CrossPoint
Technologies, Inc.

DATT-XB-2X2-S
Attenuator

Operating Manual

Rev -

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1   Introduction

CrossPoint Technologies Model DATT-XB-2X2-S Attenuator Chassis has 2 Channels of X-Band Attenuators available, ranging from 0dB to 63.75 dB of attenuation in 0.25 dB steps.

The operation can be control via the front panel keypad, rear panel 9-PIN D connector remote control interface (RS-232 or RS-422), or a rear panel Ethernet remote control interface.

1.1   Applicability

This manual covers the DATT-XB-2X2-S Attenuator unit.

Detailed specifications and additional information for this model is found in the Appendix.

Other models are available for different frequency ranges or for different numbers of channels. A DATT configuration can be customized to your specific application.

2   Controls and Indicators

2.1   Front Panel

The 1RU Switch Chassis front panel is shown here. All the indicators and controls are identified and explained below. More details on how to use these controls may be found in Section 4.
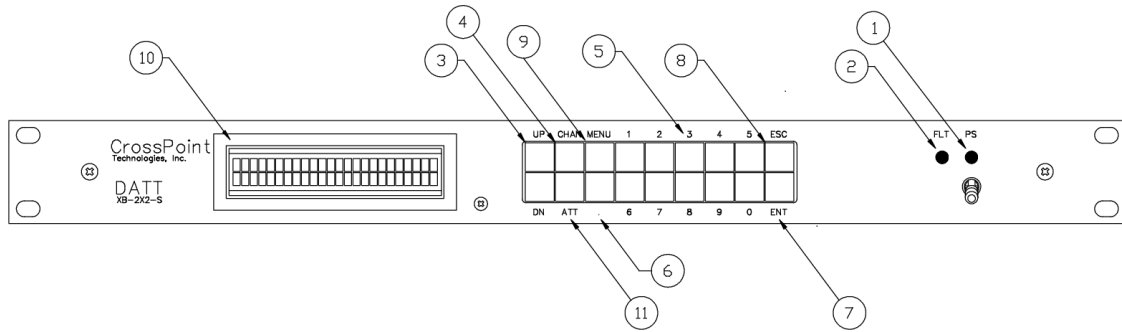

Figure 1 : Front Panel Controls and Indicators

Front Panel Controls and Indicators

Callout	Name	Description
1	POWER Indicator & Power switch	Illuminated green when power is on. Turns Red if a power supply problem is detected.
2	FAULT Indicator	Illuminated Red when any fault is detected in any chassis. This is a summary alarm indication.
3	UP and DOWN	Used to cycle through the list of available inputs or outputs when in an Edit mode. Scrolls through Menu items when in MENU mode Incrementing/Decrementing rolls over/under at the extremes
4	CHAN	Press CHAN to select an attenuator channel. Channel selected will have its current status displayed, and be controlled from front panel.
5	Numeric keys	Enter attenuation or channel numbers directly using these keys.
6	. key	Used to enter decimal point in attenuation entry.
7	ENTer key	Accept the current channel, attenuation level, exit the Edit mode, and return to the next higher menu level.
8	ESCape key	Cancel the current Edit session and return to the next higher menu level. No changes occur to attenuation state.
9	MENU key	Move from the normal display to the various configuration and status menus.
10	LCD Display	For local status and control.
11	ATTen key	Select attenuation number entry for selected channel.

2.2   Rear Panel

Rear panels are customized to the different attenuator configurations. Specific drawings are found in the Appendix for each model that identify the connector reference numbers ("J numbers").

3   Installation

The Switch Chassis mounts in a standard EIA rack. There are no fans, convection cooling occurs from the top cover. Be careful not to block the vent holes. Normal clearances between this chassis and equipment in the rack space above assure adequate cooling. The unit does not require empty space above or below.

3.1   Connections

3.1.1   AC Power

The Switch is provided with a standard detachable US AC line cord. However, the internal power supplies have universal voltage capability (220/110 VAC). Plug the equipment into an AC source of either 110 or 220 VAC.

3.1.2   Serial Port

The serial port is a dual purpose connector located on the rear of the Switch. The connector is labeled CTRL. It provides RS-232 format signals as well as RS-422 signals. The chassis connector is a common 9 pin male D connector.

3.1.2.1   RS-232 Operation

RS-232 is recommended for cable lengths up to 50 feet between the computer and the switch. Longer links can be accommodated reliably, but may require experimenting with slower baud rates, lower loss cable and better shielding.

The link can operate at four baud rates between 2400 and 19200 bits per second. The baud rate is selected by the front panel menus. The other communication parameters are fixed at 8 bit words, no parity and 1 stop bit. Set your remote computer interface to the same settings. Factory default is 19200 baud.

The serial interface does not support hardware or software flow control. Commands and responses are relatively short and flow control is not normally required. The command/response method assures that the host computer can sense if the Switch is unable to accept more characters.

The RS-232 interface is pin compatible with standard PC serial ports, which use RS-574 pin assignments. To control the system from a PC, a "null Modem" cable is required. A Null Modem adapter can be used with a "straight through" cable, or a custom cable can be wired, following the diagram below.
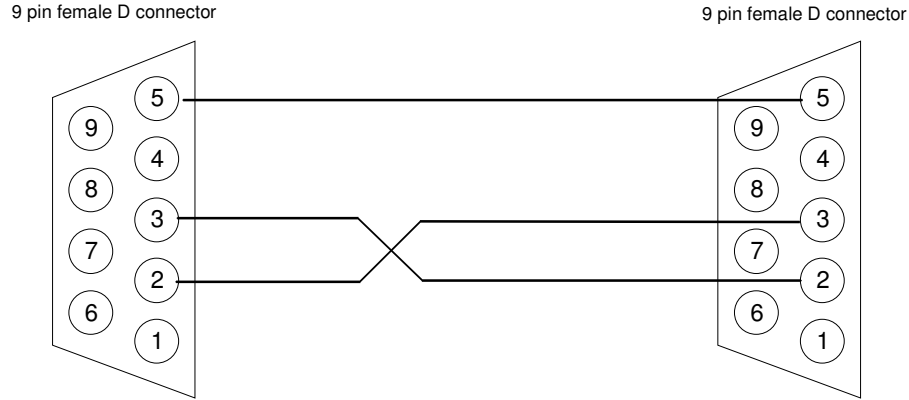
9 pin female D connector   9 pin female D connector

Figure 2 : PC to Switch Chassis – RS-232

The Serial port connector (CTRL) pin assignments are:

Pin	RS-232 Applicability	RS-485 Applicability	Circuit Function	Direction
1		X	TxDataB	Output
2	X		Receive Data	Input
3	X		Transmit Data	Output
4		X	RxDataB	Input
5	X	(Shield)	Gnd	
6		X	TxDataA	Output
7			unused	
8			unused	
9		X	RxDataA	Input

3.2   RS-422 Remote Control Operation

RS-422 operation allows data communication over cables of up to 4,000 feet. Use RS-422 when the remote computer must be located far from the switch chassis, or when ambient electronic noise levels are very high. The RS-422 standard uses balanced differential signaling, for significantly more reliable communication than RS-232. The drivers and receivers are RS-485 compliant, which makes them suitable for direct interface to full duplex RS-485 systems as well.

