AVENUE

Avenue™ signal integration system

Model 5460 Serial Digital Protection Switch Data Pack

ENSEMBLE DESIGNS

Revision 4.2 SW v2.2.0

This data pack provides detailed installation, configuration and operation information for the **5460 Serial Digital 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 5460 Serial Digital Protection Switch module is a fail-safe protection switch for monitoring and switching critical digital paths. 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 module is available from the factory in two switching configurations, a passive or an active switch design. 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 generate an alarm 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.

If the output of the passive switch is not properly terminated, the switch will continuously flip-flop between the Primary and Secondary inputs. This will not occur with the active switch as there is internal buffering.

In the case of the passive switch, an input is directly connected to the output through a relay contact without buffering. Thus, a loss of proper termination of the output will be seen by the 5460 circuitry. Failure of the output termination will cause the 5460 to sense the signal as having a fault due to the improper termination. If the module is set for Auto Changeover or Auto Reset, loss of proper termination will cause a flip-flopping of the 5460 Protect Switch. When the faulty signal is sensed, the Secondary input will be switched to the output. An internal terminating resistor is now connected to the Primary input and this input is now sensed as correct, while the Secondary is now unterminated and is sensed as having a fault. While this is usually not a matter of concern in daily operation as the output is properly terminated, it can produce unexpected results if the switch is installed and powered up without a properly terminated cable.

The 5460 monitors the integrity of the 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 four parameters, in order of increasing complexity:

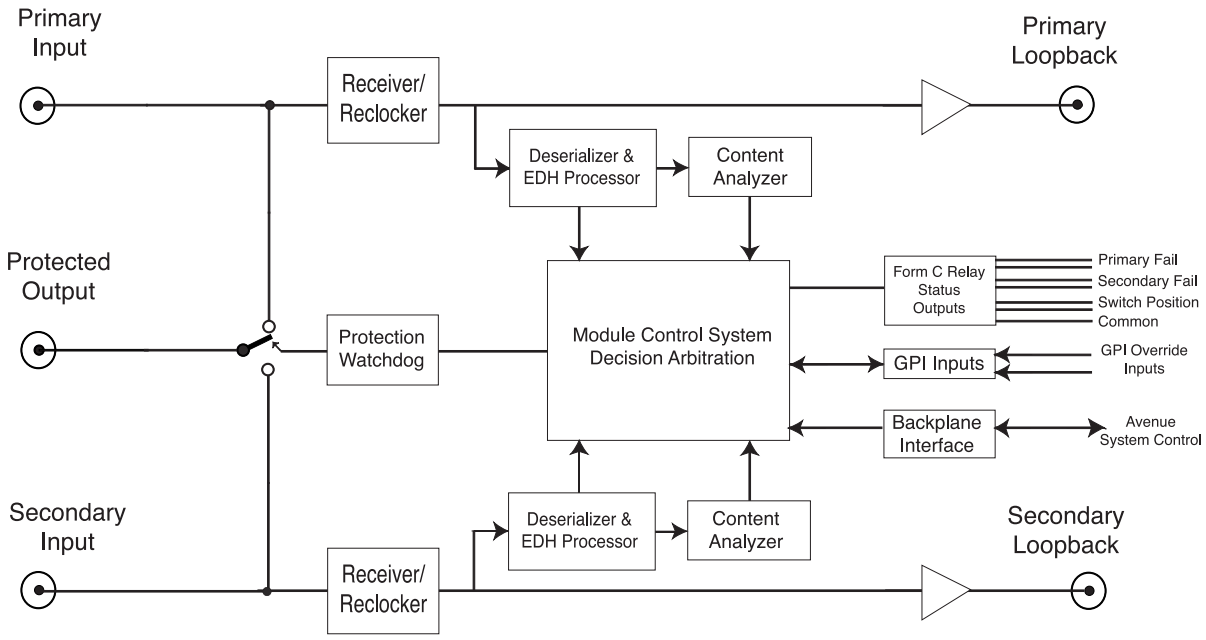
- **Timing Reference Signal (TRS)** – This parameter checks for the persistent loss of digital sync by looking for the correct Timing Reference Signal carried in the serial video stream. When this digital sync format is correct, the signal is considered good.
- **Black** – Black detection is based on three configurable parameters, black level threshold, black pixel count, and black duration time. All of these parameters can be set using the menu system to meet the needs of specific video signal inputs. See below for greater black detection detail.
- **Embedded Audio** – This parameter will look for correctly configured embedded audio packets in the horizontal intervals of the signals. The actual audio content of the packets is further analyzed to detect silence. Specific audio parameters, such as audio group and silence threshold level and audio silence duration can be configured in the Avenue PC and Touch Screen menus.
- **Error Detection and Handling (EDH)** – This parameter tests the incoming 601 video for EDH errors by checking the checksums to detect bit errors.
- **Freeze** – This parameter checks for a freeze condition as determined by the settings made in the **Freeze** menu.

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 area of the picture checked is determined by selecting **Small Window** which is approximately two thirds of the picture width and height, or **Big Window** which covers about 90% of the width and height. This allows a corner Bug to be either excluded or included in the detection process.

Black detection is performed on a pixel by pixel basis within the selected window, with user selectable **Detect Level** and **Blk Frac** adjustments. Pixels above the **Detect Level** are considered as being non-black. **Blk Frac** sets the percentage of pixels which must be non-black. If **Detect Level** is set to 12 IRE and **Blk Frac** is set to 10% then we expect there to be pixel levels above 12 IRE for more than 10% of each frame. Suppose for example, we set **Blk Time** to 3 seconds. Should less than 10% of the pixels in each frame be above the selected 12 IRE level for a period of 3 seconds, a switch would occur.

Pri Valid and **Sec Valid** are dynamic values based on incoming video. In the above example, if **Pri Valid** fell below **Blk Frac** continuously for 3 seconds there would be a switch, provided of course that we have valid secondary video. Note however, that the display may not keep pace with short duration transitions of actual video. In our example, a blip above 12 IRE for a single frame every 2 seconds would prevent a switch from taking place, as the 3 second count would reinitialized by these valid frames.

As illustrated in the block diagram below, the module maintains simple input paths. 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.



5460 Serial Digital Protection Switch

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 multiple parameters and characteristics of the signal in order to arrive at a fault decision. Detection of TRS and EDH errors is done in a Receiver/Reclocker circuit which produces a reclocked serial output feeding a Deserializer circuit. The output of this section then feeds a Field Programmable Gate Array (FPGA) where the signals are vetted, or tested for configured parameters. The Signal Vetter™ process in the FPGA detects the parameters chosen by the user using either the front panel controls or through the Avenue PC or Touch Screen menus. Each of the chosen aspects are independently monitored and when they fail to meet the vetted standard, a fault condition is issued.

Fault conditions can be monitored with an external 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).

Two GPI Override Inputs are available to allow changing switch position in response to triggers from an external source. This can be used to manually reset the switch after the Primary has recovered from a fault condition or set to respond to a signal state from an external device to trigger a switch.

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.

Every function and parameter on the module can be controlled from an Avenue Touch Screen Control 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.

