KEEMUX® Series

KEEMUX-Px

PS/2 KVM Switch
Installation and Operation Manual

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INTRODUCTION

The KEEMUX PS/2 KVM switch (KEEMUX) enables access to several IBM PC-AT, PC-AT Clone or PS/2 CPUs from one monitor, keyboard and PS/2 mouse (up to 8 CPUs as a single switch or 64 CPUs when switches are cascaded).   These CPUs can be file servers, network managers, etc.   Internal microprocessor driven circuitry allows all CPUs to be booted simultaneously and error free with only one keyboard and mouse present. Port selection is accomplished through front panel push buttons or commands typed on the keyboard. Port status LEDs continuously update on the front panel of the switch.

Available Options
- Switch models are available in 60 or 50 Hz, and 110 or 220V.
- OSD -On Screen Display feature will superimpose operating menus directly onto the monitor for security administration and control.   Add "-O" to the part number (i.e. KEEMUX-P*x*-**O**)
- RS232 support for alternative control using RS232 connection Add "-RS" to the part number (i.e. KEEMUX-P*x*-**RS**)

See our catalog, visit our website at http://www.networktechinc.com, or contact an NTI sales representative at 800-742-8324 (800-RGB TECH) or 330-562-7070 for more details.

Limitations

- The KEEMUX P*x* KVM switch is compatible with PS/2 mice and PS/2 CPU ports ONLY. Serial mice cannot be adapted for use with the KEEMUX P*x* KVM switch.

- Serial ports on CPUs require the NTI VOPEX-IM9D for use with this switch.

MATERIALS

Materials Supplied with this kit:
- NTI KEEMUX P*x* KVM Switch (4 or 8 port)
- 120VAC or 240VAC at 50 or 60Hz-5VDC/2.0A AC Adapter
- Line cord, country specific
- Card with link to pdf file of this manual

Materials *Not* Supplied, but *REQUIRED*:

Monitor, keyboard, and mouse interface cables ARE REQUIRED but not supplied.

- MONITOR   **-**   VEXT-*xx*-MM for video interface
- KEYBOARD   **-**   VKEXT-*xx*-MM for keyboard interface
- MOUSE   **-**   VKEXT-*xx*-MM for mouse interface

Optional:

- KEYBOARD   **-**   VVKINT-*xx*-MM "Y"-cable for keyboard and mouse
  and MOUSE   interface

Where:
  xx is the length of the cable in feet
  MM indicates male-to-male connector

All cables can be purchased from Network Technologies Inc by calling 800-RGB-TECH (800-742-8324) or (330)-562-7070.

FEATURES AND FUNCTIONS

Front View of KEEMUX-P8
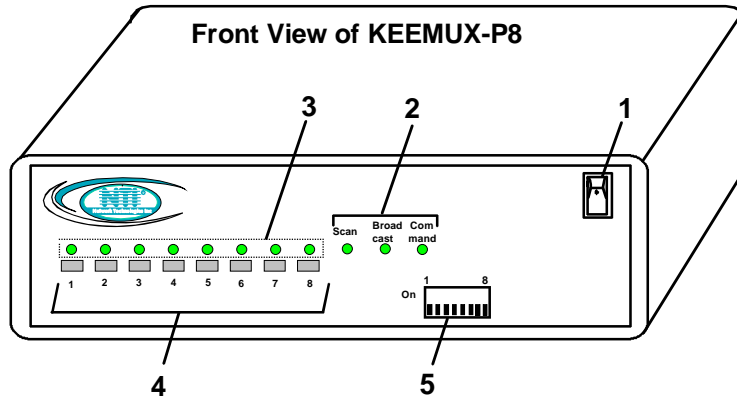
1. Power ON/OFF switch

2. Mode LEDs- for visual indication of switch mode status

3. CPU Status LEDs- for visual indication of connection between the user and a specific CPU.

4. CPU Select Switches- push to manually switch to a specific CPU

5. DIP-switches- for configuring keyboard type and cascaded switches

6. MONITOR- 15HD female connector- for connection of the user monitor

7. VIDEO *x*- 15HD female connectors- for connecting video cables from CPUs

8. 5VDC- 2.0A- connection jack for the AC adapter

9. CPU *x*- 6 pin miniDIN female connectors- for connection of device cable(s) from CPU(s)

10. PS/2 DEVICES- 6 pin miniDIN female connectors- for connection of user device(s) (keyboard/mouse)

11. DAISY In/Out- for attaching interface cables (REXT-SR-*xx*) between slave switches and the master switch

Rear View of KEEMUX-P8
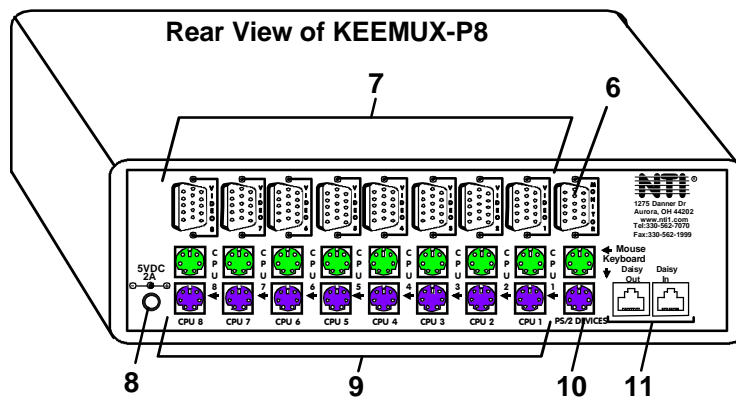
INSTALLATION

Prepare To Connect

1. Before connecting the KEEMUX to the CPUs, make sure all CPUs, the monitor, and the KEEMUX are turned OFF.

> ⚠ **WARNING! DAMAGE MAY OCCUR TO THE CPU IF POWER IS NOT DISCONNECTED BEFORE CONNECTING OR DISCONNECTING CABLES.**

2. The DIP switches on the front panel are configurable for several tasks. Switches 1-6 are used for cascading actions (see CASCADING on page 5) and switches 7 and 8 are for keyboard configuration. These keyboard configuration switches come pre-configured with both in the "OFF" position. Do not change these settings, as this will cause the PS/2 keyboard to not work.

FYI: Should switch 7 or 8 get changed to the "ON" position, it will be necessary to power-down the entire system (including CPUs), change the DIP switches back to the "OFF" position, and then power the system back up. If it is necessary to replace one PS/2 keyboard with another one, the keyboard can be hot-swapped without powering-down. Refer to Fig. 1 for instructions on proper keyboard DIP switch configuration.
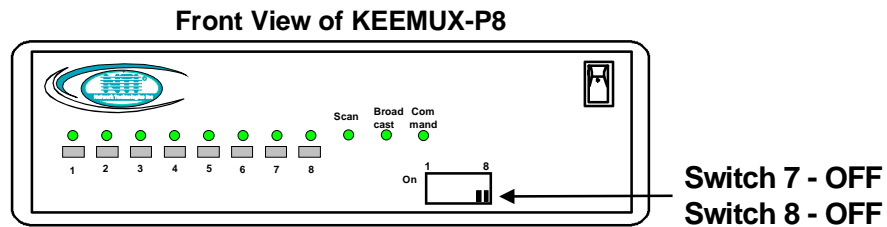
Figure 1- Keyboard DIP switch configuration

Make Connections

1. Connect the monitor cable to the 15HD female port labeled "MONITOR" on the rear panel of the KEEMUX.
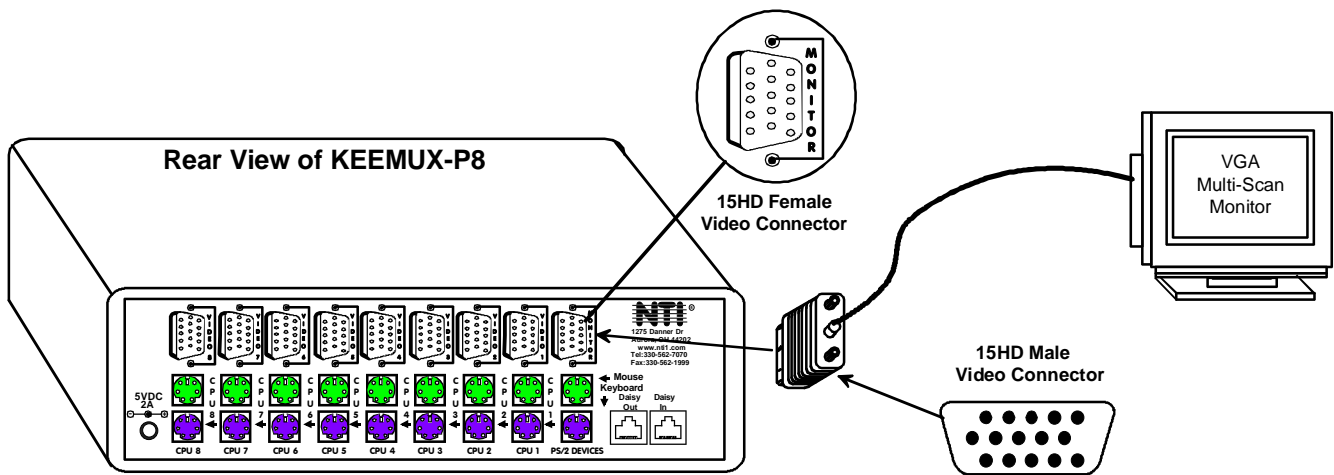
Figure 2- Connect the monitor to the KEEMUX

