NODEMUX® Series

ST-nXm-U

Multi-user / Universal KVM Switch
Installation and Operation Manual

Warranty Information

The warranty period on this product (parts and labor) is one (1) year 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.nti1.com for information regarding repairs and/or returns. A return authorization number is required for all repairs/returns.

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CHANGES

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INTRODUCTION

The NTI ST-nXm-U (NODEMUX) is a multi-user / universal KVM switch, (n= number of users, m= number of CPUs). It allows multiple users, up to 8, each with a keyboard, monitor, and mouse, to communicate directly with any PC, MAC or SUN workstation connected to the switch. A single switch can connect to 32 CPUs or up to 512 CPUs when switches are expanded. These CPUs can be file servers, network managers, etc. The auto-boot circuitry in the NODEMUX allows all CPUs to boot simultaneously without keyboard and/or mouse error.

Features

➢ Users can work individually or share the same CPU.

➢ Up to n users can work with m CPUs where n and m are the switch size acquired.

➢ Universal input and output ports that interface cables plug into adapt to PC, MAC, and SUN platform devices.

➢ Power cycle circuit control allows the NTI switch to be powered OFF, then ON, at any time without affecting the attached CPUs.

➢ Power cycle circuit control allows the attached CPUs to be powered OFF, then ON, at any time without affecting the switch or other attached CPU.

➢ OSD enabled system with security features optionally enabled on a port by port basis.

➢ A microprocessor is dedicated to each CPU, preventing connected CPUs from locking up.

➢ Each connected CPU can boot without a keyboard or mouse.

➢ Keyboard and mouse interface cable can be hot-plugged during operation.

➢ LCD display on the front panel shows the CPU to which each user is connected.

➢ 10 connection setups can be saved in memory by the user for instant setup recall.

➢ No dip switches or jumpers necessary to configure.

➢ Video formats up to 1600X1200 can be displayed from all platforms. (A VGA multi-scan monitor must be used)

➢ User's keyboard and mouse can control the switch using the On Screen Display (OSD) of each user's connections

➢ Names can be assigned to the CPUs

➢ Password security on a PORT enabled basis.

➢ RS-232 control allows control of the switch with one CPU serial port.

➢ Power required is 110 or 220 VAC @ 50-60 Hz at less than 25 watts.

➢ ST-MX multi-console adapter is compatible for system expansion to up to 512 CPUs.

Optional Features:

➢ DDC support

➢ Audio support

➢ Dual Video support

(See "Options" on page 3 for more details)

Compatibility

The NODEMUX supports all PS/2 style PCs as well as RS6000s, SGI and HP9000. It is also compatible with MAC, SUN (including all SUN Ultras) and AT/Serial style PCs. PS/2 laptops as well as IntelliMouse and MAC dongle devices are also fully supported.

Limitation

Only VGA multi-scan monitors can be used with this product.

Ordering Information

ST-nXm-U Switch

The ST-nXm-U switch is built to a specific size ranging from 2 to 8 users and 8 to 32 CPUs. The switch is built at the factory based on the specified size ordered. The switch has universal inputs and outputs that support all platforms and are configured with interface cables (see " Interface Cables" below). The "n" in the part number ST-nXm-U represents the number of users. Select either 2 ,4, or 8 user switches. The "m" in the part number represents the number of CPUs. The switch is available with support for either 8 , 16,or 32 CPUs. It is not necessary to connect a user or CPU to each port (ex. a ST-2x16 switch has the capability of supporting 16 CPUs, but can have only 10 CPUs connected and 6 empty ports.

ST-nXm-U

Replace the "n" with either 2,4, or 8

Replace the "m" with either 8,16, 24, or 32

The following list represents the available sizes that can be ordered:

ST-2X2-U*	ST-4X8-U*	ST8X8-U
ST-2X4-U*	ST-4X16-U	ST8X16-U
ST-2x8-U*	ST-4X32-U	ST8X24-U
ST-2x16-U		ST8X32-U
ST-2X32-U		

*This size is also available in a desktop style case instead of a rack mount case- just add "DT" when ordering

Interface Cables

Interface cables are not included and must be purchased separately.

A set of 2 cables for each CPU being connected to the switch:

PS/2 CPU to Switch	VEXT-xx-MM for video interface
	VKTINT-xx-MM for keyboard and mouse interface
	OR
SUN CPU to Switch	VEXT-xx-MM for video interface
	13W3M-15HDF (adapter for 13W3 to 15HD)
	SKTINT-xx-MM for keyboard/mouse interface
	OR
MAC CPU to Switch	VEXT-xx-MM for video interface
	MKTINT-xx-MM for keyboard/mouse interface

One of the following cables must be used to connect the keyboard/mouse:

<u>PS/2</u> keyboard/mouse	VKTINT-1
	OR
<u>SUN</u> keyboard/mouse	None needed. SUN keyboard plugs directly in.
	OR
<u>MAC</u> keyboard/mouse	MKTINT-1

where:

> *xx* is the length of the cable in feet
>
> *MM* indicates male-to-male connector, and
>
> *MF* indicates male-to-female connector.

Cables can be purchased from Network Technologies Inc.

Custom cable lengths are available – contact NTI for pricing and distance / resolution limitations.

Options

The following options are available for the ST-nXm-U switch.

DDC Support (see page 17)

> This feature makes the DDC information of the monitor connected to port 1 available to each CPU.
>
> This feature is ordered by adding a "D" following the size designation in the model number (i.e. ST-2X8D-U)

Audio Support (see page 18)

> This feature enables the audio from each CPU to be heard by each user
>
> This feature is ordered by adding a "A" following the U in the model number (i.e. ST-2X8-UA)

Dual Video Support (see page 18)

> This feature enables two video signals from CPUs with dual video outputs to be seen by each user
>
> This feature is ordered by adding a "DV" following the U in the model number (i.e. ST-2X8-UDV)

Front View of NODEMUX
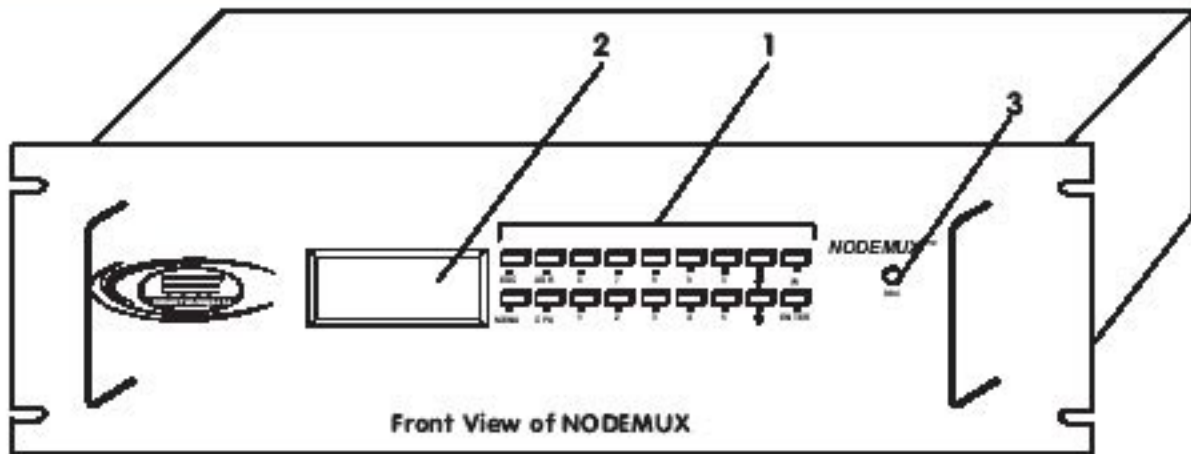
FEATURES AND FUNCTIONS

