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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Version	Jan 05
1.1	Minor typographical errors fixed	Aug 05

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1. OVERVIEW

The 7702BPX-IF and 7703BPX-IF modules are wide band 2 x 1 RF protection switches that provide auto-changeover capability by detecting a change in the input power level. Manual control or automation control via the GPI port is also provided. This is a latching switch which maintains switch state on loss of power. It is designed for intermediate frequency satellite earth station links or CATV signals and operates over a wide frequency range of 10MHz to 850MHz.

The 7703BPX-IF model 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, both products 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 7702BPX-IF and 7703BPX-IF each occupy one card slot and can be housed in either a 1RU frame, which will hold up to three modules, or a 3RU 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 *Vista*LINK™ enabled capability
- Fully Hot-swappable from front of frame
- Wide operating frequency from 10-850MHz

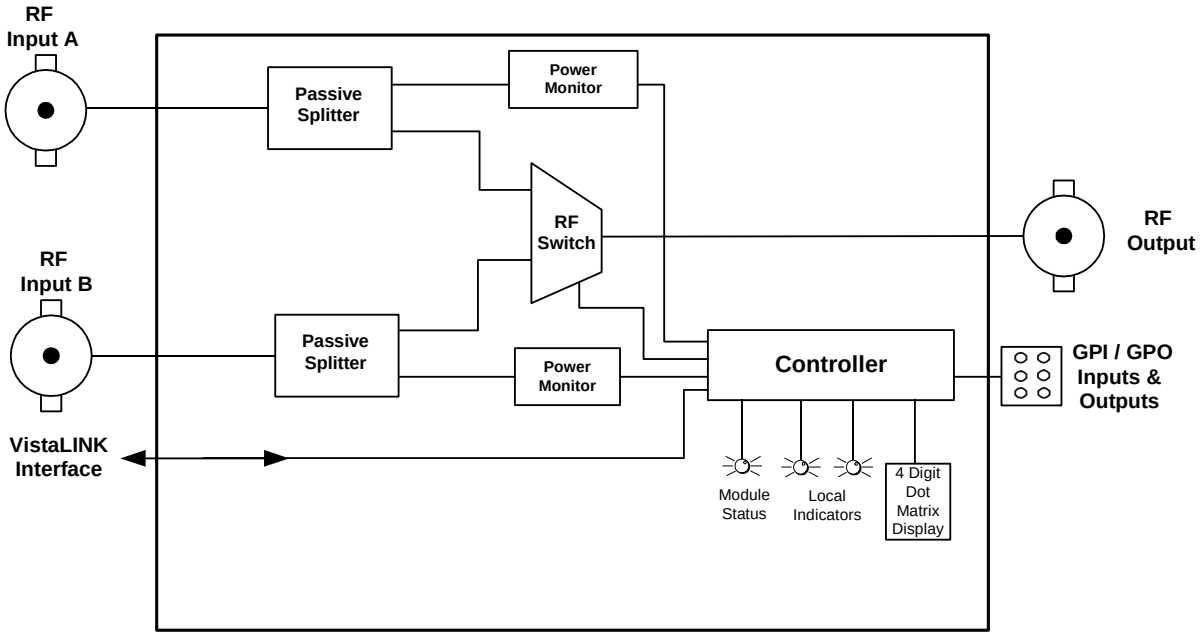

Figure 1: 7703BPX-IF Block Diagram

