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VEEMUX® Series

SM-16Xn-C5AV-1000

Audio/ Video Matrix Switch via CAT5

Installation and Operation Manual

Firmware Version

Version 1.00

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INTRODUCTION

The VEEMUX® Audio/Video Matrix Switch routes audio and video inputs from many video sources to multiple displays (projectors, monitors, etc.) and speakers via inexpensive CAT5/5e/6 cable. It is capable of connecting to as many as 16 video sources via transmitters (XTENDEX Local Units) and 64 video displays via receivers (XTENDEX Remote Units) with a maximum extension of 1,000 feet between the transmitters and receivers (sold separately). In addition to the remote inputs/outputs, the switch features one direct-connect VGA and stereo audio input/output for every 16 remote RJ45 connectors.

The audio/video signal from a single input can be routed to one or more destinations. Each image will be as crisp and clear as if directly connected to the original source. Buffered video outputs and digital transmission of audio signals ensures integrity is maintained throughout the system.

- Configure and control the switch through Ethernet, serial port, front panel buttons, or Infrared remote control.
- Matrix Control Software with Graphical User Interface is included.
- Supports resolutions up to 2048x1536 using NTI's 1,000' extenders and 1920x1440 using NTI's 600' extenders.
- Inputs and outputs can be named.
- Video quality adjustment is done automatically at every connection change, or can be forced via the front panel or web interface.
- Equipped with Liquid Crystal Display (LCD) for front panel operation.
- A digital VU-meter shows the audio levels of the selected input.
- Each output provides one video signal and one stereo audio signal.
- Each input can be independently connected to any or all outputs with no image degradation.
- No loss of audio or video quality between the transmitters and receivers.
- VGA, S-Video and HDTV transmitters and receivers can be supported on the same VEEMUX unit.
    - VGA inputs only work with VGA outputs, S-Video inputs only work with S-Video outputs, and HDTV component video inputs only work with HDTV component video outputs.
    - The 1,000' transmitters (ST-C5xxx-1000S**P** only) will work with 600' receivers, and vice versa
        - The maximum extension is 600 feet between the transmitter and receiver.
        - For resolutions at different lengths, refer to the 600' extender resolution chart.
        - The VGA video from units with audio and/or RS232 can be routed to each other and to video-only units.

Supported Web Browsers

Most modern web browsers should be supported. The following browsers have been tested:

- Microsoft Internet Explorer 6.0 or higher
- Netscape 7.0 or higher
- Mozilla FireFox 3.5.8 or higher
- Google Chrome 9.0.5 or higher
- Apple Safari 5.0.3 or higher
- Opera 11.0 or higher

Set your browser to always check if there is a newer version of the page than the version stored in cache. This action will ensure that it will display the most up-to-date information.

MATERIALS

Materials supplied with this kit:

- NTI SM-16Xn-C5AV-1000 Audio/Vide Matrix Switch (where n= 16, 32,48 or 64)
- 1-Power cord, country specific
- CT6182 DB9 Female-to-RJ45 Female adapter
- USB2-AB-1M 1 Meter USB Male Type A to Male Type B cable
- CB4352- 5 foot CAT5 patch cable
- CD containing pdf of this manual and control software
- One-man sliderail rack mounting kit (64 port models only)
- 4pcs #10-32 x 3/4" pan head screws and #10-32 cage nuts (server cabinet mounting hardware for 16, 32 and 48 port models)

Materials *Not* supplied but *REQUIRED:*

A VEXT-xx-MM cable for each monitor being locally connected to the switch (see **http://www.networktechinc.com/cable-pc.html**).

A SA-xx-MM stereo audio cable for each set of self-powered speakers being locally connected to the switch (see **http://www.vpi.us/cable-audio-3-5.html**)

A CAT5, CAT5e or CAT6 solid straight through cable (TIA/EIA-568B wiring) terminated with standard RJ45 connectors for each local extender and remote extender connected to the switch (see **http://www.networktechinc.com/cat5e.html**) .

where:

xx is the length of the cable in feet

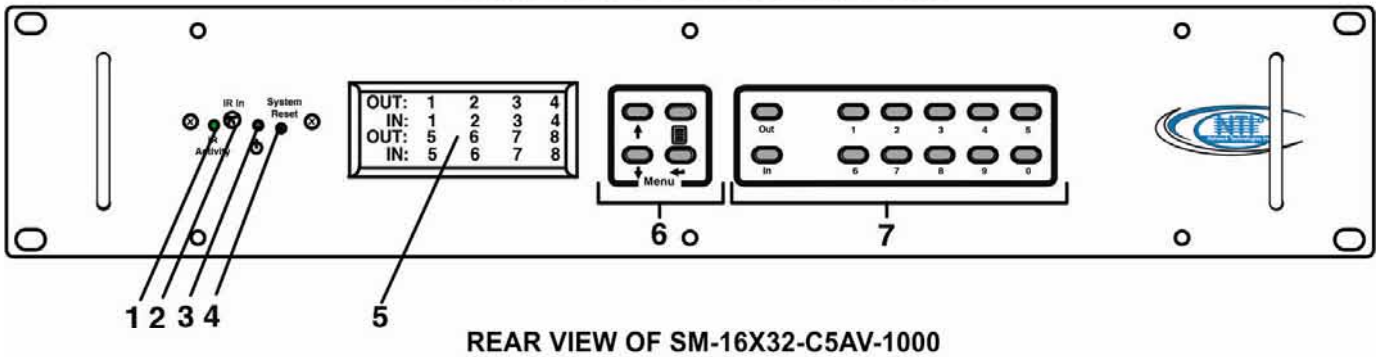
MM indicates male-to-male connector

Note: If installation requires the CATx cables to be bundled together for an extended distance, or if the environment is electro-magnetically noisy (such as being near industrial lighting or motors), shielded CATx cable may be required for best results.

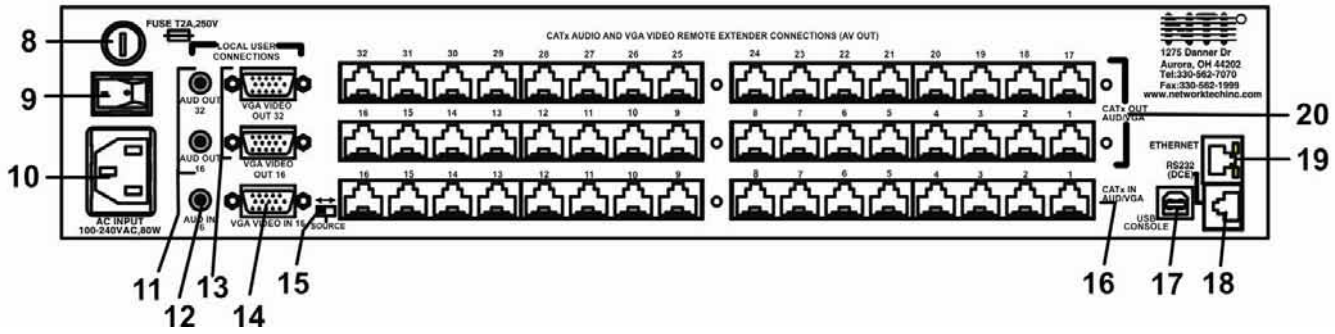
Cables can be purchased from Network Technologies Inc by calling ***(800) 742-8324*** *(800-RGB-TECH) in the US and Canada or* ***(330) 562-7070*** *(worldwide).*

CONNECTORS AND LEDS

FRONT VIEW OF SM-16X32-C5AV-1000



REAR VIEW OF SM-16X32-C5AV-1000



#	LABEL	CONNECTOR/LED	DESCRIPTION
1	IR Activity	Green LED	Illuminates to indicate communication between the hand-held remote control and the VEEMUX
2	IR In	Sensor	Receives communication from hand-held remote control
3	PWR	Green/Red LED	Illuminates green to indicate proper power to the unit and normal operation Illuminates red during system boot-up or while in standby
4	System Reset	Button	Press to reset VEEMUX to default settings
5	None	LCD Display	Displays port connections and menu for control of the VEEMUX
6	Menu	Buttons	Buttons for navigating LCD menu
7	None	Buttons	For selection of specific ports to make connections
8	Fuse	Fuseholder	For replaceable 2A 240VAC Fuse (not on 16x16 model)
9	None	Power Switch	For powering ON and OFF the VEEMUX
10	AC INPUT	IEC Connector	For attachment of the IEC power cord to power the VEEMUX
11	AUD OUT	3.5mm Stereo Jack	For connection of audio cables to audio output devices (speakers)
12	AUD IN	3.5mm Stereo Jack	For connection of audio cables to audio source
13	VGA VIDEO OUT	HD15 Female	For direct connection of VGA video cable from display device
14	VGA VIDEO IN	HD15 Female	For direct connection of VGA video cable from video source
15	SOURCE	Slide Switch	For selecting whether the A/V input for port 16 should be from a direct-connected source or from an extended source
16	CATx IN	RJ45 Female	For connection of CATx cables from extended sources
17	USB CONSOLE	USB Type B Female	For connection of a PC for serial control
18	RS232	RJ45 Female	
19	ETHERNET	RJ45 Female	For connection to an Ethernet for remote multi-user control
20	CATx OUT	RJ45 Female	For connection of CATx cables to extended devices

INSTALLATION

This NTI switch was designed to be mounted to a rack. It includes flanges to make attachment to a rack easy.

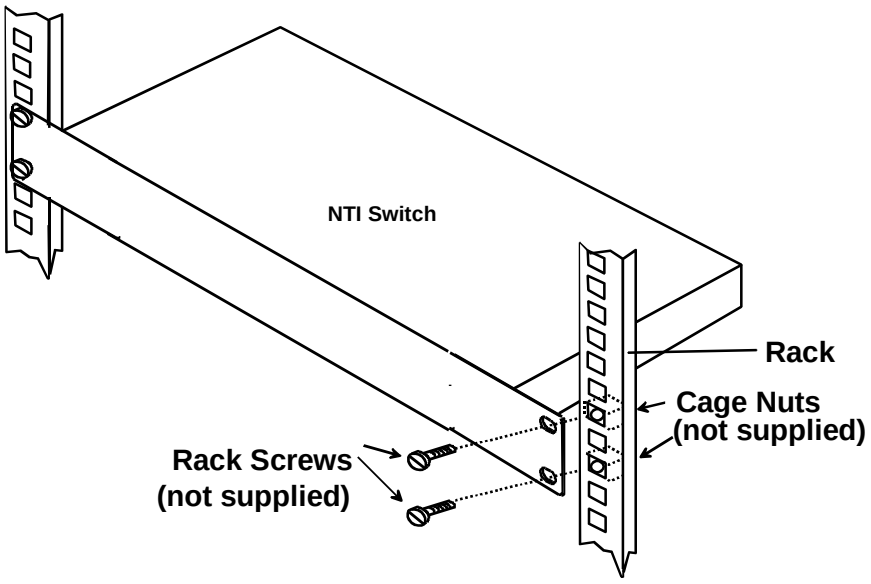
To Mount in a Rack

(For models SM-16X16/16X32/16X48-C5AV-1000)

1. Install 4 cage nuts (supplied) to the rack in locations that line up with the holes in the mounting ear on the NTI switch.

2. Secure the NTI switch to the rack using four rack screws (10-32, supplied). Each screw should be of sufficient length to go completely through the NTI mounting ear, rack frame and fully engage all threads in the cage nut.
3. Be sure to tighten all mounting screws securely.

4. Attach all cables securely to the switch and where necessary supply adequate means of strain relief for cables.



(For model SM-16X64-C5AV-1000)

Your NTI Switch was designed for easy installation by one person with a minimum of tools and effort. Follow the simple steps below to quickly install your VEEMUX.

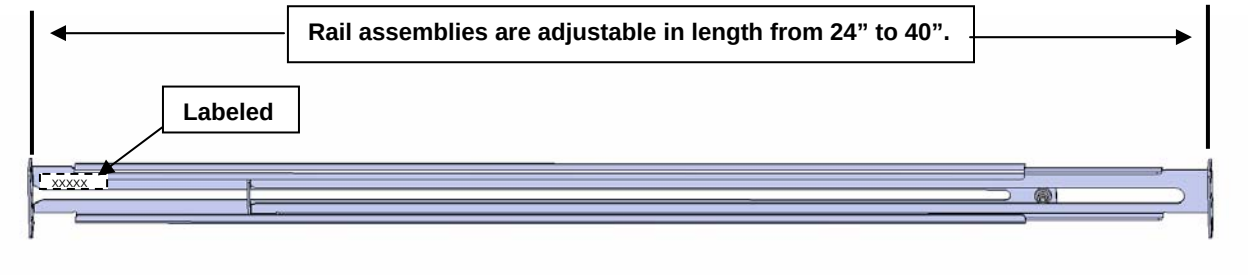
If you would like to see a video of this installation, see the link on the page that opens when you insert the CD that accompanied your VEEMUX, or open **`single-person-installation.mp4`** on the CD.

1. Locate and unpack the hardware bag. Your hardware bag will include all items necessary to install the specific VEEMUX model including the following hardware unique to the Single-Person hardware installation:

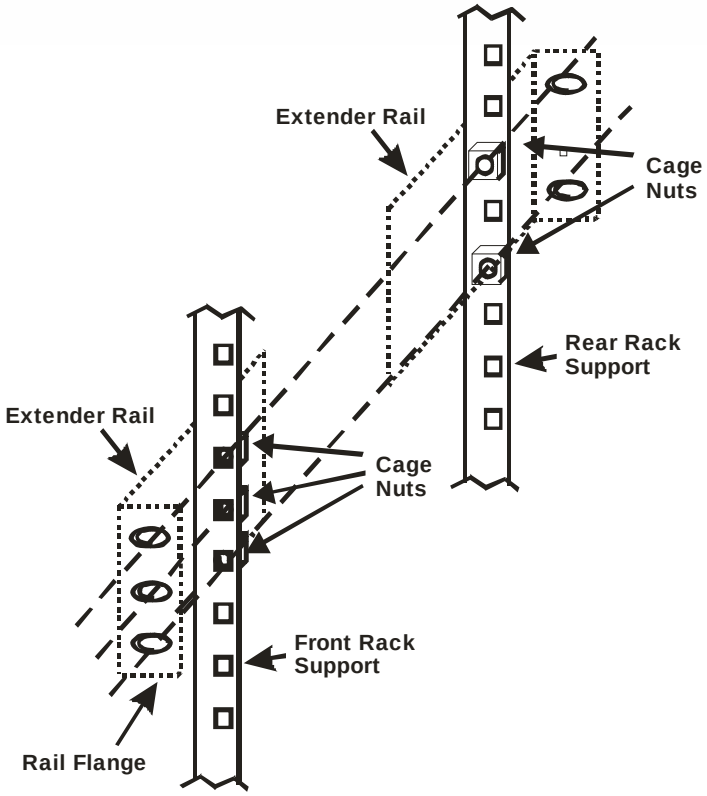
- 10- #10-32 cage nut
- 2- #10-32 x 1/2" flat-head machine screw
- 8- #10-32 x 3/4" pan-head machine screw

To install the rails you will need only a tape measure and Phillips screwdriver.

2. Unpack the left and right rail assemblies. Each are labeled "Right Front" and "Left Front" to indicate their intended position and orientation. Extend each rail assembly to the dimension required for your rack. Rail assemblies are adjustable to fit within a rack between 24" and 40" in depth.

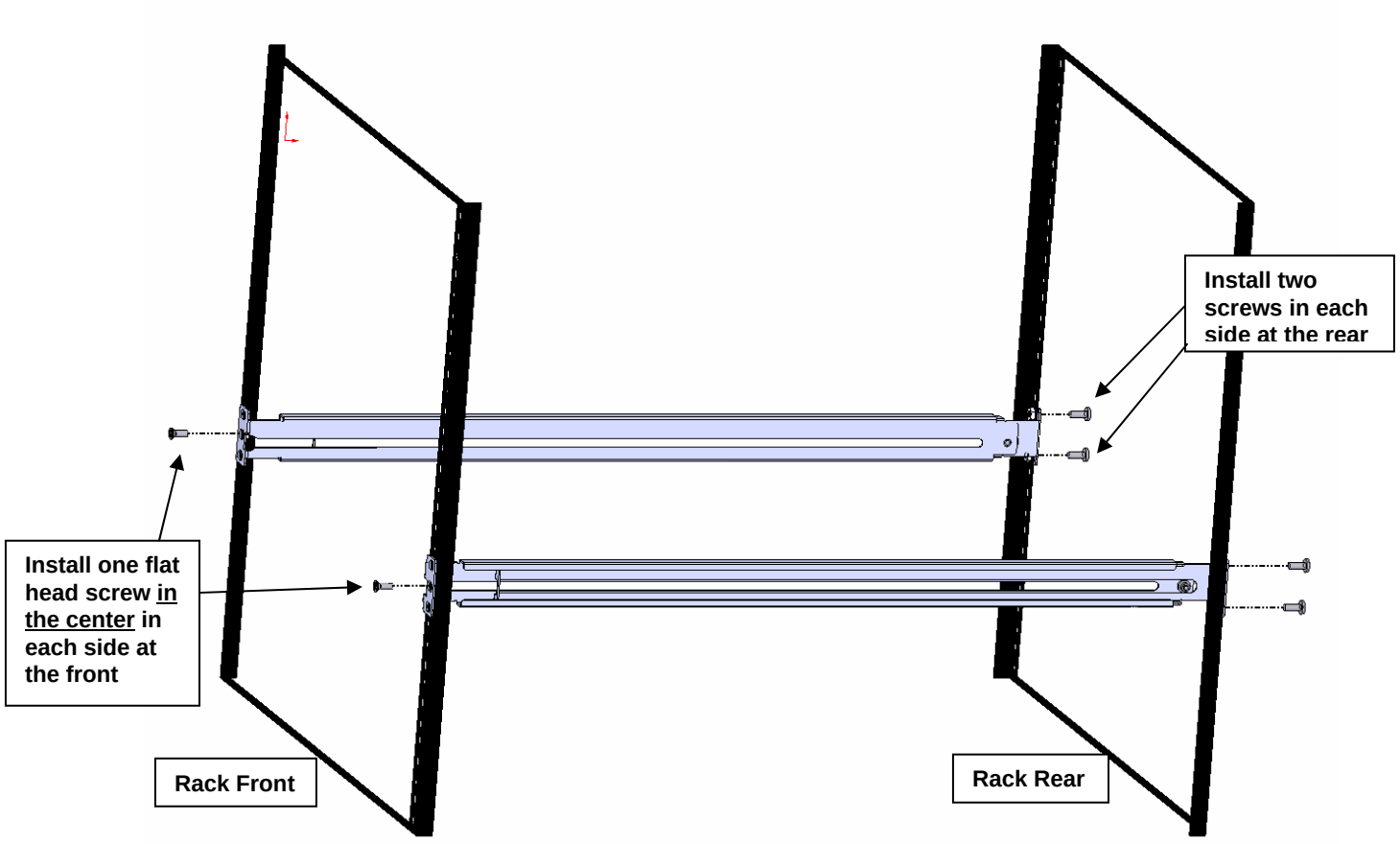


3. Install six #10-32 cage nuts at the front of the rack in positions where the VEEMUX will be mounted (three in each side). Install four more cage nuts at the rear of the rack in positions straight across from the upper and lower cage nuts installed in front.

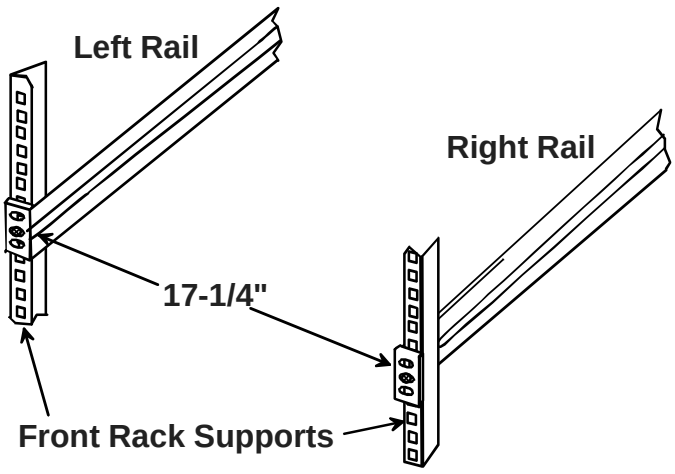


4. Install the right rail assembly. The end with the label “Right Front” mounts to the front rack support. Install only the center screw through the rail flange to the rack support and cage nut using the #10-32 x 1/2” flat head machine screw provided. (See image below.) Do not tighten at this time. Install the left rail assembly in the same fashion. The end with the label “Left Front” mounts to the front rack support.

