Figures:

Tables:

REVISION HISTORY

REVISION	**DESCRIPTION**	**DATE**
0.1	Preliminary Version	Jul 05

1. OVERVIEW

The 500FC-DA Frame Controller with Distribution Amplifier card provides a single point of access to communicate with VistaLINK™-enabled 500 series of cards. The 500FC-DA provides a 10Base-T/100Base-TX Ethernet port and communication is facilitated through the use of Simple Network Management Protocol (SNMP). The 500FC-DA handles all SNMP communications between the frame (500FR) and the network manager (NMS), and serves as a gateway to individual cards in the frame. The 500FC-DA also provides an RS-232 serial port at the card edge to set up the network addresses.

In addition the 500FC-DA provides an on board reclocking distribution amplifier for HDTV and serial digital video signal at rates of 1.5 Gb/s and 143 Mb/s to 540 Mb/s. The DA features an auto-equalized input with eight reclocked outputs and has been designed for use as a SMPTE 292M (1.5 Gb/s), DVB-ASI or SMPTE 259M distribution product.

The 500FC-DA is housed in the 500FR *exponent* Frame and must be installed in slot 1 of the frame.

Frame Controller Features:
- Complies with IEEE 802.3 100Base-TX and 10Base-T Ethernet standards
- 100 Mbps Fast Ethernet or 10 Mbps Ethernet data transfer, selected by auto-negotiation
- Full duplex or half-duplex operation, selected by auto negotiation
- RJ-45 connector for network cable connection
- Card edge RS-232 serial control port for configuration
- Front panel LEDs indicate module fault
- Rear panel LEDs indicate Ethernet link, activity and speed
- Provides frame/chassis status information through enabled hardware via VistaLINK™ including frame status, card insertion/removal counters, and 500FC-DA software version number

