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## NODEMUX<sup>®</sup> HD Series

# ST-nXm-U-HD

## Multi-user / Universal KVM Switch Installation and Operation Manual



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**CE Statement**

We, Network Technologies Inc, declare under our sole responsibility that the NODEMUX HD Series switches described in this manual are in conformity with European Standard EN5022.

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## INTRODUCTION

The NTI ST-nXm-U-HD (also known as NODEMUX-HD) is a multi-user / Universal Multi-Platform Matrix KVM switch, (n= number of users, m= number of CPUs) with high density construction to require less rack space. It allows multiple users, up to 4, each with a keyboard, monitor, and mouse, to communicate directly with any PS/2 or SUN workstation connected to the switch. A single switch can connect to up to 16 CPUs. These CPUs can be file servers, network managers, etc. The auto-boot circuitry in the NTI switch allows all CPUs to boot simultaneously without keyboard and/or mouse error. Resolution is supported through 1900x1200 with no degradation – guaranteed.

## Package Contents

### Materials Included with this kit:

- ✓ NTI ST-nXm-U-HD Multi-User Universal KVM Switch
- ✓ IEC Line Cord- country specific
- ✓ CD with pdf file of this owner's manual

## Definitions

- CPU Enclosure that contains the operating system and processor
- User Device Keyboard or Mouse
- System One or more CPUs connected to one or more switches controlled by one or more user devices
- OSD On Screen Display

## Limitations

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

## Compatibility

The ST-nXm-U-HD Universal Matrix KVM switch supports the following:

- Windows PS/2 CPUs
- SUN CPUs (including all SUN Ultras, SUN Blades and SUN Rays) (USB SUN CPU's need USB-SUN adapter)
- PS/2 laptops
- IntelliMouse

**Note: The wheel on IntelliMouse is treated as the third button on Sun CPUs and treated as a wheel on PS/2 style CPUs.**

## Ordering Information

The ST-nXm-U-HD switch is built to a specific size ranging from 2 or 4 users and 8 or 16 CPUs. The switch is built at the factory based on the specified size ordered. The switch has high density connectors (similar to SCSI) for inputs and outputs that support PS/2 and SUN platforms and are configured with interface cables (see "Interface Cables" section below). The "n" in the part number ST-nXm-U-HD represents the number of users. Select either 2 or 4 user switches. The "m" in the part number represents the number of CPUs. The switch is available with either 8 or 16 CPU ports. 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-HD

Replace the "n" with either 2 or 4

Replace the "m" with either 8 or 16

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

ST-2x8-U-HD	ST-4X8-U-HD
ST-2x16-U-HD	ST-4X16-U-HD

## Interface Cables

[Interface cables and adapters are not included and must be purchased separately.](#)

**A cable for each CPU being connected to the switch:**

- |                           |                                                                                                                                                                                                                        |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>PS/2</u> CPU to Switch | <ul style="list-style-type: none"> <li>• VMTINT-xx-MM for <u>video, keyboard and mouse</u> interface</li> </ul>                                                                                                        |
|                           | <b>OR</b>                                                                                                                                                                                                              |
| <u>SUN</u> CPU to Switch  | <ul style="list-style-type: none"> <li>• SMTINT-xx-MM for <u>video, keyboard and mouse</u> interface</li> <li>• 13W3M-15HDF (adapter for 13W3 to 15HD)</li> <li>• USB-SUN Adapter (adapter for USB SUN CPU)</li> </ul> |

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

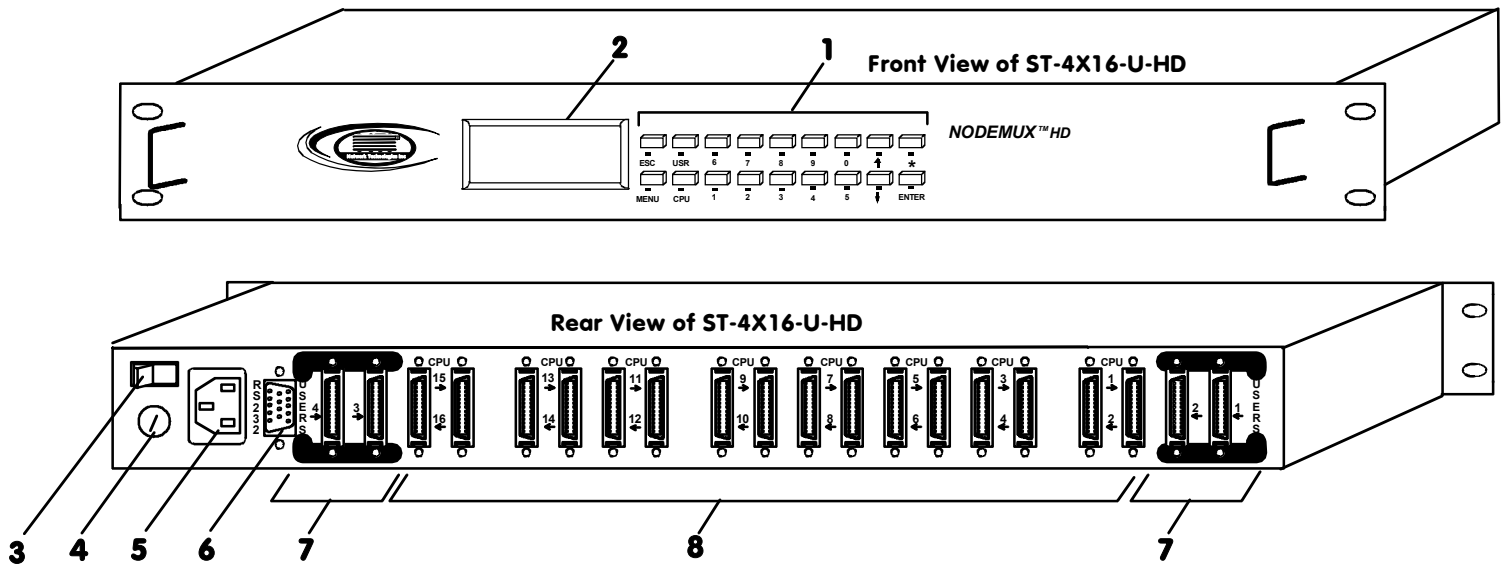
<u>PS/2</u> keyboard/mouse	VMTINT-xx
	<b>OR</b>
<u>SUN</u> keyboard/mouse	SMTINT-xx

where:

xx is the length of the cable in feet (3/6/10/15/25 foot cables available)

MM indicates male-to-male connector

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



## 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. Power switch- to power unit ON/OFF
4. Fuse Holder- for replaceable overcurrent protection fuse
5. IEC Power Connector- for attachment of country specific power cord
6. RS232- 9D male connector- for attaching RS232 interface cable from a CPU to control the functions of one or more switches
7. USER\_x- high density female connectors- for connection of user device interface cables
8. CPU\_x -high density female connectors- for connection of CPU interface cables

## Additional 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.
- High density (similar to SCSI) input and output ports that interface cables plug into adapt to PS/2 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 1900X1200 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 50 watts.



