AVENUE

Avenue™ signal integration system

Model 4500 ASI and SMPTE 310M Converter and MPEG Transport Processor Data Pack

ENSEMBLE DESIGNS

Revision 1.1 SW v2.2.3

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MODULE OVERVIEW

DVB-ASI and SMPTE 310M Converter and MPEG Transport Processor

The 4500 MPEG Transport Stream Processor processes DVB-ASI and SMPTE 310M bitstreams. It provides stream content analysis with support for 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 auto-senses 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, you 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 4500 acts as a Time Base Corrector to remove jitter and adjust transport streams to the precise, desired bit rate. The reference input to the 4500 allows the use of either analog video or a 10 MHz signal to synchronize the output of the module. This is of particular importance in broadcast applications where the quality of the symbol clock – both jitter and accuracy – bears directly on the modulation process.

Reference to the 4500 can be supplied from an Avenue 7400 or 9400 SPG with GPS Option in order to provide the ultimate clock accuracy. In this configuration, the 4500 is an ideal solution to frequency coordination for multi-transmitter systems like Single Frequency Networks (SFN) and mobile/handheld transmission services.

A CRC and Data Checksum packet can be inserted into the stream by the 4500 to provide data path integrity testing at downstream points. Monitoring of these special packets can be performed by a second 4500 or an Avenue 4450, 4455, or 7455 ASI/310 Protection Switch. Data Integrity history is carried forward through the system to facilitate fault finding. These CRC packets provide an unequivocal test of data integrity on a transmission link by transmission link basis.

Clock Quality and Transmission

This section addresses the underlying capabilities of the 4500. As background for that discussion, we will take a quick look at the components of the transport stream.

The Transport Stream Hierarchy

The transport stream works as a hierarchy. At the top of the stream hierarchy is the PAT followed by PID, PMT and PCR. See the following table for more information about the components of this hierarchy.

Transport Stream Hierarchy	
PAT	**Program Allocation Table** • Goes by about every half a second; • Shows how many programs are in the stream; • Indicates which program it is; • Points to the PID number or PMT for the program.
PID	**Packet Identifier** • PID number for program 1 is 100; PID number for program 2 is 312; • In the PID stream, there will be a PAT every half a second; • Every half second, there will be enough packets to add up to 19.3 Mb/s.
PMT	**Program Map Table** • Indicates how to find all constituent parts of the transport stream; • Has description of the program; • Indicates what the element count is; • Refers to elemental streams that collectively make up the program; elemental stream includes video, audio, closed captions, surround sound; • Indicates where to find the PCR.
PCR	**Program Clock Reference** • An on-going set of packets; • When used properly, the 4500 causes the PCR to be frequency and phase locked all the way back to the station.

Transport Stream Bit Clocks and ATSC Transmissions

Having clean, accurate, low-jitter clocks in the MPEG transport stream feeding an ATSC transmitting system is important. The 4500 offers a method to improve clock quality, thereby improving the overall performance of the transmission system.

Importance of clock quality for broadcasting

As it affects SDI signals

An SDI signal is a bitstream that contains both information (data) and the pacing (clock) needed to read it. In order to recover error-free data at the end of a cable, the clocking that is used to construct the bitstream must be stable and consistent. The eye pattern display on a digital waveform monitor can be used to verify how well a particular signal source achieves that goal. The better the clock that underlies the data, the longer a piece of cable that an SDI signal can transit without error.

When a serial clock's frequency is unwavering and free of phase shifts and noise that would cause the clock edges to jitter, the data can be easily recovered because the difference between the symbols (the ones and zeros in the bitstream) is clear and unambiguous.

As it affects ATSC digital transmission

There are two critical differences between ATSC and SDI expressed in terms of restrictions in ATSC's 8 VSB modulation.

The first difference is that the channel bandwidth of ATSC is severely restricted compared to an SDI signal traveling on a piece of coaxial cable. The effective bandwidth of that cable is several times greater than the fundamental bit rate being transmitted. The consequence of the bandwidth restriction is that the 8 VSB eye is much smaller than the SDI eye.

The second difference is ATSC's use of eight symbols (discrete amplitude levels or voltage levels) versus two for SDI. At each sampling point (clock) in the ATSC signal, the signal can take on any one of eight different voltage levels (symbols). The digital waveform monitor displays this as a stack of seven eyes, created by the eight discrete voltage levels possible at the sampling point.

The MPEG encoder generates the digital clock seen in the 8 VSB eye pattern. The frequency accuracy, purity, and stability of the computer grade clocks is sufficient for sending data from point to point on a coaxial cable. However, these computer grade clocks are not sufficient for creating a waveform as complex as 8 VSB modulation.

Placing an Avenue 4500 MPEG Stream Processor in front of the ATSC Exciter helps the transmitter present the cleanest possible digital signal.

MAJOR FUNCTIONAL CAPABILITIES OF THE 4500

Signal Conversion

The 4500 converts DVB-ASI to SMPTE 310M or SMPTE 310M to DVB-ASI. Using the reference input, the output bitstream can be synchronized to a video or 10 MHz reference signal.

Set the output of the 4500 module to the desired signal type. The module auto-senses what type of signal is on the input and converts as needed. Additionally, it will pass DVB-ASI to DVB-ASI, and SMPTE 310M to SMPTE 310M.

DVB-ASI is a worldwide standard, whereas SMPTE 310M is broadcast in North America only because it is highly specific to NTSC broadcast standards.

Stream Analysis

The idea of stream analysis in this context is similar to what the 4455 and 7455 can do, yet the capabilities of the 4500 go above and beyond those products.

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, you can configure tests to define the minimum number of video and audio packets expected per second in a given service.

Clock Cleaner

Transport Stream Time Base Corrector

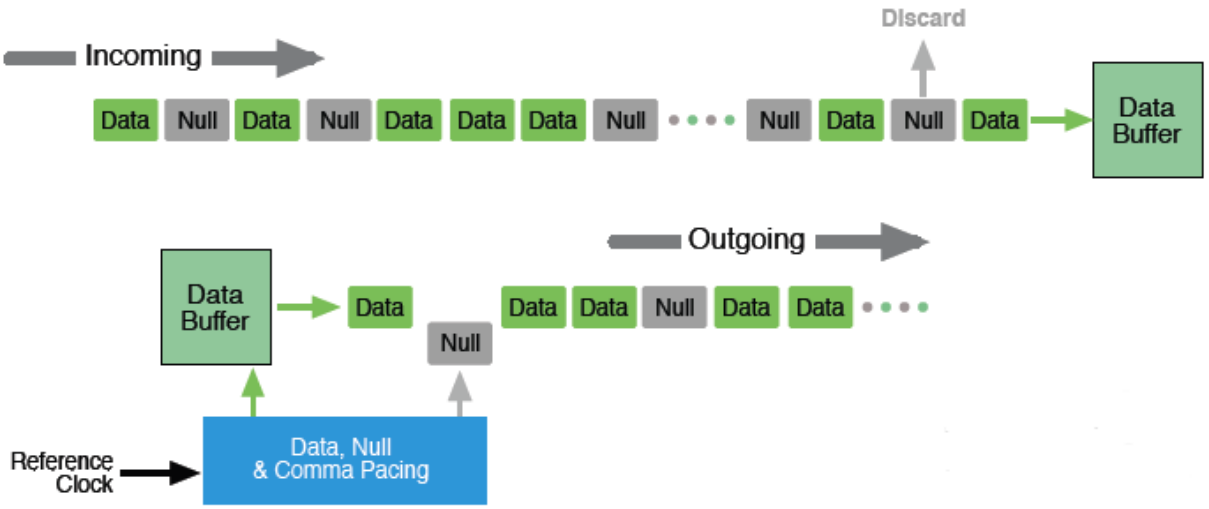
There are reclocking techniques that can be used to reduce jitter in a serial bitstream. But they cannot correct any underlying frequency error, and ultimately their effectiveness is limited by the bandwidth inherent in their design.