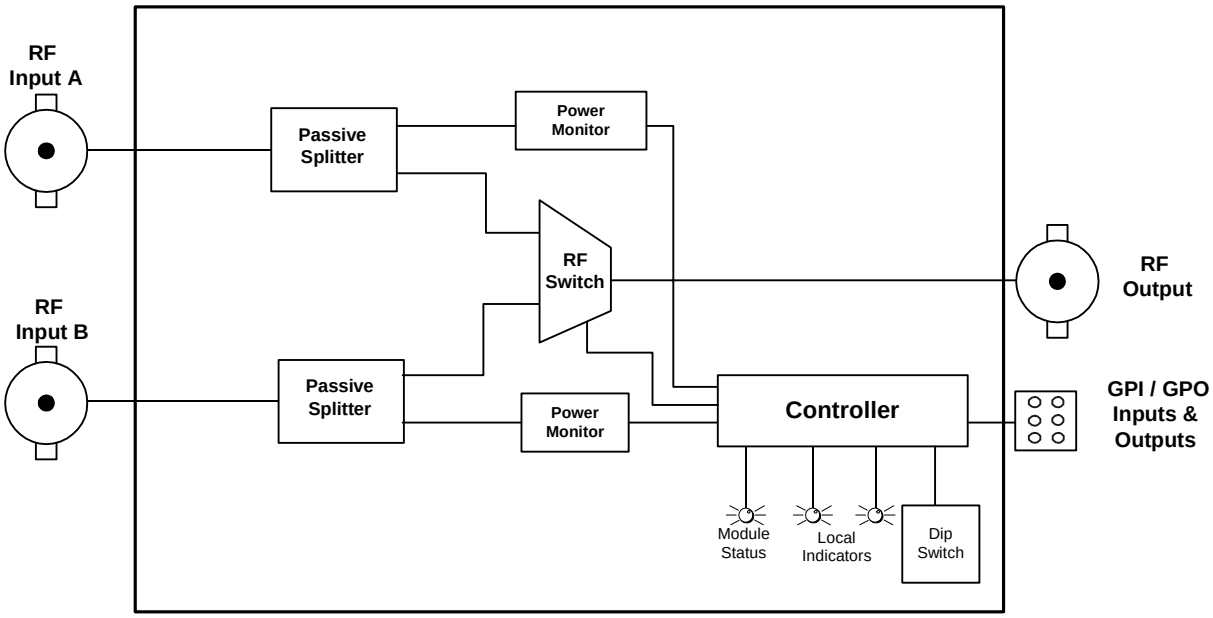

Figure 2: 7702BPX-IF Block Diagram

1.1. TYPICAL CONFIGURATION

1.1.1. Uni-directional Bypass Switch

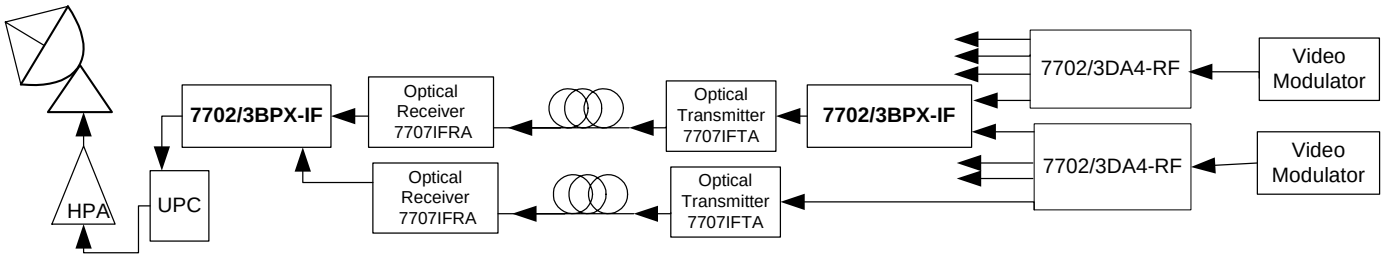

Figure 3: Typical application of protection switch in IF uplink transport system.

This diagram illustrates the use of the BPX-IF as a protection switch in an earth station IF satellite uplink transport system. The modulated video signal at 70 / 140MHz intermediate frequency is fed into the Evertz Microsystems 7702/3DA4-RF 1x4 active splitter for distribution to multiple transmit paths. Two signals from different sources are directed to the 7702/3BPX-IF, one acting as a primary source and the other as a backup signal if the primary fails. The IF signal is then transported over optical fibre up to 60km using the optical transmitter / receiver pair, 7707IFTA and 7707IFRA from Evertz Microsystems from the NOC (Network Operations Centre) to the dish. The protection switch can also be used to provide redundancy to the fibre optic link as shown in this diagram. This protects against a fibre break or optical transmitter / receiver failure. The switch is a latching switch, maintaining the switch state on loss of power.

