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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Version	Aug 02
1.1	Revised functions of DIP switch	Nov 02
1.2	Added 8 new CWDM wavelengths	Dec 02
1.3	Added Channel B Threshold Setting	May 03
1.4	Revised sections 4.2, 7.2 and 7.3 according to firmware change	Feb 04
1.5	Fixed format and updated *Vista*LINK® description	Nov 08
1.6	Added table format throughout section 4.2	Apr 09

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1. OVERVIEW

The 7707BPX is a wide band 2 x 1 optical switch that can also be used as an auto-changeover by detecting a change in the input power level. Manual control or automation control via the GPI port is also provided.

The 7707BPX has integrated *Vista*LINK® technology for remote control and monitoring capability via SNMP. This provides the user with the ability to locally or remotely configure and monitor parameters such as module status, selected input, power level and switching threshold.

In the auto-changeover application, the 7707BPX can be configured to have a *Main* input and a *Standby* input. In this configuration, it will automatically switch to the *Standby* input when the *Main* input power is weak or lost. It can also be set to auto-switch back to the *Main* source when this signal is re-established.

The 7707BPX occupies one card slot and can be housed in either a 1RU frame, which will hold up to three modules, or a 3 RU frame, which will hold up to 15 modules.

Features:

- Intelligent auto-switching with input power detection and user definable threshold
- Supports manual or automation control via GPI interface
- Comprehensive signal and status monitoring via four-digit card-edge display, or through SNMP and VistaLINK® enabled capability
- Fully hot swappable from front of frame with no fiber disconnect/reconnect required
- Accepts any wavelength in the 1270nm to 1610nm range
- Supports Single mode (8-10 μm) fiber optic cable
- SC/PC, ST/PC or FC/PC fiber connector options

