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## REVISION HISTORY

| REVISION | DESCRIPTION | DATE |
|---|---|---|
| 0.1 | Preliminary version | Jun 06 |
| 0.2 | Update to released firmware version 1.00 build 568 | Oct 06 |
| 0.3 | Updated GPIO Pinout Table 2-1 | Apr 07 |
| 0.4 | Updated specs and formatting | Sept 09 |

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# 1. OVERVIEW

The 7700R4x1-HD provides a convenient, low cost way to route high definition and standard definition serial digital signals. The 7700R4x1 can be used for 1.5Gbs, 270 Mbs, 360 Mbs, 540 Mbs, 177 Mb/s, DVB-ASI and 143 Mb/s serial digital signals. The module can also be used for SMPTE 310M (19.4 Mb/s) signals with the internal reclocker turned off. The 7700R4x1 features auto-equalized inputs with two re-clocked outputs. The 7700R4x1-HD is housed in the Evertz 7800FR or 7700FR-C Multiframe which are available in a 3RU or a 1RU version.

**Features:**

- Hot-swappable, front-loading modular 4x1 routing
- Full support for SMPTE 292M (1.5 Gb/s), SMPTE 259M (270, 360, 143 Mb/s) and SMPTE 344M (540 Mb/s)
- DVB-ASI compatible with all outputs maintaining polarity from input to output
- Non reclocking mode for SMPTE 310M (19.4 Mb/s)
- Features independant isolated outputs to ensure no cross channel loading effects (no need to terminate unused outputs)
- LEDs for signal presence and module health

**Inputs:**

- 4 Inputs
- SMPTE 292M (1.5 Gb/s), SMPTE 259M (270 Mb/s, 360 Mb/s, 143 Mb/s), SMPTE 344M (540Mb/s) and DVB-ASI
- SMPTE 310M (19.4 Mb/s) in non-reclocking mode
- Return Loss > 15 dB up to 1.5 Gb/s
- Automatic cable equalization up to 100m at 1.5 Gbs

**Outputs:**

- 2 re-clocked outputs
- Return loss > 15 dB up to 1.5 Gbs
- Wideband jitter < 0.2 UI

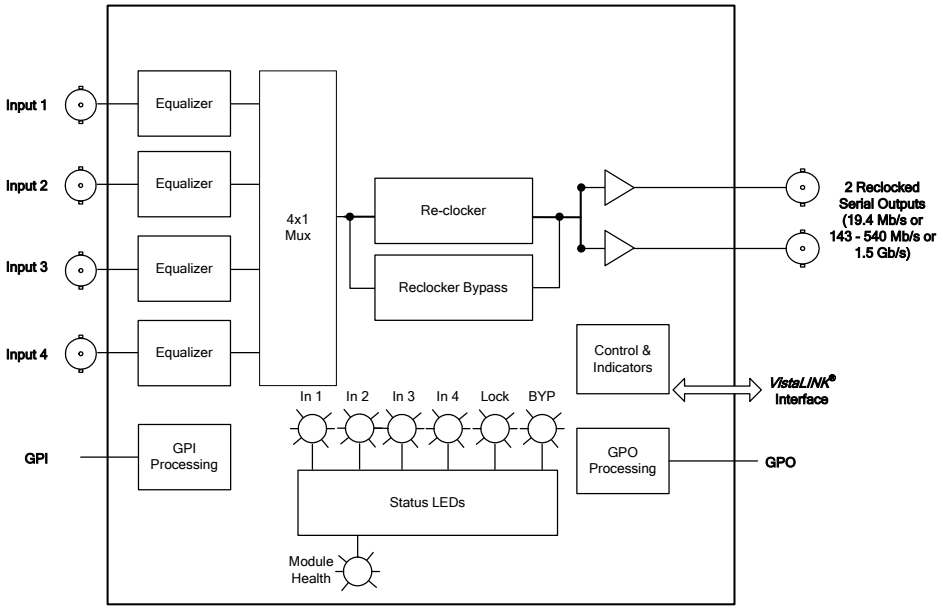


**Figure 1-1: 7700R4X1-HD Block Diagram**

# 2. INSTALLATION

The 7700R4X1-HD module comes with a companion rear plate that occupies one slot in the frame. For information on inserting the module into the frame see section 3 of the 7700FR chapter.

