

MXCORE 32X32

User Manual

Expandable HDMI Video Switch Matrix



Smart-AMV
SMART AUDIO VIDEO INNOVATION

| TABLE OF CONTENTS | |
|-----------------------------------|-------|
| WHAT'S IN THE BOX? | 2 |
| INTRODUCTION | 3 |
| FEATURES | 3 |
| APPLICATIONS | 3 |
| EDID EMULATION | 3 |
| TECHNICAL SPECIFICATIONS | 4 |
| HARDWARE INSTALLATION | 5 |
| FRONT PANEL CONTROL | 6-7 |
| ESTABLISHING AN RS-232 CONNECTION | 8 |
| USING THE SmartControl SOFTWARE | 9-11 |
| USING RS-232 CONTROL | 12-16 |
| USING NET-IP-PRO (TCP/IP CONTROL) | 17 |
| USING IR REMOTE CONTROL | 18 |
| LIMITED WARRANTY STATEMENT | 19 |

WHAT'S IN THE BOX?

| PART NO. | QTY | DESCRIPTION |
|--------------|-----|--|
| MXC-HD32X32S | 1 | MXCORE-HD Expandable HDMI 32X32 Matrix Switcher. |
| CCPWR06 | 1 | 6' Power Plug Cable |
| | 1 | Quick Start Guide |



Figure 2-1

INTRODUCTION

The MXCORE 32X32 HDMI Matrix Router allows you to route up to 32 HDMI input sources to up to 32 HDMI display devices. The MXCORE 32X32 supports high resolutions of up to 1080p, along with 7.1 Digital Surround Sound Audio with no loss of picture clarity and no ghosting of images. The HDMI signal allows the transfer of both audio and video signals simultaneously. The Matrix also supports HDMI 1.4, HDCP, and DVI 1.0 protocol. The Matrix supports 12-bit color depth for all HDTV resolutions, including 1080p/60, and PC resolution up to 1920 x 1200.

FEATURES

- Switches any HDMI source input to any output up to 32x32
- Sources can be routed independently to any display
- Supports high definition video resolutions of 480p, 720p, 1080i and 1080p
- Supports PC resolutions VGA, SVGA, SXGA, UXGA and WUXGA (1920 x 1200)
- Supports digital video formats in Deep Color to 12bit per color
- Compatible with HDMI version 1.4 and DVI
- Supports 7.1 Digital Surround Sound Audio
- Supports EDID for total control of compliant displays
- Delivers uncompressed digital video with zero signal loss
- Input cable equalization
- HDMI Output up to 25 feet and longer with Premium HDMI Cables
- Remote switching via RS-232 with SmartControl software
- Front panel Switching with 4x40 LCD display
- IR remote control (Optional)
- Web based remote control via TCP/IP with NET-IP-CONTROL (Optional)

APPLICATIONS

- Wall Displays
- Digital Signage
- Airports
- Dealer Rooms
- Control Rooms
- Audio/Visual Presentations
- Shopping Centers
- Security
- Point-of-Sale
- Hotels/Resorts

EDID Emulation

Each input port incorporates our unique “SmartEDID” programmable technology capable of learning video resolutions, audio settings and 3D data. The EDID memory of each display is stored in a single flash memory, giving users the freedom to choose any EDID and the emulation of any display.

The MXCore Series enables HDMI and DVI sources to continuously read the EDID of a monitor with full emulation at any given time. The EDID management allows learning and saving of up to 100 displays, including audio. With the support of HDMI 1.4 HDCP, the MXCore Series can learn EDID from any display provided.

TECHNICAL SPECIFICATIONS

| VIDEO | |
|---------------------------|--|
| Video Amplifier Bandwidth | 3.2G |
| Input Video Signal | Video (TMDS) 0.5~1.0Vpp |
| Input DDC Signal | 5 volts |
| Signal Supports | HDMI Standard, DVI and HDCP compliant |
| Pixel Rates | Clock frequency beyond 165Mpix/second |
| Format | HDMI Single Link, 4:4:4 and 4:2:2 data input formats |
| Resolution | HDMI up to 1080p and DVI up to 1920x1200x60hz |
| Input Ports | Up to 8 cards with 4 HDMI Type A 19-pin Female connectors each |
| Output Ports | Up to 8 cards with 4 HDMI Type A 19-pin Female connectors each |
| Input Equalization | Automatic |
| Input Cable Length | Up to 25 ft. |
| Output Cable Length | Up to 25 ft. |
| Video Type | RGB/YCBCR : 24/30/36-bits,YCBCR: 8/10/12/16/20/24-bits |
| AUDIO | |
| Audio Supported | DTS-HD Master Audio, Dolby True- HD & Dolby Digital Plus integrated in HDMI signal |
| CONTROL | |
| Front Panel | 2x8 keyboard with 4x40 LCD |
| RS232 | DB9 Female, 9600 BPS, N, 8, 1, No flow control |
| IR (Optional) | 38Khz RC5 |
| TCP/IP (Optional) | With NET-IP-PRO |
| OTHER | |
| Dimensions | 17.25" W X 8.75" H X 12.5" D (Front plate is 19" W for standard rack) |
| Weight | 21.5 Lbs. |
| Power Internal | 50/60Hz, 100~230 VAC |
| Consumption | 300W |
| Operating Temp. | 32 to 131 °F (0 to 55 °C) |
| Storage Temp. | -4 to 185 °F (-20 to 85 °C) |
| Humidity | Up to 95% RH (no condensation) |

HARDWARE INSTALLATION

1. Power off the computers and displays.
2. Connect the HDMI video cables from the video sources to the HDMI inputs on the rear of the MXCORE 32X32.
3. Connect the displays to the HDMI outputs on the rear of the MXCORE 32X32.
4. Optionally connect the IR Eye for IR remote control.
5. Optionally connect a computer to the RS-232 port on the MXCORE 32X32 or a NET-IP-PRO for additional remote control.
6. Power on the Video sources and displays.
7. Power on the MXCORE 32X32.