In contrast, the Avenue 4500 overcomes underlying frequency error by separating the content from the original clock and generating a new output based upon more accurate and more stable clocks.

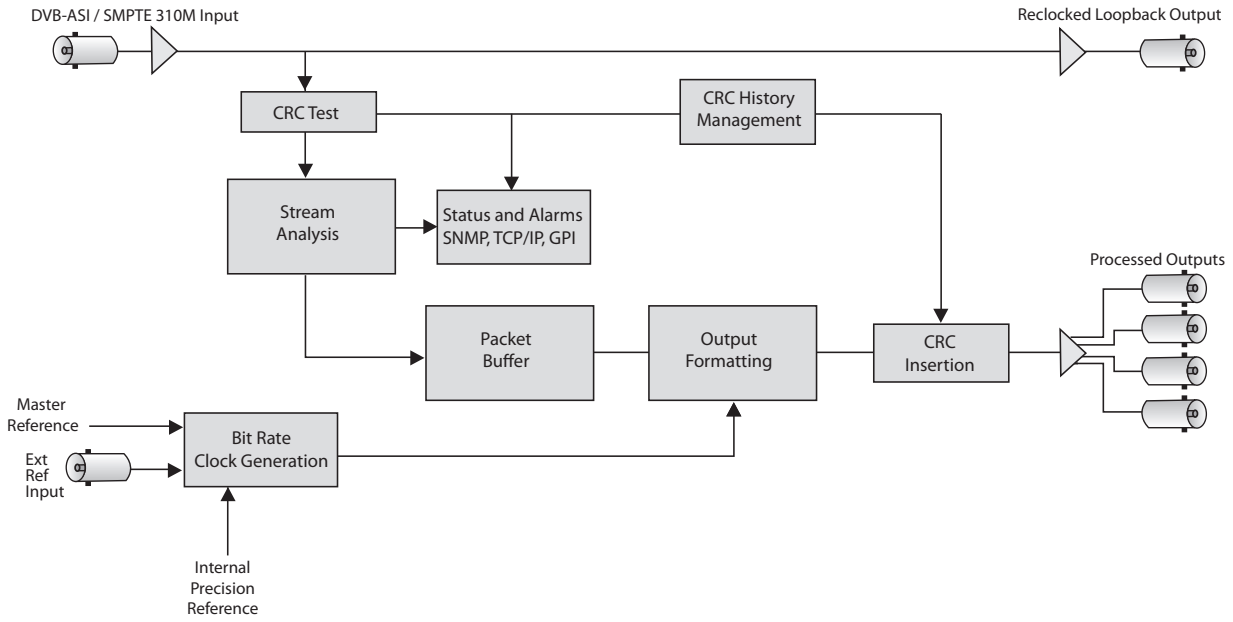
Although the data rate of the actual content is constantly varying in response to the compressibility of that content, the overall data rate is held constant at 19.39 Mb/s. The 4500 accomplishes this by adjusting the number of null packets (which contain no data) to keep the packet count at precisely 12,894 per second.

As a transport stream arrives at the input of the Avenue 4500, the signal is deserialized and the Data packets are saved into a buffer. The Null packets are discarded.

Guided by a reference clock, Data packets are read from the buffer. Null packets are inserted as needed to bring the total bit rate up to 19.39 Mb/s. The packets are then serialized, using that reference clock, as either a DVB-ASI or SMPTE 310M signal. All of the original Data is preserved, but the clocks are all new.



BLOCK DIAGRAM



4500 MPEG Stream Processor
Functional Block Diagram, Portrait View

4500 MPEG Stream Processor
Functional Block Diagram, Landscape View

INSTALLATION

Plug the 4500 module into any one of the slots in the 1RU or 3RU frame and install the plastic overlay provided onto the corresponding group of rear BNC connectors associated with the module location. Note that the plastic overlay has an optional adhesive backing for securing it to the frame. Use of the adhesive backing is only necessary if you would like the location to be permanent and is not recommended if you need to change module locations. This module may be hot-swapped (inserted or removed) without powering down or disturbing performance of the other modules in the system.

CABLING

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

Status and Alarm Cabling

In addition to full monitoring and access through the control system, the module provides contact closure status indications through the 15-pin D Control connector on the corresponding rear slot of the frame. These connections can drive an alarm system or other external monitoring devices including LEDs. Two override GPI Inputs can also be accessed through the connector. Pinouts for the status monitoring are given in the illustration on the next page.

Form C relay contacts provide both NO (Normally Open) and NC (Normally Closed) switching to indicate fault status of the Primary and Secondary inputs and the protection switch output. Both the NO and NC contacts are simultaneously available on the **Control** connector. Each output is independently strappable to provide Ground, current limited +5V (1k Ω resistor), or a Common which appears on the D connector.

The three relay contacts provide the following status reporting:

- **Primary Good or Failed** – indicates Primary input status as Good when NO contact is active (switched to Common).
- **Secondary Good or Failed** – indicates Secondary input status as Good when NO contact is active (switched to Common).
- **Switch Position** – indicates the position of the protect switch as either Primary or Secondary selected. The normal position corresponds to the Primary feeding the input.

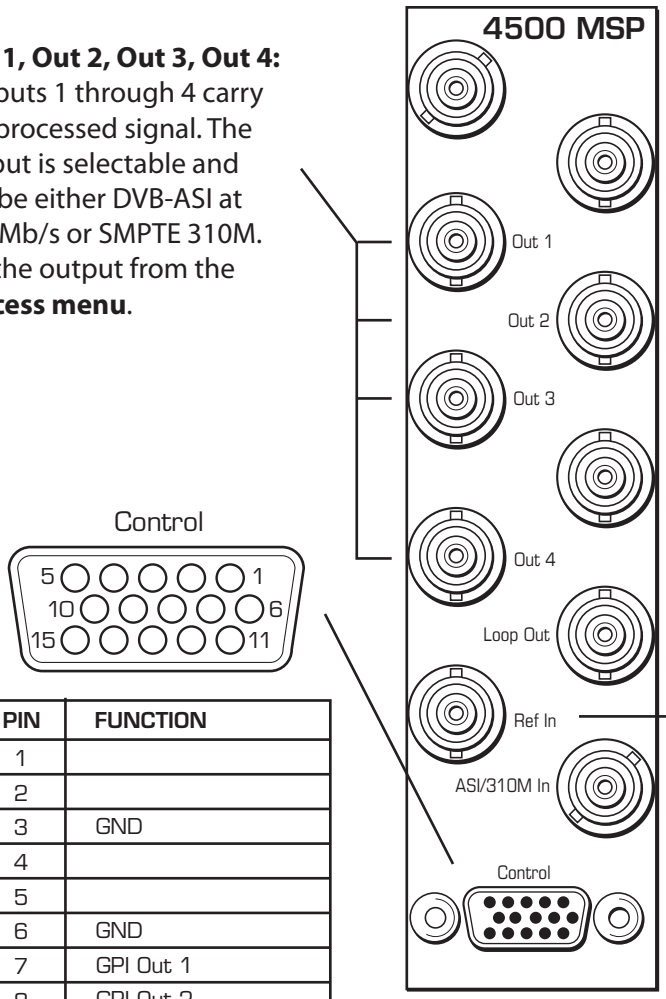
An individual common is provided to each of the relays. For each of the three status relays there is a 3-position jumper on the module which configures the common signal that will be used by that relay. The choices are as follows:

- **COM** – uses the user-provided common signal from the **Control** connector.
- **+5** – provides a +5V signal through a 1k Ω resistor to the relay common.
- **Gnd** – uses ground as the relay common.