# INSTALLATION

Turn OFF power to all CPUs that will be connected to the NTI NODEMUX-HD switch before connecting or disconnecting any cables.

1. If using RS-232 Control see RS-232 section (page 21) for more information.
2. Connect the monitors to the 15HD female connector ends of the VMTINT-xx or SMTINT-xx cables, depending upon what type of devices will be connected (PS/2 or SUN). See Fig. 1.
3. Connect the keyboards to the purple 6 miniDIN female connector (PS/2) or orange 8 miniDIN female connector (SUN) of the VMTINT-xx or SMTINT-xx (respectively). If using a PS/2 mouse, connect it to the green 6 miniDIN female connector on the VMTINT-xx cable. See Fig. 1. Insure that the monitors and related keyboards are connected to the same interface cables.
4. Connect the high density male connector end of the cable to a USER x port on the ST-nXm-U-HD switch.

**NOTE: If it is desired for only a monitor to be connected to a user port, the device cable end(s) of the VMTINT-xx / SMTINT-xx does not need to be connected to anything.**

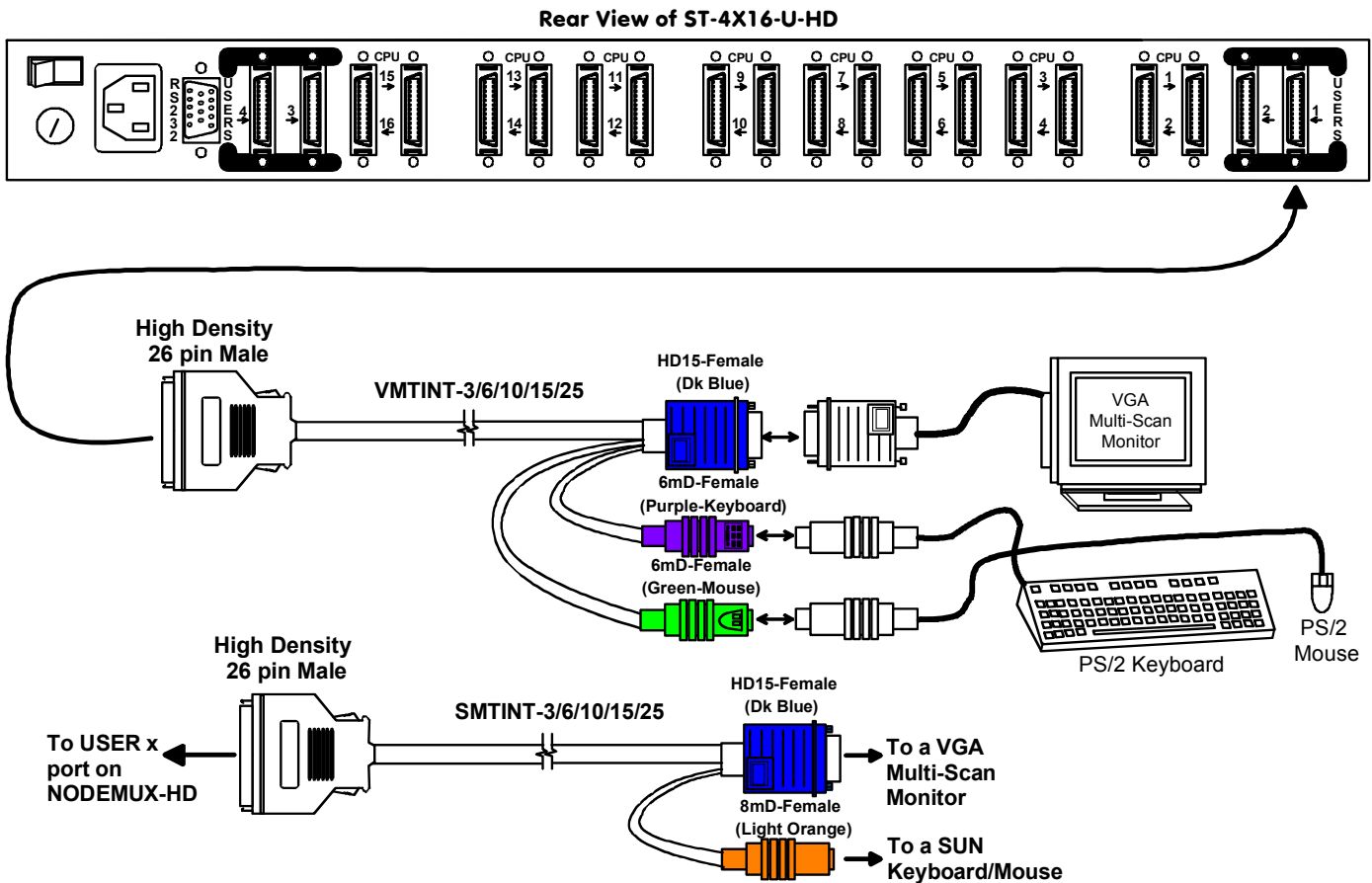


Figure 1- Connect devices to switch using interface cables

- For each CPU: Connect a VMTINT-xx-MM (PS/2 CPU) or SMTINT-xx-MM (SUN CPU) or MMTINT-xx-MM (MAC CPU) cable to the devices port(s) and video port of the CPU as shown in Fig. 2.