2. INSTALLATION

The 7702BPX-IF and 7703BPX-IF come with a companion rear plate that has three BNC (F type optional) 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.

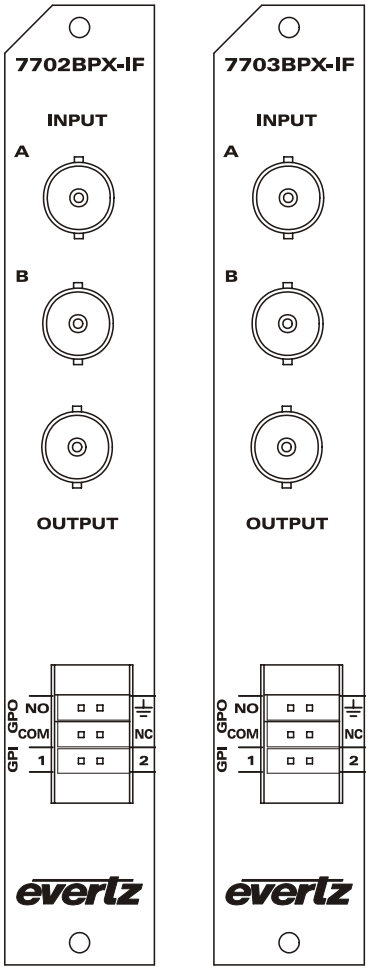

Figure 4: 7702BPX-IF and 7703BPX-IF Rear Panels

INPUT A, B The two BNC (F type optional) connectors are RF inputs that accept frequencies over the range 10MHz to 850MHz. The A connector is for the *Main* input and the B connector is for the *Standby* input.

OUTPUT This BNC (F type optional) connector is the output from the switch.

2.1. GPIO

A 6-pin removable termial block labeled **GPIO** contains 2 GPI inputs and 2 GPI outputs

GPI 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. GPIs are active low when Dip switch 3 is Off and GPIs are active high when Dip switch 3 is in On (positioned closest to the PCB). The GPI inputs are opto isolated with a with an internal pullup resistor to

+5V or +12V as shown in Figure 5. See section 6.4 for information on selecting the pull-up voltage.

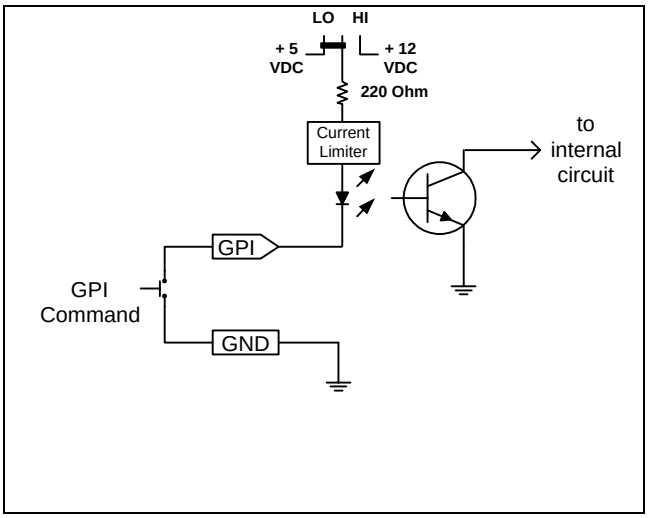

Figure 5: GPI Input Circuitry

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 6.

