AVENUE

Avenue™ signal integration system

Model 4460 ASI Digital Protection Switch Data Pack

ENSEMBLE DESIGNS

Revision 3.1 SW v1.1.1

This data pack provides detailed installation, configuration and operation information for the **4460 ASI Protection Switch** module as part of the Avenue Signal Integration System.

The module information in this data pack is organized into the following sections:

- Module Overview
- Applications
- Installation
- Cabling
- Module Configuration and Control
  - Front Panel Controls and Indicators
  - Avenue PC Remote Control
  - Avenue Touch Screen Remote Control
- Troubleshooting
- Software Updating
- Warranty and Factory Service
- Specifications

MODULE OVERVIEW

The 4460 ASI Protection Switch module is a fail-safe protection switch for monitoring and switching critical ASI paths. When a fault is detected in the Primary input, and the Secondary input is verified as good, the relay will activate, causing the Secondary input to be switched to the module's output.

The module is available from the factory in two switching configurations, a passive or an active switch design as described below.

- The passive design offers a simple but powerful approach using the least amount of active components. It essentially provides a fail-safe signal to the output BNC even during loss of power. It does however, require paying stricter attention to cable length in the facility.
- The active switch design utilizes active input circuitry to address cable equalization, present properly terminated input loads, and feed the signals through cable drivers to the output relays but does requires a constant source of power for a nearly fail-safe continuous output. The redundant power supply option for the Avenue frame is recommended.

The action of the switch, both when a fault occurs in the Primary signal and when that fault clears, can be configured as either auto reset on or off.

- When Auto mode is turned on, a fault in the Primary signal will cause the switch to automatically throw to the Secondary. With Auto mode turned off, a fault in the Primary signal will be detected, but no switching will take place.
- The Auto Reset parameter governs how the switch behaves when the Primary signal is restored following a fault. With Auto Reset on, the switch will revert to the Primary. When Auto Reset is off, manual intervention is needed to throw the switch back to the Primary input.

The 4460 monitors the integrity of the ASI stream and analyzes the audio and video content. Signal health and fault detection is determined by monitoring the signal level of the incoming video, if it is below the threshold then it is considered bad.

The two digital inputs, Primary and Secondary, are connected directly to a relay in the passive design. The normal position of the relay passes the Primary input directly to the output, even in the complete absence of power.

In the active design, the inputs pass through serial digital receiver/equalizers for buffering. In both passive and active designs, when a fault is detected in the Primary input, and the Secondary input is seen as not faulted, the relay will activate, switching the Secondary input to the output

Each of the signals is fed to identical detection circuits which evaluate the signal in order to arrive at a fault decision. Signal detection can be enabled or disabled using the local or remote controls.

Fault conditions can be monitored with an external GPI (general purpose interface) alarm system or other device through the 15-pin **Control** connector on the corresponding rear backplane connector. The Form C relays status outputs form this connector can be monitored by a device to show Primary and Secondary signal status and the current position of the protect switch (Primary or Secondary).