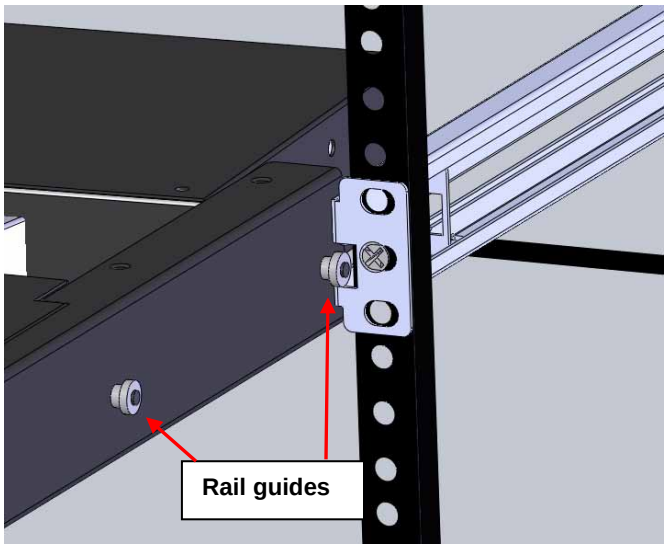
5. Install two #10-32 x 3/4” pan-head screws in the rear of each rail assembly as shown below. Do not tighten at the time.



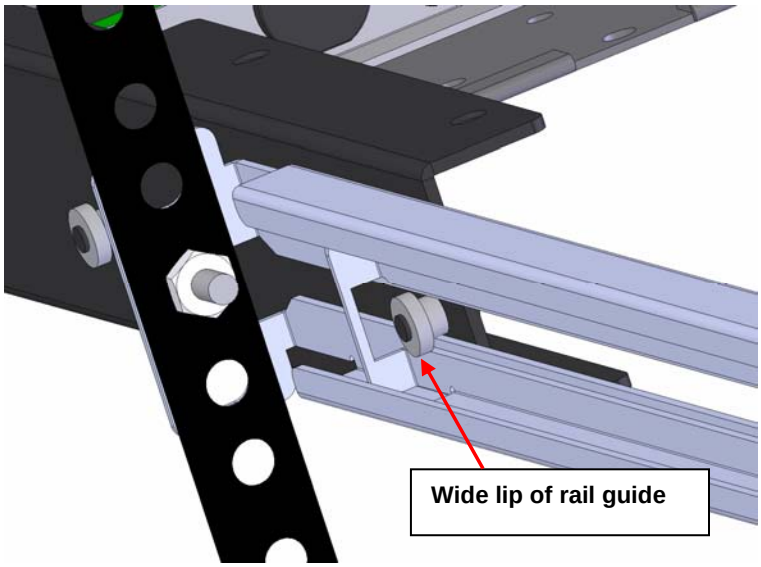
6. Measure the distance between the inside of the rails at the front of the rack. Adjust the distance to 17-1/4” and tighten the flat-head screws to the rail flanges securely.



7. Lineup the rail guides on the VEEMUX drawer with the slots in the front of the left and right rails and slide the drawer into the rack. The rail guides should be positioned such that the wide lip of the guide is on the backside of the rail. Slide the drawer in completely.

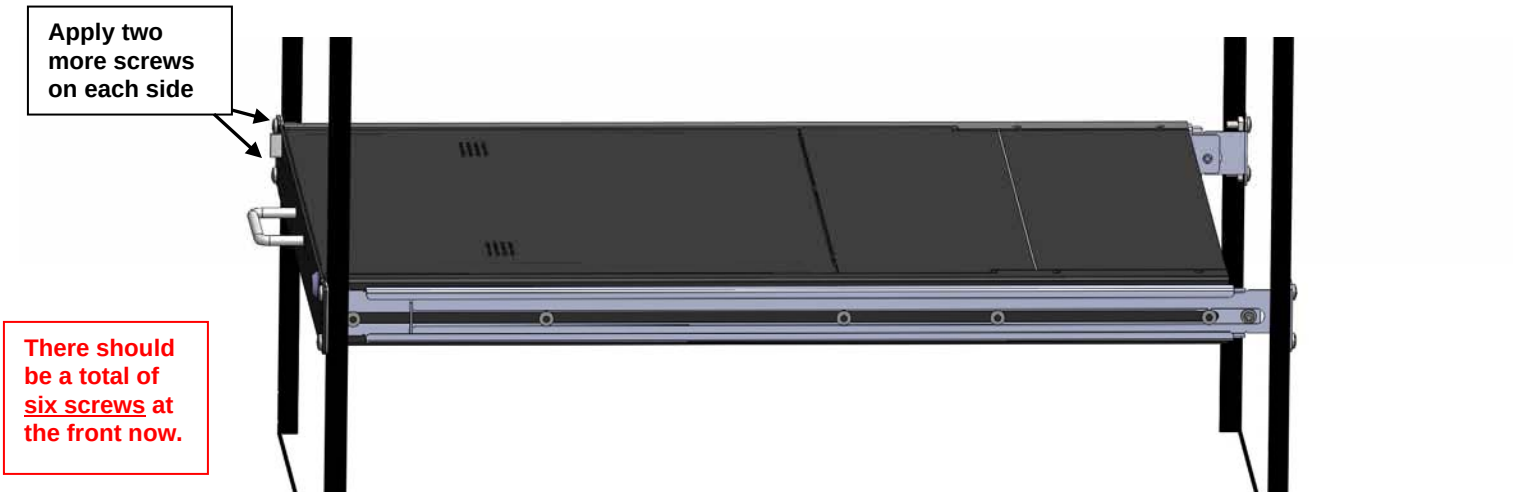


View of rail guide from the front of the rack support



View of rail guide from the backside of the rail

8. Apply four more #10-32 x 3/4" pan-head machine screws (two for each) through the holes in the drawer flanges, through the holes in the left and right rails, into the cage nuts in the rack supports. Tighten each securely.



9. Tighten securely the four screws applied to the rear rail flanges in step 4.

10. Make your cable connections according to the instructions that follow.

Select Extenders

The VEEMUX Audio/Video CATx Matrix Switch includes ports for connecting extended video/audio sources to extended self-powered speakers and display devices. Extended Video/Audio sources, displays, and speakers can be connected using NTI XTENDEX transmitters and receivers (sold separately) as listed below:

XTENDEX Models Compatible with the VEEMUX include:

600 Series (Local and Remote)	Supported Features
ST-C5VA-600	VGA Video + Audio
ST-C5SVA-600[1]	S-Video + Audio
ST-C5HDTV-600[1]	HDTV + Audio
1000 Series (Local and Remote)	
ST-C5V-1000SP	VGA Video
ST-C5V2A-1000SP	VGA Video + two-way audio
ST-C52VRS-1000SP	VGA Video + RS232
ST-C5V2ARS-1000SP	VGA Video + two-way audio + RS232

1. VGA inputs only work with VGA outputs, S-Video inputs only work with S-Video outputs, and HDTV component video inputs only work with HDTV component video outputs

When mixing 600 foot and 1000 foot transmitters and receivers on the input and output ports, keep in mind that there are distance limitations when connecting transmitters and receivers. CATx cable lengths must be as indicated below:

Note: When connecting 600 foot extenders to 1000 foot extenders, the 1000 ft extenders must be ST-C5xxxx-1000SP models in order to be compatible.

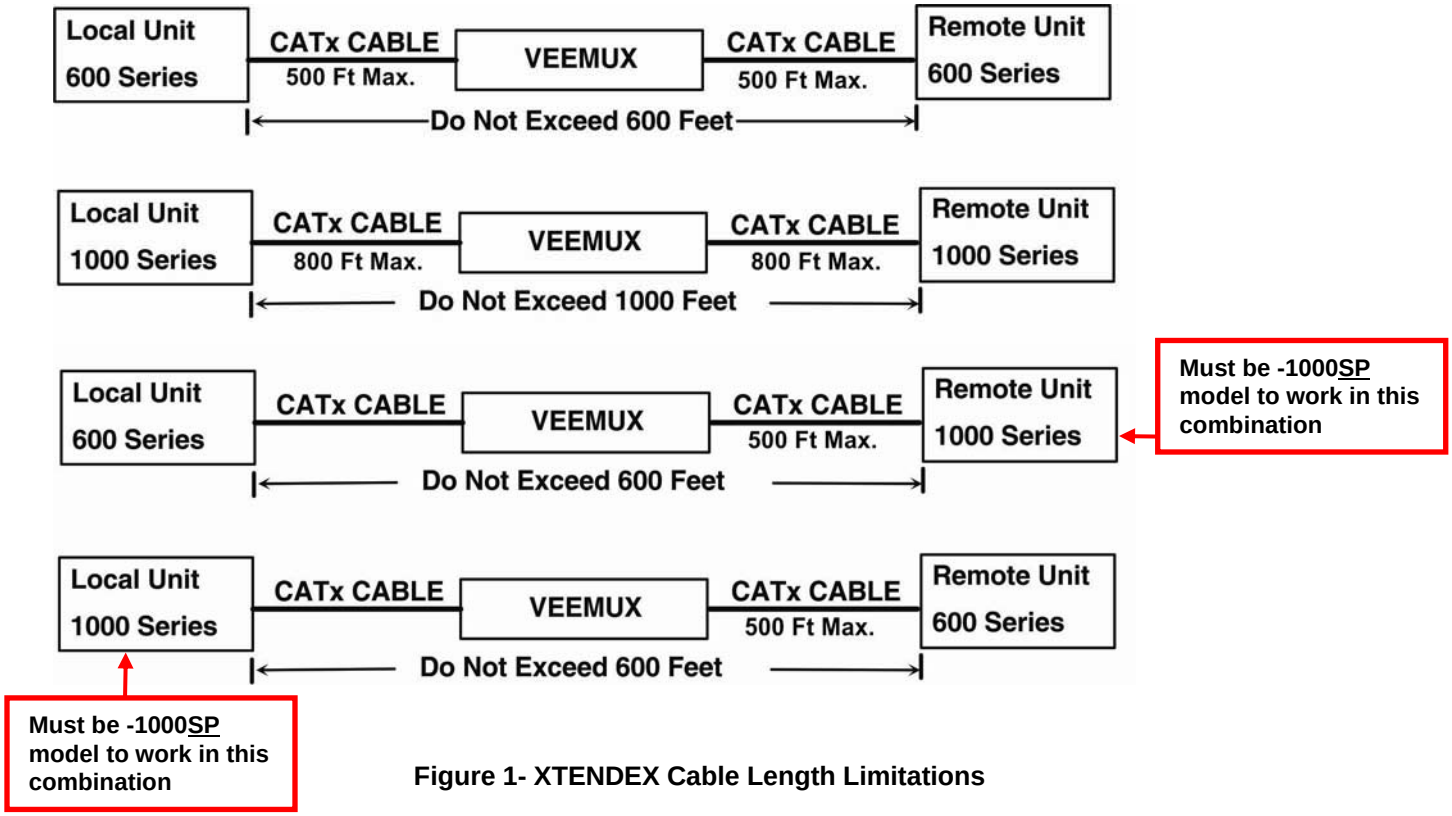


Figure 1- XTENDEX Cable Length Limitations

Note: If installation requires the CATx cables to be bundled together for an extended distance, or if the environment is electro-magnetically noisy (such as being near industrial lighting or motors), shielded CATx cable may be required for best results.

Connect Extended Sources and Devices

1. Connect CATx cables from XTENDEX transmitters to ports marked “CATx IN”.

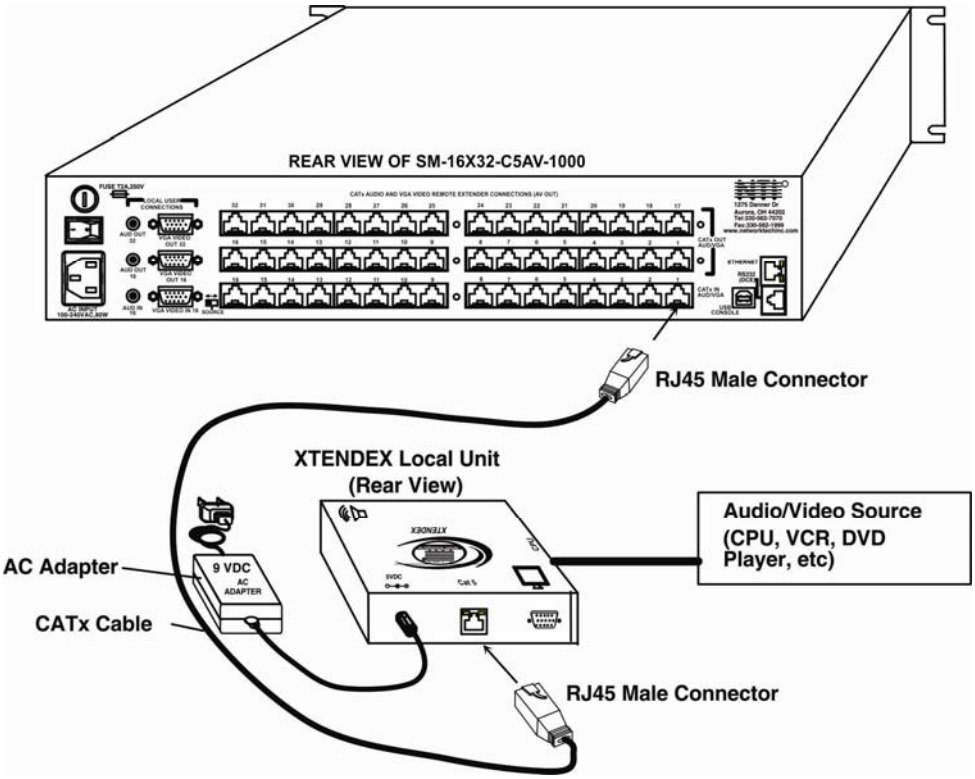


Figure 2- Connect XTENDEX Transmitters

2. Connect CATx cables from XTENDEX receivers to ports marked “CATx OUT”.

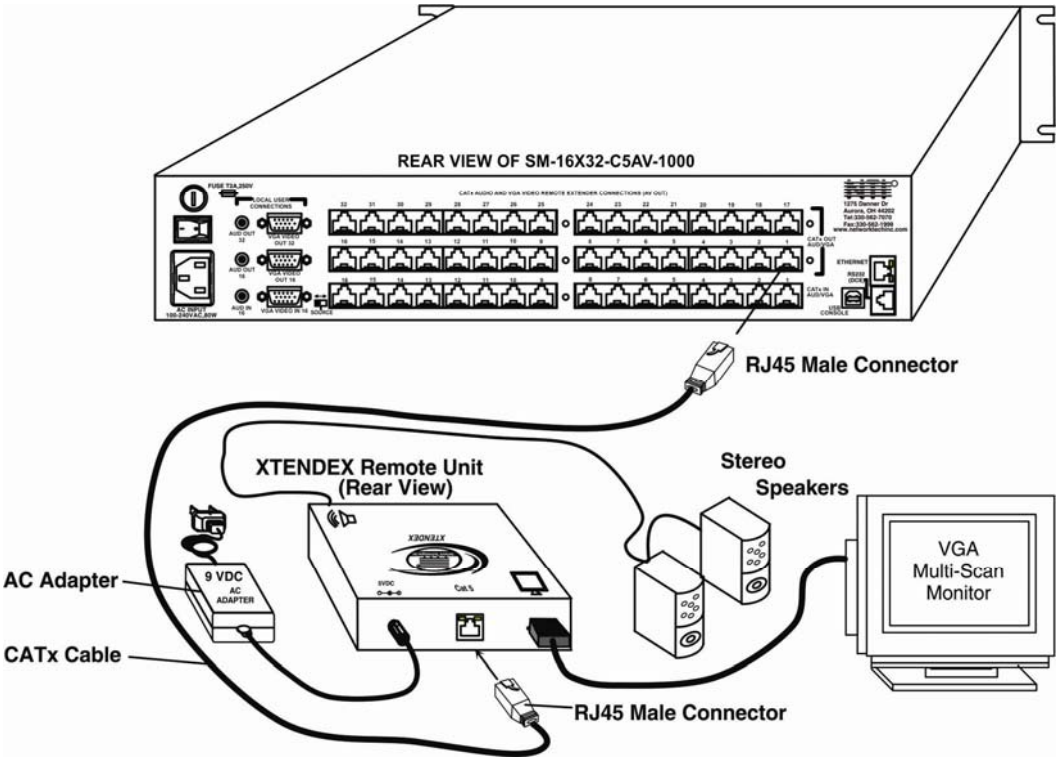


Figure 3- Connect XTENDEX Receivers

Direct-Connect Source and Devices

The user can directly connect one audio and/or video source to the “VGA VIDEO IN 16” and “AUDIO IN 16” ports. The “Source” switch controls whether video for port 16 will come from the direct-connect source or the extended source connected through the RJ45 port at port 16.

1. Make connections from any VGA video or stereo audio source directly to the connectors provided.

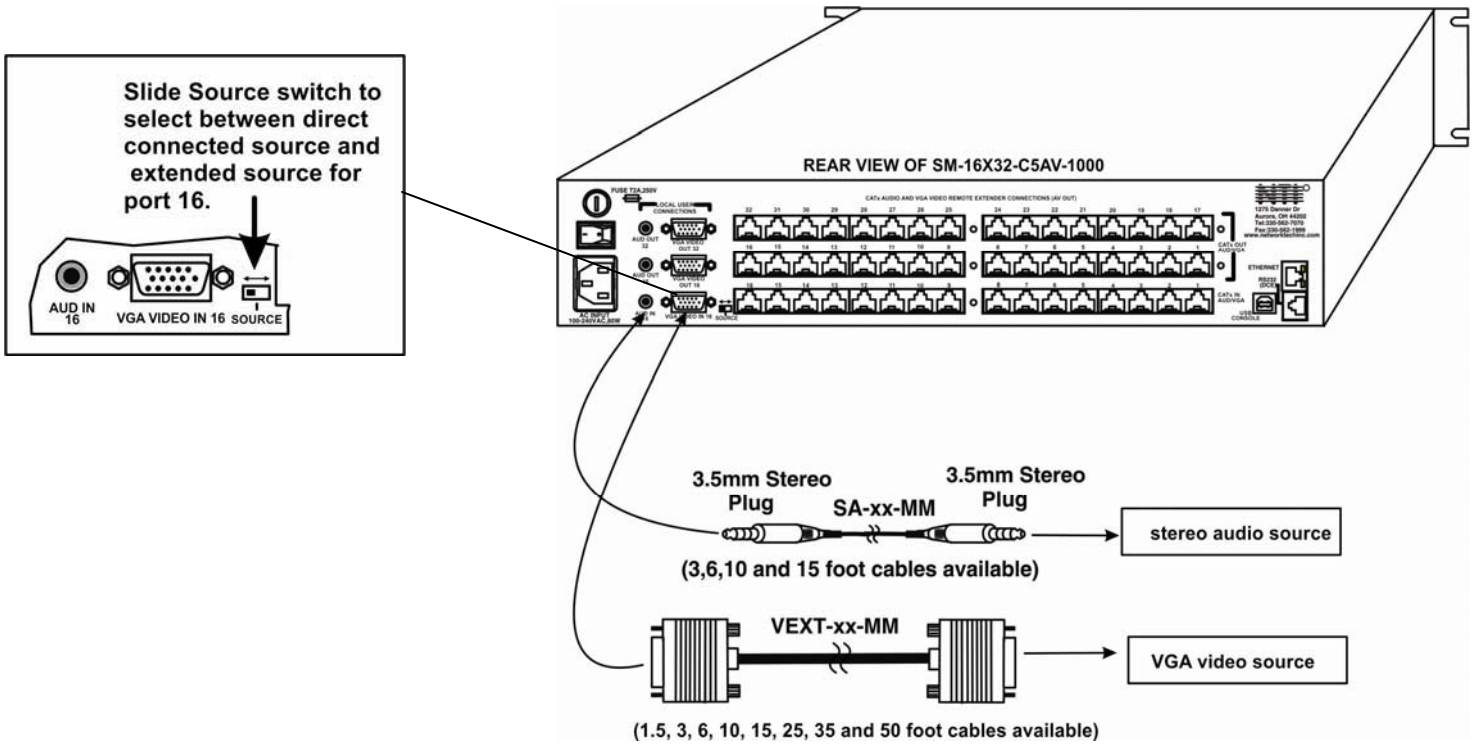


Figure 4- VGA Video and Stereo Audio Source directly connected

2. Make connections to any VGA video display device and self-powered speakers or headset. Audio and video signals will be split between the directly connected devices and the extended devices connected to the like-numbered RJ45 ports.