The link can operate at four baud rates between 2400 and 19200 bits per second. The other communication parameters are fixed at 8 bit words, no parity and 1 stop bit. Set your remote computer interface to the same settings. For long runs, a termination might be required to assure reliable communication at high baud rates. If you experience data integrity problems (parity errors, garbled data) try slower baud rates. If slower baud rates help, then try the faster rates with a 120 ohm terminating resistor across the receive data pins (RXA and RXB). Terminate each pair at its receiver. The terminations can be installed inside the back shells of the cable connectors. The actual resistance value may be adjusted to match the cable's characteristic impedance. A value of 120 ohms is typical for twisted shielded pairs.

The serial interface does not support hardware or software flow control. Commands and responses are relatively short and flow control is not normally required. The command/response method assures that the host computer can sense if the Switch is unable to accept more characters.

The interface requires 2 twisted pairs of wires between the communicating devices. Shielding is recommended over the two pairs. For best performance and safety, do not ground the shield at both ends. Leave one end of the shield unconnected. If each pair is individually shielded, ground the shield at its source end (driven end) and leave it floating at its receiving end.

The suggested drawing below is for the RS-422 interface using 2 twisted shielded pairs. The computer side does not show pin numbers, as there are many forms of RS-422 connectors available. Notice the individual shields are grounded at opposite ends, and there is no ground continuity between the two devices (the two shields are assumed isolated from each other). In long runs, this serves to protect both devices from carrying ground currents, especially in the event of a power line fault in either device. If your cable has individual shields that are in intimate contact with each other, it may not be possible to avoid ground current flow down the cable shield.
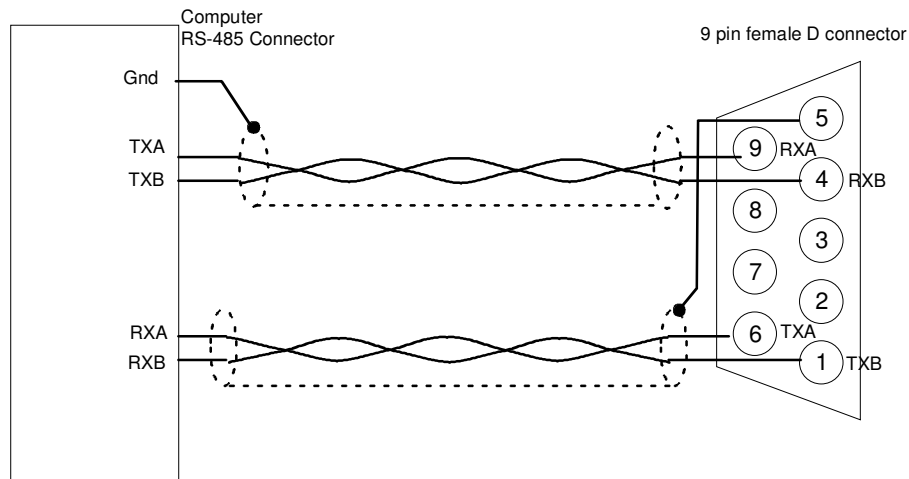

Figure 3 : Computer to Switch RS-422 Wiring

A standard PC RS-232 port can be transformed to balanced operation using an "RS-232 to RS-422" or "RS-232 to RS-485" adapter device. These devices are available from a variety of sources. Some can be powered directly from the RS-232 handshake signals available at the PC connector. This type is recommended, as it does not require a separate power supply or transformer for operation.

Suggested sources for these adapters are B&B Electronics (www.bb-elec.com or 815-433-5100) and Black Box Network Services (www.blackbox.com or 877-877-2269).

4   Front Panel Operation

After all cable connections have been made, power up the Attenuator Unit. The Unit will power on in Local mode, so the front panel is enabled. After displaying the model number, and initializing itself, the Attenuator unit will set itself to the attenuation level for each channel that existed when it was powered down.

The following sections discuss general operations. Detailed operating sequences appear after the general discussion

4.1   Remote and Local Modes

Manual operation is permitted whenever the Attenuator unit is in Local mode. The front panel can always be used to view the state of the Attenuator unit. But to make changes via the keypad, the Attenuator must be placed into Local mode.

The remote computer can place the Attenuator unit in Remote mode, thereby disabling changes from the front panel. However, the Attenuator unit can be returned to Local mode using its front panel menus. The remote computer can also place the Attenuator unit into Local Lockout state. In Local Lockout state, the front panel is disabled and cannot be used. The remote computer must release the switch from Local Lockout state before front panel control can occur. To allow recovery if the remote computer fails, the switch can be power cycled. It will always release the Local Lockout and revert to Local state at power up. The Attenuator unit path will be interrupted during this power cycle operation.

4.2   Setting Attenuation Levels

To change the attenuation level of a specific channel, press the CHAN key. Pressing CHAN will change the LCD display to an edit mode. A blinking cursor will appear to indicate the Channel is waiting for data. Use the numeric keys to specify the desired Channel, or use the UP and DOWN keys to increment/decrement through the available Channel numbers. When the display shows the desired selection, press ENTer to confirm the choice. Pressing ESC before the ENTer key will cancel the change.

When the ENT key is pressed, the Attenuator unit verifies that the number entered by the operator is within the valid range of channels. If the operator enters a number that is out of range for the Attenuator unit (e.g. typing in "3" for a 2 Channel Attenuator Unit), the operation is aborted, and the LCD displays the previous selection. No change occurs in the RF path. If the number is accepted, the change is made to the Channel selection, and the display is updated. Any leading zeroes are removed and the cursor disappears

After the appropriate Channel has been selected, press the ATT key to enable the keypad to enter digits for the attenuation level. As digits are entered, they scroll left, to the maximum number of digits allowed for the Attenuator unit. If an incorrect digit is typed, follow it by correct digits, allowing the erroneous digit to "fall out" of the left of the display area. Leading zeroes may be entered to flush erroneous digits. Also, the "." key will insert a decimal point to the right of the last entered digit. The ENT key accepts only the digits actually displayed.

Attenuation levels can also be changed using the UP, and DN keys after the ATT key has been pressed. Each time the UP or DN key is pressed will increment the attenuation level by 0.25dB. Again the ENT key must be pressed to execute the attenuation level change.