1. Keypad- buttons for user control over switch functions

2. LCD Display- for visual indication of connection between the user and a specific CPU.

3. DDC button- for manual update of DDC information between the monitor and the CPU(s) attached (optional)

4. CPU *x*- 8 pin miniDIN female connectors- for connection of CPU device cables

5. User *x*- 8 pin miniDIN female connectors- for connection of user device cables

6. Power ON/OFF switch

7. IEC Power Connector- for attachment of power cord (not available on all units)

8. Fuse Holder- holder for replaceable overcurrent protection fuse (not available on all units)

9. RS232- for attaching RS232 interface cable from a CPU to control the functions of one or more switches

10. MONITOR *x*- 15HD female connectors- for connection of user monitors

11. VIDEO *x*- 15HD female connectors- for attachment of video cables from CPUs

Rear View of NODEMUX
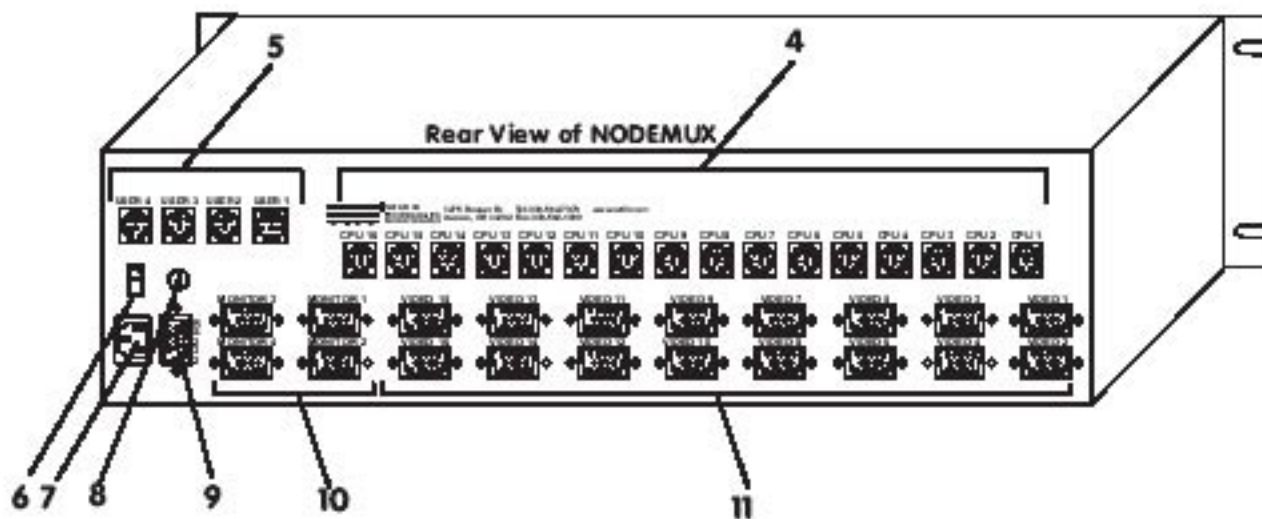
INSTALLATION & CONFIGURATION

Turn <u>OFF</u> power to all CPUs that will be connected to the NTI Switch before connecting or disconnecting any cables.

WARNING! CPUs may be damaged if cables are connected or disconnected while power is ON.

1. Connect the monitors to the ports labeled "MONITOR x" on the rear of the NODEMUX.
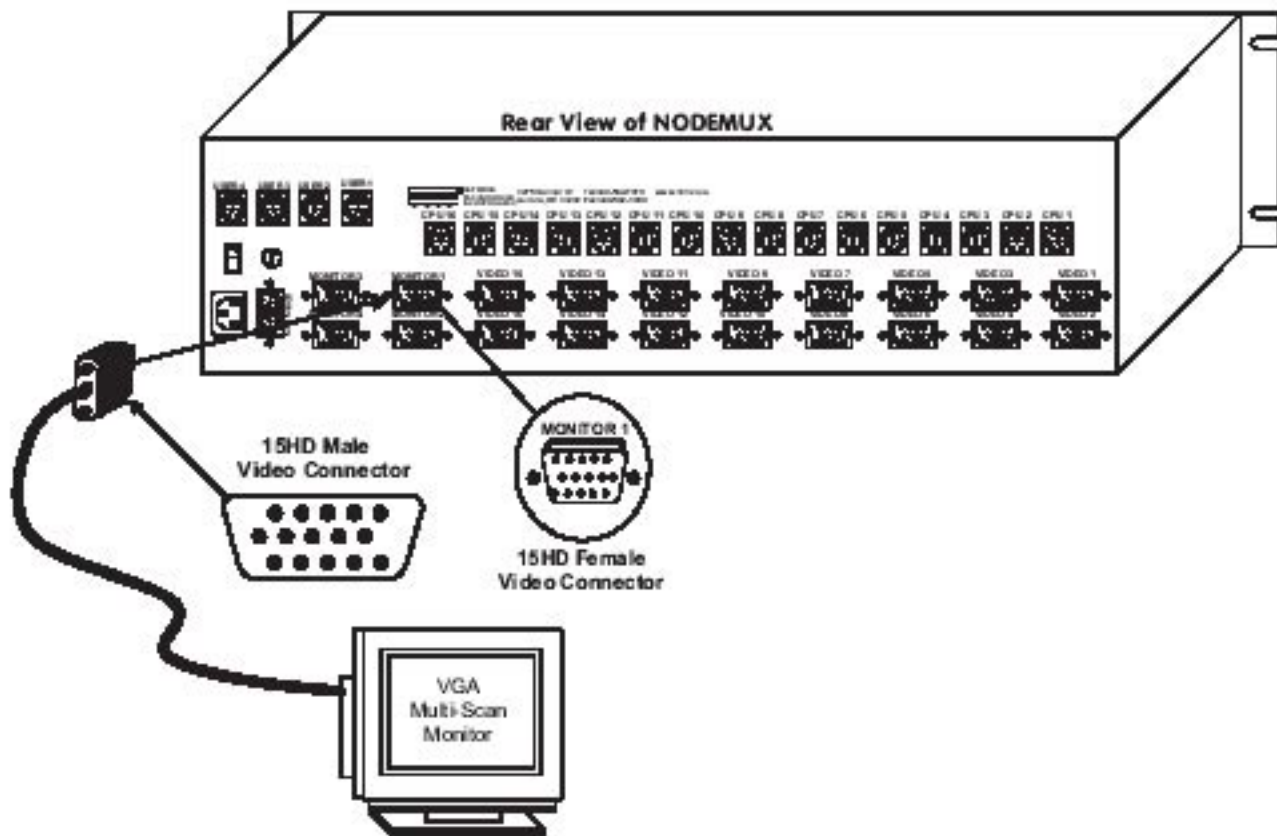
Figure 1- Connect monitor to NODEMUX

2. Connect the keyboards to the ports labeled "USER x" on the rear of the NTI Switch. (See Fig. 2 on page 6) Use the proper interface cables. (See also Cable Selection Guide on page 9.) Insure that the monitors and related keyboards have the same port numbers.