**NOTES:**

*If the CPU is a SUN type with 13W3 video connector, use an NTI 13W3M-15HDF adapter to connect the SMTINT-xx-MM cable to the CPU.*

*If the CPU only has a serial port for mouse connection (via a com port), a VOPEX-IM9D must be used to convert the signal from the serial port to PS/2 port. Do not use a 9D-to-6mD adapter, it will not work.*

*For USB SUN CPUs, a USB-SUN adapter and a USB-AB-Xm cable must be used to connect the SMTINT-xx-MM cable to the CPU. See Fig. 2.*

- Connect the high density end of each cable to a CPU x port on the ST-nXm-U-HD switch. See Fig. 2.

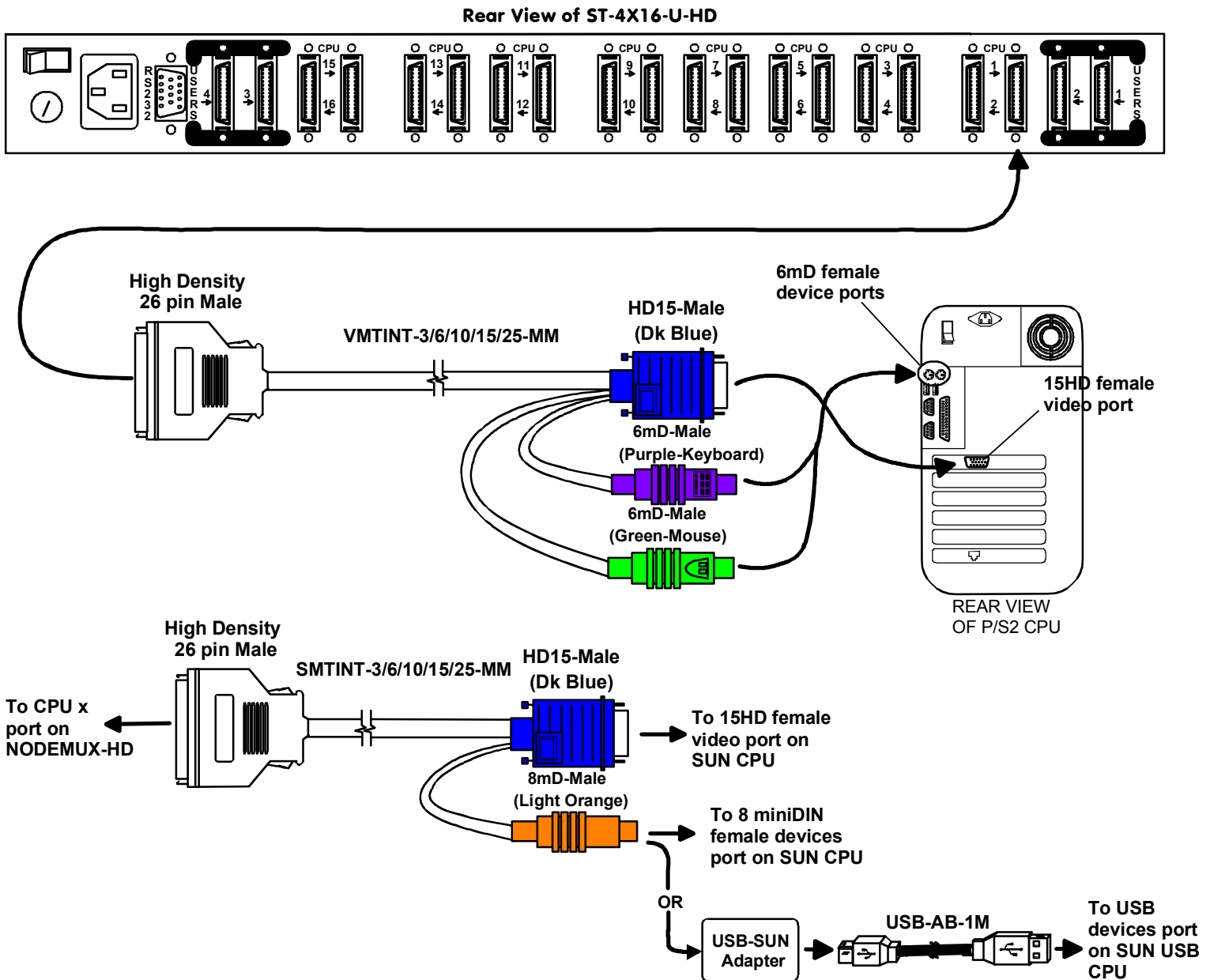


Figure 2- Connect CPUs to switch using interface cables

7. Plug the NTI Switch into an AC power outlet.
8. Turn ON power to the NTI Switch, the LCD should illuminate.
9. Turn ON power to any or all CPUs connected to the NTI Switch.

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

## USING THE NODEMUX-HD SWITCH

### Basic Operation

This unit enables 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. A Liquid Crystal Display (LCD) on the front panel indicates the port to which the user is attached. The ST-nXm-U-HD can be controlled by three methods;

- front panel keypad control with LCD
- keyboard control with on-screen display (OSD)
- RS-232 interface.

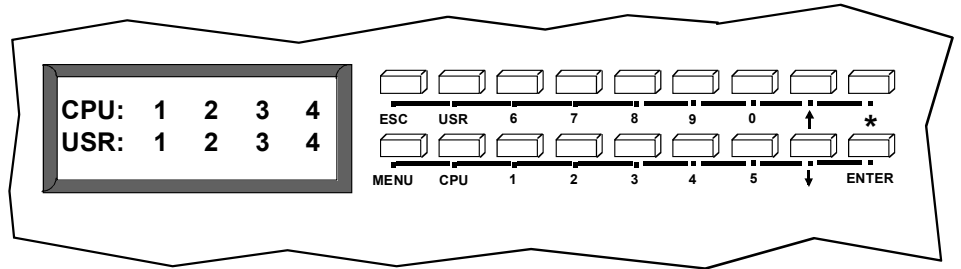
### Keypad Control

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:

<u>Key</u>	<u>Action</u>
ESC	Escape back to the main display.
0 – 9	Used to enter numbers. ( <i>n</i> )
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 page 8.)
▼	Display previous 4 users and the CPUs they are connected to. (See page 8.)
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 21.
*	Activate Memory Function- 10 memory locations (0 – 9), 0 is the power ON default.
	to Save current connections      * - USR - <i>n</i> (0-9) - ENTER
	to Recall connections                * - CPU - <i>n</i> (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 Feature

The security feature in the OSD control of the ST-nXm-U-HD 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 ST-nXm-U-HD 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 ST-nXm-U-HD switch using the keyboard and mouse.