4.3   Using the Menus

The menu system provides screens for configuring certain internal parameters, such as serial interface baud rates. It also provides status information regarding internal fault monitoring. There are screens to restore the switch to its default settings. Menus are multi-level hierarchies. The operator chooses a level and moves to the next lower level until the specific items are reached

The normal display is the Connection screen, showing the state of the Attenuator unit. Press the MENU key to change to the first menu heading. Use the UP/DOWN keys to scroll through the headings. Press ENT to move down into the multi-level menus. Press ESC to return to the next higher menu level.

Once a specific parameter is reached, the parameter can be changed by using the UP/DN keys to see the various options. When the desired value is displayed, press ENT to make that the current value of the parameter. Press ESC to abort, and return to the next higher level.

Certain parameters require that the switch be reset. The reset operation occurs automatically, without powering off the switch. The LCD will show "Resetting" followed by the normal initialization screen. The RF connection will be restored, typically without actually being broken. The reset operation occurs whenever a communication parameter is changed (RS-232, RS-422)

4.4   LCD screens and Menus

4.4.1   Menu Tree

Startup Splash
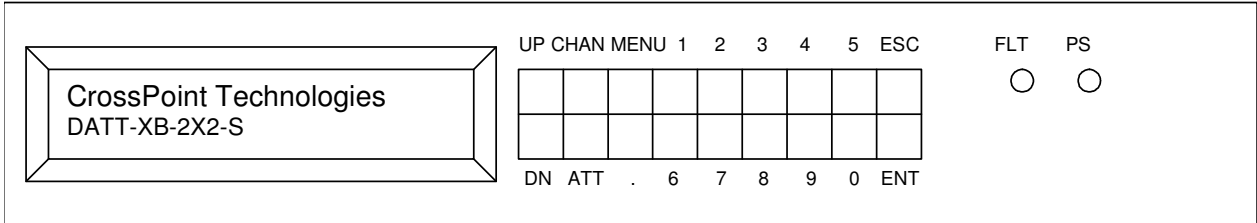Connection Screen
        Remote/Local Mode
        BITE Status
                Power Supply status
                Internal communication status
        Maintenance & Setup
                Serial Options
                        RS232/RS422 Interface Selection
                        Baud Rate
                Ethernet
                        DHCP enable
                        Static IP address set or DHCP address readback
                        Port
                        Static Net Mask
                        MAC (Hardware) address readback
                        System Network ID readback
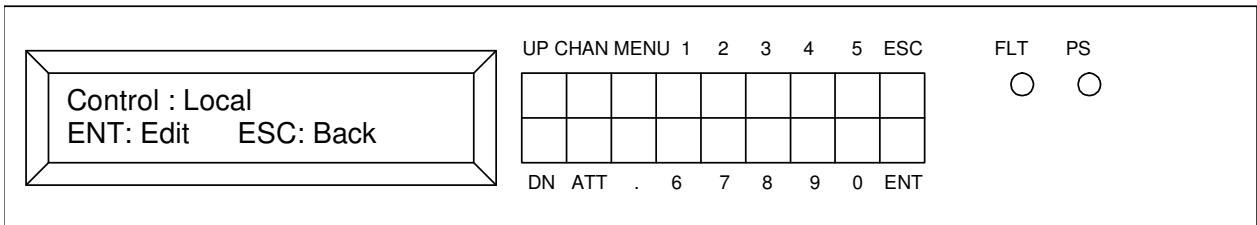   Software Version
        Set Defaults

4.4.2   Startup Splash

The splash screen is visible for 3 seconds after power on or reset. If gives the model number of the Attenuator unit.

NOTE: (illustrations that follow are generic for explanation purposes only.)

```
                              UP CHAN MENU  1   2   3   4   5  ESC      FLT    PS
   ┌────────────────────┐     ┌──┬──┬──┬──┬──┬──┬──┬──┐        ○      ○
   │ CrossPoint Technologies │     │  │  │  │  │  │  │  │  │
   │ DATT-XB-2X2-S       │     ├──┼──┼──┼──┼──┼──┼──┼──┤
   └────────────────────┘     └──┴──┴──┴──┴──┴──┴──┴──┘
                              DN  ATT  .   6   7   8   9   0  ENT
```
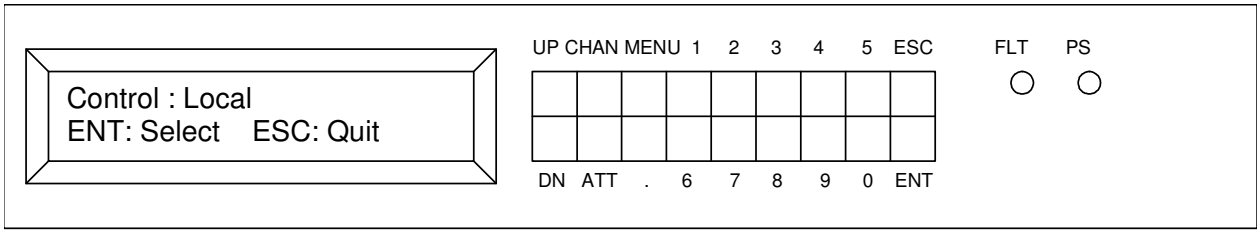
4.4.3   Remote/Local Control

From the connection screen, pressing MENU will bring up the first Menu heading. Scroll through the top level items using the UP/DN keys. Press ENT to step into a selection and view the current setting. Press ENT again to step into the list of choices. Choices are viewed by scrolling UP/DN. Press ENT to select a new parameter value. Press ESC to back up one level in the menu and abandon any changes. The first MENU screen will look like this:

```
                              UP CHAN MENU  1   2   3   4   5  ESC      FLT    PS
   ┌────────────────────┐     ┌──┬──┬──┬──┬──┬──┬──┬──┐        ○      ○
   │ Control : Local     │     │  │  │  │  │  │  │  │  │
   │ ENT: Edit    ESC: Back │     ├──┼──┼──┼──┼──┼──┼──┼──┤
   └────────────────────┘     └──┴──┴──┴──┴──┴──┴──┴──┘
                              DN  ATT  .   6   7   8   9   0  ENT
```
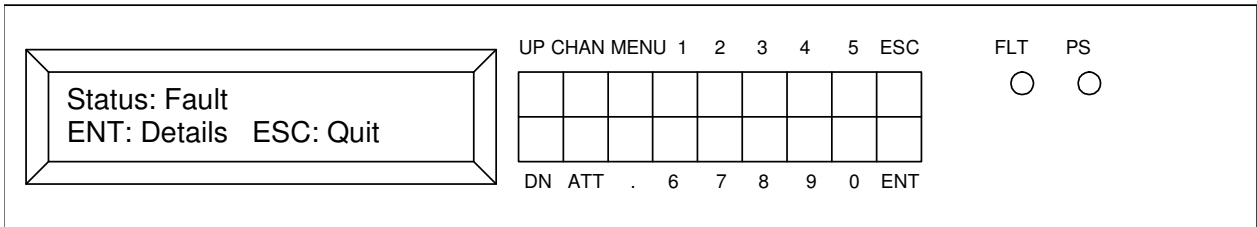
The Attenuator unit is in Local mode unless the remote computer has taken over the switch. If the screen shows "Remote", front panel control is disabled. (Switch settings can be viewed but not changed). When the system is in Remote mode, control can be acquired by pressing ENT to step into this menu item. Press UP or DN until the screen shows Local, as in the picture below. The bottom line will instruct the operator to press ENT to confirm this change to Local mode. Pressing ESC will abandon the change, and back up one level to the top menu list.

