HDR16X16 Plus

User Manual

16 Port 4K 30Hz HDMI Matrix Switch
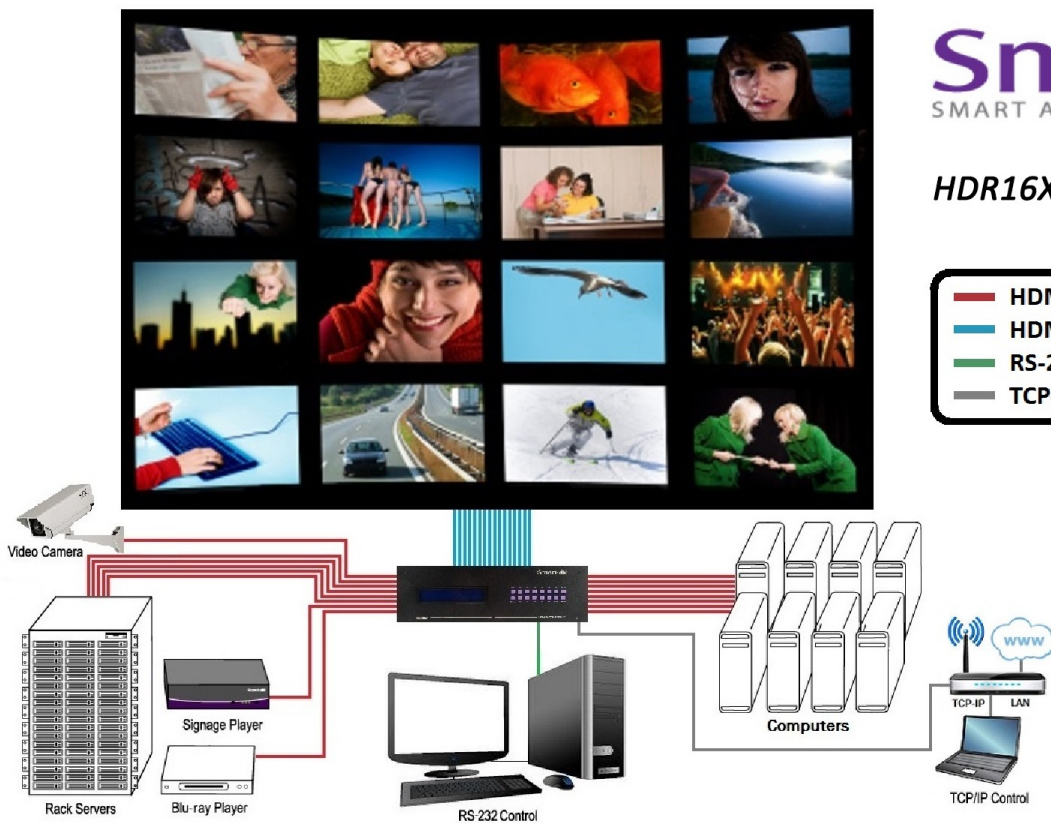
16-Port 4K 30Hz HDMI Matrix Switch with Front Panel, RS-232 & Optional TCP/IP Control

TABLE OF CONTENTS

WHAT'S IN THE BOX?

PART NO.	QTY	DESCRIPTION
HDR16X16 Plus	1	16 Port HDMI Matrix Switch
CCPWR06	1	Power Supply Cord
	1	Quick Start Guide

Figure 2-1

INTRODUCTION

The HDR16X16 Plus conforms to the 4K HDMI (High Definition Media Interface) 30Hz standard with HDCP compliance and provides a connection to view any of sixteen HDMI video sources on any combination of sixteen video displays. The HDR16X16 provides HDMI output up to 40 feet away at resolutions up to 1080p. The system works with Blu-ray players, PCs, and satellite set-top boxes that connect to an HDMI display. Users can switch to any source locally using the Front Panel or remotely via RS-232 with Windows®-based software that is easy to understand and simple to use, a cornerstone of all SmartAVI products. It can be optionally controlled via TCP/IP using the NET-IP-PRO from SmartAVI.

