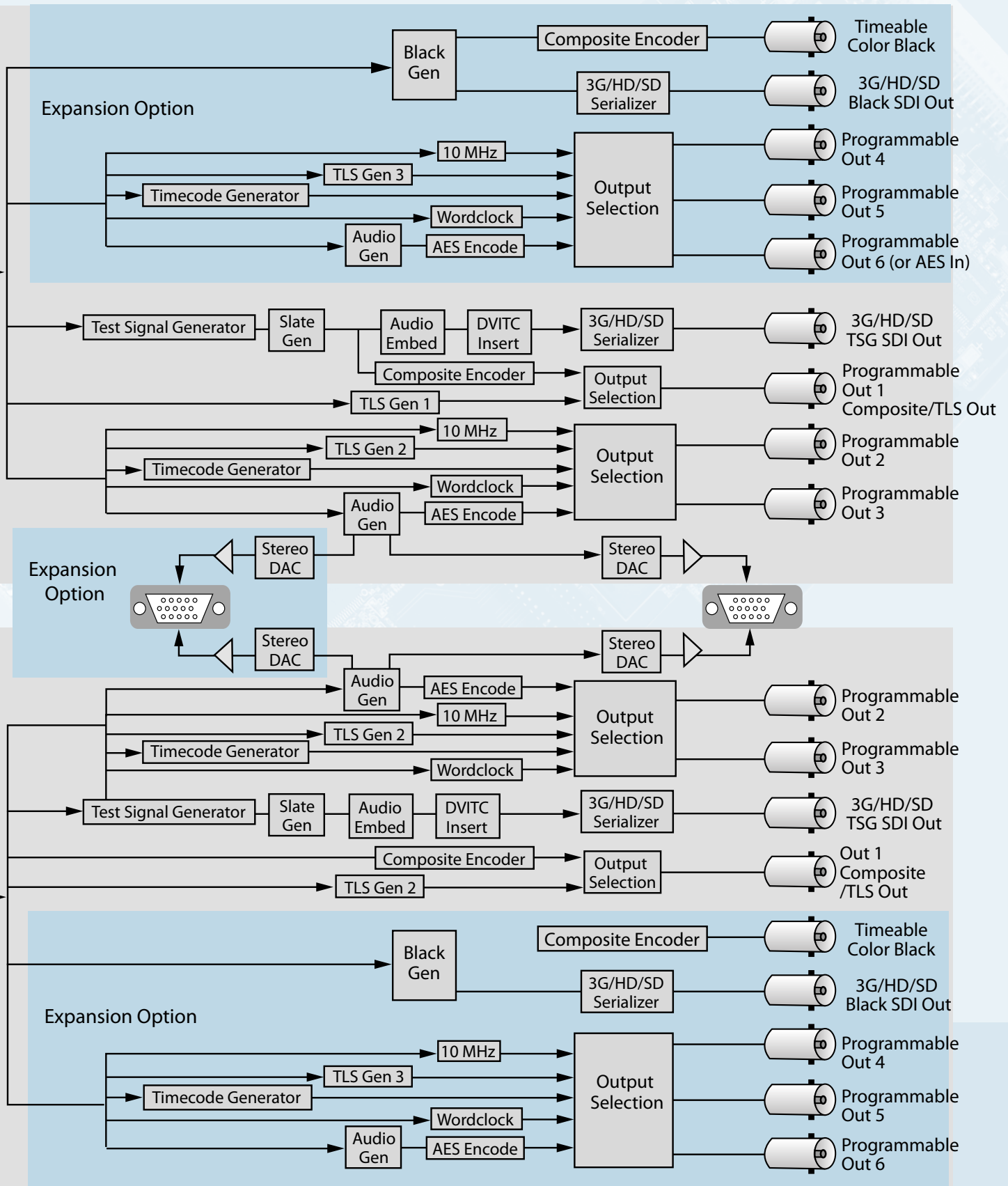
Generator B

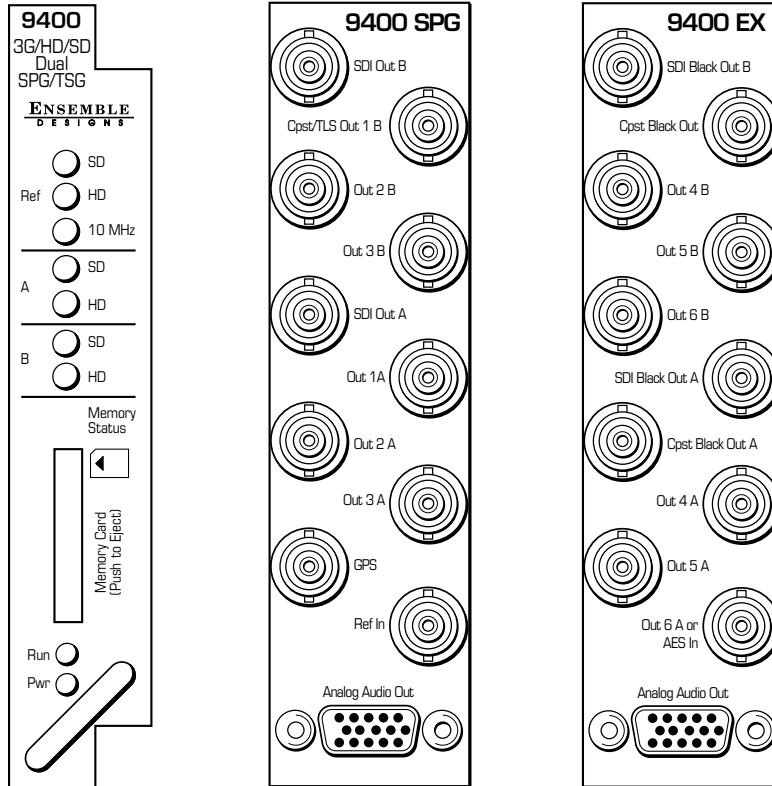
Has the same outputs as noted for Generator A. Generator B is completely independent from Generator A. Generator B can operate in a different frame rate family and its set of outputs can be timed independently.