The Attenuator unit may also be in Local Lockout mode. In this mode, the remote computer has absolute control. This menu item cannot be used to regain control from a Local Lockout condition. The remote computer must place the Switch into either Remote or Local modes or power must be cycled to release a Local Lockout.
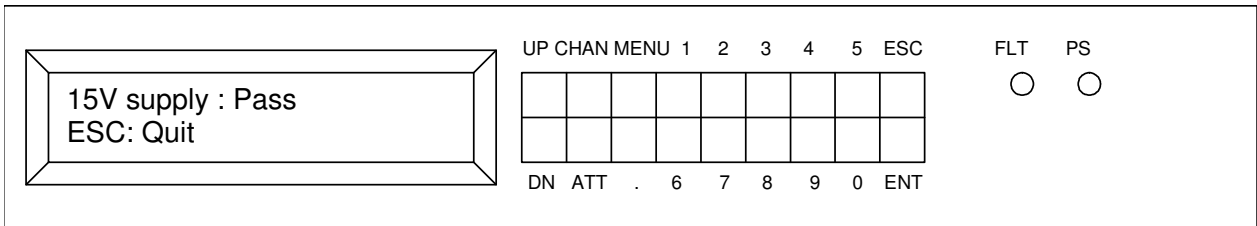
```
┌─────────────────────────────────────────────────────────────────────────┐
│                         UP CHAN MENU 1   2   3   4   5  ESC     FLT   PS   │
│  ╔═══════════════════════╗  ┌──┬──┬──┬──┬──┬──┬──┬──┬──┐                  │
│  ║                       ║  ├──┼──┼──┼──┼──┼──┼──┼──┼──┤        ○     ○    │
│  ║  Control : Local      ║  │  │  │  │  │  │  │  │  │  │                  │
│  ║  ENT: Select   ESC: Quit ║ └──┴──┴──┴──┴──┴──┴──┴──┴──┘                │
│  ╚═══════════════════════╝  DN  ATT  .  6   7   8   9   0  ENT             │
└─────────────────────────────────────────────────────────────────────────┘
```

4.4.4   Status

The next top level Menu item, "Status", displays details from the built in test circuits. This example shows a Fault reported. The Red FLT lamp will be lit at all times when any fault is detected. If the problem is a power supply, the PS LED will be lit. Switches with redundant power supplies will have two LED's for this purpose. Press ENT to drop down and view details.
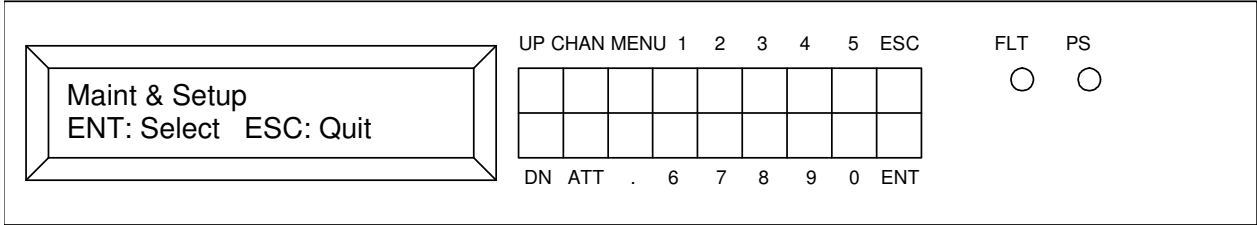
```
┌─────────────────────────────────────────────────────────────────────────┐
│                         UP CHAN MENU 1   2   3   4   5  ESC     FLT   PS   │
│  ╔═══════════════════════╗  ┌──┬──┬──┬──┬──┬──┬──┬──┬──┐                  │
│  ║                       ║  ├──┼──┼──┼──┼──┼──┼──┼──┼──┤        ○     ○    │
│  ║  Status: Fault        ║  │  │  │  │  │  │  │  │  │  │                  │
│  ║  ENT: Details  ESC: Quit ║ └──┴──┴──┴──┴──┴──┴──┴──┴──┘                │
│  ╚═══════════════════════╝  DN  ATT  .  6   7   8   9   0  ENT             │
└─────────────────────────────────────────────────────────────────────────┘
```

Use the UP/DN buttons to scroll through the various power supply voltages. A sample display is shown below:

```
┌─────────────────────────────────────────────────────────────────────────┐
│                         UP CHAN MENU 1   2   3   4   5  ESC     FLT   PS   │
│  ╔═══════════════════════╗  ┌──┬──┬──┬──┬──┬──┬──┬──┬──┐                  │
│  ║                       ║  ├──┼──┼──┼──┼──┼──┼──┼──┼──┤        ○     ○    │
│  ║  15V supply : Pass    ║  │  │  │  │  │  │  │  │  │  │                  │
│  ║  ESC: Quit            ║  └──┴──┴──┴──┴──┴──┴──┴──┴──┘                  │
│  ╚═══════════════════════╝  DN  ATT  .  6   7   8   9   0  ENT             │
└─────────────────────────────────────────────────────────────────────────┘
```
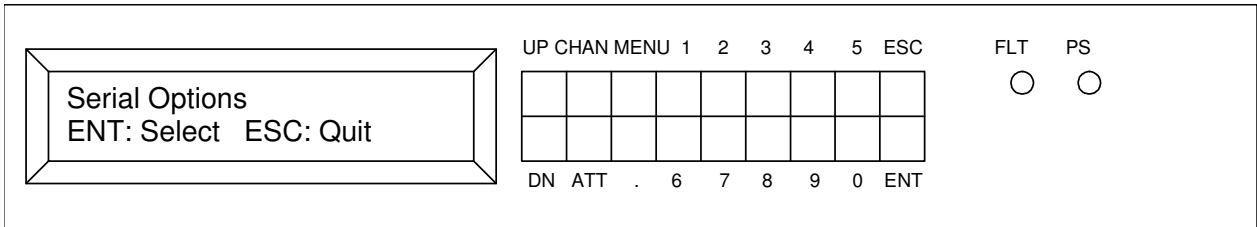
4.4.5   Maintenance & Setup