3RU and 1RU Backplane Diagrams

3RU Backplane

Out 1, Out 2, Out 3, Out 4: Outputs 1 through 4 carry the processed signal. The output is selectable and can be either DVB-ASI at 270 Mb/s or SMPTE 310M. Set the output from the **Process menu**.



Loop Outut: The loop output is reclocked and follows the ASI/310M Input.

Ref In: The Reference input is used to correct the ASI and 310M symbol clock and remove jitter. The Reference Input can have two sources: an external source, or the Frame Master Reference. The reference input signal can be PAL or NTSC composite video or 10 MHz 1V P-P sine or square.

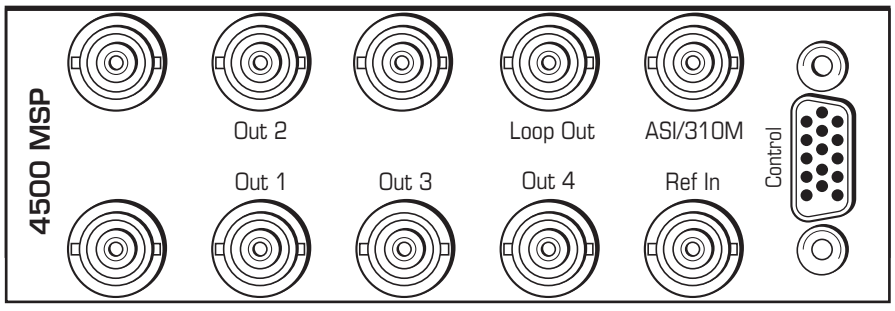
Using the reference input, the output bitstream can be synchronized to a video or 10 MHz reference signal.

ASI/310M In: Can be either DVB-ASI at 270 Mb/s or SMPTE 310M signal input. The module auto-senses what type of signal is on the input and converts as needed.

Control

PIN	FUNCTION
1	
2	
3	GND
4	
5	
6	GND
7	GPI Out 1
8	GPI Out 2
9	GPI Out 3
10	GPI Out 4
11	GPI In 1
12	GPI In 2
13	GND
14	GPI In 3
15	GPI In 4

1RU Backplane



MODULE CONFIGURATION AND CONTROL

The configuration parameters for each Avenue module must be selected after installation. This can be done remotely using one of the Avenue remote control options or locally using the module front panel controls. Each module has a **REMOTE/LOCAL** switch on the front edge of the circuit board which must first be set to the desired control mode.

The configuration parameter choices for the module will differ between **Remote** and **Local** modes. In **Remote** mode, the choices are made through software and more selections are available. The **4500 Parameter Table** on the following page summarizes and compares the various configuration parameters that can be set remotely or locally and the default/factory settings.

If you are not using a remote control option, the module parameters must be configured from the front panel switches. Parameters that have no front panel control will be set to a default value. The **Local** switches are illustrated in the **Front Panel Controls and Indicators** section following the **4500 Parameter Table**.

Avenue module parameters can be configured and controlled remotely from one or both of the remote control options, the Avenue Touch Screen or the Avenue PC Application. Once the module parameters have been set remotely, the information is stored on the module CPU. This allows the module be moved to a different cell in the frame at your discretion without losing the stored information. Remote configuration will override whatever the switch settings are on the front edge of the module.

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

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

4500 Parameter Table

CONTROL	LOCAL	REMOTE	DEFAULT
Ref Source	None	Configured Ref Internal Input Stream	Configured Ref
Program Sel	None	1 - 100	1
Output Format	**ASI/310M** switch: Select **ASI** (left) to select ASI as the output, or **310M** (right) to select 310M as the output.	DVB-ASI SMPTE 310M	DVB-ASI
CRC Insert	None	Off On - Forward On - No Fwd	Off
CRC Err Gen	None	Off CRC Error Only CSum Error Only CRC & CSum Error	Off
Configured Ref	None	Master Ref External Ref	Master Ref
CRC PID	None	4000 - 8000	4000

Front Panel Controls and Indicators

Each front edge indicator and switch setting of the 4500 is shown in the diagram below:

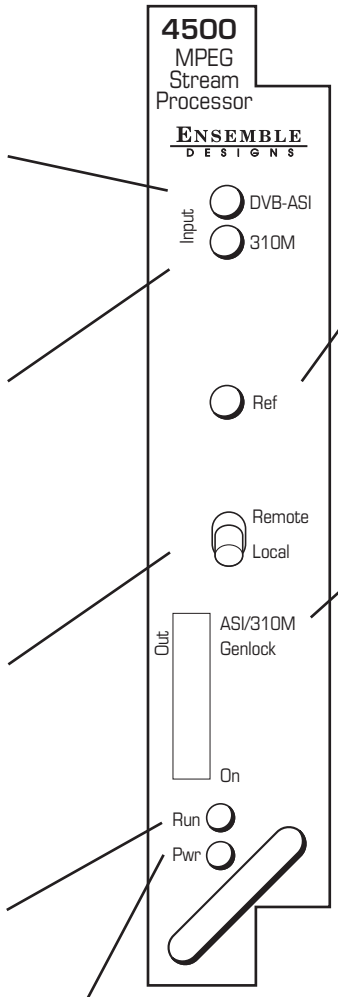
DVB-ASI green LED:
ON when input is DVB-ASI.
OFF when no DVB-ASI signal is present in the input. The module auto-senses what type of signal is on the input and converts as needed.

310M green LED:
ON when input is 310M.
OFF when no 310M signal is present in the input. The module auto-senses what type of signal is on the input and converts as needed.

Remote/Local switch:
Set to the mode you wish to use: Up for **Remote** mode and down for **Local** mode.

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

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



Ref green LED:
ON when Reference input is detected and locked.
OFF when no Reference input is detected.

ASI/310M switch:
Select **ASI** (left) to select ASI as the output, or **310M** (right) to select 310M as the output.

AVENUE PC REMOTE CONFIGURATION

The Avenue PC remote control status menus for the 4500 module are illustrated and explained below. Refer to the 4500 Parameter Table for a summary of available parameters that can be set remotely through the menus illustrated. For more information on using Avenue PC, refer to the Avenue PC Control Application Software data pack that came with the option.

Parameter fields that are grayed out can indicate one of the following conditions:

- An option is not installed.
- The function is not active.
- The module is locked.
- The User Level set with Avenue PC is not accessible from the current User Level.