2.   Connect the keyboard cable to the 6 pin miniDIN female port labeled "KEYBOARD" on the rear panel of the switch.   Connect the mouse cable to the 6 pin miniDIN female port labeled "MOUSE" on the rear panel of the KEEMUX.
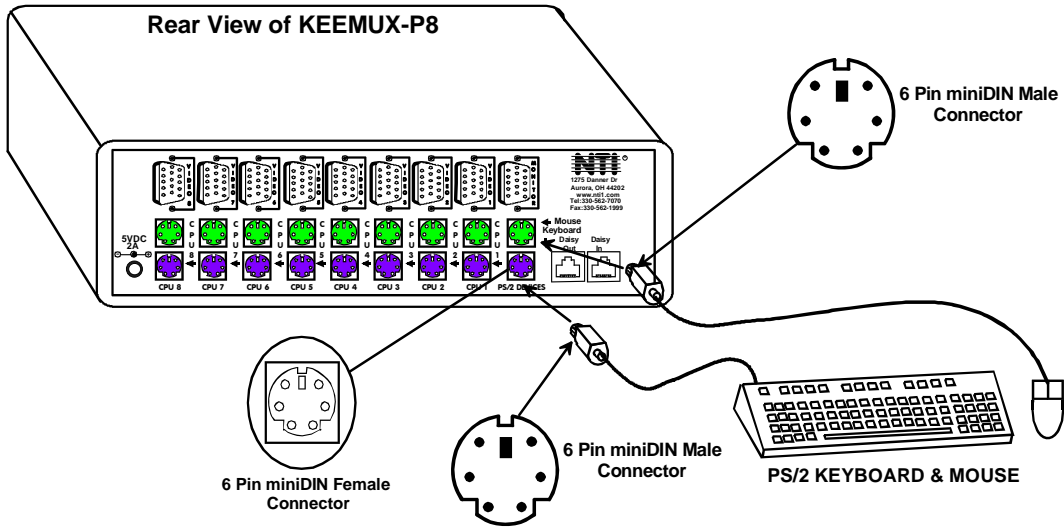
Figure 3- Connect the user keyboard and mouse

3.   Connect each CPU to the keyboard, monitor and mouse ports using VEXT-*xx*-MM for the monitor and VKEXT-*xx*-MM (2) for the mouse and keyboard– REQUIRED (not supplied). See Fig. 4.
   - Group the keyboard, monitor and mouse interface cables from each CPU.
   - Make sure that cables from the first CPU are connected to the VIDEO 1 and CPU 1 MOUSE and KEYBOARD connectors.
   - Cables from the second CPU should connect to the VIDEO 2 and CPU 2 MOUSE and KEYBOARD connectors...etc.
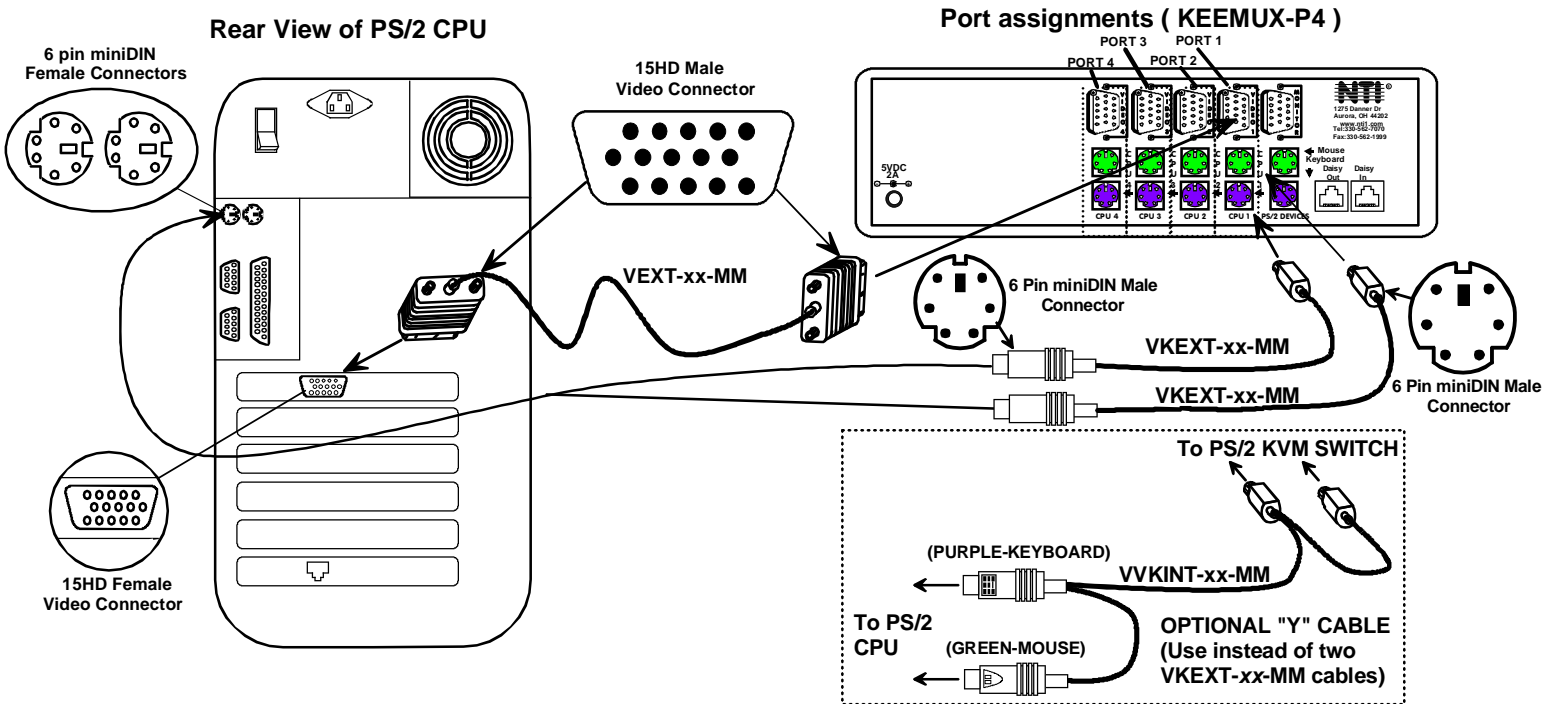
Figure 4- Connect a CPU to the KEEMUX

Power Up

1. Turn the KEEMUX power ON first. The mode LEDs on the KEEMUX should flash twice.
2. Turn the monitor power ON.
3. Turn any or all of the CPUs ON.

FYI: Do not press any port buttons on the front panel until the PORT 1 LED on the front panel illuminates.