DA Features:
- Normal mode for SMPTE 259M (143 $\Rightarrow$ 540 Mb/s) or SMPTE 292M (1.5 Gb/s) signals - autodetects correct bit rate
- Configurable for DVB-ASI and Non-Reclock mode using *Vista*LINK™ control
- Fully hot-swappable from front of frame with no BNC disconnect required
- Independent isolated output drivers to ensure no cross channel loading effects (i.e. no need to terminate unused outputs)
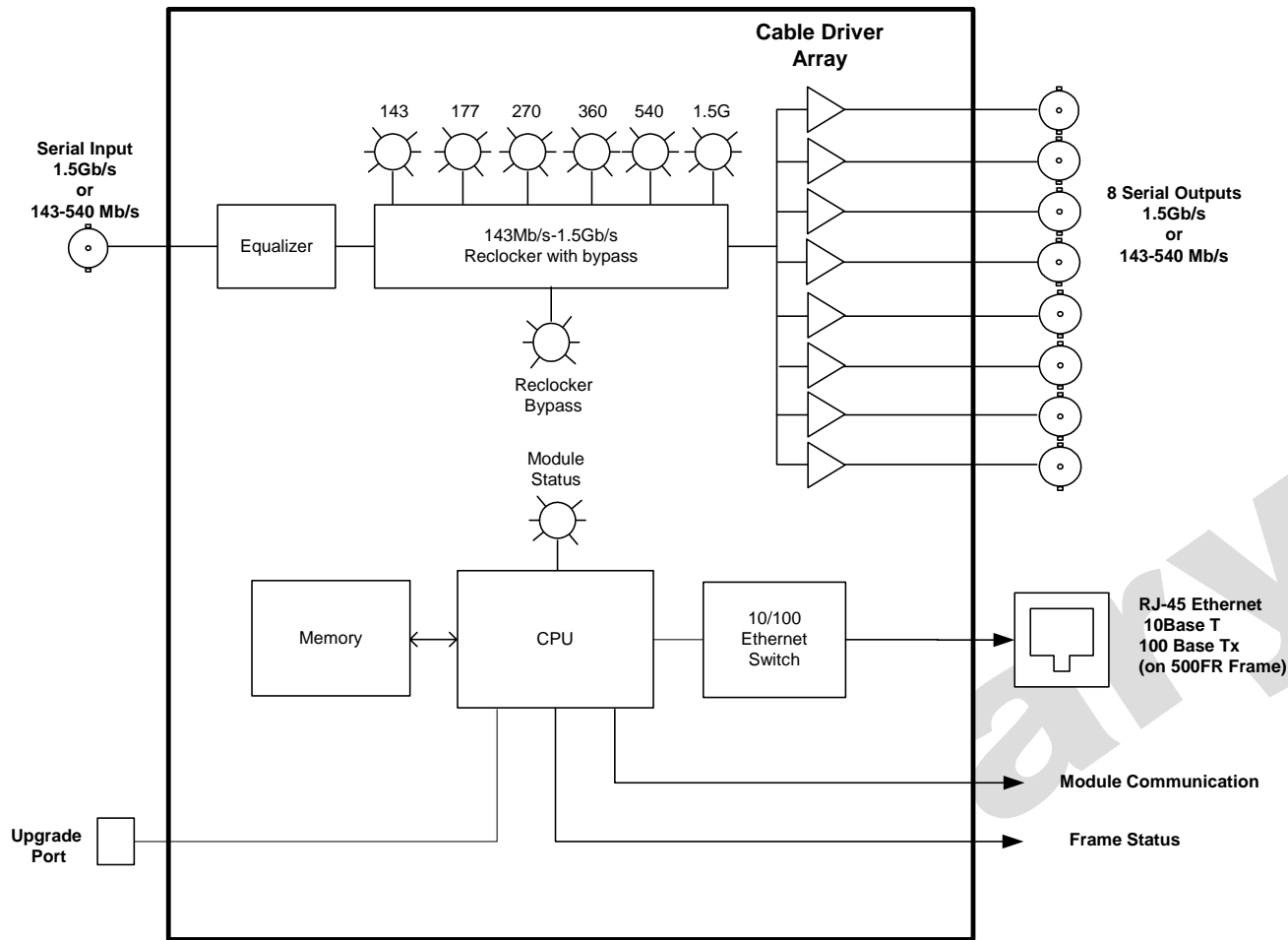
evertz

Figure 1: 500FC-DA Block Diagram

2. INSTALLATION

The 500FC-DA Frame Controller module can only be installed into slot 1 of the 500FR frame. Orient the module vertically such that the white card ejector is on the bottom. Align the card with the card guide corresponding for slot number 1. Carefully slide the module into the frame and press it completely into the rear panel connectors. Make sure that the connectors are fully seated in the rear panel.

The 500FC-DA comes with a companion rear panel overlay that can be placed over the rear panel BNC connectors to identify their function.
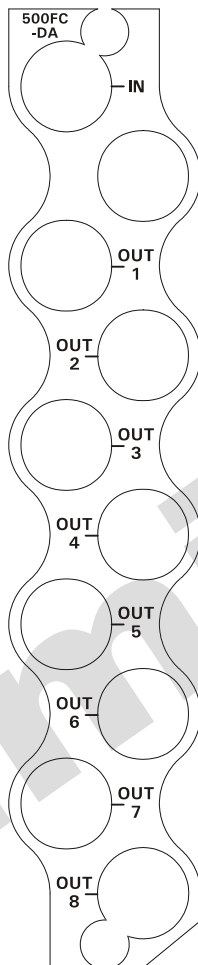
Figure 2: 500FC-DA Rear Panel Overlay

2.1. DISTRIBUTION AMPLIFIER CONNECTIONS

IN   Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 259M, DVB-ASI or SMPTE 292M standard. See section **Error! Reference source not found.** for information on choosing the correct video standard.

OUT 1 to 8   There are eight BNC connectors with reclocked serial component video outputs, compatible with the SMPTE 259M / DVB-ASI, or SMPTE 292M standard.