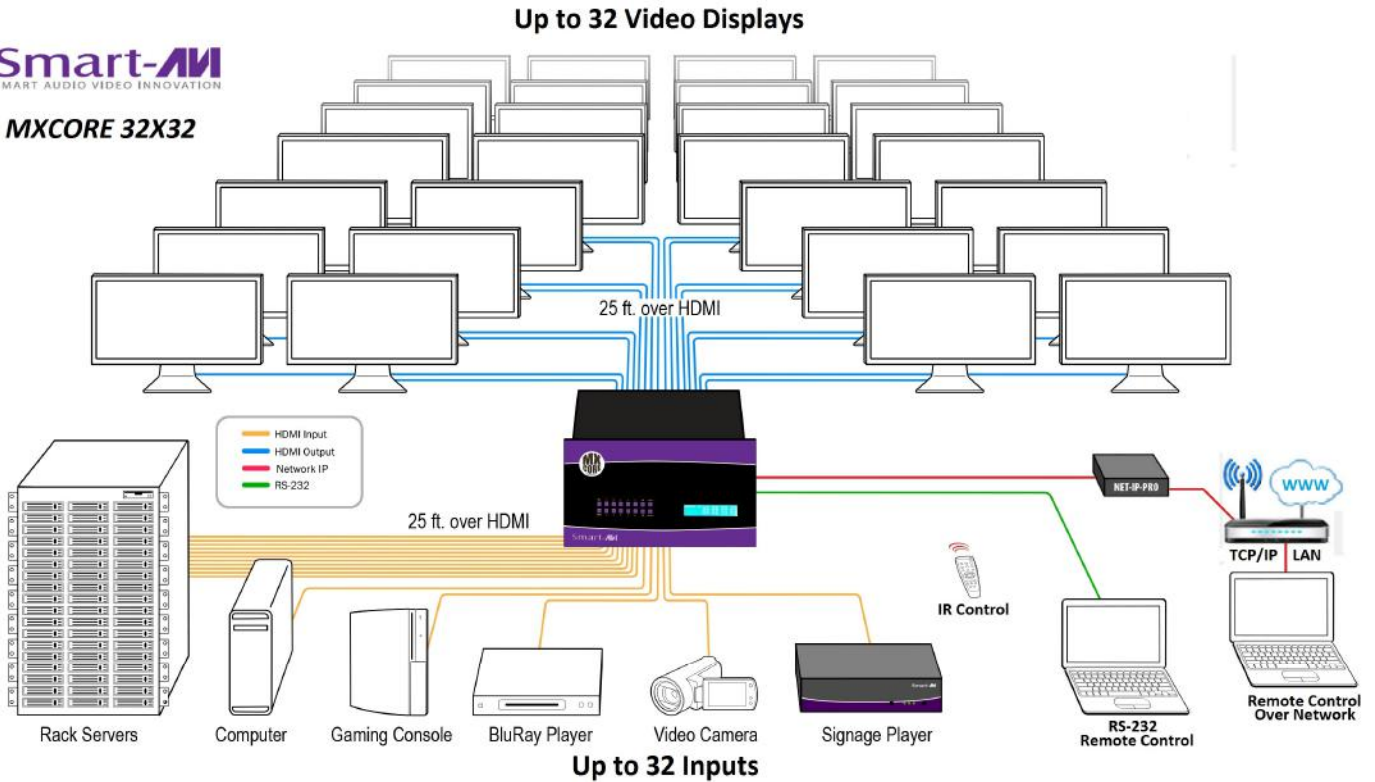
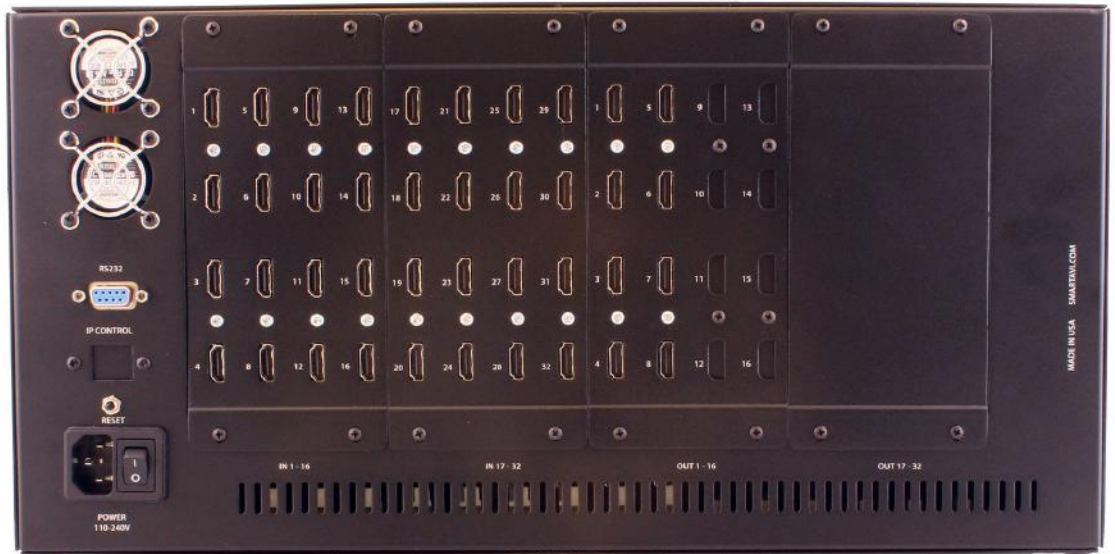