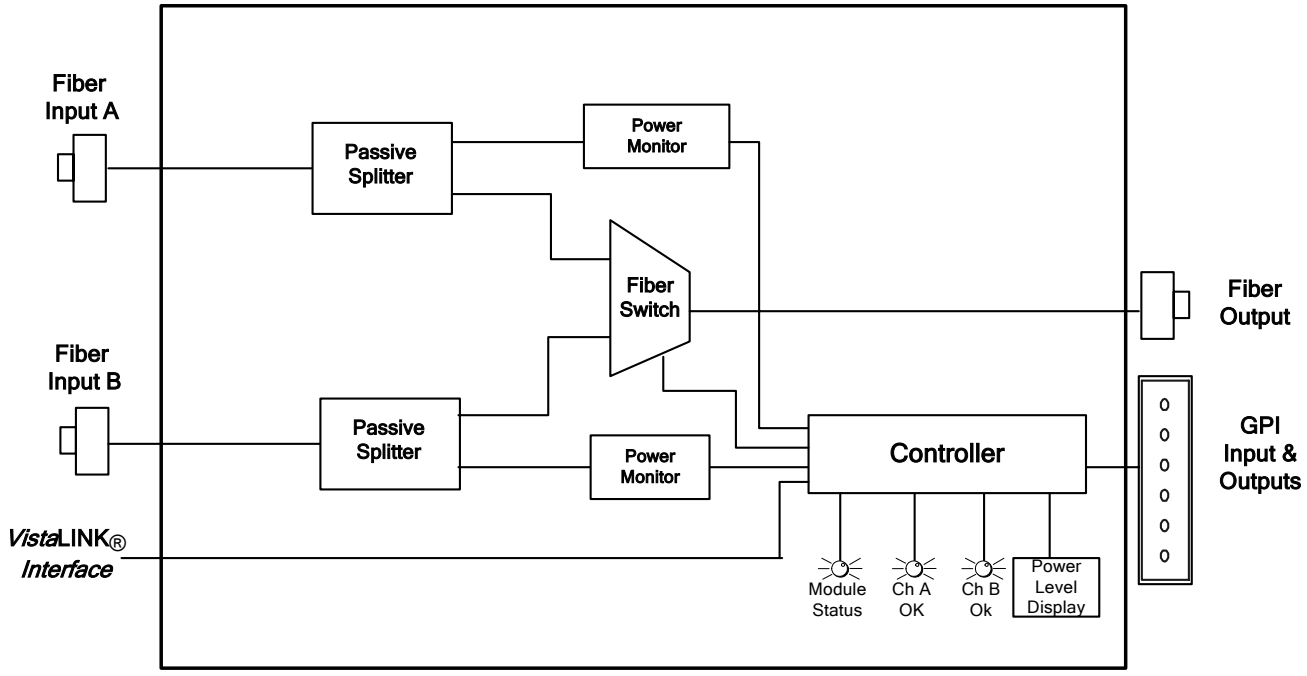


Figure 1-1: 7707BPX Block Diagram

1.1. TYPICAL CONFIGURATIONS

1.1.1. Uni-Directional Bypass Switch

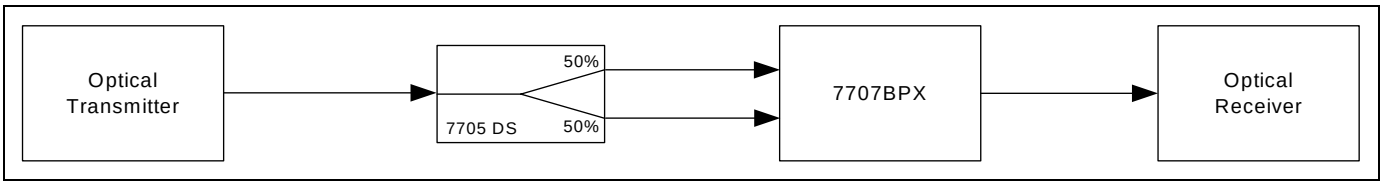


Figure 1-2: Uni-Directional Configuration

Provides system protection against fiber breaks. 7707BPX settings can be set to any configuration

1.1.2. Bi-Direction Bypass Switch

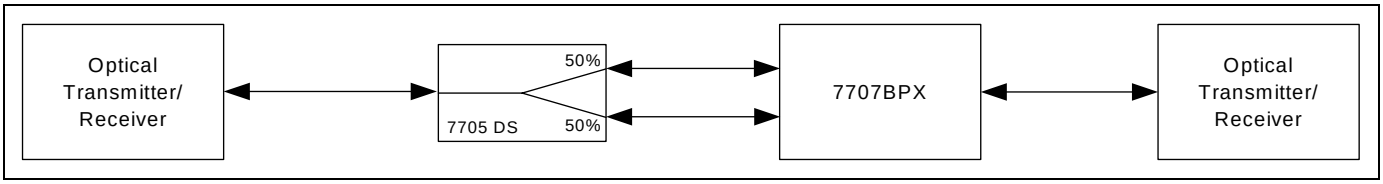


Figure 1-3: Bi-Directional Configuration

For bi-directional use, the 7707BPX requires that the maximum allowable optical signal attenuation in the fiber link is 12dB.

1.1.2.1. Bi-Directional Setup Procedure

1) For the 7707BPX to properly function bi-directionally there must be less than 15dB of optical attenuation in the fiber link. To measure the fiber link attenuation first measure the optical power launched from both Channel A and Channel B of the 7705DS, these power values will subsequently be referred to as the *Remote Launch Powers*. Next, measure the optical power before Channel A and Channel B of the 7707BPX as shown in Figure 1-4. Verify the system complies with the following two formula:

Remote Launch Optical Power Channel A-15 ≤ Optical Power Meter Reading
Remote Launch Optical Power Channel B-15 ≤ Optical Power Meter Reading