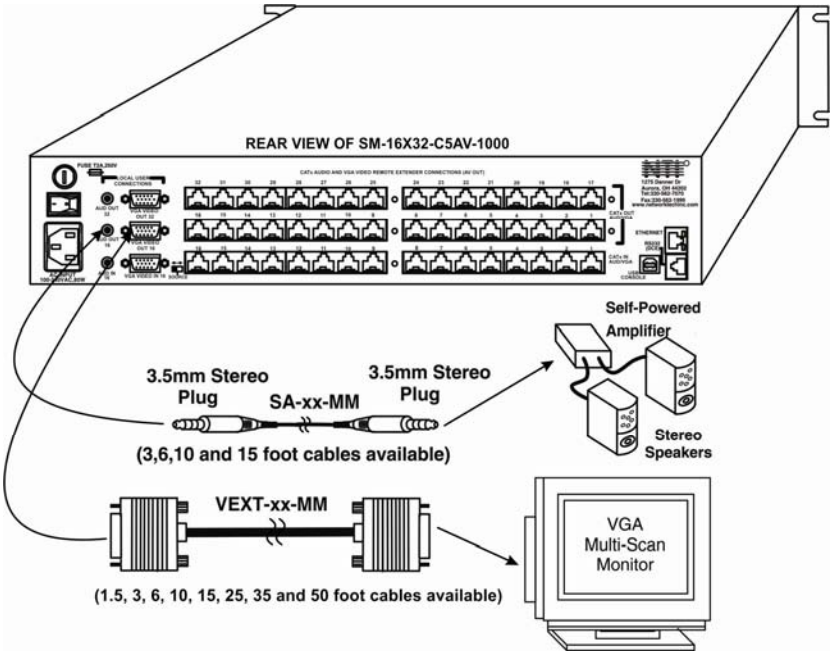


Figure 5- VGA Display and Stereo Audio Devices directly connected

Connect to the Ethernet

If the Telnet Interface (page **28**) or Web Interface (page **33**) will be used to remotely control port connections, an Ethernet connection to the Local Area Network (LAN) must be made using CATx cable with RJ45 connectors attached. Wiring between connectors should be straight through (pin 1 to pin 1, pin 2 to pin 2, etc.) Connect a CATx cable between the connector labeled "ETHERNET" and the LAN (see Fig. 4).

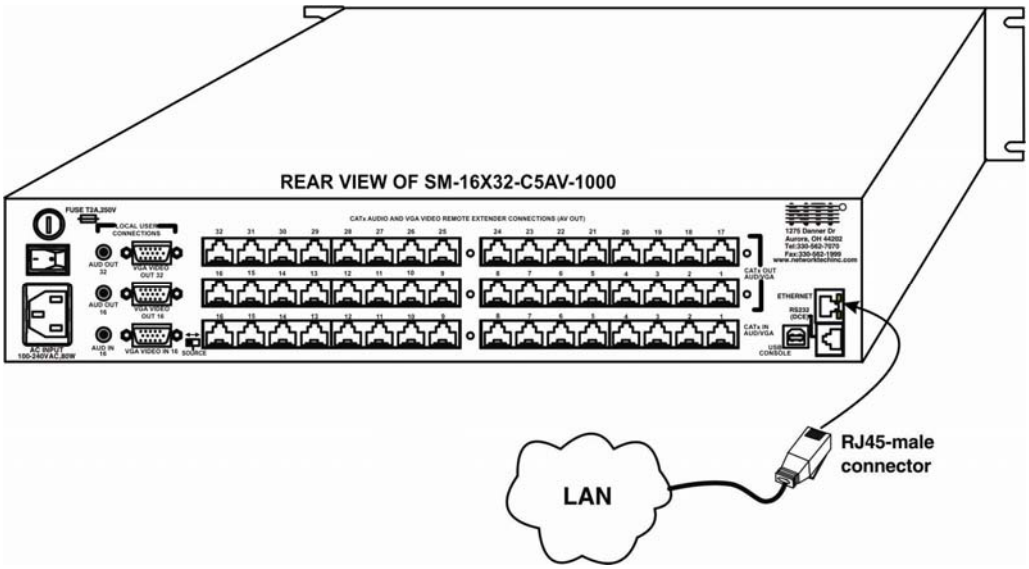


Figure 6- Connect the VEEMUX to the LAN

Serial Connection

If control via serial connection is going to be used, serial control can be achieved using the “USB Console” port or the “RS232”.

To use the “RS232” port, connect one end of a CAT5 patch cable (supplied) to the port labeled “RS232” on the rear of the VEEMUX. Plug the other end of the CAT5 cable into an RJ45-to-DB9 adapter (supplied), and connect the adapter to the RS232 port on the control terminal. Follow the instruction under “RS232 Control” on page **22** for configuration and use of the RS232 control feature.

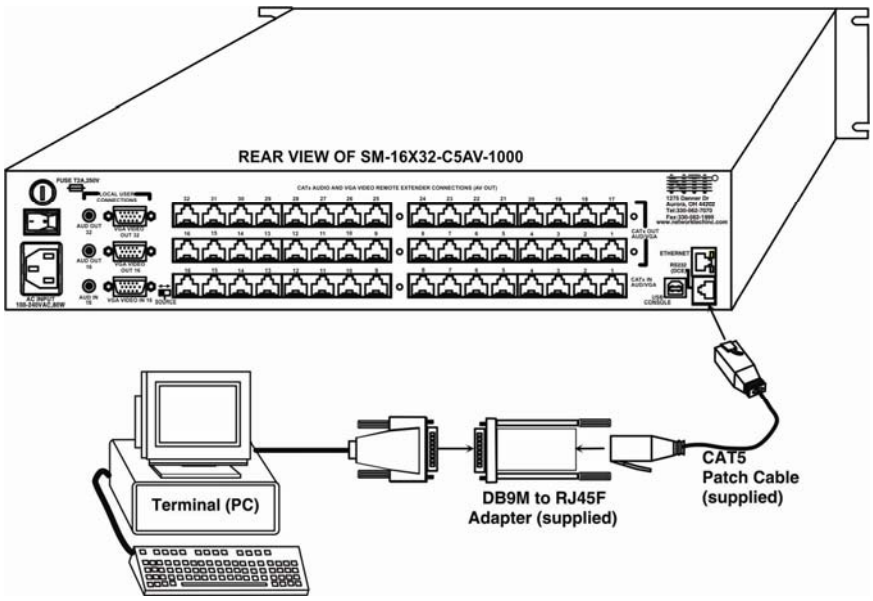


Figure 7- Serial Connection via RS232

To use the "USB CONSOLE" port, connect a USB cable (1 meter cable supplied) between the VEEMUX and your PC. Then install the drivers as described on page 17.

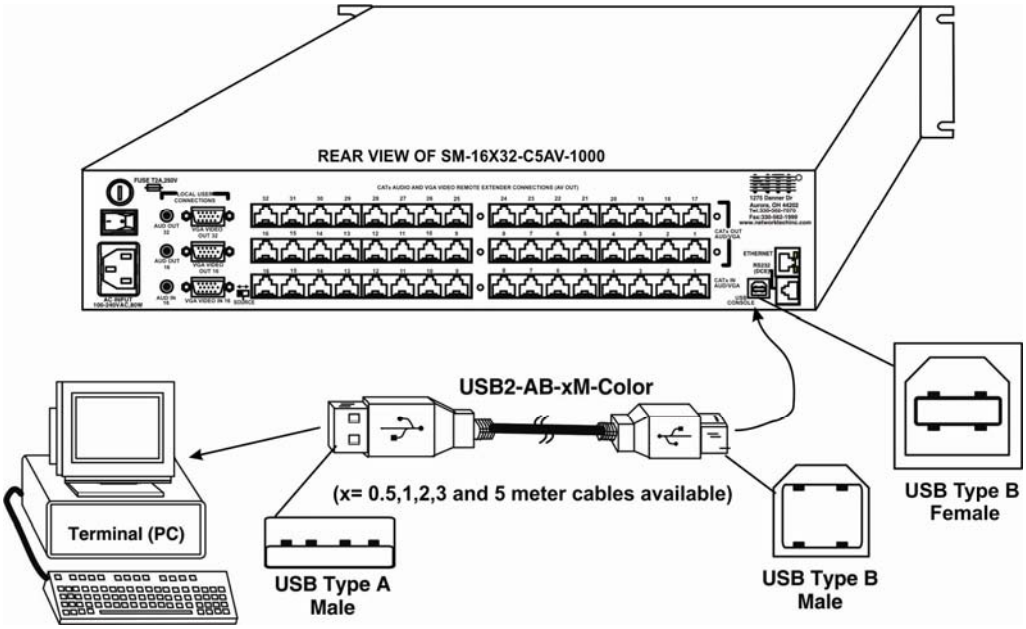


Figure 8- Serial Connection using USB Console port

OPERATING THE VEEMUX

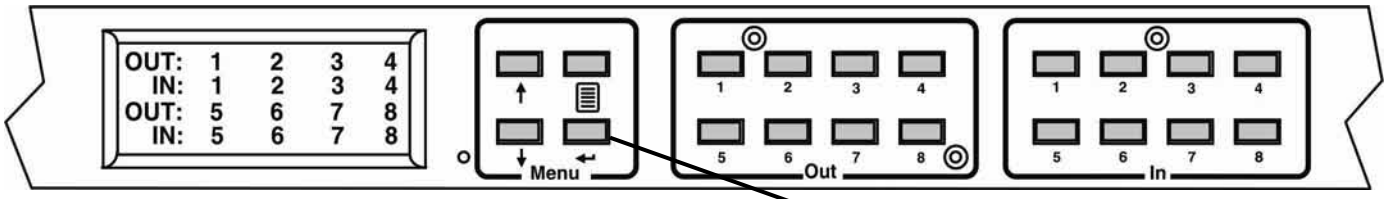
The VEEMUX video matrix switch has four methods of control:

- Front Panel LCD with Keypad
- Directly via an RS232 Interface
- Remotely via Ethernet
- Infrared Remote (optional).

Every unit comes standard with all control methods built-in. An IRT-UNV-IR Remote Control is required (purchased separately) to use the Infrared option. No software is involved (see Infrared Control on page **48**). With the RS232 option, there are no external devices to be purchased. NTI provides software commands as well as a test program to ensure the RS232 functions properly (see page **22** – RS232 Control).

Front Panel LCD with Keypad Control

The front panel LCD and keypad allow the user to monitor switch status and route any user to any video source on the switch. When the unit is first powered-up, each monitor is automatically connected to the video source of its equal number (i.e. monitor 1 to source 1, monitor 2 to source 2, monitor 3 to source 3, etc.). (After configurations have been saved (page **35**), upon power-up the VEEMUX will load the configuration saved into memory location 0.) Along with the routing of the inputs (video sources) to the outputs (monitors) the keypad and LCD allow the users to configure the RS232 control interface. The keypad buttons perform the following functions:



Key Functions:

Up Arrow- Scroll up the menu

Down Arrow- Scroll down the menu

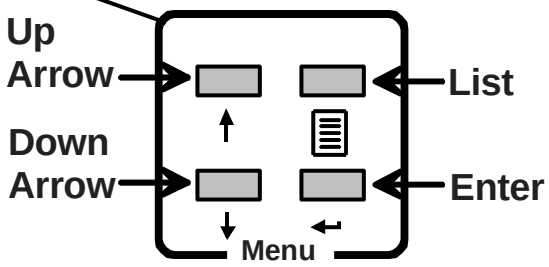
Left Arrow (Enter Key)- Select the menu item

List - Open the menu, or exit the menu (also used to back out of the menu, one step at a time)

Out Used in command sequence to select which output (display device) to connect

In Used in command sequence to select which input (video source) to connect

0-9 Used for numerical port selection in command sequence



To quickly change a connection, use one of these scenarios:

Press the **Out** button and the desired port number followed by the **In** button and desired port number. Then press **Enter.**
Press the **In** button and the desired port number followed by the **Out** button and desired port number. Then press **Enter**.

Multiple displays can be connected to a single video source using one command sequence:
<**In**> xx<**Out**>xx<**Out**>xx<**Out**>xx<**Out**>xx<**Enter**> or
<**Out**>xx<**Out**>xx<**Out**>xx<**Out**>xx <**In**> xx <**Enter**> (where xx is the port number)

To configure the VEEMUX, use the Menu keys.

Press the **List** button to list your main menu options:

1- Serial
2- Ethernet
3- DDC
4- Standby
5- Save Config
6- Load Config
7- VU Meter
8- LCD Contrast

Use the **Up** and **Down Arrow** keys to scroll through this list.
Use the **Enter** Key to select a menu item.
Press the **List** button again to exit the menu.

If, while in a menu, you pause for more than 5 seconds, you will automatically exit the menu.

LCD Menus

1. Under the “Serial” menu are two parameters:

1- Baud rate
2- Address

These parameters are used when the VEEMUX is controlled through an RS232 connection (page **22**). If you select Baud rate, use the arrow keys to toggle through the available baud rates. The baud rate can be set to 115200, 57600, 38400, 19200, 9600, 4800, 2400, or 1200.

If you select Address, use the arrow keys to toggle through the address options (01-15). This is also the switch address used in conjunction with the IR Remote operation (page **52**).

2. Under “Ethernet” menu are several parameters:

1- Mode
2- IP
3- Mask
4- Gateway
5- Preferred DNS
6- Alt. DNS

The Mode parameter will let you select between a manual IP setting and a DHCP assigned dynamic IP address setting. An asterisk indicates which mode is configured, an arrow shows which mode is being selected. To change the configured setting and move the asterisk, select the desired mode and press the **Enter** button.

If you choose a manual IP setting, the IP parameter provides the fields for entering a valid IP address. Use the up and down arrows to advance the numbers, and the **Enter** button to move from field to field. Press **List** to exit this screen.

Selections 3, 4 are necessary to apply valid values for your Subnet Mask and Gateway. Navigate these settings as described for setting the IP address.

3. Under the "DDC" menu are two parameters:

1- Chose Input (Choose Input)
2- All Inputs

You can either 1) select the EDID information source for each input individually, or 2) for all inputs at once. Within this section you will need to select between:

default 1- the inputs will get EDID information from a predefined table in the VEEMUX supporting CPU monitors
local DDC- the inputs will get EDID information from local extender port
From Out (?)- select which Output port the Input will get EDID information from regardless of which output it is connected to
Mix DDC- collect EDID information from all remote ports and finds the parameter common to all. If no common parameter is found, it uses the information found at the remote connected to port 1.

4. The fourth option in the main menu is "Standby". If you select Standby, the VEEMUX switch will immediately go into a power saver mode and the LCD display will go blank. It will remain in this state until

1) any button is pressed on the front panel,
2) the Standby button is pressed on the optional IR Remote Control (page **49**), or
3) the "Disable Standby" button is pressed in the web interface (page **45**)

Save and Load (Recall) Config

The VEEMUX provides the ability to save and recall up to 100 switch configurations using the LCD menu. The switch configurations define the current port connections, volume control settings, and video blank status.

Note: The IRT-UNV IR Remote (page 48) can also be used to access these configurations by using the "SAVE" and "RECALL" buttons.

To save a configuration, select "Save Config" from the main menu followed by a numeric button(s) (0-99) corresponding to the memory slot the configuration is to be saved in. Press **Enter** after your selection to force the current configuration to immediately be saved to the selected memory slot.

Note: Memory slot 0 is the default configuration. The VEEMUX will boot up to whatever is saved as configuration 0.

Configurations can be loaded (recalled) in much the same manner. To recall, select "Load Config" from the main menu followed by the numeric button(s) (0-99) corresponding to the memory slot from which the configuration is to be recalled. Press **Enter** after your selection to immediately force the switch to change the current switch configuration to match that of the configuration recalled.

VU Meter

The VU Meter selection on the LCD Menu allows the user to see what the volume level is set at for an input port. The port for which the information is displayed is indicated on the LCD below the information. Use the arrow buttons to scroll up or down to display the volume level for other audio sources.

LCD Contrast

The brightness of the LCD display can be adjusted using the Contrast selection in the LCD menu. Press the **Up** or **Down** arrow to increase or decrease level of contrast in the LCD display.

USB Console Port

The "USB Console Port" can be used for a serial control connection to your PC. Connect a USB cable (1 meter cable supplied) between the VEEMUX and your PC (page 12), you will be able to control your VEEMUX serially from a terminal console using this connection.

Installing Drivers

You will only need to install drivers the first time the VEEMUX is connected to your PC. After the first time, when the VEEMUX is connected your PC should recognize the VEEMUX and re-assign the COM port. Follow the steps below to install the drivers.

1. Make sure the USB cable is connected between the VEEMUX and your PC.

2. Power ON the VEEMUX. The PC will see the VEEMUX as "New Hardware" and create a virtual COM port to communicate with it.

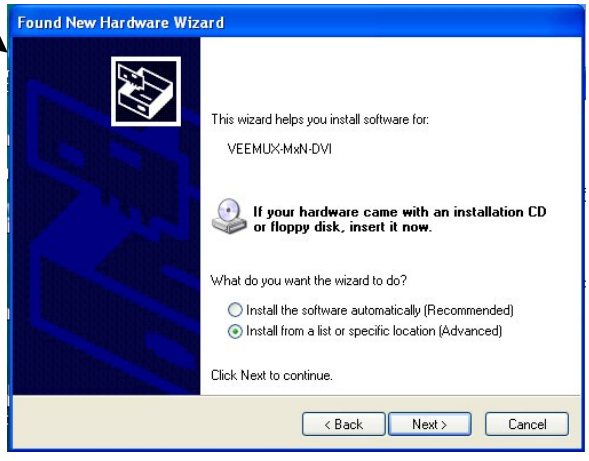
3. You will be prompted to load drivers. A driver file compatible with Windows XP, 2000, Vista and 7 (32 and 64 bit versions) can be found on the CD that came with your VEEMUX. Browse to the drive your Product Manual CD is in and locate and select the file named "**`veemux_mxn_dvi.inf`**" in a directory named **`"windows-drivers\32bit or \64bit"`** depending upon your operating system.

The .inf file will direct your PC to locate and install the file **`usbser.sys`** (already on your PC, comes with Windows). Installing the usbser.sys file should happen automatically. When finished, Windows will indicate installation is successful.

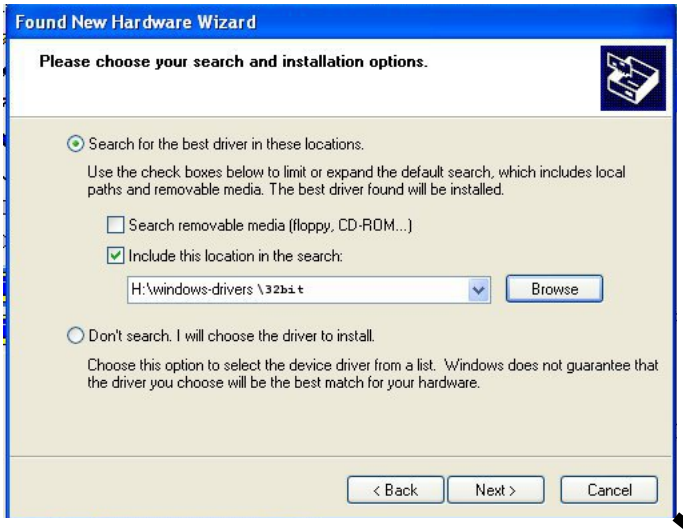
Windows XP-32 bit Installation

Your typical installation will include windows like the ones that follow. The images below are from a Windows XP SP2 32 bit installation.

A. Windows will want to check the internet for drivers. Choose "**No, not this time**" because the drivers are unique to the VEEMUX.