2.2. ETHERNET CONNECTION
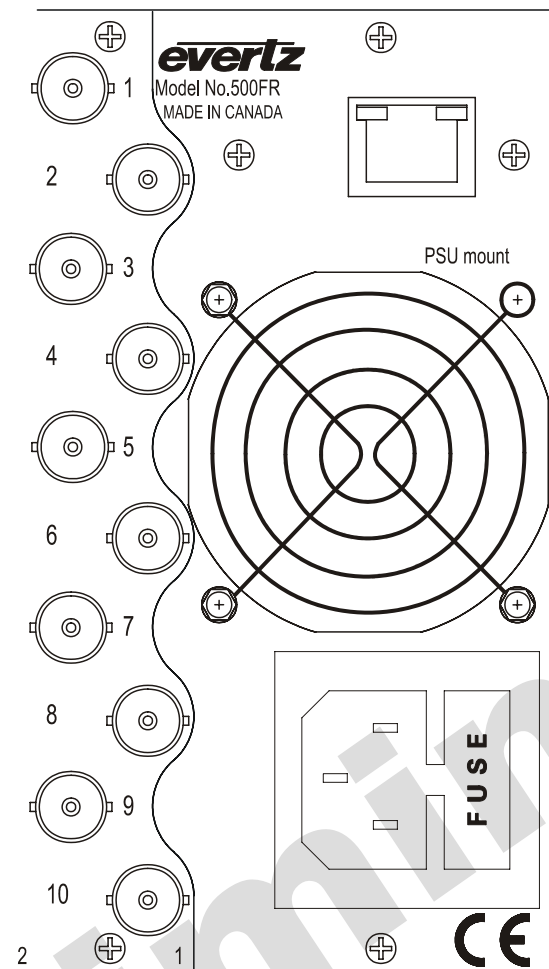
Figure 3: Ethernet Connector on 500FR Rear Panel

The 500FR has a RJ-45 Ethernet connector located on the rear panel on the side of the frame adjacent to slot 1. The 500FC-DA is designed to be used with either 10Base-T (10 Mbps) or 100Base-TX (100 Mbps) also known as *Fast Ethernet,* twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. The maximum cable run between the 500FC-DA and the supporting hub is 300 ft (90 m). The maximum combined cable run between any two end points (i.e. 500FC-DA and PC/laptop via network hub) or stations is 675 feet (205 m). The cable must be "straight through" with a RJ-45 connector at each end. Make the network connection by plugging one end of the cable into the RJ-45 receptacle of the 500FC-DA and the other end into a port of the supporting hub.

The straight-through RJ-45 cable can be purchased or can be constructed using the pinout information in Table 1. A color code wiring table is provided in Table 1 for the current RJ 45 standards (AT&T 258A or EIA/TIA 258B color coding shown). Also refer to the notes following the table for additional wiring guide information.

	Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
Pin 1	1	Transmit +	White/Green	White/Orange	X
	2	Transmit –	Green/White or White	Orange/White or Orange	X
	3	Receive +	White/Orange	White/Green	X
	4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
	5	N/A	White/Blue	White/Blue	Not used (required)
	6	Receive –	Orange/White or Orange	Green/White or Green	X
	7	N/A	White/Brown	White/Brown	Not used (required)
	8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Table 1. Standard RJ45 Wiring Colour Codes

Note the following cabling information for this wiring guide:
- Only two pairs of wires are used in the 8-pin RJ 45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins, a crossover cable made for one will also work with the other.
- Pairs may be solid colours and not have a stripe.
- Category 5 cable must use Category 5 rated connectors.
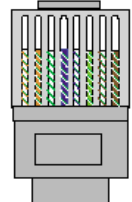
The maximum cable run between the 500FC-DA and the supporting hub is 300 ft (90 m). The maximum combined cable run between any two end points (i.e. 500FC-DA and PC/laptop via network hub) is 675 feet (205 m).

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity. The RJ-45 connector on 500FR rear panel is fitted with two LEDs to monitor the Ethernet connection.