Broadcast Application Configuration Example









Order Info:

9400

SPG/TSG Module (Takes up one slot in Avenue frame)

9400-EX

Expansion module to be used in conjunction with 9400 (Takes up one slot in Avenue frame)

7400-GPS

GPS receiver option that plugs onto 9400 module. (Does not take up a slot in Avenue frame)

Includes weatherproof antenna. Antenna mounts onto standard 3/4" pipe. Customer to provide 75 Ω 1694A coax up to 60 m/200 ft with F connector for antenna connection and BNC for Avenue frame connection.

Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
3 Gb/s Level A or Level B (SMPTE 424M, 425M)
625i 50
525i 59.94
Composite PAL, NTSC

Frame Rate Families

Each 9400 has 2 identical Generators, each with a variety of outputs. All of the outputs from a particular Generator must be selected within the same frame rate family.

50 Hz (625) Derived Family: 1080i/50, 720p/50, 1080p/25, 1080sF/25, 625i/50
59.94 Hz (525) Derived Family: 1080i/59.94, 720p/59.94, 1080p/23.98, 1080sF/23.98, 525i/59.94
60 Hz Derived Family: 1080i/60, 720p/60, 1080p/24, 1080sF/24

Reference Input

Number	Two: External or Frame Master Reference
Signal Type	PAL or NTSC composite video or HD Tri-Level Sync or 10 MHz 1V P-P sine or square
Return Loss	>40 dB (applies to external ref input)

Serial Digital Outputs

Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M HD Serial Digital 2.97 Gb/s SMPTE 424M, 425M or SD Serial Digital 270 Mb/s SMPTE 259M
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz
Max Cable Length	270 Mb/s 300 meters 1.485 Gb/s 100 meters 2.97 Gb/s 70 meters Belden 1694A

Tri-Level Sync Outputs

Signal Type	HD Tri-Level Sync
Output DC	±50 mV
Return Loss	>30 dB to 30 MHz

Composite Outputs

Signal Type	NTSC / PAL
Impedance	75 Ω
Return Loss	>40 dB DC to 5.5 MHz
Frequency Response	±0.1 dB 0 to 5.0 MHz
Output DC	±50 mV
K Factor	<1.0%
Differential Phase	<1.0 degree
SCH Phase	±2 degrees
Delay	adjustable over full frame in sub degree steps
Color Framing	tracks ref

Accuracy

Internal Reference (TCXO)	
Freq Error	<10 ⁻⁷ < ±1 Hz F _{sc}
GPS Option	
Freq Error	<10 ⁻¹²

Stability

Analog Jitter	<1 ns
Digital Jitter	<0.2 UI (0.13 UI typical)
AES Jitter	<1 ns

AES Audio Outputs

Type	AES3id tone, 50 Hz to 20 KHz, or silent
Resolution	24 bit

Analog Audio Outputs

Number	Two stereo pairs or four mono
Type	tone, 50 Hz to 20 KHz, or silent
Impedance	30 Ω, balanced
Reference Level	-10 to +4 dBu, selectable

Additional Output Choices

Timecode	DVITC on the SDI outputs VITC on the composite outputs LTC on BNC unbalanced or on HD-15 balanced, 1 V P-P drop or non-drop for NTSC
6 Hz Pulse Word Clock 10 MHz	when locked to internal or GPS reference

Flash Memory

Number	One
Type	Secure Digital SD Flash Memory Card
Size	1 GB card included

File Type

Video	.tga
Audio	.wav, .mp3, .wma

General Specifications

Power Consumption	10 watts for 900 10 watts for 9400-EX
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft

3G Sync Changeover Switch

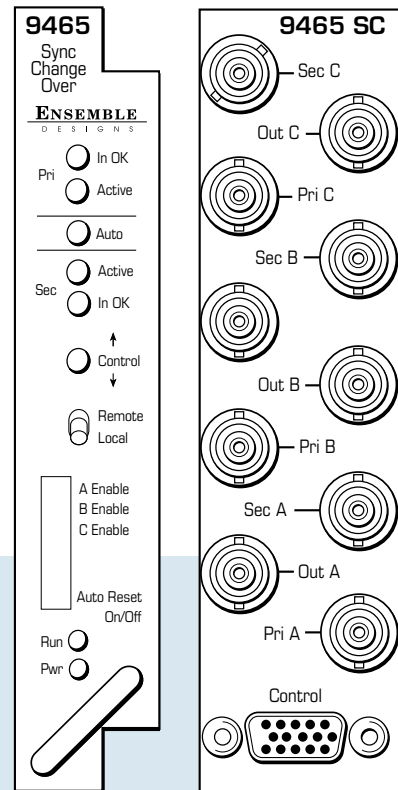
The 9465 3G Sync Changeover module can be used with Avenue's 9400 SPG module, 7400 SPG module, or with third party sync pulse generators. In the event of a failure of the primary sync source, the 9465 changes to the secondary source.

There are three poles or sections on the 9465. One pole tests for 3 Gb/s or 1.5 Gb/s HD SDI, SD SDI, ASI and SMPTE 310M signals. The other two poles test for AES audio, composite video, Bi-Level Sync and Tri-Level Sync. A drop in signal amplitude below a predetermined auto threshold will trigger the switch.

Multiple changeover switches can be ganged together through the control system. Depending on the application, two or more 9465s may be required to handle all signals that need to be protected.