FEATURES

- 4K 30Hz HDMI 16x16 router switches 16 HDMI inputs with 16 HDMI outputs
- Sources can be routed independently to displays
- Switching controlled via the front panel, RS-232 and TCP/IP with optional NET-IP-PRO
- Supports high definition video resolutions of 720p, 1080i and 1080p
- Supports 7.1 Digital Surround Sound Audio
- HDCP and HDMI 1.4 compliant
- Supports EDID for total control of compliant displays
- Learn EDID from any display
- Delivers uncompressed digital video with zero signal loss
- Outputs HDMI up to 40 feet (with high quality active cables)
- Rack-mountable

APPLICATIONS

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

TECHNICAL SPECIFICATIONS

VIDEO	
HDTV Resolutions	480p, 720p, 1080i, 1080p, Supports all DVI-D Resolutions
TV Resolution	480i
Input Interface	(16) HDMI Type A 19-pin Female TMDS
Output Interface	(16) HDMI Type A 19-pin Female TMDS
Input Cable Length	Up to 40 ft.
Output Cable Length	Up to 40 ft.
CONTROL	
Front Panel	Buttons & LCD Display
RS-232	DB9 Female, 9600 bps, N, 8 1, No flow control
TCP/IP	Optional with NET-IP-PRO
OTHER	
Warranty	Limited 1 Year Parts and Labor
Power	100-240 VAC
Dimensions	17"W x 7 1/8"H x 15"D Front Panel is 19" wide to fit a 19" rack
Weight	24.45 lbs. (Unit only)
ENVIRONMENTAL	
Operating Temperature	0 to +40° C (+32° to 104° F)
Operating Humidity	10% to 85% (Non-condensing)
Storage Temperature	-20° to +60° (+20° to +140° F)
Storage Humidity	10% to 85% (Non-condensing)

HARDWARE INSTALLATION

1. Turn off all input devices and displays.
2. Connect male to male HDMI cables to the input devices or sources and the "IN" ports on the HDR16X16 Plus.
3. Connect the displays to the "OUT" ports on the HDR16X16.
4. Power on the input devices and the displays.
5. Connect the power cord and power-on the HDR16X16.

IMPORTANT:
Each input and output can support up to 10mA/5VDC.
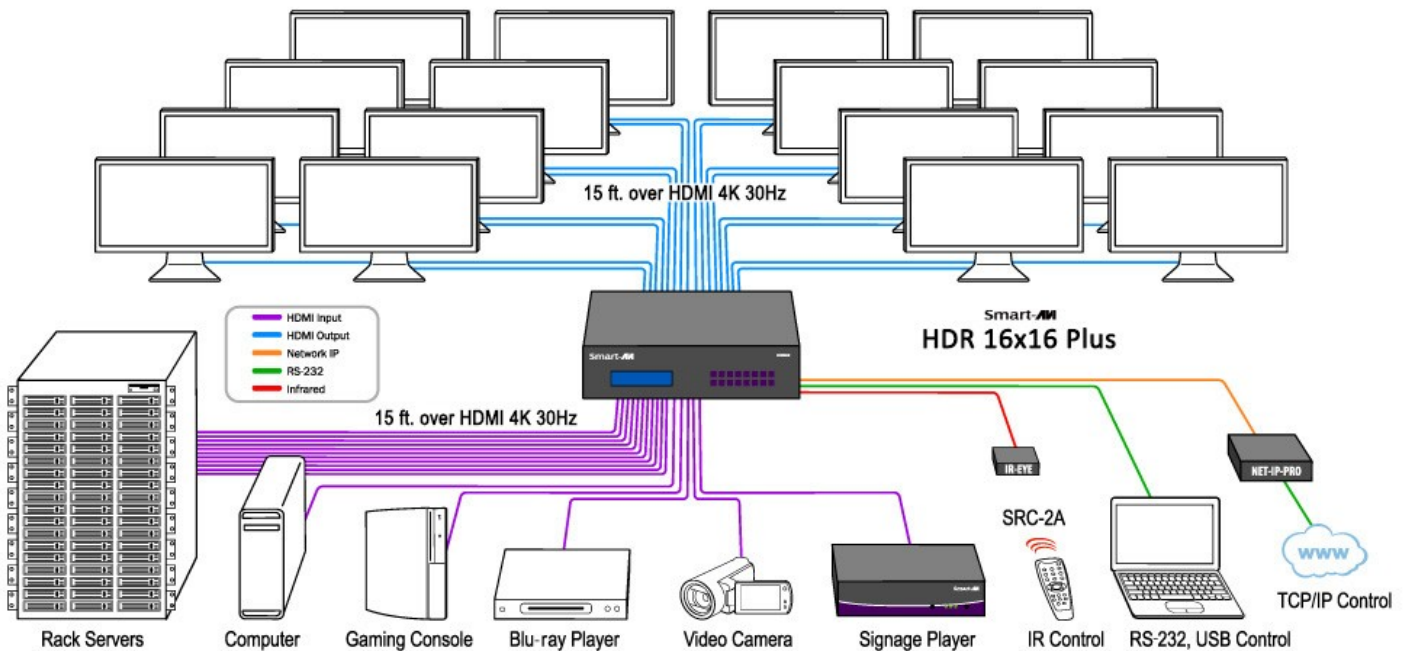*Do not connect extenders that are powered by HDMI.*