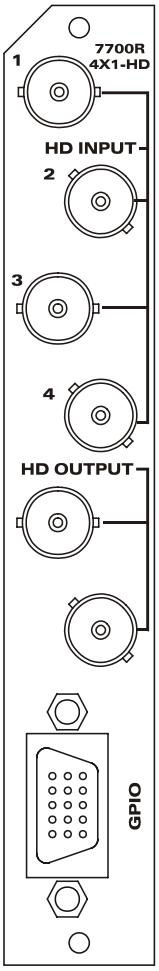


**Figure 2-1: 7700R4X1-HD Series Rear IO Module**

## 2.1. VIDEO CONNECTIONS

**INPUTS:** The input BNC connectors 1, 2, 3, and 4 will accept either HD, SD or DVB-ASI serial digital signals, supporting SMPTE 292M, SMPTE 259M, and SMPTE 344M. SMPTE 310M (19.4 Mb/s) is also supported in non-reclocking mode. All inputs can be programmed to auto sensing mode via the menu system.

**OUTPUTS:** The two reclocked BNC connectors are used to route the input video. Inputs can be routed via the card edge menu system or GPI contact closure.

## 2.2. GENERAL PURPOSE INPUTS & OUTPUTS

The high density female dB15 connector supports four general purpose inputs (GPI) and four general purpose outputs (GPO). The GPIs are edge triggered and default to falling edge detection, with internal pull-ups to either +5V or +12V DC, set by jumper J12 (refer to Figure 7-1). If an input is left floating (not connected) it will not be activated. GPIs can be activated by simply connecting the GPI input pins to ground using a button, switch, relay, or an open collector transistor. The GPOs are normally open relay contacts with a pull-up to 3.3V nominal. If the GPO is not activated, the level will remain floating. When activated, a maximum of 3.3 mA is supplied.

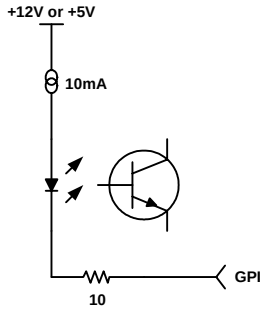


**Figure 2-2: Typical GPI Circuitry**

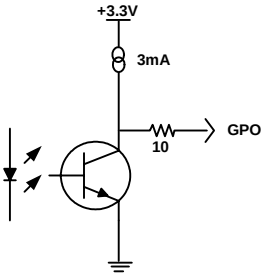


**Figure 2-3: Typical GPO Circuitry**

**GPI:** The GPIs are edge triggered and defined to route one of the four inputs to the two reclocked outputs. For example, activating GPI 1 will route input 1. If two GPIs are activated simultaneously, then the lower GPI is processed. For example, if GPI 1 and 4 are both activated at the same time, then GPI 1 is processed and input 1 will be routed. GPI pin assignments are defined in Table 2-1.

**GPO:** The GPOs indicate which of the four inputs have been routed. For example, if routing input 3, then GPO 3 will be active. In the event of a power failure, upon reboot Input 3 will remain routed and GPO 3 will remain active. GPO pin assignments are defined in Table 2-1.

**Both GPIs and GPOs need to be enabled. This can be done using the 7700R4X1-HD card edge menu system (refer to section 6.2.5 and 6.2.7)**

| High Density DB-15 PIN | 7700R4X1 ASSIGNMENT |
|---|---|
| | |
| 1 | GPI 1 |
| 2 | GPI 2 |
| 3 | GPI 3 |
| 4 | GND |
| 5 | GND |
| 6 | GPI 4 |
| 7 | Not Used |
| 8 | Not Used |
| 9 | GPO 2 |
| 10 | GPO 1 |
| 11 | Not Used |
| 12 | GPO 4 |
| 13 | GPO 3 |
| 14 | Not Used |
| 15 | Not Used |