Features

- » 3 poles for signal testing
- » Use with 3 Gb/s and 1.5 Gb/s HD SDI, SD SDI, analog composite, AES audio, DVB-ASI, SMPTE 310M, Bi-Level Sync and Tri-Level Sync signals
- » Gang multiple 9465s and 7465s together as needed
- » Passive design
- » GPI inputs for remote manual override
- » GPI outputs to indicate signal status and switch position



Input Signals

Number	Six
Signal Type	270 Mb/s SD Serial Digital SMPTE 259M 1.485 Gb/s HD Serial Digital SMPTE 274M, 292M or 296M 2.97 Gb/s HD Serial Digital SMPTE 424M, 425M Analog Composite, DVB-ASI, SMPTE 310M, AES Digital Audio, Bi-Level Sync or Tri-Level Sync, selectable
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz
Automatic Cable Input Equalization	

Output Signals

Number	Three
Signal Type	Follows input
Impedance	75 Ω
Return Loss	>15 dB to 1.485 GHz

Switcher Characteristics

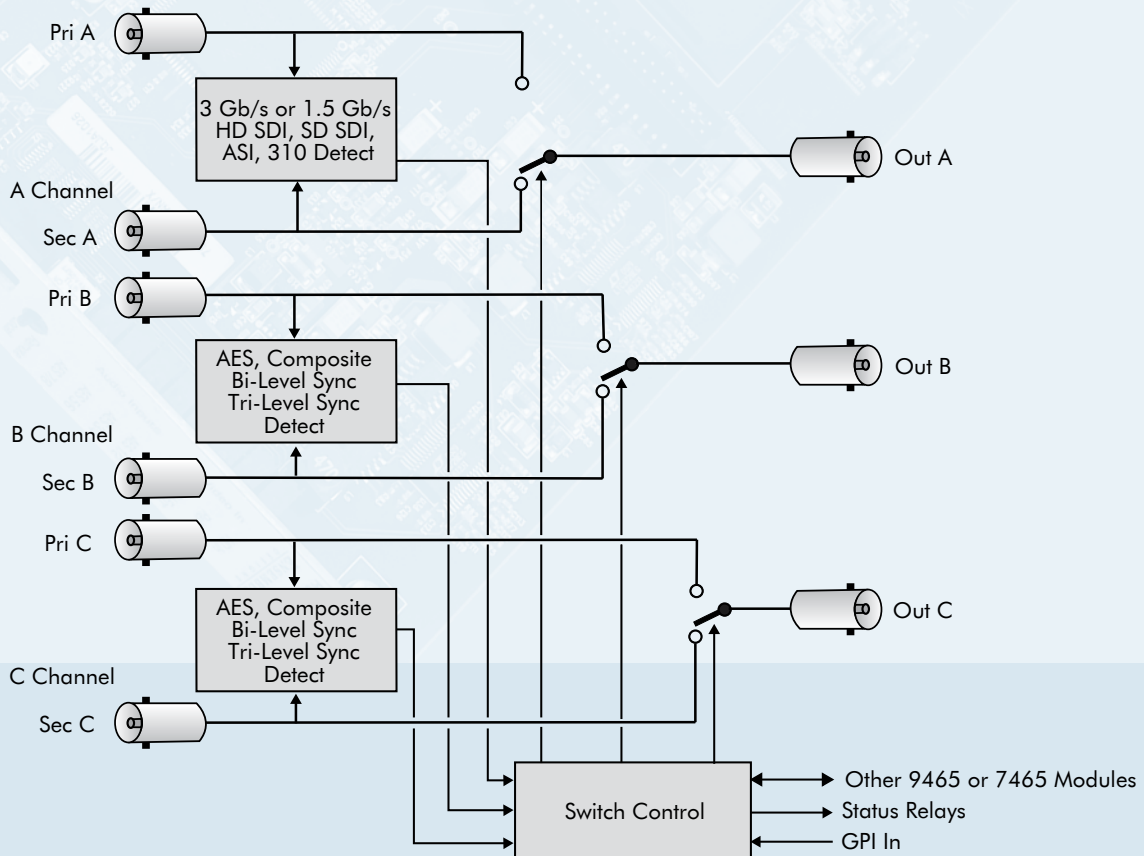
Type	75 Ω RF Relay
Insertion Loss	<0.5 dB

General Specifications

Connectors	BNC
Power Consumption	<7.0 watts
Temperature Range	0 to 40°C ambient (all specs met)
Relative Humidity	0 to 95%, noncondensing
Altitude	0 to 10,000 ft
Fusing	1.5 Amp PTC resettable fuse

HD Standards Supported

- 1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
- 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
- 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
- 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
- 3 Gb/s Level A or Level B (SMPTE 424M, 425M)



Model 9600

3G /HD /SD Embedder, Disembedder and Data Inserter

The 9600 module is a sixteen-channel audio embedder or disembedder for 1.5 and 3 Gb/s high definition video signals or for 270 Mb/s standard definition signals. Eight AES ports automatically configure as inputs or outputs depending on if the module is configured as mux or demux.

Configurable Mux or Demux

When configured as a multiplexer, the 9600 has one serial digital video input and eight AES audio inputs. These eight AES streams are embedded into the video stream. AES inputs are sample rate-converted, allowing the use of asynchronous audio. The output of the module is a digital stream that contains the original video signal and eight AES pairs, or sixteen channels.

When configured as a demultiplexer, audio signals present in the incoming video signal are extracted and delivered as standard AES digital audio streams.

The 9600 includes a full-featured, sixteen-channel audio mixer. The channel swap and shuffle capability allows you to completely rearrange and remix audio channels. It provides precise control over audio level, with up to 12 dB of gain to compensate for low level sources. All audio processing is performed at full 24 bit resolution by a digital signal processor (DSP). Delay is adjustable up to one second.

In-Line Shuffler

Because the 9600 has simultaneous disembedding and embedding, it is an in-line processor for embedded audio. It can take embedded content, adjust levels and remap channels, and deliver it to the output as an embedded signal.