10/100   This Amber LED is ON when a 100Base-TX link is last detected. The LED is OFF when a 10Base-T link is last detected (the LINK LED is ON). Upon power-up the LED is OFF as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

LN/ACT   This dual purpose Green LED indicates that the 500FC-DA has established a valid linkage to its hub, and whether the 500FC-DA is sending or receiving data. This LED will be ON when the 500FC-DA has established a good link to its supporting hub. This gives you a good indication that the segment is wired correctly. The LED will BLINK when the 500FC-DA is sending or receiving data. The LED will be OFF if there is no valid connection.

2.3.   SERIAL PORT CONNECTION

To connect the serial port for the module unit remove the module from the frame. Install the Upgrade cable provided (located in the vinyl pouch in the front of the manual binder) onto header J1 at the card edge. Re-install the module into the frame. This serial port is used to configure the network addresses for the module and also to upgrade the firmware in the module. See section 6.

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standards: SMPTE 292M, SMPTE 259M A, B, C, D (143 to 540 Mb/s) or DVB-ASI
Connector: 1 BNC per IEC 60169-8 Amendment 2
Equalization: Automatic to 350m @ 270Mb/s, 100m @1.5Gb/s with Belden 1694 (or equivalent)
Return Loss: > 15 dB up to 1.0 Gb/s
> 10 dB up to 1.5 Gb/s

3.2. SERIAL VIDEO OUTPUTS

Number of Outputs: 8 Reclocked
Connector: BNC per 60169-8 Amendment 2
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 200ps nominal
Overshoot: < 10% of amplitude
Return Loss: > 15 dB up to 1.0 Gb/s
> 12 dB up to 1.5 Gb/s
Wide Band Jitter: < 0.2 UI

3.1. ETHERNET

Network Type: Fast Ethernet 100 Base-TX IEEE 802.3u standard for 100 Mbps baseband CSMA/CD local area network
Ethernet 10 Base-T IEEE 802.3 standard for 10 Mbps baseband CSMA/CD local area network
Connector: RJ-45

3.2. SERIAL COMMUNICATIONS

Standard: RS-232
Connector: 9 Pin Female D connector on upgrade breakout cable (provided with 500FR)
Baud Rate: 57600
Format: 8 bits, no parity, 2 stop bits, no flow control

3.3. ELECTRICAL

Voltage: + 12VDC
Power: 7 Watts
EMI/RFI: Complies with FCC Part 15
Class A and EU EMC directive

3.4. PHYSICAL

Number of slots: 1 (must be in slot 1 of 500FR)

4. STATUS LEDS

The location of the status LEDs is shown in Figure 4.

4.1. MODULE STATUS LEDS

MODULE STATUS   Upon power-up, and if disabled through the Frame MIB, only LED 2 will be ON ("green") when the module is operating properly. When both LEDs 1 and 2 are enabled through the Frame MIB (VistaLINK™), both will flash alternatively.

RECLOCKER RATE: There are 6 LEDs that indicate the rate (143, 177, 270, 360 or 540 Mb/s, or 1.5 Gb/s) that the reclocker is currently using.

RECLOCKER BYPASS: This Green LED will be On when the reclocker rate is disabled by jumper J2.

5. JUMPERS

Figure 4: LED and Jumper Locations

5.1. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE   The UPGRADE jumper J4 located at the bottom edge of the module is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section in the front of the binder for more information.

          To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J4 into the *UPG* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto the COM header J1 at the front edge of the card. Re-install the module into the frame. Run the upgrade as described in the

Upgrading Firmware chapter in the front of the binder. Once the upgrade is completed, remove the module from the frame, move J4 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

6.   CONFIGURING THE FRAME CONTROLLER

The 500FC-DA Frame Controller is configured by connecting its serial port to a computer running a readily available terminal program such as HyperTerminal. The following procedure will guide you through each step of the configuration process.