**Table 2-1: High Density DB-15 GPIO Pin Assignments**

# 3. SPECIFICATIONS

## 3.1. SERIAL DIGITAL VIDEO INPUTS

**Standard:**
**Reclocking Mode:** SMPTE 292M, SMPTE 259M, SMPTE 344M, DVB-ASI
**Non reclocking Mode:** SMPTE 310M (19.4 Mb/s) to 1.5 Gb/s

**Number of Inputs:** 4
**Connector:** 1 BNC per IEC 61169-8 Annex A
**Equalization:** Automatic to 100m @ 1.5Gb/s with Belden 1694 or equivalent cable
Automatic to 300m @ 270Mb/s with Belden 8281 or equivalent cable
**Return Loss:** **>**15 dB up to 1.5GHz
**Wide Band Jitter:** < 0.2 UI

## 3.2. SERIAL DIGITAL VIDEO OUTPUTS

**Number of Outputs:** 2
**Standard:**
**Reclocking Mode:** SMPTE 292M, SMPTE 259M, SMPTE 344M, DVB-ASI
**Non reclocking Mode:** SMPTE 310M (19.4 Mb/s) to 1.5 Gb/s

**Connector:** BNC per IEC 61169-8 Annex A
**Signal Level:** 800mV nominal
**DC Offset:** 0V ±0.5V
**Rise and Fall Time:** 200ps nominal
**Overshoot:** < 10% of amplitude
**Return Loss:** > 15 dB up to 1.5 Gb/s
**Wide Band Jitter:** < 0.2 UI

## 3.3. GENERAL PURPOSE INPUTS AND OUTPUTS

**Number of Inputs:** 4
**Number of Outputs:** 4
**Type:** Opto-isolated, active low or high
**GPI:** internal pull-ups to +5 or +12V (jumper settable)
**GPO:** internal pull-ups to +3.3V
**Connector:** Female High Density DB-15
**Signal Level:** Closure to ground

## 3.4. ELECTRICAL

**Voltage:** +12VDC
**Power:** 5 W
**EMI/RFI:** Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

## 3.5. PHYSICAL

**7700 frame mounting:**
**Number of slots:** 1

# 4. STATUS INDICATORS

The 7700R4X1-HD modules have a number of LED Status indicators on the card edge of the board to show operational status of the card at a glance (refer to Figure 4-1).

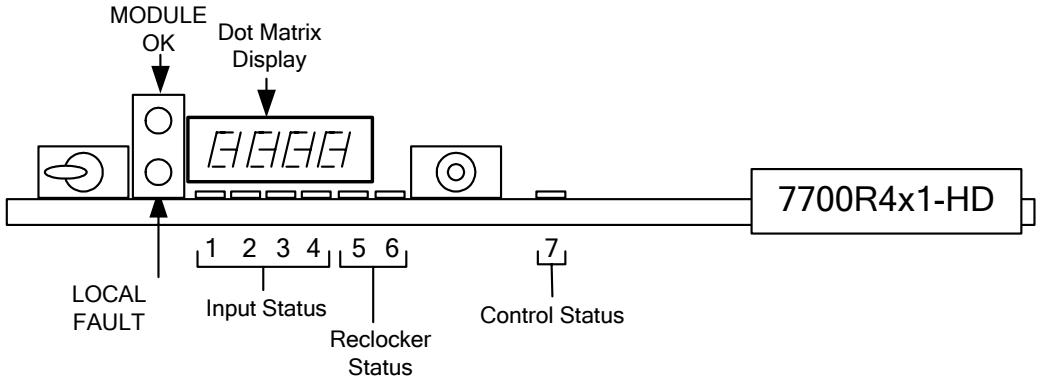


**Figure 4-1: LED Status Indicators**

Two large LEDs on the front of the board indicate the general health of the module.

**LOCAL FAULT:** This red LED indicates poor module health and will be ON during the absence of a valid input signal or if a local input power fault exists (i.e.: a blown fuse). The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper.