FYI: If it is desired for only a monitor to be connected to a set of user ports, an NTI keyboard cable (VKTINT-1 for example) must also be connected to the keyboard port for that user. (The other end of the VKTINT-1 does not need to be connected to anything.) This is required in order to enable the user of that port to switch between CPU ports on the NTI Universal KVM switch. (See Fig. 4 on page 8 "Video-Only User".)
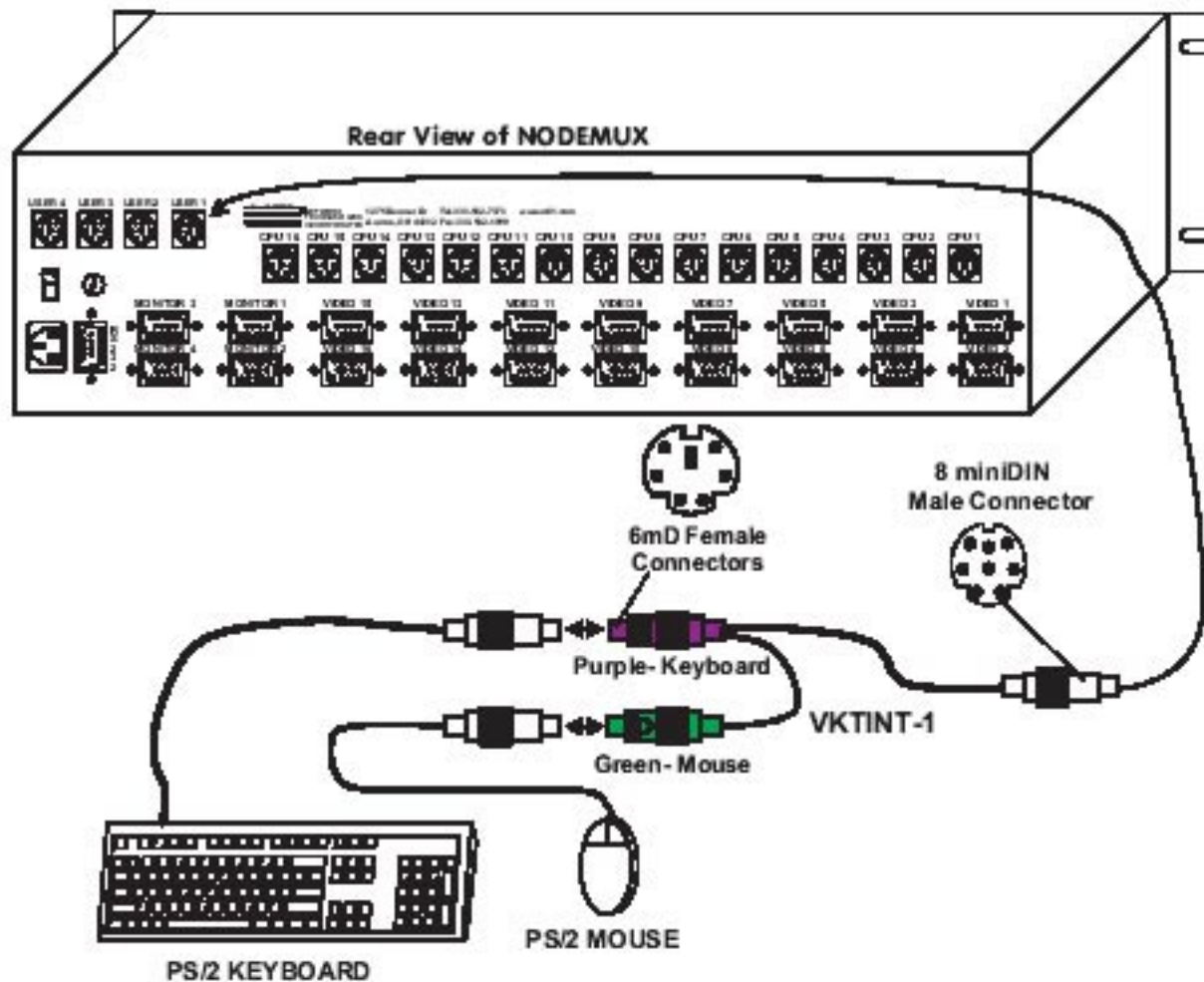
Figure 2- Connect PS/2 devices to NODEMUX

3. For each CPU: Connect a cable from the Keyboard port of the CPU to a port labeled "CPU x" on the NODEMUX. (See Fig. 3 on page 7 and Cable Selection Guide on page 9.) Note the port's number.

4. Connect a VEXT-xx-MM (and adapter if needed) from the video port of the CPU to a port labeled "VIDEO x" on the NODEMUX with the same port number as the keyboard. Make sure the CPU is connected to a "CPU x" port and a "VIDEO x" port with the same number. Otherwise the user's typing may be going to one CPU, but the user will be viewing a different CPU on the monitor.

Note: If a serial mouse is connected (via a com port) to a PS/2 mouse port on a PC, a VOPEX-IM9D must be used to convert the signal from the serial port to a PS/2 port. Do not use a 9D-to-6mD adapter, it will not work.

8 miniDIN
Female Connector

CPU 1

Rear View of NODEMUX

VIDEO 1

15HD Female
Video Connector

8 miniDIN
Male Connector

Rear View of PS/2 CPU

6mD Male
Connectors

Input Device Ports

Purple- Keyboard

VKTINT-*xx*-MM

Beige

Green- Mouse

6 miniDIN Female

Video Port

VEXT-*xx*-MM

15HD Female
Video Connector

15HD Male
Video Connector
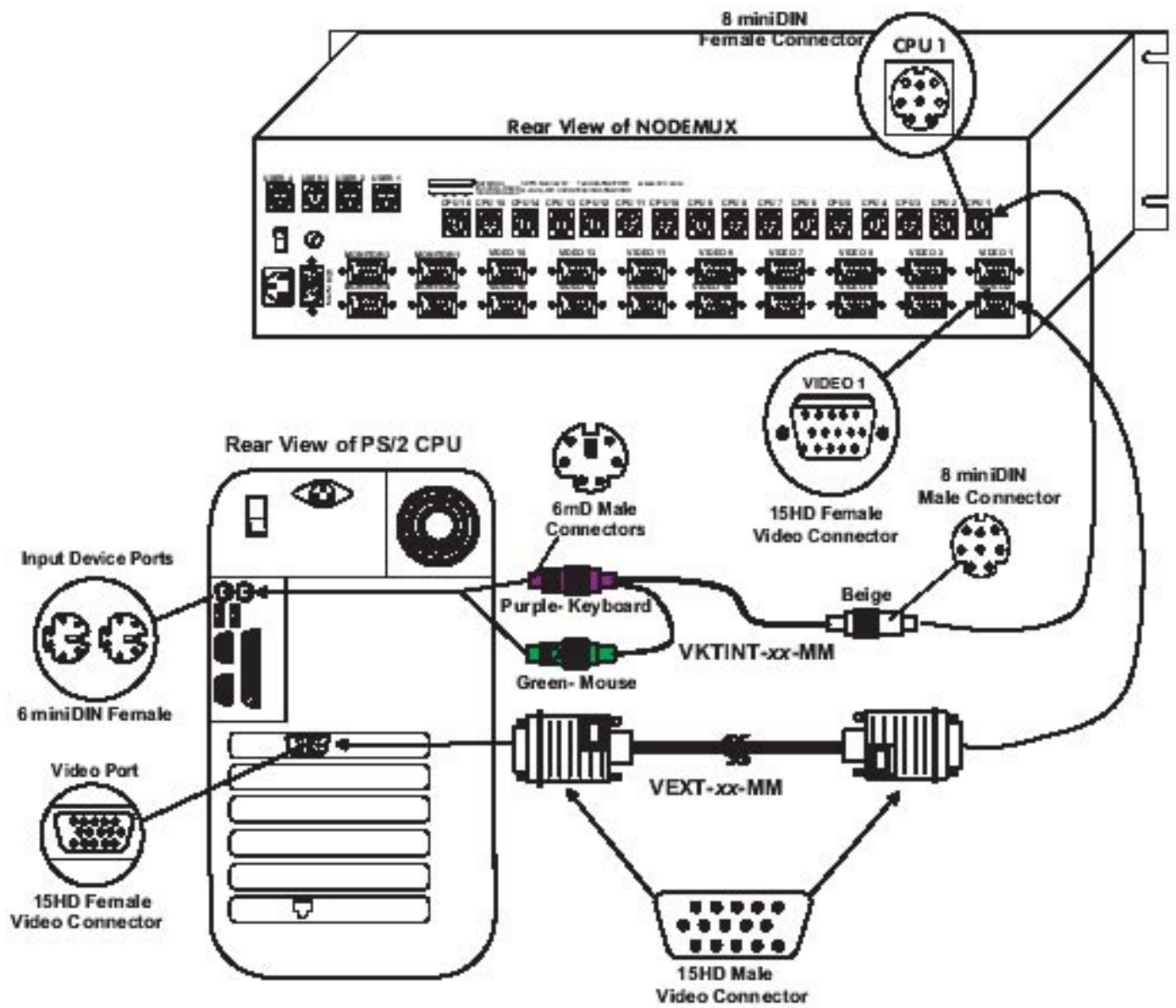
Figure 3- Connect PS/2 CPU to NODEMUX