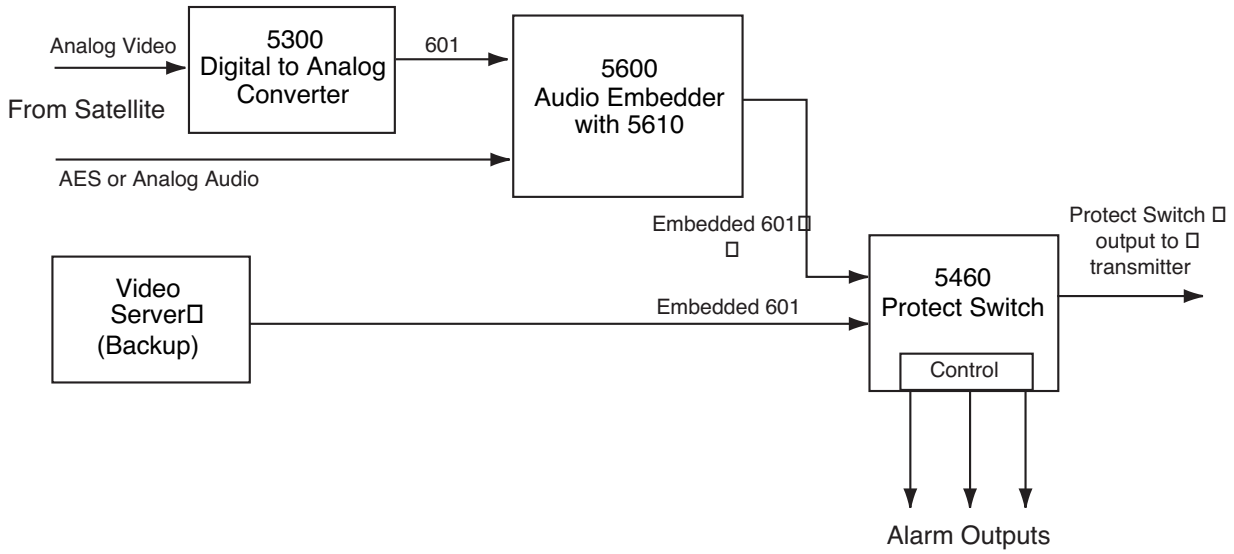
Modules at software version 2.2.0 or later support SNMP (Simple Network Management Protocol) monitoring. For each applicable signal processing module, module, signal, and reference status are reported. For complete details on using SNMP monitoring, refer to the **Avenue System Overview** in the manual that accompanies each frame.

APPLICATIONS

Auto Switched Conversion Application

As shown in the application below, a typical use for the 5460 module would be to use it in conjunction with the 5300 Analog to Digital Converter module and the 5600 Audio Embedder module to form a fully redundant, auto-switched conversion chain. The Primary input is backed up with a Secondary input from a video server.

Relay circuits accessible from the 15-pin D Control connector on the rear backplane can be connected to alarms for monitoring Primary and Secondary status and switch position.



Redundant Auto-Switched Conversion With 5460 Module

INSTALLATION

Plug the 5460 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.

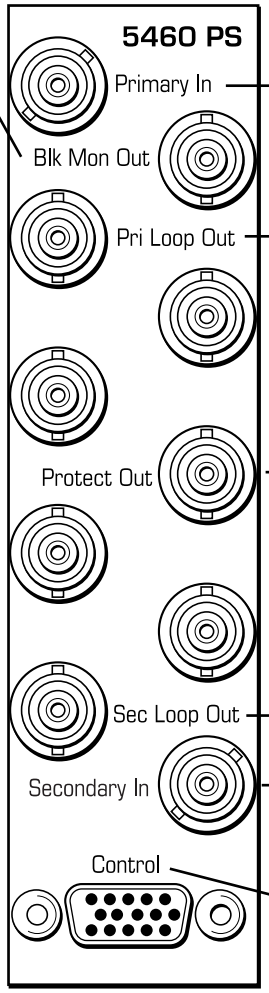
CABLING

Refer to the 3 RU and 1 RU backplane diagrams of the module on the following page for cabling instructions. Note that unless stated otherwise, the 1 RU cabling explanations are identical to those given in the 3 RU diagram. Be sure to read the **Important Note** at the top of the page about proper output terminating.

IMPORTANT NOTE: All channel output destinations must be terminated properly. Improper termination will affect the integrity of the sync signal and cause errors. Be sure any unused inputs to distribution amplifiers or other destinations are terminated.

3 RU Backplane

The **Blk Mon Out** BNC displays a 2-level black and white diagnostic signal showing the Black Threshold level when the Freeze Detect control is off. When Freeze Detect is on, this output is invalid.



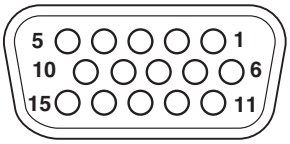
Connect the primary digital signal to the **Primary In** BNC and loop the **Pri Loop Out** BNC to another destination in the facility if necessary.

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.

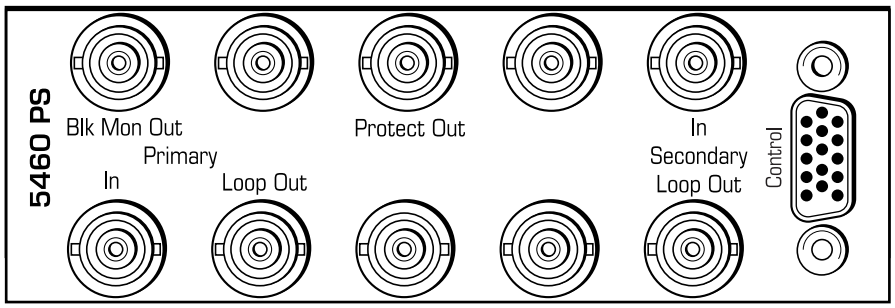
Pinouts for the 15-pin **Control** connector for status monitoring and GPI inputs are given in the table at left.

Control



Pin	Function
1	Pri NC
2	Pri NO
3	Gnd
4	Pri Com
5	Sec NO
6	Gnd
7	Sec NC
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

1 RU Backplane



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 preceding illustration.

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.

Because both the NO and NC connections are provided, it is possible to have independent status lines for each of the two states of a status signal. For example, if the jumper is set to **+5V**, the Primary NO output will source +5V when the relay is in the normal position (Signal Failed) and the Primary NC output will source the +5V when the relay is closed (Signal Good). Additionally in the case of selecting **+5V** as the common, the 1k Ω resistor on the module will act as a current limiter, allowing the direct connection of ordinary LEDs to each of these output pins. A green LED could be connected to the NC output and a red LED to the NO output. This provided very complete and explicit indication to the operator as to the signal status.

Also available through the **Control** connector are two Override GPI inputs that when closed to ground, will force the switch to either Primary or Secondary. The GPI inputs are edge-triggered on a negative pulse, or simply a falling edge. These inputs may also be used to switch back to the Primary after a fault has cleared.

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 **5460 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. It also provides the default User Levels for each control. These levels can be changed using the Avenue PC application.

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 **5460 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.

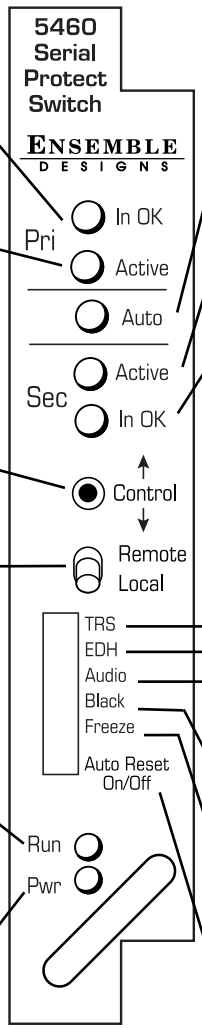
For setting the parameters remotely using the Avenue Touch Screen option, refer to the **Avenue Touch Screen Remote Configuration** section of this data pack following Avenue PC.