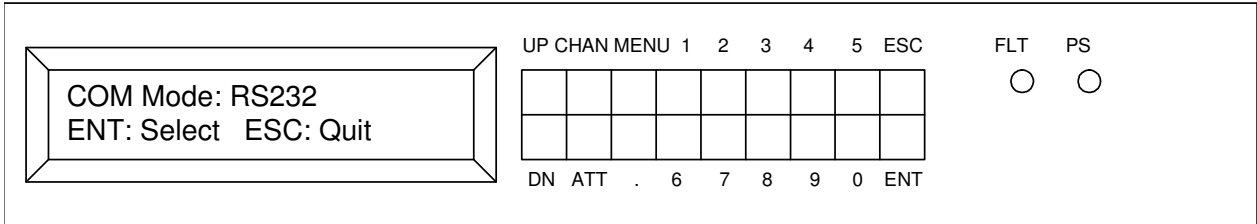This top level menu item allows the setup of the serial port, and allows reading the software version identifier.

```
                              UP CHAN MENU  1   2   3   4   5  ESC      FLT   PS
                                                                        O     O
   Maint & Setup
   ENT: Select   ESC: Quit
                              DN  ATT   .   6   7   8   9   0  ENT
```

Press ENT to drop into the menu and scroll through the choices.

4.4.6   Serial Options

All serial communication settings are made from these menu items. Press ENT to drop into these items

```
                              UP CHAN MENU  1   2   3   4   5  ESC      FLT   PS
                                                                        O     O
   Serial Options
   ENT: Select   ESC: Quit
                              DN  ATT   .   6   7   8   9   0  ENT
```

The default RS232 mode is shown here.

```
                              UP CHAN MENU  1   2   3   4   5  ESC      FLT   PS
                                                                        O     O
   COM Mode: RS232
   ENT: Select   ESC: Quit
                              DN  ATT   .   6   7   8   9   0  ENT
```

Pressing ENT will allow scrolling through the other choices. RS422 and (future) Ethernet are selected from this menu. To select RS422, use UP/DN until the screen shows RS422. Press ENT to change the interface. Changing Serial mode parameters will cause the Switch to reset itself automatically when the action is confirmed, and will be operational again in about 6 seconds.

```
                              UP CHAN MENU  1   2   3   4   5  ESC      FLT   PS
                                                                        O     O
   COM Mode: RS422
   Press ENT to Confirm
                              DN  ATT   .   6   7   8   9   0  ENT
```
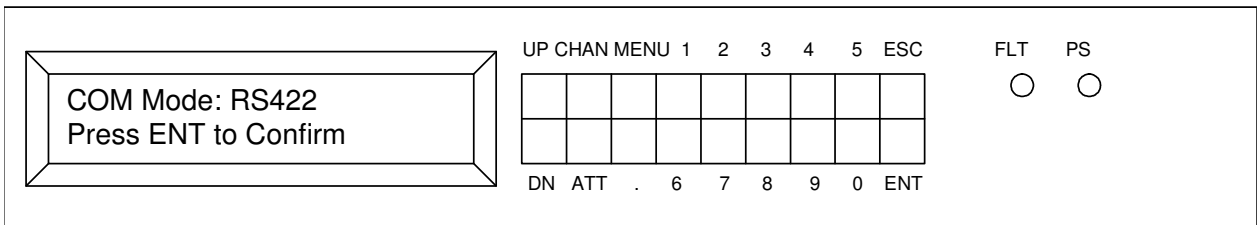
Similar menu choice selects baud rate. Factory default is 19200 baud.

		UP	CHAN MENU	1	2	3	4	5	ESC	FLT	PS

Baud Rate: 19200
ENT: Edit   ESC: Back

DN   ATT   .   6   7   8   9   0   ENT
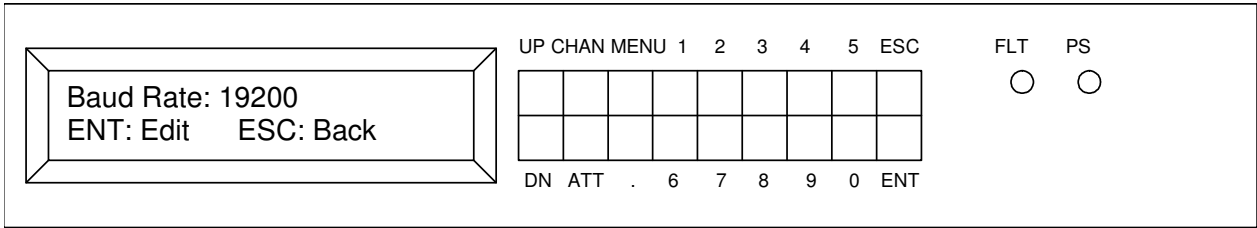
Press ENT to drop into the menu item and scroll through available choices. Press ENT to change the baud rate. Changing Serial mode parameters will cause the Matrix to reset itself automatically when the action is confirmed, and will be operational again in about 6 seconds.

4.4.7   Ethernet Options

All Ethernet communication settings are made from these menu items. Press ENT to drop into these items

UP   IN MENU   1   2   3   4   5   ESC   FLT   PS

Ethernet Options
ENT: Select   ESC: Quit

DN   OUT OFF   6   7   8   9   0   ENT
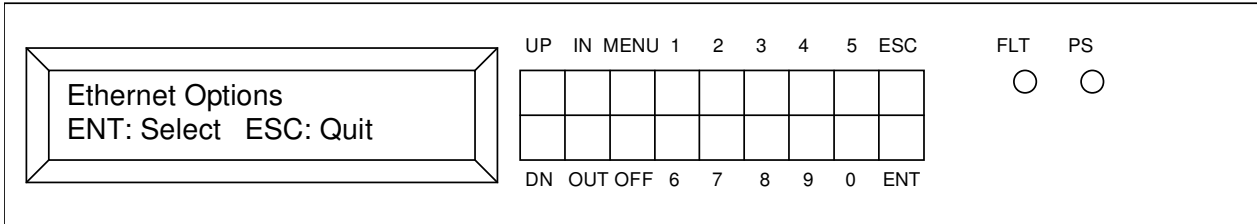
The default condition is for static IP addressing. Therefore, DHCP is off by default. The DHCP selection menu appears first because its state will have an effect on data items presented in later menus.