### Administrator Login

**The administrator** will activate security when logging in by typing <Ctrl> + <M> , then <A>, and then <Y>. The administrator will then be prompted for a valid administrator username and password (see Fig. 3).

The factory administrator login settings are:

- default user name = **ADMINISTRATOR**
- default password = **ADMINISTRATOR**

***NOTE: The username for the administrator cannot be changed from "ADMINISTRATOR".***

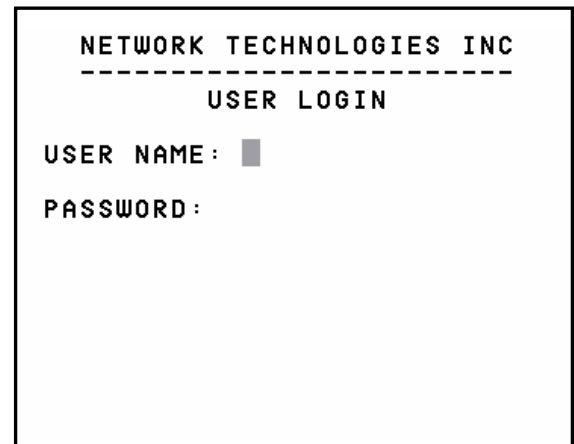


Figure 3- User login screen

Once logged-in, follow the instructions on pages 11 and 12 for setting up users and changing the administrator 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. The administrator can setup each of the users and the limitations of their use of the individual CPUs within the Administration Mode.

**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 on page 8 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 Mode functions described on page 13 to control the system of CPUs within the limitations as determined by the administrator.

### User Login Mode

User Login Mode requires a user to login with a user name and password from the list created by the administrator. With security enabled, the user will be locked to the current CPU and the login screen will remain on the monitor until the user logs in.

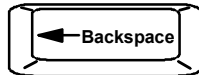
**Function:**

**Keystroke:**

Add a character (case sensitive) to the user name/password



Remove previous character from the user name/password



Submit user name/password



Exit USER LOGIN and return to previous mode. This function is only available if security is not currently enabled.



*If the password submitted is incorrect, the user will not be able to proceed.*

*If the password submitted is correct, the user will proceed to Normal Mode.*

## Additional OSD Modes Available With Security

### Administration Functions

Administration mode enables the administrator to select a port for extended status information or setup users and assign system access rights to those users.

**Function:**

**Keystroke:**

Enter Administration Options mode



Enter Port Status mode for selected port



Exit Administration and Return to previous mode






### Administration Options

To enter the Administration Options mode: press <A> from the Maintenance Mode menu. (See page 17 for Maintenance Mode.)

The Administration Mode (see Fig. 4) can be accessed only when security features are activated and the administrator is logged-in. Users other than the administrator are not allowed to enter the Administration Mode.

If a different user is logged-in, log-out by pressing <Q> from the Maintenance Mode menu, then log-in as Administrator. (See page 9, "Enabling The Security Feature".)

Administration Mode allows the administrator to use the following functions:

Function:	Keystroke:
Change the administrator's password	
Disable security	
Enter User Name List Mode	

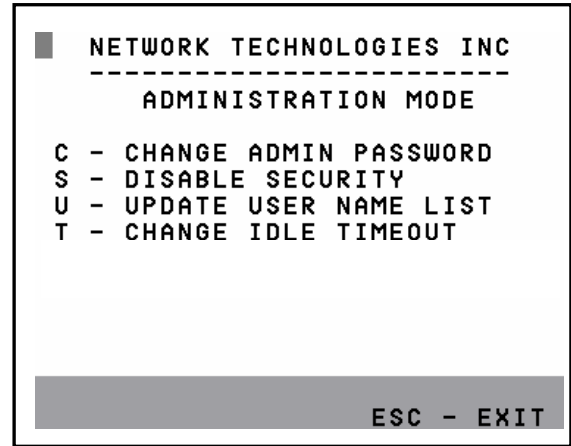







Figure 4- Administration Mode Menu

Selects the idle time in minutes	 -  -  - 	(xxx from 002 to 255. ie. t002 would set the time out period for 2 minutes. 000 will disable it.)
Exit Administration Mode and return to previous mode		

### Port Status Mode

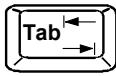




Port Status mode enables the administrator to view extended status information about the port selected in Administration mode. The information available here can also be found on the Command mode main menu, except when multiple users are connected to a single CPU. In that event, while the Command mode main menu simply lists the number of users connected, the specific users connected can be seen here. To exit Port Status Mode, press <Esc>.

### Administrator Password

To enter the Administrator Password menu press <C> from the Administration Mode menu.

The Administrator Password menu (see Fig. 5) enables the administrator to change his password. Two edit fields are available, one for password, the other for verify password. The password can be up to 13 characters in length.

**NOTE: The default password for the administrator is ADMINISTRATOR.**

Function:	Keystroke:
Switch between Password and Verify Password fields	
Add character to password string or verify password string	 or  +  (Type any upper or lower case alphabetical or numeric character)
Delete previous character in edited string	

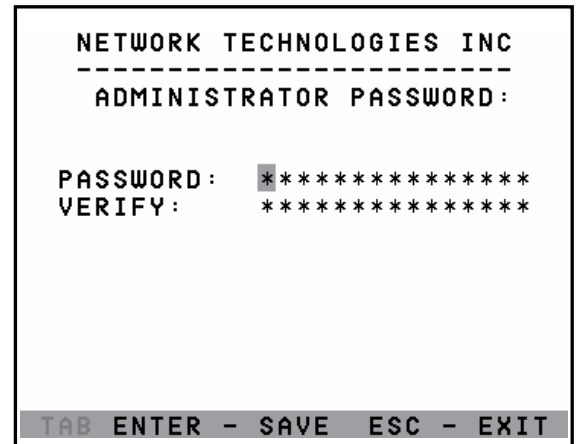


Figure 5- Administrator password menu

**Administrator Password (cont'd)**

**Function:**

Save new password. (The administrator will be prompted for a Yes or No confirmation)

Return to Administration Mode

**Keystroke:**



(If Password string and Verify Password string are different, this command will have no effect, enabling the administrator to correct the password)



**User Name List**

To enter the User Name List press <U> from the Administration Mode menu.