Figure 5-1

Figure 5-2



FRONT PANEL CONTROL

Front Panel Buttons

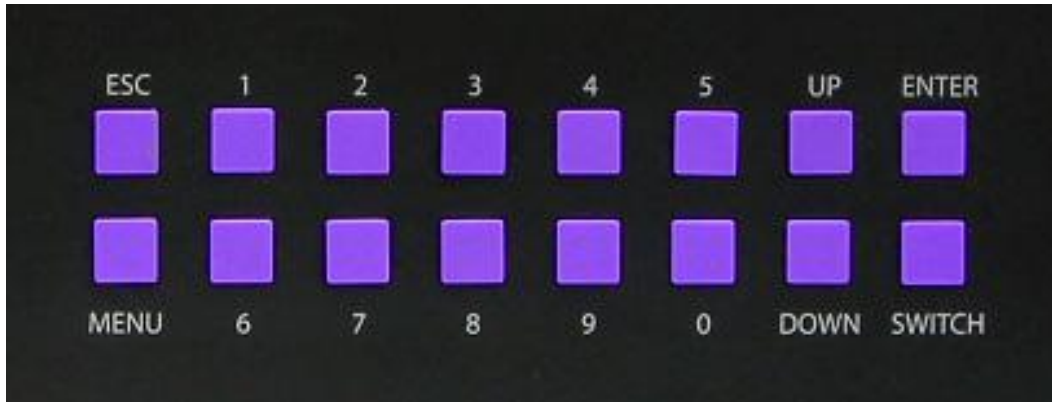


Figure 6-1

To lock the front panel buttons and avoid any accidental changes, press ESC + MENU + ENTER + SWITCH at the same time. The display will indicate that it is locked. Repeat the procedure to unlock the front panel.

Front Panel Display

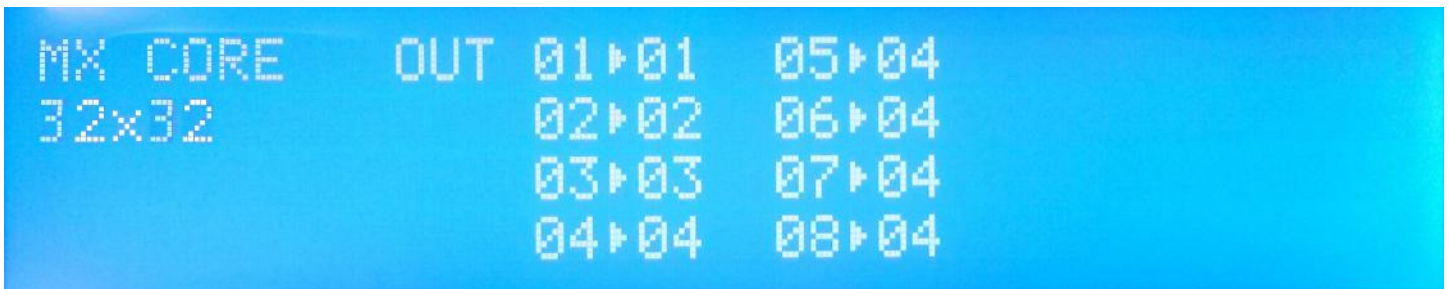


Figure 6-2

Default Display:

During normal operation, you will see a list of ports on the front panel display.

To assign an output to an input, press SWITCH. A blinking block cursor will appear. Use UP and DOWN to select the input that you would like to assign. Once the cursor is over the desired input port, press ENTER to enter editing mode. Press UP and DOWN to select the output port. Once you have selected an output, press ENTER to save the configuration. To escape from editing mode, press ESC.

FRONT PANEL CONTROL (Continued)

Main Menu

To view the menu, press MENU. There are 6 menu options available:

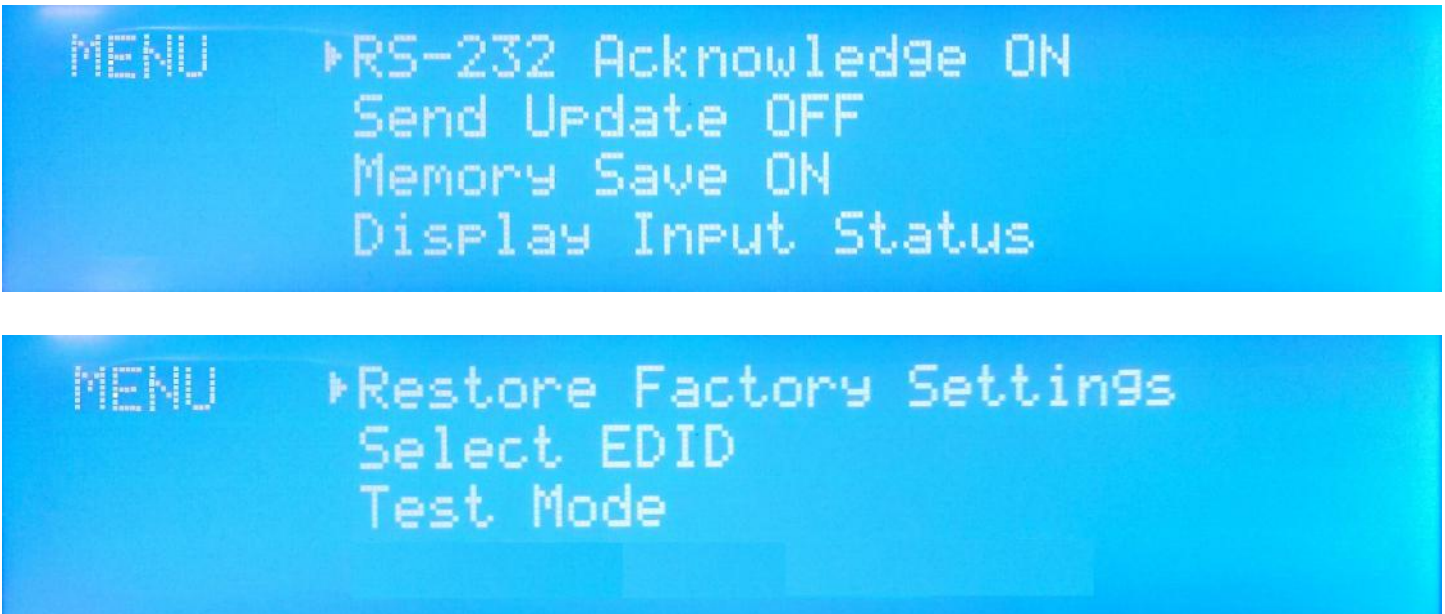


Figure 7-1

RS-232 Acknowledge - Sets the MXCORE 32X32 to send a confirmation that an RS-232 command has been received.