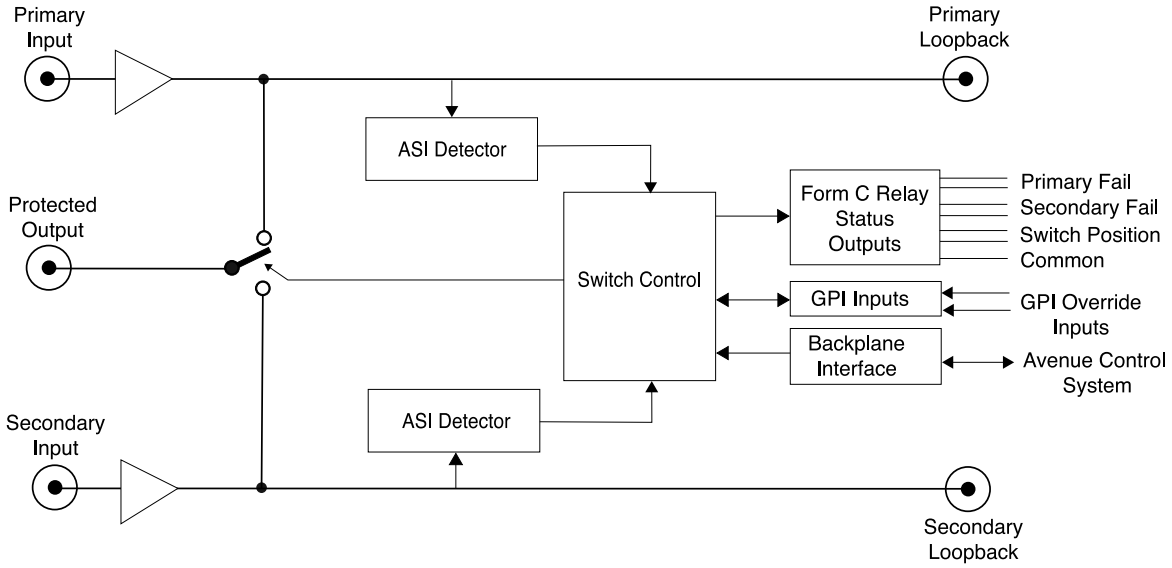
The two GPI Override Inputs available (Primary and Secondary) allow changing switch position from an external device. The GPI inputs can be configured for one of two operational modes:

- Neg Edge Switch – in this mode, a low going transition automatically triggers a switch to occur. This can be used to manually reset the switch after the Primary has recovered from a fault condition.
- Ext Fault Low – provides a mode for allowing external devices and conditions to be factored into the decision logic which controls the operation of the switch. A low on this input signifies that an external device has detected a fault and will trigger the GPI.

As an example, if the Primary GPI is set to Ext Fault Low and the module's own Signal Detect function is also enabled, then either a loss of signal or a low signal detected on the Primary GPI input will indicate a fault condition. If the Secondary channel condition is good, the switch will throw to the Secondary. If the Secondary is also faulted, no switch will occur.

A GPI menu is provided for enabling the type of GPI action. Because the status of the GPI inputs can only be inferred from the Pri Status indicator if the GPI mode is set to Ext Fault Low, the menu also provides GPI status indicators which show the state of the GPI inputs, regardless of the GPI mode.

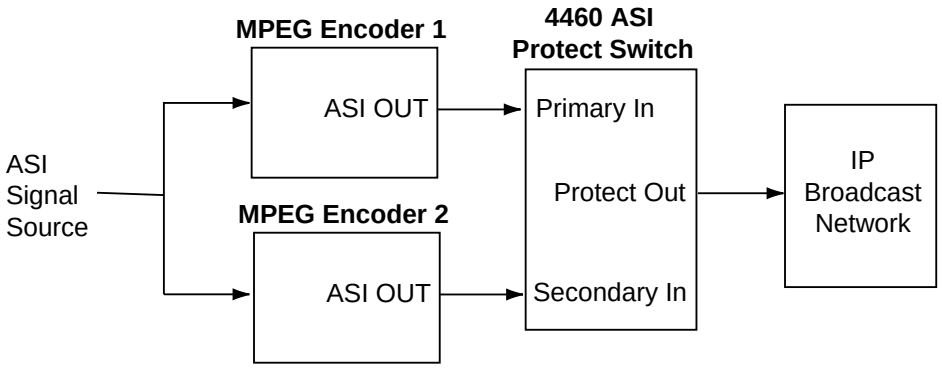
The on-board CPU can monitor and report module ID information (slot location, software version and board revision), and power status to the optional frame System Control module. This information can be accessed by the user or set to register an alarm if desired using the remote control options available.



4460 Functional Block Diagram

APPLICATIONS

A typical application for the 4460 module is illustrated in the figure below. The module can provide protection for critical ASI paths such as MPEG Encoder feeds to an IP Broadcast network. If the Primary In signal fails, the identical secondary input will switch to the Protect Out for an uninterrupted signal flow.