The User Name List (see Fig. 6) enables the administrator to see a list of users. The administrator can select either an existing user to modify user settings, or an empty record to add a new user.

**Function:**

Edit the highlighted user's access rights in System Access List

Enter Edit mode to add/change/remove users

Change the highlighted user's password

Return to Administration Mode

**Keystroke:**

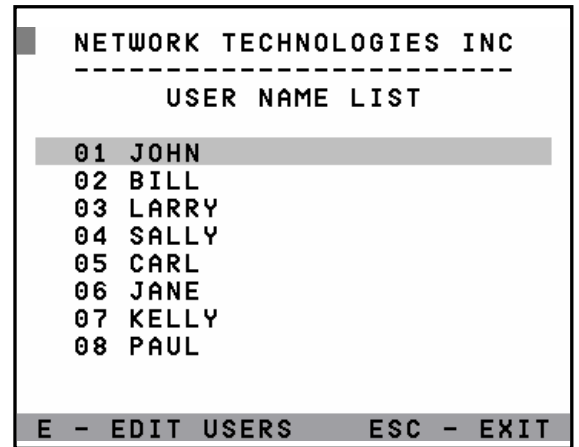
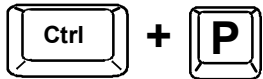
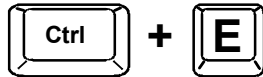
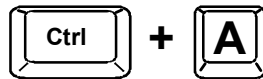


Figure 6- User Name List

**System Access List**

To enter the System Access List, press <Ctrl> + <A> from the User Name 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. Use the mouse to change access rights by clicking on a given number to toggle the port's status.

**Function:**

Save the changes to the access list and return to previous mode

Exit the System Access List without saving and return to previous mode

**Keystroke:**

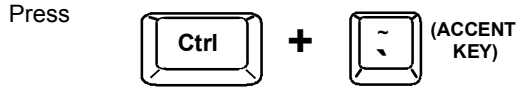




# USER ACCESS FUNCTIONS

## Command Mode

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



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 (see Fig. 7) 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 alphabetically sequential- see Maintenance Mode on page 17 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.

An arrow to the left of a port number in the list indicates the port the user is currently connected to. From left to right, the columns display the following:

- Port Number
- Port Name
- Type of CPU connected
- Power Status of the CPU (ON/OFF)
- The actual user number (1-8) selected to the CPU.
- If no user is connected to a CPU, the user number is replaced by a "-" (dash).
- If more than one user is connected to the same port, this field will indicate the total number of users connected and the text color will be red.

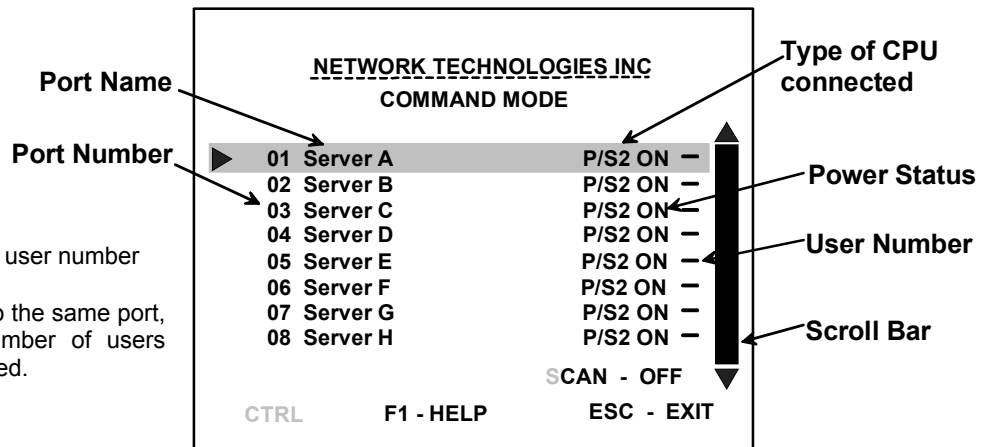




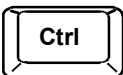



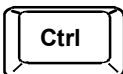




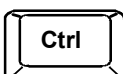


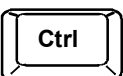







Figure 7- Command Mode main menu

**NOTE:** While in Command Mode, the numbers on the NUM PAD on the keyboard are not active. If numbers are required while in Command Mode, use the numbers on the main key bank.

The list below describes the command functions available from the keyboard within the OSD mode of control after entering into Command Mode:

Function:	Keystroke:
Select the previous port	
Select the next port	
Increments the menu by 1 page	
Decrements the menu by 1 page	
Enable/disable Scan Mode	 + 
Enter Edit Mode (Only available if administrator is logged in)	 + 
Selects scan time in seconds	 +  -  -  -  (xxx from 002 to 255. ie. t002 would set the time-out period for 2 seconds)
Enter Maintenance Mode	 + 
Display Help Menu	
Select a specific port	 +  -  -  (Pxx would be P01, P02, etc.)
Select the first port on the switch	
Select the last port on the switch	

## Command Mode (Cont'd)

**Function:**

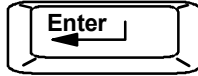
**Keystroke:**

Enter Search Mode, add a character to search string and select the CPU's name that matches best.



(Type any alphabetical or numeric character)  
Note: use is case sensitive

Switch to a selected port



Exit Command Mode



The mouse can also be used to control the ST-nXm-U-HD switch Command Mode within the menu.

- The scroll wheel can be used to scroll through the ports list.
- The mouse cursor can be moved to the Scan, Help, and Exit fields where the user can click on the left mouse button to perform that function or toggle that indicator.
- Ports listed on the screen can be selected by moving the cursor onto a port and clicking.
- To move through the port list, the scroll bar to the right of the list can be used by clicking the up and down arrows.

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

## Scan Mode

To activate Scan Mode press <Ctrl> + <S> from the Command Mode menu.