You will need the following equipment in order to configure the 500FC-DA Frame Controller
- PC with available communications port. The communication speed is 57600 baud, therefore a 486 PC or better with a 16550 UART based communications port is recommended.
- "Straight-thru" serial extension cable (DB9 female to DB9 male) or (DB25 female to DB9 male)
- Terminal program such as HyperTerminal
- Special upgrade cable supplied with the 500FR frame. This cable is normally in the vinyl pouch at the front of this manual. (Evertz part #WA S76).

6.1.   ESTABLISHING COMMUNICATION WITH THE FRAME CONTROLLER

6.1.1.   Connecting the Computer to the Card Edge Serial Port

Connect the serial upgrade cable (Evertz part #WA S76) to the 2x3 header (J1) at the front edge of the 500FC-DA card. Note that pins 1 and 5 on the header should be removed and pins 1 and 5 on the cable connector should also be plugged. If the cable is not keyed, make sure that you install it so that the cable is pointing towards the front of the frame when the module is installed. Pin 1 of the ribbon cable is brown and will be facing the top edge of the module (farthest from the card ejector) when the cable is correctly installed.

500FC-DA End			PC End	
2 row X 3 pin Berg	Pin	6 Conductor Ribbon Cable	9 pin D Female	Pin
Key	1	Blue		1
Rx	2	Green	Tx	2
Tx	3	Yellow	Rx	3
Tx Gnd	4	Orange	Gnd	5
Key	5	Red		
---	6	Brown		

Table 2: Serial Upgrade Cable (WA-S76)

6.1.2. Terminal Program Setup

1. Start the terminal program and configure the port settings of the terminal program as follows:

Baud	**57600**
Data bits	**8**
Parity	**no**
Stop bits	**2**
Flow Control	**no**

2. Install the 500FC-DA card into the frame. After the card powers up the 500FC-DA main menu appears in the terminal window. (For future reference, the 500FC-DA software version is displayed prior to the main menu and should be quoted to Evertz service staff when required.) The 500FC-DA menu for Network and SNMP Configuration is detailed in section 6.2.

For example:

```
A)500FC hardware build 1, S/N 180487476a.
display build is 2
Evertz model 500 FRAME CONTROLLER
Software version 1. 3  build 2


Running...

---- 500FC Main Menu ----

NOTE: In all menus, changes made will only take
effect if you select "Save and Exit"


(1) Network Configuration
(2) SNMP Configuration
(3) Engineering (this option should be used only under the supervision of
evertz tech support)

(X) Exit
>
```

3. If the prompt does not appear, the following is a list of possible reasons for failed communications:

- Defective Serial Upgrade cable.
- Wrong communications port selected in the terminal program.
- Improper port settings in the terminal program. (Refer to step 2 for settings).

6.2.   CONFIGURING THE NETWORK SETTINGS

From main menu, three selections are available - *Network Configuration, SNMP Configuration* and *Engineering.*
- *Network Configuration* is used to set network IP addresses as well as broadcasting and routing instructions
- *SNMP Configuration* is used to identify up to five trap destination IP addresses.
- *Engineering* is a debug menu option and should only be used under the supervision of Evertz technical support staff.

```
---- 500FC Main Menu ----

NOTE: In all menus, changes made will only take
effect if you select "Save and Exit"


(1) Network Configuration
(2) SNMP Configuration
(3) Engineering (this option should be used only under the supervision of
evertz tech support)

(X) Exit
>
```

To choose one of the menu choices, press the letter or number shown on the left and then press <Enter>. If you choose menu item 1 or 2 you will be presented with an additional menu. Choose menu items on these sub menus in the same way.

6.2.1. Exiting Setup Sub Menus

When you are have completed changes within a sub-menu, press S to save the configuration to memory. After 30 seconds, A successful save of the configuration is acknowledged with a commit successful statement, and the user is returned to the main menu.