5. For units with audio support (optional) : Connect the 3.5mm plug from each set of speakers to the 3.5mm jacks labeled "AUDIO OUT" (numbered corresponding to the users that will receive the audio from connected CPUs). Attach SA-xx-MM audio cables (purchased separately) between the audio port on each CPU and the 3.5mm audio jacks marked "AUDIO IN" on the NODEMUX switch. Be sure to connect the audio cables from each CPU to audio jacks of the same number as the keyboard, mouse, and video cable ports connected to. See Fig. 4.
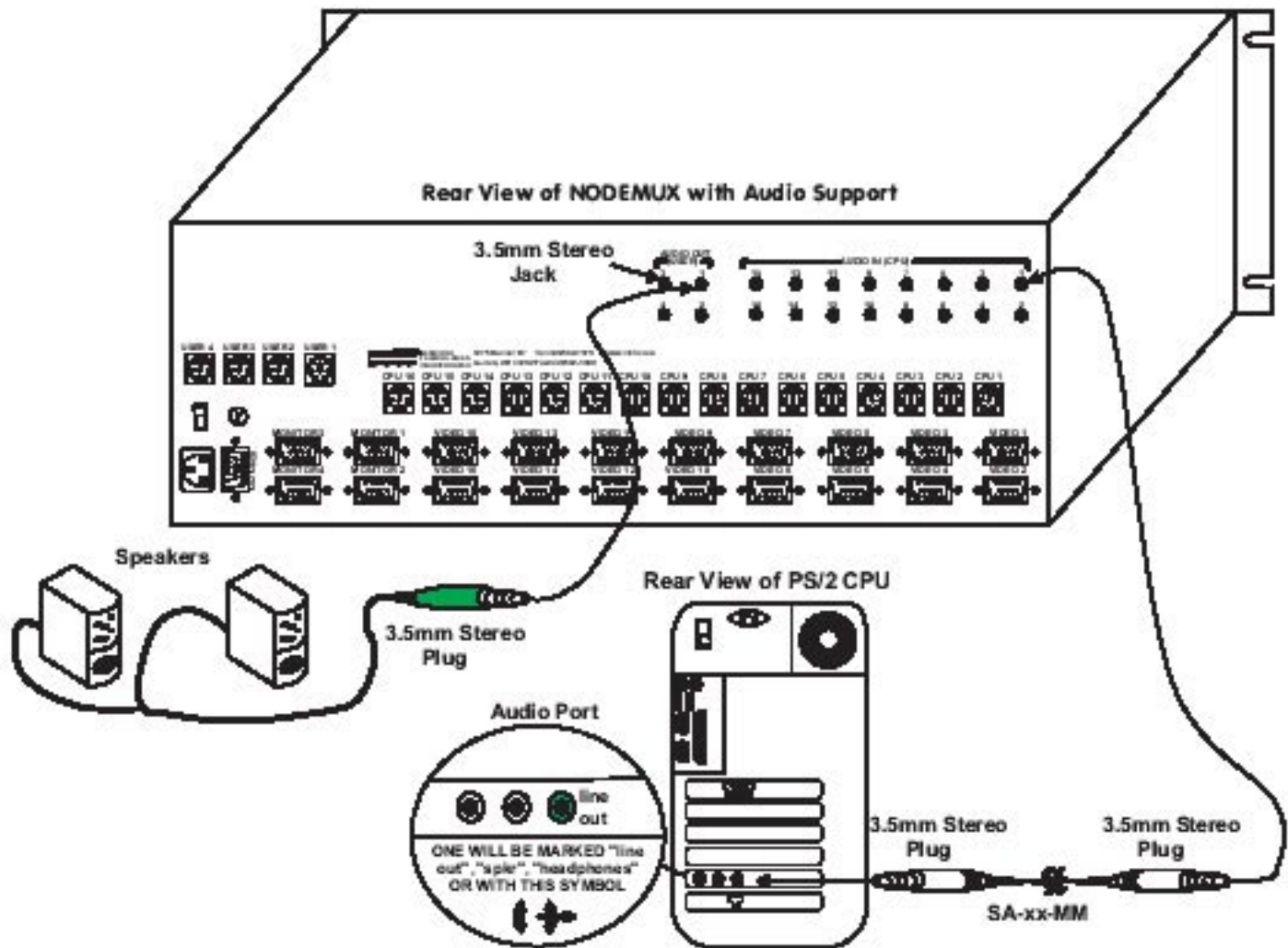
Figure 4- Connect speakers and audio cables from CPUs to audio jacks

6. Plug the NTI Switch into an AC power outlet.

7. Turn ON power to the NTI Switch, the LCD should illuminate.

8. Turn ON power to any or all CPUs connected to the NTI Switch.

FYI: The order in which the CPUs and switch are turned ON does not matter. A power strip can be used.

Cable Selection Guide For CPU and Keyboard/Mouse
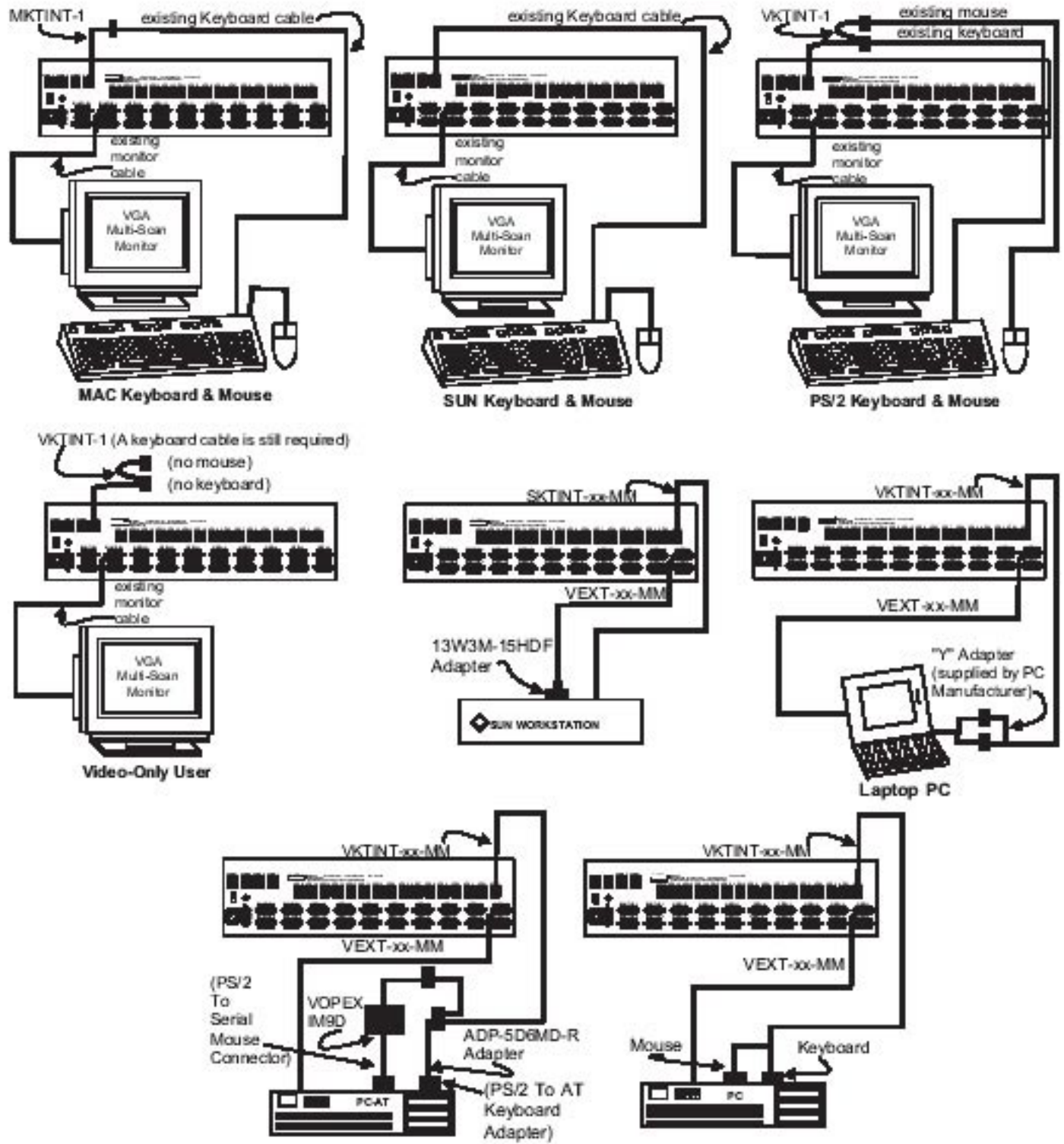
Figure 5- Cable Selection Guide

USING THE NTI NODEMUX UNIVERSAL KVM SWITCH

Basic Operation

This unit allows any user to access any CPU at any time with no restrictions or limitations. Users can even share a CPU and work on the same project – each from their own console. Resolution is supported through 1600x1200 with no degradation – guaranteed. A Liquid Crystal Display (LCD) on the front panel indicates the port to which the user is attached. The ST-nXm-U can be controlled by three methods; front panel keypad control with LCD, keyboard control with on-screen display (OSD), and an RS-232 control interface.