CASCADING

The KEEMUX switch can be expanded to access up to 64 CPUs by cascading multiple units together, as illustrated below. The KEEMUX connected to the monitor and keyboard must be configured as the "master unit" (via DIP switches-see page 6). Any switches connected to the master unit must be configured as "slave units". All KEEMUXs are fully configurable for this expansion method. The only additional hardware required is a set of keyboard, monitor, mouse, and RMT extension cables for each slave unit (see Fig. 5 below).
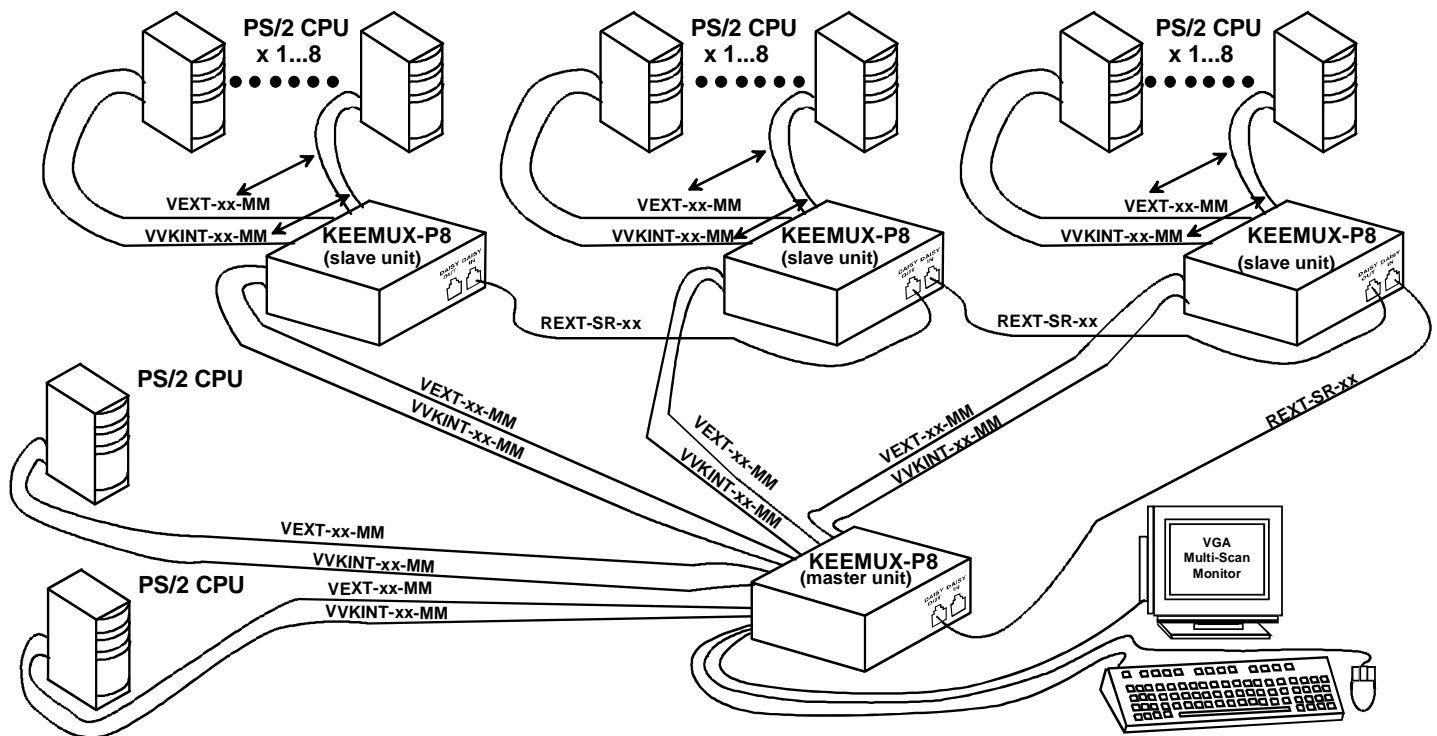
Figure 5- Cascaded configuration

Limitations

a. All the slave units must be the same size.
b. Only 4 or 8-port switches can be used as slave units.
c. Up to 8 slave units may be connected to form a maximum system size of 64 ports (1 x 8 port master + 8 x 8 port slaves).
d. Slave units must be added to the master unit in order (slave #1 to master's port 1, slave #2 to master's port 2, etc.).

FYI: Port 1 of the master unit (with a 4-port slave unit connected to it) will function and be controlled as ports 1-4 (1-8 for an 8-port slave.). Port 2 of the master unit (with a second 4-port slave unit connected) will function and be controlled as port numbers 5-8 (9-16 for an 8-port slave). See Fig. 6 on page 6.

e. All units must be powered OFF during configuration and interconnecting.

Configuration

All 4, and 8-port units are configured using the 8-position DIP switch (located on the front of each unit) according to tables 1 and 2 below.

Front Panel Configuration Switches

Table 1 * (default settings)			
Switch	**SW1**	**SW5**	**SW6**
STAND-ALONE SWITCH	OFF*	OFF*	OFF*
SLAVE	ON	OFF	OFF
MASTER W/4-PORT SLAVES	OFF	OFF	ON
MASTER W/8-PORT SLAVES	OFF	ON	OFF

Table 2 * (default settings) Master & Slave SW2-4 Settings				
SW2	**SW3**	**SW4**	**Master with-**	**Slave Setting**
OFF*	OFF*	OFF*	No Slave Attached	N/A
OFF	OFF	OFF	1 Slave attached	Slave Unit #1
OFF	OFF	ON	2 Slaves attached	Slave Unit #2
OFF	ON	OFF	3 Slaves attached	Slave Unit #3
OFF	ON	ON	4 Slaves attached	Slave Unit #4
ON	OFF	OFF	5 Slaves attached	Slave Unit #5
ON	OFF	ON	6 Slaves attached	Slave Unit #6
ON	ON	OFF	7 Slaves attached	Slave Unit #7
ON	ON	ON	8 Slaves attached	Slave Unit #8

About Table 2:
These switch settings are used by the slave(s) to establish its identity (i.e. location in the group) to the master.

On a master, the same switches are used to configure the master for how many slaves are attached to it.

Cascaded Installation

1. Attach all slaves consecutively to the master switch.
   a. Perform steps 1 and 2 under INSTALLATION on page 4 for each slave unit.
   b. Configure each switch as per the tables above under CONFIGURATION before proceeding.
   c. With a VEXT-*xx*-MM cable, connect slave #1 monitor port to master's VIDEO 1 port.
   d. With a VVKINT-*xx*-MM or (2) VKEXT-*xx*-MMs, connect slave #1's PS/2 DEVICES ports to the master's CPU1 KEYBOARD and MOUSE ports.
   e. Repeat steps c and d for each additional slave unit, keeping in mind that each slave will connect to the next available master's port (i.e. slave #2 to master's VIDEO 2 and CPU 2 KEYBOARD and MOUSE, etc.). See Fig. 6 below.
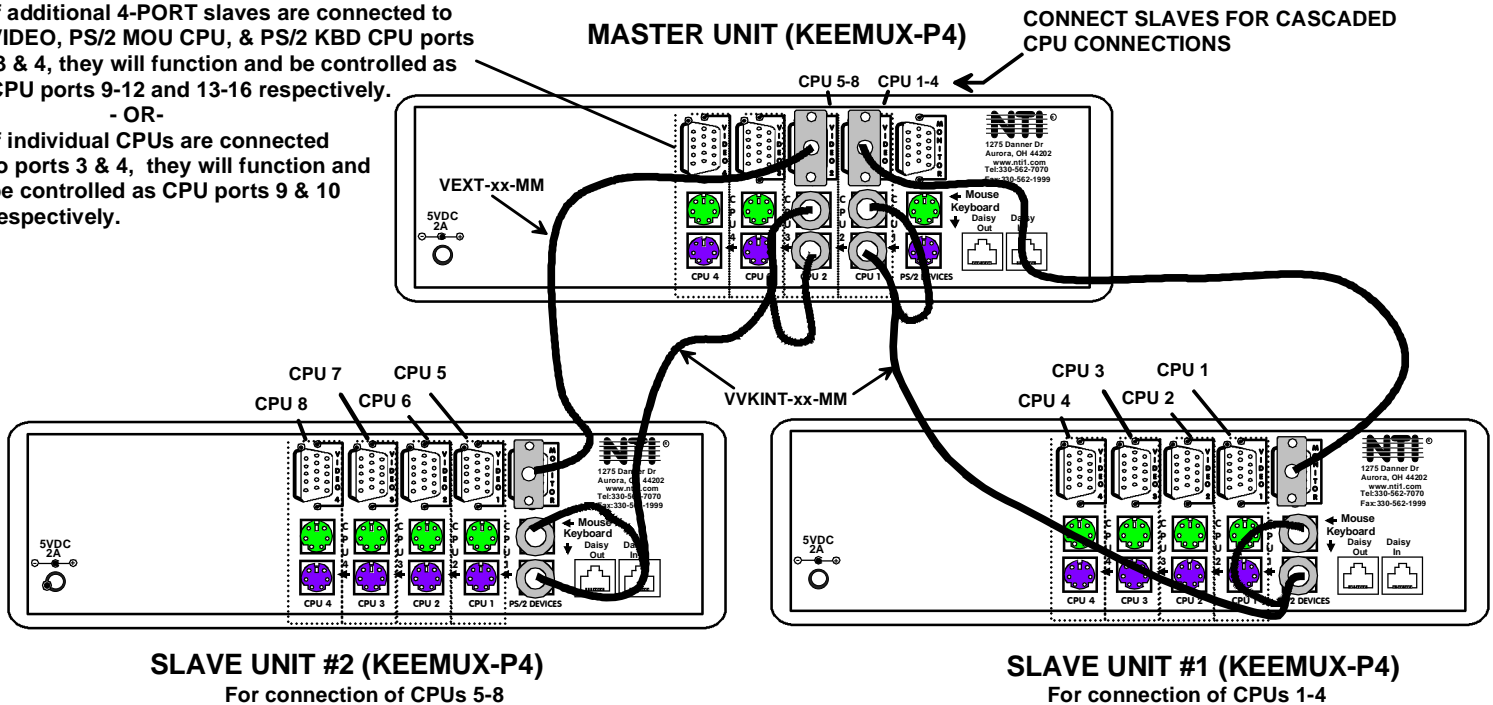

Figure 6- Cable connections for cascading

2. Connect Local CPUs to any remaining consecutive ports on the master as described under INSTALLATION on page 3.
3. Connect the RMT extension cables:
   a. With an RMT extension cable (REXT-SR-*xx*), connect the master's "DAISY OUT" port to slave #1's "DAISY IN" port.
   b. With another RMT extension cable, connect slave #1's "DAISY OUT" port to slave #2's "DAISY IN" port. (See Fig. 7 below.)
   c. Apply additional RMT extension cables until all slave units are connected together.