B. You can try to "**Install the software automatically**" but if windows doesn't check the CD, you will need to use "**Install from a list or specific location**" instead.

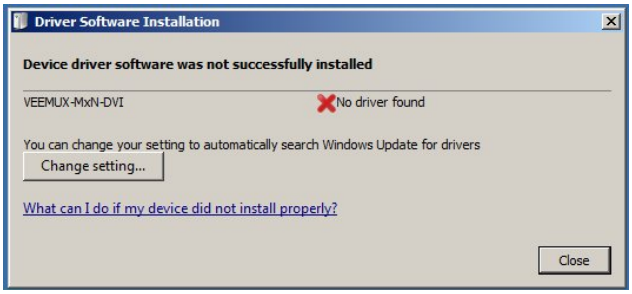


C. Let the New Hardware Wizard search for the driver, but direct it to the drive the Product Manual CD is in and the directory of either the 32 bit driver or the 64 bit driver.

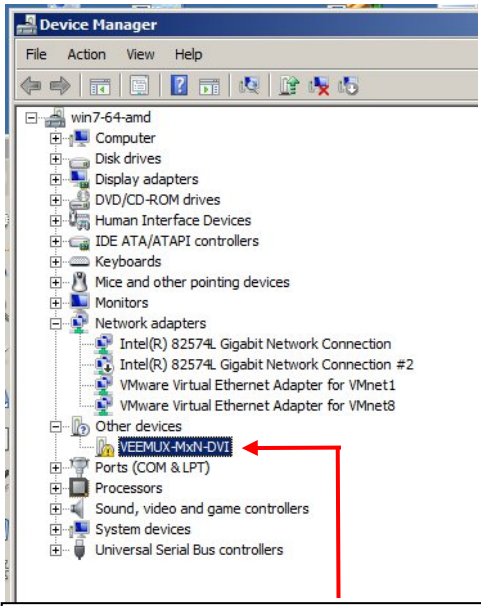
D. Once the driver is installed, you will get this screen and the VEEMUX USB Console Port will be ready to use. .

Windows 7-64 bit Installation

A Windows 7 64 bit installation has a few extra steps. The images below are from a Windows 7, 64-bit installation.

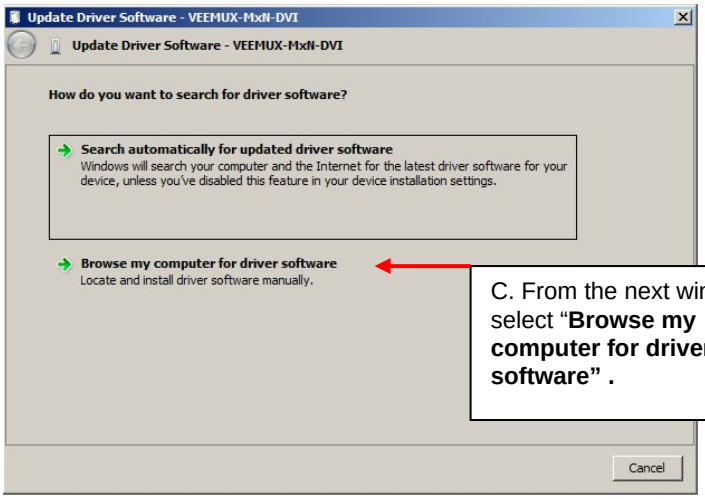


A. Upon VEEMUX power ON, the driver cannot be found. Press "**Close**".

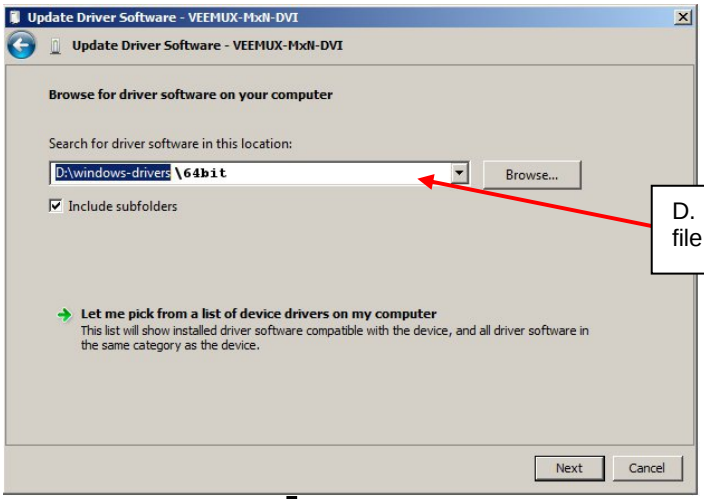


B. Open the Device Manger and select the VEEMUX in the device list. Right-click and open "Properties". Select "Update Driver Software".

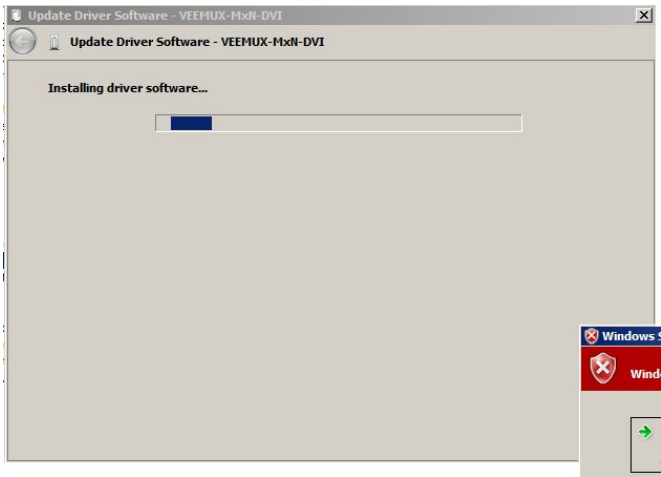
Tip: The Device Manager can be opened by right-clicking on "My Computer" on the desktop, selecting "Properties", and selecting "Device Manager".

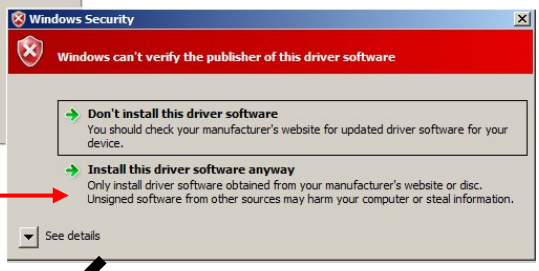


C. From the next window, select "**Browse my computer for driver software" .**

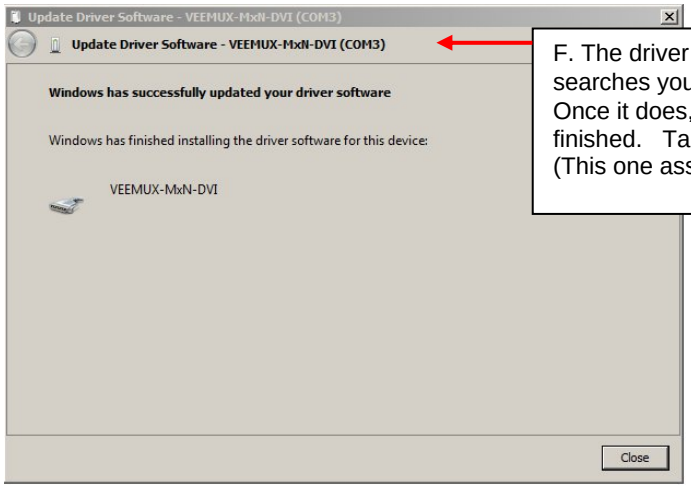


D. In the next window, enter the path to the .inf driver file (on the Product Manual CD). Press "Next".





E. You will probably get this warning that Windows can't verify the publisher of the driver software. Select **"Install this driver software anyway. "**



F. The driver will load. This might take a minute while it searches your computer for the `usbser.sys` file it needs. Once it does, you will get a window telling you Windows is finished. Take note of the COM port number it assigned. (This one assigned COM3.)

4. During the installation, your PC will assign a COM port number to the USB port attached to the VEEMUX. You will need to identify the COM port number assigned. This information can be viewed in your Device Manager list (below) if you didn't take note of it during installation.

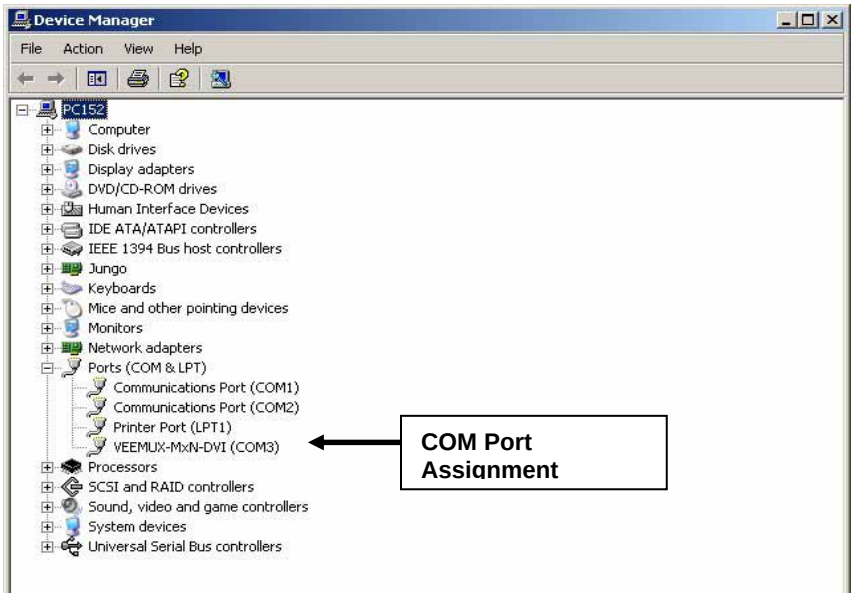


Figure 9- COM port assigned to VEEMUX

Using the USB Console Port

The virtual COM port will be used to enable serial control over the VEEMUX (see RS232 control on page **22**). When you open a terminal program or the Matrix Switcher's Control Program (page **25**), you will need to configure the program to use the correct COM port (see Figure 9 and Figure 10).

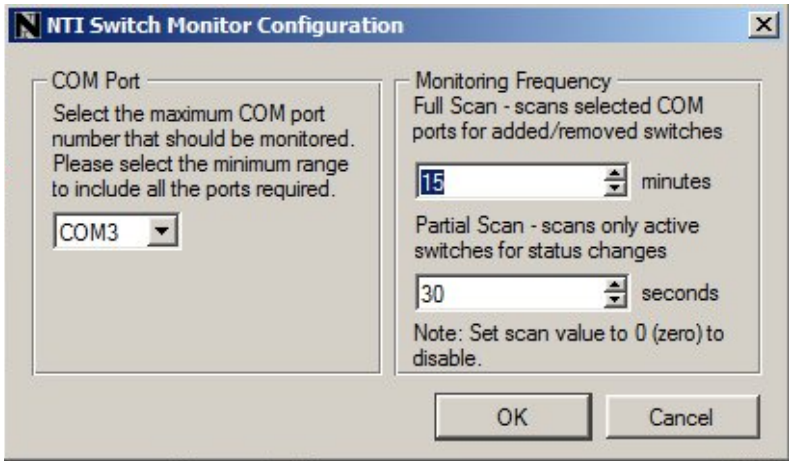


Figure 10- Configure COM port in Matrix Switcher's Control Program

RS232 CONTROL

RS232 enables the VEEMUX to be remotely controlled via RS232. To control the VEEMUX via RS232 the user has three options:

- write a program that runs on a PC using the Command Protocol (page 24)
- use the Matrix Switcher's Control Program (page 25) provided on the CD
- use the SerTest program (page 26) provided on the CD

Remote Connection

The RS232 Interface is designed to meet the RS232C standard and can be controlled from any CPU or other controller with an RS232 communications port. The pin-out for the RJ45 connector on the unit is as follows:

RS232 (RJ45) CONNECTOR

PIN	SIGNAL	FUNCTION
1	-	No connection
2	-	No connection
3	RX+	Receive data (TXD at host)
4	GND	Ground
5	-	No connection
6	TX+	Transmit data (RXD at host)
7	-	No connection
8	-	No connection

A 5 foot patch cable and adapter, RJ45-to-DB9, have been provided for connection to most CPUs (see page 11). To daisy chain multiple units, connect a Matrix-Y-1 cable (sold separately) between the CPU and the first switch, and between each switch (as shown in Figure 11).

Baud Rate

The baud rate can be changed by selecting MENU on the front panel keypad, using the OSD menu, using Telnet commands (page 28) or from the RS232 commands (page 24). The baud rate can be set to 115200, 57600, 38400, 19200, 9600, 4800, 2400, or 1200. A data protocol of 8 data bits, no parity, and 1 stop bit is used for communications. The default baud rate setting is 9600.

Unit Address and Loop Back

To allow multiple units to be controlled from a single host port, the RS232 control interface is designed to allow "daisy chaining" up to 15 units using an NTI Matrix-Y-1 cable. Connect the Matrix-Y-1 cable between the RJ45-to-DB9 serial adapter (provided with the RS232 option) and the CPU as shown in Figure 11. By setting the appropriate unit address (page 14), each unit can be given a unique address (1-15). Then the unit will only respond to commands on the bus if its address is embedded in the command.

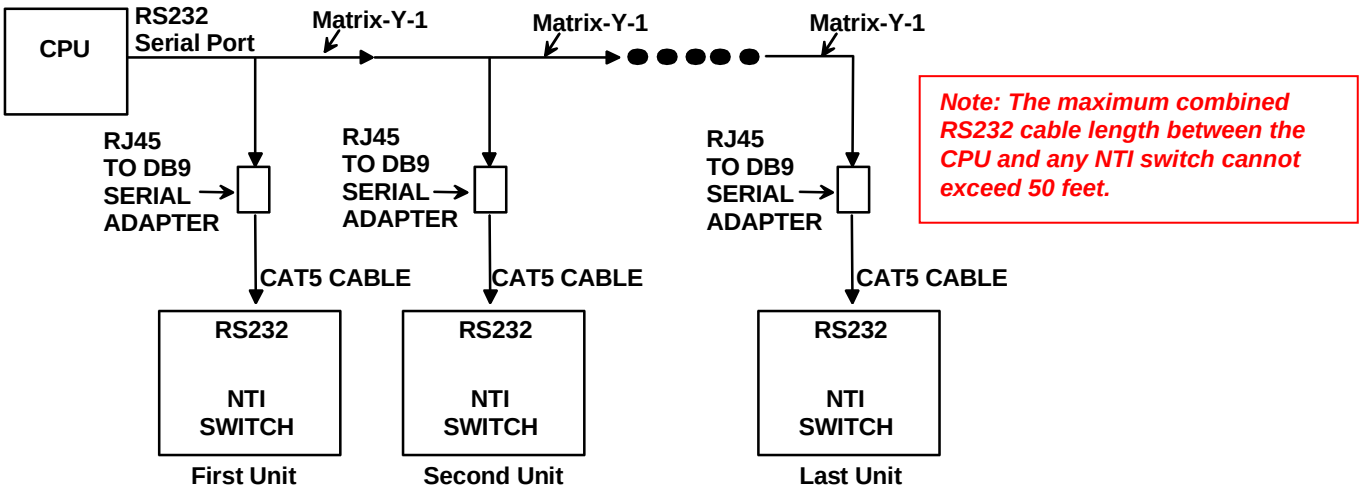


Figure 11- RS232 connection with Matrix-Y-1 cable

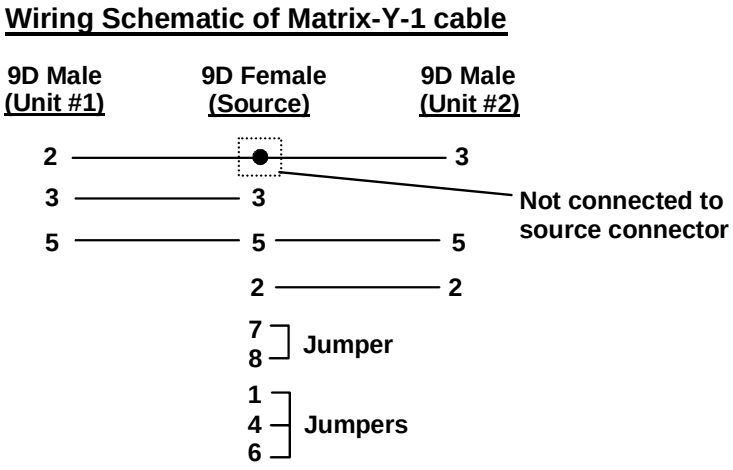


Figure 12- Pinout of Matrix-Y-1 cable

Command Protocol

CPU controller commands supported by the unit are defined below. All commands must be terminated with a <CR> (carriage return). When a command is sent, the entire string is echoed back along with a response from the addressed unit as shown in the Command Definitions table (below). All characters in the command string are case sensitive (see Command Definitions table), and all numbers below 10 must have a leading 0 (ex: 1 = 01).

Legend:

(All numbers must be two digits)

SW	:	Switch (01-15)	MM	:	Save Into Memory Bank (00-99)
BR	:	Baud Rate Code	LL	:	Load From Memory Bank (00-99)
OP	:	Output Port (01-MAXOUTPUTS)	<CR>	:	Carriage Return (Hex 0xD)
IP	:	Input Port (01-MAXINPUTS)	ip	:	IP address

Command Definitions

Command String	Good Response	Description
CS *SW,IP,OP*	*<CR>	Connect One Output/User Port To Input/CPU Port
CA *SW,IP*	*<CR>	Connect All Output/User Ports To Input/CPU Port
RO *SW,OP*	*<CR>*IP*<CR>	Read Connection For Output/User Port
VB *SW*,OP,01	*<CR>	Blank the video for specific Output/User Port
VB *SW*,OP,00	*<CR>	Unblank the video for specific Output/User Port
CC *SW,MM*	*<CR>*MM*<CR>	Save Matrix Connections Into Memory Bank xx Xx=00-99
RC *SW,LL*	*<CR>LL<CR>	Restore Matrix Connections From Memory Bank
CB 00,*BR*	None	Change baud rate of serial line, BR=11(5200),57(600),38(400),19(200)96(00),48(00),24(00),12(00) Factory default is 9600
RS *SW*	*<CR>	Internal Reset
RV *SW*,00	*<CR>string\0<CR>	Read NTI Version String
RU *SW*	*<CR>*IP,OP*<CR>	Read Unit Size
EA *SW,ip*	*<CR>	Set the IP address, ip is in xxx.xxx.xxx.xxx format, number of digits is minimum 1 and maximum 3 for each field Leading zeroes are accepted
EM *SW,ip*	*<CR>	Set the Subnet mask, ip is in xxx.xxx.xxx.xxx format, number of digits is minimum 1 and maximum 3 for each field. Leading zeroes are accepted
EG *SW,ip*	*<CR>	Set the default gateway, ip is in xxx.xxx.xxx.xxx format, number of digits is minimum 1 and maximum 3 for each field Leading zeroes are accepted
ET *SW*,timeout	*<CR>	Set the website timeout; timeout = numeric string of timeout in seconds. Values: 60, 300, 600, 900, 1800, 3600, 7200, 18000, 28800
RA *SW* *	<CR>*ip*<CR>	Read the IP address, ip is in xxx.xxx.xxx.xxx format, number of digits is minimum 1 and maximum 3 for each field Leading zeroes are accepted
RM *SW* *	<CR>*ip*<CR>	Read the Subnet mask, ip is in xxx.xxx.xxx.xxx format, number of digits is minimum 1 and maximum 3 for each field Leading zeroes are accepted
RG *SW* *	<CR>*ip*<CR>	Read the default gateway, ip is in xxx.xxx.xxx.xxx format, number of digits is minimum 1 and maximum 3 for each field Leading zeroes are accepted
RT *SW* *	<CR>timeout<CR>	Read the website timeout; timeout = numeric string of timeout in seconds. Values: 60, 300, 600, 900, 1800, 3600, 7200, 18000, 28800
SS *SW*,00	*<CR>	Disable Autostatus feature (see below)
SS *SW*,01	*<CR>	Enable Autostatus feature (see below)
GO *SW*,OP	*<CR>go *SW,OP,IP*<CR>	Read connection of a Video Output Port to Video Input Port
GM *SW*,00	*<CR>go *SW,OP,IP* (all ports)<CR>	Read connection matrix of all Video Output ports

If the first field is not a known command (as listed above) or SW field is different from the serial address programmed in the switch memory, the command will be ignored. If the SW field corresponds to the unit address, but the syntax is wrong after this field, the switch will answer with a bad response ?<CR>.