Features

- » Audio embedder or disembedder for 3G, HD or SD signals
- » Handles 8 AES streams/16 channels
- » Up to one second of delay
- » In-line processor for embedded audio
- » Supports Dolby E and AC-3 data
- » Dolby E encoding and decoding options
- » Audio Automatic Gain Control option
- » Built-in audio mixer
- » Phase inversion selectable on a channel basis
- » Built-in sample rate converters accept asynchronous inputs
- » Mux/demux RS-232 and RS-422 as per SMPTE 337M
- » 26 bit processing resolution
- » Memory registers
- » Local and remote control

Dolby and AC-3

The 9600 can be fitted with Dolby E encoding and decoding options. The decoding option can be fed from either an AES input or an AES stream disembedded from the incoming SDI signal. The resulting discrete surround signals are then selectable as inputs to the sixteen channel mixer/shuffler.

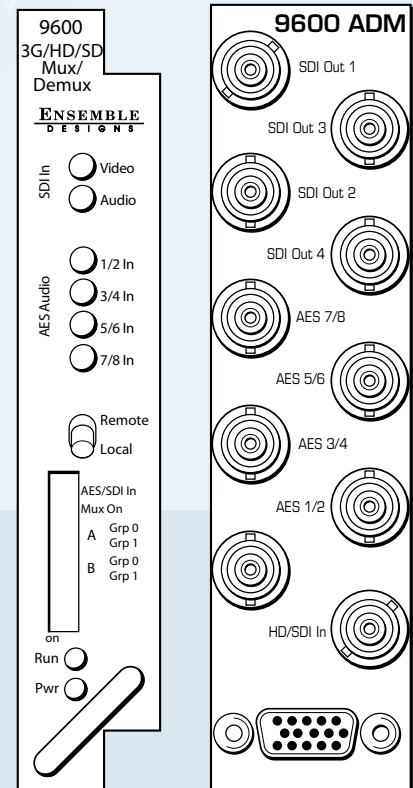
The Dolby E encoder is fed from selected outputs of the sixteen channel mixer/shuffler. The resulting encoded bitstream can be output both on an AES output and embedded into the SDI output.

Additionally, the 9600 fully supports embedding and disembedding of encoded multi-channel bitstreams such as AC-3 and Dolby E.

LevelTrack™ AGC Option

The 9670 LevelTrack™ Audio Automatic Gain Control software key can be added as an option. This option provides control for keeping audio levels consistent in program material.

The 9600 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 lockout, and customizable menus are just some of the tools included in the Avenue control system.



Input

Number	One
Signal Type	HD Serial Digital 1.485 Gb/s SMPTE 274M, 292M or 296M HD Serial Digital 2.97 Gb/s SMPTE 424M, 425M SD Serial Digital 270 Mb/s SMPTE 259M Data as per SMPTE 337M
Impedance	75 Ω
Return Loss	>15 dB DC to 1.5 GHz
Max Cable Length	
270 Mb/s	300 meters Belden 1694A
1.485 Gb/s	100 meters Belden 1694A
2.97 Gb/s	70 meters Belden 1694A
Automatic Cable Input Equalization	

Standards Supported

1080i (SMPTE 274M -4,5,6) 50, 59.94 or 60 Hz
 720p (SMPTE 296M -1,2,3) 50, 59.94 or 60 Hz
 1080p (SMPTE 274M -9,10,11) 23.98, 24, 25 Hz
 1080p (SMPTE 424M, 425M) 50, 59.94 Hz
 1080sF (RP211 -14,15,16) 23.98, 24, 25 Hz
 525i 59.94, 625i 50
 Data (SMPTE 337M)

Output

Number	One
Signal Type	HD or SD Serial Digital, follows input
Impedance	75 Ω
Return Loss	>15 dB DC to 1.5 GHz

AES/EBU Digital Inputs

Number	Eight (total of sixteen channels)
Type	AES3id or data (SMPTE 337)
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	30 kHz to 100 kHz (sample rate converted internally to 48 kHz)
Crosstalk	<144 dB
Dynamic Range	>144 dB
Reference Level	-18 or -20 dBFS (selectable)

AES/EBU Digital Outputs

Number	Eight (total of sixteen channels)
Type	AES3id or data
Connectorization	Coaxial, 75 Ω
Bit Depth	20 and 24 bit
Sample Rate	48 kHz Synchronous to Video output
Reference Level	-18 or -20 dBFS (selectable)

Embedded Output (In SDI Outputs)

Group Assign	Cascade or Replace
Channels	Sixteen
Bit Depth	24 Bit

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

Sep 09

Audio Automatic Gain Control

The LevelTrack™ Audio AGC option adds a user configurable audio level management system to Avenue signal processing modules. LevelTrack will correct mismatched audio levels between different program sources or segments within a program. Errors of this type are regrettably common due to inconsistencies between different providers and program elements.

LevelTrack will automatically monitor the levels in up to 8 audio channels. Based upon the history in each channel, gradual changes are applied to prevent the audio level from dropping below or exceeding user programmable thresholds. This automatic level control can be applied on an individual channel or stereo pair basis. By adjusting the overall level of the signal, rather than masking the errors with compression, LevelTrack will not upset the internal dynamics of the program material.

User control is provided over the parameters for minimum and maximum signal targets, maximum gain and attenuation, attack time, and transition time. This flexibility allows the operator to customize LevelTrack to suit the specific audio level challenges in a particular installation. All of these parameters can be adjusted through the Avenue Control System.

LevelTrack operates downstream of the manual audio level adjustments that are already provided in Avenue modules. This allows the automatic feature to assist the operator when needed, without needing to be enabled or disabled.