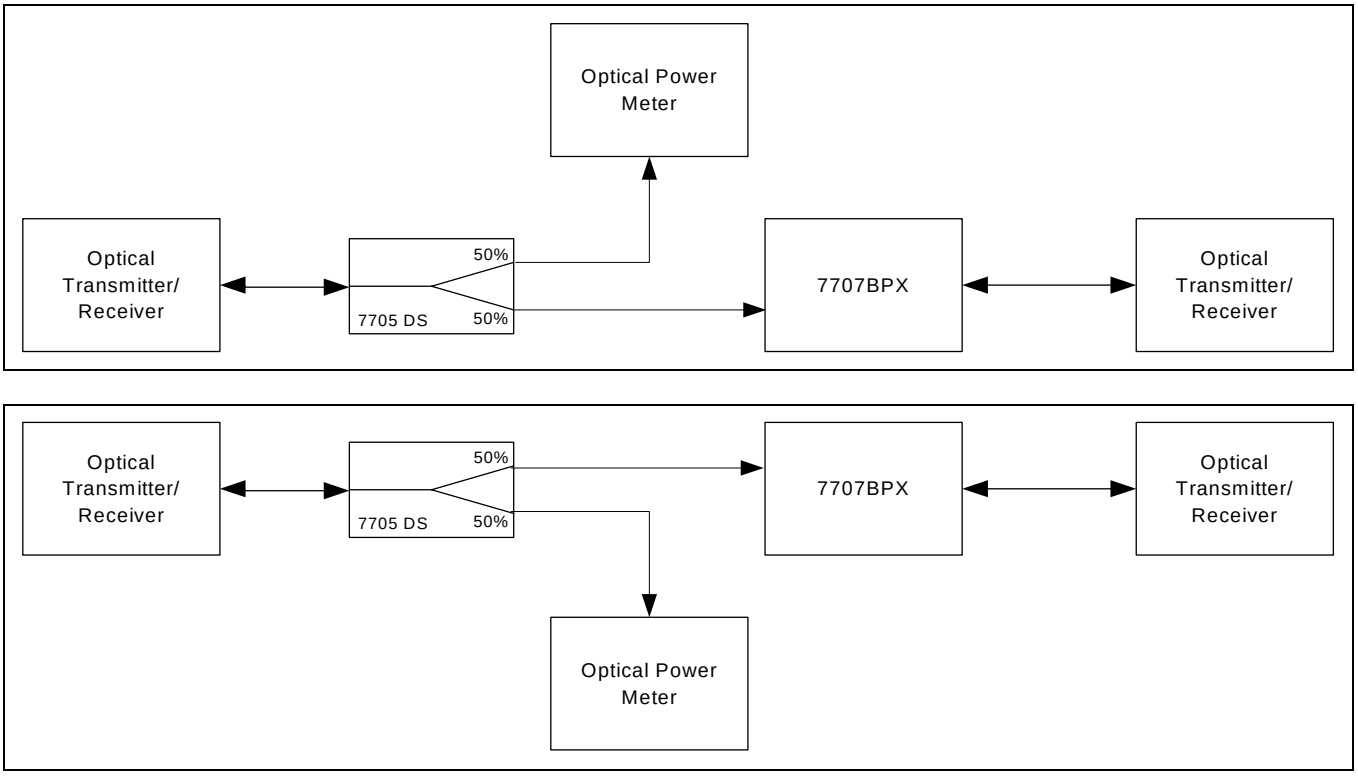


Figure 1-4: Bi-Directional Setup Step 1

2) Back reflection is phenomena where by part of the optical power being transmitted is reflected back when the signal encounters an interface of differing refractive indexes. The back reflection between an optical Fiber and air is –15dB. To avoid Back reflection issues, measure the optical power being transmitted from Channel A and Channel B of the 7707BPX as shown in Figure 1-5. Set the 7707BPX's optical threshold to:

Optical Threshold A= Optical Power Meter Reading –12
Optical Threshold B= Optical Power Meter Reading –12