4460 Application for MPEG Encoders

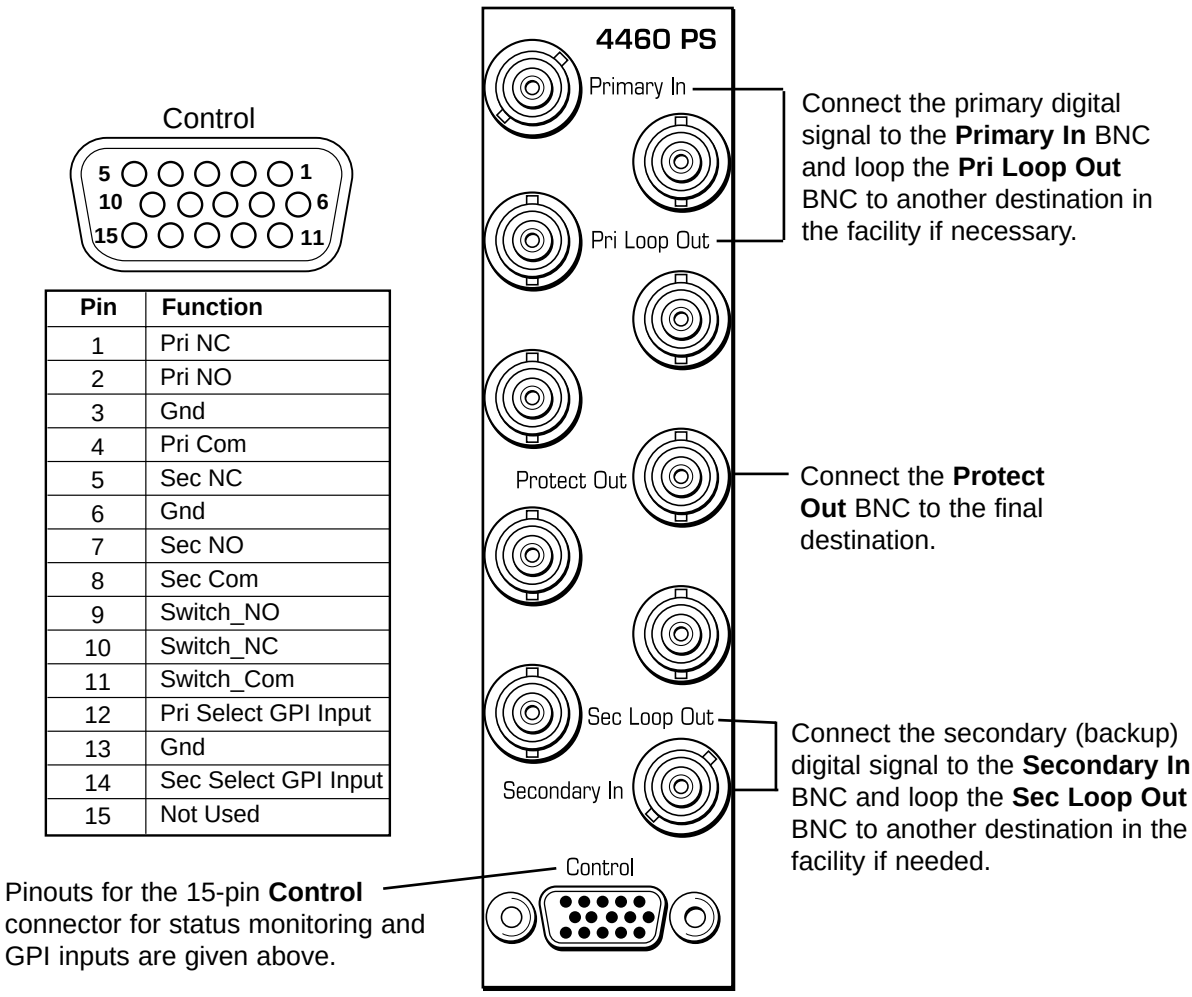
INSTALLATION

Plug the 4460 module into any one of the slots in the 1 RU or 3 RU 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 3 RU and 1 RU backplane diagrams of the module below for cabling instructions. Note that unless stated otherwise, the 1 RU cabling explanations are identical to those given in the 3 RU diagram.