The LevelTrack product is available through a software license and does not require any additional hardware. It will operate on these modules:

- 7550 HD/SD Video Processing Frame Sync
(requires 7615 or 8415)
- 7600 HD/SD Embedder/Disembedder
- 7900 HD Up/Down/Cross Converter
(requires 7615 or 8415)
- 7910 HD Upconverter and Cross Converter
(requires 7615 or 8415)
- 7920 HD Downconverter
(requires 7615 or 8415)
- 7930 HD Cross Converter
(requires 7615 or 8415)
- 7940 SD Aspect Ratio Converter
(requires 7615 or 8415)
- 8400 SD Video Processing Frame Sync
(requires 8415)
- 8500 Video Processing Frame Sync, ADC, DAC and TBC
(requires 8415)

Glossary

AES/EBU – The digital audio standard defined as a joint effort of the Audio Engineering Society and the European Broadcast Union. AES/EBU or AES3 describes a serial bitstream which carries two audio channels, thus an AES stream is a stereo pair. The AES/EBU standard covers a wide range of sample rates and quantization (bit depth). In television systems, these will generally be 48 kHz and either 20 or 24 bits.

AFD – Active Format Description is a method to carry information regarding the aspect ratio of the video content. The specification of AFD was standardized by SMPTE in 2007 and is now beginning to appear in the marketplace. AFD can be included in both SD and HD SDI transport systems. There is no legacy analog implementation. (See WSS).

ASI – A commonly used transport method for MPEG-2 video streams, ASI or Asynchronous Serial Interface operates at the same 270 Mb/s data rate as SD SDI. This makes it easy to carry an ASI stream through existing digital television infrastructure. Known more formally as DVB-ASI, this transport mechanism can be used to carry multiple program channels.

Bandwidth – Strictly speaking, this refers to the range of frequencies (i.e. the width of the band of frequency) used by a signal, or carried by a transmission channel. Generally, wider bandwidth will carry and reproduce a signal with greater fidelity and accuracy.

Beta – Sony Beta-SP videotape machines use an analog component format that is similar to SMPTE, but differs in the amplitude of the color difference signals. It may also carry setup on the luminance channel.

Bit – A binary digit, or bit, is the smallest amount of information that can be stored or transmitted digitally by electrical, optical, magnetic, or other means. A single bit can take on one of two states: On/Off, Low/High, Asserted/Deasserted, etc. It is represented numerically by the numerals 1 (one) and 0 (zero). A byte, containing 8 bits, can represent 256 different states. The binary number 11010111, for example, has the value of 215 in our base 10 numbering system. When a value is carried digitally, each additional bit of resolution will double the number of different states that can be represented. Systems that operate with a greater number of bits of resolution, or quantization, will be able to capture a signal with more detail or fidelity. Thus, a video digitizer with 12 bits of resolution will capture 4 times as much detail as one with 10 bits.

Blanking – The Horizontal and Vertical Blanking Intervals of a television signal refer to the time periods between lines and between fields. No picture information is transmitted during these times, which are required in CRT displays to allow the electron beam to be repositioned for the start of the next line or field. They also are used to carry synchronizing pulses which are used in transmission and recovery of the image. Although some of these needs are disappearing, the intervals themselves are retained for compatibility purposes. They have turned out to be very useful for the transmission of additional content, such as teletext and embedded audio.

CAV – Component Analog Video. This is a convenient shorthand form, but it is subject to confusion. It is sometimes used to mean ONLY color difference component formats (SMPTE or Beta), and other times to include RGB format. In any case, a CAV signal will always require 3 connectors— either Y/R-Y/B-Y, or R/G/B.

Component – In a component video system, the totality of the image is carried by three separate but related components. This method provides the best image fidelity with the fewest artifacts, but it requires three independent transmission paths (cables, for example). The commonly used component formats are Luminance and Color Difference (Y/Pr/Pb), and RGB. It was far too unwieldy in the early days of color television to ever consider component transmission.

Composite – Composite television dates back to the early days of color transmission. This scheme encodes the color difference information onto a color subcarrier. The instantaneous phase of the subcarrier is the color's hue, and the amplitude is the color's saturation or intensity. This subcarrier is then added onto the existing luminance video signal. This trick works because the subcarrier is set at a high enough frequency to leave room in the spectrum for the chrominance information. But it is not a seamless matter to pull the signal apart again at the destination in order to display it or process it. The resultant artifacts of dot crawl (also referred to as chroma crawl) are only the most obvious result. Composite television is the most commonly used format throughout the world, either as PAL or NTSC. It is also referred to as Encoded video.

Color Difference – Color Difference systems take advantage of the physiological details of human vision. We have more acuity in our black and white vision than we do in color. This means that we need only the luminance information to be carried at full bandwidth; we can scrimp on the color channels. In order to do this, RGB information is converted to carry all of the luminance (Y is the black and white of the scene) in a single channel. The other two channels are used to carry the “color difference.” Noted as B-Y and R-Y, these two signals describe how a particular pixel “differs” from being purely black and white. These channels typically have only half the bandwidth of the luminance.

Checkfield – A Checkfield signal is a special test signal that stresses particular aspects of serial digital transmission. The performance of the Phase Locked-Loops (PLLs) in an SDI receiver must be able to tolerate long runs of 0's and 1's. Under normal conditions, only very short runs of these are produced due to a scrambling algorithm that is used. The Checkfield, also referred to as the Pathological test signal, will “undo” the scrambling and cause extremely long runs to occur. This test signal is very useful for testing transmission paths.

Chroma – The color or Chroma content of a signal, consisting of the hue and saturation of the image. See Color Difference.

Decibel (dB) – The Decibel is a unit of measure used to express the ratio in the amplitude or power of two signals. A difference

of 20 dB corresponds to a 10:1 ratio between two signals, 6 dB is approximately a 2:1 ratio. Decibels add while the ratios multiply, so 26 dB is a 20:1 ratio, and 14 dB is a 5:1 ratio. There are several special cases of the dB scale, where the reference is implied. Thus, dBm refers to power relative to 1 milliwatt, and dBu refers to voltage relative to .775 V RMS. The original unit of measure was the Bel (10 times bigger), named after Alexander Graham Bell.

dBFS – In Digital Audio systems, the largest numerical value which can be represented is referred to as Full Scale. No values or audio levels greater than FS can be reproduced because they would be clipped. The nominal operating point (roughly corresponding to 0 VU) must be set below FS in order to have headroom for audio peaks. This operating point is described relative to FS, so a digital reference level of -20 dBFS has 20 dB of headroom before hitting the FS clipping point.