5460 Parameter Table

CONTROL	LOCAL	REMOTE	DEFAULT	USER LEVEL
Auto Reset	Switch 6: On Off	On Off	On	Admin
Reset Time	15 seconds	0 - 60 seconds	15 seconds	Admin
TRS	Switch 1: On Off	Off Lenient Strict	Lenient	Admin
EDH	Switch 2: On Off	Off Lenient Strict	Lenient	Admin
Audio Detect	Switch 3: On Off	On Off	On	Admin
Black Detect	Switch 4: On Off	On Off	On	Admin
Freeze Test	Switch 5: On Off	Off Clean Source Noisy Source	Off	Admin
Sec Test Enable	On	On Off	On	Admin
Window	Big	Small Big	Big	Admin
Black Time	3 sec	0 – 20 sec	3 sec	Admin
Detect Level	10 IRE	0 – 100 IRE	10 IRE	Admin
Black Fraction	50%	0 – 100%	50%	Admin
Audio Group	Group 1	Group 1 Group 2 Group 3 Group 4	Group 1	Admin
Audio Threshold	–38 dB	–20 dB –30 dB –38 dB –46 dB	–38 dB	Admin
Audio Time	3 sec	0 – 20 sec	3 sec	Admin
Audio Channel Enable	Enabled Enabled Disabled Disabled	Ch1 enable/disable Ch2 enable/disable Ch3 enable/disable Ch4 enable/disable	Enabled Enabled Disabled Disabled	Admin
Freeze Time	3 sec	0 – 20 sec	3 sec	Admin
Pri GPI Mode	Neg Edge Switch	Off Neg Edge Switch Ext Fault Low Ext Inhibit Low	Neg Edge Switch	Admin
Memory Registers	Last Saved	1 – 5	Last Saved	Admin

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:
Momentary switch to set output to Primary (Up) or Secondary (Down).

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

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

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

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.

TRS switch:
Select **On** (left) to monitor for TRS error condition as fault or **Off** (right) for no TRS testing.

EDH switch:
Select **On** (left) to monitor for EDH error condition as fault or **Off** (right) for no EDH testing.

Audio switch:
Select **On** (left) to detect audio silence condition as fault or **Off** (right) for no audio detection.

Black switch:
Select **On** (left) to detect black condition as fault or **Off** (right) for no black detection.

Freeze switch:
Select **On** (left) to detect freeze condition as fault or **Off** (right) for no freeze 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.

Avenue PC Remote Configuration

The Avenue PC remote control status menus for this module are illustrated and explained below. Refer to the **5460 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.

5460 Avenue PC Menus

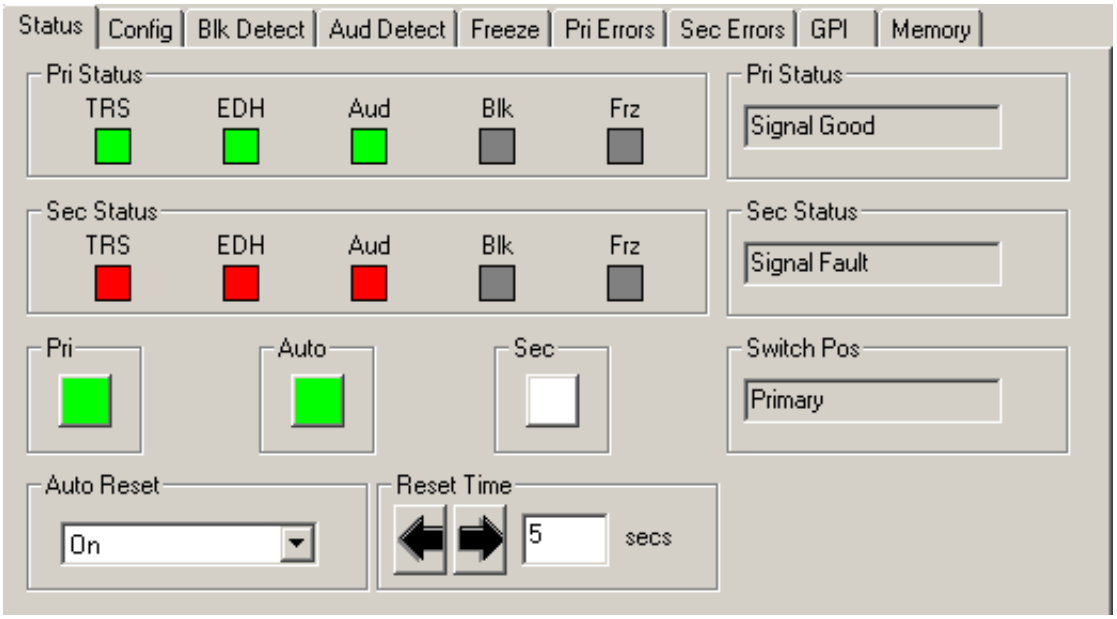
The **Status** menu screen shown below displays overall status of selected parameters on both the Primary and Secondary inputs as Green = Good, Red = Bad, Gray = Not enabled. It allows you to set the **Auto Reset** and **Reset Time** controls for the switching function.

- **Pri Status** – shows the status of the Primary Timing Reference Signal (**TRS**), Error Detection Handling (**EDH**), embedded audio present and correct (**Aud**), black detected as defined in the **Black Detect** menu (**Blk**), and if frozen video is detected as defined in the **Freeze** menu (**Frz**).

  The **Pri Status** window on the right will display the status of the Primary and can be monitored with the Avenue PC alarm function.

- **Sec Status** – shows the status of the Secondary Timing Reference Signal (**TRS**), Error Detection Handling (**EDH**), embedded audio present and correct (**Aud**), and black detected as defined in the **Black Detect** menu (**Blk**), and if frozen video is detected as defined in the **Freeze** menu (**Frz**).

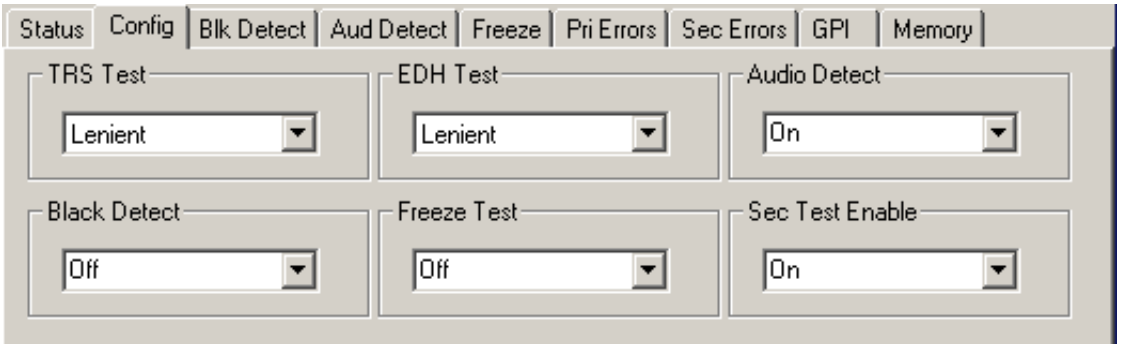
  The **Sec Status** window on the right will display the status of the Secondary and can be monitored with the Avenue PC alarm function.