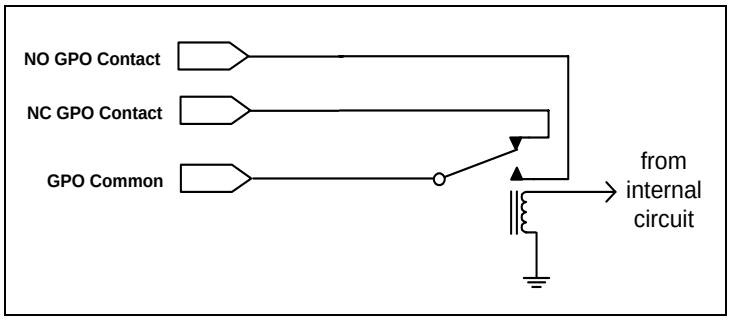

Figure 6: GPO Configuration

3. SPECIFICATIONS

3.1. RF INPUT/OUTPUT

Inputs:	2
Outputs:	1
Connectors:	BNC per IEC 60169-8 Amendment 2 (F type optional)
Frequency Range:	10MHz to 850MHz
Insertion Loss:	< 3.5 dB (10 – 200 MHz)
	< 4 dB (10 – 850 MHz)
Flatness:	< ±0.25dB (10 – 200MHz)
	< ±0.5dB (10 – 850MHz)
Input Power Range:	0dBm to –50dBm
Return Loss:	> 15 dB (10 – 200 MHz)
	> 12dB (10 - 850MHz)
Isolation:	> 50 dB (10 – 850 MHz)

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 7702BPX-IF and 7703BPX-IF have 9 LED Status indicators on the front card edge to show operational status of the card at a glance. The 7703BPX-IF also has an alphanumeric dot matrix display, toggle switch and push button. The card edge pushbutton and toggle switch is for user input. Figure 7 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 IF input signal or if a board 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 IF input signal is present, and the board power is good.

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

CH A ACTIVE: This Green LED indicates that Channel A has power above threshold.

CH A PWR LOW: This Red LED indicates when the received power on Channel A is below the switching threshold set for Channel A. (See section 4.2.6)

CH B ACTIVE: This Green LED indicates that Channel B has power above threshold.

CH B PWR LOW: This Red LED indicates when the received power on Channel B is below the switching threshold set for Channel B. (See section 4.2.6)

OUTPUT INDICATOR: This Green LED is ON when Channel A is connected to the output and OFF when Channel B is connected to the output.

AUTO MODE: This Yellow LED is ON when Auto Mode is selected and OFF when Auto mode is not selected.

SWITCH BACK: This Yellow LED is OFF when Switch Back Mode is selected (For auto mode only).

4.2. DOT-MATRIX DISPLAY (7703BPX-IF ONLY)

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 chose 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 each of the displays are described in the sections 4.2.1 to 4.2.8.

OK

MON

PWRA Display the input power of channel A
PWRB Display the input power of channel B
GPI1 GPI1 state
GPI2 GPI2 state
CHAN Indicates whether input A or input B is the active channel
MODE Indicates operational mode status
- **AUTO** Indicates Auto – No switch back
- **ASB** Indicates Auto - Switch Back
- **EXT** Indicates external (GPI) mode status
- **CHAN A** Indicates external mode status
- **CHAN B** Indicates external mode status

VER Display firmware version

SET

MODE Sets operating mode
- **AUTO** Auto – No switch back
- **ASB** Auto - Switch Back
- **EXT** External (GPI) mode
- **CHAN A** Switch to channel A
- **CHAN B** Switch to channel B

MINA Set Channel A's minimum power threshold
MINB Set Channel B's minimum power threshold
DISP Set Display Orientation (HORZ / VERT)
ACTV Sets High or Low as GPI Active State
FRST Factory Reset

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

The 7703BPX-IF detects the input RF power of both inputs and displays this on the four-digit card edge display. Enter the *MON* menu item, then use the toggle switch to select *PWRA* or *PWRB,* then press the pushbutton. This displays the corresponding input power. The following list describes possible displays and their meaning.

OVR Indicates RF input power is above threshold
-10 to –60 Numerical value of optical input power in dBm
LOW Indicates RF input power is below threshold

The power reading is reliable to –45dBm.

Do not set the threshold for switching below –45dBm.