NOTE: If switches are not being cascaded, then the "DAISY IN" and "DAISY OUT" ports will not be used.
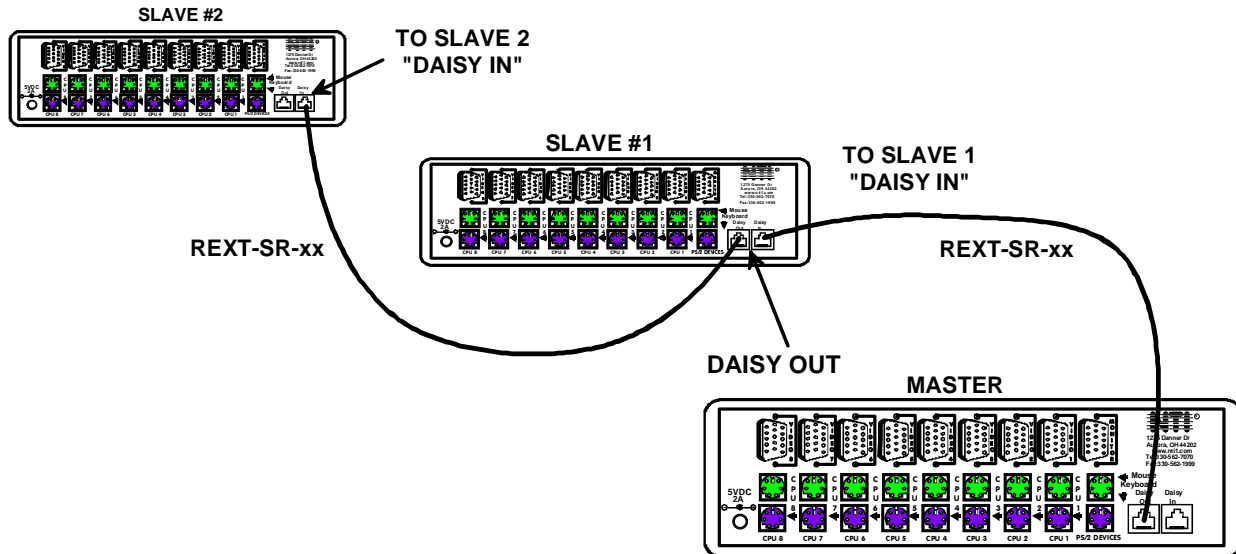

Figure 7- Connect remote extension cables between cascaded units

USING THE NTI KEEMUX PS/2 KVM SWITCH

Control over the CPUs attached to the NTI KEEMUX is achieved through operation of the KEEMUX. Once the KEEMUX is properly connected, the KEEMUX will enable a connection to be made between the CPUs attached to its CPU *x*, and VIDEO x ports and the keyboard, monitor, and mouse attached to the PS/2 DEVICES and MONITOR ports.   The LEDs on the control panel of the KEEMUX will illuminate depending on which port (and associated CPU) is being connected to the keyboard, monitor, and mouse.   The choice of which CPU will be connected to the keyboard, monitor, and mouse is determined by controlling the KEEMUX either through the front control panel on the KEEMUX, by keyboard control, or by optional methods such as RS232 or an On Screen Display (OSD).

Front Panel Control

There is a touch-switch and LED on the front panel of the KEEMUX for each connected CPU. Pressing any touch-switch on the front panel of the KEEMUX will connect the selected CPU to the keyboard, monitor, and mouse.
Holding down any front panel touch-switch for more than 2 seconds will cause the KEEMUX to cycle through all modes of operation: COMMAND, SCAN, BROADCAST, and NORMAL (described on pages 8 and 9). Three LEDs on the front panel indicate when these modes are enabled. Release the touch-switch when the desired mode is enabled. When no mode LEDs are illuminated the user is in Normal Mode controlling directly the CPU to which the user is connected through the KEEMUX.
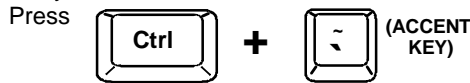
Keyboard Control

 Keyboard control of the KEEMUX can be achieved using either of two methods:

 • **Basic Command Mode**- operated strictly by using keyboard commands as instructed below.   Basic Command Mode is only applicable if the OSD option is not built into the switch.
 • **OSD Command Mode** (optional)- operated using the keyboard and mouse in conjunction with On Screen Display (OSD) menus superimposed onto the monitor.   If OSD is built in, use the menus as instructed on page 12.

    By pressing <Ctrl> + <`> (accent key), the user can enter Command Mode (either Basic, or OSD).   Once in Command Mode, typing a series of commands will cause the KEEMUX to connect the user to any one CPU to which the KEEMUX is attached. Once finished, pressing the <Esc> key will exit Command Mode.

Basic Command Mode

In order to control the KEEMUX with the keyboard, Command Mode must be enabled. To enter Command Mode from the keyboard: Press

Ctrl **+** **~ `** (ACCENT KEY)

NOTE: IF THE OSD FEATURE HAS BEEN INSTALLED, PROCEED DIRECTLY TO "OSD CONTROL" ON PAGE 10.   If not, continue with the instructions for controlling the KEEMUX as detailed below.

When the COMMAND LED is illuminated, all 3 status lights on the keyboard will illuminate to indicate that Command Mode is enabled and the following functions are available: (**NOTE**: The user must exit Command Mode in order to type to a CPU.   To exit Command Mode, press <Esc>.)

Command Functions

Function: **Keystroke**:

Increment Port [1]   **I** or **→**   (select the next higher port ex. 05→06)

Decrement Port [1]   **D** or **←**   (select the next lower port ex. 02→01)

Toggle Scan Mode ON and OFF   **S**

Toggle Broadcast Mode ON and OFF   **B**

KEY SYMBOLS LEGEND:
or PRESS EITHER KEY
+ CHORDED SEQUENCE- PRESS CONSECUTIVELY AND KEEP KEYS PRESSED UNTIL ALL ARE PRESSED.
- PRESS CONSECUTIVELY

Sets scan time-out period for each port.   **T** - **(0-2) x** - **(0-9) x** - **(0-9) x**   (xxx from 002 to 255.   ie. t 002 would set the time out period for 2 seconds)

Selects a specific port   **P** - **(0-9) x** - **(0-9) x**   (Pxx would be P01, P02, etc.)

Exit Command Mode   **Esc**

[1] If the SCAN LED is ON, pressing → or ← will cause the switch to select the next <u>active</u> port.

NOTE: The "port" mentioned in the "Command Functions" above refers to the combination of the video (VIDEO x), mouse and keyboard (CPU x) of like numbers that a CPU is connected to (i.e. the CPU that is connected to VIDEO 1 and CPU 1 will be identified as Port 1 or P01). (See Fig. 8 on page 9.)

Port assignments (KEEMUX-P4)

PORT 3   PORT 1

PORT 4   PORT 2
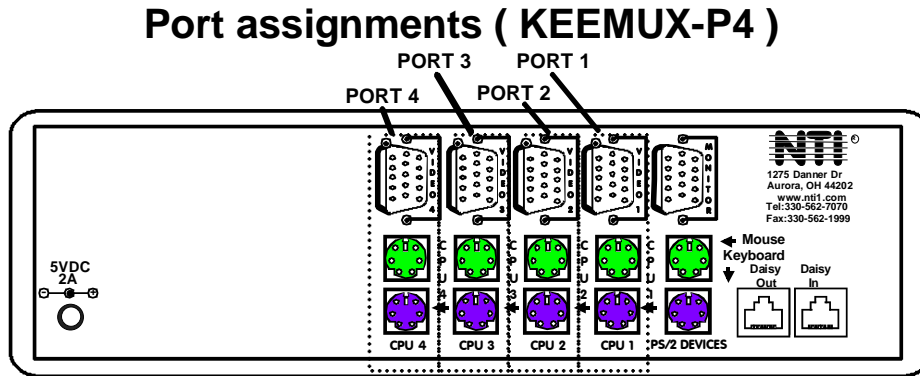
Figure 8- Connections grouped by port number

Please note: If the switches are being cascaded (such as that illustrated in Fig. 5 on page 5 under "Cascading"), make note of which port each of the CPUs is connected to on each slave and which port each slave is connected to on the master.