UP   IN MENU   1   2   3   4   5   ESC   FLT   PS

DHCP: Off
ENT: Edit   ESC: Back

DN   OUT OFF   6   7   8   9   0   ENT
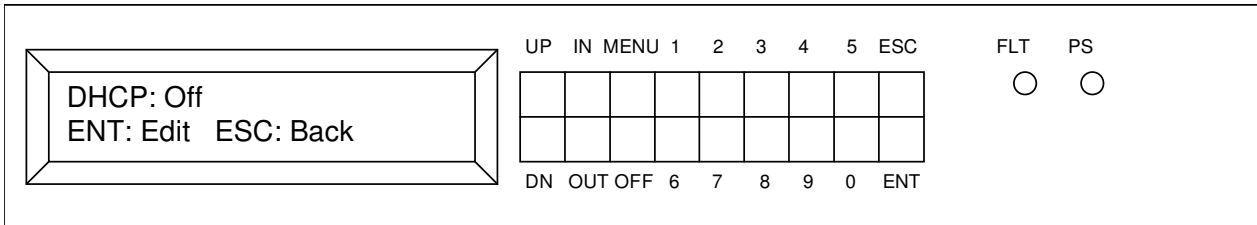
Pressing ENT will enter the DHCP edit mode. Then use the UP/DN keys to set DHCP ON or OFF as desired. Press ENT to accept the setting and return to this level of the menu. Press ESC to abort any change and leave the current value in place

The next menu item is the IP address screen. This screen shows either the static IP address assigned during setup (when DHCP is off) or it shows the address received from the DHCP initialization process if DHCP is enabled. If DHCP is enabled, but no address has been assigned, the screen will show an address of 000.000.000.000. In this case, communication with the matrix is not possible.

```
                    UP  IN MENU 1   2   3   4   5  ESC       FLT    PS
                                                              ◯      ◯
  Addr: 192.168.001.053
  ENT: Edit   ESC: Back
                    DN OUT OFF 6   7   8   9   0  ENT
```

If DHCP is off, press ENT to manually set the IP address. Your network administrator will be able to help determine this address. The address must be manually typed using the numeric keys. Leading zeroes must be entered, as each field is a fixed 3 characters. Press ENT when done to accept the new address and return to the upper level menu. If DHCP is enabled, this screen is read-only.

The next menu item is the IP Port value. The default is Port 23, the standard port for Telnet services. If another port is desired, it may be set here. Ports in the full range 1..65535 are accepted. Leading zeroes are not required for this item.

```
                    UP  IN MENU 1   2   3   4   5  ESC       FLT    PS
                                                              ◯      ◯
  Port: 23
  ENT: Edit   ESC: Back
                    DN OUT OFF 6   7   8   9   0  ENT
```

When using static addressing (DHCP Off), a network mask must be supplied. The next menu item allows this mask value to be entered. Like the IP address, leading zeroes are required because the number is broken into 4 fields, and a decimal point key is not available. Set the netmask according to the addressing system used in your network. Your Network Administrator will know what this value should be.
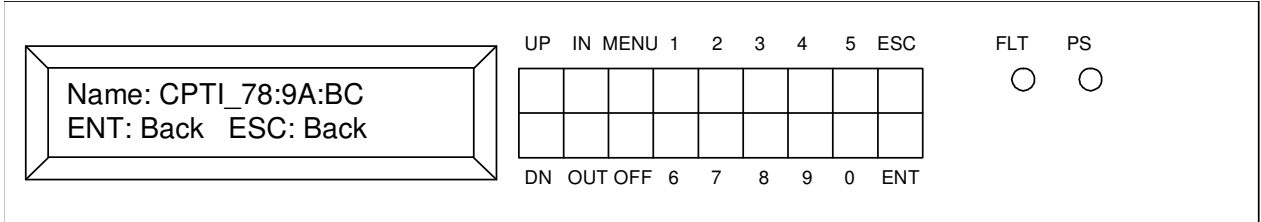
```
                    UP  IN MENU 1   2   3   4   5  ESC       FLT    PS
                                                              ◯      ◯
  Mask: 255.255.255.000
  ENT: Edit   ESC: Back
                    DN OUT OFF 6   7   8   9   0  ENT
```

If DHCP is On, this field is read only, and shows the last value entered manually, not the value in use on the network.

For system administration, it is often important to know the hardware MAC (Media Access Control) address. This address is assigned in silicon at the factory, and is globally unique among all Ethernet devices. The next menu item displays the MAC address of the matrix switch, and is read-only.

```
                    UP  IN MENU 1   2   3   4   5  ESC       FLT    PS
                                                              ◯      ◯
  MAC: 12:34:56:78:9A:BC
  ENT: Back   ESC: Back
                    DN OUT OFF 6   7   8   9   0  ENT
```
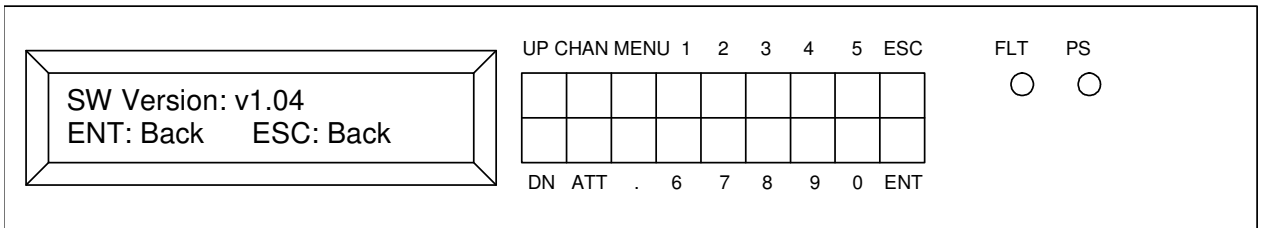
In some networks the System Administrator will want to put a name for the switch into the IP routing tables. If DHCP is being used, the IP address can change dynamically, so it becomes difficult to find the matrix by its IP address. A name can be assigned, so that the matrix can be found by name-server techniques. To simplify this setup, the switch matrix creates a unique name for itself and registers this name with the local router during DHCP initialization. The name is always of the format "CPTI_" followed by the last 6 characters of its MAC address. (The first 6 characters of the MAC will always be the same for all CrossPoint products, so they add no uniqueness to the name). The CPTI_ header allows the matrix to be easily identified in a router table by the System Administrator, and matched to a specific switch matrix.

		UP	IN	MENU	1	2	3	4	5	ESC	FLT	PS
Name: CPTI_78:9A:BC											○	○
ENT: Back ESC: Back												
		DN	OUT	OFF	6	7	8	9	0	ENT		

4.4.8   Software Version

This read only display shows the current installed version of firmware in the system controller.