Keypad Control

The front panel keypad and LCD display allow the user to monitor switch status and route any user to any CPU on the switch. Along with the routing of the inputs to the outputs the keypad and LCD allow the users to configure the RS-232 control interface. The keypad buttons perform the following functions:

Key	Action
ESC	Escape back to the main display.
0 – 9	Used to enter numbers. (n)
USR	The output user number can be entered (2 digits or 1 digit and ENTER) followed by the desired CPU to be connected to.
CPU	Used following single digit user entries.
ENTER	Used following single digit entries.
▲	Display next 4 users and the CPUs they are connected to. (See note below.)
▼	Display previous 4 users and the CPUs they are connected to. (See note below.)
MENU	The RS-232 menu is displayed. This allows the baud rate to be set at 9600, 2400, 1200 or 300 baud and the unit address to be set to 1 - 15. See RS-232 control on page 18.
*	Activate Memory Function- 10 memory locations (0 – 9), 0 is the power ON default.

       to Save current connections   * - USR - n (0-9) - ENTER

       to Recall connections   * - CPU - n (0-9) - ENTER

The following examples show various methods of routing user 3 to CPU 5. Users and CPUs can be entered as a two digit number or a one digit number followed by ENTER.

USR - 3 - CPU - 5 - ENTER

USR - 3 - ENTER - 5 - ENTER

USR - 0 - 3 - 0 - 5

0 - 3 - 0 - 5
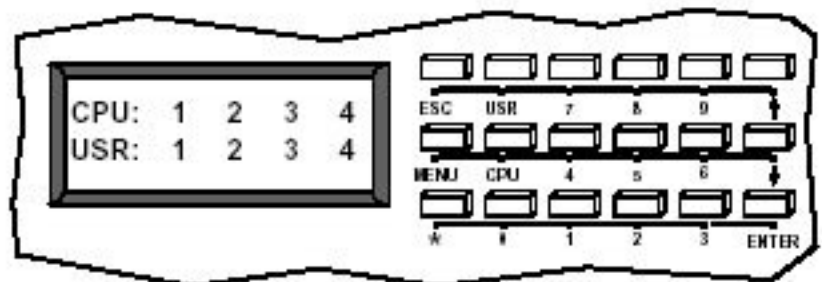
Note: By default, the display will show all connections between CPUs and users, displaying 4 at a time, from the first to the last, and repeating the cycle indefinitely.   If the user presses either the up or down arrow to manually view connections, the display will freeze on the chosen view. To resume the default cycle of displaying all connections, the user must press and hold either the up or down arrow for 3 seconds, and then release it.

OSD Control

OSD superimposes a menu system on the user's video screen with a list of all connected CPUs. OSD allows CPUs to be named (with up to 12 character names).   OSD then allows selection of CPUs by that name. Connected CPUs can be listed by name or by port number. OSD Search Mode enables the user to type in the first few characters of the CPU's name and the OSD will locate it. HELP screens assist with all OSD functions.

Security Option

The security option in the OSD Control of the NODEMUX switch enables an administrator to control access to CPU ports for each user.   Up to 63 users can be created.   These users have controlled access to any CPU.   Only the administrator can activate or deactivate the security features on each user port. Finally, the administrator can set a maximum idle time value after which the current user will be logged out and the login screen displayed again. This time out does not function while the OSD is active. The current security status, idle time out, and scan dwell time are all saved and will be restored whenever power to the switch is cycled OFF, then ON. To reset the administrator's password call NTI and have the device serial number of the NODEMUX switch available.

Enabling The Security Feature

To enable the security feature the administrator must first enter Command Mode from the keyboard using the <Ctrl> + <`> (accent key). The OSD menu will automatically appear on the monitor.   This provides a visual way to control the NODEMUX switch using the keyboard and mouse.

The administrator , when setting the Universal KVM switch up for the first time, may want to proceed directly to the ADMINISTRATION Mode by typing <CTRL> + <M> , then <A>, and then <Y>.

  The factory settings are:

- default user name = ADMINISTRATOR
- default password = ADMINISTRATOR

Once logged-in, follow the instructions on page 13 for setting up users and changing the password. Once the password is setup, if it is lost or forgotten, the administrator will have to contact NTI for assistance on clearing the password and set it up again. Within the ADMINISTRATION Mode the administrator can setup each of the users and the limitations of their use of the individual CPUs on the system.

When a standard user powers up the system a security screen may appear as setup by the administrator.   The user will need to login to the system by following the instructions below for the USER LOGIN.   If the user does not know the appropriate user name and password (setup by the administrator), contact the system administrator for this information.   Once logged-in a user can follow the Command Functions described on page 14 to control the system of CPUs within the limitations as determined by the administrator.

Additional OSD Modes Available With Security Enabled

User Login

User login mode requires a user to login with a user name and password from the list created by the Administrator.

USER LOGIN FUNCTIONS

Key	Function
Alphanumeric	Adds a character to the user name/password.
Backspace	Removes previous character from the user name/password
Enter	Submit user name/password
Esc	Exit USER LOGIN and return to previous mode. This function is only available if security is not currently active.

The Administration, Port Status, Administration Options, User Name List, and System Access List modes are only available if certain conditions are met. The conditions are:

1. The security feature has been enabled

2. The administrator is currently logged in

Administration

Administration mode allows the administrator to select a port for extended status information, or choose one of the following options:

ADMINISTRATION FUNCTIONS

Key	Function
A	Enter Administration Options mode
Enter	Enter Port Status mode for selected port
Esc	Exit ADMINISTRATION and return to previous mode

The mouse can be used to control administration mode as well as the keyboard. Ports can be selected that are on the screen by moving the cursor onto that port and clicking. Clicking twice on a selected port will switch to that port and exit command mode. To change the displayed ports on the screen click on the up and down arrows that are located to the right of the port names displayed.

Port Status

Port status mode allows the administrator to view extended status information about the port selected in Administration mode. The information available here can also be found on the main COMMAND menu, except when multiple users are connected to a single CPU. In that event, while the main COMMAND menu simply lists the number of users connected, the specific users connected can be seen here.

PORT STATUS FUNCTIONS

Key	Function
Esc	Exit PORT STATUS and return to previous mode

Administration Options

Administration options mode allows the Administrator to use the following functions:

ADMINISTRATION OPTIONS FUNCTIONS

Key	Function
C	Change the Administrator's password
S	Disable security
U	Enter User Name List mode
P	Disable/enable sharing
Txxx	Selects the idle time in minutes. xxx= time in minutes from 1(001) to 255. Use 000 to disable this feature.
Esc	Exit ADMINISTRATION OPTIONS and return to previous mode

User Name List

The User name list displays the list of users and provides control for adding new users, changing or assigning user passwords, and changing access rights for any given user. The user names have a maximum size of 12 characters, may not include spaces, and are not case sensitive. The passwords have a maximum size of 15 characters, may not include spaces, and are case sensitive.

USER NAME LIST FUNCTIONS

| Key/Sequence	Function
Ctrl-A	Edit the highlighted user's access rights
Ctrl-E	Enter Edit mode to add/change/remove users
Ctrl-P	Change the highlighted user's password
Esc	Exit the User name list and return to previous mode

System Access List

The System access list displays the ports so that the Administrator can change access rights for the selected user. That user's name is displayed at the top of the access list.