Scan Mode enables the user to scan through selected ports and to have full device control of the connected port. A port is skipped from the scan cycle if one of the following conditions is true:

- the port is used by another user
- security mode is enabled and the user does not have access rights to the port
- the CPU connected to the port is OFF

The scan dwell time is programmable from 2 to 255 seconds (default time-out period is 5 seconds). When the user uses the mouse or keyboard the scanned port becomes active and scanning is stopped. The switch will resume scanning after a period of user inactivity determined by the scan dwell time. See Command Mode above for configuring the scan dwell time.

**NOTE: The scan dwell time set by the user only effects that user and has no effect on other switch users.**

**NOTE: The keyboard and mouse must remain idle for the full scan dwell time before the switch selects the next active port.**









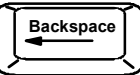
## Edit Mode

To activate Edit Mode press <Ctrl> + <E> from the Command Mode menu.

Edit Mode allows only the administrator to modify the names of the CPUs connected to the switch. Names of CPUs can be up to 12 characters in length. Characters typed can be upper or lower case. After changes have been made the administrator will be prompted by the menu to save the changes. Answer "Y" to save changes and answer "N" to continue using previously entered port names.

**Function:**

**Keystroke:**

Move cursor one position to the right		<b>NOTE: If a change has been made, using the up or down arrow will also prompt the user to save any changes.</b>
Move cursor one position to the left		
Move cursor to the previous port		
Move cursor to the next port		
Select the first port on the switch		
Select the last port on the switch		
Toggles between insert and overwrite		Character either gets inserted and the remaining characters shift to the right, or characters get overwritten.
Erase current character		
Erase previous character		

When finished making changes in Edit Mode, press <Esc> and a prompt will appear to press either <Y> to save the changes or <N> to continue making changes without saving the changes just made.

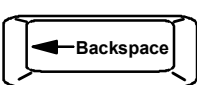

## Search Mode

Search Mode is enabled by typing any alphabetical or numeric characters while in the Command Mode menu.

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

**Function:**

**Keystroke:**

Erase previous character in search name	
Select the previous port	

**Search Mode (cont'd)**

**Function:**

**Keystroke:**

Select the next port



Add a character to the search string and select the best matching CPU name



(Type any alphabetical or numeric character)

Exit Search Mode, return to Command mode



**Maintenance Mode**

To enter Maintenance Mode (see Fig. 8) press <Ctrl>+<M> from the Command Mode menu.

Maintenance Mode enables a user to customize the On Screen Display to their requirements. Also, the Security Mode can be activated/deactivated from this menu.

**Function:**

**Keystroke:**

Reset all of the port names



Toggle between numeric and alphabetic listing of ports



Move On Screen Display (OSD) menu up on monitor



Move OSD menu down on monitor



Move OSD menu to the right



Move OSD menu to the left



Make OSD menu taller



Make OSD menu shorter



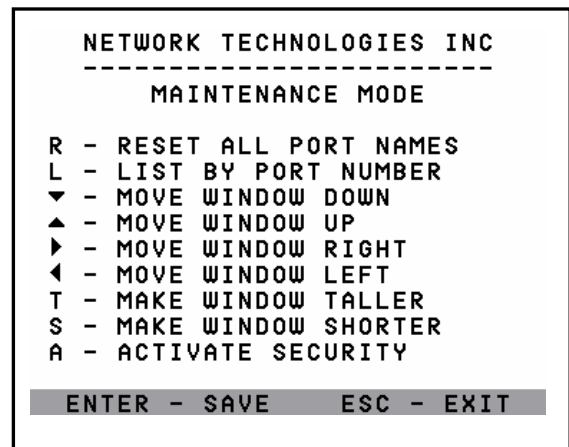
**Activate security features.**

Present only when security is available but not active.



**Enter Administration Mode.**

Option present only when administrator is logged in.



**Figure 8- Maintenance Mode menu**

**NOTE: If activating security features, the user will be prompted for a "Y" (yes) or "N" (no) to confirm the menu choice, at which point the user will be asked for a username and password before continuing. Only the administrator can activate the security features.**

**Maintenance Mode (Cont'd)**  
**Function:**

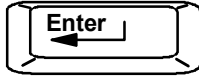
Log current user out and return to User Login Mode.

**Keystroke:**



(Only displayed when security is active)

Save OSD window parameters for the port



Return to Command Mode



**NOTE:** 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 the window will return there when the ST-nXm-U-HD switch is reconnected to that particular CPU (provided the parameters are saved before exiting Maintenance Mode).

To enter Help Mode press the <F1> key from the Command Mode menu (see pages 13 and 14).

Help Mode displays a list of commands with a short explanation of their function. The following options allow the user to quickly obtain information on any command.

**Function:**

**Keystroke:**

View the previous page of help if available



View the next page of help if available



Exit HELP and return to previous mode



## KEYBOARDS

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. (Figure 9 on page 20 is available for reference.)

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

SB = Space Bar

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

+ (SB + Alt) = Press keys simultaneously

### SUN's Startup Keys

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

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

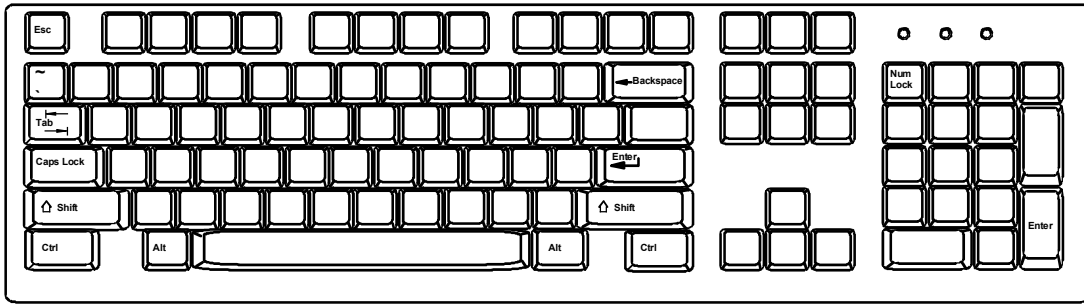
This switch will also support other startup commands not listed above.