		UP	CHAN	MENU	1	2	3	4	5	ESC	FLT	PS
SW Version: v1.04											○	○
ENT: Back ESC: Back												
		DN	ATT	.	6	7	8	9	0	ENT		

4.4.9   Set Defaults

This menu item erases all communication parameters, and sets the switch to RS232, 19200 baud. All switches are set to their OFF condition (Failsafe models revert to failsafe condition). The Switch resets itself and will be operational again in about 6 seconds.

		UP	CHAN	MENU	1	2	3	4	5	ESC	FLT	PS
Set Defaults											○	○
Press ENT to Confirm												
		DN	ATT	.	6	7	8	9	0	ENT		
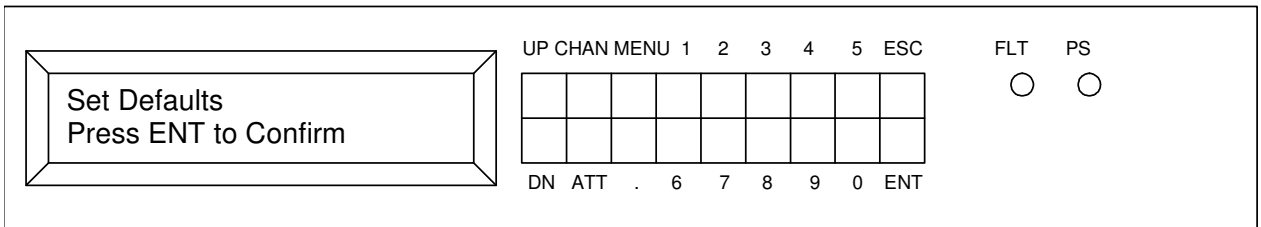
5   Remote Control

The Attenuator unit may be controlled from a dumb terminal or terminal emulator program, such as HyperTerm (found on most PC's). The switch system does not echo characters as they are typed. However, every command returns either a copy of what was received, or an error code. This reply returns after the command has executed, signaling that the command was acted upon.

5.1   Protocol

All messages and responses over the User IO interface are ASCII strings. No binary data is transmitted over this interface. Commands consist of 2 ASCII characters and may require an optional parameter string. Commands are terminated by carriage return (hex 0D). Execution does not begin until the carriage return is received.

Multiple commands may be sent on the same line if separated by a semicolon (";"). Incoming command strings are limited to 63 characters, including the carriage return. Outgoing responses are truncated if they would exceed 255 characters.

In most cases, a command mnemonic can be followed by an ASCII question mark ("?"). This form of the command will be interpreted as a status request and the current value associated with that command will be returned. The state of the device will not be altered by a status request.

Parameters are typically separated by commas. Certain commands can have multiple parameter sets which are separated by parentheses.

The 2 character mnemonics are case insensitive on receipt, but will be upper case in the response.

Transmit and receive operations are synchronous to one another. Responses are returned when the command is complete. All commands are echoed after completion as a verification to the remote computer. If the host computer does not wait for the response string, it should allow 250 msec between commands to ensure that it does not overrun internal buffers.

When Channel attenuation numbers are required as parameters, they may omit leading zeroes. Up to 3 characters are accepted. The maximum switch size is 999 x 999.

When parameters are out of range (e.g. a channel number is higher than the number of installed channels), the command are not executed. In commands which include lists of items, all items are processed until an error is encountered. All items after an error are discarded, as well as the error itself. An error response is returned.

5.2   Command Set

5.2.1   Summary

Mnemonic	Description
AT	Set attenuation of a specified channel
CE	Clear Last Error
CS	Internal Communication Status
DA	Report All attenuator settings
ER	Error Response
LE	Report Last Fault
ID	Identify Attenuator model
RD	Restore Default settings
RL	Remote/Local state
SZ	Attenuator Size and range
TR	Test Report

5.3   Detailed Command and Status Formats

5.3.1   AT Set Attenuation

FORMAT: (1) AT(xxx,yy.y)(zzz,aa.a)…
                    (2) ATxxx?
        Where xxx and zzz = input channel number in ASCII format
                        Yy.y and aa.a = attenuation (dB) in ASCII floating point format
RESPONSE: (1) SC(xxx,yy.y)(zzz,aa.a)…
                    (2) SC(xxx,yy.y)

DESCRIPTION: This command sets a list of specified attenuator channels to specified attenuation. Attenuations are specified in floating point format, and are rounded to the nearest 0.25 dB. (see SZ command – models with different resolutions will round to their minimum resolution). Range checking occurs after rounding, so a value will be accepted if it rounds to a value within the allowed range (see SZ command). The response will show the rounded value that was accepted.

EXAMPLE : Sending AT(2,23.7) will result in a response of AT(2,23.75) and the channel 2 attenuator will be set to 23.75 dB.

5.3.2   CE Clear Last Error After Reporting

FORMAT: (1) CE
RESPONSE: (1) CE0000
DESCRIPTION: Returns hex ASCII value (16 bits as 4 characters.)This is a bit mapped indication of the most recent fault information. After returning this value, the error bits are reset. CE0000 indicates there were no faults since last CE command. This command is identical to the LE command, except that LE does not clear the fault information after reporting it. See LE command for more detail on the meaning of the bits in the response.

5.3.3   CS Communication Status

FORMAT: (1) CS
RESPONSE: (1)CSBOK,S00000000
                     (2)CSB01,S00000000
                     (3)CSB01,S00000001

DESCRIPTION: returns internal communication faults if any. Response 1 is the normal, no fault response. BOK indicates all the backplane controller boards are communicating properly.

If there are currently faults, they will be returned in two hex digits as shown in response 2 and 4. The B01 error messages can be interpreted according to the tables below. The S00… string shows communication failures to the attenuator driver cards. These bits can be interpreted according to the tables in the front panel discussion of these faults. The attenuator returns 8 digits after the 'S'. Message	Backplane Controller 1
BOK	OK
B01	Not communicating

The last item is the state of the attenuator driver card communication. The bits in this hex ASCII message can be interpreted according to the table below, using an example response of "S000000C0". These examples indicates that the relay driver card in slot 4 is not communicating properly. S (hex)	Bit 3	Bit 2	Bit 1	Bit 0
0	16	16	15	15
0	14	14	13	13
0	12	12	11	11
0	10	10	9	9
0	8	8	7	7
0	6	6	5	5
C	**4**	**4**	3	3
0	2	2	1	1

5.3.4   DA Dump Attenuator Settings

FORMAT: (1) DA
                      (2) DA?
RESPONSE: (1) same as format (2)
                      (2) DA(xxx,yy.y)(zzz,ww.w)…

The responses are organized as (channel, attenuation). Pairs are enclosed in parentheses.
Channels are integers from 1 to 8. Attenuations are floating point values from 0 to 63.75 dB.