**MODULE OK:** This green LED indicates good module health. It will be ON when a valid input signal is present on the current selected input, and the board power is good.

**DOT MATRIX:** This display will provide high-level system information, such as product ID, firmware version and monitoring status. Also provides the display for the card edge based menu system.

**INPUT STATUS:** These green LEDs indicate when a valid input signal has been detected. There a four input status LEDs in total, representing the four inputs.
**LED 1:** signal detected on input 1
**LED 2:** signal detected on input 2
**LED 3:** signal detected on input 3
**LED 4:** signal detected on input 4

**RECLOCKER STATUS:** These two green LEDs indicate the current status of the reclocker. If the left LED is active, this indicates the reclocker is locked. If the right LED is active, this indicates the reclocker if bypassed.
**LED 5:** reclocker locked
**LED 6:** reclocker bypassed

**CONTROL STATUS:** This amber LED indicates the current control status of the 7700R4X1-HD module. If the LED is active, this indicates the module is in remote control mode, via VistaLINK® Pro or similar remote software. If the LED is not active, this indicates local control, via the card edge menu system.
**LED 7:** control mode

# 5. CARD EDGE CONTROLS

The 7700R4X1 module is equipped with a toggle switch, a push button, and a 4-character dot-matrix display to allow the user to select various functions and navigate through the card edge menu system (refer to Figure 5-1).

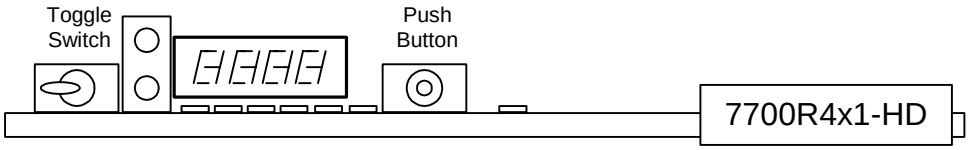


**Figure 5-1: Card Edge Controls**

## 5.1. CARD EDGE DISPLAY – MONITORING MODE

During normal operation, the 7700R4X1-HD module will display useful monitoring information regarding the current routing state of the card via the 4-character dot matrix display. Selections include the routed video standard, HD/SD, or input number. To access the possible monitoring modes, refer to section 6.2.9.

# 6. CARD EDGE MENUS

## 6.1. NAVIGATING THE CARD EDGE MENU SYSTEM

Status monitoring and control over the card's parameters is provided via the 4-digit alphanumeric display located on the card edge. The toggle switch and pushbutton are used to navigate through a menu system to set various parameters for the module. To enter the menu system, press the pushbutton. This will bring you to the main setup menu where you can use the toggle switch to move up and down the list of available sub-menus. When you have chosen the desired sub-menu, press the pushbutton to select the next menu level.

In the sub-menu there will be a list of parameters to adjust. To adjust any parameter, use the toggle switch to move up or down to the desired parameter and press the pushbutton. Using the toggle switch, adjust the parameter to its desired value. If the parameter is a numerical value, the number will increase if you lift the toggle switch, and decrease if you push down on the toggle switch. If the parameter contains a list of choices, you can cycle through the list by pressing the toggle switch in either direction.

When you have reached the desired value, press the pushbutton. This will update the parameter to the selected value and return to the sub-menu. To change another parameter, press the pushbutton to enter the main menu system again and continue selecting and adjusting other parameters.

Each of the menu items, with function explanations, are described in the following sections.

The default values for the menu items are <u>underlined</u>.