4500 Avenue PC Menus

Input Menu

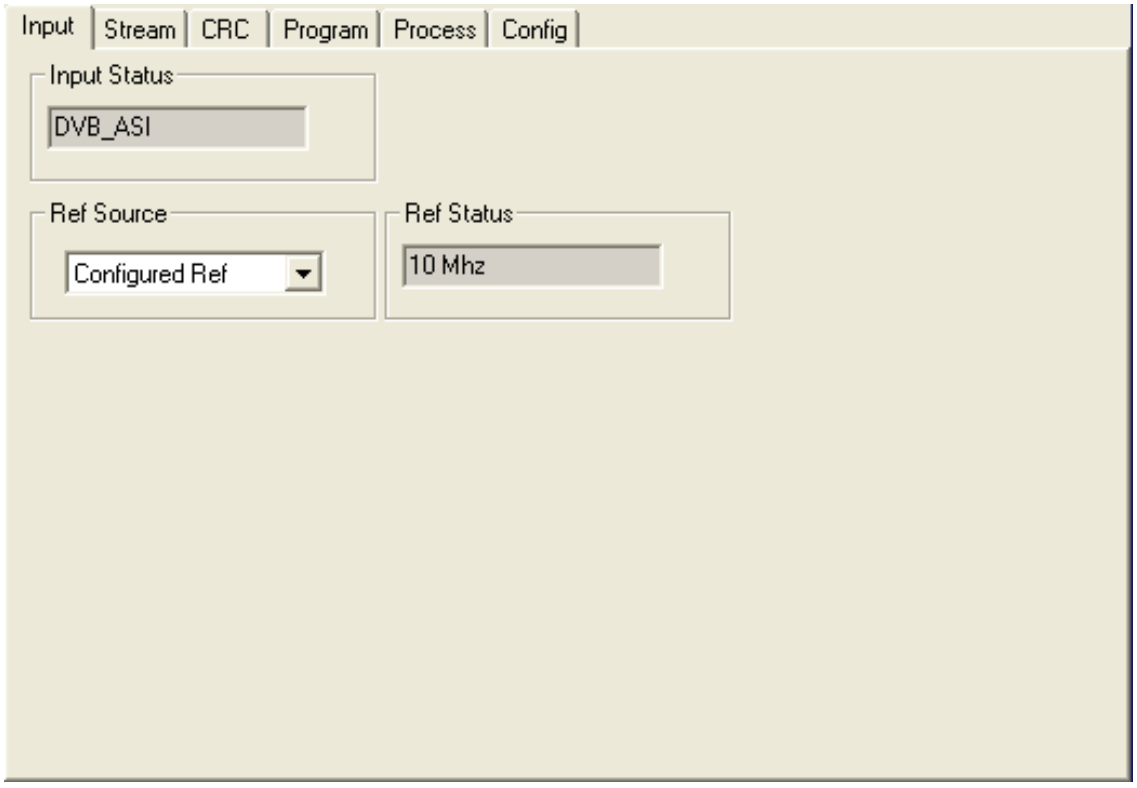
The **Input menu** screen shown below displays the Input Status, Reference Source and Reference Status. This is useful for verifying which signal is present in the input and which reference source is selected. The built-in transport stream analyzer detects whether the input constitutes a valid signal by checking for PAT, PMT, and PID packets.

- **Input Status** – Auto-detects which input signal is present. Can be either DVB-ASI at 270 Mb/s or SMPTE 310M. If there is no input signal present, this field will show "No input."

- **Ref Source** – Shows the selected Reference Source. Available selections are: Configured Ref, Internal, and Input Stream.
  Configured Ref means that the Ref Status field will reflect what has been selected under the **Config menu**.
  Internal means that the Ref Status field shows Internal.
  Input Stream means that the Ref Status field reflects the signal present in the Input, either ASI Input or SMPTE 310M Input.

- **Ref Status** – Displays one of the following:

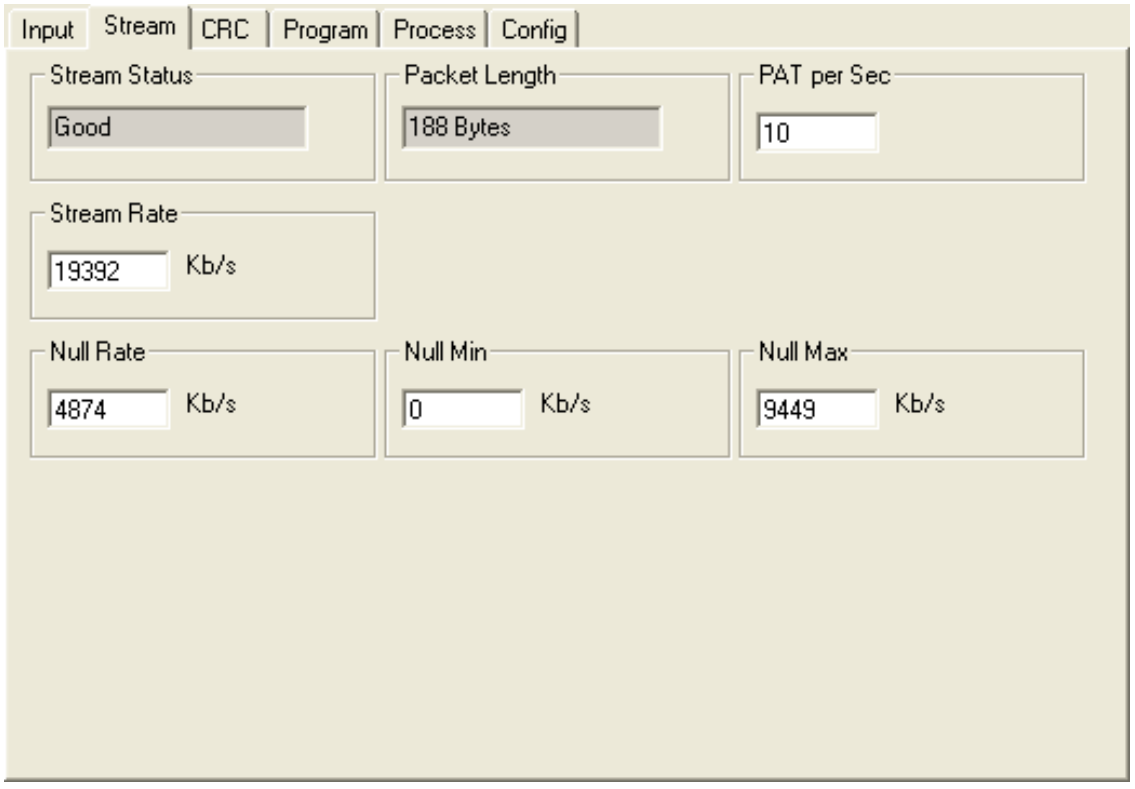
  No Reference, SD525 Sync, SD625 Sync, 10 MHz, ASI Input, 310M Input, Internal, Unknown.



Stream Menu

The **Stream menu** shown below displays information about the signal stream for monitoring purposes. All the fields are read-only.