Send Update - Sets the MXCORE 32X32 to send an RS-232 command back to the controller when the configuration is changed via the front panel or remote control (optional).

Memory Save - Sets the MXCORE 32X32 to save the configuration when powered off.

Display Input Status - This displays the status of the inputs. If no input is present, the display will read NONE. This is the default view.

Restore Factory Settings - Sets the HDR32x32 to the default factory configuration.

Select EDID - Gives the option to learn the EDID of your display or choose a programmed EDID that is compatible with your monitor.



Figure 7-2

ESTABLISHING AN RS-232 CONNECTION

Before you start:

Controlling a Smart-AVI device via RS-232 requires an RS-232 card installed on your computer or a USB to RS-232 adapter. Below are instructions on how to create an RS-232 connection between a PC and the Smart-AVI device.

Make sure to use communication settings **9600 bps, N, 8, 1, No flow control**.

Check the device and your PC to determine if you need a male to male or a male to female cable and how long it needs to be. The Smart-AVI device requires a straight through cable. You can use a Null Modem Adapter to convert a crossed cable to a straight through cable. Examples of crossed and straight through cable pin-outs are shown below. The standard maximum length for an RS-232 cable is 50 feet. Call our Smart-AVI Support Engineer if you require more information.

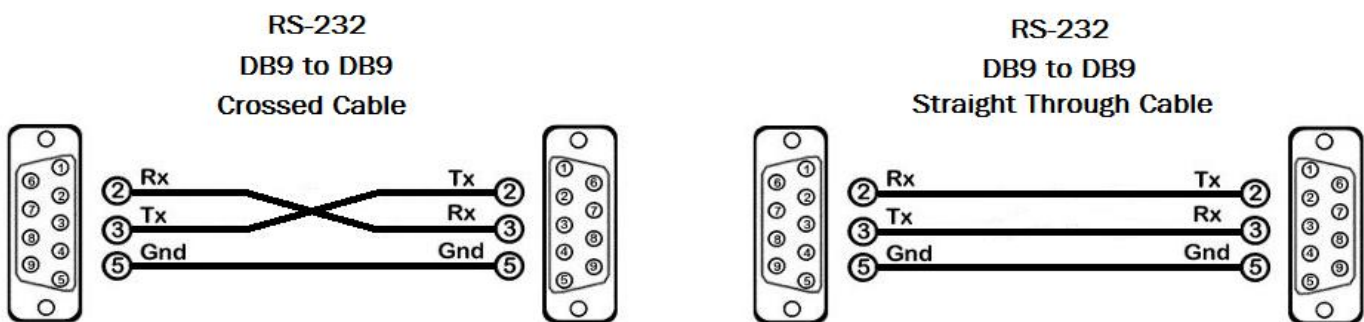


Figure 8-1
Examples of 9 pin RS-232 Straight Through and Crossed Cables

Establish a connection to the Smart-AVI device:

1. Connect an RS-232 cable to the RS-232 connector on the PC.
2. Connect the other end of the cable to the RS-232 port of the Smart-AVI device.
3. Use Windows Control Panel / Device Manager to identify the Com port number. See instructions and Figure 8-2 below.
4. Power on the device.

If you are using a USB to COM port adapter on a Windows PC and need to identify the COM port used, do the following:

1. Click on the start button.
2. Click on Control Panel.
3. Click on Device Manager. In Windows 7 you need to click on "Hardware and Sound" to get to Device Manager.
4. Click on the arrow next to Ports (COM & LPT). You should see the name of your adapter and the COM port number in use.

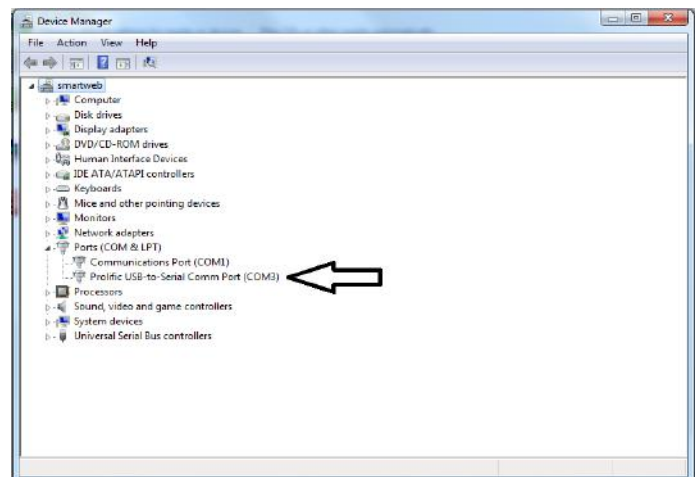
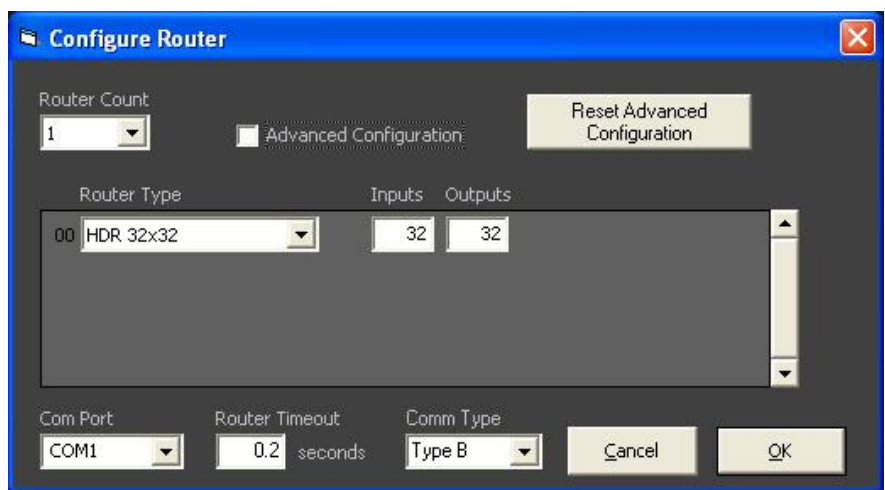