## 6.2. CARD EDGE DISPLAY – MENU SYSTEM

The following is a brief description of the top level of the menu tree that appears when you enter the card edge setup menu. Selecting one of these items will take you down into the next menu level. The details of each display are described in the following sections.

| | |
|---|---|
| ***BACK*** | Returns the display back to monitoring mode |
| ***ROUT*** | Selects which input to route |
| ***VID*** | Selects the locking mode to the serial digital signals |
| ***BYPS*** | Selects reclocker bypass conditions |
| ***ASI*** | Selects auto locking to ASI or 177 |
| ***GPIE*** | Selects GPI enable mode |
| ***GPIA*** | Selects GPI active trigger level |
| ***GPOE*** | Selects GPO enable mode |
| ***GPOA*** | Selects GPO active trigger level |
| ***MONI*** | Selects the type of monitoring |
| ***DISP*** | Selects the orientation of the display |
| ***REM*** | Selects the control mode |
| ***FRST*** | Selects the factory reset option |

### 6.2.1. ROUT – Selects which input to route

| *ROUT* |
|---|
| *INP1* |
| *INP2* |
| *INP3* |
| *INP4* |
| *BACK* |

This control selects which input to route.
*INP1* - Selects Input 1
*INP2* - Selects Input 2
*INP3* - Selects Input 3
*INP4* - Selects Input 4
*BACK* - Back to top level

**The *ROUT* control will be disabled when the GPI control is enabled (refer to section 6.2.5)**

### 6.2.2. VID – Selects the locking mode to the serial digital signal

| *VID* |
|---|
| *AUTO* |
| *1.5G* |
| *540M* |
| *360M* |
| *270M* |
| *177M* |
| *143M* |
| *BACK* |

This control selects which serial digital data rate to lock to.
*AUTO* - Automatic
*1.5G* - Locks to 1.5Gb/s only
*540M* - Locks to 540Mb/s only
*360M* - Locks to 360Mb's only
*270M* - Locks to 270Mb/s only
*177M* - Locks to 177Mb/s only
*143M* - Locks to 143Mb/s only
*BACK* - Back to top level

### 6.2.3. BYPS – Selects Reclocker Bypass Conditions

| *BYPS* |
|---|
| *NONE* |
| *AUTO* |
| *FORC* |
| *BACK* |

This control selects the reclocker bypass conditions:
*NONE* - Reclocker is never bypassed
*AUTO* - Auto-Bypassed when PLL is not locked
*FORC* - Force reclocker bypassed
*BACK* - Back to top level

### 6.2.4. ASI – Selects auto locking to ASI or 177

| *ASI* |
|---|
| *DVB* |
| *177M* |
| *BACK* |

This control selects the auto locking to either ASI or 177 mode
*DVB* - Locks to DVB-ASI only
*177M* - Locks to 177 Mb\s only
*BACK* - Back to top level

**The *ASI* control has no effect for input types other than DVB-ASI or 177 Mb/s signals. When in *DVB* mode, the module will lock to 1.5 Gb/s, 540 Mb/s, 360 Mb/s, 270 Mb/s, 143 Mb/s or ASI only. When in *DVB* mode, the module will lock to 1.5 Gb/s, 540 Mb/s, 360 Mb/s, 270 Mb/s, 143 Mb/s or 177 Mb/s only.**

### 6.2.5. GPIE – Selects GPI enable mode

| *GPIE* |
|---|
| *YES* |
| *NO* |

This control selects the GPI enable mode
*YES* - Enabled
*NO* - Disabled

**When the *GPIE* control is enabled, manual routing via the *ROUT* control is disabled.**

### 6.2.6. GPIA – Selects GPI Active Trigger Edge

| *GPIA* |
|---|
| *FALL* |
| *RISE* |

This control selects the GPI active trigger level
*FALL* - Falling edge detection
*RISE* - Rising edge detection

### 6.2.7. GPOE – Selects GPO Enable Mode

| *GPOE* |
|---|
| *YES* |
| *NO* |

This control selects the GPO enable mode
*YES* - Enabled
*NO* - Disabled

### 6.2.8. GPOA – Selects GPO Active Trigger Level

| *GPOA* |
|---|
| *LOW* |
| *HIGH* |

This control selects the GPO active trigger level
*LOW* - Selects Active Low
*HIGH* - Selects Active High

### 6.2.9. MONI – Selects the Type of Monitoring

| MONI |
|---|
| INPT |
| STD |
| HDSD |
| GPI |
| BACK |

This control selects the type of monitoring of the routed input:
*INPT* - Displays which input is routed
*STD* - Displays the video standard of the routed input
*HDSD* - Displays whether the routed input is HD or SD
*GPI* - Displays which GPI was last detected
*BACK* - Back to top level