- **The ports on the slave connected to the port 1 port on the master would be numbered 01-04 with multiple KEEMUX-P4s, the ports on the slave connected to port 2 would be numbered 05-08 (with multiple KEEMUX-P8s they would be 01-08, and 09-16, etc.)**
- **A connection to a CPU from the keyboard would be achieved by typing the appropriate port number. (See Fig. 6 on page 6.)**
- **No programming of the KEEMUX is necessary to achieve this control.**
- **When cascading, if not all of the ports are used on each slave attached to your system, THE PORT NUMBER(S) ASSOCIATED WITH THE UNUSED PORT(S) WILL NOT BE ACCESSIBLE when trying to control the switches connected to the system.   (I.e. if ports 7 and 8 are not used on the first slave and an attempt is made to connect to ports 7 or 8 while in Command Mode, the KEEMUX will ignore the attempt.)**

Scan Mode

When in Scan Mode the KEEMUX scans each port with a CPU powered-ON. (The SCAN LED on the front panel will illuminate and remain ON while in Scan Mode.) The port with the CPU powered-ON remains active while in use. When the switch becomes idle for the configured time-out period (default time-out period is 5 seconds) the switch will connect to the next powered-ON CPU port. See Command Mode section above for configuring the scan time-out period.

FYI: The keyboard and mouse must remain idle for the full scan time-out period before the switch will connect to the next active port.

Broadcast Mode

(Use with extreme caution or commands intended for one CPU will be sent to all CPUs)

Broadcast Mode allows the operator to send keystrokes to all active CPUs simultaneously. However, Broadcast Mode has some critical requirements.

- BROADCAST LED must be OFF when booting any attached CPUs.
- BROADCAST LED must be ON and COMMAND LED must be OFF for keystrokes to reach attached CPUs.

Note: The user must type somewhat slowly when in Broadcast Mode (less than 20 wpm) and cannot use the <Backspace> key.

Normal Mode

When all of the KEEMUX mode LEDs are OFF the user is in Normal Mode, controlling the CPU to which the user is connected through the KEEMUX.

OSD CONTROL

(Optional)

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 of the OSD Control enables an administrator to control access to the CPU ports for each user.   Up to 24 users can be created.   These users have controlled access to any CPU.   Only the administrator can activate or deactivate the security features. Security can be activated from the Maintenance Mode menu (page 16) with a successful administrator login for verification purposes. Furthermore, the administrator can set a maximum idle time value after which the current user will be logged out and the login screen displayed. 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.

Enabling the Security Feature

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

The administrator , when setting the KEEMUX 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**

FYI: The user name for administrator cannot be changed from "ADMINISTRATOR"

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.   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 15 to control the system of CPUs within the limitations as set 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.   Access to the functions of the KEEEMUX will not be allowed until a user has logged in.

Function: **Keystroke:**

Adds a character to the
user name/password

```
┌─────┐
│ A-Z │   (Type any alphabetical or numeric character)
│ 0-9 │
└─────┘
```

Removes previous character
from the user name/password

```
┌────────────┐
│ ◄─Backspace │
└────────────┘
```
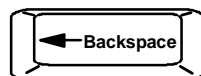
User Login Mode (Cont'd)

Function:	Keystroke:

Submit user name/password

Enter

Exit User Login Mode and return to previous mode. This function is only available if security is not currently active.

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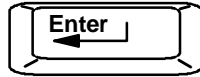
If the password submitted is incorrect, the user will not be able to proceed.

If the password submitted is correct, the user will proceed to the maintenance menu for additional feature options.

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Additional Modes Available With Security

NOTE: The lists that follow are only available if the administrator is logged in.

Administration Mode

Administration Mode allows the administrator to use the following functions:

Function:	Keystroke:

Change the administrator's password

C

Enter User Name List Mode

U

Disable security

S

Selects the idle time in seconds

T - **(0-2) x** - **(0-9) x** - **(0-9) x** **(xxx from 000 to 255.   ie. t002 would set the time-out period for 2 seconds. 000 will disable it)**
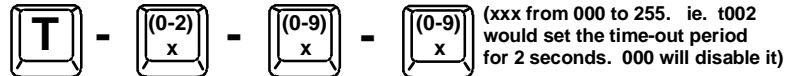
Exit Administration Mode and return to previous mode

Esc

Administrator Password

To change the administrator password press <C> from the Administration Mode menu.

The administrator is able to change the administrator password as needed (see Fig. 9).   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.

Figure 9- Administrator password change

Function:	Keystroke:	
Add character to password string or verify password string	[A-Z 0-9] **or** [↑ Shift] + [A-Z]	**(Type any upper or lower case alphabetical or numeric character)**
Delete previous character in edited string	[Backspace]	
Save new password.	[Enter]	**(If Password string and Verify Password string are different, this command will have no effect, enabling the administrator to correct the password)**
Move to next field to be edited	[Tab]	
Return to Administration Mode	[Esc]	
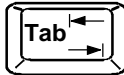
User Name List

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. User names may be up to 12 characters long, may not contain spaces, and are not case sensitive. Passwords may be up to 15 characters long, may not contain spaces, and are case sensitive.
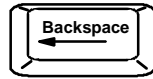
Function:	Keystroke:
Edit the highlighted user's System Access rights	[Ctrl] + [A]
Enter Edit Mode to add/change/ remove users	[Ctrl] + [E]
Change the highlighted user's password	[Ctrl] + [P]
Exit the User Name List and return to previous mode	[Esc]
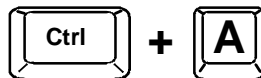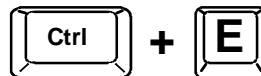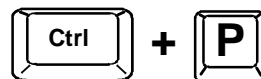
System Access List

The System Access List displays a list of numbers representing the ports so the administrator can change access rights to the ports for the selected user. The user's name is displayed at the top of the access list. The mouse is used to change access rights by clicking on a given number to toggle a port's status.   A user that has access to a port can connect to that port and control the CPU connected to that port when in Normal Mode.

Function:	Keystroke:
Save the changes to the access list and return to previous mode	[Enter]
Exit the System access list without saving and return to previous mode.	[Esc]
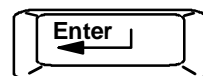
User Access Functions
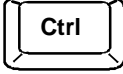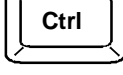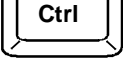
Introduction
The OSD menu enables a user to name the CPUs connected to the KEEMUX and connect to them using that name from a single keyboard and mouse. The OSD is positioned on the user's monitor, displaying 8 CPU names at a time. The screen can be used for switching as well as editing the CPUs' names. Through the OSD menu, the user can control the KEEMUX to cycle through all modes of operation: COMMAND, SCAN, BROADCAST and NORMAL.   LEDs on the front panel will illuminate to indicate when these modes are enabled.

<u>OSD Command Mode</u>

If the OSD option is installed, when entering the Command Mode from the keyboard using the <Ctrl> + <`> (accent key), the On Screen Display menu will automatically appear on the monitor in addition to illuminating the indicator LEDs on the KVM switch.   This provides a visual way to control the KEEMUX using the keyboard, monitor, and mouse.

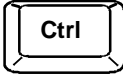The list below describes the command functions available from the keyboard within the OSD mode of control after entering into Command Mode and while the COMMAND LED is illuminated:

Function: **Keystroke:**

Select the previous port   ↑

Select the next port   ↓

Enable/disable Scan Mode   **Ctrl** + **S**

Enable/disable Broadcast Mode   **Ctrl** + **B**

Enter Edit Mode   **Ctrl** + **E**

Enter Maintenance Mode   **Ctrl** + **M**

Display Help Menu (available with   **F1**
every control mode)
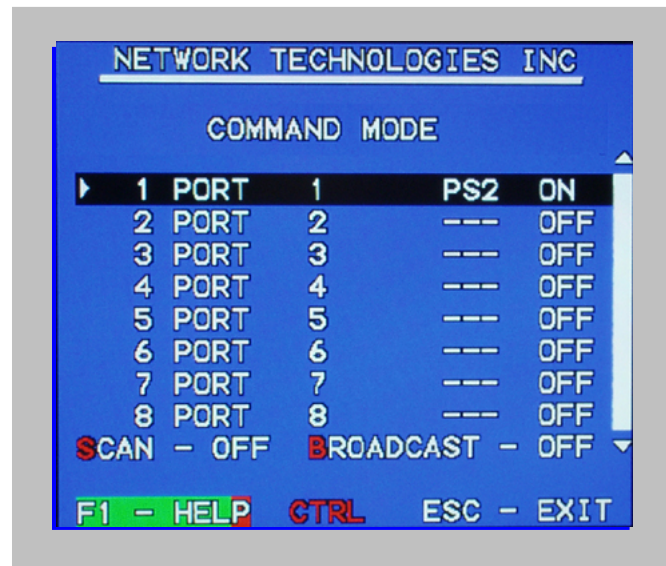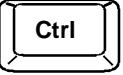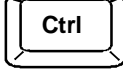
Figure 10- Command Mode menu

Sets scan time-out on   **Ctrl** + **T** - **(0-2) x** - **(0-9) x** - **(0-9) x**   (xxx from 002 to 255.   ie. t002
each port   would set the time-out period
                                                                                           for 2 seconds)

Selects a specific port   **Ctrl** + **P** - **(0-9) x** - **(0-9) x**   (Pxx would be P01, P02, etc.)

Enters Search Mode and adds a character   **A-Z 0-9**   **(Type any alphabetical or numeric character)**
to search string and selects the CPU's
name that matches best.