User Access Functions

Command Mode

In order to control the switch with the keyboard, Command Mode must be enabled. To enable Command Mode from the keyboard:

Press   [Ctrl] **+** [~ `] (ACCENT KEY)
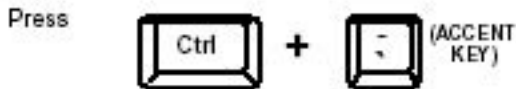
All the status lights on the keyboard will illuminate to indicate that Command Mode is enabled. At this point, the Command Mode menu will be displayed.

The Command Mode menu lists all CPUs by name and port number. Only 8 ports are listed on the screen at a time. To view the other portions of the list, scroll using the arrow keys on the keyboard or use the mouse to click on the arrows on the scroll bar in the OSD menu. When the Command Mode main menu is displayed, the first displayed port in the list will be the port the current user is connected to, followed by the next seven consecutively numbered ports. (Alternatively the list may be sorted alphabetically- see Maintenance Mode on page 14 to toggle sort method.) The names of accessible ports are displayed with white characters. If Security is activated, the access rights for the user logged-in may not include all ports. Names of restricted access ports are displayed in blue.

From left to right, the columns display the following:

- Port Number
- Port Name
- Type of CPU connected (PC, MAC, SUN)
- Power status of that CPU (ON/OFF)
- User number (1-8) connected to that CPU

At the far right, arrows pointing up and down allow for mouse clicking to maneuver up and down through the menu. While in COMMAND Mode, the numbers on the NUM PAD are not active. If numbers are required while in COMMAND Mode, use the numbers on the main key bank.

When the COMMAND LED is illuminated, the following functions are available with the optional OSD:

COMMAND FUNCTIONS

Key/Sequence	Function
↑	Select previous port on OSD display
↓	Select next port on OSD display
Page Up	Increments the menu by 1 page
Page Down	Decrements the menu by 1 page
Ctrl-E	Enter Edit mode
Ctrl-M	Enter Maintenance mode
Ctrl-S	Scan Mode enable/disable (to begin scanning, simply exit COMMAND Mode after enabling the function – Scroll Lock status light will blink when scanning)
F1	Display HELP menu (available within every control mode)

COMMAND FUNCTIONS (Cont'd)

Key/Sequence	Function
Ctrl-P-x-x	Selects a specific port. xx = port number as a two digit number (ex. p01, p08, p15, etc.)
Ctrl-T-x-x-x	Selects the scan time in seconds. xxx = time in seconds between 2 (002) and 255
Home	Selects the first port on the switch
End	Selects the last port on the switch
Alphanumeric	Typing any alphanumeric enters Search Mode and adds a character to search string and selects the CPU's name that matches best
Enter	Switch to a selected port
Esc	Exit keyboard command mode

The mouse can be used to control command mode as well as the keyboard. The mouse cursor can be moved to the Help and Exit fields, which can be then clicked on to perform that function. The port that is on the screen can be selected by moving the cursor onto that port and clicking. Clicking twice on a selected port will switch to that port and exit COMMAND Mode. To change the displayed ports on the screen click on the up and down arrows that are located to the right of the port names displayed.

Note: Exit COMMAND Mode to type to a CPU. To exit COMMAND Mode, press <Esc>, or press <Ctrl> + <` >(accent) keys simultaneously or by clicking the "ESC" command on the screen with the mouse.

Note: When in SCAN Mode, stop the SCAN cycle temporarily by typing or moving the mouse. That CPU will remain selected on that port as long as there is typing or mouse movement. SCAN will continue after all keyboard or mouse activity ceases.

Edit Mode

Edit mode allows the user to modify the names of the CPUs connected to the switch. Names of CPUs can be up to 12 characters in length. When in Edit mode, multiple keystroke combinations are not valid (<SHIFT>+<P>, <CTRL>+<P>, <ALT>+<P>, and <P> will all type a "P" to the display - lower case letters cannot be typed). After changes have been made, answer the question asked. Answer "Y" to save changes and answer "N" to continue using previously entered port names. The <Esc> key will exit EDIT Mode and abort any EDIT session.

EDIT FUNCTIONS

Key/Sequence	Function
→	Move cursor one position to the right
←	Move cursor one position to the left
↑	Previous port on OSD display
↓	Next port on OSD display
Home	Selects the first port on the switch
End	Selects the last port on the switch
Insert	Toggles between insert (character gets inserted and the remainder of the name gets shifted to the right) and overstrike (current character gets overwritten)
Delete	Erase current character
Backspace	Erase previous character

Search Mode

Search mode allows the user to enter and maneuver through a list of CPU names. The best matching CPU name is selected. The list of CPUs may also be searched for a specific (or similar) name. To enter SEARCH Mode, simply begin typing alphanumeric characters. The following commands are valid when the search option has been invoked from Command mode.

SEARCH FUNCTIONS

Key	Function
Backspace	Erase previous character in search name
↑	Select previous port on OSD display
↓	Select next port on OSD display
Alphanumeric	Add a character to the search string and select the best matching CPU name
Esc	Exit SEARCH mode, return to COMMAND mode
Enter	Switch to selected port

Maintenance Mode

Maintenance mode allows a user to customize the On Screen Display to their requirements. Also, the share feature is turned OFF or ON from Maintenance Mode. The OSD default for sharing is ON. In this mode, any user can access any CPU at any time (even share one). When sharing is disabled, no one but the selected user can access that CPU. When sharing is enabled, and more than one person is attached to a CPU, it is displayed on the main COMMAND Menu. The number that displays which user is connected to which port changes color (from white to red), and the number shows *how many* users are connected to that particular port.

MAINTENANCE FUNCTIONS

Key	Function
R	Reset all of the port names
L	Toggle between numeric and alphabetic listing of ports
↑	Move On Screen Display (OSD) window up on monitor
↓	Move OSD window down on monitor
→	Move OSD window to the right
←	Move OSD window to the left
T	Make OSD window taller
S	Make OSD window Shorter
A	Activate security or Administration mode
Q	Logout (if logon)
Enter	Save OSD window parameters for the CPU port currently connected ONLY.
Esc	Return to COMMAND mode

FYI: Based on different scan rates, the OSD window may appear in different areas of the monitor as different CPU ports are selected. The Maintenance Mode functions allow placement of the window in a particular area of the monitor and it will stay there when switched back to that particular CPU (as long as the parameters are saved before exiting).

Help Mode

This mode displays a list of commands with a short explanation of their function. These lists are organized in pages for each mode (i.e. COMMAND, EDIT, SEARCH, and HELP). The following options allow the user to quickly obtain information on any command.

HELP FUNCTIONS

Key	Function
Page Up	View the previous page of help if available
Page Down	View the next page of help if available
Esc	Exit HELP and return to previous mode

DDC SUPPORT

(Optional)

DDC information allows the CPU to automatically select the optimal resolution for the monitor by receiving, at power up, information from the monitor concerning its resolution specifications.

When DDC support is installed, the DDC information is acquired from the monitor by the ST-nXmD-U switch when the ST-nXmD-U is powered-up. A monitor with DDC support must be connected to MONITOR 1 for this to occur. The DDC information will be made available at every CPU port.

The DDC information can also be acquired by pressing the DDC button located on the front of the switch (see page 4, item 3). This button allows the monitor configuration to be changed without powering down the switch.

Notes:
1. *All monitors connected to the ST-nXmD-U switch with DDC support must be able to support at least the maximum resolution of the DDC monitor connected to "MONITOR 1".*

2. *In order for the CPU to correctly receive the DDC information from the switch at boot-up, the switch must be powered up before all attached CPUs.*

SUN DDC Configuration

(When connected to SUN with pgX32 or pgX64 video card)

If this switch does not have the DDC support option installed, to get an image the SUN CPU must be configured manually. There are three ways to accomplish this:

1. Forced Resolution: Console
   a. open a terminal session and su,
   b. type # *eeprom output-device=screen:r1024x768x70*
   c. REBOOT the CPU.