### SUN's 14 Extra Keys

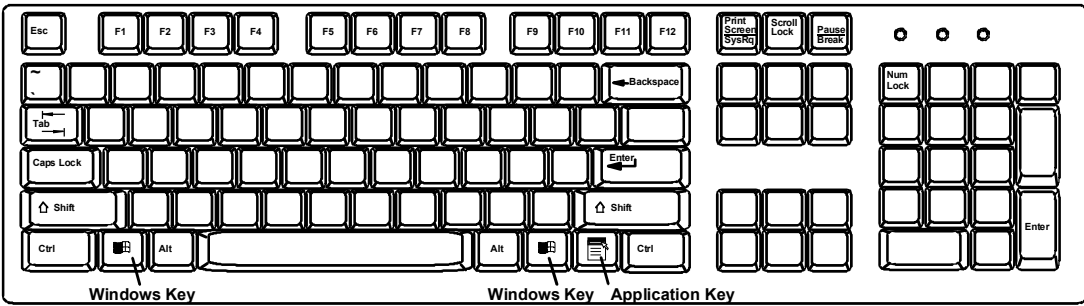
PS/2,Win Keyboards	Sun Extras	PS/2,Win Keyboards	Sun Extras
SB+F1	Stop (L1)	SB+F8	Paste (L8)
SB+F2	Again (L2)	SB+F9	Find (L9)
SB+F3	Props (L3)	SB+F10	Cut (L10)
SB+F4	Undo (L4)	SB+F11	Help
SB+F5	Front (L5)	SB + UP Arrow	Vol +
SB+F6	Copy (L6)	SB + DOWN Arrow	Vol -
SB+F7	Open (L7)	SB + LEFT Arrow	Mute

SB= Space Bar

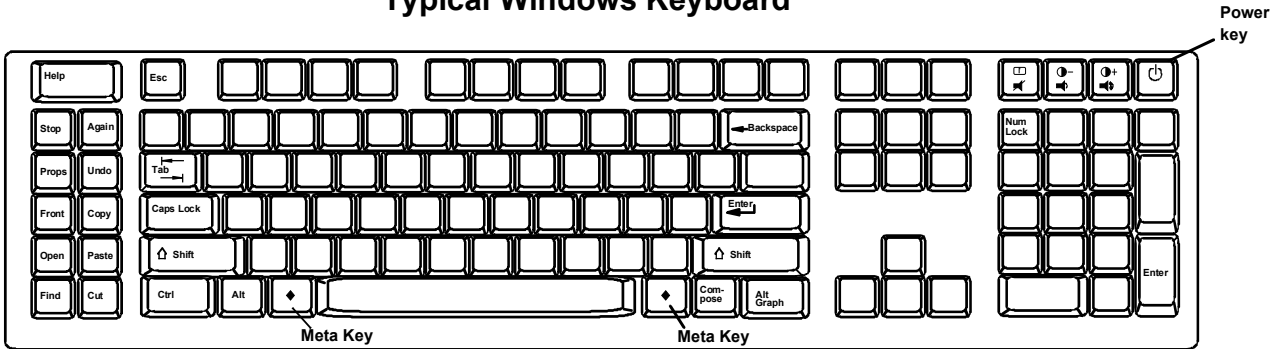
*Use the chart to the left to type SUN's additional 14 keys using a PS/2 101 or WIN95 keyboard*



Typical 101 Keyboard



Typical Windows Keyboard



SUN Keyboard

Figure 9- Keyboard Layouts



## RS232 CONTROL

### Remote Connection

The RS232 Interface is designed to control the switch via serial (RS232) daisy chain connection from any CPU or other controller with an RS232 communications port. There is, however, a restriction that must be followed:

**A program must be used that will send an entire command line all at once, not character by character. (The HyperTerminal program in WINDOWS cannot be used, as it sends each character one at a time.)**

The pin outs for the DB-9 connector on the unit are as follows:

#### RS232 INPUT (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	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	None	no connection

On the DB-9 female connector, pins 4 (DTR) and 6 (DSR) are shorted and pins 7 (RTS) and 8 (CTS) are shorted. Therefore, host 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, use NTI Matrix-Y-1 "Y" cable (see Fig 10).

### Baud Rate

The unit powers up with a default baud rate of 9600 and a fixed data protocol of 8 data bits, no parity and 1 stop bit. The baud rate is selectable through the "Baud Rate Menu" (See "Keypad Control" on page 7), the RS232 Command Protocol (page 22) or using the RMTEST program (page 23). A data protocol of 8 data bits, no parity, and 1 stop bit is used in the daisy chain communication.

### Unit Address

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 the NTI Matrix-Y-1 "Y" cables. By setting the appropriate unit address with the keypad (see "Keypad Control" on page 7) or using the RMTEST program (page 23), 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. (See Fig. 10.)

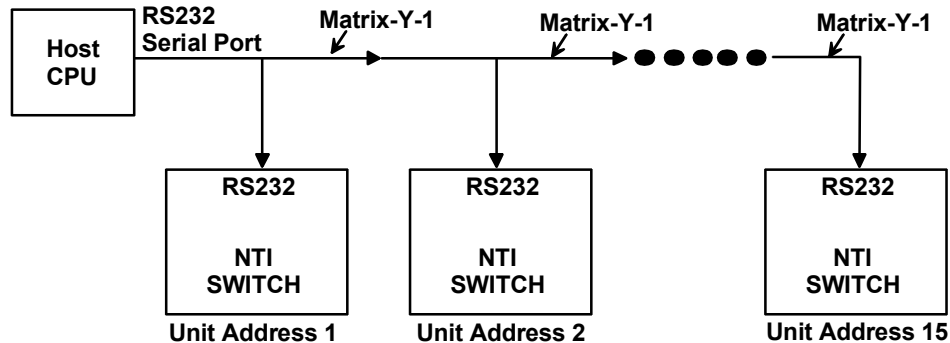


Figure 10- RS232 Connections for Daisy-chain

## Command Protocol

CPU controller commands supported by the unit are defined below. All commands should be terminated with a <CR> (carriage return). When a command is sent, the entire string is echoed back to the host along with a response from the addressed unit as shown in the command definitions table below. All characters in the command string should be upper case, and all numbers below 10 should have a leading 0 (ex: 1 = 01). As command strings are sent, the inner character delay cannot exceed 500 milliseconds.