Figure 8-2

USING THE SmartControl SOFTWARE

RS-232: Controlling the MXCORE32X32 has never been simpler with SmartControl software. With SmartControl, you can assign a unique name to each port on the MXCORE32X32, as well as each display, customizing projects to meet your needs. Although all the functions of the matrix are available locally on the front panel of the MXCORE32X32, using SmartControl allows for customization of all the matrix functions.

- Download the Smart Control Pro software from the Smart-AVI website. www.smartavi.com
- Double click SmartControlPro-v5-0-03_Installer.exe in order to initiate software installation.
- Click Install. After installation has completed, click CLOSE.
- In order to use the software, click on the START button>Programs>SmartControl Pro.
- There you should see a help file, the SmartControl Pro launcher as well as a shortcut to uninstall SmartControl Pro. Click on SmartControl Pro in order to launch the software. When the software starts you will see a screen like this:



Advanced Configuration:

If you have more than one Router installed you will want to check this box.

Router Type:

Select HDR 32X32

Inputs/Outputs:

Enter the number of Inputs/Outputs your MXCORE32X32 has.

Com Port:

See the section in this manual on establishing an RS-232 connection for instructions on how to identify the com port number.

Router Time out:

This field is set to 0.2 by default, meaning the computer acknowledges commands almost instantly. Sometimes a computer takes longer to respond. This setting should be left at 0.2. Try longer timeout settings if router error messages occur.

After you have entered in the necessary information click OK. This will now take you to the Main Routing Window where you can route the different video/audio connections.

Figure 9-1

USING THE SmartControl SOFTWARE (continued)

Main Routing Window

The Main Routing Window enables you to control the router(s) connections by means of the Crosspoint panel, the button panel, or with pre-recorded routes called macros.

Crosspoint Panel: This is the simplest way to route the connections. Simply click on the cross point itself. The input on the left will then be routed to the output above.

Note: Inputs can be routed to several different outputs, but each output can only have a single input at

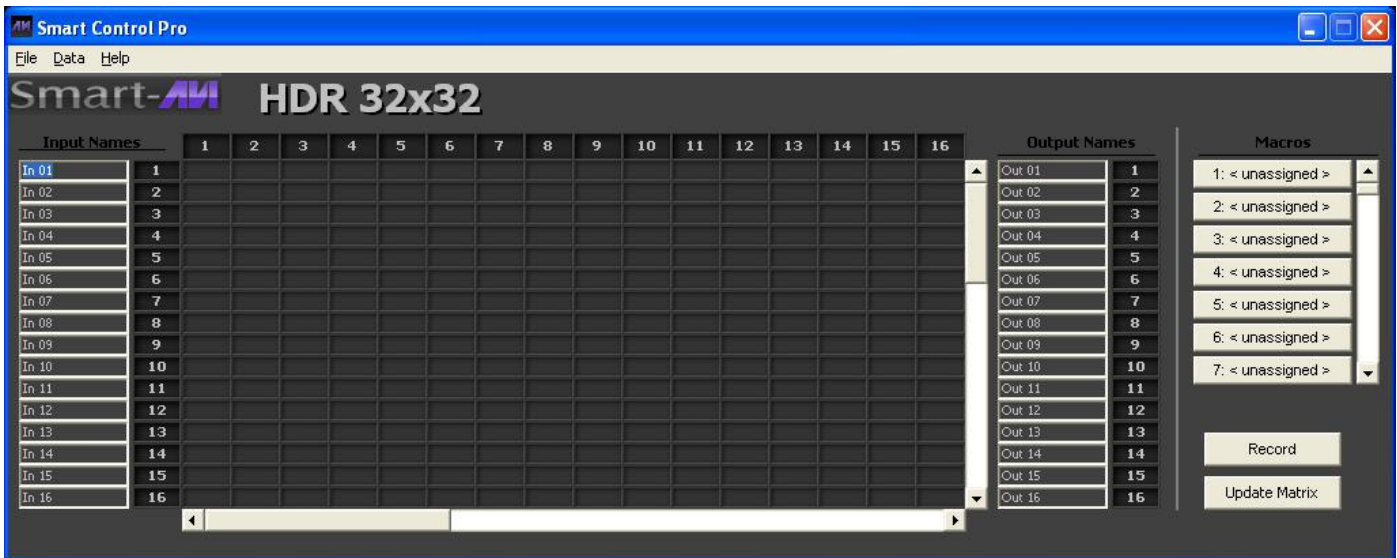


Figure 10-1

On the screen shown in figure 10-1 the input buttons run down the left side and the output buttons run across the top.



Figure 10-2

On the screen shown in figure 10-2 source 1 is sent to display 1, source 2 to display 2, 3 to 3, 4 to 4, 5 to 5, etc.

USING THE SmartControl SOFTWARE (continued)

The Button Panel:

Output Options:

To select multiple outputs, in the row for any input or source, click the button under the desired outputs or displays.

Input Options:

To route an input to all the outputs at once, hold the control key down and click on an input.

Macros: This section of the window is used to save and play back macros. Macros store a set sequence of routes.