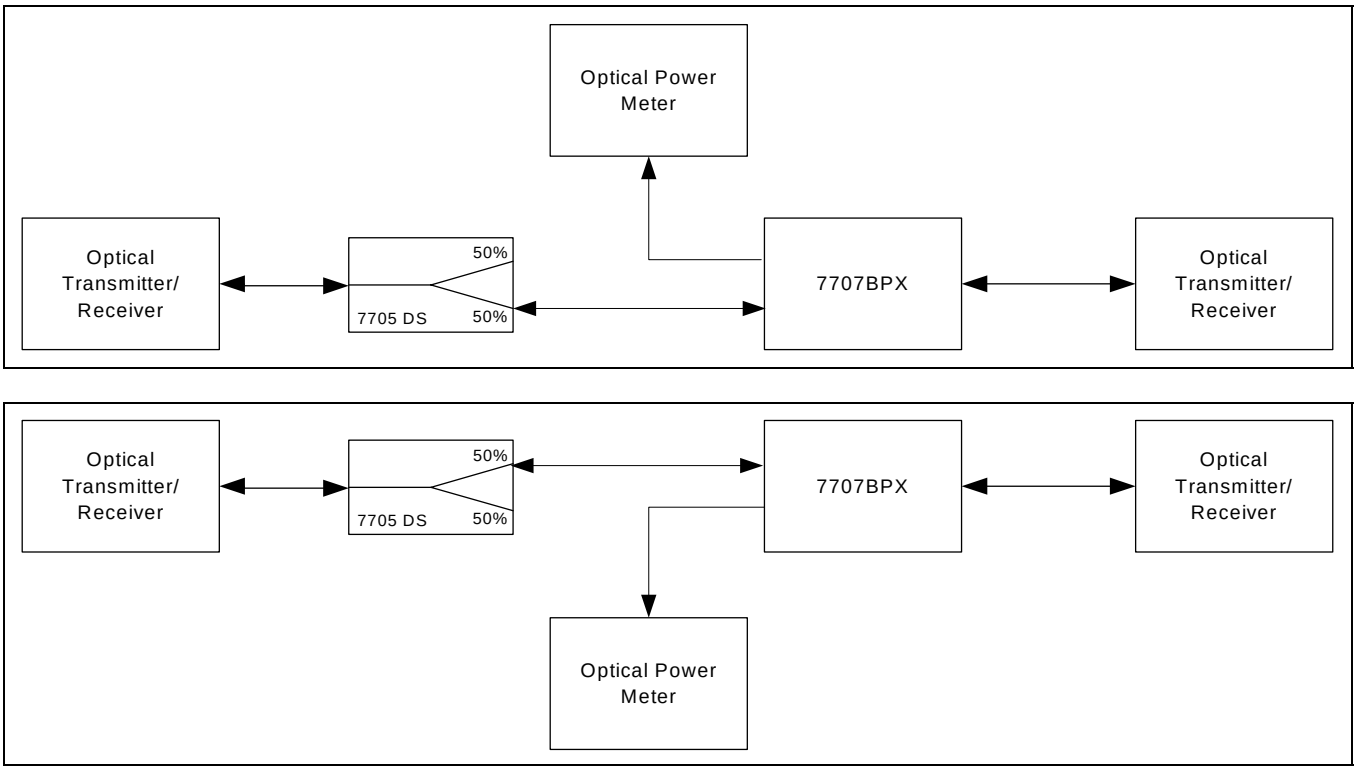


Figure 1-5: Bi-Directional Setup Step 2

2. INSTALLATION

The 7707BPX comes with a companion rear plate that has three SC/PC (shown), ST/PC or FC/PC optical connectors and a six pin terminal strip. For information on mounting the rear plate and inserting the module into the frame see the 7700FR chapter section 3.

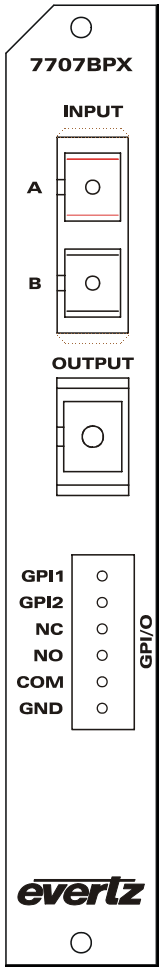


Figure 2-1: 7707BPX Rear Panel

INPUT A, B: The two SC/PC, (shown), ST/PC or FC/PC female connectors are wide range optical inputs that accept wavelengths accommodating standard 1310nm, or 1270nm to 1610nm CWDM transmission schemes. The A connector is for the *Main* input and the B connector is for the *Standby* input.

OUTPUT: This SC/PC, (shown), ST/PC or FC/PC female connector is the output from the switch.

2.1. GPIO I/O

A 6-pin High Density D connector labeled **GPIO** contains 2 GPI inputs and GPO relay contact output.

GPI's: The two top pins on the 6 pin terminal strip are used for two General Purpose inputs (GPI). The GPIs can be configured as active high or low by setting DIP switch 3. The GPI inputs are opto isolated with a with an internal pullup resistor to +5V or +12V as shown in Figure 2-2. See section 6.4 for information on selecting the pull-up voltage.

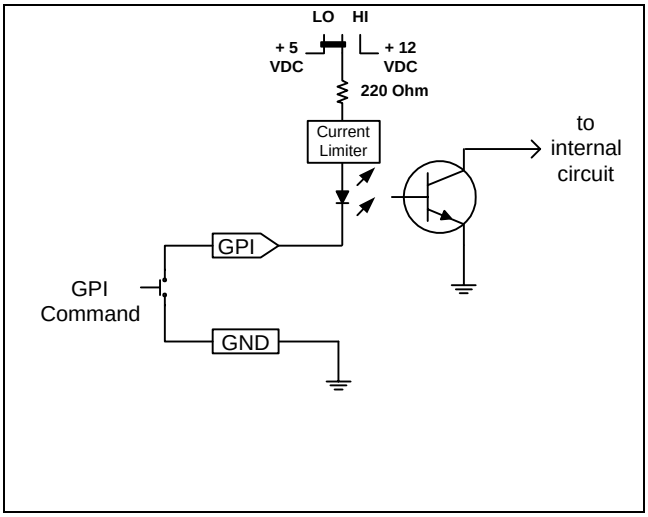


Figure 2-2: GPI Input Circuitry

GPO: The **NC, NO** and **COM** pins on the 6 pin terminal strip are used for the General Purpose Output (GPO). The GPO output is a set of normally open and normally closed relay contacts as shown in Figure 2-3.