DNR – Digital (or Dynamic) Noise Reduction. A technique to reduce the noise content of a signal by taking advantage of the repetitive nature of a television signal. Since noise is random, its average value over time is zero. By looking at sequential frames of a television signal, the noise can be averaged out.

EDH – Error Detection and Handling is a method to verify proper reception of an SDI or HD SDI signal at the destination. The originating device inserts a data packet in the vertical interval of the signal which contains a checksum of the entire video frame. This checksum is formed by adding up the numerical values of all of the samples in the frame, using a complex formula. At the destination this same formula is applied to the incoming video and the resulting value is compared to the one included in the transmission. If they match, then the content has all arrived with no errors. If they don't, then an error has occurred.

Embedded Audio – Digital Audio can be carried along in the same bitstream as an SDI or HD SDI signal by taking advantage of the gaps in the transmission which correspond to the horizontal and vertical intervals of the television waveform. This technique can be very cost-effective in transmission and routing, but can also add complexity to signal handling issues because the audio content can no longer be treated independently of the video.

Eye Pattern – To analyze a digital bitstream, the signal can be displayed visually on an oscilloscope by triggering the horizontal timebase with a clock extracted from the stream. Since the bit positions in the stream form a very regular cadence, the resulting display will look like an eye—an oval with slightly pointed left and right ends. It is easy to see from this display if the eye is “open,” with a large central area that is free of negative or positive transitions, or “closed” where those transitions are encroaching toward the center. In the first case, the open eye indicates that recovery of data from the stream can be made reliably and with few errors. But in the closed case data will be difficult to extract and bit errors will occur. Generally it is jitter in the signal that is the enemy of the eye.

Frame Sync – A Frame Synchronizer is used to synchronize the timing of a video signal to coincide with a timing reference

(usually a color black signal that is distributed throughout a facility). The synchronizer accomplishes this by writing the incoming video into a frame buffer memory under the timing direction of the sync information contained in that video. Simultaneously the memory is being read back by a timing system that is genlocked to a house reference. As a result, the timing or alignment of the video frame can be adjusted so that the scan of the upper left corner of the image is happening simultaneously on all sources. This is a requirement for both analog and digital systems in order to perform video effects or switch glitch-free in a router. Frame synchronization can only be performed within a single television line standard. A synchronizer will not convert an NTSC signal to a PAL signal; it takes a standards converter to do that.

Frequency Response – A measurement of the accuracy of a system to carry or reproduce a range of signal frequencies. Similar to Bandwidth.

H.264 – The latest salvo in the compression wars is H.264 which is also known as MPEG-4 Part 10. MPEG-4 promises good results at just half the bit rate required by the currently dominant standard, MPEG-2.

HD – High Definition. This two letter acronym has certainly become very popular. Here we thought it was all about the pictures—and the radio industry stole it.

HDMI – The High Definition Multimedia Interface comes to us from the consumer marketplace where it is becoming the de facto standard for the digital interconnect of display devices to audio and video sources. It supports a wide range of video formats and can carry digital audio. It is a bit serial interface that carries the video content in digital component form over multiple twisted-pairs. This gives it a lower cost of entry than SD or HD SDI, but cable length is much more limited. HDMI is closely related to the DVI interface for desktop computers and their displays.

IEC – The International Electrotechnical Commission provides a wide range of worldwide standards. Among them, they have provided standardization of the AC power connection to products by means of an IEC line cord. The connection point uses three flat contact blades in a triangular arrangement, set in a rectangular connector. The IEC specification does not dictate line voltage or frequency. Therefore, the user must take care to verify that a device either has a universal input (capable of 90 to 230 volts, either 50 or 60 Hz), or that a line voltage switch, if present, is set correctly.

Interlace – Human vision can be fooled to see motion by presenting a series of images, each with a small change relative to the previous image. In order to eliminate the flicker, our eyes need to see more than 30 images per second. This is accomplished in television systems by dividing the lines that make up each video frame (which run at 25 or 30 frames per second) into two fields. All of the odd-numbered lines are transmitted in the first field, the even-numbered lines are in the second field. In this way the repetition rate is 50 or 60 Hz, without using more bandwidth. This trick has worked well for years, but it introduces other temporal artifacts. Motion

pictures use a slightly different technique to raise the repetition rate from the original 24 frames that make up each second of film—they just project each one twice.

IRE – Video level is measured on the IRE scale, where 0 IRE is black, and 100 IRE is full white. The actual voltages to which these levels correspond can vary between formats.

ITU-R601 – This is the principal specification for standard definition component digital video. It defines the luminance and color difference coding system that is also referred to as 4:2:2. The standard applies to both 625 line/50 Hz (PAL) and 525 line/60 Hz (NTSC) derived signals. They both will result in an image that contains 720 pixels horizontally, with 486 vertical pixels in 525, and 576 vertically in 625. Both systems use a sample clock rate of 27 Mhz, and are serialized at 270 Mb/s.

Jitter – Serial Digital signals (either video or audio) are subject to the effects of Jitter. This refers to the instantaneous error that can occur from one bit to the next in the exact position of each digital transition. Although the signal may be at the correct frequency on average, in the short term it varies. Some bits come slightly early, others come slightly late. The measurement of this jitter is given either as the amount of time uncertainty or as the fraction of a bit width. For 270 Mb/s video, the allowable jitter is 740 picoseconds, or 0.2 UI (Unit Interval—one bit width).

Luminance – The “black & white” content of the image. Human vision has more acuity in luminance, so television systems generally devote more bandwidth to the luminance content. In component systems, the luminance is referred to as Y.

MPEG – The Moving Picture Experts Group is an industry group that develops standards for the compression of moving pictures for television. Their work is an ongoing effort. The understanding of image processing and information theory is constantly expanding. And the raw bandwidth of both the hardware and software used for this work is ever increasing. Accordingly, the compression methods available today are far superior to the algorithms that originally made the real-time compression and decompression of television possible. Today, there are many variations of these techniques, and the term MPEG has to some extent become a broad generic label.