Autostatus

When Autostatus is enabled, any output-to-input connection change in the VEEMUX will cause an Autostatus message to be sent via RS232 to the administrator. The format of the message would be "pc SW,OP:IP<CR>"

Example of an Autostatus message:

pc 01,01:04<CR>

which means "At the switch with unit address 01, the output (01) has changed connection to input 04."

Notes: Message to the administrator will be delayed by any RS232 traffic being received by the switch from the administrator.
Autostatus must be disabled before using SerTest or the Matrix Switcher's Control Program (page 25).

By default, Autostatus is disabled and must be manually enabled. Autostatus is also disabled any time the power to the VEEMUX is interrupted.

Matrix Switcher's Control Program For Windows 9X, NT, 2000, XP, Vista and 7

The Matrix Switcher's Control Program is an easy and powerful graphical program that controls NTI matrix switches through an RS232 interface. The Matrix Switcher's Control Program is downloaded by clicking on the link "Download Matrix Switcher's Control Program" found on the web page that appears when you insert the instruction manual CD into your CD ROM drive.

To install the Matrix Switcher's Control Program after downloading

1. Locate the ***Setup.exe*** in the directory the program was downloaded to and double-click on it
2. Follow the instructions on the screen

The Matrix Switcher's Control Program performs best on monitors set to a screen resolution of at least 800 X 600. Instruction for using the Matrix Switcher's Control Program is available by opening "MSCP Help" in the "NTI" program group once the program has been installed and is open on the screen.

To open "MSCP Help" from the Windows desktop

1. Click on **START**
2. Click on **PROGRAMS**
3. Click on **NTI**
4. Click on **MSCP Help**

Note: While in Scan Mode, the video radio buttons shown on the Switch page of the Matrix Switcher's Control Program may not be in sync with the connection changes within the VEEMUX. Connections will change without updating the image on the screen.

SerTest- RS232 Interface Test Program

This software allows a user to test the functions of an NTI server switch, matrix switch or Multi-user/Multi-platform switch RS232 interface. The SerTest program is automatically loaded when installing the Matrix Switcher's Control Program as described above. The SerTest program, located in the NTI program group, generates a main menu with the 4 selections described below:

Main Options

- Matrix Operations - send commands to the matrix unit.
- Ethernet Operations - set Ethernet connection variables
- Setup Options - set COM port, baud rate, and unit address
- About SerTest - display the program version

Matrix Operations

Key	Selection	Description
1)	Connect Video Output/User to an Input/CPU	- connect an output to an input
2)	Connect All Video Outputs/Users to an Input/CPU	- connect all outputs to an input
3)	Connect Audio Output/User to an Input/CPU	- connect an output to an input (audio ports only)
4)	Connect All Audio Outputs/Users to an Input	- connect all outputs to an input (audio ports only)
5)	Change Mute Status for Audio Output/User	- mute or un-mute the Audio port output
6)	Change Volume for Audio Output/User	- change Audio port output volume
7)	Read Connection for Video Output/User	-read the connection of a specific video output
8)	Read Connection for Audio Output/User	-read the connection of a specific audio output
9)	Read Mute and Volume for Audio Output/User	- read the volume and the mute status of the specified output (audio ports only)
a)	Save I/O Connections into Unit Memory	-save the connections into switch memory bank
b)	Restore I/O Connections from Unit Memory	-restore the connections from switch memory bank
c)	Change All Units Baud Rate (9600/COM1:)	-change RS-232 Baud rate of all switches -the current baud rate and serial port are displayed in parentheses
d)	Reset Unit	- send a reset command to the switch - the current unit address is displayed in parentheses
e)	Reset All Units	- send an internal reset command to all switches
f)	Read Unit Size	- read the switch size (number of inputs and outputs)
g)	Read Unit Version/Revision String	-read a string containing the switch version, type, and size
h)	Save All Units I/O Connections into Units Memory	-save the connections into switch memory bank, command for all switches
i)	Restore All Units I/O Connections from Units Memory	-restore the connections from switch memory bank, command for all switches

Grayed keys not supported in this product

Ethernet Operations

Key	Selection	Description
1)	Set Unit IP Address	- enter the desired IP address in xxx.xxx.xxx.xxx format - number of digits is minimum 1 and maximum 3 for each field. Leading zeroes are accepted
2)	Set Unit Subnet Mask	- enter the desired IP address in xxx.xxx.xxx.xxx format - number of digits is minimum 1 and maximum 3 for each field. Leading zeroes are accepted
3)	Set Unit Default Gateway	- enter the desired default gateway - number of digits is minimum 1 and maximum 3 for each field. Leading zeroes are accepted
4)	Set Unit Website Timeout	- set the website timeout; timeout = numeric string of timeout in seconds - Values: 60, 300, 600, 900, 1800, 3600, 7200, 18000, 28800 0 = no timeout
5)	Read Unit IP Address	- read the unit IP address in xxx.xxx.xxx.xxx format
6)	Read Unit Subnet Mask	- read the unit subnet mask in xxx.xxx.xxx.xxx format
7)	Read Unit Default Gateway	- read the unit default gateway in xxx.xxx.xxx.xxx format
8)	Read Unit Website Timeout	- read the current website timeout period in seconds - Values: 60, 300, 600, 900, 1800, 3600, 7200, 18000, 28800 0 = no timeout

Setup Options

Key	Selection	Description
1)	select Com port current: (COM1:)	- select PC serial port - the current PC serial port is displayed in parentheses
2)	select Baud rate current: (9600)	- select PC serial port baud rate - the current baud rate is displayed in parentheses
3)	set unit Address current: (1)	- select the unit address - the current address is displayed in parentheses
4)	set read timeout (5)	- select the time period (in seconds) the SerTest will wait for an answer to a command - the current time period is displayed in parentheses

For any selection that requires user input, the user is prompted. When commands are sent to the matrix unit, the command string and matrix unit responses are echoed to the screen. All commands generated by the program are formatted according to the information provided in sections above. If any transmission problems are detected, an error message is displayed.

Press <**Esc**> or <**Enter**> to back out to the main menu and press again to exit.

ETHERNET CONTROL

Telnet Interface-Port 2000

Note: Before Telnet can be used, it must first be enabled using the WEB interface (page 37).

The Telnet Interface enables the user to control the switch using telnet client through an Ethernet connection. The telnet server listens on ports 2000 and 2005. Port 2000 is for an operator telnet session while port 2005 (must be enabled) is intended for a software control type session (see page 29). For operator telnet control using the telnet interface and the current IP address, type the following in a command shell:

telnet 192.168.1.30 2000

The VEEMUX will prompt the user for a password. The user must enter the password followed by <Enter>.

The factory default password is **"nti".**

With a proper password sent the VEEMUX will respond with:

Password Successful
Connection Established

The commands below are now available.

Telnet Interface- Port 2000 Commands

Command	Reply	Description
H(elp) or h(elp)	Displays the list of commands	Help
CS nn,mm	*<CR>	Connect One input nn To output mm
CA nn	*<CR>	Connect All Outputs To Input nn
RO mm	*<CR>nn<CR>	Read Connection For Output. Returns the number of the input nn connected to output mm
CC nn	*<CR>nn<CR>	Save Matrix Connections Into Memory Bank nn nn should be between 00 and 99
RC nn	*<CR>nn<CR>	Restore Matrix Connections From Memory Bank nn nn should be between 00 and 99
CB nn	*<CR>	Change baud rate of serial line, nn=12(00),24(00),48(00),96(00) Factory default is 9600.
RV 00	*<CR>string<CR>	Read NTI Version String
RU	*<CR>nn,mm<CR>	Read Unit Size Returns the number of inputs nn and the number of outputs mm
RS	*<CR>	Reset Unit
CP	User is prompted to introduce the password twice	Change password- five (5) characters minimum
<Ctrl>-<X>-<Enter>	Good Bye. Connection to host lost.	Quit telnet session
H(elp) or h(elp)	Displays the list of commands	Help

Notes:

1. ***The commands must be typed exactly as shown in the chart. The commands are case sensitive.***
2. ***If a mistake is made, the user must backspace to the beginning and completely retype the command.***
3. ***If a command is sent that the VEEMUX does not recognize or exceeds the configuration of the switch, the reply "?" may be received. Check the command syntax and try again.***

Telnet Interface-Port 2005

For a software control type of telnet interface session (versus operator telnet control through port 2000 as described on page 28), connect to the VEEMUX through the current IP address at port 2005. Use the command set below to control and acquire information from the VEEMUX.

Note: After establishing the connection, the unit will answer with a blinking prompt on the next line. If the connection fails it will answer with ?<CR>

Legend: (All numbers must be two digits)

OP : Output Port (01-MAXOUTPUTS)
IP : Input Port (01-MAXINPUTS)
<CR> : Carriage Return (Hex 0xD)

Command Summary

Command String	Good Response	Description
RU<CR>	ru IP,OP<CR>	Read unit size
RO OP<CR>	pc OP,IP<CR>	Read connection for OP
CS IP,OP<CR>	*<CR>	Connect OP to IP
CA IP<CR>	*<CR>	Connect all outputs to IP
SS 01<CR>	*<CR>	Enable auto-status mode
SS 00<CR>	*<CR>	Disable auto-status mode
SX<CR>	See details	Examine connections
XX<CR>	*<CR>	Close connection

A <CR> (carriage return, 0x0D) is considered to be the end of the command string. If a string exceeds 16 characters, an end of string will be inserted automatically to avoid buffer overflow. An eventual <LF> (line feed, new line, 0x0A) after a <CR> will be ignored. A bad string will always be responded to with the ASCII character '?' followed by a <CR>.

Command Detail

RU-Read Unit Size

Command:

Byte 1	Byte2	Byte3
'R' (0x52)	'U' (0x55)	<CR> (0x0D)

Response:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
'r' (0x72)	'u' (0x75)	Space (0x20)	Input – 1st digit (0x30…0x32)	Input – 2nd digit (0x30…0x39)	',' (0x2C)	Output – 1st digit (0x30…0x32)	Output-2nd digit (0x30…0x39)	<CR> (0x0D)

This command will read the size of the unit. The response returns the number of inputs and the number of outputs in two-digit, ASCII code format. If the numbers are smaller than 10, the 1st digit is '0'.

RO-Read Connection for Output Port

Command:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
'R' (0x52)	'O' (0x4F)	Space (0x20)	Output – 1st digit (0x30…0x32)	Output – 2nd digit (0x30…0x39)	<CR> (0x0D)

Response:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
'p' (0x70)	'c' (0x63)	Space (0x20)	Output – 1st digit (0x30…0x32)	Output-2nd digit (0x30…0x39)	',' (0x2C)	Input – 1st digit (0x30…0x32)	Input – 2nd digit (0x30…0x39)	<CR> (0x0D)

This command will read the connection of an output port. The response returns the output port that is connected to the input port.

CS- Connect Output Port to Input Port

Command:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
'C' (0x43)	'S' (0x53)	Space (0x20)	Input –1st digit (0x30…0x32)	Input –2nd digit (0x30…0x39)	',' (0x2C)	Output – 1st digit (0x30…0x32)	Output – 2nd digit (0x30…0x39)	<CR> (0x0D)

Response:

Byte 1	Byte 2
'*' (0x2A)	<CR> (0x0D)

This command connects the specified input port to the specified output port.

CA- Connect All Output Ports to Input Port

Command:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
'C' (0x43)	'A' (0x41)	Space (0x20)	Input – 1st digit (0x30…0x32)	Input - 2nd digit (0x30…0x39)	<CR> (0x0D)

Response:

Byte 1	Byte 2
'*' (0x2A)	<CR> (0x0D)

This command connects all output ports to the specified input port.

SS_01- Enable Auto Status Mode

Command:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
'S' (0x53)	'S' (0x53)	Space (0x20)	'0' (0x30)	'1' (0x31)	<CR> (0x0D)

Response:

Byte 1	Byte 2
'*' (0x2A)	<CR> (0x0D)

Auto status mode is disabled by default whenever the connection is established, and this command must be entered to enable it. When auto status mode is enabled, a message will be sent whenever an input/output connection changes from any source. The format of this message is given in the table below. The first two numeric digits are the output port number and the two after the colon are the number of the input port that is now connected to it.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
'p' (0x70)	'c' (0x63)	Space (0x20)	Output – 1st digit (0x30…0x32)	Output – 2nd digit (0x30…0x39)	':' (0x3A)	Input – 1st digit (0x30…0x32)	Input – 2nd digit (0x30…0x39)	<CR> (0x0D)

SS_00- Disable Auto Status Mode

Command:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
'S' (0x53)	'S' (0x53)	Space (0x20)	'0' (0x30)	'0' (0x30)	<CR> (0x0D)

Response:

Byte 1	Byte 2
'*' (0x2A)	<CR> (0x0D)

This command disables auto status mode.

SX- Examine connections

Command:

Byte 1	Byte 2	Byte 3
'S' (0x53)	'X' (0x58)	<CR> (0x0D)

Response:

Multiple lines, one line for each output:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
'p' (0x70)	'c' (0x63)	Space (0x20)	Output – 1st digit (0x30…0x32)	Output – 2nd digit (0x30…0x39)	':' (0x3A)	Input – 1st digit (0x30…0x32)	Input – 2nd digit (0x30…0x39)	<CR> (0x0D)

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
'p' (0x70)	'c' (0x63)	Space (0x20)	Output – 1st digit (0x30…0x32)	Output – 2nd digit (0x30…0x39)	':' (0x3A)	Input – 1st digit (0x30…0x32)	Input – 2nd digit (0x30…0x39)	<CR> (0x0D)

Last line:

Byte 1	Byte 2
'*' (0x2A)	<CR> (0x0D)

Terminate telnet session

Command:

Byte 1	Byte 2	Byte 3
'X' (0x58)	'X' (0x58)	<CR> (0x0D)

Response:

Byte 1	Byte 2
'*' (0x2A)	<CR> (0x0D)

The unit will respond with '*'<CR> and close the connection, terminating the telnet session. The unit is then available for future connections.

Web Interface

A user may control the connections of the VEEMUX using a Web Interface via any web browser (see page 1 for supported web browsers). With the VEEMUX connected to a LAN through an Ethernet cable, a user can access the web interface controls inside the VEEMUX.

FYI: To quickly locate a VEEMUX on the LAN and edit the IP address settings, use the Device Discovery Tool (page 47).

To access the web interface, type the current IP address into the address bar of the web browser.

Address http://192.168.1.30

To open a SSL-encrypted connection, type:

Address https://192.168.1.30

You will be prompted to accept a certificate. Accept the NTI certificate.

A "Login Page" will appear.

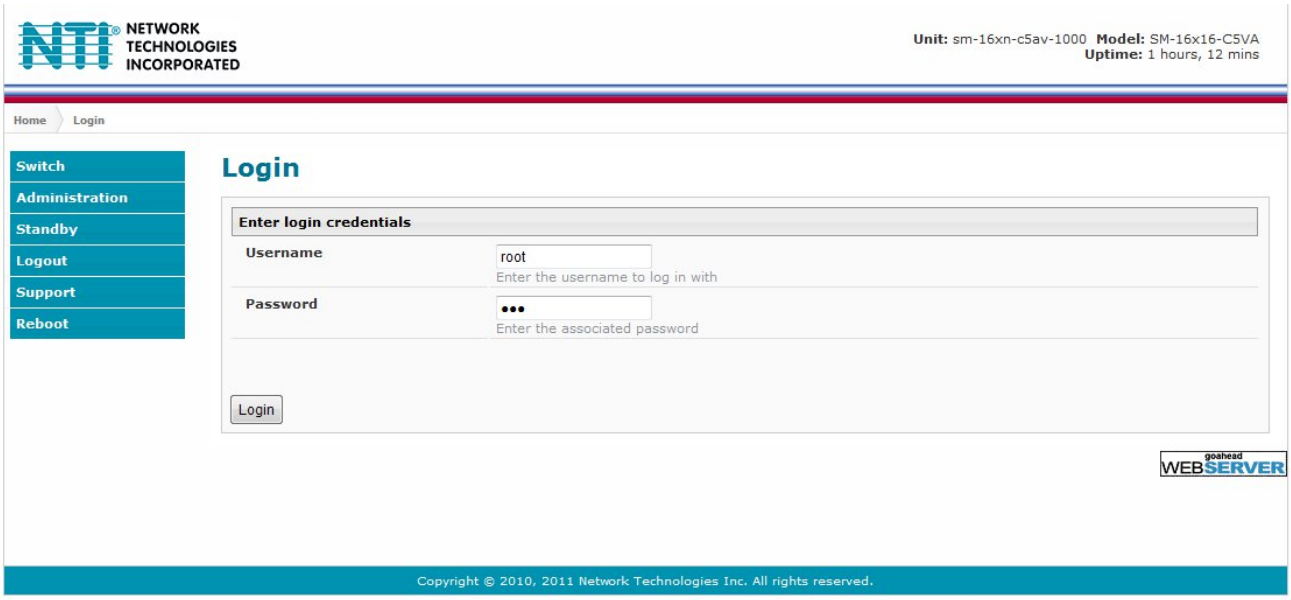


Figure 13- Web interface Login page

Enter the Password

The cursor will be flashing inside the username box. Enter the administrative username (this cannot be changed), then enter the default password:

User Name = root (lower case letters only)

Password = nti (lower case letters only)

To change the password, see page 43.

Note: The browser must be configured to accept cookies in order for the user to successfully make use of the web interface.

With a successful login, the main menu and Video Switch page will appear.

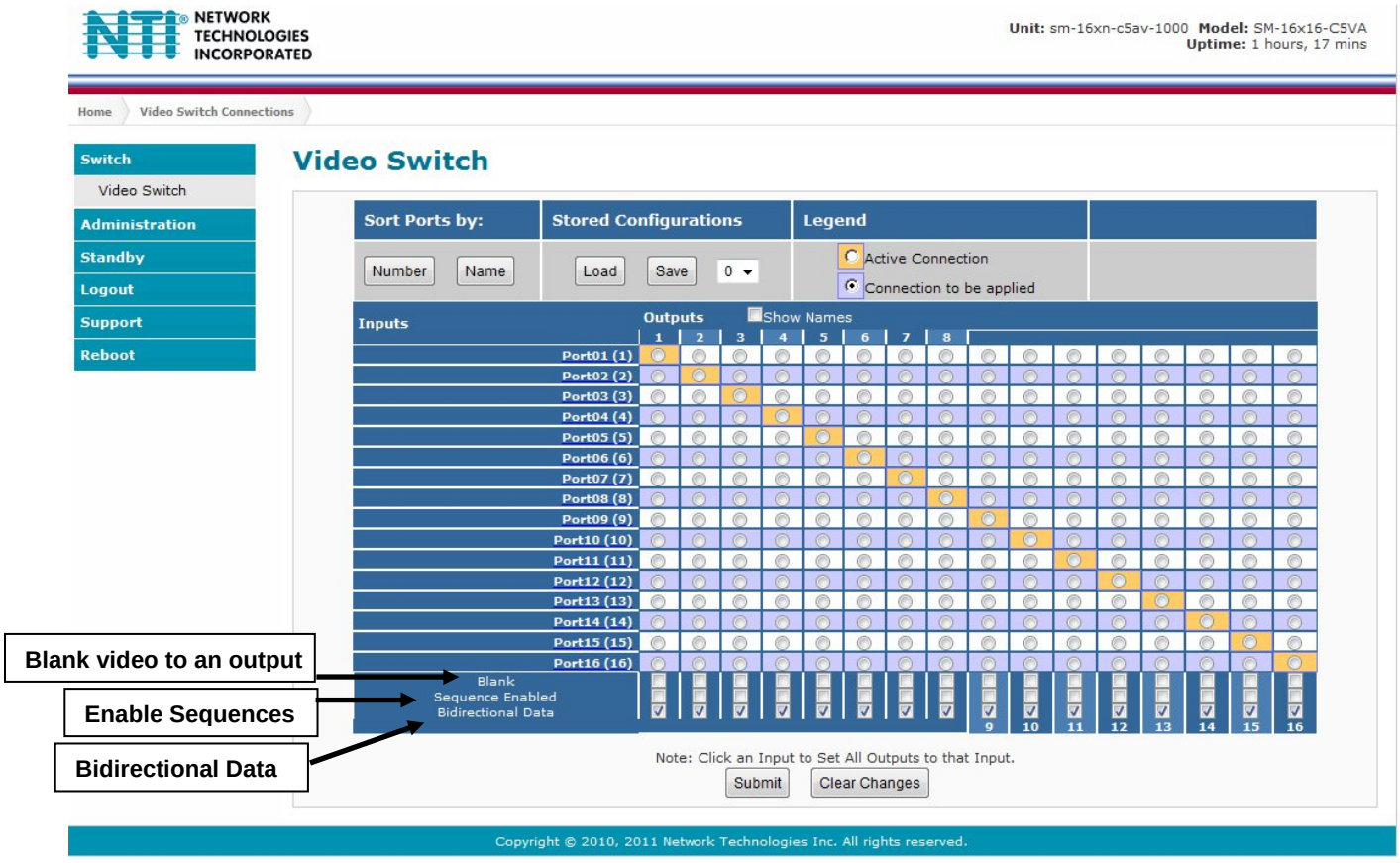


Figure 14- Main menu and Video Switch page

From the menu the user can choose from several links to either view the status of the switch or change the configuration of it. As described on the following pages, each link will enable different areas of control.