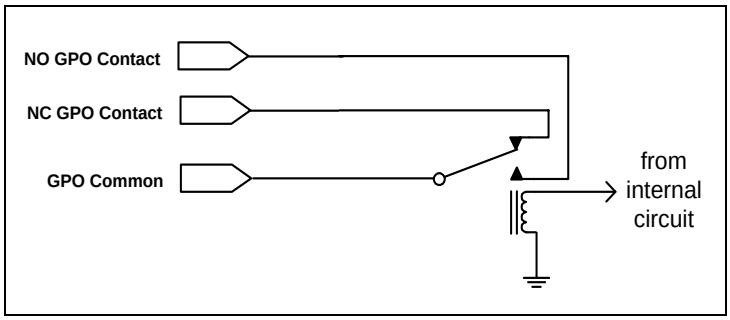


Figure 2-3: GPO Configuration

2.2. CARE AND HANDLING OF OPTICAL FIBER

2.2.1. Safety

Never look directly into an optical fiber. Non-reversible damage to the eye can occur in a matter of milliseconds.

The laser modules used in the Evertz fiber optic modules are Class I, with a maximum output power of 2mW, and wavelengths of either 1310 nm or 1270 to 1610 nm.

2.2.2. Handling And Connecting Fibers

Never touch the end face of an optical fiber.

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. Evertz recommends that you maintain a minimum bending radius of 3 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable. The Evertz fiber optic modules come with cable lockout devices, to prevent the user from damaging the fiber by installing a module into a slot in the frame that does not have a suitable I/O module. For further information regarding care and handling of fiber optic cable see section 3 of the Fiber Optics System Design chapter of this manual.

3. SPECIFICATIONS

3.1. OPTICAL INPUT/OUTPUT

Number: 3 Bi-directional optical signals
Connector: Female SC/PC, ST/PC or FC/PC
Insertion Loss: < 3 dB
Switch Time: < 30 msec
Maximum Input Power: 0 dBm
Input Optical Sensitivity: -40 dBm
Wavelengths: 1270nm to 1610nm
Fiber Size: 9 μm core / 125 μm overall

3.2. GENERAL PURPOSE INPUTS

Number of Inputs: 2
Type: Opto-isolated, active low with internal pull-ups to +5V
Connector: 2 pins plus ground on 6 pin terminal strip
Signal Level:
+5V Pullup: Low: -5 to +2.5 VDC, High: 3.5 to 10 VDC
+12V Pullup: Low: -5 to +9.5 VDC, High: 10.5 to 15 VDC
Max Sink Current: (input shorted to ground) 15 mA
Max Leakage Current for input High: 200 μA

3.3. GENERAL PURPOSE OUTPUTS

Number of Outputs: 1
Type: "Dry Contact" relay contacts - normally open and normally closed contact provided
Connector: 3 pins on 6 pin terminal strip

3.4. ELECTRICAL

Voltage: +12VDC
Power: 3 Watts
EMI/RFI: Complies with FCC regulations for class A devices
Complies with EU EMC directive

3.5. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

4. STATUS INDICATORS AND DISPLAYS

The 7707BPX has 6 LED Status indicators and a 4 digit alphanumeric display on the front card edge to show operational status of the card at a glance. The card edge pushbutton is used to select various displays on the alphanumeric display. Figure 6-1 shows the location of the LEDs and card edge controls.

4.1. STATUS INDICATOR LEDS

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 optical input signal, if a laser fault exists, 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 optical input signal is present, and the laser and board power are good.

There are four small LEDs beside the LED display that indicate the status of the module:

CH A PWR: This Red LED indicates when the received power on Channel A is below the switching threshold set for Channel A. Refer to section 4.2.5.

CH B PWR: This Red LED indicates when the received power on Channel B is below the switching threshold set for Channel B. Refer to section 4.2.5.

CH A ACTIVE: This Green LED indicates that Channel A is active and is connected to the output.

CH B ACTIVE: This Green LED indicates that Channel B is active and is connected to the output.

4.2. DOT-MATRIX DISPLAY

Additional signal and status monitoring and control over the card's parameters is provided via the 4-digit alphanumeric display located on the card edge. To select one of two menu display modes, press the toggle switch. To go to the sub menu press pushbutton once and to choose submenu display press toggle switch. When in a particular display mode, press pushbutton to display the value and use the toggle switch to change values (if applicable) and to see what status is being displayed for the particular menu item. The following display messages indicate what is being displayed. The details of the each of the displays are described in the sections 4.2.1 to 4.2.7.