For example: (after pressing S<enter>)

```
---- 500FC Network Configuration ----

---------------------------------
ip address:       192.168.8.185
netmask address:  255.255.255.0
gateway:          192.16.8.11
broadcast address: 255.255.255.255
DHCP enabled: True
---------------------------------
(1) Set IP Address
(2) Set Netmask
(3) Set Gateway
(4) Set Broadcast Address
(5) Use DHCP

(S) Save and Exit
(X) Exit
> s
Saving network information ... please wait
This process will take 30 seconds to complete...
Saving complete
```

Press X if you made an error during configuration and want to exit the setup sub-menu without saving the new settings. In either case you will return to the main menu.

For example: (after pressing X<enter>)

```
---- 500FC Network Configuration ----

---------------------------------
ip address:        192.168.8.185
netmask address:   255.255.255.0
gateway:           192.168.8.11
broadcast address: 255.255.255.255
DHCP enabled: True
---------------------------------
(1) Set IP Address
(2) Set Netmask
(3) Set Gateway
(4) Set Broadcast Address
(5) Use DHCP

(S) Save and Exit
(X) Exit
> x


---- 500FC Main Menu ----

NOTE: In all menus, changes made will only take
effect if you select "Save and Exit"


(1) Network Configuration
(2) SNMP Configuration
(3) Engineering

(X) Exit
>
```

At this point, the serial connector can be removed from the Frame Controller and the terminal program closed. An SNMP manager using the previously specified IP can now be initiated.

6.2.2. Network Configuration

The *Network Configuration* menu has five network parameters that need to be configured. If the network is using a DCHP server, set the *DCHP* parameter to *yes* before proceeding to change the other parameters. When the DCHP setting is set to *yes*, the *IP Address, Netmask, Route,* and *Broadcast* addresses are automatically assigned and their corresponding menu items are disabled.

If the network is not using a DHCP server, set the *DHCP* parameter to *No* before proceeding to change the *IP Address, Netmask, Route,* and *Broadcast* addresses.

The chart below gives a brief description of each menu item and what the parameter does. To choose one of the menu choices, press the letter or number shown on the left and then press <Enter>. You will be prompted to enter the required parameter value. When you are done configuring the *Network Setup* menu items press X to return to the main menu. If you are unclear about how to configure your network, consult your network administrator.

IP Address	This control sets the unique IP address of the 500FC-DA within the network. 192.168.1.XXX is an example of an IP address in a private (internal) network. If connecting multiple frames (each with its own frame controller), take care not to use the same IP address for each.
Netmask	This menu item defines the "subnet mask" of the network. Specifically, this parameter outlines all the IP addresses that can communicate with the 500FC-DA. This parameter can be set to 255.255.255.0 for a private network.
Route	The "Route" menu item identifies the IP address of the "gateway" (commonly referred to as the "firewall"). In its simplest sense the gateway could be the PC directly connected to the frame and running the network application software (i.e. VistaLINK PRO). This gateway which links to and communicates with other network gateways. In a private network, this gateway could be identified as 192.168.1.YYY
Broadcast	This menu item sets the "broadcast" IP address for which . For example, in a private network this parameter can be set to 192.168.1.255
Use DHCP	This setting allows the Frame Controller to automatically generate IP address for the above parameters from a DHCP server during boot-up. If not running a DHCP server, set this parameter to "No" first before making any changes to other parameters.

✍ **To communicate beyond the private (internal) network over the internet, all messages must be sent via the gateway (firewall). As a result, the firewall must be configured separately by the end-user to facilitate communication. Consult your network administrator if establishing communication link beyond the private network.**

For convenience and future reference, a chart is provided below to record IP addresses for this SNMP network. (Additional blank charts have also been added at the end of this manual.)

Frame Controller Parameters	IP Address
Hostname	
IP Address	
Netmask	
Route	
Broadcast	

Once the *Network Configuration* parameters have been configured, exit *Network Setup* by pressing S then <Enter>. Proceed to the *SNMP Setup* menu option by entering 2 then <Enter> at the Main Menu prompt.