**When the GPI mode is selected as the MONI type, the GPI status will appear on the card edge dot matrix display. If no GPI is detected then the display will read "NNNN". However if a GPI is detected then the appropriate character will change to indicate which GPI has been detected. For example, if GPI 3 is detected, the display will change from "NNNN", to " 3", indicating detection on GPI 3.**

### 6.2.10. Selects the orientation of the display

| DISP |
|---|
| VERT |
| HORZ |

This control selects the orientation of the 4-character dot matrix display:
*VERT* - Selects the Vertical orientation
*HORZ* - Selects the Horizontal orientation

### 6.2.11. REM – Remote Control Mode

| REM |
|---|
| ENBL |
| DISA |
| BACK |

This control selects the control mode of the module:
*ENBL* - Allows for remote control of the module
*DISA* - Local card edge menu control only
*BACK* - Back to top level

### 6.2.12. FRST – Selects the factory reset option

| FRST |
|---|
| NO |
| YES |
| BACK |

This control selects the option to factory reset the module:
*NO* - Cancel – same effect as *BACK*
*YES* - Factory Reset all controls
*BACK* - Back to top level

# 7. LOCATION OF LEDS AND JUMPERS

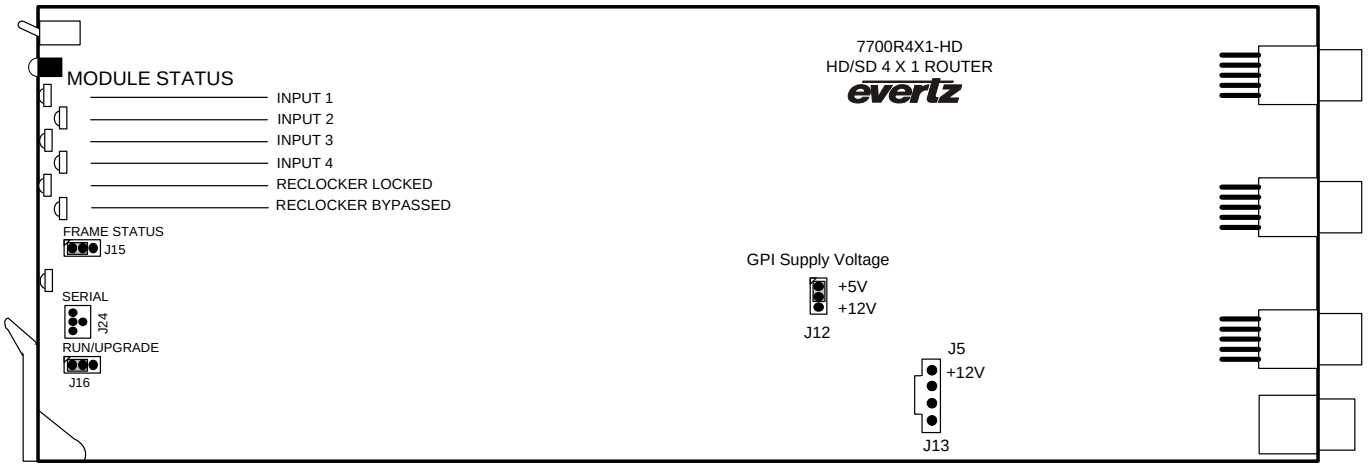


**Figure 7-1: LED and Jumper Locations on REV A Boards**

## 7.1. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper J15, located at the front of the module, determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

**FRAME STATUS:** To monitor faults on this module with the frame status indicators (on the power supply's FRAME STATUS LEDs and on the Frame's Fault Tally output), install this jumper in the ON position.

When this jumper is installed in the Off position local faults on this module will not be monitored.

## 7.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

**UPGRADE:** The UPGRADE jumper J16, located at the front edge of the module near the serial port header, is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section in the front of the binder for more information.