MON

- **PWRA** Display the input power of channel A
- **PWRB** Display the input power of channel B
- **GPI1** GPI1 state
- **GPI2** GPI2 state
- **GPO** GPO state
- **CHAN** Indicates whether input A or input B is the active channel
- **S/W** Display firmware version

SET

- **MINA** Set Channel A's minimum power threshold before the switch will activate in Auto mode
- **MINB** Set Channel B's minimum power threshold before the switch will activate in Auto mode
- **DISP** Set orientation of text in the card edge display
- **CSEL** Select Auto/Manual mode (in Remote mode only)

4.2.1. Displaying the Optical Power of Input A and Input B

The 7707BPX detects the input optical power of both inputs and displays this on the four-digit card edge display. When the user first enters the *PWRA* or *PWRB* display to display the power on the selected input, press the pushbutton.

MON
PWRA/PWRB
OK
+5 to –40
< –40

OK	Indicates optical input power is within acceptable range (> +5 dB).
+5 to –40	Numerical value of optical input power.
< –40	Indicates optical input power is bellow –40 dBm.

4.2.2. Displaying the GPI1 and GPI2 State

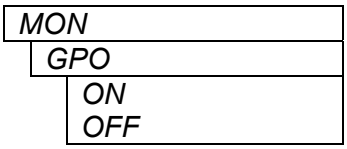
The 7707BPX detects the status of the GPI inputs and the state of the optical switch. When the user first enters the *GPI1* or *GPI2* display to display the state of particular GPI input, press the pushbutton.

MON
GPI1 or *GPI2*
HIGH
LOW

HIGH	Indicates that selected GPI input is high.
LOW	Indicates that selected GPI input is low.

4.2.3. Displaying the GPO State

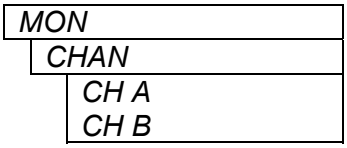
The 7707BPX detects the status of the GPI output. When the user first enters the *GPO* display to display the state of GPI output, press the pushbutton.



ON	Indicates that GPI output is on.
OFF	Indicates that GPI output is off.

4.2.4. Displaying the Active Channel

The 7707BPX detects the active channel. When you first enter the *CHAN* display to display which input is active channel, press the pushbutton.



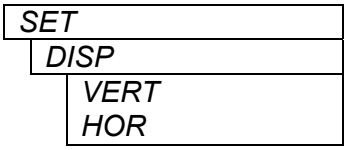
CH A	Indicates that A is active channel.
CH B	Indicates that B is active channel.

4.2.5. Setting the Optical Power Threshold for Auto Mode Switching

The *MINA* and *MINB* display allows the user to set the minimum input optical power threshold for each channel before the auto switch function will occur. To increase the optical power threshold, press the toggle switch up. To decrease the optical power threshold, press the toggle switch down. The threshold will be shown in dB.

4.2.6. Changing the Orientation of the Text on the Display

The *DISP* display allows the user to select a horizontal or vertical orientation for the displays to accommodate mounting the module in the 3RU or 1RU frames. To change the orientation of the display, press the toggle switch.



VERT	Vertical orientation suitable for modules installed in the 3RU frame.
HOR	Horizontal orientation suitable for modules installed in the 1RU frame.

4.2.7. Selecting the Channel (Remote Mode Only)

The *CSEL* display allows the user to select the channel in Remote Mode only. When the user first enters the *CSEL* display to display which channel is selected, press the pushbutton. To change the channel, press the toggle switch.

- *SET*
  - *CSEL*
    - *AUTO*
    - *CH A*
    - *CH B*
    - *BACK*

AUTO	Turns on the Auto Mode. Card will switch automatically.
CH A	Selects channel A.
CH B	Selects channel B.
BACK	Takes user to main menu without changing anything.

5. DIP SWITCHES

The 7707BPX is equipped with a 4 position DIP switch to allow the user to select various functions. DIP switch 1 is located at the top of the DIP switch (farthest from to the card ejector). Table 5-1 gives an overview of the DIP switch functions. Sections 5.1 and 5.2 give a detailed description of each of the DIP switch functions. The On position is down, or closest to the printed circuit board.