Figure 5-1

FRONT PANEL CONTROL

There are multiple ways to control the HDR16X16 Plus: via the front panel, via RS-232 using the Smart-Control software, via RS-232 commands (with AMX, Crestron), and with an optional TCP-IP module.
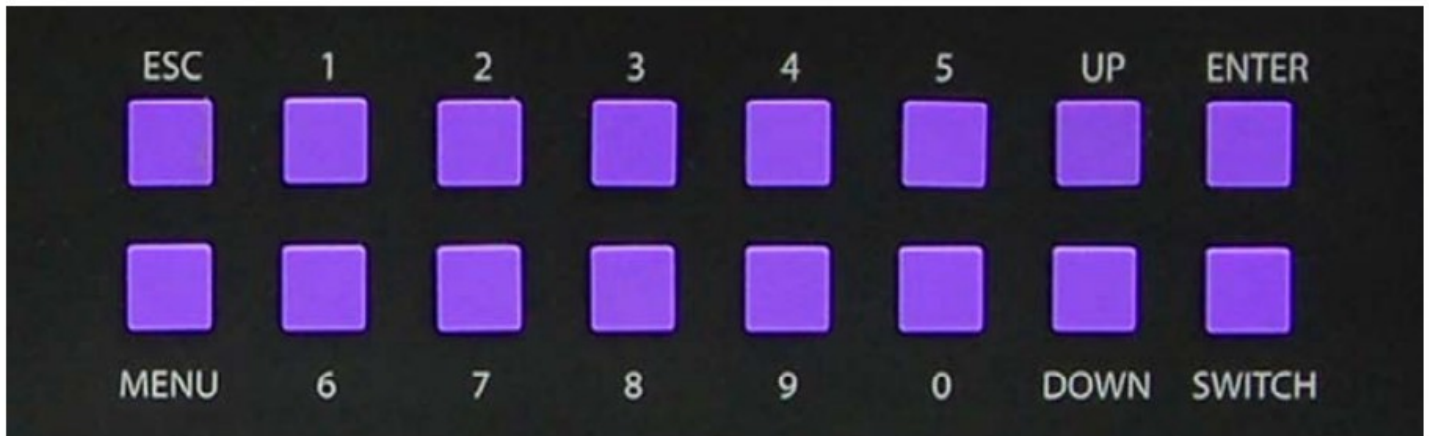

Figure 6-1

Input and output are relative to the HDR16X16 Plus. Output refers to displays or monitors. Input refers to video sources such as DVD players or computers.

During normal operation, you will see a list of ports on the front panel display. See Figure 6-2.
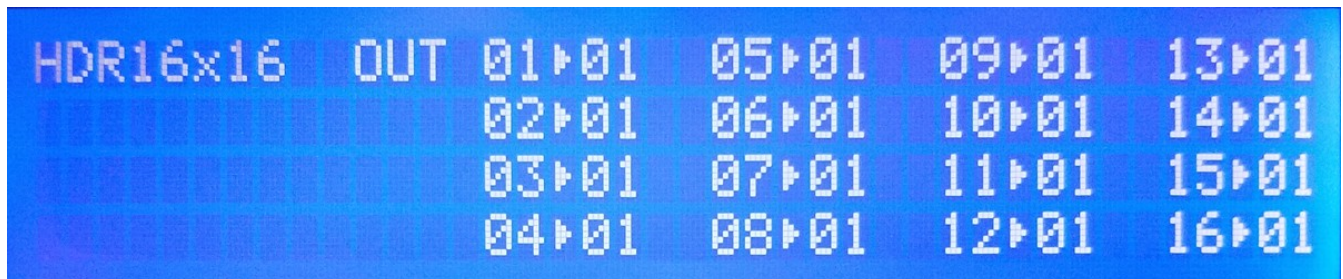
Default Display HDR16X16 Plus