To upgrade the firmware in the module, pull it out of the frame. Move Jumper J16 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J24 near the card ejector. Re-install the module into the frame. Run the upgrade as described in the *Upgrading Firmware* section in the front of the binder. Once the upgrade is completed, remove the module from the frame, move J16 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

**Note that the baud rate for firmware upgrades is 57600 baud.**

### 7.3. CONTROLLING GPI PULLUP VOLTAGE

Jumper J12 is located near the center of the module and controls whether the GPI inputs are pulled up to 5 volts or 12 volts.

**GPI SELECT:** To pull the GPI inputs and outputs up to +12 volts install this jumper in the position closest to the bottom edge of the module.

To pull the GPI inputs and outputs up to +5 volts install this jumper in the position closest to center of the module.

## 8. VISTALINK® REMOTE MONITORING/CONTROL

### 8.1. What is VistaLINK®?

VistaLINK® is Evertz's remote monitoring and configuration platform which operates over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. VistaLINK® provides centralized alarm management, which monitors, reports, and logs all incoming alarm events and dispatches alerts to all the VLPro Clients connected to the server. Card configuration through VistaLINK® PRO can be performed on an individual or multi-card basis using simple copy and paste routines, which reduces the time to configure each module separately. Finally, VistaLINK® enables the user to configure devices in the network from a central station and receive feedback that the configuration has been carried out.

There are 3 components of SNMP:

1. An SNMP manager, also known as a Network Management System (NMS), is a computer running special software that communicates with the devices in the network. Evertz VistaLINK® Pro Manager graphical user interface (GUI), third-party, or custom manager software may be used to monitor and control Evertz VistaLINK® enabled products.

2. Managed devices (such as 7700R4x1-HD), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK® enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC VistaLINK® frame controller module, which serves as the Agent.

3. A virtual database known as the Management Information Base (MIB) lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

For more information on connecting and configuring the VistaLINK® network, see the 7700FC Frame Controller chapter.

## 8.2. VistaLINK® MONITORED PARAMETERS

The following parameters can be remotely monitored through the VistaLINK® interface.

| Parameter | Description |
|---|---|
| **Reclocker Locked** | Indicates if the internal reclocker has locked to the routed input |
| **Detected Video Standard** | Indicated the video standard of the routed input |
| **Routed Video Type** | Indicates the video type either HD or SD |
| **Card Type** | Indicates the card type |
| **Remote Mode** | Indicates if the module is to be controlled remotely or locally via card edge |

**Table 8-1: VistaLINK® Monitored Parameters**

## 8.3. VistaLINK® CONTROLLED PARAMETERS

| Parameter | Description |
|---|---|
| **Video Standard** | Sets the video standard to lock to. |
| **Bypass Mode** | Sets the reclocker bypass mode |
| **177Mb/s Locking** | Sets the locking mode to either 177 Mb/s or DVB-ASI only |
| **Input Select** | Selects which input to route |
| **GPI Control** | Sets the enable state of the GPI |
| **GPI Trigger** | Sets the GPI detection to either the rising edge or falling edge |
| **GPO Enable** | Sets the enable state of the GPO |
| **GPO Active Level** | Sets the active level of the GPO to either active low or active high |
| **Monitor** | Sets the monitoring state when the card is in normal operation |

**Table 8-2: VistaLINK® Controlled Parameters**

## 8.4. VistaLINK® TRAPS

| Trap | Description |
|---|---|
| **Input Video 1 Not Present** | Triggers when input 1 is not present |
| **Input Video 2 Not Present** | Triggers when input 2 is not present |
| **Input Video 3 Not Present** | Triggers when input 3 is not present |
| **Input Video 4 Not Present** | Triggers when input 4 is not present |
| **Input Video not Locked** | Triggers when the internal reclocker is not locked to the routed input |
| **GPI 1 Triggered** | Triggers when GPI 1 is detected |
| **GPI 2 Triggered** | Triggers when GPI 2 is detected |
| **GPI 3 Triggered** | Triggers when GPI 3 is detected |
| **GPI 4 Triggered** | Triggers when GPI 4 is detected |

**Table 8-3: VistaLINK® Traps**

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