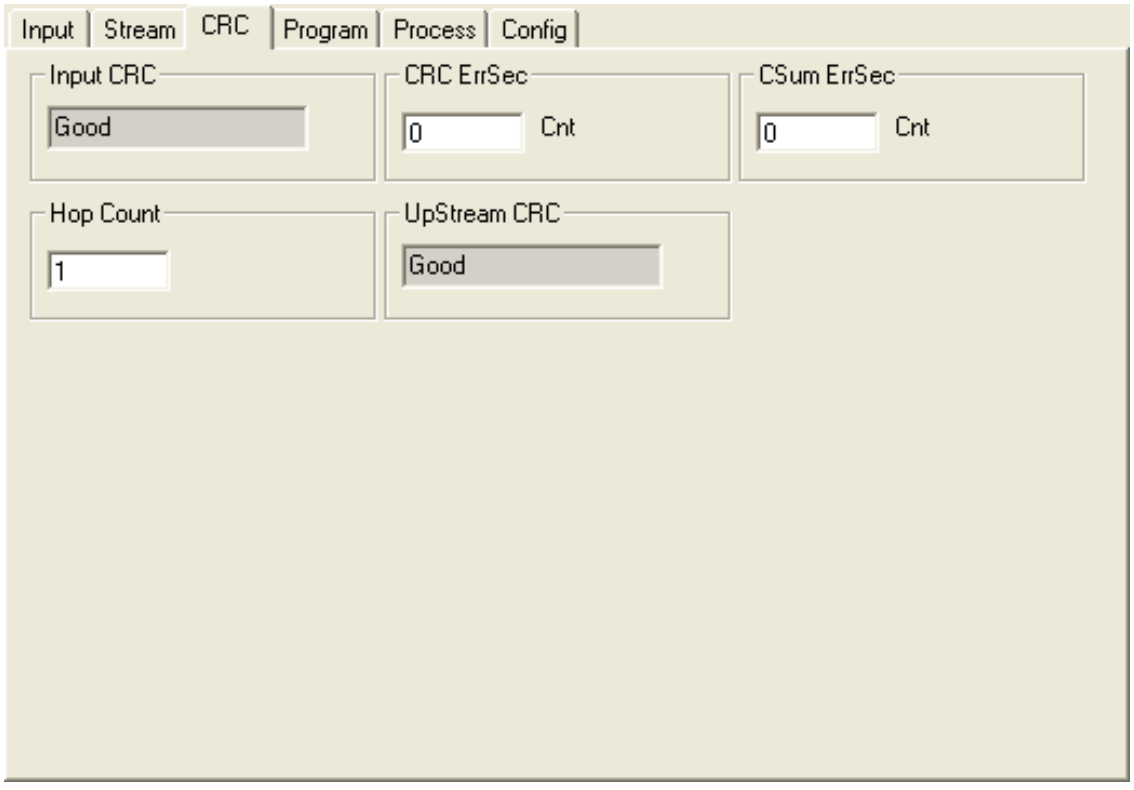
- **Stream Status** – Status indicators for the signal stream are Good, Not Present, and No Input.
- **Packet Length** – Indicates the packet length in bytes. Can be 188, 204 or 208.
- **PAT per Sec** – Shows how many Program Allocation Tables are present in the signal per second.
- **Stream Rate** – Shows the stream rate in terms of kilobytes per second.
- **Null Rate** – Indicates the current rate of Null packets being inserted into the signal stream in terms of kilobytes per second.
- **Null Min** and **Null Max** – These fields show the range of minimum and maximum Null packets in the signal stream in terms of kilobytes per second.



CRC Menu

The **CRC menu** shown below allows you to monitor the status of the Cyclic Redundancy Check (CRC) data in the stream. A CRC and Data Checksum packet can be inserted into the stream by the 4500 to provide data path integrity testing at downstream points. These CRC packets test the data integrity on a transmission link by transmission link basis.

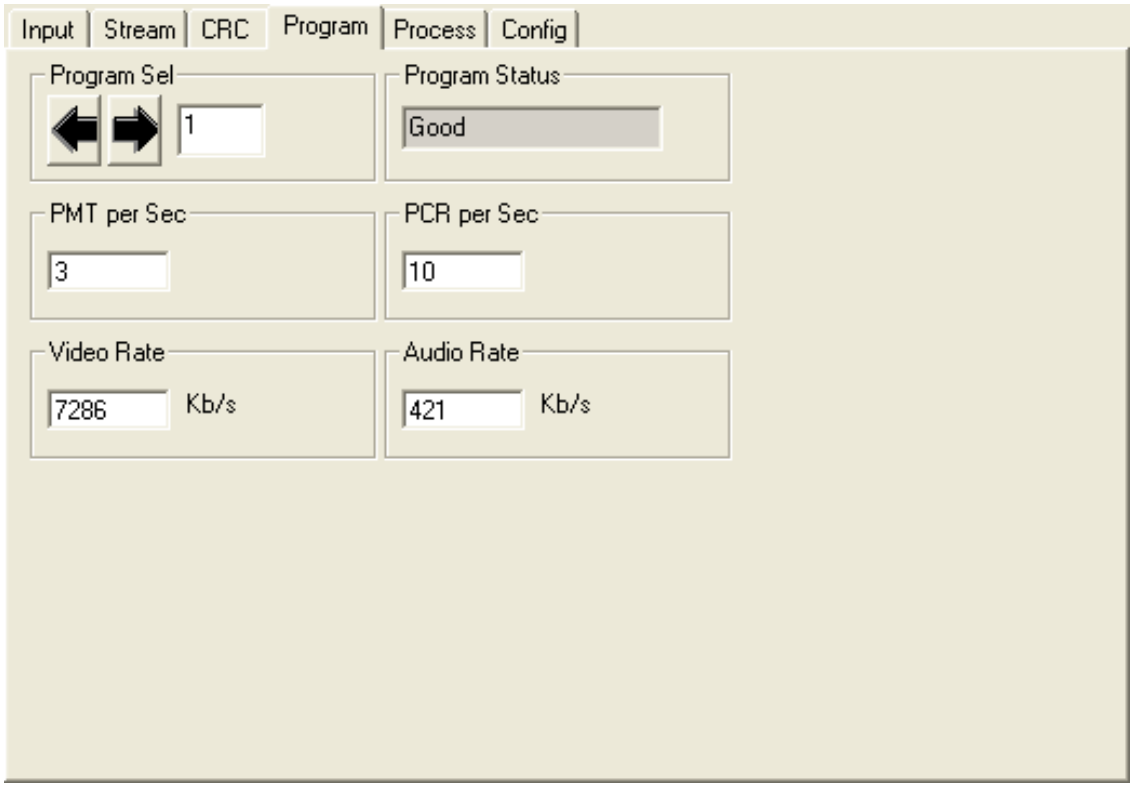
- **Input CRC** – Possible values are: None, Good, CRC Bad, CSum Bad, CRC/CSum Bad.
- **CRC ErrSec** – The CRC error rate per second.
- **CSum ErrSec** – The Checksum error rate per second.
- **Hop Count** – The number of times that the signal has gone from one 4500 to another. For example, a 4500 module upstream may insert CRC packets which are detected by a downstream 4500 module.
- **UpStream CRC** – Indicates whether there has been an error in the signal upstream.



Program Menu

The **Program menu** shown below allows you to select a program and monitor its program status, Program Map Tables per second, Program Clock References per second, video rate and audio rate.

- **Program Sel** – Select a program by clicking the arrows or entering a value directly in the field. (Touch Screen: Select a program by pressing the arrows.) Available values are 1 to 100.
- **Program Status** – Reports the program status. Possible values are: No Input, No Stream, No PAT, No PMT, No Video, No Audio, Good.
- **PMT per Sec** – Reports the number of Program Map Tables detected in the signal per second.
- **PCR per Sec** – Reports the number of Program Clock References detected in the signal per second.
- **Video Rate** – Reports the Video Rate in terms of kilobytes per second.
- **Audio Rate** – Reports the Audio Rate in terms of kilobytes per second.



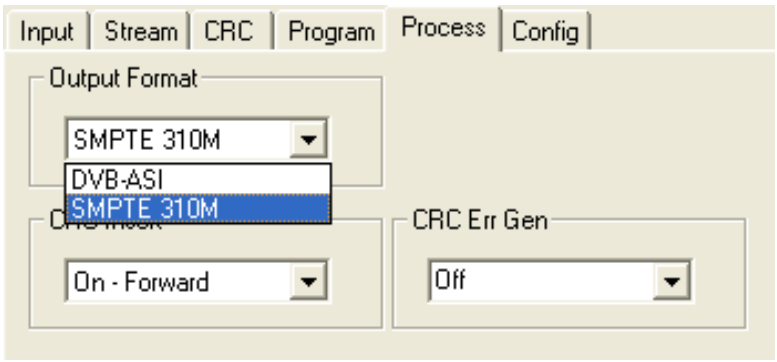
Process Menu

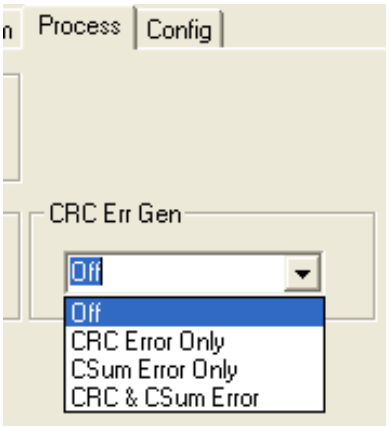
The **Process menu** allows you to select which Output Format you want (DVB-ASI or SMPTE 310M) for BNC Outputs 1 through 4 for the processed signal. You can also configure how you want to treat CRC insertion and CRC and Checksum error generation using the drop-down menus CRC Insert and CRC Error Generator. Data Integrity history is carried forward through the system to facilitate fault finding.