Figure 6-2

FRONT PANEL CONTROL (Continued)

Main Menu
To view the menu, press MENU. There are 6 menu options available: Use the UP and DOWN keys to position the cursor next to the desired item and press the ENTER key to open the items display or toggle the item on or off. Press ESC to return to the Main Menu display.

```
MENU    ▶RS-232 Acknowledge ON
         Display Input Status
         Restore Factory Settings
         Manage EDID
```
Figure 7-1

RS-232 Acknowledge: Sets the HDR16X16 Plus to send a confirmation that an RS-232 command has been received. The enter key toggles this on and off.

Display Input Status: This displays the status of the inputs. If no input is present, the display will read NONE. See figure 7-2.

```
INPUT   01▶----  05▶----  09▶----  13▶----
        02▶----  06▶----  10▶----  14▶----
        03▶----  07▶----  11▶----  15▶----
        04▶----  08▶----  12▶----  16▶----
```
Figure 7-2

Restore Factory Settings: This sets the HDR16X16 Plus to factory defaults and reboots. See figure 7-3.

```
MENU     RS-232 Acknowledge ON
         Display Input Status
        ▶Restore Factory Settings
         Manage EDID
```
Figure 7-3a

```
Restore matrix to factory defaults?

Press [Enter] for Yes and [Esc] for No
```
Figure 7-3b

Manage EDID: "3) Learn EDID from monitor" only learns from the monitor connected to output port 1. See figure 7-4.

```
Press number to make selection.
1) Learn 1920x1080 EDID.
2) Learn DTS Audio EDID      ESC to exit
3) Learn EDID from monitor.
```
Figure 7-4

Test Mode: Sets all outputs to Input 1. Pressing the up button will change all outputs to input 2, etc.

```
         Test Mode (Broadcast)
         Restoring Crosspoints
         ..............
```
Figure 7-5

FRONT PANEL CONTROL (Continued)
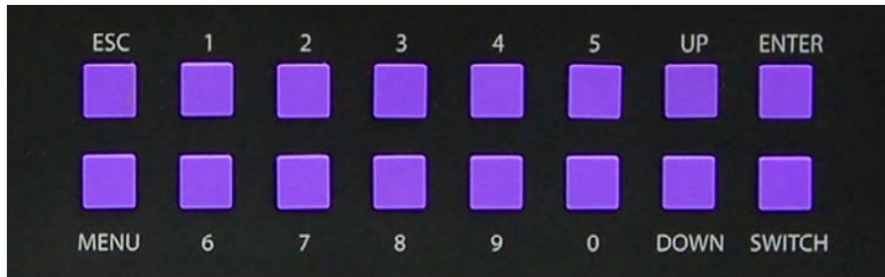

Figure 8-1

To assign a display (output) to a video source (input) using the front panel controls perform the following:

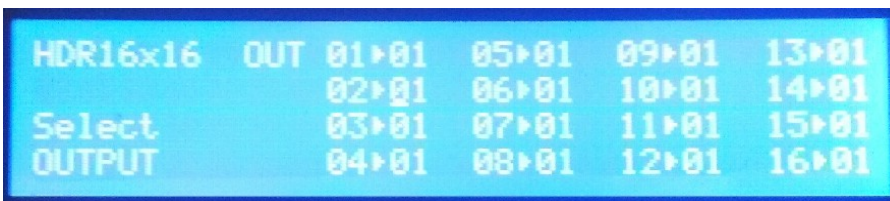Press the SWITCH key, The "Select OUTPUT" screen will display. See figure 8-2.

Figure 8-2

Press the number key for the display (output) and press the ENTER key.