> *Note: The user must exit Command Mode to type to a CPU.*
>
> *To exit Command Mode, either hold down any touch-switch on the front panel for more than 2 seconds, OR press <ESC>.*

Selects the first port on the switch   **Home**

OSD Command Mode (Cont'd)

Function:	Keystroke:

Selects the last port on the switch   `End`

Switch to a selected port   `Enter`
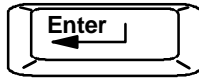
Exit OSD Command Mode   `Esc`

The mouse can also be used to control Command Mode. The mouse cursor can be moved to the Scan, Help, and Exit fields where the user can then click on the left mouse button to perform that function.   Ports listed 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 simply click on the up and down arrows located to the right of the port names displayed.
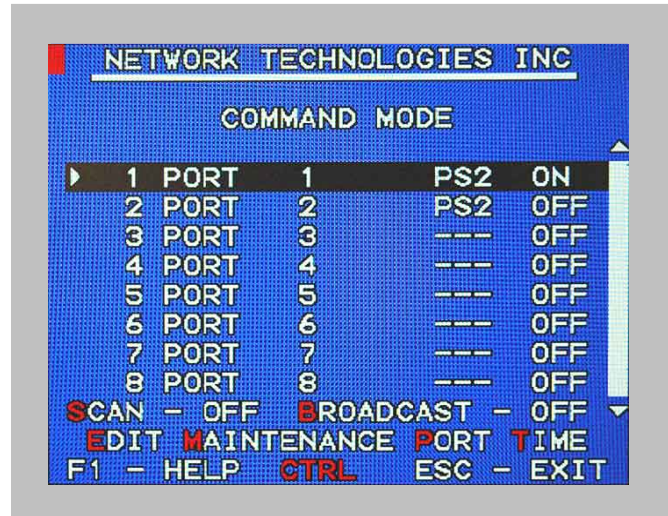
Figure 11- Press <Ctrl> for more functions

Scan Mode

When in Scan Mode the switch scans to each port with a CPU powered-ON. (The SCAN LED on the front panel will illuminate and remain ON while in Scan Mode.) To enter Scan Mode press <Ctrl> + <S> from Command Mode. The port with the CPU powered-ON remains active while in use. When the switch becomes idle for the configured time-out period (default time-out period is 5 seconds) the switch will connect to the next powered-ON CPU port. See Command Mode section above for configuring the scan time-out period.

NOTE: The keyboard and mouse must remain idle for the full scan time-out period before the switch will connect to the next active port.

Broadcast Mode

(Use with extreme caution or commands intended for one CPU will be sent to all CPUs)
Broadcast Mode allows the operator to send keystrokes to all active CPUs simultaneously (even those CPUs the user cannot connect to due to lack of security access). To enter Broadcast Mode press <Ctrl> + <B> from Command Mode.   Broadcast Mode is indicated by the illumination of the BROADCAST LED on the front panel.   The BROADCAST LED will remain ON while in Broadcast Mode.   However, Broadcast Mode has some critical requirements:

- BROADCAST LED must be OFF when booting any attached CPUs.
- BROADCAST LED must be ON and COMMAND LED must be OFF for keystrokes to reach attached CPUs.

Normal Mode

When all of the KEEMUX mode LEDs are OFF the user is in Normal Mode, controlling the CPU to which the user is connected through the KEEMUX.

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. To enter Edit Mode press <Ctrl> + <E> from Command Mode.   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 the user 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	→
Move cursor one position to the left	←
Previous port	↑
Next port	↓
Selects the first port on the switch	Home
Selects the last port on the switch	End
Toggles between insert and overstrike	Insert **(The character either gets inserted and the remainder of the name gets shifted to the right, OR the current character gets overwritten.)**
Erase current character	Delete
Erase previous character	←Backspace
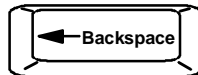
Figure 12- Edit Mode screen

When finished making changes in Edit Mode, press <Enter> 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.   If the <ESC> key is pressed instead of <Enter>, all changes made will be cancelled and the display will return to the previous menu.

Search Mode

Search Mode allows the user to enter and maneuver through a list of CPU names. As the user types, the best matching CPU name is selected. The list of CPUs may also be searched for a specific (or similar) name. From Command Mode, type any alphabetical or numeric character to enter Search Mode. The following commands are valid when the search option has been invoked from Command Mode.
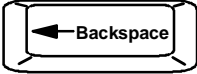
Function: **Keystroke:**

Erase previous character
in search name

Move cursor one position to
the right in search name

Move cursor one position to
the left in search name

Select previous port

Select next port

Figure 13- Search Mode screen

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

Switch to selected port

Maintenance Mode

Maintenance Mode allows a user to customize the On Screen Display to their requirements. To enter Maintenance Mode press <Ctrl> + <M> from Command Mode.

Function: **Keystroke:**

Reset all of the port names

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

Figure 14- Maintenance Mode screen

16

Maintenance Mode (Cont'd)

Function: **Keystroke:**

Make OSD window taller

| **T** |

Make OSD window shorter

| **S** |

Change user password.
(Present only when a standard
user is logged in.)

| **P** |

Log current user out and return
to User Login Mode.

| **Q** |

Activate security features.
Present only when security is
available but not active.

| **A** |

Enter Administration Mode.
Option present only when administrator
is logged in.

> *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.*

Save OSD window parameters
for the port

| **Enter** ⏎ |

Return to Command Mode

| **Esc** |

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). To enter Help Mode press <F1> from Command Mode. The following options allow the user to quickly obtain information on any command.

Function: **Keystroke:**

View the previous page of help
if available

| **Page Up** |

View the next page of help
if available

| **Page Down** |

Exit HELP and return to previous
mode

| **Esc** |

RS232 CONTROL

(Optional)

RS232 Connections and Configuration

Rear View of KEEMUX-P4-RS
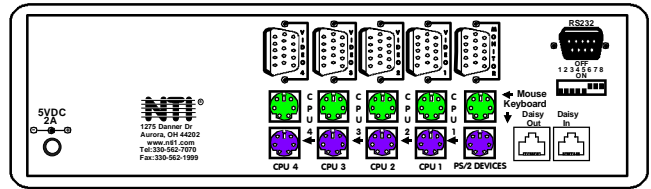
Remote Connection

The RS232 Interface (optional) 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:

RS232 CONNECTOR (DB-9 FEMALE)

PIN	SIGNAL	FUNCTION
1	CD	Carrier Detect
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	-	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, host handshaking is bypassed and TXD and RXD are the only active signals. A straight-through DB-9 serial cable **(not null modem- see specifications on page 26)** will work for most CPUs. To daisy chain multiple units, a Matrix Y-1 cable is used (see page 19) for each KEEMUX in the chain. The last unit in the chain should have DIP switch 1 ON (see table under "Unit Address and Loop Back" on page 19).

Baud Rate

The baud rate can be changed by powering down the unit, changing the 8 position RS232 DIP switch on the rear of the KEEMUX, and then powering back up. This table shows how to set the baud rate.

DIP SWITCH			BAUD RATE
4	3	2	
OFF	OFF	OFF	300
OFF	OFF	ON	600
OFF	ON	OFF	1200
OFF	ON	ON	2400
ON	OFF	OFF	4800
ON	OFF	ON	
ON	ON	OFF	9600
ON	ON	ON	

OFF
1 2 3 4 5 6 7 8
ON
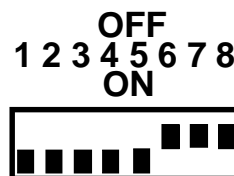
Unit Address and Loop Back

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 RS232 DIP switches, 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. Use the table below to set the unit address.