- **Switch Pos** – the status window will indicate the current position of the protect switch. This window can be monitored by the Avenue PC alarm 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 shown below allows you to configure the various condition detectors:

- **TRS Test** – enable the test for any Timing Reference Signal (TRS) errors. **Off** sets the input for no TRS test, **Lenient** allows occasional TRS errors to be ignored (10 frames in a row), or **Strict** detects any TRS error as a fault.
- **EDH Test** – enable the test for any Error Detection Handling (EDH) errors. **Off** sets the input for no EDH test, **Lenient** allows occasional EDH errors to be ignored (10 frames in a row), or **Strict** detects any EDH error as a fault.
- **Audio Detect** – enable the test for embedded audio. **On** detects an audio condition as determined by the settings made in the **Aud Detect** menu, or **Off** sets the input for no audio test.
- **Black Detect** – enable the test for black detection. **On** detects black present as defined by the settings made in the **Blk Detect** menu, or **Off** sets the input for no black test.
- **Freeze Test** – enable the test for a freeze condition as determined by the settings made in the Freeze menu. **Off** sets the input for no freeze test, **Lenient** allows occasional freeze errors to be ignored, or **Strict** detects any freeze error as a fault.
- **Sec Test Enable** – enable the test for checking the status of the Secondary input. When **On**, the Secondary status will be checked for the same configuration tests as assigned for the Primary. When all matching configuration items are valid, the input will switch to the Secondary input.

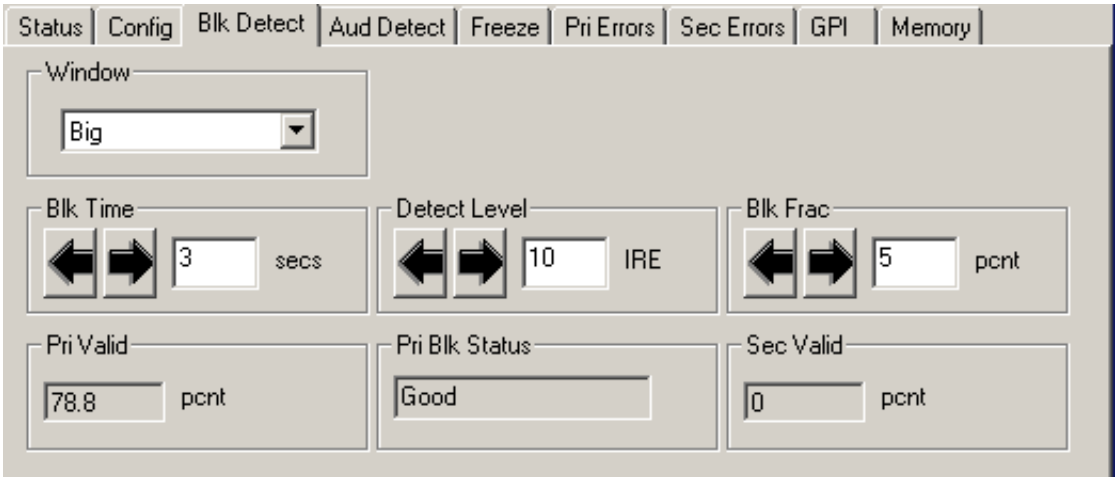


The **Blk Detect** menu shown below allows you to configure the following black detector parameters:

- **Window** – select **Big** or **Small**. **Big** examines nearly the entire raster. **Small** limits the test to a smaller portion of the raster (somewhat smaller than Safe Title limits).
- **Blk Time** – select the amount of time from one frame to 20 seconds that the signal must be continuously in black before the protect switch (and alarm) is generated.
- **Detect Level** – set the video value from 0 to 100 IRE below which a pixel is considered to be black.
- **Blk Frac** – set the percentage of pixels in the detection window that must satisfy the detection level parameter.

The following status displays are also provided and can be monitored with Avenue PC alarms:

- **Pri Valid** – shows the portion of the Primary input which currently exceeds the **Detect Level** parameter. This display will track the actual video content.
- **Pri Blk Status** – shows the status (**Good** or **Bad**) of the Primary black signal.
- **Sec Valid** – shows the portion of the Secondary input which currently exceeds the **Detect Level** parameter. This display will track the actual video content.

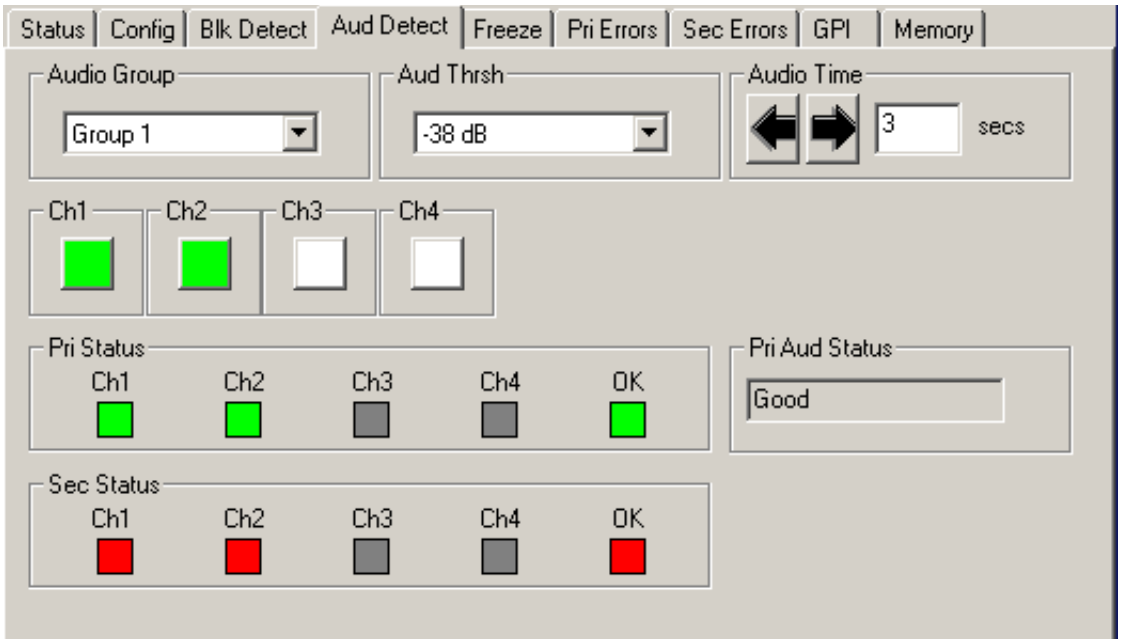


The **Aud Detect** menu shown below allows you to configure the following audio parameters:

- **Audio Group** – select which embedded audio group (**Group 1 – 4**) to detect.
- **Aud Thrsh** – select the silence detection level from –46 to –20 dB.
- **Audio Time** – set the time that the channels must be continuously silent before an alarm is trigged (0 – 20 seconds). Note that a loss of embedded audio will cause an immediate switch, regardless of this setting.
- **Ch1, Ch2, Ch3, Ch4** – enable or disable Channels 1 – 4. Each embedded group contains four audio channels. Sensing for each channel can be enabled separately.