Metadata – The Greek word meta means “beyond” or “after.” When used as a prefix to “data,” it can be thought of as “data about the data.” In other words, the metadata in a data stream tells you about that data—but it is not the data itself. In the television industry, this word is sometimes used correctly when, for example, we label as metadata the timecode which accompanies a video signal. That timecode tells you something about the video, i.e. when it was shot, but the timecode in and of itself is of no interest. But in our industry’s usual slovenly way in matters linguistic, the term metadata has also come to be used to describe data that is associated with the primary video in a datastream. So embedded audio will (incorrectly) be called metadata when it tells us nothing at all about the pictures. Oh well.

NTSC – The color television encoding system used in North

America was originally defined by the National Television Standards Committee. This American standard has also been adopted by Canada, Mexico, Japan, Korea, and Taiwan. This standard is referred to disparagingly as Never The Same Color or Never Twice the Same Color.

Oversampling – To perform digital sampling at a multiple of the required sample rate. This has the advantage of raising the Nyquist Rate (the maximum frequency which can be reproduced by a given sample rate) much higher than the desired passband. This allows the use of more easily realized antialias filters.

PAL – During the early days of color television in North America, European broadcasters developed a competing system called Phase Alternation by Line. This slightly more complex system is better able to withstand the differential gain and phase errors that appear in analog amplifiers and transmission systems. Engineers at the BBC claim that it stands for Perfection At Last.

Pathological Test Pattern – See Checkfield.

Progressive – An image-scanning technique which progresses through all of the lines of a frame in a single pass. Computer monitors all use progressive displays. This contrasts to the Interlace technique common to television systems.

Return Loss – An idealized input or output circuit will exactly match its desired impedance (generally 75 ohms) as a purely resistive element, with no reactive (capacitive or inductive) elements. In the real world we can only approach the ideal. So our real inputs and outputs will have some capacitance and inductance. This will create impedance-matching errors, especially at higher frequencies. The Return Loss of an input or output measures how much energy is returned (reflected back due to the impedance mismatch). For digital circuits, a return loss of 15 dB is typical. This means that the energy returned is 15 dB less than the original signal. In analog circuits, a 40 dB figure is expected.

RGB – RGB systems carry the totality of the picture information as independent Red, Green and Blue signals. Television is an additive color system, where all three components add to produce white. Because the luminance (or detail) information is carried partially in each of the RGB channels, all three must be carried at full bandwidth in order to faithfully reproduce an image.

ScH Phase – Used in composite systems, ScH Phase measures the relative phase between the leading edge of sync on line 1 of field 1 and a continuous subcarrier sinewave. Due to the arithmetic details of both PAL and NTSC, this relationship is not the same at the beginning of each frame. In PAL, the pattern repeats every 4 frames (8 fields) which is also known as the Bruch Blanking sequence. In NTSC, the repeat is every 2 frames (4 fields). This creates enormous headaches in editing systems and the system timing of analog composite facilities.

SDI – Serial Digital Interface. This term refers to inputs and outputs of devices that support serial digital component video. This generally means standard definition at 270 Mb/s. The use

of “HD SDI” is used to indicate High Definition Serial Digital video at 1.485 Gb/s or 2.97 Gb/s.

SMPTE – The Society of Motion Picture and Television Engineers is a professional organization that has done tremendous work in setting standards for both the film and television industries. The term “SMPTE” is also shorthand for one particular component video format—luminance and color difference.

TBC – A Time Base Corrector is a system to reduce the Time Base Error in a signal to acceptable levels. It accomplishes this by using a FIFO (First In, First Out) memory. The incoming video is written into the memory using its own jittery timing. This operation is closely associated with the actual digitization of the analog signal because the varying position of the sync timing must be mimicked by the sampling function of the analog-to-digital converter. A second timing system, genlocked to a stable reference, is used to read the video back out of the memory. The memory acts as a dynamically adjusting delay to smooth out the imperfections in the original signal’s timing. Very often a TBC will also function as a Frame Synchronizer. See also: Frame Sync.

Time Base Error – Time Base Error is present when there is excessive jitter or uncertainty in the line-to-line output timing of a video signal. This is commonly associated with playback from videotape recorders, and is particularly severe with consumer type heterodyne systems like VHS. Time base error will render a signal unusable for broadcast or editing purposes.

Timecode – Timecode, a method to uniquely identify and label every frame in a video stream, has become one of the most recognized standards ever developed by SMPTE. It uses a 24-hour clock, consisting of hours, minutes, seconds, and television frames. Originally recorded on a spare audio track, this 2400-baud signal was a significant contributor to the development of videotape editing. We now refer to this as LTC or Longitudinal Time Code because it was carried along the edge of the tape. This allowed it to be recovered in rewind and fast forward when the picture itself could not. Timecode continues to be useful today and is carried in the vertical interval as VITC, and as a digital packet as DVITC. Timecode is the true metadata.

Tri-Level Sync – For many, many years, television systems used composite black as a genlock reference source. This was a natural evolution from analog systems to digital implementations. With the advent of High Definition television, with even higher data rates and tighter jitter requirements, problems with this legacy genlock signal surfaced. Further, a reference signal with a 50 or 60 Hz frame rate was useless with 24 Hz HD systems running at film rates. Today we can think of composite black as a bi-level sync signal—it has two levels, one at sync tip and one at blanking. For HD systems, Tri-Level Sync has the same blanking level (at ground) of bi-level sync, but the sync pulse now has both a negative and a positive element. This keeps the signal symmetrically balanced so that its DC content is zero. And it also means that the timing pickoff point is now at the point where the signal crosses blanking and is no longer subject to variation with amplitude. This makes Tri-Level Sync a much more robust signal and one which can be delivered with less jitter.