3 RU Backplane



Pin	Function
1	Pri NC
2	Pri NO
3	Gnd
4	Pri Com
5	Sec NC
6	Gnd
7	Sec NO
8	Sec Com
9	Switch_NO
10	Switch_NC
11	Switch_Com
12	Pri Select GPI Input
13	Gnd
14	Sec Select GPI Input
15	Not Used

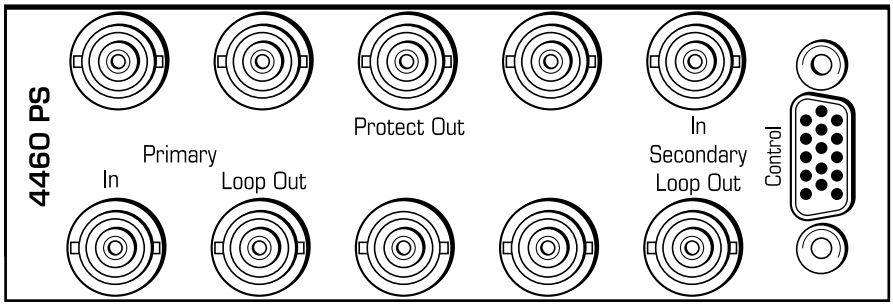
Connect the primary digital signal to the **Primary In** BNC and loop the **Pri Loop Out** BNC to another destination in the facility if necessary.

Connect the **Protect Out** BNC to the final destination.

Connect the secondary (backup) digital signal to the **Secondary In** BNC and loop the **Sec Loop Out** BNC to another destination in the facility if needed.

Pinouts for the 15-pin **Control** connector for status monitoring and GPI inputs are given above.

1 RU Backplane



MODULE CONFIGURATION AND CONTROL

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

The configuration parameter choices for the module will differ between **Remote** and **Local** modes. In **Remote** mode, the choices are made through software and allow more selections. The **4460 Parameter Table** later in this section 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 **4460 Parameter Table**. The **Local** switches are inactive when the **Remote/Local** switch is in the **Remote** position.

In the **Remote** mode, Avenue module parameters can be configured and controlled from one 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 to be moved to a different cell in the frame at your discretion without losing the stored information.

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

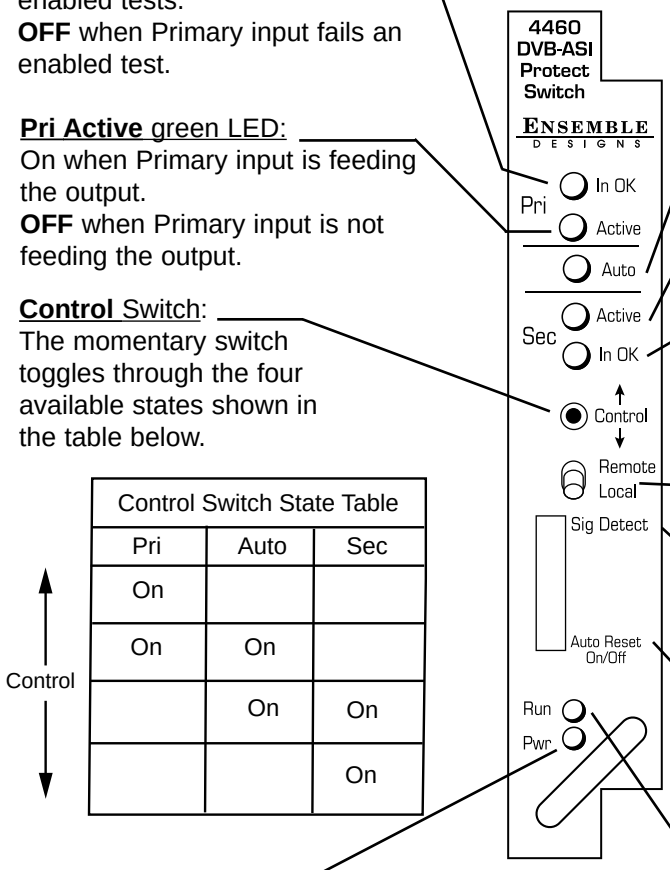
For setting the parameters remotely using the Avenue Touch Screen option, refer to the **Avenue Touch Screen Remote Configuration** section of this document following Avenue PC.