The following status displays are also provided:

- **Pri Status** – shows the status of the four audio channels embedded in the Primary signal. Green indicates Channel OK, red indicates silence and gray indicates channel not enabled. An **OK** indicator shows the overall result of the test for all the channels enabled.
- **Sec Status** – shows the status of the four audio channels embedded in the Secondary signal. Green indicates Channel OK, red indicates silence and gray indicates channel not enabled. An **OK** indicator shows the overall result of the test for all the channels enabled.
- **Pri Aud Status** – shows the overall status of the audio channels embedded in the Primary signal. This window can be monitored by the Avenue PC alarm function.



The **Freeze** menu shown below allows you to configure the following parameter for a video freeze condition:

- **Freeze Mode** – set the freeze detection for **Clean Source**, **Noisy Source**, or **Off**.
- **Freeze Time** – enable the amount of time in seconds for the protect switch to switch to the Secondary input after a video freeze condition is detected.

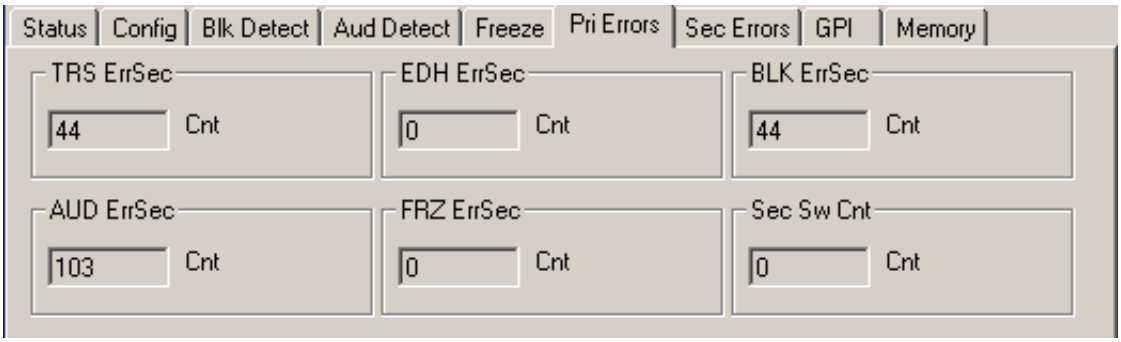
The following status indicators can be monitored by Avenue PC alarm functions.

- **Pri Frz Status** – indicates the freeze status of the Primary as **Frozen** or **Un-Frozen**.
- **Sec Frz Status** – indicates the freeze status of the Secondary as **Frozen** or **Un-Frozen**.

  Note: If either **Noisy Source** or **Clean Source** are selected, with Freeze test set to **Off** in the Configuration menu, use of Avenue PC alarms is allowed without activating a switch to the Secondary Source. Primary and Secondary Freeze Error Counts are then active.

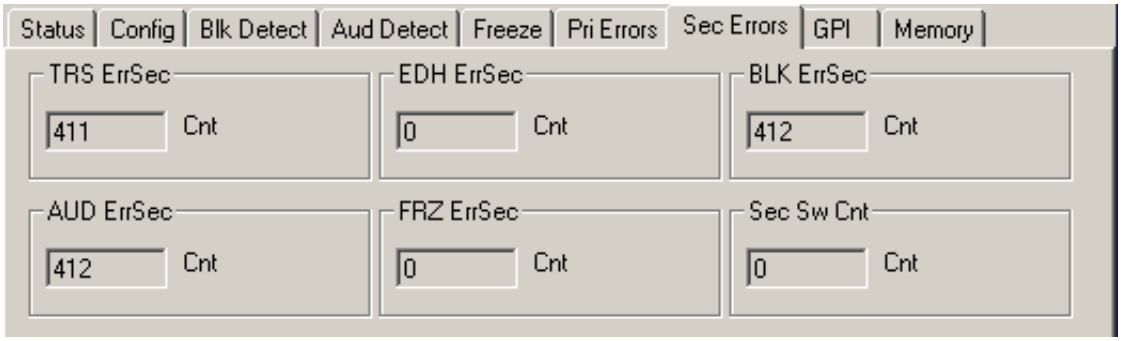
The **Pri Errors** menu shown below displays the amount of time in seconds that each of the enabled error conditions have been present after detection on the Primary and the number of times the Primary has switched to the Secondary (**Sec Sw Cnt**).

(Note that a freeze condition set for **Lenient** will take approximately 6 seconds for detection and a **Strict** freeze detection will take approximately 4 seconds.)



The **Sec Errors** menu shown below displays the amount of time in seconds that each of the enabled error conditions have been present after detection on the Secondary and the number of times the Primary has switched to the Secondary (**Sec Sw Cnt**).

(Note that a freeze condition set for **Lenient** will take approximately 6 seconds for detection and a **Strict** freeze detection will take approximately 4 seconds.)

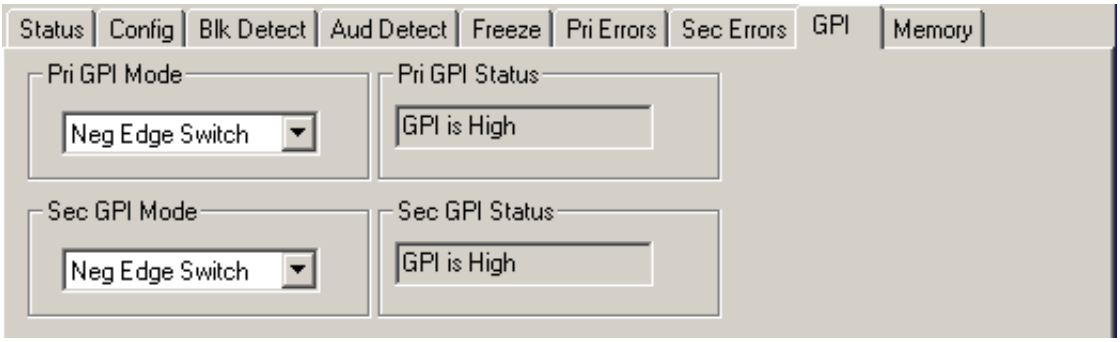


The 5460 can be set up to allow an external device to trigger a switch through the GPI interface. The **GPI** menu screen shown below allows configuration of the two external GPI inputs to the module.

The Primary and Secondary GPI Modes 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. In this case, a loss of proper signal to the module or a low signal detected from an external device will close the switch.
- **Ext Inhibit Low** – acts to prevent a switch regardless of the status of the input signal to the module. In this case, a loss of proper signal will not cause a switch.

Status of the Pri GPI and Sec GPI inputs are indicated as **GPI is Low** or **GPI is High** in the **Pri GPI** and **Sec GPI Status** window.



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

- Select **Save**, then one of the five memory registers **Reg 1 – 5**. The box will turn green. The entire module setup is now saved in the selected register.
- To recall a register, select the register box. If there is information saved, the box will turn green. The saved setup will now be loaded to the module. Up to five different module setups can be saved and recalled using the individual registers.

Avenue Touch Screen Remote Configuration

The Avenue Touch Screen remote control status menus for this module are illustrated and explained below. Refer to the **5460 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 that came with the option.