DESCRIPTION: Dumps a list of all attenuator settings. This is a status request only. No changes
to attenuation will occur.

EXAMPLES: DA(1,6.25) (2,14)

In the example, attenuator 1 is set to 6.25 dB, and attenuator 2 is set to 14 dB. The attenuators
have 0.25 dB resolution (see SZ command).

5.3.5   ER Error Reply

DESCRIPTION: If the system detects an error in an incoming command, it will reply with ERxxx
where the xxx is a numeric code indicating the error type. The offending command string may be
appended after a colon.

EXAMPLE: sending a command "FG3" which is an unknown command will cause the system to
reply with "ER001:FG". The list of possible error codes are:

Error Code	Description	Comments
ER001	Unrecognized command	
ER002	one or more parameters are incorrect	not used for numeric range errors
ER003	Command not applicable to this particular device	
ER004	one or more numeric parameters are out of range	
ER005	something wrong in how info is grouped (parens, semicolons, etc)	

5.3.6   ID Device ID

FORMAT: (1) ID
                      (2) ID?
RESPONSE: (1) same as (2)
                      (2) IDCrossPoint Technologies DATT-XB-2x2-S

DESCRIPTION: Returns ASCII string identifying the Attenuator model. This query may be used as
a confirmation that the device is communicating.

5.3.7   LE Last Fault Query

FORMAT: (1) LE
RESPONSE: (1) LE0000

DESCRIPTION: Returns hex ASCII value (16 bits as 4 characters.)This is a bit mapped indication of the most recent fault information. LE0000 indicates there were no faults since power up. This query can be used if there is an intermittent fault. Faults are reported as current conditions. (See TR and CS queries) If a fault occurs briefly, it is usually an indication of a missed poll or checksum error on the internal communication links. These faults are recoverable and require no user interaction. However, to confirm that situation, the LE query can be used.

	Bit 3	Bit 2	Bit 1	Bit 0
Not all bits are assigned in each model. The example response ("LE2000") indicates that one of the switch cards failed to respond in time, or indicated a checksum error to an I^2C message on the backplane. However, if there are no current faults, then the switch cards are all communicating successfully and require no action. Occasional, intermittent voltage faults usually indicate noise spikes that got through the filters to the A to D converter, and are also not significant. LE				
2		485 Com Fault (Backplane controllers)	**I^2C Com Fault (Relay Driver cards)**	
0			-15V	
0				
0	+15V	5V A	Battery	

5.3.8   RD Restore Defaults

FORMAT: (1) RD
RESPONSE: none

DESCRIPTION: restores defaults to all communication settings and **sets all channels to maximum attenuation**. Serial port will revert to RS232 at 19200 baud. Ethernet will revert to DHCP addressing, (DHCP on) and port 23. The matrix will reset. No response is sent because of the reset operation.

CAUTION
When this command is executed, the DATT will reset itself and begin using the new communication parameters. All attenuation settings will go to maximum attenuation and remain so until new connections are assigned. Reset typically takes less than 10 seconds, depending on network response times.

CAUTION
The computer that sends this command may find it cannot communicate after this command because of the changes to the communication parameters. There is no other command to change serial settings remotely.

5.3.9   RL Remote or Local control

FORMAT: RL[R|L|K]
                      RL?

Where R = Remote mode
L = Local Mode
K = Remote with Local lockout mode

RESPONSE: RL[R|L|K]

DESCRIPTION: Determines whether the device uses the local keyboard or the Host port for commands. In Remote mode, the local front panel keys are disabled, though the user can regain Local control by suing the proper menu. In Local mode, the keys are enabled. While in Local mode, the Host port can assert control by issuing the RLR command. This will place the device in Remote mode, and disable the keyboard. (Most recent device to request control gets control) If the Host computer sends RLK, the front panel is locked out. The Host computer must issue the RLL or RLR command to remove the locked state.

EXAMPLE: RLL   places the Switch Matrix in local mode, enabling the front panel.

DEFAULT: Powers up in Local mode, regardless of how it was configured at power down. This allows manual recovery from the lockout condition (RLK).

5.3.10   SZ Attenuator Size

FORMAT: (1) SZ
                      (2) SZ?
RESPONSE: (1) same as (2)
                      (2) SZxxx,yy.y,zz.z

          Where xxx = number of channels
          yy.y = maximum attenuation for each channel (floating point)
          zz.z = resolution of each attenuator (floating point).

DESCRIPTION: Returns the number of channels installed, and the attenuation range and resolution. All channels have identical range and resolution

EXAMPLE: SZ2,63.75,0.25 indicates the DATT has 2 attenuation channels available.
                      Those attenuators have an active range of 0 .. 63.75 dB, in 0.25 dB steps.

Appendix A

This sections provides details of
        Specifications
        Panel Drawings
        Connectors

These configurations are covered in this Appendix.
        DATT-XB-2X2-S

DATT-XB-2X2-S

Specification	Conditions	Min	Typ	Max	Units
Frequency Range		7.25		8.4	GHz
Insertion Loss	0dB Atten Selected @7.85 GHz	-1.75	-2.00	-2.25	dB
Isolation	Channel to Channel	80	<85		dB
Impedance			50		Ω
VSWR			1.6	1.8	
Signal Level				+5	dBm
Attenuation Steps	0, 0.25, 0.50, 1.00, 2.00, 4.00, 8.00, 16.00, 32.00				dB
Max. Attenuation	63.75				dB
Temperature (Op)		0		50	°C
AC Voltage		90		265	VAC
		47	60	63	Hz
Power Consumption			7	10	W

Dimensions :   17 x 15 deep x 1.75 high (nominal) : 1 RU
Atten Type :   Pin Diode Absorptive (8-Bit Control)
Control :   RS232 or RS422 selectable, Ethernet, or Front Panel
                    Keypad
Connectors   SMA-F in and out
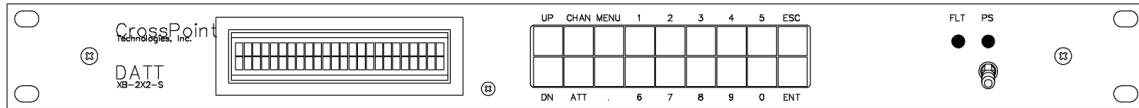
Front Panel

Rear Panel

Connector List

Ref	Connector Type	Name
J1	SMA-F	Input Channel 1
J2	SMA-F	Input Channel 2
J3	SMA-F	Input Channel 3
J4	SMA-F	Input Channel 4
J5	RJ45	Ethernet Control
J6	DB-9	Serial Control
J7	IEC	AC In
J8	Stud	Ground