### Legend:

(All numbers must be two digits)

SW	:	Switch (01-15)	MM	:	Save Into Memory Bank (00-99)
BR	:	Baud Rate Code (12,24,48,96)	LL	:	Load From Memory Bank (00-99)
OP	:	Output /User Port (01-MAXOUTPUTS)	<CR>	:	Carriage Return (Hex 0xD)
IP	:	Input/CPU Port (01-MAXINPUTS)			

Command String	Good Response	Description
CS SW,IP,OP	*<CR>	Connect One User Port To CPU Port
CA SW,IP	*<CR>	Connect All User Ports To CPU Port
RO SW,OP	*<CR>IP<CR>	Read Connection For 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=12(00),24(00),48(00),96(00) Factory default is 9,600
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
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 User Port to CPU Port
GM SW,00	*<CR>go SW,OP,IP (all ports)<CR>	Read connection matrix of all User 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 NODEMUX 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 13).**

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

## 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 on page 24. 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.

## MATRIX SWITCHER'S CONTROL PROGRAM FOR WINDOWS 9X, NT, 2000 AND XP

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**

## SAFETY AND EMC REGULATORY STATEMENTS

**WARNING** A WARNING in this manual indicates the potential for serious injury or death.

**CAUTION** A CAUTION in this manual indicates the potential for damage to the equipment

Do not continue past a WARNING or CAUTION statement until you have read and clearly understand the reason for the potential injury, death, or damage to the equipment and have taken the appropriate action(s).

### Grounding

These products have protective earth ground terminals and are built with full attention to consumer safety. There must be an un-interruptible safety earth ground between the main power source and the product's power cord or supplied power cord set. If ever the possibility exists for the grounding protection to have been reduced in any way, disconnect the power supply until the grounding connection has been fully restored.

### Servicing

NTI products are not intended to be serviced in the field and contain no user-serviceable parts. In the event repair is needed, all servicing must be performed by factory trained and authorized service personnel. Only those items specifically identified in this manual (if any) may be adjusted by the user of this product and adjusted only as instructed in this manual.

## TECHNICAL SPECIFICATIONS

### Appendix A- Defaults

SETTING	DEFAULT VALUE
KVM keyboard/mouse type	PS/2 or SUN
CPU keyboard/mouse type	PS/2, SUN
Computer Names	SERVERxx
Scan time interval	5 SECONDS
Scan setting	OFF
Security	OFF
Administrator password	ADMINISTRATOR
Maximum ports	16 CPU, 4 User

### Appendix B- General Information

DESCRIPTION	SPECIFICATION
Dimensions	19"W x 10" D x 1.75" H
Operating temperature	0°C - 55°C (32°F - 131°F)
Power requirements	120 or 240VAC @ 50 or 60Hz
Video bandwidth	200 MHz (without cables)
Video sync	TTL
Chassis material	Aluminum

### Appendix C- Cables

NTI #	DESCRIPTION
VMTINT-3/6/10/15/25	Interface PS/2 Keyboard and Mouse and VGA video to NODEMUX-HD switch
SMTINT-3/6/10/15/25	Interface SUN Keyboard and Mouse and VGA video to NODEMUX-HD switch
VMTINT-3/6/10/15/25-MM	Interface PS/2 CPU to NODEMUX-HD switch
SMTINT-3/6/10/15/25-MM	Interface SUN CPU to NODEMUX-HD switch

#### Legend:

MM- male connectors on both ends

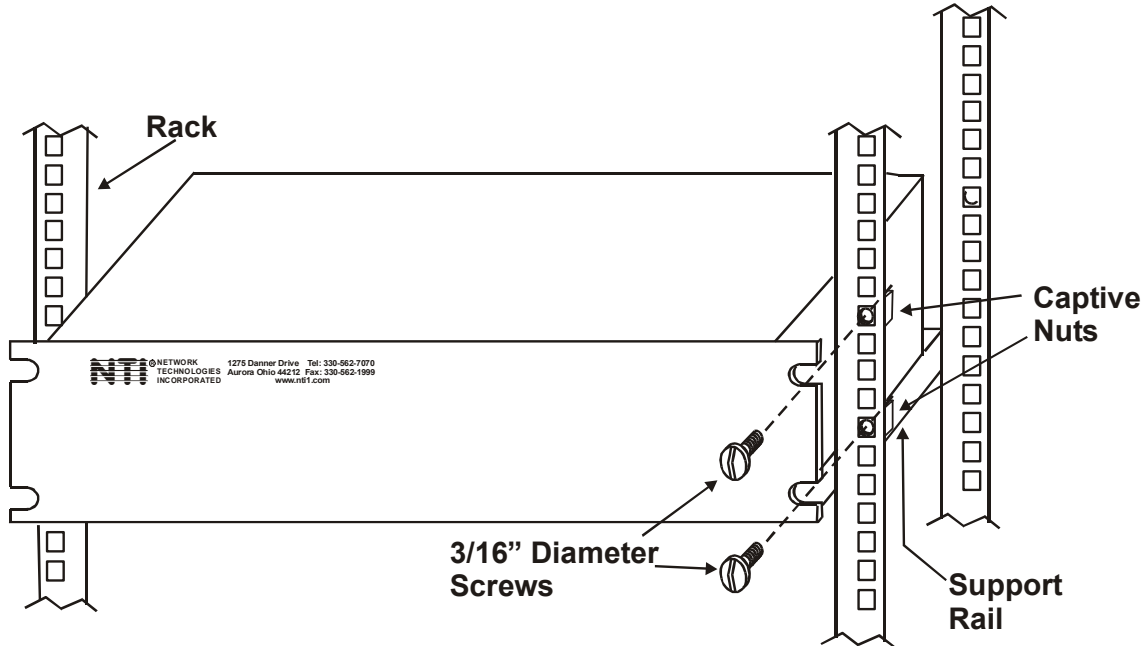
If the cable desired is not listed above, please visit our website at <http://www.networktechinc.com> for a complete listing of the cables and adapters we offer, or call us at (800) 742-8324 (800-RGB-TECH) or (330) 562-7070.

**Appendix D- Rack mounting Instructions**

If this NTI switch was designed to be directly mounted to a rack, it includes a mounting flange to make attachment easy. 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. Then 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. We suggest installing additional rails to the rack frame to support the weight of the switch. Be sure to tighten all mounting screws securely.

Do not block power supply vents in the NTI switch chassis (if provided) .

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



**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
CPU will not boot up	Cable to NODEMUX is loose	Check for proper cable connections and restart
Cannot access CPU	Access not permitted	See administrator to review system access list (pg. 12)

**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.