To record a macro:

1. Click on the Record button (last button shown). A blinking “recording” message below this button will be displayed to indicate that all routes are being recorded.
2. Select the desired crosspoints. There is no limit on the number of routes you may record. If you click a macro button while in the record mode, the macro will be executed, and these routes will be added to the recording. This makes it possible to combine the routes of two or more macros into one bigger macro.
3. When finished, click the “Save Macro” button. You will be instructed to then click on one of the macro buttons. Doing this will save the recorded routes to that button. To cancel saving the macro, click the “Cancel Save” button.
4. To play back a macro, simply click on one of the 50 macro buttons. Use the scroll bar to bring any of these into view.

The macros are automatically saved in the current configuration file. They are also saved when you select the File/Save Configuration... menu.

To save macros in a separate file for a special purpose, select the File/Save Macros...menu.

USING RS-232 CONTROL

Setting up the Terminal Application:

1. Open Hyperterminal on the PC. (or use the terminal client of your choice)
2. Use the default settings to create a connection to the device: **9600, 8, N, 1.**(see settings on right).
3. Be sure that Flow Control is *None*.
4. The output of the device will be the same as the PC.

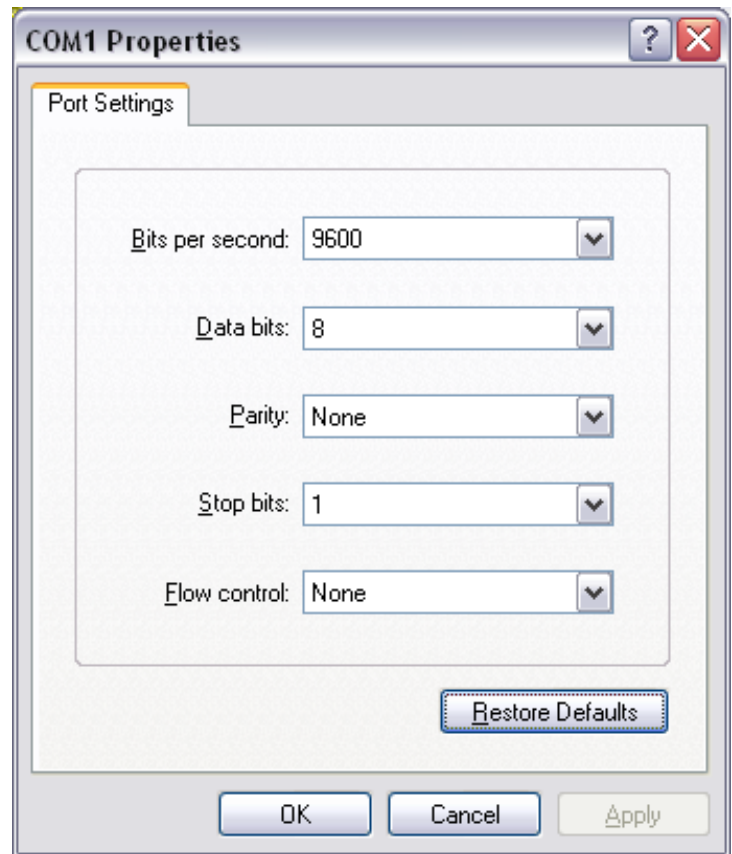


Figure 12-1

There are two primary modes of operation for the MXCORE32x32: *Command Mode* and *Debug Mode*. When connecting to the MXCORE32x32 via RS-232, it will start in Command Mode. Debug Mode is a user friendly way of operating the MXCORE32x32 and includes instructional menus. The following section details the use of the Debug Mode.

When you connect to the MXCORE32x32 to a computer via an RS-232 connection and turn the MXCORE32X32 on, you will see the following screen (results from HDR32x32 shown):

```
SmartAVI MXCore 32x32 ver: ##.##.##.##
```

Debug Mode: To enter Debug Mode type “d on <enter>” and you will see the following prompt:

```
d on
Debug mode:
DBG>
```

To exit Debug Mode (and enter Command Mode) type “d off <enter>”:

```
DBG>d off
Command line debugging disabled.
Type “d on” to re-enable.
```

USING RS-232 CONTROL (Continued)

To display the help menu for a list of commands, type “? <enter>” or “help <enter>“
DBG>?

=====
Command Line Interface Help:

| | | |
|---------|--------------------------|--|
| D | Enable/Disable debug | d [on]/[off] |
| Sw | Switch Port | sw [output] 1-32 [input] 1-32 |
| br | Broadcast Port | br [input] 1-32 |
| om | Set output mode | om [output a] [mode# (0-2) ?] |
| do | Disable outputs | do [output],[output]... |
| eo | Enable outputs | eo [output],[output]... |
| h | Toggle Hotplug | h [input] |
| olev | Set output level | olev [output a ? r] [level (1-10)] |
| ilev | Set Input EQ level | ilev [input ? r] [level (1-3)] |
| ostatus | View output status | ostatus [output a] |
| istatus | View input status | istatus [input a] |
| q | Query Crosspoints | |
| reset | Restore Factory Settings | |
| boot | Reboot matrix | |
| info | Display matrix info | |
| edid | Select EDID | edid [map (1-2) s] |
| help | Command list | |
| ? | | |

=====
To display the MXCORE 32X32 information including cross-point data, type “q <enter>”:
DBG>q

| Output | Input | Output | Input |
|---------|-------|---------|-------|
| 1...1 | | 17...11 | |
| 2...2 | | 18...1 | |
| 3...3 | | 19...2 | |
| 4...4 | | 20...3 | |
| 5...5 | | 21...4 | |
| 6...6 | | 22...5 | |
| 7...7 | | 23...6 | |
| 8...8 | | 24...7 | |
| 9...9 | | 25...8 | |
| 10...10 | | 26...1 | |
| 11...11 | | 27...9 | |
| 12...12 | | 28...10 | |
| 13...1 | | 29...11 | |
| 14...11 | | 30...12 | |
| 15...12 | | 31...12 | |

USING RS-232 CONTROL (continued)

To switch ports, type “sw [output] 1-32[input] 1-32 <enter>”:

Example:

```
DBG>sw 2 2
```

This switches Output 2 to Input 2

To set the broadcast port, type “br [input] 1-32<enter>”:

Example:

```
DBG>br 2
```

This will send input 2 to all outputs.

```
DBG>br \
```

Sets 1:1 mode.