Video Switch Page

The Video Switch page (above) displays the active connections (shown in orange) and enables the user to control the video connections of the VEEMUX. Up to 100 different connection configurations can be saved and later recalled by any connection method. Scanning Sequences (page 40) for each output can also be enabled.

Note: Changes made using the keypad (page 13) or by another user through the web interface will be updated automatically to your browser every 10 seconds.

Note: Configuration 0 will be automatically loaded when the VEEMUX is powered-up.

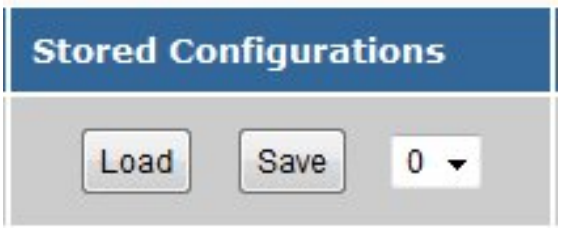
To change a connection, click on the radio button (square image with circle in the center) that intersects the input and output columns. A black dot will be placed in the circle to indicate the selection. Then press the **Submit** button. The display will be reloaded with the selections changed to orange to indicate they are now active. Multiple connections can be changed simultaneously.

To quickly clear the selected radio buttons press the **Clear Changes** button. This will only work if the **Submit** button has not already been pressed with the selections made.

To quickly connect all outputs to a single input, click on the desired input.

FYI: See page 22 for an example of using the Outputs Scanning Sequences feature.

To save a configuraton, from the **Stored Configurations** user interface, use the drop-down list to select the desired slot (numbers 0-99) to save the active configuration into and press the **Save** button.



Note: This will save the currently active configuration on the VEEMUX and the DDC configuration (page 42). If changes have been made in the web interface without first pressing the Submit button, those changes will not yet be part of the active configuration.

Note: If changes to the active configuration have been made by another user prior to saving the current connection selections, the changes made by the other user will be saved as the configuration.

The webpage configuration that loads after a **Save** is the configuration that was actually saved.

To load a saved configuration, from the **Stored Configurations** user interface, use the drop-down list to select the desired configuration. Then press the **Load** button. The VEEMUX will make the connections and the screen will refresh to show the connections associated with that configuration selection.

To blank the video to a specific output, click the box to the right of "Blank" that corresponds with the desired output to place a checkmark in it. The video going to that output will be disabled.

To enable the scanning sequence configured for an output, configure the automatic scanning sequence of inputs that should be viewed at the output (see page 40) and then click the box to the right of "Sequence Enabled" that corresponds with the desired output to place a checkmark in it. The video viewed from that output will switch from input to input according to the configured sequence.

To control whether an output supports bi-directional data flow, place a checkmark in the box "Bidirectional Data" corresponding to the desired output port for those ports that should support bi-directional data flow. Remove the checkmark from the boxes corresponding to those output ports that do not need to support it.

Note: If two outputs are connected to the same input, and both outputs have a microphone and set of speakers, the microphone will only be usable at the output with bidirectional data enabled. Only one output per input can have bidirectional data enabled at a time.

For best results, bidirectional data should only be enabled at outputs with an XTENDEX connected. Enabling bidirectional data at an empty output could interfere with the proper operation of other outputs when both are connected to the same input.

Administration

The Administration section provides links to pages for all configuration options in the VEEMUX switch. The administration section is broken up into 8 topics:

System	Assign the switch name and serial port communication settings
Network	Assign all network settings for connection to LAN
Video Input Names	Assign port names to each cable connection from video sources for easy reference
Video Output Names	Assign port names to each cable connection from display devices for easy reference
Scanning Sequence	Assign dwell times for each input as it is assigned to each output's scanning sequence
DDC Options	Configure how each input will receive EDID information
Change Password	Change the password used to access the VEEMUX
Firmware	Update the firmware as new versions become available

System Configuration

On the System Configuration page, under Administration, fields are provided to assign a unique name to the VEEMUX, set the baud rate for serial communications, and the serial address to be used in RS232 commands.

After applying the desired settings, press "**Save**" to finish.

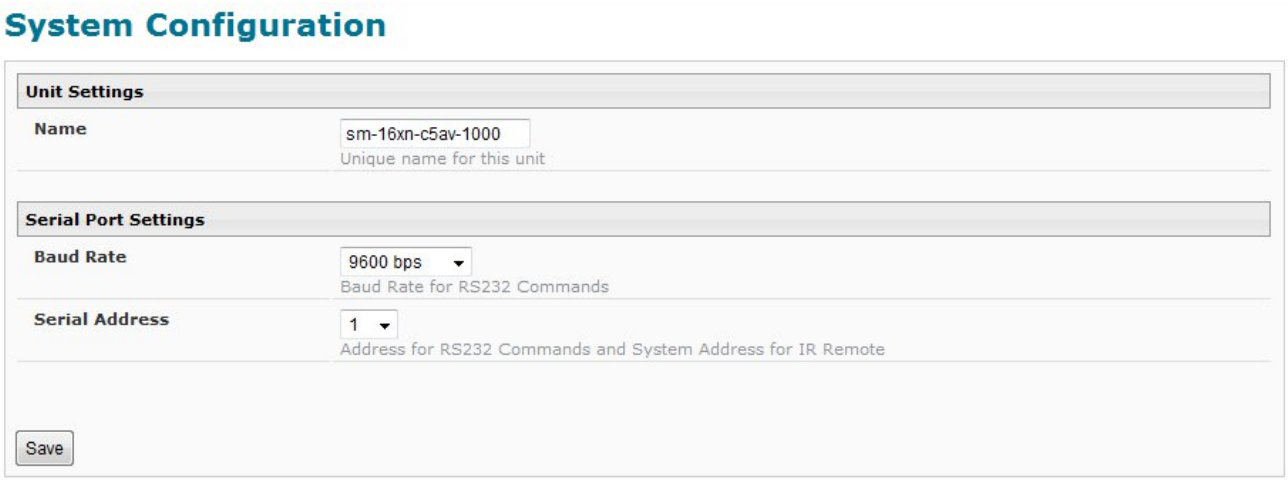


Figure 15- System Configuration page

Network Configuration

On the Network Configuration page, under Administration, the user can configure the VEEMUX web interface connection. This will provide access to control of the VEEMUX from any web-accessible computer.

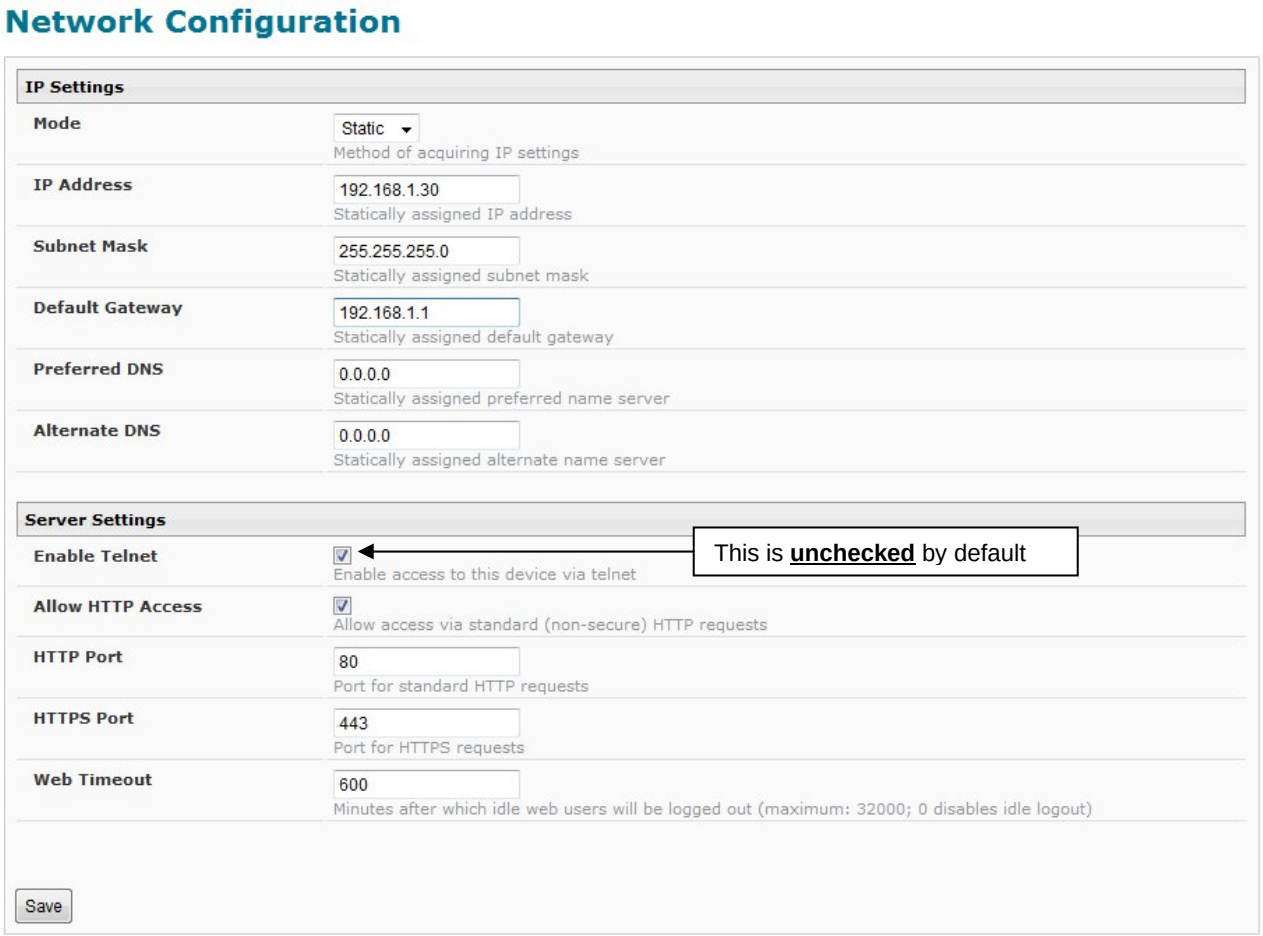


Figure 16- Network Configuration page

IP Settings

Mode – Choose between Static IP assignment and DHCP.

IP Address- If using Static IP assignment, enter a valid IP address to use

Subnet Mask- Enter a valid subnet mask value

Default Gateway- Enter a valid gateway address

Preferred DNS- Enter a valid Domain Name Server address (not required)

Alternate DNS- Enter a valid alternate Domain Name Server address if desired (not required)

This change will take a few seconds and automatically redirect the user to the IP address specified.

Server Settings

If telnet is going to be used to control the VEEMUX, place a checkmark in the “Enable Telnet” block.

If you wish to disable non-secure web access to the VEEMUX, remove the checkmark from “Allow HTTP Access”. With this box empty, only secure shell web access will be allowed.

A standard port number can be assigned for the HTTP (non-secure) and HTTPS (secure) ports, numbers ranging from 0-65535. Default HTTP port is 80, and default HTTPS port is 443.

The Website Timeout option controls how long an inactive web connection will stay logged in. The range is 0-3200 minutes (0 disables it). Any change to the Website Timeout configuration takes effect immediately.

Press the “**Save**” button to save any changes made.

Video Input Names

From the Administration menu, the Video Input Names page can be displayed. This page enables the Administrator to change the name of the input ports displayed on the Video Switch page.

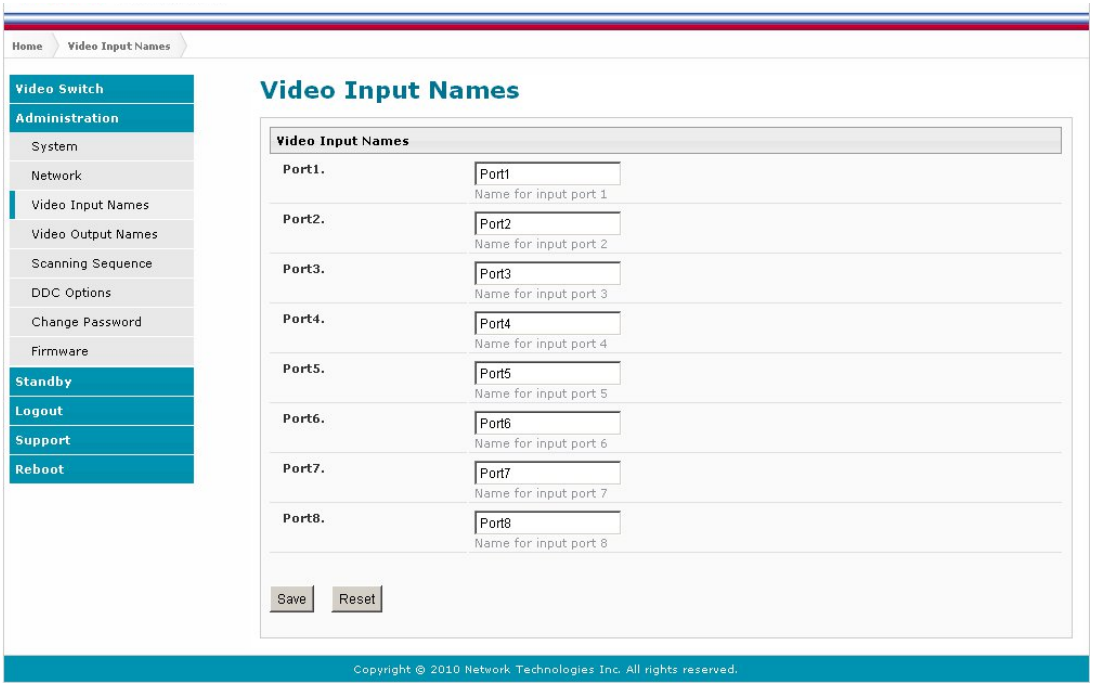


Figure 17- Video Input Names page

To change an Input Name, enter the name of the port for the desired input port number, and press “**Save**”.

If you make changes and change your mind and want to return the names back to what they were before changing them, press “**Reset**”. This must be done before pressing the “**Save**” button, or changes will not be able to be reversed.

Video Output Names

From the Administration menu, the Output Names page can be displayed. This page enables the Administrator to change the names of the output ports displayed on the Switch page.

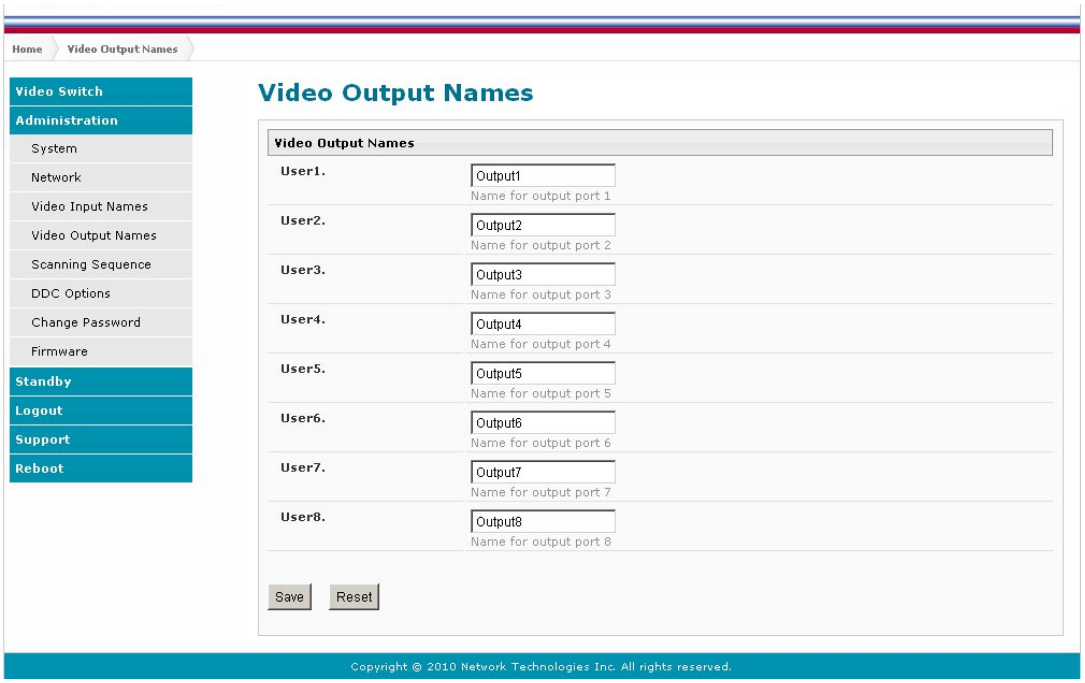


Figure 18- Video Output Names page

To change an Output Name, enter the name of the port for the desired output port number, and press "**Save**".

If you make changes and change your mind and want to return the names back to what they were before changing them, press "**Reset**". This must be done before pressing the "**Save**" button, or changes will not be able to be reversed.

Scanning Sequences

From the Administration menu, the Scanning Sequence page can be displayed. The Scanning Sequence page displays the configuration of an automatic switching sequence from input (video source) to input for each output (monitor).

The page displays:

- output number being configured
- the Scanning Sequence function status for that output
- the length of time in seconds (dwell time) that each input will be viewed when connected- the dwell time value ranges from 0-32000 seconds

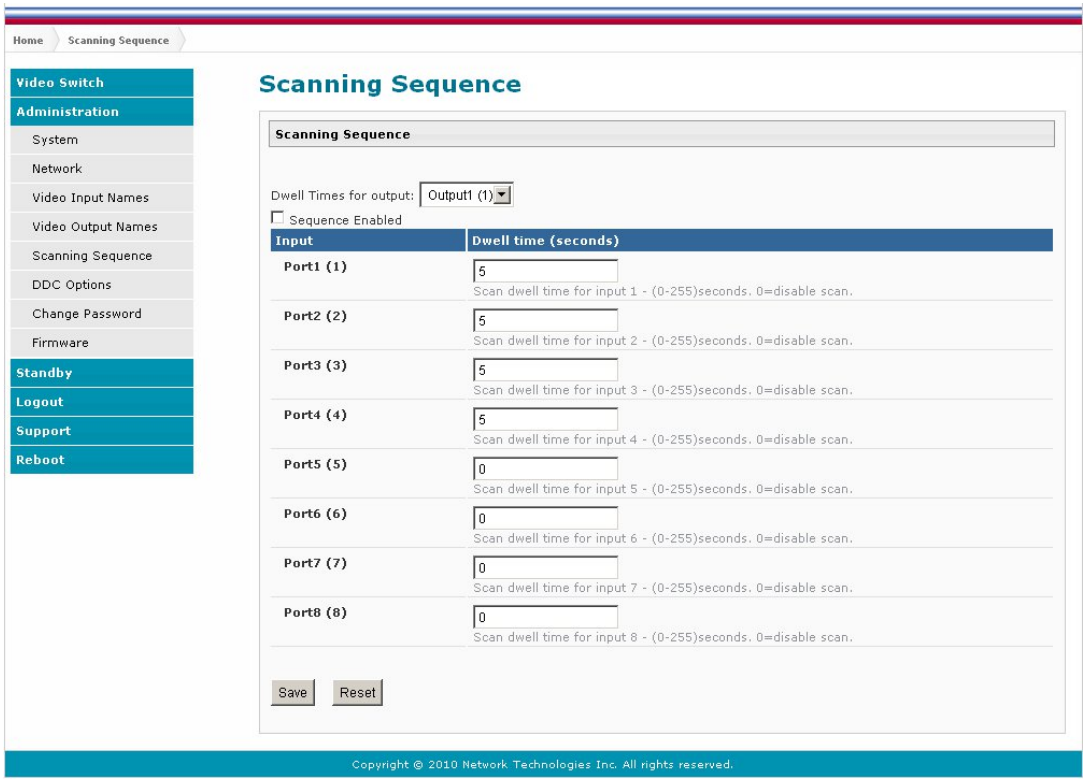


Figure 19- Scanning Sequence page

The output selection at the top of the page can be changed to any output to display the Scan Sequence Input dwell time values for that output.