4460 Parameter Table

CONTROL	LOCAL	REMOTE/FACTORY	DEFAULT
Primary Output	Control Switch: refer to Control Switch State table on page 8.	Pri button	Off
Auto		Auto button	On
Secondary Output		Sec button	Off
Auto Reset	Switch 2: Auto Reset Off On	Off On	On
Reset Time	15 seconds	0 to 60 seconds	15 seconds
Signal Detect	Switch 1: Auto Reset Off On	Off On	On
Fail Time	3 sec	0 to 20 seconds	3 seconds
Pri GPI Mode	Off	Off Neg Edge Switch Ext Fault Low	Off
Sec GPI Mode	Off	Off Neg Edge Switch Ext Fault Low	Off

Front Panel Controls and Indicators

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



Pri In OK green LED:
On when Primary input passes all enabled tests.
OFF when Primary input fails an enabled test.

Pri Active green LED:
On when Primary input is feeding the output.
OFF when Primary input is not feeding the output.

Control Switch:
The momentary switch toggles through the four available states shown in the table below.

Control Switch State Table

Pri	Auto	Sec
On		
On	On	
	On	On
		On

Control

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

Auto green LED:
On when Auto is active.
OFF when Auto is turned off.

Sec Active red LED:
On when Secondary input is feeding the output.
OFF when Secondary input is not feeding the output.

Sec In OK green LED:
On when Secondary input passes all enabled tests.
OFF when Secondary input fails an enabled test.

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

Sig Detection Switch
Select **On** (left) to enable signal detection for the module or **Off** (right) to disable signal detection.

Auto Reset switch:
Select **On** (left) to enable module to auto reset when Primary input is restored or **Off** (right) for manual reset when Primary input is restored.

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.).

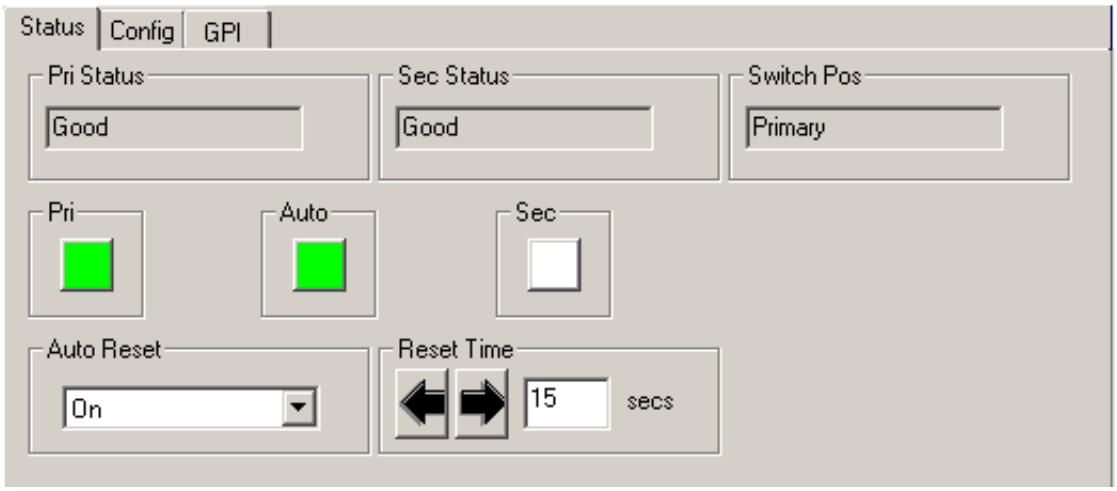
Avenue PC Remote Configuration

The Avenue PC remote control status menus for this module are illustrated and explained below. For more information on using Avenue PC, refer to the Avenue PC Control Application Software data pack that came with the option.