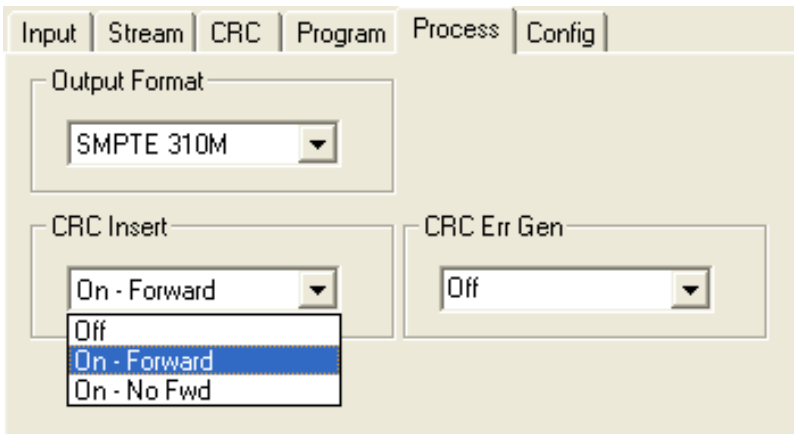
- **Output Format** – Set the output of the 4500 module to the desired signal type, either DVB-ASI or SMPTE 310M.

- **CRC Insert** – Available selections are: Off, On - Forward, On - No Fwd.
  Off means that no CRC packets are inserted into the signal.
  On - Forward means that CRC packets are inserted into the signal and also forwarded on so that they can be detected downstream.
  On - No Fwd means that CRC packets are inserted into the signal but are not forwarded on.

- **CRC Err Gen** – Available selections are: Off, CRC Error Only, CSum Error Only, CRC & CSum Error.







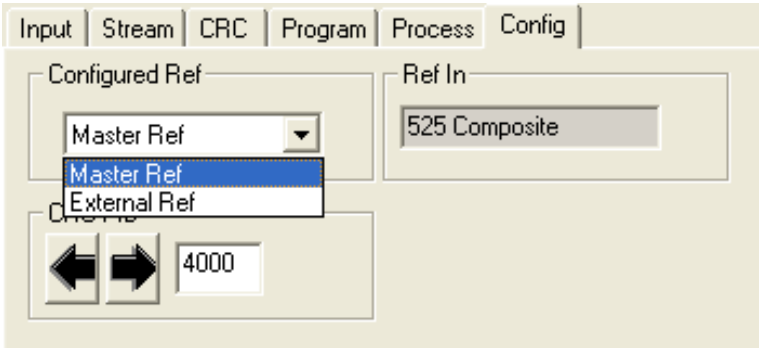
Config Menu

The **Config menu** allows you to select which reference you want to use (Master Ref or External Ref). The **Ref In** field reports the type of reference signal coming in. You can also select an option for the CRC PID control (from 4000 to 8000).

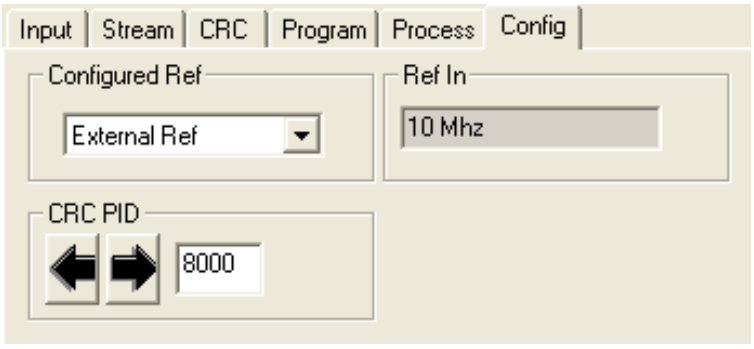
- **Configured Ref** – Select either Master Ref or External Ref.
  Master Ref means that the module is taking its reference signal from the Avenue Frame itself.
  External Ref means that the module is taking its reference from an external source, such as an Avenue 7400 Test Signal and Sync Pulse Generator installed in the Avenue Frame.

- **Ref In** – Reports the type of reference signal coming in.
  Possible values are: No Reference, 525 Composite, 625 Composite, 10 MHz.

- **CRC PID** – Use the arrow buttons to select a value from 4000 to 8000. You can also enter a number directly in the field. This is commonly a "set and forget" type of configuration. Use it to select the PID you want to use for inserting CRCs or Checksum, replacing Null packets.



The Config menu showing the available selections for the Configured Ref control.



The Config menu showing the upper limit that can be selected for the CRC PID control.

AVENUE TOUCH SCREEN REMOTE CONFIGURATION

The Avenue Touch Screen remote control status menus for this module are illustrated and explained below. Refer to the **4500 Parameter Table** for a summary of available parameters that can be set remotely through the menus illustrated. For more information on using Avenue Touch Screen, refer to the Avenue Touch Screen data pack.

Parameter fields that are grayed out can indicate one of the following conditions:

- An option is not installed.
- The function is not active.
- The module is locked.
- The User Level set with Avenue PC is not accessible from the current User Level.

Input Menu

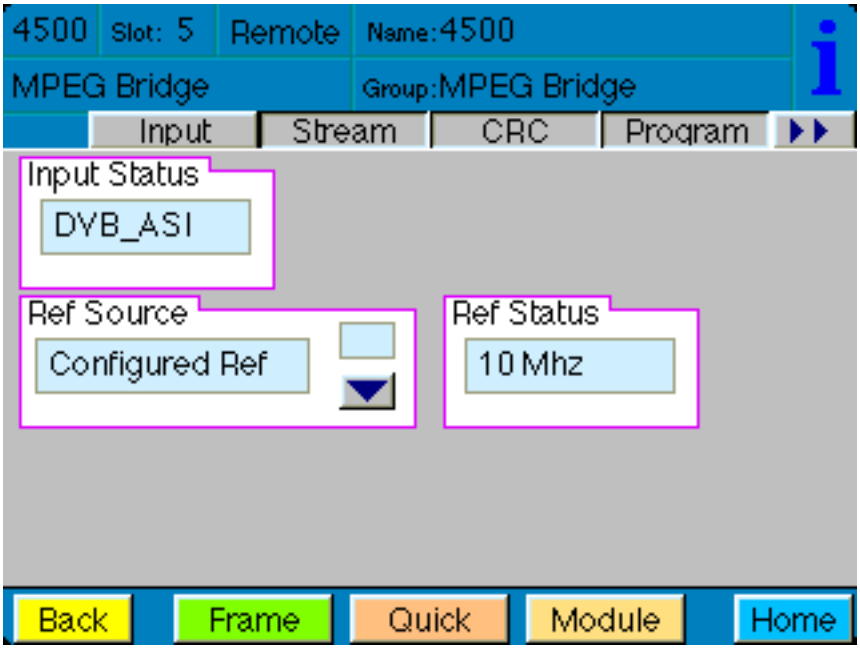
The **Input menu** screen shown below displays the Input Status, Reference Source and Reference Status. This is useful for verifying which signal is present in the input and which reference source is selected. The built-in transport stream analyzer detects whether the input constitutes a valid signal by checking for PAT, PMT, and PID packets.