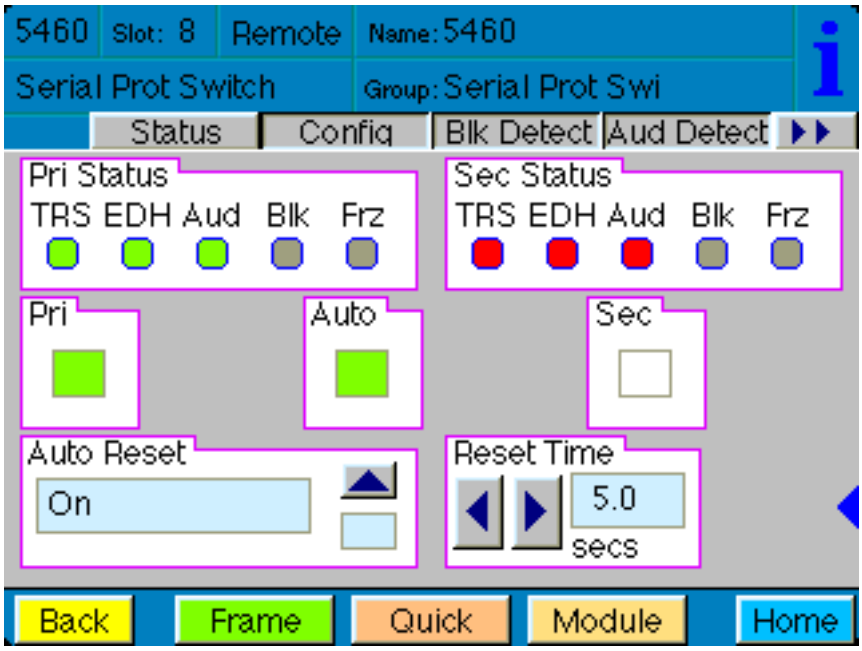
Parameter fields that are grayed out can indicate one of the following conditions:

- 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.

5460 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.

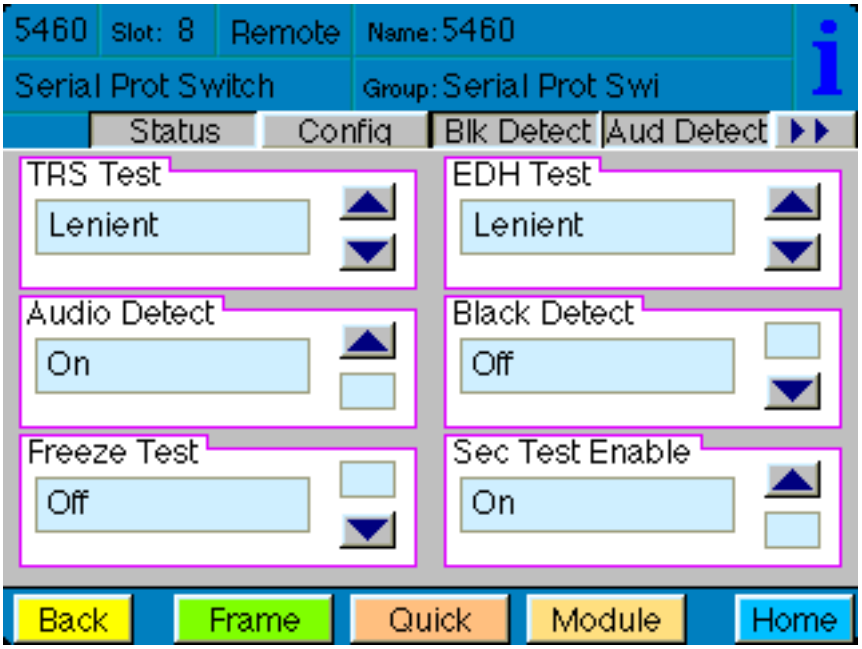
- **Pri Status** – shows the status of the Primary Timing Reference Signal (**TRS**), Error Detection Handling (**EDH**), embedded audio present and correct (**Aud**), black detected as defined in the **Black Detect** menu (**Blk**), and if frozen video is detected as defined in the **Freeze** menu (**Frz**).
- **Sec Status** – shows the status of the Secondary Timing Reference Signal (**TRS**), Error Detection Handling (**EDH**), embedded audio present and correct (**Aud**), and black detected as defined in the **Black Detect** menu (**Blk**), and if frozen video is detected as defined in the **Freeze** menu (**Frz**).
- **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 shown below allows you to configure the various condition detectors:

- **TRS Test** – enable the test for any Timing Reference Signal (TRS) errors. **Off** sets the input for no TRS test, **Lenient** allows occasional TRS errors to be ignored, or **Strict** detects any TRS error as a fault.
- **EDH Test** – enable the test for any Error Detection Handling (EDH) errors. **Off** sets the input for no EDH test, **Lenient** allows occasional EDH errors to be ignored, or **Strict** detects any EDH error as a fault.
- **Audio Detect** – enable the test for embedded audio. **On** detects an audio condition as determined by the settings made in the **Aud Detect** menu, or **Off** sets the input for no audio test.
- **Black Detect** – enable the test for black detection. **On** detects black present as defined by the settings made in the **Blk Detect** menu, or **Off** sets the input for no black test.
- **Freeze Test** – enable the test for a freeze condition as determined by the settings made in the Freeze menu. **Off** sets the input for no freeze test, **Lenient** allows occasional freeze errors to be ignored, or **Strict** detects any freeze error as a fault.
- **Sec Test Enable** – enable the test for checking the status of the Secondary input. When **On**, the Secondary status will be checked for the same configuration tests as assigned for the Primary. When all matching configuration items are valid, the input will switch to the Secondary input.

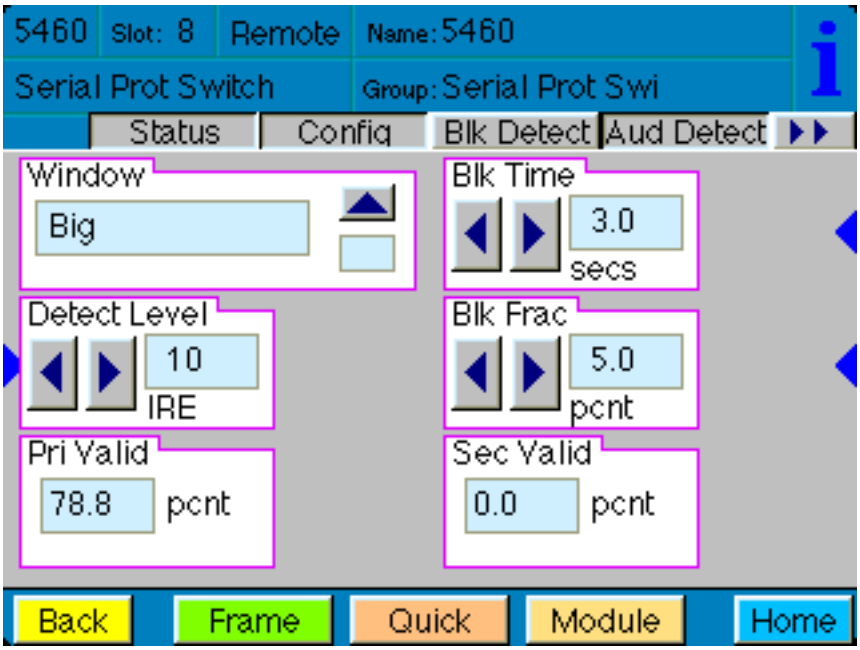


The **Blk Detect** menu shown below allows you to configure the following black detector parameters:

- **Window** – select **Big** or **Small**. **Big** examines nearly the entire raster. **Small** limits the test to a smaller portion of the raster (somewhat smaller than Safe Title limits).
- **Blk Time** – select the amount of time from one frame to 20 seconds that the signal must be continuously in black before the protect switch (and alarm) is generated.
- **Detect Level** – set the video value from 0 to 100 IRE below which a pixel is considered to be black.
- **Blk Frac** – set the percentage of pixels in the detection window that must satisfy the detection level parameter.