4.2.2. Displaying the GPI1 and GPI2 State

The 7703BPX-IF detects the status of the GPI inputs and displays this on the four-digit card edge display. Enter the *MON* menu item, then use the toggle switch to select *GPI1* or *GPI2,* then press the pushbutton. The following list describes possible displays and their meaning.

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

4.2.3. Performing a Factory Reset

The 7703BPX-IF allows performing a factory reset of card parameters. Enter the SET / FRST menu item, then toggle to 'YES' and hit the pushbutton. This restores the default parameters of the card. The default operating mode is External and the default threshold levels are –45dBm for both channels.

4.2.4. Selecting High or Low as GPI Active State

The 7703BPX-IF allows setting the Active state of the GPIs as high or low via the menu item SET / ACTV.

4.2.5. Displaying the Active Channel

The 7703BPX-IF detects the active channel and displays this on the four-digit card edge display. Enter the *MON* menu item, then use the toggle switch to select *CHAN,* then press the pushbutton. The following list describes possible displays and their meaning.

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

4.2.6. Setting the RF Power Threshold for Auto Mode Switching

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

The power reading is reliable to –45dBm.

Do not set the threshold for switching below –45dBm.

4.2.7. 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. The following list describes possible displays and their meaning.

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

4.2.8. Selecting the Switch Mode

To select the desired operating mode, use SET / MODE to select either AUTO, ASB, CH A (Manual), CH B (Manual) or EXT (External Mode). Table 1 shows the operating modes for each selection.

SETTING	MODE	DESCRIPTION
AUTO	Auto	If channel A is active, will switch to channel B if A falls below threshold (if B is above threshold). If A rises above threshold, channel B will remain active channel, unless channel B falls below threshold, then module will switch back to A (if A is above threshold)
ASB	Auto Switch Back	Channel A is the main input and Channel B is standby. If A falls below threshold, will switch to B (if B is above threshold). When A returns to a level above threshold, will switch back to A.
CH A or CH B	Manual	The active channel is selected as either Channel A or Channel B
EXT	External (GPI)	Operating mode is selectable via the GPIs

Table 1: Setting the Switch Mode via the SET/MODE menu

To operate in external (GPI) mode, set the EXT item to ON. The Switch mode is now selectable based on the GPI1 and GPI2 settings. Table 2 shows the settings to achieve the desired switch state. The Auto Switch Back and No Auto Switch Back Modes operate as described in Table 1. The *SET / ACTV* menu item controls whether the active GPI state is high or low.

Operating	Manual		Auto	
Mode	**CH A**	**CH B**	**Switch Back**	**No Switch Back**
GPI1	Active	Inactive	Inactive	Active
GPI2	Inactive	Active	Inactive	Active

Table 2: Controlling the switch Using GPI Inputs – 7703BPX-IF

5. DIP SWITCHES (7702BPX-IF ONLY)

The 7702BPX-IF is equipped with a 4 position DIP switch to allow the user to select the operating modes. DIP switch 1 is located at the top of the DIP switch (farthest from to the card ejector). Table 3 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. See section 4.2.6 for a description of the operating modes.

DIP Switch	Function
1	Manual Mode Enable
2	CH A/B (Manual Mode) – Switch Back Select (Auto Mode)
3	External GPI Mode Enable
4	GPI Active HIGH / Active LOW select

Table 3: DIP Switch Functions

5.1. CONTROLLING THE SWITCH OPERATING MODE

DIP switches 1, 2, and 3 allow the user to select one of four operating modes for the 7702BPX-IF.

DIP 1	DIP 2	DIP 3	Mode	Description
Off	Off	Off	Auto	If channel A is active, will switch to channel B if A falls below threshold (if B is above threshold). If A rises above threshold, channel B will remain active channel, unless channel B falls below threshold, then module will switch back to A (if A is above threshold)
Off	On	Off	Auto Switch Back	Channel A is the main input and Channel B is standby. If A falls below threshold, will switch to B (if B is above threshold). When A returns to a level above threshold, will switch back to A.
On	Off	Off	Manual Mode	Selects Channel A
On	On	Off		Selects Channel B
Off	Off	On	External GPI	Operating mode controlled via GPIs. See section 5.2 for controlling operating modes via GPI in external mode.