4460 Avenue PC Menu

The **Status** menu screen shown below displays overall status of selected parameters on both the Primary and Secondary inputs as Green = Good, Red = Bad, Gray = Not enabled. It also allows you to set the **Auto Reset** and **Reset Time** controls for the switching function.

- **Pri** – lights green when the **Primary** input is selected for the output. Press this switch control to select the Primary as the output
- **Auto** – lights green when **Auto** is turned on. Switch **Auto** on and off with this switch control. When **Auto** is on, the module will automatically switch to the Secondary input if the Primary fails and the Secondary is good.
- **Sec** – lights red when the Secondary input is selected to the output. Press this switch control to select the Secondary as the output.
- **Auto Reset** – set to **On** or **Off** to determine if the switch will automatically switch back to the Primary after it recover.
- **Reset Time** – set the amount of time the Primary signal must be good before the Auto reset switches back to Primary from Secondary.



The **Config** menu screen shown below allows enabling and disabling of signal detection on the module and the setting of fail time in seconds. Selecting **Signal Detect** to **On** sets the module as active. Set the **Fail Time** to determine how long a loss of the primary signal parameters must occur before switching to the secondary output.

- **Signal Detect** – Set the signal detection to **On** or **Off.**
- **Fail Time** – Set the amount of time in **secs** that primary signal parameters are in failure before it will switch to secondary input.

The 4460 can be set up to allow an external device to trigger a switch through the GPI interface.The **GPI** menu screen shown below allows configuration of the two external GPI inputs to the module.

The Primary or Secondary GPI input can be set to one of the following:

- **Off** – disables the GPI input.
- **Neg Edge Switch** – switch on a low-going transition to the GPI input
- **Ext Fault Low** – acts in conjunction with the status of the input signal to the module when Signal Detect is turned on in the Config menu. In this case, a loss of signal to the module or a low signal detected from an external device will close the switch.

Other Config menu selections and indications are the following:

- **Pri GPI Mode** – Set the Primary GPI switch mode to one of modes explained above.
- **Pri GPI Status** – Reports the status of the GPI inputs as one of four states.
- **Sec GPI Mode** – Set the Primary GPI switch mode to one of modes explained above.
- **Sec GPI Status** – reports the status of the GPI inputs as one of four states.

Status of each GPI input is indicated as one of four states (regardless of the GPI mode):

- **Good** – the signal is considered good for the tests currently enabled (Signal Detect and GPI Mode).
- **Sig Fai**l – the input signal has failed the Signal Detect test.
- **GPI Fail** – The input has failed the GPI test (GPI mode is set to Ext Fault Low and GPI is low.
- **All Fail** – both Signal Detect and GPI have failed.

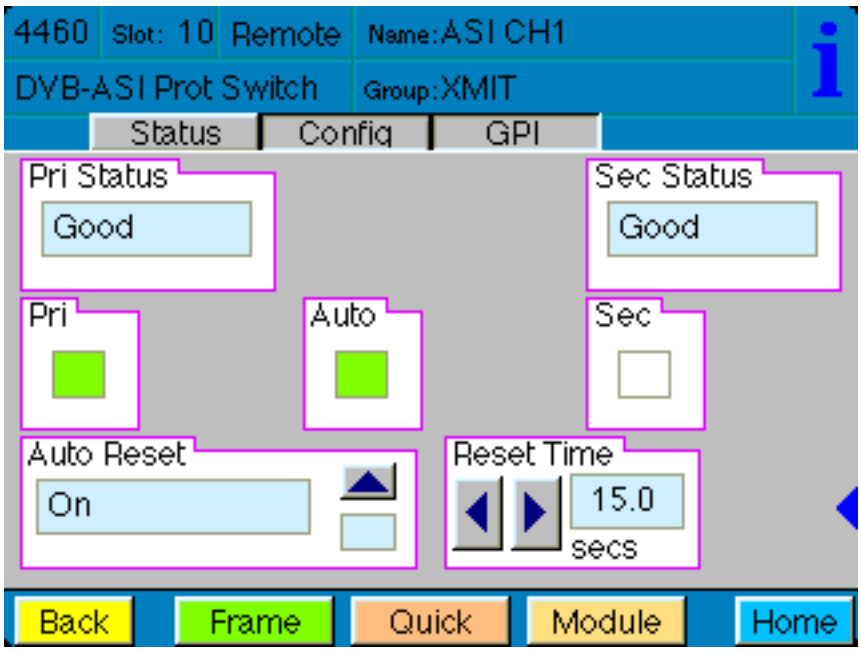
Avenue Touch Screen Remote Configuration