2. Forced Resolution: Super User
   a. : Halt the machine
   b. type ok *setenv output-device screen:r1024x768x70*
   c. type ok *reset2*

3. Forced Resolution: Hot Plug Video
   a. Unplug the monitor from the NTI switch
   b. Unplug the NTI switch video cable from the CPU
   c. Plug the monitor directly into the CPU
   d. REBOOT the CPU
   e. Unplug the monitor and reconnect to the NTI switch
   f. Reconnect the NTI switch video cable to the CPU

AUDIO SUPPORT

(Optional)

Audio support provides the following additional features:
- Audio signals from the same CPU that keyboard, mouse, and video signals are from can be received by the user.
- Audio inputs accept any standard line level audio (1Vrms or 2.5Vp-p).
- Audio outputs are capable of driving an 8 Ohm speaker load with 200mW of continuous RMS power.

Audio is controlled using the RS232 control method of the NODEMUX. Switch.

DUAL VIDEO SUPPORT

(Optional)

Dual Video support enables CPUs with two video outputs to be connected to the NODEMUX and two user monitors to be connected to view both sets of video signals from each CPU.   Each monitor must be of the VGA multi-scan type. This option is only available in rack mount units.

RS232 CONTROL

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 DB-9 connector(s) on the unit is as follows:

The pin outs for the DB-9 connector on the unit are as follows:
RS232 Connector (DB-9 FEMALE)

PIN	SIGNAL	FUNCTION
1	None	no connection
2	TXD	Transmit Data (RXD at host)
3	RXD	Receive Data (TXD at host)
4	DSR	Data Set Ready
5	GND	Signal Ground
6	DTR	Data Terminal Ready
7	CTS	Clear to Send
8	RTS	Request to Send
9	none	no connection

NOTE: Security must be disabled or user access granted on the port(s) to be selected by RS-232 control.

On the DB-9 female connector, pins 1 (DCD), 4 (DTR), and 6 (DSR) are shorted and pins 7 (RTS) and 8 (CTS) are shorted. Therefore, CPU handshaking is bypassed and TXD and RXD are the only active signals. A straight through DB-9 cable (not null modem) will work for most CPUs. To daisy chain multiple units, the CPU drives the input port on the first unit and the output port is connected to the input port on the next unit etc. The last unit will have a loop back plug installed in its RS232 OUT connector.

Baud Rate

The baud rate can be changed by selecting MENU on the front panel keypad. Then select 1 for SET BAUD RATE and select the desired baud rate of 9600, 2400, 1200, or 300. A data protocol of 8 data bits, no parity, and 1 stop bit is used for communications.

Unit Address and Loop Back

To allow multiple units to be controlled from a single CPU port, the RS232 control interface is designed to allow "daisy chaining" up to 15 units. By setting the appropriate unit address with the keypad, 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. To set the unit address, select MENU on the front panel keypad. Then select 2 for SET UNIT ADDRESS and then type the address number (1-15) and <ENTER>. The "loop back" plug should be on the RS232 OUT connector on the last unit in the chain. If only one unit is being controlled, the loop back plug should be on the RS232 OUT connector on that unit.
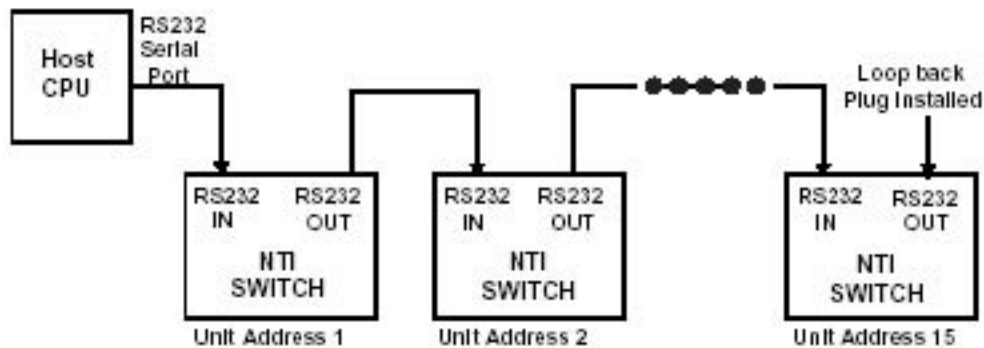

Figure 6- RS232 connection with "IN" and "OUT" ports

Note: The RS232 connection on the switch may only have a single 9 pin "RS232" female connector. In this case, in order to connect multiple NODEMUX units together, a Matrix-Y-1 cable must be used. (See Fig. 7). No loop back plug will be used with this configuration. See Fig. 8 for the pinout of the Matrix-Y-1 cable.
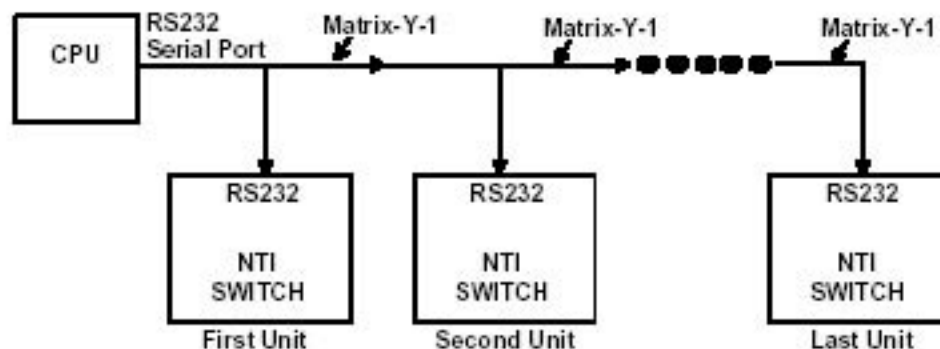

Figure 7- RS232 connection with Matrix-Y-1 cable
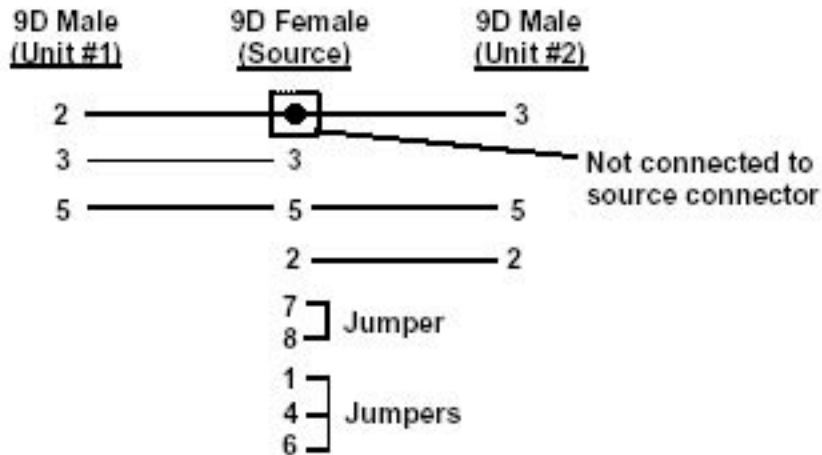
Wiring Schematic of Matrix-Y-1 cable

Figure 8- Matrix-Y-1 wiring schematic

RS-232 Command Protocol

Legend: (All numbers must be two digits)

SW	:	Switch (01-15)
BR	:	Baud Rate Code (12,24,48,96)
VV	:	Volume Level (00-99, XX=UNSUPPORTED)
MU	:	Mute State (00=UNMUTE, 01=MUTE, XX=UNSUPPORTED)
OP	:	Output Port (01-MAXOUTPUTS)
IP	:	Input Port (01-MAXINPUTS)
MM	:	Save Into Memory Bank (00-09)
LL	:	Load From Memory Bank (00-09)
<CR>	:	Carriage Return (Hex 0xD)

Command String	Good Response	Description
CS SW,IP,OP	*<CR>	KVM Connect One User Port To CPU Port
CA SW,IP	*<CR>	KVM Connect All User Ports To CPU Port
RO SW,OP	*<CR>IP<CR>	KVM Read Connection For User Port
AS SW,IP,OP	*<CR>	AUDIO Connect One Output/User Port To Input/CPU Port
AA SW,IP	*<CR>	AUDIO Connect All Output/User Ports To Input/CPU Port
AO SW,OP	*<CR>IP<CR>	AUDIO Read Connection For Output/User Port
AM SW,OP,MU	*<CR>	Set Mute State For Output/User Port
AV SW,OP,VV	*<CR>	Set Volume Level For Output/User Port
CC SW,MM	*<CR>MM<CR>	Save Matrix Connections Into Memory Bank
RC SW,LL	*<CR>LL<CR>	Restore Matrix Connections From Memory Bank
CB 00,BR	None	Change Baud Rate For All Switches
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
AR SW,OP	*<CR>MU,VV<CR>	Read Mute, Volume For Output/User Port

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 serial address, but the syntax is wrong after this field, the switch will answer with ?<CR>.