IN 1 to OUT 1

IN 2 to OUT 2

IN 3 to OUT 3

Etc.

```
DBG>br /
```

Sets inverse 1:1 mode.

IN 1 to OUT 32

IN 2 to OUT 31

IN 3 to OUT 30

Etc.

To learn an EDID type “edid [map (1-2) | s]”

The system will respond with the name of the EDID that has been learned.

Each card will display whether or not the EDID was learned successfully.

Examples:

```
DBG>edid 1
```

This will load the factory setting 1 EDID (SM HD) for HDMI 1080p with no audio.

```
DBG>edid 2
```

This will load the factory setting 2 EDID (SM HDAU) for HDMI 1080p including audio.

```
DBG>edid s
```

This will load the EDID of the display connected to output port 1

USING RS-232 CONTROL (continued)

Command Mode: allows raw commands to be sent to the MXCORE 32x32 to control its various functions without the use of a menu or prompt. This mode is intended for advanced use only.

There are two types of commands that you can issue the MXCORE32X32:

Commands with CHECKSUM <CHK> begin with //

Commands without CHECKSUM begin with \\

For a complete list of HEX commands used for switching your Smart-AVI Matrix see: [RS-232 Control And Integration With Third Party Software User Manual](#)

A. Sending commands with CHECKSUM:

1. To set a video crosspoint:
//FxxMyyIzz<CHK><CR>
Ex. to set video input 3 to output 12 on a router with the default frame address "0" send the command: //FO0M12I03<0x42><CR>
2. To broadcast an input to all outputs:
//FxxBzz<CHK><CR>
Ex. to broadcast input 3 to all outputs, send the command: //FO0B0402<CR>
3. To set RS-232 crosspoint:
/FxxRyyIzz<CHK><CR>
4. To disconnect RS-232 crosspoint:
//FxxDyyIzz<CHK><CR>
**A new method is to disconnect all: //FO0D<CR>*
5. To set new frame address:
//FxxFnn<CHK><CR>
6. To query crosspoints from PC:
//FxxU<CHK><CR>
 - If all outputs are connected to input 1 then a 4x4 Matrix will respond with:
<0x80><0x80><0x80><0x80><CR>
 - The router will send back one byte for each output and the string ends with a <CR>. The first byte sent is Out#1. In the example above, since there are 5 bytes total, we know that there are 4 outputs.
 - To calculate the input number, the router sends the input number with the 7th bit set.
 - o 0x80 = "1000 0000" >> input 0
 - o 0x81 = "1000 0001" >> input 1
 - o ...0x8F "1000 1111" >> input 15
7. To reboot the processor:
//BOOT<CR>
8. To restore the matrix to factory defaults:
//RESET<CR>
You must cycle matrix's power after this command.
9. To change data switching mode to RS-232 (user sets data xpoints)
//RS<CR>
10. To change data switching mode to IR (data follows last switch to any input)
//IR<CR>
11. To query version number:
//XXXX<CR>

USING RS-232 CONTROL (continued)

B. Sending commands without CHECKSUM:

1. To set a video crosspoint:

\\FxxMyylzz<CR>

Ex. to set video input 3 to output 12 on a router with the default frame address "0" send the command: \\F00M12I03<CR>

2. To broadcast an input to all outputs:

\\FxxBzz<CR>

Ex. to broadcast input 3 to all outputs, send the command:

\\F00B04<CR>

3. To set RS-232 crosspoint:

\\FxxRyylzz<CR>

4. To disconnect RS-232 crosspoint:

\\FxxDyylzz<CR>

**A new method is to disconnect all: //FOOD<CR>*

5. To set new frame address:

\\FxxFnn<CR>

6. To query crosspoints from PC:

\\FxxU<CR>

NOTES:

- When successful, commands #1-5 will acknowledge by sending the checksum with nibbles swapped & <CR><LF> e.g. checksum of 0x24 acknowledges with <0x42><CR><LF>
- All bytes in examples are ASCII characters unless they are contained in brackets <>
- Calculating the Checksum: <CHK> stands for CHECKSUM: the <CHK> value is calculated by performing an XOR of the full command string *For example: //F00M12I03 will XOR to the hexadecimal value 0x42, therefore the value of <CHK> is 0x42
- <CHK> is the logical exclusive OR (XOR) of all previous bytes.
- <CR> is carriage return (0x0D), all commands sent from PC end with <CR>.
- <LF> is line feed (0x0A)
- xx is the frame address of the router e.g. "00" or "01" From the factory the address is always "00", however it can be changed with command #5 above.
- yy is the Output (monitor) number. e.g. "01"
- zz is the Input number. e.g. "06" or "16"
- nn is the Matrix's new frame address

USING NET-IP-PRO (TCP/IP CONTROL)

The NET-IP-PRO (Sold separately) is an RS-232 control module that allows most SmartAVI switching matrices to be controlled remotely via HTTP or TELNET. Manage the switching functions of your matrix with ease from anywhere in the world. With NET-IP-PRO you can save input/output configuration presets for easy access. TELNET access provides transparent command control of your matrix, perfect for use with automated third-party control software.