The Avenue Touch Screen remote control status menus for this module are illustrated and explained below. For more information on using Avenue Touch Screen, refer to the Avenue Touch Screen data pack that came with the option.

4460 Avenue Touch Screen Menus

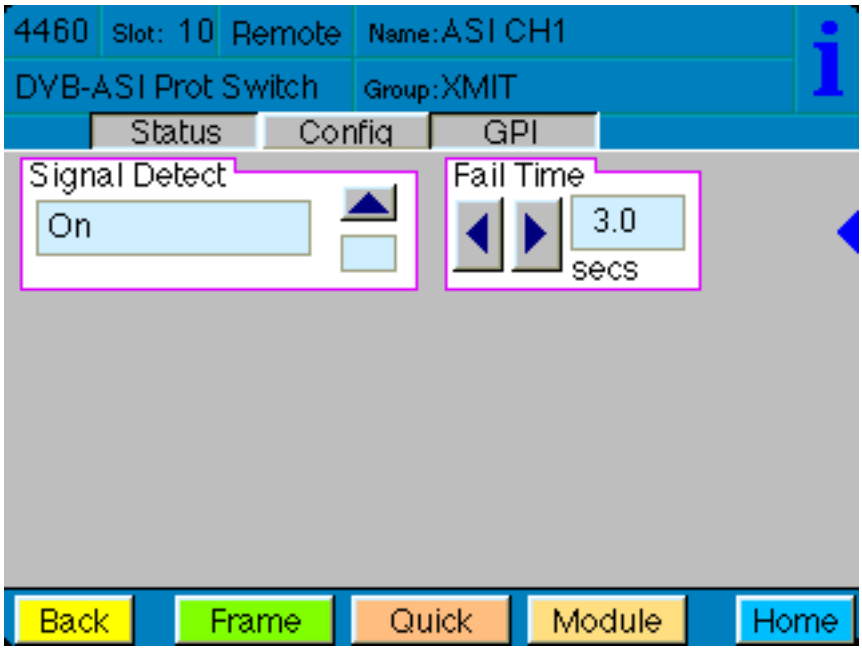
The **Status** menu screen shown below displays overall status of selected parameters on both the Primary and Secondary inputs as Green = Good, Red = Bad, Gray = Not enabled. It also allows you to set the Auto Reset and Reset Time controls for the switching function.

- **Pri** – lights green when the **Primary** input is selected to the output. Press this switch control to select the **Primary** as the output.
- **Auto** – lights green when **Auto** is turned on. Switch **Auto** on and off with this switch control. When **Auto** is on, the module will automatically switch to the Secondary input if the Primary fails and the Secondary is good.
- **Sec** – lights red when the Secondary input is selected to the output. Press this switch control to select the Secondary as the output.
- **Auto Reset** – set to on or off to determine if the switch will automatically switch back to the Primary after it recover.
- **Reset Time** – set the amount of time the Primary signal must be good before the auto reset switches back to Primary from Secondary.



The **Config** menu screen shown below allows enabling and disabling of signal detection on the module and the setting of fail time in seconds. Selecting **On** sets the module as active. Set the **Fail Time** to determine how long a loss of the primary signal parameters must occur before switching to the secondary output.

- **Signal Detect** – Set the signal detection to **On** or **Off.**
- **Fail Time** – Set the amount of time in **secs** that primary signal parameters are in failure before it will switch to secondary input.