- **Input Status** – Auto-detects which input signal is present. Can be either DVB-ASI at 270 Mb/s or SMPTE 310M. If there is no input signal present, this field will show "No input."

- **Ref Source** – Shows the selected Reference Source. Available selections are: Configured Ref, Internal, and Input Stream.
  Configured Ref means that the Ref Status field will reflect what has been selected under the **Config menu**.
  Internal means that the Ref Status field shows Internal.
  Input Stream means that the Ref Status field reflects the signal present in the Input, either ASI Input or SMPTE 310M Input.

- **Ref Status** – Displays one of the following:

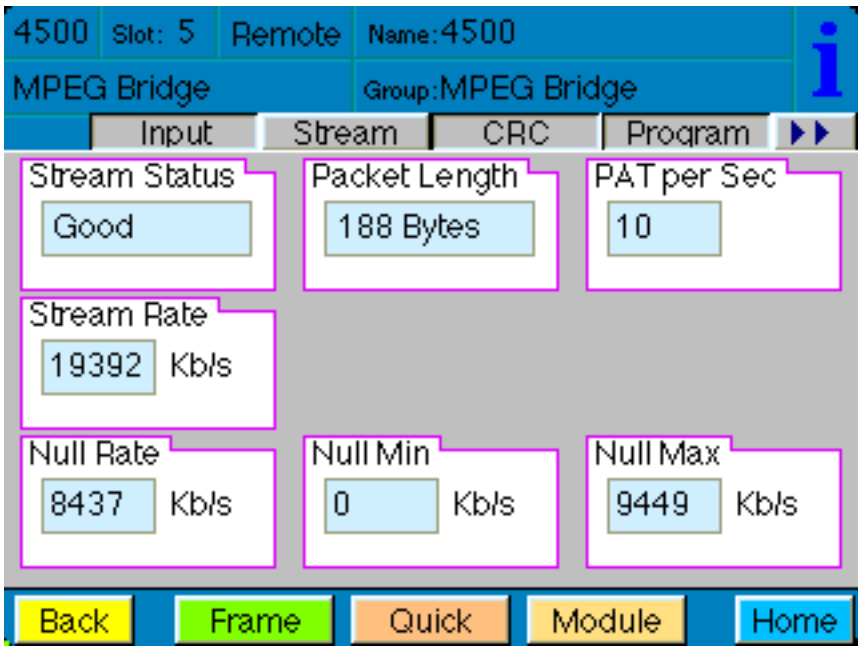
  No Reference, SD525 Sync, SD625 Sync, 10 MHz, ASI Input, 310M Input, Internal, Unknown.



Stream Menu

The **Stream menu** shown below displays information about the signal stream for monitoring purposes. All the fields are read-only.

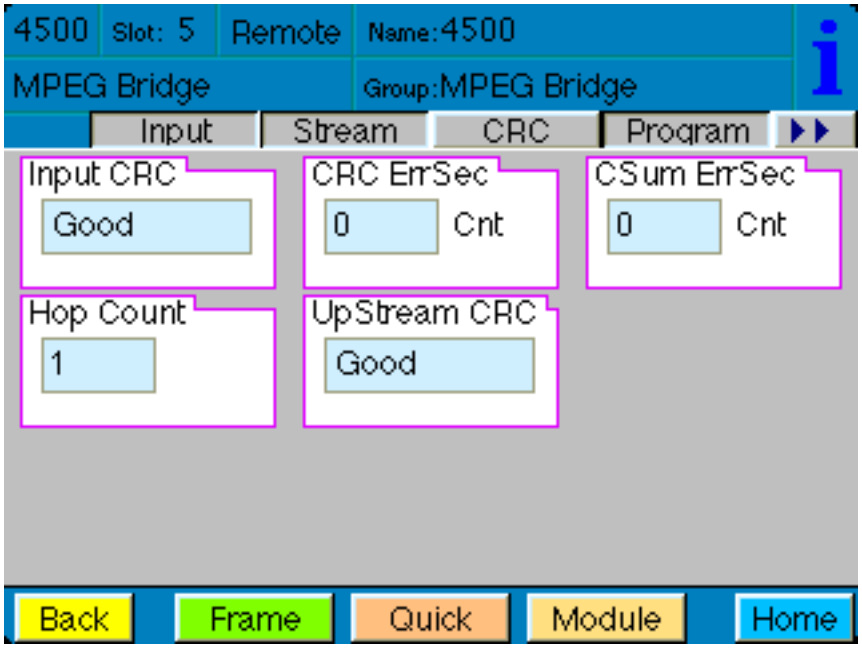
- **Stream Status** – Status indicators for the signal stream are Good, Not Present, and No Input.
- **Packet Length** – Indicates the packet length in bytes. Can be 188, 204 or 208.
- **PAT per Sec** – Shows how many Program Allocation Tables are present in the signal per second.
- **Stream Rate** – Shows the stream rate in terms of kilobytes per second.
- **Null Rate** – Indicates the current rate of Null packets being inserted into the signal stream in terms of kilobytes per second.
- **Null Min** and **Null Max** – These fields show the range of minimum and maximum Null packets in the signal stream in terms of kilobytes per second.



CRC Menu

The **CRC menu** shown below allows you to monitor the status of the Cyclic Redundancy Check (CRC) data in the stream. A CRC and Data Checksum packet can be inserted into the stream by the 4500 to provide data path integrity testing at downstream points. These CRC packets test the data integrity on a transmission link by transmission link basis.

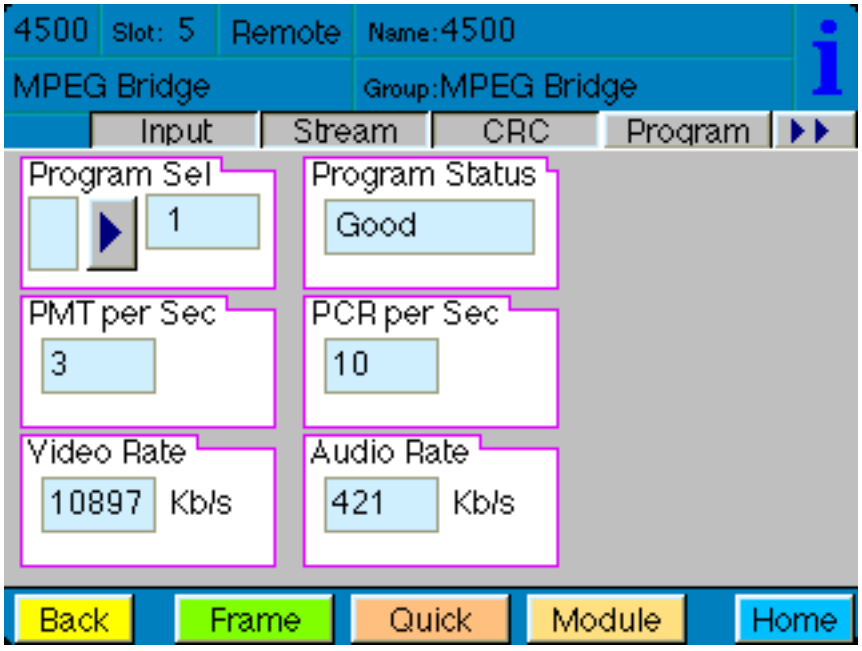
- **Input CRC** – Possible values are: None, Good, CRC Bad, CSum Bad, CRC/CSum Bad.
- **CRC ErrSec** – The CRC error rate per second.
- **CSum ErrSec** – The Checksum error rate per second.
- **Hop Count** – The number of times that the signal has gone from one 4500 to another. For example, a 4500 module upstream may insert CRC packets which are detected by a downstream 4500 module.
- **UpStream CRC** – Indicates whether there has been an error in the signal upstream.