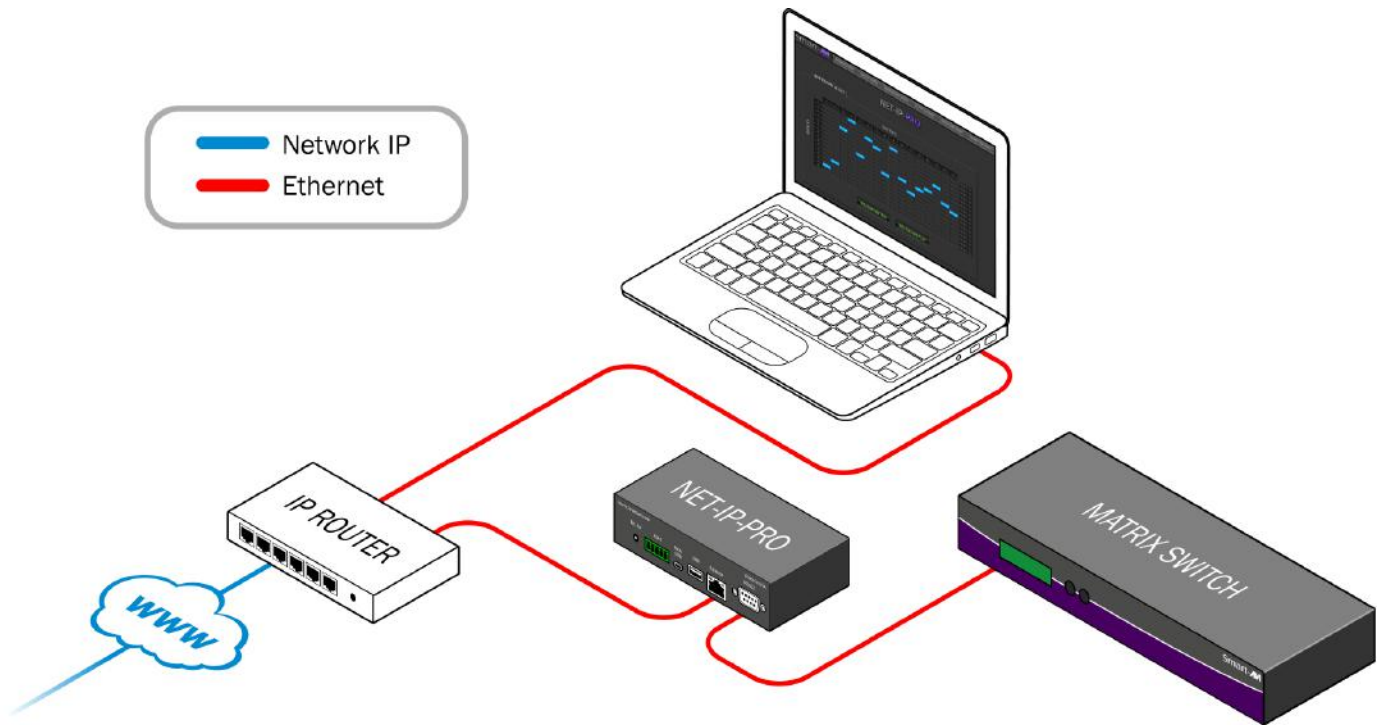


Figure 17-1

For more information about the NET-IP-PRO, visit www.smartavi.com.

USING IR REMOTE CONTROL

Switching Input / Output ports

Press [IN] [1] [OUT] [4] [OK]

This will send the input (source) connected to port 1 to the display connected to output port 4.

Broadcasting a single input source to all output ports.

Press [F1] [4] [OK]

This will send input 4 to all output displays.



LIMITED WARRANTY STATEMENT

A. Extent of limited warranty

Smart-AVI Technologies, Inc. warrants to the end-user customers that the Smart-AVI product specified above will be free from defects in materials and workmanship for the duration of 1 year, which duration begins on the date of purchase by the customer. Customer is responsible for maintaining proof of date of purchase.

Smart-AVI limited warranty covers only those defects which arise as a result of normal use of the product, and do not apply to any:

- a. Improper or inadequate maintenance or modifications
- b. Operations outside product specifications
- c. Mechanical abuse and exposure to severe conditions

If Smart-AVI receives, during applicable warranty period, a notice of defect, Smart-AVI will at its discretion replace or repair defective product. If Smart-AVI is unable to replace or repair defective product covered by the Smart-AVI warranty within reasonable period of time, Smart-AVI shall refund the cost of the product.

Smart-AVI shall have no obligation to repair, replace or refund unit until customer returns defective product to Smart-AVI.

Any replacement product could be new or like new, provided that it has functionality at least equal to that of the product being replaced.

Smart-AVI limited warranty is valid in any country where the covered product is distributed by Smart-AVI.

B. Limitations of warranty

To the extent allowed by local law, neither Smart-AVI nor its third party suppliers make any other warranty or condition of any kind whether expressed or implied with respect to the Smart-AVI product, and specifically disclaim implied warranties or conditions of merchantability, satisfactory quality, and fitness for a particular purpose.

C. Limitations of liability

To the extent allowed by local law the remedies provided in this warranty statement are the customers sole and exclusive remedies.

To the extent allowed by local law, except for the obligations specifically set forth in this warranty statement, in no event will Smart-AVI or its third party suppliers be liable for direct, indirect, special, incidental, or consequential damages whether based on contract, tort or any other legal theory and whether advised of the possibility of such damages.

D. Local law

To the extent that this warranty statement is inconsistent with local law, this warranty statement shall be considered modified to be consistent with such law.

Smart-AVI

SMART AUDIO VIDEO INNOVATION

NOTICE

The information contained in this document is subject to change without notice. SmartAVI makes no warranty of any kind with regard to this material, including but not limited to, implied warranties of merchantability and fitness for particular purpose. SmartAVI will not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material. No part of this document may be photocopied, reproduced, or translated into another language without prior written consent from SmartAVI Technologies, Inc.

20170109



Designed and Manufactured in the USA

800.AVI.2131

Tel: (818) 503-6200 Fax: (818) 503-6208
11651 Vanowen St. North Hollywood, CA 91605

SmartAVI.com