Table 4: Operating Mode Switch Settings

5.2. CONTROLLING THE SWITCH USING GPI INPUTS

In External GPI mode, the Switch mode is selectable based on the GPI1 and GPI2 settings. Table 6 shows the settings to achieve the desired switch state. The Auto Switch Back and No Auto Switch Back Modes operate as described in Table 4. DIP switch 4 controls whether GPIs are active when high or low in external mode. When the module is in Manual mode or one of the Auto modes DIP 4 has no effect.

DIP 4	GPI Active State
Off	Active low
On	Active high

Table 5: GPI Active State Switch Settings

Operating	Manual		Auto	
Mode	**CH A**	**CH B**	**Switch Back**	**No Switch Back**
GPI1	Active	Inactive	Inactive	Active
GPI2	Inactive	Active	Inactive	Active

Table 6: Controlling the switch Using GPI Inputs – 7702BPX-IF

6. JUMPERS

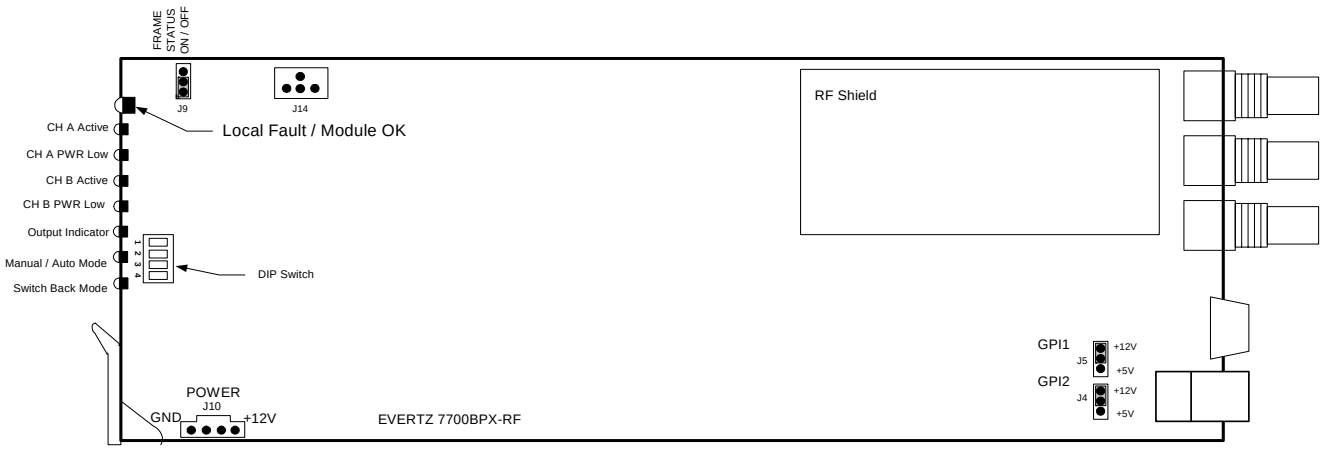

Figure 7: Location of Jumpers – 7702BPX-IF

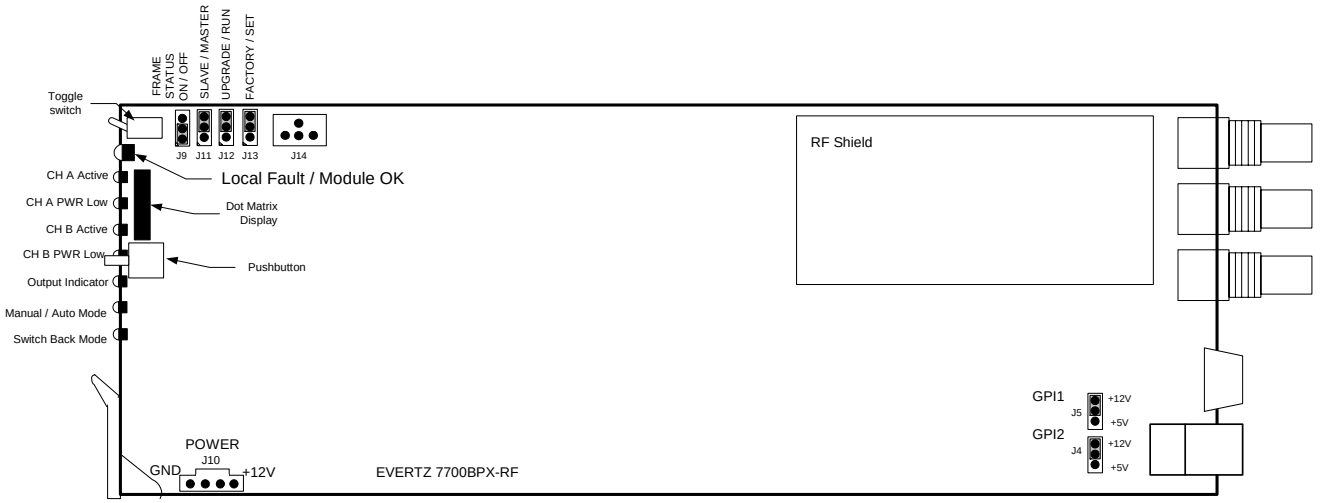

Figure 8: Location of Jumpers – 7703BPX-IF

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

The FRAME STATUS jumper J9 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 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. MONITORING AND CONTROL OF 7703BPX-IF CARDS THROUGH SNMP OR CARD EDGE MENU SYSTEM

The card does not require any reconfiguration or adjustment to monitor and control through SNMP or the card edge menu system. Updates to configuration and status are visible in both systems.

6.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES (7703BPX-IF ONLY)

UPGRADE The UPGRADE jumper J12 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 J14 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 jumpers J4 and J5, 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 5 shows the jumper configuration and the GPI input schematic. Jumper J5 is used for GPI1 and J4 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,

6.5. USING THE GPO OUTPUTS

There are three pins on the 6 pin terminal strip dedicated to the GPO, NC (Normally Closed), NO (Normally Open) and Common, connected as shown in the circuit diagram of section 2.1. The common connection will switch between NC and NO on a change in state of the RF switch. This GPO is intended to indicate a change in state of the switch. The signals on NC and NO are to be provided by the user.