Set Volume Level For Output/User Port (for command string AV SW,OP,VV in chart on page 20)

This command will set the volume of the specified AUDIO output/user port from a scale of 00 to 99, which represents a logarithmic volume.

Serial Data (VV)	Audio Volume
90 – 99	+10dB
80	0dB
60	-20dB
0 – 28	-52dB

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

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 included on the CD packaged with the NODEMUX.   The Matrix Switcher's Control Program is downloaded by clicking on the link "Download Matrix Switcher's Control Program".

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

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 RMTEST program is automatically loaded when installing the MATRIX SWITCHER'S CONTROL PROGRAM as described above. The RMTEST program, located in the NTI program group, generates a main menu with the 3 selections described below:

Main Options

1. Matrix Options   - send commands to the matrix unit.
2. Setup Options   - set COM port, baud rate, and unit address
3. Quit   - quit the program

If Matrix Options is selected, the following menu, which has 7 options, is displayed:

Matrix Options

1. Reset single unit   - reset single matrix to power-up defaults (matrix switch only)
2. Reset all units   - reset all daisy chained matrix units (matrix switch only)
3. Change single output   - connect an input to one output
4. Change all outputs   - connect an input to all outputs
5. Read single output   - read which input is connected to an output
6. Read unit size   - read how many inputs and outputs the unit has
7. Return to main menu   - go back to the MAIN OPTIONS menu

The Setup Options main menu selection only needs to be executed if the switches baud rate or unit address have been changed from the factory defaults (9600 baud, and unit address = 1). When this option is selected, the following menu, which has 4 options, is displayed:

Setup Options

1. Set COM port (default = COM1)   - set port to COM1-COM3
2. Set baud rate (default = 9600)   - set baud rate (see interface manual for supported baud rates)
3. Set unit address (default = 01)   - set the unit address (if multiple units are daisy-chained)
4. Return to main menu   - Go back to the MAIN OPTIONS menu

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 the sections above. If any transmission problems are detected, an error message is displayed.

KEYBOARD MAPPING

The keyboard configuration of each CPU is saved in the NTI Switch. For example, if the CPU attached to Port 4 had CAPS LOCK and NUM LOCK selected the last time that CPU was accessed, then they will automatically be set when that CPU is accessed again.

Key Equivalents

Using the chart below, find the character needed to be typed on the CPU being accessed, then follow the row across for the equivalent on the keyboard device being used. (See Fig. 9 on page 24 for reference.)

PS/2 101	WINXX	Apple Extended	SUN Keyboard
L-Ctrl	L-Ctrl	L-Ctrl	L-Ctrl
L-Alt	L-Alt	L-Opt	L-Alt
R-Ctrl	R-Ctrl	R-Ctrl	Compose
R+Alt	R+Alt/Aplcn	R-Opt	Alt-Graph
SB+Alt	Logo	Cmnd	Meta
SB+RT Arrow	SB+RT Arrow	Power	Power

SB = Space Bar

L and R = Left and Right keys when two keys are marked the same on a keyboard.

Mouse Click Equivalents

To emulate right button click using Apple 1 button mouse, hold down the CMND key while pressing the mouse button

SUN's Startup Keys

With a Sun keyboard attached to the switch, the following emergency startup keys are supported:

Key	Function		Key	Function
Stop	Bypass POST		Stop-F	Enter Forth on TTYA instead of probing
Stop-A	Abort		Stop-N	Reset NVRAM contents to default values
Stop-D	Enter diagnostic mode			

This switch will also support other startup commands not listed above.

SUN'S 14 EXTRA KEYS

Use the chart below to type SUN's additional 14 keys using a PS/2 101 or a WIN95 keyboard (SB= Space Bar)

PS/2,Win,Mac Keyboards	Sun Extras		PS/2,Win,Mac Keyboards	Sun Extras
SB+F1	Stop (L1)		SB+F8	Paste (L8)
SB+F2	Again (L2)		SB+F9	Find (L9)
SB+F3	Props (L3)		SB+F10	Cut (L10)
SB+F4	Undo (L4)		SB+F11	Help
SB+F5	Front (L5)		SB + UP Arrow	Vol +
SB+F6	Copy (L6)		SB + DOWN Arrow	Vol -
SB+F7	Open (L7)		SB + LEFT Arrow	Mute

Figure 9- Keyboard key layouts

TROUBLESHOOTING

PROBLEM	SOLUTION
• No video	• Check all cable connections on video source and switch.
• No video when connected to SUN w/pgX32 or pgX64 video card	• No DDC support in switch. See page 17 for SUN DDC CONFIGURATION
• Cannot connect to other CPU ports	• Make sure user NTI keyboard adapter cable is connected, even if no keyboard is attached (such as a VKTINT-1 or MKTINT-1). (See FYI on page 5, after item 2.)

RACK MOUNTING INSTRUCTIONS

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

1. Install 4 captive nuts to the rack in locations that line up with the holes (or slots) in the mounting flange on the NTI switch.

2. Secure the NTI switch to the rack using four 3/16" diameter screws (not provided). Each screw should be of sufficient length to go completely through the NTI mounting flange, rack frame and fully engage all threads in the captive nut. Be sure to tighten all mounting screws securely.

Note: Do not block power supply vents in the NTI switch chassis (if provided). Be sure to enable adequate airflow in front of and behind the NTI switch.

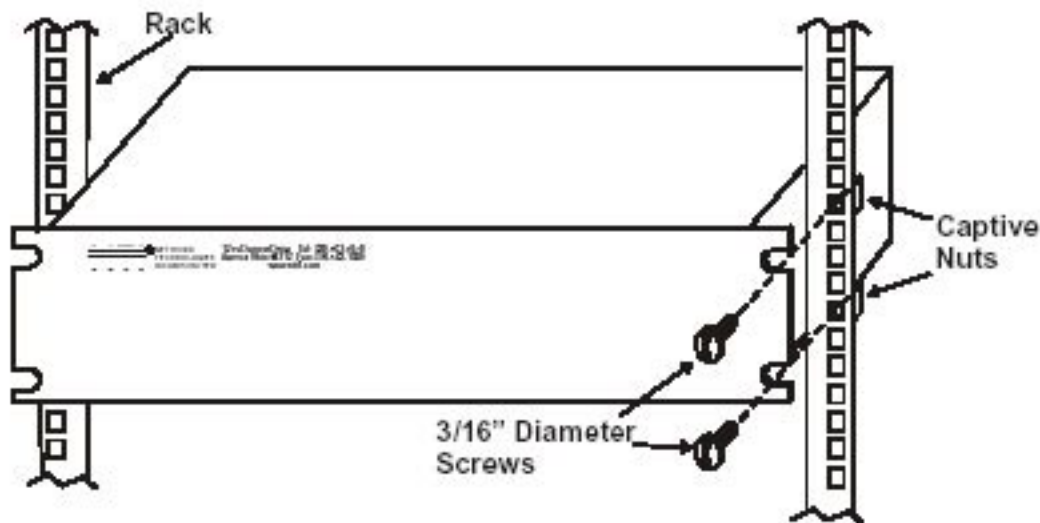3. Attach all cables securely to the switch and where necessary supply adequate means of strain relief for cables.

Figure 10- Mount the NODEMUX to a rack

Man044 Rev 3-10-05