6.2.3. SNMP Configuration

In the *SNMP Configuration* menu, two parameters are configured:

Trap Setup	This menu item identifies the destination IP addresses (the SNMP Manager or NMS) to which TRAPS are sent via SNMP. A maximum of five IP address may be entered.
Community Strings	Factory default "private" and "public" (No changes required. However, if these settings are changed, the manager must have the identical settings. Otherwise no communication will occur between the 500FC-DA and manager.)

Once the *SNMP Configuration* parameters have been configured, exit *SNMP Configuration* by pressing S then <Enter>.

6.2.3.1. Community Strings

Community Strings are considered as "passwords" within SNMP, controlling the ability to read ("GET") and/or read/write ("SET") values to a specific destination. "GET" and "SET" messages include the community strings within their packets. By factory default, community strings are set to "public" and "private", respectively. If these settings are changed, the SNMP manager's community string must agree with the "SET" string. Otherwise no communication will occur between the 500FC-DA and manager.
For example:

```
---- 500FC Community Strings ----

Read-Only: |public|
Read-Write: |private|

(1) Set Read-Only Community String
(2) Set Read-Write Community String

(X) Exit
>
```

6.2.3.2. Trap Setup

"Trap Setup" allows the user to set IP addresses of SNMP Managers from which GETs and SETs are sent to the Frame Controller and to which TRAPS are returned. A maximum of five IP addresses can be stored in the Frame Controller. After selecting "Add…" or "Remove…", IP address are entered one at a time.

Add Trap Destinations	Add a SNMP Manager IP address to the TRAP distribution list.
Remove Trap Destinations	Remove a SNMP Manager IP address from the TRAP distribution list. For example, selecting this option reveals the list of IP addresses with the prompt to remove one from the list: Trap #1: 192.168.1.76 Trap #2: 192.168.8.140 Trap #3: 192.168.8.112 Remove trap # > 3

7. UPGRADING THE FRAME CONTROLLER FIRMWARE

The 500FC-DA Frame Controller facilitates communication between the SNMP-enabled (VistaLINK™) cards, residing in a frame, and the SNMP Manager (or NMS). Frequently, new cards or new features for existing cards are added to the VistaLINK™ product family. In both cases, a new Management Information dataBase ("MIB") exists. Subsequently, the 500FC-DA should also be upgraded with the latest information ("image") to maintain the most up to date monitoring and control capabilities.

The 500FC-DA Frame Controller firmware is upgraded by setting the module to upgrade mode as described in section 5.1. You will then follow the procedure outlined in the *Upgrading Firmware* section in the front of the binder for more information.

7.1.1. Downloading Upgrade Files

1. Download the 500FC-DA firmware file from the web site (www.evertz.com – Downloads link, Firmware Downloads link, 500 Series). Save the file to the hard drive.
2. Unzip the downloaded file and store it in a selected sub-directory. Record the location of the stored file.

7.1.2. Setting the 500FC-DA Frame Controller to Upgrade Mode

The *UPGRADE* jumper J1 located at the front of the module is used when firmware upgrades are being done to the 500FC-DA Frame Controller module. For normal operation a jumper is set in the *RUN* position, or by default, remains without a jumper. To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J1 into the *UPGRADE* position as described in section 5.1.

7.1.3. Upgrade Procedure

Follow the procedure outlined in the *Upgrading Firmware* section in the front of the binder.

8.   ADDITIONAL IP ADDRESS TABLES

Frame Controller Parameters	IP Address
Hostname	
IP Address	
Netmask	
Route	
Broadcast	

Frame Controller Parameters	IP Address
Hostname	
IP Address	
Netmask	
Route	
Broadcast	

Frame Controller Parameters	IP Address
Hostname	
IP Address	
Netmask	
Route	
Broadcast	

Frame Controller Parameters	IP Address
Hostname	
IP Address	
Netmask	
Route	
Broadcast	

Frame Controller Parameters	IP Address
Hostname	
IP Address	
Netmask	
Route	
Broadcast	