USB – The Universal Serial Bus, developed in the computer industry to replace the previously ubiquitous RS-232 serial interface, now appears in many different forms and with many different uses. It actually forms a small local area network, allowing multiple devices to coexist on a single bus where they can be individually addressed and accessed.

WSS – Wide Screen Signaling is used in the PAL/625 video standards, both in analog and digital form, to convey information about the aspect ratio and format of the transmitted signal. Carried in the vertical interval, much like closed captioning, it can be used to signal a television receiver to adjust its vertical or horizontal sizing to reflect incoming material. Although an NTSC specification for WSS exists, it never achieved any traction in the marketplace.

Word Clock – Use of Word Clock to genlock digital audio devices developed in the audio recording industry. Early digital audio products were interconnected with a massive parallel connector carrying a twisted pair for every bit in the digital audio word. A clock signal, which is a square wave at the audio sampling frequency, is carried on a 75 ohm coaxial cable. Early systems would daisy-chain this 44.1 or 48 kilohertz clock from one device to another with coax cable and Tee connectors. On the rising edge of this Word Clock these twisted pairs would carry the left channel, while on the falling edge, they would carry the right channel. In most television systems using digital audio, the audio sample clock frequency (and hence the “genlock” between the audio and video worlds) is derived from the video genlock signal. But products that are purely audio, with no video reference capability, may still require Word Clock.

YUV – Strictly speaking, YUV does not apply to component video. The letters refer to the Luminance (Y), and the U and V encoding axes used in the PAL composite system. Since the U axis is very close to the B-Y axis, and the V axis is very close to the R-Y axis, YUV is often used as a casual shorthand for the more long-winded (and correct) “Y/R-Y/B-Y.”

Y/Cr/Cb – In digital component video, the luminance component is Y, and the two color difference signals are Cr (R-Y) and Cb (B-Y).

Y/Pr/Pb – In analog component video, the image is carried in three components. The luminance is Y, the R-Y color difference signal is Pr, and the B-Y color difference signal is Pb.

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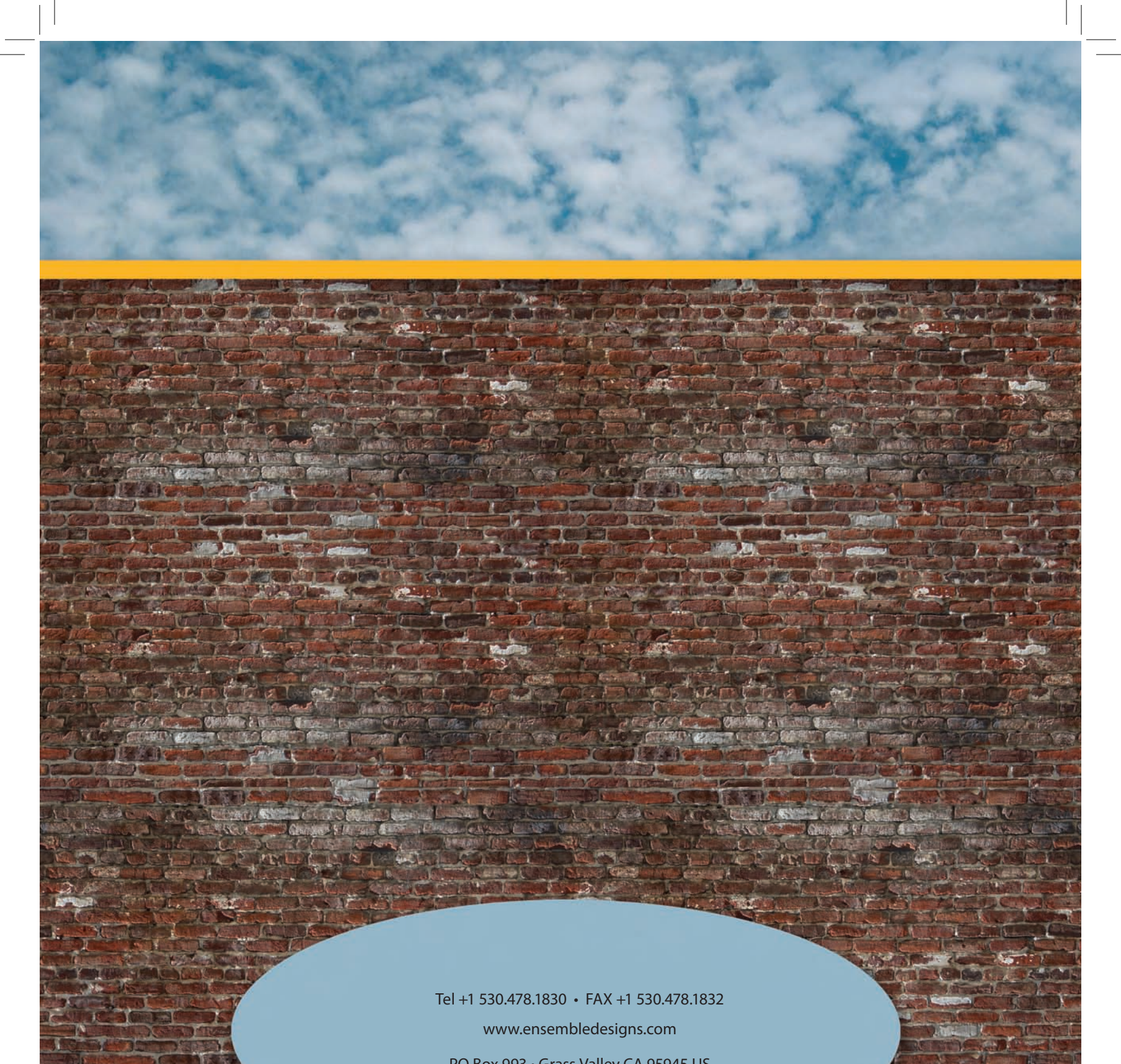
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