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The Primary or Secondary GPI input can be set to one of the following:

- **Off** – disables the GPI input.
- **Neg Edge Switch** – switch on a low-going transition to the GPI input
- **Ext Fault Low** – acts in conjunction with the status of the input signal to the module when Signal Detect is turned on in the Config menu. In this case, a loss of signal to the module or a low signal detected from an external device will close the switch.

Other Config menu selections and indications are the following:

- **Pri GPI Mode** – Set the Primary GPI switch mode to one of modes explained above.
- **Pri GPI Status** – Reports the status of the GPI inputs as one of four states.
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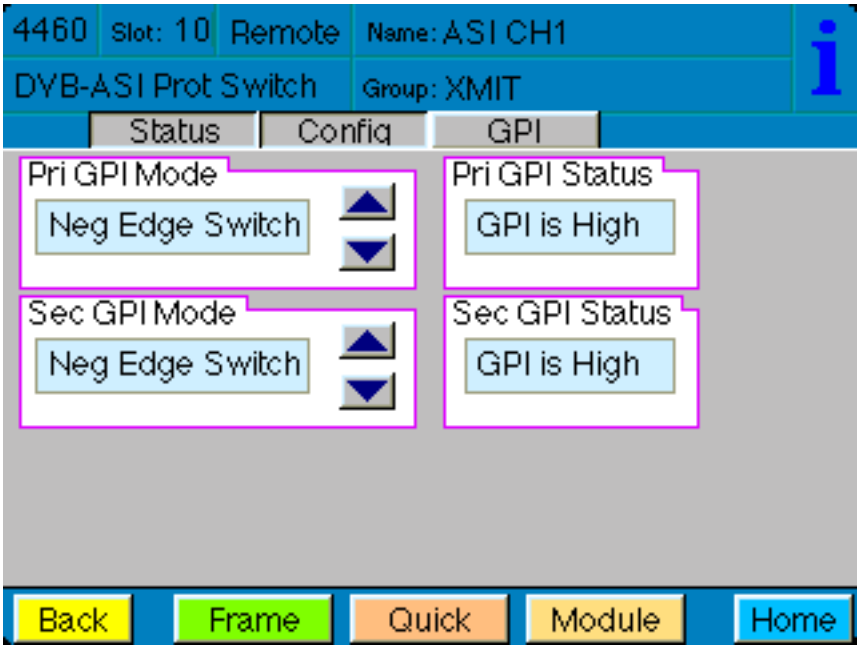
- **Good** – the signal is considered good for the tests currently enabled (Signal Detect and GPI Mode).
- **Sig Fai**l – the input signal has failed the Signal Detect test.
- **GPI Fail** – The input has failed the GPI test (GPI mode is set to Ext Fault Low and GPI is low.
- **All Fail** – both Signal Detect and GPI have failed.



TROUBLESHOOTING

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

If using the **Remote** mode, the following status items can be monitored using the Avenue Touch Screen Control Panel or PC Application:

- Input status
- Power status
- Slot ID, Software Version and Board Revision

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

No status lights are lit on front panel:

- Check that frame power is present (green LED{s} on frame power supplies).
- Check that module is firmly seated in frame. Try removing it and plugging it in again.

Can't control module:

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

No signal out of module:

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

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

http://www.ensembledesigns.com/support

SOFTWARE UPDATING

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

WARRANTY AND FACTORY SERVICE

Warranty

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

Factory Service

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

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

Ensemble Designs, Inc.
Attention: Customer Service RMA #####
870 Gold Flat Rd.
Nevada City, CA. 95959 USA
(530) 478-1830
Fax: (530) 478-1832
service@endes.com
http://www.ensembledesigns.com

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

SPECIFICATIONS

4460 ASI Protect Switch

Input Signal:

Number:	Two
Signal Type:	DVB-SSI, DVB-ASI @ 270 Mb/s or SMPTE 310M
Impedance:	75 Ω
Return Loss:	>15 dB DC to 270 MHz

Loopback:

Number:	Two
Impedance:	75 Ω

Protect Output Signal:

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

General Specifications:

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

Due to ongoing product development, all specifications subject to change.