DIP SWITCH				UNIT ADDRESS
8	7	6	5	
OFF	OFF	OFF	OFF	0 (not valid)
OFF	OFF	OFF	ON	1
OFF	OFF	ON	OFF	2
OFF	OFF	ON	ON	3
OFF	ON	OFF	OFF	4
OFF	ON	OFF	ON	5
OFF	ON	ON	OFF	6
OFF	ON	ON	ON	7
ON	OFF	OFF	OFF	8
ON	OFF	OFF	ON	9
ON	OFF	ON	OFF	10
ON	OFF	ON	ON	11
ON	ON	OFF	OFF	12
ON	ON	OFF	ON	13
ON	ON	ON	OFF	14
ON	ON	ON	ON	15

Note: In order to connect multiple KEEMUX units together a Matrix-Y-1 cable must be used. (See Fig. 15.)   See Fig. 16 for the pinout of the Matrix-Y-1 cable.   The Matrix-Y-1 cable is available from Network Technologies Inc.
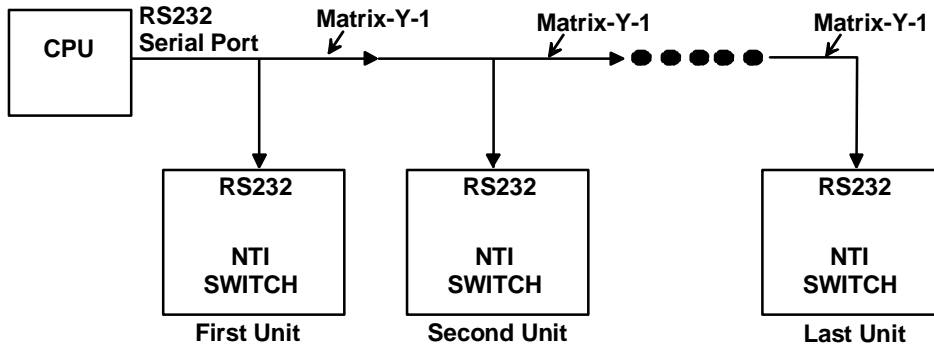
Figure 15- RS232 connection with Matrix-Y-1 cable

Wiring Schematic of Matrix-Y-1 cable
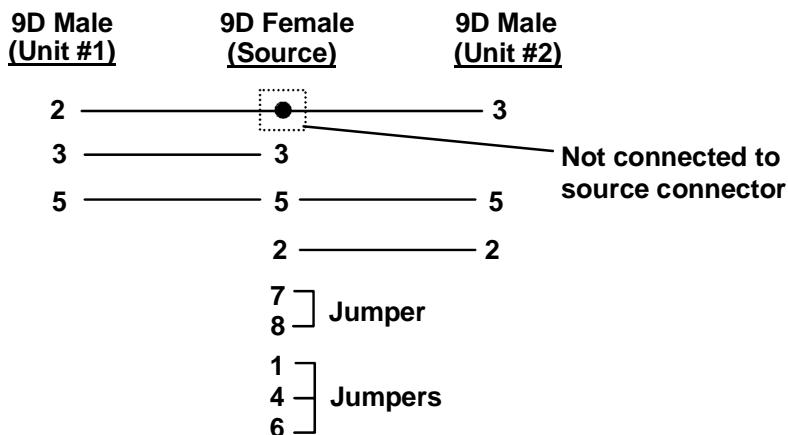
Figure 16- Pinout of Matrix-Y-1 cable

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 along with a response from the addressed unit . 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.

Note: To use this command protocol, the user is required to write a program that will send an entire command string all at once, not character by character. Programs that send one character at a time (such as HyperTerminal) cannot be used to control the KEEMUX. Alternatively, the user may use the NTI Switch Control Program or SerTest to control the KEEMUX via RS232 (see page 21).

RS - reset unit(s) to default power-up configuration
FORMAT: RS AA<CR>
                 RS = "reset unit" command followed by at least one space
                 AA = unit address; if 00, all units on the bus will be reset and no response will be
                 returned
RESPONSE: *<CR> if command received and executed OK
                          -OR-

                 ?<CR> if syntax or transmission error occurred
Note: The RS command does not change the actual configuration.

CS - change single USER channel

FORMAT: CS AA,XX,YY<CR>

                 CS = "change single output" command followed by at least one space

                 AA = unit address

                 XX = input/CPU to connect

                 YY = output/USER to change

RESPONSE: *<CR> (command received and executed OK)

                          -OR-

                  ?<CR>   (syntax or transmission error occurred)

RO - read single USER channel

FORMAT: RO AA,XX<CR>

                 RO = "read output" command followed by at least one space

                 AA = unit address

                 XX = output/USER to read

RESPONSE: *<CR> (command received and executed OK)

                   XX<CR> (XX = input/CPU connected)

                          -OR-

                 ?<CR> (syntax or transmission error occurred)

RU - read unit size

FORMAT: RU AA<CR>

                 RU = "read unit size" command followed by at least one space

                 AA = unit address

RESPONSE: *<CR> (command received and executed OK)

                 XX,YY<CR> (XX = # of CPU's, YY = # of USERS)

                          -OR-

                 ?<CR> (syntax or transmission error occurred)

NTI Switch Control Program For Windows 9X, NT, 2000, XP, Vista, 7,8 and 10

The NTI Switch Control Program is an easy and powerful graphical program that controls NTI switches through an RS232 interface.   The NTI Switch Control Program is available from http://www.networktechinc.com/srvsw-pc.html#tab-6.   To install the NTI Switch 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 NTI Switch Control Program performs best on monitors set to a screen resolution of at least 800 X 600. Instruction for using the NTI Switch 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**

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/Single-user switch RS232 interface. The SerTest program is automatically loaded when installing the NTI SWITCH 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

- Switch Operations   - send commands to the unit.
- Ethernet Operations   - set ethernet connection variables (not applicable to this model)
- Setup Options   - set COM port, baud rate, and unit address
- About SerTest   - display the program version

If Switch Operations is selected, the following menu is displayed:

SWITCH OPERATIONS

1) Reset Unit
   - send a reset command to the switch
   - the current unit address is displayed in parentheses

2) Reset All Units
   - send an internal reset command to all switches

3) Connect Output/User to an Input/CPU
   - connect an output to an input

4) Connect All Outputs/Users to an Input/CPU (not applicable to this model)
   - connect all outputs to an input

5) Connect Audio Output/User to an Input/CPU (only applicable to models with audio support)
   - connect an output to an input (Audio ports only)

6) Connect All Audio Outputs/Users to an Input/CPU (only applicable to models with audio support)
   - connect all outputs to an input (Audio ports only)

7) Change Mute Status for Audio Output/User (only applicable to models with audio support)
   - mute or un-mute the Audio port output

8) Change Volume for Audio Output/User (only applicable to models with audio support)
   - change Audio port output volume

9) Read Connection for Output/User
   - read what input is connected to the specified output

a) Read Connection for Audio Output/User (only applicable to models with audio support)
   - read what input is connected to the specified output

b) Read Mute Status and Volume for Audio Output/User (only applicable to models with audio support)
   - read the volume and the mute status of the specified output (Audio ports only)

c) Read Unit Size
   - read the switch size (number of inputs and outputs)

d) Read Unit Version/Revision String (not supported by this model)
   - read a string containing the switch version, type, and size

e) Save I/O Connections into Unit Memory   (not applicable to this model)
   - save the connections into switch memory bank

f) Restore I/O Connections from Unit Memory (not applicable to this model)
   - restore the connections from switch memory bank

g) Save All Units I/O Connections into Units Memory (not applicable to this model)
   - save the connections into switch memory bank, command for all switches

h) Restore All Units I/O Connections from Units Memory (not applicable to this model)
   - restore the connections from switch memory bank, command for all switches

i) 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

ETHERNET OPERATIONS   (not applicable to this model)

SETUP OPTIONS

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 of the switch to be connected to by this program
   - the current address is displayed in parentheses

For any selection that requires user input, the user is prompted. When commands are sent to the KEEMUX, the command string and KEEMUX 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.

KEYBOARD MAPPING

The keyboard configuration of each CPU is saved in the KEEMUX. 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 Port 4 is accessed again.

HOW TO DISABLE OPERATING MODES

The operating modes of the KEEMUX can be disabled if a user desires to do so.   The Command Mode can be disabled which would also disable the Scan and Broadcast Modes, or, the Scan and/or Broadcast Modes can be individually disabled leaving the other features in Command Mode enabled.

To disable these operating modes, the user must get access to the jumper block.   This block is located close to the DIP switches on the circuit board the keyboards plug into (called the digital board) inside the KEEMUX. (See Fig. 17.)
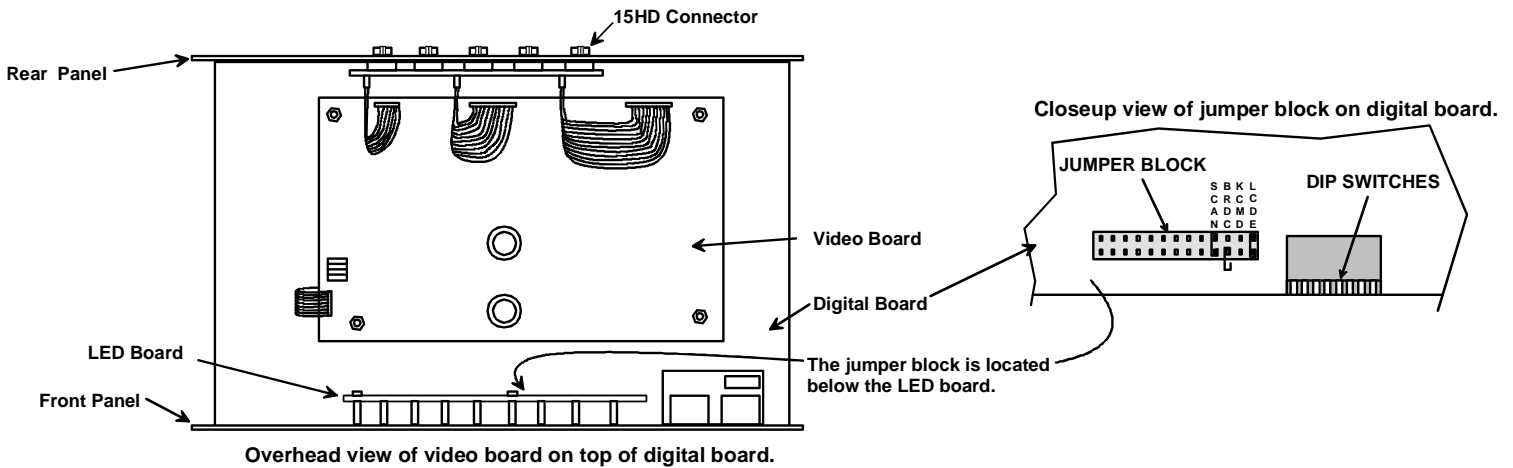
15HD Connector

Rear Panel

Closeup view of jumper block on digital board.