DIP Switch	Function
1	Auto Switch Back
2	Manual Mode Enable
3	GPI Active State
4	Dual GPI Control Mode

Table 5-1: DIP Switch Functions

5.1. CONTROLLING THE OPTICAL SWITCH OPERATING MODE

DIP switches 1, 2 and 4 allow the user to select one of four operating modes for the 7707 BPX:

DIP 1 Switch Back	DIP 2 Manual Mode	DIP 4 Dual GPI Mode	Mode Name	Mode Description
---	On	Off	Single GPI	Switch to input A if GPI1 is Active. Switch to input B if GPI1 is Inactive.
---	On	On	Dual GPI	Switch to input A if GPI1 is Active. Switch to input B if GPI2 is Active.
Off	Off	Off	Invalid	Do not use.
Off	Off	On	Auto – no switch back	Switch to input A if GPI1 is Active. Switch to input B if GPI2 is Active. If both GPIs are inactive then switch to input B if power on B is above threshold B and power on input A is below threshold A. Use GPI1 to switch back to input A.
On	Off	Off	Invalid	Do not use.
On	Off	On	Auto switch back	Switch to input A if GPI1 is Active. Switch to input B if GPI2 is Active. If both GPIs are inactive then switch to input B if power on B is above threshold B and power on input A is below threshold A. Switch back to input A if power on input A is above threshold A.

Table 5-2: Operating Mode Switch Settings

5.2. CONTROLLING WHETHER GPIS ACTIVATE WHEN HIGH OR LOW

DIP switch 3 controls whether GPIs are active when high or low:

DIP 3	DESCRIPTION
Off	GPIs are active when low.
On	GPIs are active when high.

Table 5-3: GPI Settings

6. JUMPERS

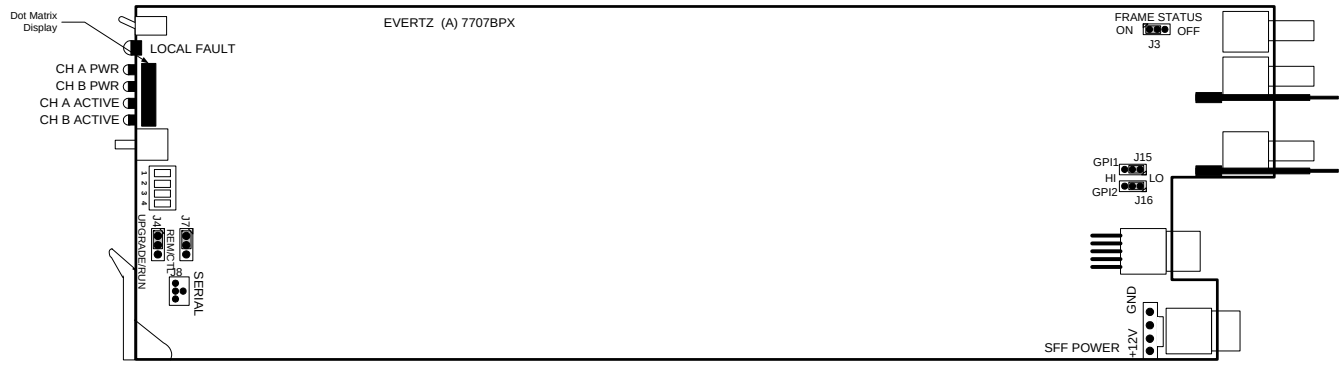


Figure 6-1: Location of Jumpers – Main Module

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

The FRAME STATUS jumper J3 located near the back rear 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 FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the On position. (Default)

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

6.2. SELECTING WHETHER MODULE WILL BE CONTROLLED FROM THE LOCAL CONTROLS OR THROUGH THE *VISTA*LINK® INTERFACE

The REM/CTL jumper J7 selects whether the module will be controlled from the local user controls or through the *Vista*LINK® interface.

REM/CTL: When this jumper is installed in the CTL position, the card functions are controlled through the local controls.

When this jumper is installed in the REM position, the card functions are controlled through the *Vista*LINK® interface.

6.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE: The UPGRADE jumper J4 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* chapter in the front of the manual binder for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move the UPGRADE jumper into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto the SERIAL header J13 at the card edge. Re-install the module into the frame. Run the upgrade as described in the *Upgrading Firmware* chapter of this manual. Once the upgrade is completed, remove the module from the frame, move the UPGRADE jumper into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

6.4. SELECTING THE GPI PULLUP VOLTAGE

The GPI jumper J15 and J16, located at the rear of the module, selects whether the general purpose inputs GPI1 and GPI2 will be pulled up to +5 volts or +12 Volts. Figure 6-2 shows the jumper configuration and the GPI input schematic. Jumper J15 is used for GPI1 and J16 is used for GPI2.

GPI: To set the pull-up voltage to +5 volts set the jumper to the LO position.

To set the pull-up voltage to +12 volts set the jumper to the HI position.