The inputs and the amount of time that each will be viewed (0-32000 seconds) can be set to cycle sequentially for each connected output. If an input is set to 0 seconds, that input will not be viewed and will be skipped from the scanning sequence. To include an input in the sequence, enter a dwell time period from 1-32000 seconds, and press "**Save"**.

If you make changes and change your mind and want to return the values back to what they were before changing them, press "**Reset**". This must be done before pressing the "**Save**" button, or changes will not be able to be reversed.

To enable the scanning sequence for the output shown, place a checkmark in the "Sequence Enabled" block.

Tip: To quickly enable the scan sequence for multiple outputs, use the "Sequence Enable" blocks found on the Switch Page (page 18).

Note: If only one input has a dwell time value entered, then the output connection to that input will not end when the Scanning Sequence is enabled.

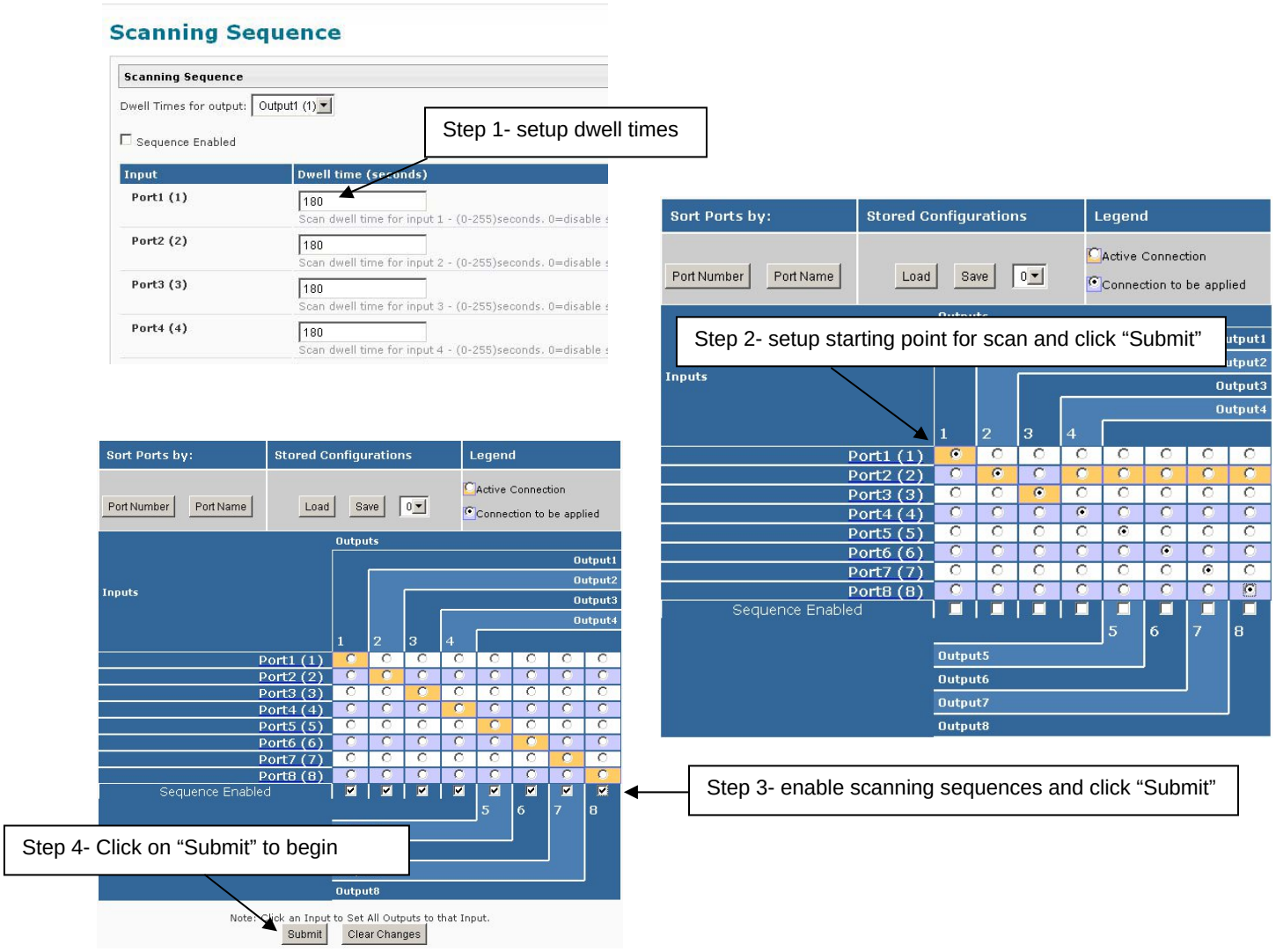
Example of using Outputs Scanning Sequences

Problem: A synchronous scan is desired for all outputs with a dwell time of 3 minutes per input, and no two outputs should be looking at the same input at any given time.

Solution:

1. Set the dwell time for all inputs listed in each output at 180 seconds (3 minutes). Press "**Save**" each time changes are made to the selected output. .
2. Go to the Video Switch page (page 18) and set each output to an input of the same number (1 to 1, 2 to 2, 3 to 3, etc..). Click on "**Submit**" at the bottom of the Video Switch Page to submit selections and establish a connection and starting point for the scanning sequence. (Blocks shown in yellow in the third image indicate connections made.)
3. Click on the "**Sequence Enable**" box for each output (from the Video Switch Page).
4. Click on "**Submit**" again to begin the scanning sequence for each output.

From the moment the configuration is submitted, a synchronous scan will begin on all outputs. Each output will connect to its respective input for 3 minutes. After 3 minutes, the outputs will each switch to the next consecutive input and remain connected for 3 minutes. This cycle will continue indefinitely until sequencing is disabled.



DDC Options

From the Administration menu, the DDC Options page can be displayed. DDC enables the video source to get EDID information from the display device. This enables the video source to automatically select the optimal resolution for the display by receiving, at power up, information from the display device concerning its resolution specifications.

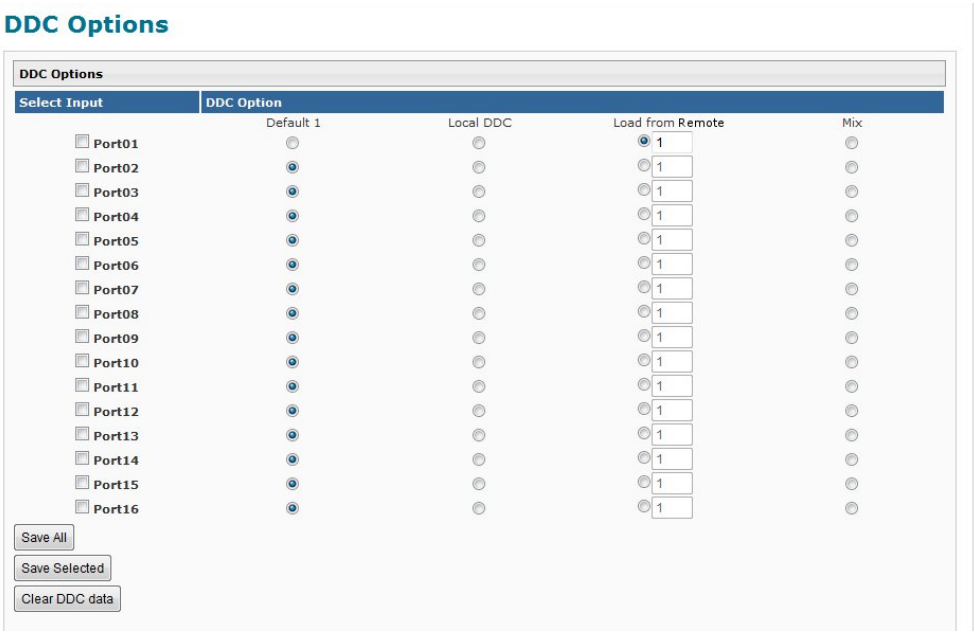


Figure 20- DDC Options page

EDID information can be provided to the video source by the VEEMUX as follows:

Default1- The video source on the input port will receive EDID information from the VEEMUX through an onboard table of values. The values for Default 1 support computer monitors. Default 1 is the default selection for all ports.

Local DDC- The video source on the input port will receive EDID information taken from the monitor connected to the extender Local Unit connected to that input

Load from Remote- select the radio button for this option and enter the output number associated with the remote monitor that the CPU should get its EDID information from. After the VEEMUX reads the EDID information from the remote monitor, it will store the information until the "Clear DDC data" button is selected.

Mix- The VEEMUX will poll all remote monitors for EDID information and compile a list looking for common information. Once found, the common EDID parameter will be supplied to the video source. If no common EDID is found, the first EDID parameter found will be used.

Save All- Click on this button to save all changes made to DDC options.

Save Selected- Click on this button to save only the changes to DDC selections of the selected Input ports. If no ports are selected (far left hand column), then your changes will not be saved.

Clear DDC data- Click this button to clear the DDC data stored in the VEEMUX. If the monitor is changed on a remote unit, and that remote unit is selected under "Load from Remote", the EDID information for that remote unit will need to be updated. Once the "Clear DDC data button is selected, the VEEMUX will refresh the EDID information from the newly connected monitor.

Once any changes are made, press "**Save**" to have them take effect.

Notes: In order for the video sources to correctly receive the EDID information from the switch at boot-up, the switch must be powered-up before all attached video sources.

When "Load from Remote" is used for Port 16/32/48/64, the EDID information will be taken from the monitor on the remote extender, not from the monitor connected to the directly-connected "VGA VIDEO OUT xx" port.

Change Password

From the Administration menu, the Change Password page can be displayed. This page enables the administrator to change the password used to access the VEEMUX. (This password is also used for the telnet interface.) Be sure to make note of the new password exactly as it is case sensitive. The password must be between 5 and 16 characters in length and can be alphabetical or numeric.

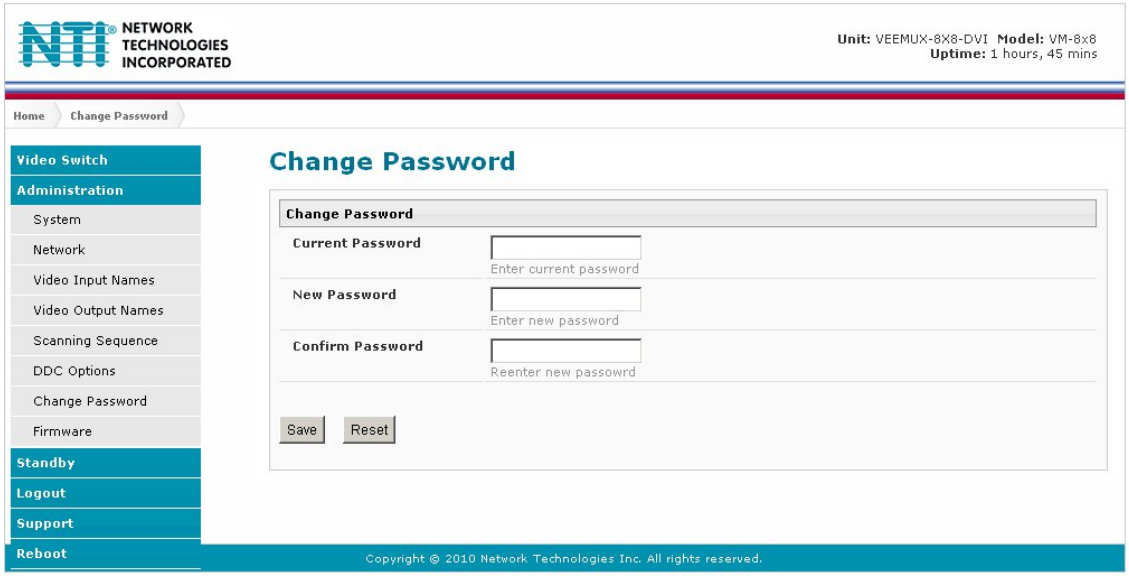


Figure 21- Change Password page

Once the change is made, press "**Save**" to have it take effect.

Update Firmware

From the Administration menu, the Update Firmware page can be displayed. The Update Firmware page shows the current version of the firmware and enables the Administrator to update the firmware to the latest version available.

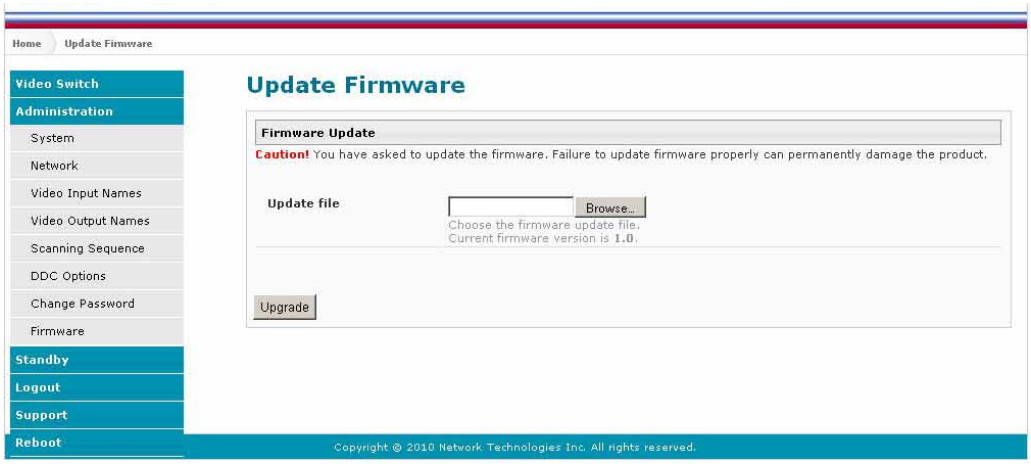


Figure 22- Update Firmware page

WARNING: Failure to carefully follow these directions can permanently damage the VEEMUX. Please read these directions in full before continuing. Do not, under any circumstances, reset or power-down the VEEMUX while the firmware is being updated. Do not attempt to update the firmware if a power-failure is likely.

Note: The Firmware can only be updated from the non-secure (http) website. If you attempt to access this page from the secure (https) website, you will be automatically redirected to the non-secure site.

To update the firmware:

1. Contact NTI for the latest firmware file name sm**-16xn-c5av-v*x-x*.bin** (where x.x is the version number) and copy it to your computer.
2. On the Update Firmware page, in the "Update File" block, browse to the firmware file.
3. Press **Upgrade**.

Note: If an update is attempted using the wrong firmware for the section an error message will be received. No update will occur.

4. The VEEMUX will upload the firmware and then restart itself (this may take up to 4 minutes), logging out all connections. After the restart, approximately 4 more minutes, the VEEMUX will be ready to resume operation.

If a message appears stating that the Upload has failed, or that a non-fatal error has occurred:

1. Ensure that the file being uploaded is the NTI firmware file.
2. Repeat the process from step 2 above.

Note: The following message does not indicate that damage to the product has occurred.

If a message appears stating that there has been a fatal error:

1. **DO NOT RESET OR POWER-DOWN THE VEEMUX**.
2. Repeat the update process from the first step 2 above.
3. If you get another Fatal Error message, call NTI tech-support at 1-800-742-8324 or 330-562-7070.

FYI: The VEEMUX should continue to run normally unless it is reset. However, damage may have occurred to the web server firmware that will prevent the product from starting up correctly.

Standby Mode

From the menu, the user can quickly place the VEEMUX in Standby Mode. When in Standby, the VEEMUX will still be powered-ON but all functions will stop. The VEEMUX will be in a power-saving ready-to-use state.

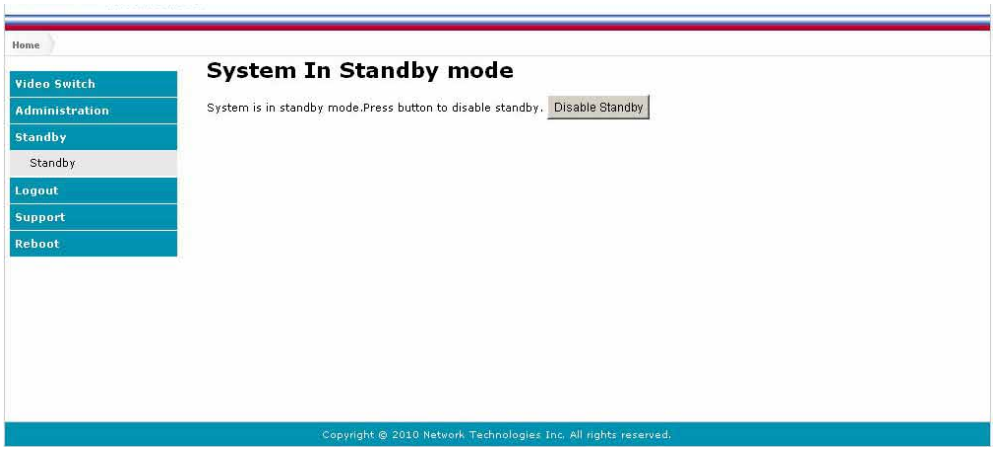


Figure 23- VEEMUX in Standby Mode

By simply selecting “Standby” from the side menu, the VEEMUX is placed in Standby Mode. When in Standby Mode, the VEEMUX is still operating as configured, but cannot be manipulated further until standby is disabled.

Standby Mode can be disabled either

by pressing “Disable Standby” through the web interface (above),

by pressing any button on the front panel keypad

by using the IR Remote control (optional)

Logout

To quickly logout of the web interface, select “Logout” from the menu. You will immediately be logged out and presented with a login screen.

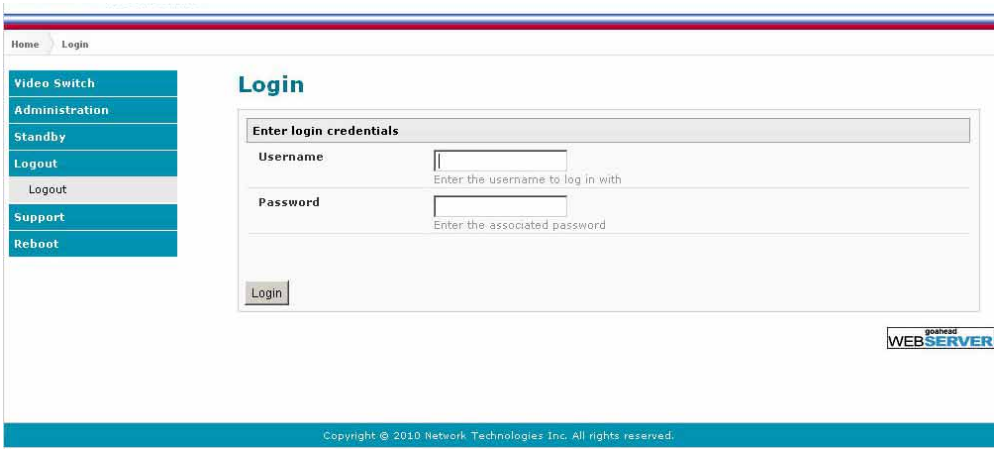


Figure 24- Logout of the VEEMUX web interface

Support

The Support link on the menu drops down to two choices, **Manua**l and **Downloads**.

The **Manual** link will open the pdf manual for the VEEMUX.