JUMPER BLOCK

DIP SWITCHES

S B K L
C R C C
A D M D
N C D E

Video Board

Digital Board

LED Board

The jumper block is located below the LED board.

Front Panel

Overhead view of video board on top of digital board.

Figure 17- Location of the jumper block

If the unit is a rackmount style, the digital board is located directly beneath the cover of the unit, requiring the user to only remove the 10 screws from the cover to get access.   With the cover removed, the jumper block will be easy to locate. Follow the instructions under "CONFIGURING THE JUMPER BLOCK" on page 24 to disable the desired mode(s).

If the unit is in a plastic case, the digital board is located on the bottom of the case, requiring the user to partially disassemble the unit to gain access to the jumper block.

For models KEEMUX-P*x* in a plastic case:

1. Make sure the KEEMUX is completely disconnected from all CPU components.   Be sure to unplug the KEEMUX from the electrical outlet.
2. Remove the two Philips-head screws from the underside of the KEEMUX and set the KEEMUX on a firm and flat surface, bottom down. (See Fig. 18.)
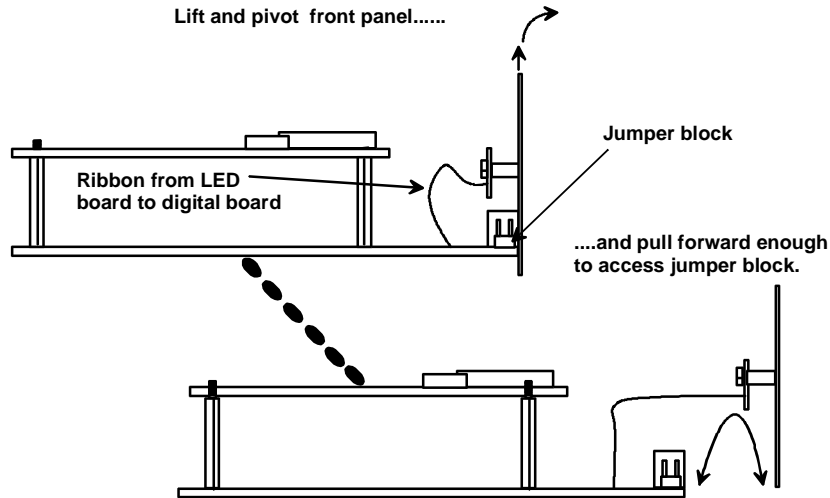
Philips-head screws holding the plastic case together
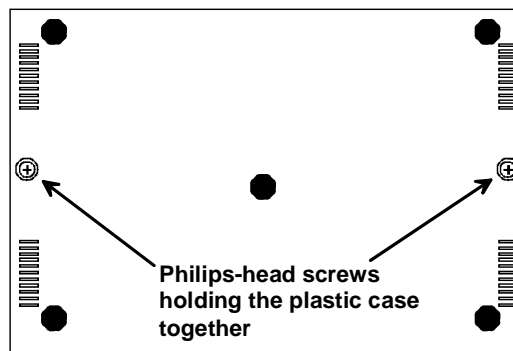
View of bottom of plastic case

Figure 18- Remove screws to open case

3. Remove the top half of the plastic case from the KEEMUX.

NOTE: Before proceeding, it is important to discharge any static charge you may be carrying by touching any large metal object (away from the KEEMUX).

4.   With it loosened, grasp firmly the front panel and slide the front panel up out of the slots in the plastic case that support it. Once clear of the case, pivot the assembly forward approximately 1", just enough to provide access to the jumper block. (See Fig. 19.)   Be careful not to dislodge the connection of the ribbon connecting the front panel to the digital board.   If it appears to become loose, be sure to reseat the connection before re-assembly. Now follow the instructions under "CONFIGURING THE JUMPER BLOCK" on page 24.

Lift and pivot front panel......

Jumper block

Ribbon from LED board to digital board

....and pull forward enough to access jumper block.

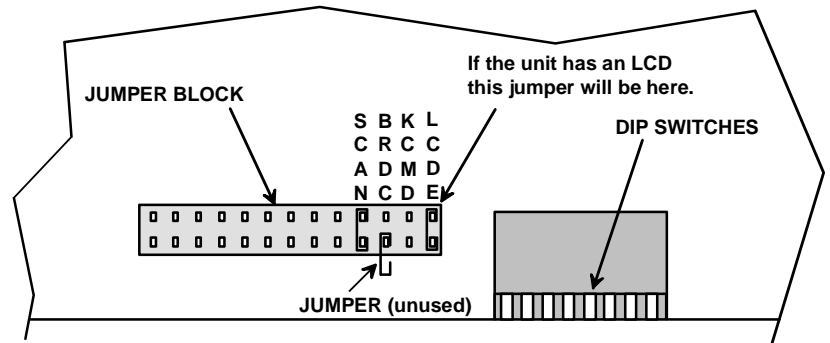**Pull front panel assembly far enough forwared to provide access to jumper block.**

Figure 19- Clear the jumper block for configuration access

Configuring The Jumper Block

Once the jumper block is exposed, apply a jumper across the appropriate pins to disable the desired mode(s) according to the chart below.

Pin Designation	Mode
KCMD	Command Mode*
BRDC	Broadcast Mode
SCAN	Scan Mode

*Note: Putting a jumper across pins KCMD to disable Command Mode will also disable Broadcast and Scan Modes.

JUMPER BLOCK

If the unit has an LCD this jumper will be here.

DIP SWITCHES

S B K L
C R C C
A D M D
N C D E

JUMPER (unused)

**Drawing shows jumper across SCAN pins, disabling Scan Mode. Broadcast Mode is still enabled.**

Figure 20- Place jumpers according to desired functionality

Once the desired jumpers are in place, reverse the disassembly process to re-assemble the KEEMUX.   Be particularly careful to make sure all DIP switches are in the OFF position (see Fig. 1 on page 3).   Do not turn the power ON until the unit has been properly re-assembled.

SPECIFICATIONS FOR STRAIGHT-THROUGH RS232 SERIAL CABLE

KEEMUX to PS2 CPU (9 PIN)

KEEMUX		Signal	PS/2 CPU	
9 pin		**Direction**	**9 pin**	
Function	**Pin #**		**Pin #**	**Function**
RxD	3	←	3	TxD
TxD	2	→	2	RxD
CTS	7	←	7	RTS
RTS	8	→	8	CTS
DSR	4	←	4	DTR
DTR	6	→	6	DSR
SG	5	—	5	SG

① ② ③ ④ ⑤
⑥ ⑦ ⑧ ⑨
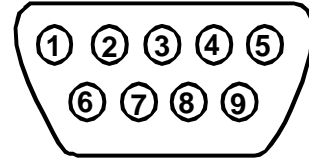
**Mating Face
of a 9D Male**

Terminals 7 and 8 are jumpered together and terminals 4 and 6 are jumpered together.

TROUBLESHOOTING

If the KEEMUX is not working properly, please look for a solution in the list below:

PROBLEM: Keyboard Errors
SOLUTION: Check cable connections on each CPU and the switch.

PROBLEM: No Video
SOLUTION: Check cable connections on each CPU and the switch. Verify that keyboard, video, and mouse connect from each CPU to matching ports. After reconnecting, the CPU may need to be re-booted in order to sense the monitor connection.

PROBLEM: No Mouse Movement
SOLUTION: Check cable connections on each CPU and the switch. Verify that keyboard, video, and mouse connect from each CPU to matching ports. Verify that the mouse driver was loaded.

PROBLEM: No Keyboard Activity after running shutdown program on IBM PowerServer 220
SOLUTION: 1.   Select a different port from the front panel buttons.
2.   Turn power OFF to PowerServer 220.
        (either step above will enable keyboard)

PROBLEM: Monitor shuts down while working with OSD menu
SOLUTION: Disengage or increase time setting of CPU's monitor "sleep" mode from the BIOS and/or control panel display settings.   (The CPU does not sense activity while in the OSD menu)

   If a solution was not found in the list above, answers may be found in the Frequently Ask Questions (FAQs) section of our website at http://www.networktechinc.com or call us directly at (**800) 742-8324 (800-RGB-TECH)** or **(330) 562-7070** and we will be happy to assist in any way we can.

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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