7. *Vista*LINK™ REMOTE MONITORING/CONTROL (7703BPX-IF ONLY)

7.1. What is *Vista*LINK™?

*Vista*LINK™ is Evertz's remote monitoring and control capability 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. For monitoring there needs to be a detecting device that automatically reports all errors to a central alarm and error logging station. We also need to be able to interrogate individual detector devices from the central station to determine the status of individual channels. Finally, we need to be able to configure devices in the network from the 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 *Vista*LINK™ Pro 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 7703BPX-IF cards), 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 *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 and 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
Input A RF Power	A range of values describing received RF power at the input A
Input B RF Power	A range of values describing received RF power at the input B
GPI1 State	Indicates the state of the GPI1 input
GPI2 State	Indicates the state of the GPI2 input
Active Channel	Indicates input A or B as the active channel
Card Type	Indictates card type as 7703BPX-IF

Table 7: *Vista*LINK™ Monitored Parameters

7.3. *Vista*LINK™ CONTROLLED PARAMETERS

The following parameter can be remotely controlled through the *Vista*LINK™ interface.

Parameter	Description
Operating Mode	Sets the operating mode for the module: - External (Controlled by GPIs) - Auto / No Switch Back - Auto / Switch Back - Channel A - Channel B
RF Threshold A	Sets the value of the Input A RF threshold
RF Threshold B	Sets the value of the Input B RF threshold
Active State for GPIs	Sets the active state for GPIs - High or Low

Table 8: *Vista*LINK™ Controlled Parameters

7.4. *Vista*LINK™ TRAPS

The following traps can be enabled 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

Table 9: *Vista*LINK™ Traps