The **Downloads** link will open the firmware downloads page for the SM-16xN-C5AV-1000 Video Matrix Switch via CAT5 at NTI. From there you can see what versions of firmware are available and determine if the version in your VEEMUX is current or in need of an upgrade (page 44).

Figure 25- Support Tab

Reboot

To quickly reboot the VEEMUX, select “Reboot” from the side menu. This will force the VEEMUX to power cycle its processor. A reboot will take approximately 45 seconds to occur. Refresh your browser and log back in to the VEEMUX as desired.

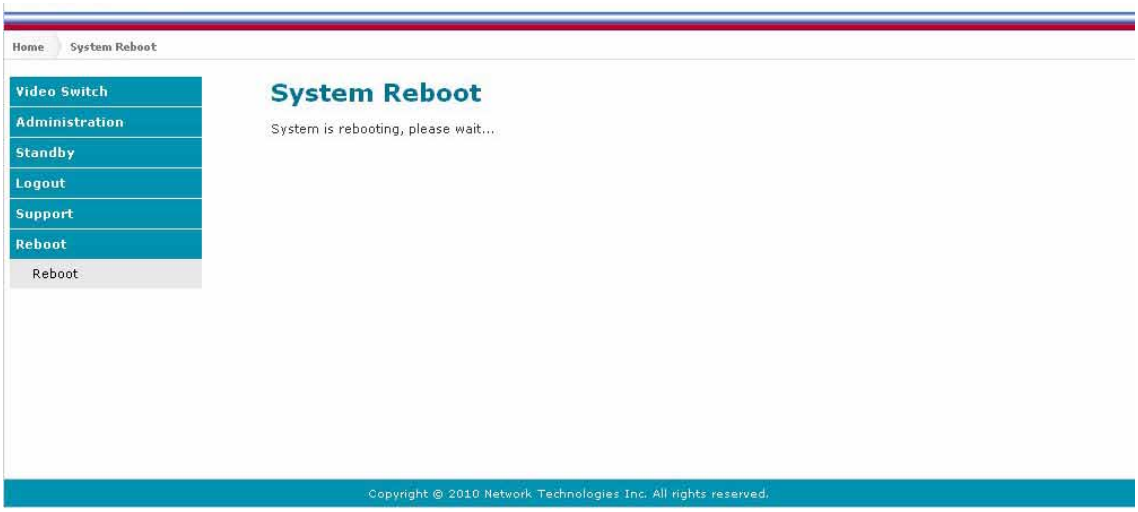


Figure 26- System Reboot

DEVICE DISCOVERY TOOL

In order to easily locate the VEEMUX on a network, or to change network settings, the NTI Device Discovery Tool may be used. A link to the Discovery Tool is provided on the web page that appears when you insert the instruction manual CD provided into your CD ROM drive. Click on the link or browse the CD and click on the file *discover.html* . This will open your browser and display the Device Discovery Tool page.

Note: The Discovery Tool requires the Java Runtime Environment to operate. A copy of Java and a link to the web page from which it can be downloaded and installed is provided on the CD.

Note: The computer using the Discovery Tool and the VEEMUX must be connected to the same physical network in order for the Device Discovery Tool to work.

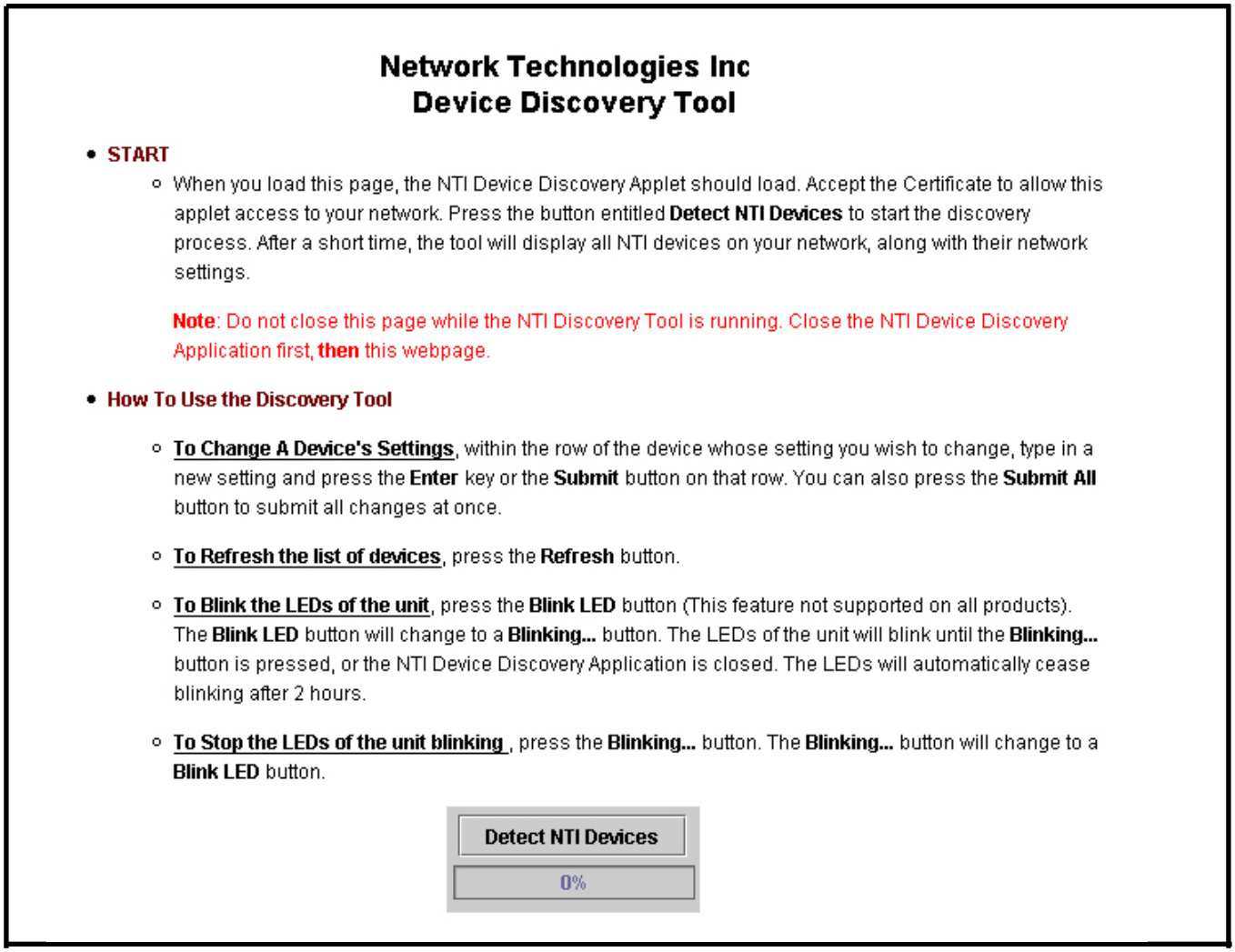


Figure 27- Device Discovery Tool page

Use the Device Discovery Tool to display all NTI VEEMUXs on your network, along with their network settings. Follow the instructions on the Device Discovery Tool page to use the tool and to change the device settings if so desired.

INFRARED REMOTE CONTROL

The IRT-UNV Infrared Remote Control (optional) allows the user to remotely and intuitively control up to 15 NTI SM-16Xn-C5AV-1000 video matrix switches providing the ability to route connections, save and recall switch configurations, and put the switch into Standby.

Features:

- Ability to switch one input to all outputs
- Scroll through inputs for a single output by using the Input +/- keys (similar to changing channels)
- Automatically scan through all channels for a single output
- Save or Recall up to 10 matrix switch preset configurations
- Control up to 15 NTI switches (systems) with a single remote
- Put the switch in Standby

Materials

Materials supplied with the IRT-UNV:

- NTI IRT-UNV Infrared Remote Control
- 2- AAA Batteries (installed)

Buttons

The IRT-UNV Infrared Remote Control user interface consists of a keypad with 29 buttons. The buttons have the following functions:

- **Numerical Values (0-9)**
  - Selects port numbers (for IN, OUT)
  - Selects memory locations (for saved configurations)

- *** (Asterisk)**
  - Pressed to select all outputs

- **OUT**
  - Pressed to indicate an output port selection

- **IN**
  - Pressed to indicate an input port selection

- **IN + / -**
  - Cycles through input ports (up or down), connecting to each one (similar to changing channels)

  Note: This affects only the selected output port

- **SAVE**
  - Pressed to save the current switch configuration (port connections and volume settings)
  - Up to 10 configurations can be saved (0-9)

- **RECALL**
  - Pressed to recall a switch configuration (port connections and volume settings)
  - Up to 10 configuration can be recalled (0-9)

- **SYS**
  - Pressed to select the desired NTI system to be controlled
  - Only used when controlling multiple systems
  - Must be followed by a system number: 1-15

- **ENTER**
  - Pressed to immediately accept the command (normal delay is approx. 5 seconds).

- **ESC**
  - Pressed to cancel the current command

  Note: If the command has not yet been accepted, all button presses in the command sequence will be cleared

- **Standby** 
  Pressed to put the unit into or out of standby mode

- **VIDEO** 
  - Pressed prior to entering a port switch command
  - Applies the command to the video signals only
  - (by default, port switch commands are applied to both Audio and Video)

- **BLANK Video** 
  - Turns OFF Video for the selected output
  - Can be used with *(Asterisk button) to turn OFF video for all outputs
  - Video will be turned ON by pressing the Blank Video button again, or by switching ports

  Note: Blank and Un-Blank commands are applied only to the selected output

- **SCAN**
  - Pressed to toggle the scan enable/disable feature for the selected port
  - Must be preceded by an output port number (1 or 2 digits), or the * (Asterisk) button to toggle all ports

  Note: If the dwell time for a port is set for 0 seconds, it will not be scanned (page 40)

- **PREV -THIS BUTTON IS NOT USED FOR THIS PRODUCT**
- **AUDIO**  **THIS BUTTON IS NOT USED FOR THIS PRODUCT**
- **VOL + / - THESE BUTTONS ARE NOT USED FOR THIS PRODUCT**
- **MUTE Audio**  **THIS BUTTON IS NOT USED FOR THIS PRODUCT**

Operation

Operation of the IRT-UNV is intuitive. The number of button presses required to complete any operation is kept to a minimum. This is accomplished using intelligent software within the NTI Matrix Switch. Additionally, the Matrix Switch allows for multiple ways for the user to complete the same operation – ensuring that the Remote will work as expected, regardless of who uses it.

Changing Ports

The first, and most important operational use of the IR Remote is changing ports of the switch. This requires the selection of both input and output ports. There are several methods of control.

Channel Surfing

The “IN +/-“ and “SCAN” buttons can be used to surf through input port connections. However, since there are multiple outputs/users, the question becomes “which output connection is being changed?” As a result, it is required that an output be selected prior to using the “IN +/-“ buttons.

The output port can be selected in two ways:

- by pressing the “OUT” button before selecting the output port number
- by pressing the “OUT” button after selecting the output port number

In both cases, the user must enter the output port number using the Numeric Keys (0-9). However, when the “OUT” button is pressed prior to selecting the port number, there will be a two (2) second delay after the last digit of the output port is entered that must expire before the output port is accepted. To avoid this delay, press the “ENTER” button to immediately accept the port number.

Once the output port has been accepted, there will be a five (5) second timeout, during which the user must press another button (“IN +,” IN -,” or “SCAN”). Each subsequent press of “IN+” or “IN-“ will renew the timeout, waiting for you to press it again (to advance or go back by one more Input channel). If no new command is sent to the switch before the timeout expires, the switch will forget the selected output, and pressing the “IN +/-“ buttons will have no effect.

All output channels can surf inputs at once by pressing the “ * “ button prior to pressing the “IN +/-“ buttons.

Examples:

Change connection of Output 1 from Input 1 to Input 3:

<**OUT**> + <**1**> + wait 2 seconds + <**IN+**> + <**IN+**>

<**OUT**> + <**1**> + <**ENTER**> + <**IN+**> + <**IN+**> (must press <**IN+**> within 5 seconds of pressing <**ENTER**>)

<**1**> + <**OUT**> + <**IN+**> + <**IN+**> (must press <**IN+**> within 5 seconds of pressing <**OUT**>)

Jump To Input

With the output port selected, a user knowing the desired input port number can enter it using the Numeric keys (0-9). Just as with using the "OUT" button, pressing the "IN" button after the number will force the command immediately. If the "IN" button is pressed prior to the port number, the "ENTER" button must be pressed to avoid a two (2) second delay before the input port is accepted.

Examples:

Quick method to change Output 1 from Input x (any) to Input 8:

<**1**> + <**OUT**> + <**8**> + <**IN**>

Quick method to change Output 12 from Input x (any) to Input 20:

<**1**> + <2> + <**OUT**> + <2> + <0> + <**IN**>

Jump To Output

Users can also change ports by specifying the input port number first. Similar to selecting the output port first, the "IN" button can be pressed either before or after entering the port number. Once the input port has been selected, the output port can be selected, following the same format as "Jump to Input…"

Expiration of a five (5) second timeout will force the switch to forget the entered input port number.

Example:

Quick method to change Input 1 from Output x (any) to Output 8:

<**1**> + <**IN**> + <**8**> + <**OUT**> (must enter the <x> + <**OUT**> command within 5 seconds of pressing <**IN>**)

Connect All

It may be desirable to broadcast the video (and audio) signals from one input to all of the outputs. In this situation, the user can quickly make all of these connections by using the " * " (asterisk) button which selects all outputs. With the input port selected, pressing the " * " button will immediately force the command to connect all output ports to the selected input.

Example :

Connect all users to Input 2:

<**2**> + <**IN**> + <*****>

The " * " button can also be pressed prior to selecting the input port. In this case, the command will take effect once the input port has been selected.

<*****> + <**2**> + <**IN**>

If no command is received before the five (5) second timeout expires, the switch will forget the " * " key-press.

Save and Recall

The VEEMUX provides the ability to save and recall up to 100 switch configurations. The IRT-UNV IR Remote can be used to access these configurations by using the "SAVE" and "RECALL" buttons.

To save a configuration, press the "SAVE" button followed by Numeric key(s) 0-99 corresponding to the memory slot the configuration is to be saved in. After the numeric key(s) press the "Enter" button. If the "Enter" button is not pressed, after two seconds the function will timeout and the number entered will be saved as that configuration.

Configurations can be recalled in much the same manner. To recall, press the "RECALL" button followed by the numeric key (s) corresponding to the memory slot from which the configuration is to be recalled. After the numeric key(s) press the "Enter" button. If the "Enter" button is not pressed, after two seconds the function will timeout and the number entered will be recalled to the current configuration.

Multiple Switch Control

All compatible NTI matrix switches will work with the same IRT-UNV IR Remote control. As a result, a user with multiple NTI matrix switches may find that, if the switches are installed too close together, both switches may respond to an IR command intended only for one switch. Or, the user may want to control multiple switches with a single remote, instead of having one remote per switch. To accommodate this situation, the IRT-UNV IR Remote provides the "SYS" button, which can be used to select the NTI switch to be controlled.

All switches will have the capability to allow the user to set the switch address (0-15). Each switch to be separately controlled must be set to a different address prior to using the Remote Control. With the addresses set, press the "SYS" button on the IRT-UNV, followed by a two digit number corresponding to the address of the matrix switch to be controlled.

Upon accepting the "SYS" command, the switch with the corresponding address will illuminate the "IR" LED and respond to all IR Remote commands and will blink the "IR" LED on the front of the switch for visual indication. All other switches will ignore any further commands, until the "SYS" button is pressed again. To select a new NTI switch to control, press the "SYS" button again and repeat the process.

Canceling a Command

Considering the number of key presses required for some of the commands, it's possible that the user may inadvertently press an incorrect button. Should this happen, the user can press the "ESC" button to cancel a command. Provided the command has not been accepted by the system, pressing the "ESC" button will cause the switch to "forget" or "erase" all button commands from the current command sequence. Once the command sequence has been cancelled, the user can begin entering the command again.

Technical Specifications For IRT-UNV

Number of Controllable Systems	Max: 15
Pushbutton Control	29 keys
Power supply	2x AAA Battery
Chassis material	Plastic
Approvals	RoHS

Troubleshooting the IRT-UNV

PROBLEM	SOLUTION
IRT-UNV is not selecting outputs or inputs	• Check battery • The IRT-UNV may be configured to control the wrong switch- see "Multiple Switch Control" above.

TECHNICAL SPECIFICATIONS

CATx	
CATx Connectors	RJ45 for CAT5, 5e, 6 or 7
Distance Limitations	Depends on combinations of extenders connected- see page 8
Video (Local Ports)	
Video Connector	HD15 female
Video Resolution	1920x1200 @ 60 Hz
Video Bandwidth (For Local and RJ45 ports)	16 outputs: 175MHz 32 outputs: 141MHz 48 outputs: 117MHz 64 outputs: 99MHz
Audio (Local Ports)	
Audio Connectors	3.5mm jack
Audio Signal Type	Stereo unbalanced
Audio: Frequency response THD + N S/N Crosstalk	20Hz to 20kHz, +/- 1.0dB 0.01% @ 1kHz >76 dB > 70 dB @ 1kHz
Audio Input: Impedance Max. input level	10kOhm 1Vrms or 2.5Vp-p
Audio output: Impedance	< 0.1 Ohm
Control	
Serial Signal Type Baud Rate Supported Flow Control Parity	RS232, RJ45 female connector TxD,RxD 4800,9600,19200,38400,57600 and 115200bps XON/XOFF, software Even, odd, none
USB Console	Virtual Serial Port- USB Type B female connector
Ethernet	RJ45 female connector, 10/100BASE-TX
Infrared	IR Receiver (works with optional remote control transmitter)

TECHNICAL SPECIFICATIONS

General	
Operating environment temperatures and RH	30-100°F (0-38°C) 17-09% RH (non-condensing)
Chassis material	Powder coated steel
Power Supply	IEC connector for 100-240VAC power connection
Size (In.) WxDxH	
16x16	19x12x1.75
16x32	19x16x3.5
16x48	19x20x3.5
16x64	19x24x5.25
Approvals	RoHS, CE

TROUBLESHOOTING

Each and every piece of every product produced by Network Technologies Inc is 100% tested to exacting specifications. We make every effort to insure trouble-free installation and operation of our products. If problems are experienced while installing this product, please look over the troubleshooting chart below to see if perhaps we can answer any questions that arise. If the answer is not found in the chart, please check the FAQs (Frequently Asked Questions) at our website at http://www.networktechinc.com or contact us directly for help at 1-800-742-8324 (800-RGB-TECH) in US & Canada or 1-330-562-7070 worldwide. We will be happy to assist in any way we can.

Problem	Cause	Solution
Only the video is distorted	Extender cable has been hot-plugged to the VEEMUX	• Switch output to different input and back. • Power cycle switch. • If still having problem power cycle remote extender.
Distorted audio and or video	Cable is run through electronically noisy environment	• Make sure you have good quality CATx cable. • Make sure the cable runs are as far away from any source of electronic noise. • If problem persists consider using shielded cable.
Microphone doesn't work	Bidirectional Data is not enabled Extender not configured properly	• Make sure bidirectional data is enabled for that input/output combination • When the connected local and remote are both 1000 foot extenders, make sure the correct microphone is enabled (local or remote). For directions on how to choose which microphone is enabled refer to the manual for the 1000 foot extender.
Video looks very noisy	• Bidirectional data is enabled on a port that isn't connected • Bidirectional data is enabled on a port connected to a 600 foot extender • Extender on port that has bidirectional data has been unplugged	• Make sure the bidirectional data is enabled on a connected output (if both 1000 and 600 foot extenders connected choose bidirectional data enabled on 1000 over 600) • Bidirectional data will only work on a port connected to a 1000 foot extender. • Disable bidirectional data on empty output port and power cycle the VEEMUX.
IRT-UNV is not selecting outputs or inputs	• No power • IRT-UNV is not sending signal to correct address	• Replace battery in IRT-UNV • The IRT-UNV may be configured to control the wrong switch- see "Multiple Switch Control" (page 52).

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WARRANTY INFORMATION

The warranty period on this product (parts and labor) is two (2) years from the date of purchase. Please contact Network Technologies Inc at **(800) 742-8324** (800-RGB-TECH) or **(330) 562-7070** or visit our website at **http://www.networktechinc.com** for information regarding repairs and/or returns. A return authorization number is required for all repairs/returns.

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