The following status displays are also provided:

- **Pri Valid** – shows the portion of the Primary input which currently exceeds the Detect Level parameter. This display will track the actual video content.
- **Sec Valid** – shows the portion of the Secondary input which currently exceeds the Detect Level parameter. This display will track the actual video content.

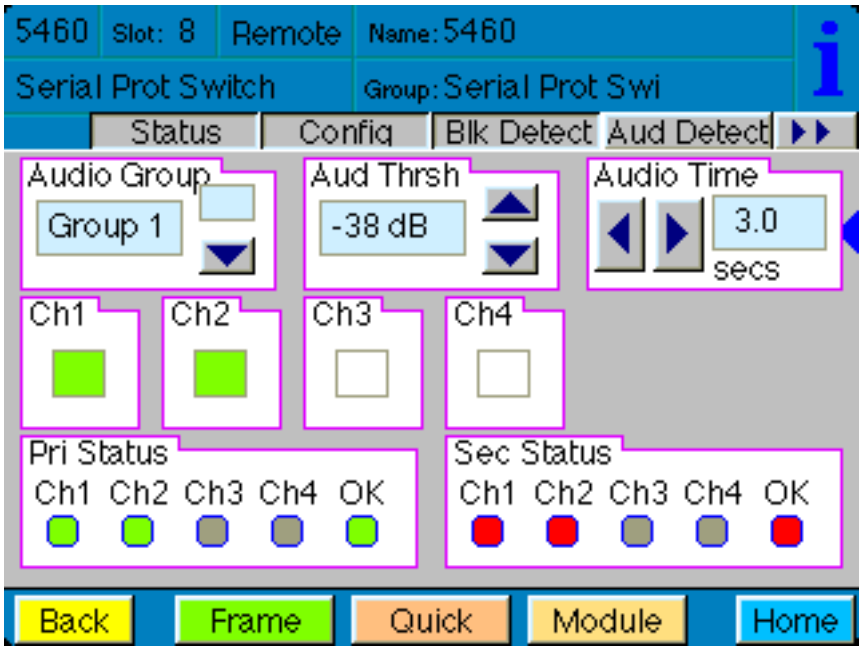


The **Aud Detect** menu shown below allows you to configure the following audio parameters:

- **Audio Group** – select which embedded audio group (**Group 1 – 4**) to detect.
- **Aud Thrsh** – select the silence detection level from –46 to –20 dB.
- **Audio Time** – set the time that the channels must be continuously silent before an alarm is trigged (0 – 20 seconds). Note that a loss of embedded audio will cause an immediate switch, regardless of this setting.
- **Ch1, Ch2, Ch3, Ch4** – enable or disable Channels 1 – 4. Each embedded group contains four audio channels. Sensing for each channel can be enabled separately.

The following status displays are also provided:

- **Pri Status** – shows the status of the four audio channels embedded in the Primary signal. Green indicates Channel OK, red indicates silence and gray indicates channel not enabled. An **OK** indicator shows the overall result of the test for all the channels enabled.
- **Sec Status** – shows the status of the four audio channels embedded in the Secondary signal. Green indicates Channel OK, red indicates silence and gray indicates channel not enabled. An **OK** indicator shows the overall result of the test for all the channels enabled.



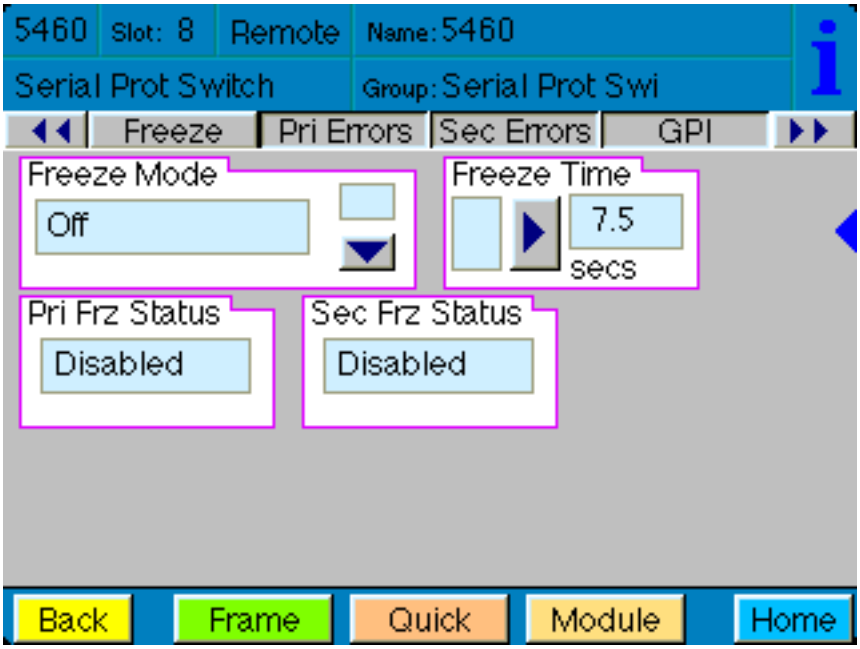
The **Freeze** menu shown below allows you to configure the following parameter for a video freeze condition:

- **Freeze Mode** – set the freeze detection for **Strict**, **Lenient**, or **Off**.
- **Freeze Time** – enable the amount of time in seconds for the protect switch to switch to the Secondary input after a video freeze condition is detected.

The following indicators give Primary and Secondary freeze status:

- **Pri Frz Status** – indicates the freeze status of the Primary as **Frozen** or **Un-Frozen**.
- **Sec Frz Status** – indicates the freeze status of the Secondary as **Frozen** or **Un-Frozen**.

  Note: If either **Noisy Source** or **Clean Source** are selected, with Freeze test set to **Off** in the Configuration menu, use of Avenue PC alarms is allowed without activating a switch to the Secondary Source. Primary and Secondary Freeze Error Counts are then active.