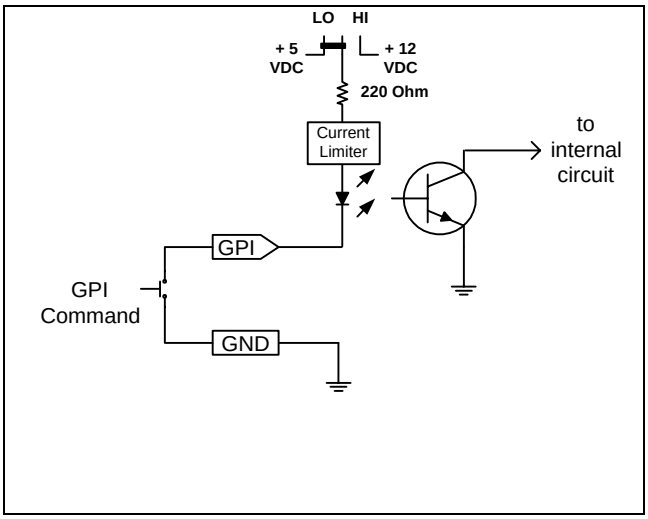


Figure 6-2: GPI Input Circuitry

7. *VISTA*LINK® REMOTE MONITORING/CONTROL

7.1. WHAT IS *VISTA*LINK®?

*Vista*LINK® 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. *Vista*LINK® 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 *Vista*LINK® 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, *Vista*LINK® 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 VL-Fiber demo Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz *Vista*LINK® enabled fiber optic products.

2. Managed devices, (such as 7707BPX cards), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz *Vista*LINK® enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC *Vista*LINK® 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 *Vista*LINK® network, see the 7700FC Frame Controller chapter.

7.2. *VISTA*LINK® MONITORED PARAMETERS

The following parameters can be remotely monitored through the *Vista*LINK® interface:

Parameter	Description
Active input	Indicates whether input A or B is the active input.
Input A Optical Power	A range of values describing received optical power at the fiber input A.
Input B Optical Power	A range of values describing received optical power at the fiber input B.
Input A Status	Input A status is the active input.
Input B Status	Input B status is the active input.
Master Jumper	Indicates the position of Master Jumper.
Optical Threshold A	Indicates the set value of the Input A optical threshold.
Optical Threshold B	Indicates the set value of the Input A optical threshold.
Auto Switchback Mode	Indicates if the Auto Switchback Mode is on or off.
Auto/Manual Mode	Indicates if the card is in Auto Mode or if in Manual Mode what channel is active.
GPI1 State	Indicates the state of the GPI1 input.
GPI2 State	Indicates the state of the GPI2 input.
Dual GPI Mode	Indicates if Dual GPI Mode is on or off.
GPI Active State	Indicates if GPI Active State is Low or High.

Table 7-1: *Vista*LINK® Monitored Parameters

7.3. *VISTA*LINK® CONTROLLED PARAMETERS

The following parameter can be remotely controlled through the *Vista*LINK® interface:

Parameter	Description
Auto/Manual Mode	Indicates if the card is in Auto Mode or if in Manual Mode what channel is active (*only in Remote Mode*).
Optical Threshold A	Indicates the set value of the Input A optical threshold (*in both Local and Remote Modes*).
Optical Threshold B	Indicates the set value of the Input B optical threshold (*in both Local and Remote Modes*).

Table 7-2: *Vista*LINK® Controlled Parameters

7.4. *VISTA*LINK® TRAPS

The following traps can be controlled through the *Vista*LINK® interface. Each trap will indicate a fault condition when its value is True:

Trap	Description for True Condition
ChannelAweak	Channel A input power is below the threshold.
ChannelBweak	Channel B input power is below the threshold.
GPI1active	GPI1 Is Active.
GPI2active	GPI2 Is Active.
Localjumper	REM/CTL Jumper in CTL position.
Remotejumper	REM/CTL Jumper in REM position.
DualGPIControlMode	Dual GPI Mode is Enabled (DIP switch 4 is On or Dual GPI Mode Control Parameter is set On using *Vista*LINK® interface.
GPIactivehigh	GPI Active Mode is Active High (DIP switch 3 is On or GPI Active Mode Control Parameter is set to High using *Vista*LINK® interface.
AutoModeEnabled	Auto Mode is enabled (DIP switch 2 is On or Auto Switch Mode Control Parameter is set to On using *Vista*LINK® interface.
ActiveInputA	Input A is Active.
ActiveInputB	Input B is Active.
AutoSwitchBackMode	Auto Switch back Mode is On (DIP switch 1 is On or Switch Back Mode Control Parameter is set to On using *Vista*LINK® interface.

Table 7-3: *Vista*LINK® Traps

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