Program Menu

The **Program menu** shown below allows you to select a program and monitor its program status, Program Map Tables per second, Program Clock References per second, video rate and audio rate.

- **Program Sel** – Select a program by clicking the arrows or entering a value directly in the field. (Touch Screen: Select a program by pressing the arrows.) Available values are 1 to 100.
- **Program Status** – Reports the program status. Possible values are: No Input, No Stream, No PAT, No PMT, No Video, No Audio, Good.
- **PMT per Sec** – Reports the number of Program Map Tables detected in the signal per second.
- **PCR per Sec** – Reports the number of Program Clock References detected in the signal per second.
- **Video Rate** – Reports the Video Rate in terms of kilobytes per second.
- **Audio Rate** – Reports the Audio Rate in terms of kilobytes per second.



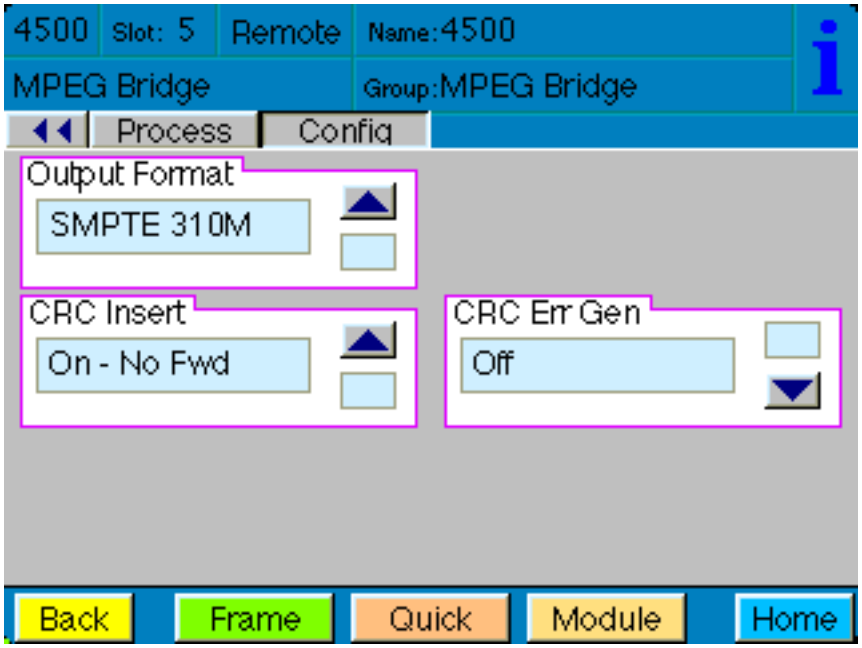
Process Menu

The **Process menu** allows you to select which Output Format you want (DVB-ASI or SMPTE 310M) for BNC Outputs 1 through 4 for the processed signal. You can also configure how you want to treat CRC insertion and CRC and Checksum error generation using the drop-down menus CRC Insert and CRC Error Generator. Data Integrity history is carried forward through the system to facilitate fault finding.

- **Output Format** – Set the output of the 4500 module to the desired signal type, either DVB-ASI or SMPTE 310M.

- **CRC Insert** – Available selections are: Off, On - Forward, On - No Fwd.
  Off means that no CRC packets are inserted into the signal.
  On - Forward means that CRC packets are inserted into the signal and also forwarded on so that they can be detected downstream.
  On - No Fwd means that CRC packets are inserted into the signal but are not forwarded on.

- **CRC Err Gen** – Available selections are: Off, CRC Error Only, CSum Error Only, CRC & CSum Error.



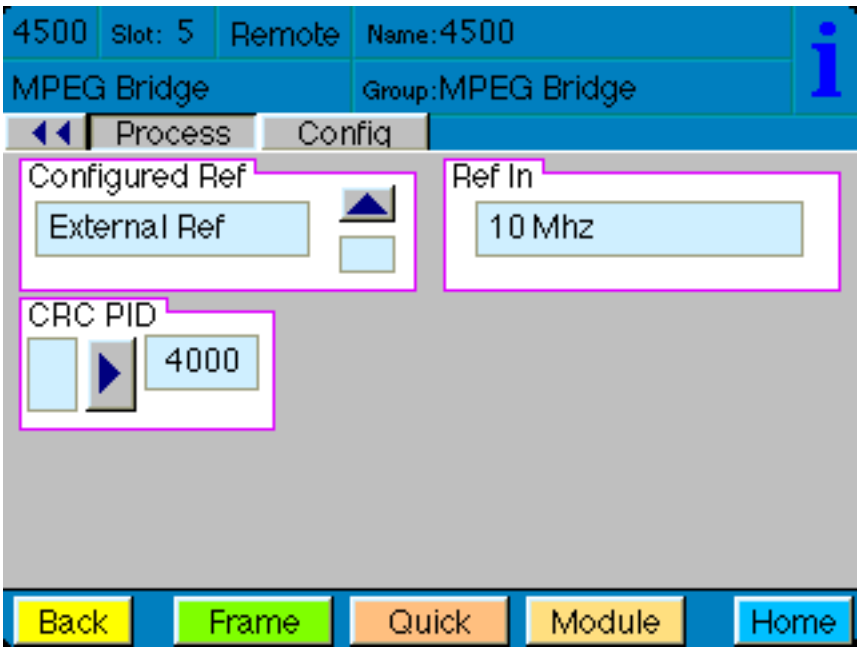
Config Menu

The **Config menu** allows you to select which reference you want to use (Master Ref or External Ref). The **Ref In** field reports the type of reference signal coming in. You can also select an option for the CRC PID control (from 4000 to 8000).

- **Configured Ref** – Select either Master Ref or External Ref.
  Master Ref means that the module is taking its reference signal from the Avenue Frame itself.
  External Ref means that the module is taking its reference from an external source, such as an Avenue 7400 Test Signal and Sync Pulse Generator installed in the Avenue Frame.

- **Ref In** – Reports the type of reference signal coming in.
  Possible values are: No Reference, 525 Composite, 625 Composite, 10 MHz.

- **CRC PID** – Use the arrow buttons to select a value from 4000 to 8000. You can also enter a number directly in the field. This is commonly a "set and forget" type of configuration. Use it to select the PID you want to use for inserting CRCs or Checksum, replacing Null packets.



TROUBLESHOOTING

As a troubleshooting aid, reference signal status and presence, as well as power and CPU status can be easily monitored from the front panel of the 7465 module using the front panel indicators.

Refer to the troubleshooting tips below:

Can't control module

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

Module remote controls are grayed out

- Module is locked or access to module controls is restricted by User Level.

No signal out of module

- Check status of Active LEDs. Primary or Secondary should be lit. If not, check the inputs for signal presence and quality.
- Check cabling to input of the module.

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

http://www.ensembledesigns.com/support

SOFTWARE UPDATES

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

WARRANTY AND FACTORY SERVICE

Warranty

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

Factory Service

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

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

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

(530) 478-1830
Fax: (530) 478-1832

Ensemble Designs customer service email address:

service@ensembledesigns.com

Website: http://www.ensembledesigns.com

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

SPECIFICATIONS

Input Signals

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

Loopback

Number	One
Impedence	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
Data integrity CRC test

Clock Accuracy

Internal Reference (TCXO)

Freq Error	<0.1 ppm <10^{-7}

External reference follows Ref Source
10^{-12} possible with GPS grade reference

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