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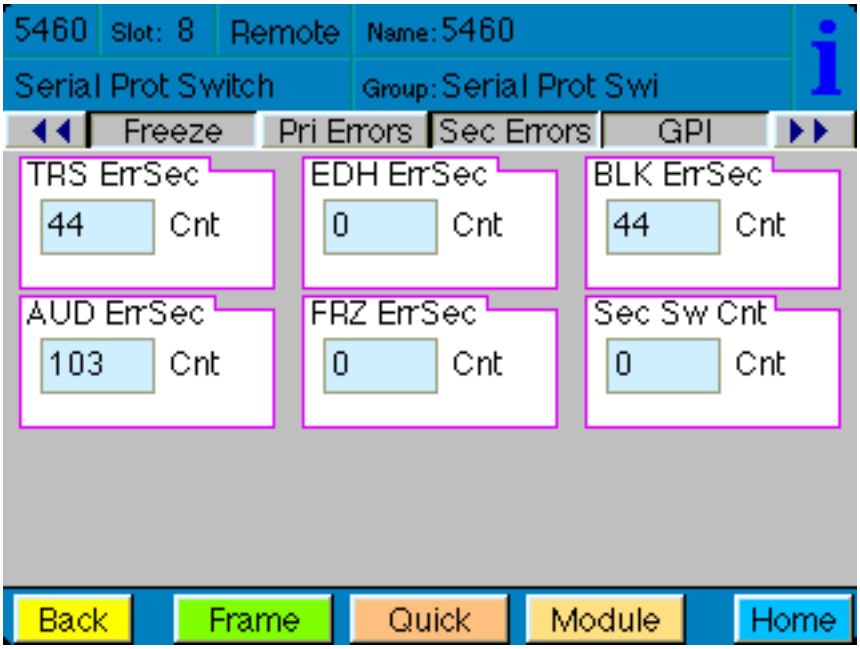

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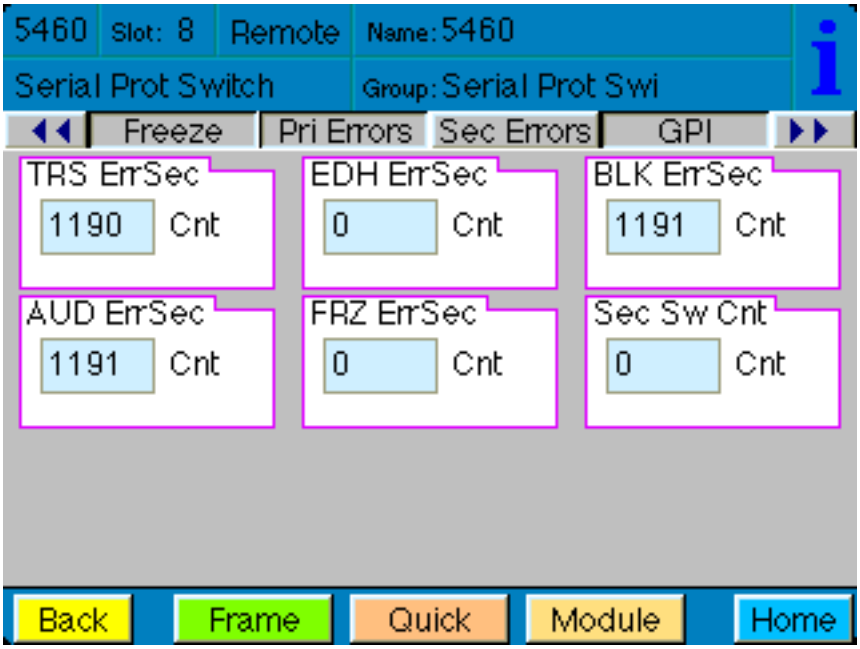

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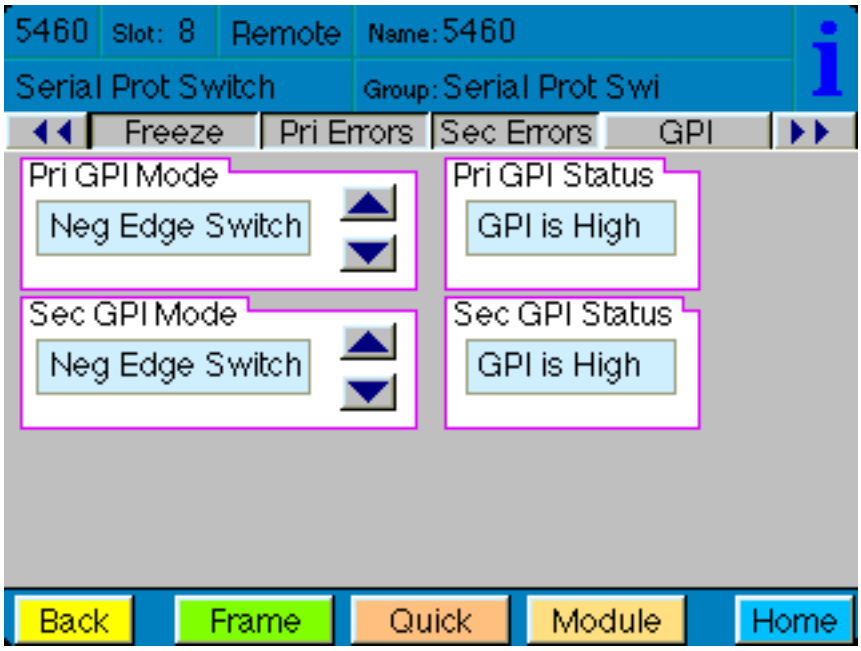

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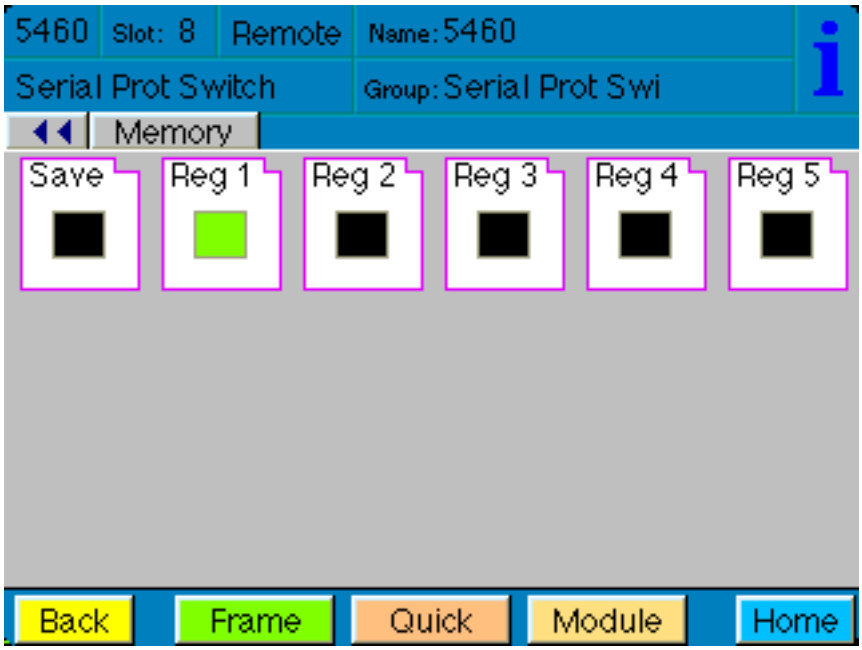

TROUBLESHOOTING

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

Refer to the overall troubleshooting tips given below for the **5460** module:

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 presence and quality.
- Check cabling to input of module.

You may 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 UPDATING

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

WARRANTY AND FACTORY SERVICE

Warranty

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

Factory Service

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

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

Ensemble Designs, Inc.

Attention: Customer Service RMA #####

870 Gold Flat Rd.

Nevada City, CA. 95959 USA

(530) 478-1830

Fax: (530) 478-1832

service@ensembledesigns.com

http://www.ensembledesigns.com

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

SPECIFICATIONS

5460 Serial Protect Switch

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

Serial Digital Loopback:

Number:	Two
Impedance:	75 Ω

Serial Output Signal:

Number:	One
Signal Type:	Serial Digital (SMPTE 259M)
Impedance:	75 Ω

General Specifications:

Connectors:	BNC
Power Consumption:	< 5 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.