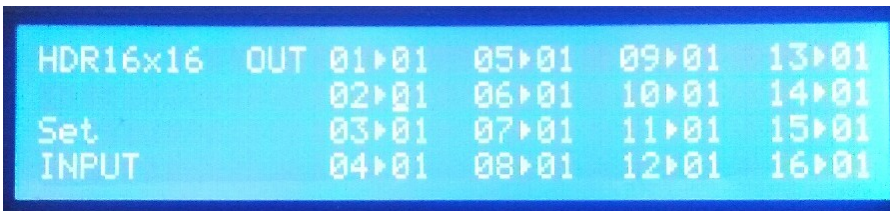The "Set INPUT" screen will now display. See figure 8-3.

Figure 8-3

Press the number key for the source (input) and press the ENTER key.

An alternative way to assign an output to an input is:

Press SWITCH. A blinking block cursor will appear. Use the UP and DOWN keys to select the output/display that you would like to assign. Once the cursor is over the desired output port, press ENTER.

Press the UP and DOWN keys to select the input/source port. Once you have selected an input, press EN-TER to save the configuration. To return to the default screen, press ESC.

IMPORTANT: Because HDCP takes time to negotiate, when switching ports, wait 2 seconds for the proc-ess to complete. Failure to do so may cause an error with the HDCP and the HDR16X16 may lock up.

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.

Use terminal client software such as the PuTTY to connect to 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 thorough 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.
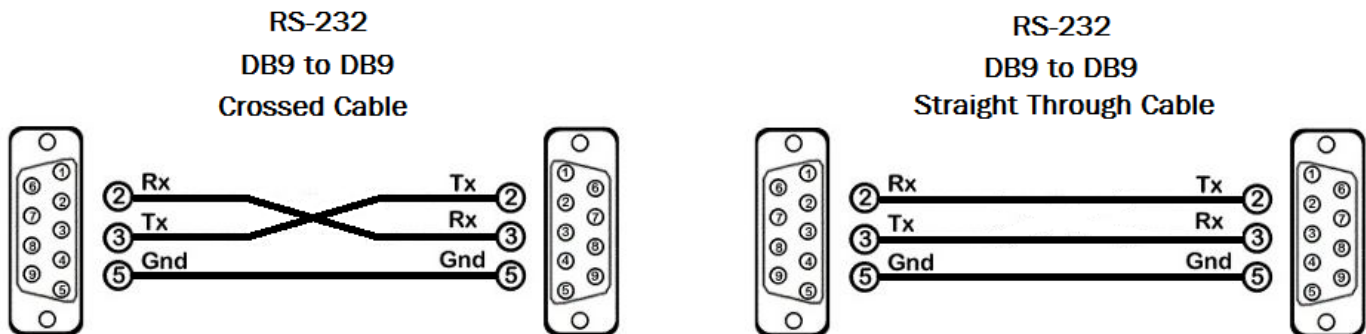

Figure 9-1
Examples of 9 pin RS-232 Straight Through and Crossed Cables

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 9-2 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.
4. Click on the arrow next to Ports (COM & LPT).

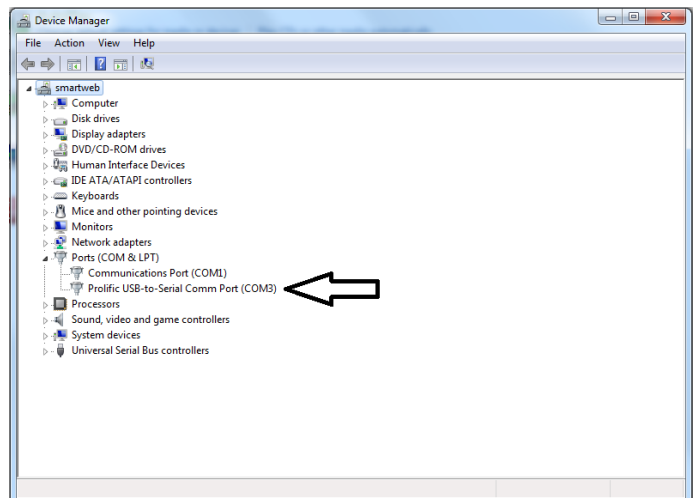You should see the name of your adapter and the COM port number in use.

Figure 9-2

USING THE SmartControl SOFTWARE

RS-232: Controlling the HDR16X16 Plus has never been simpler with SmartControl software. With Smart-Control, you can assign a unique name to each port on the HDR16X16, 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 HDR16X16 Plus, 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:
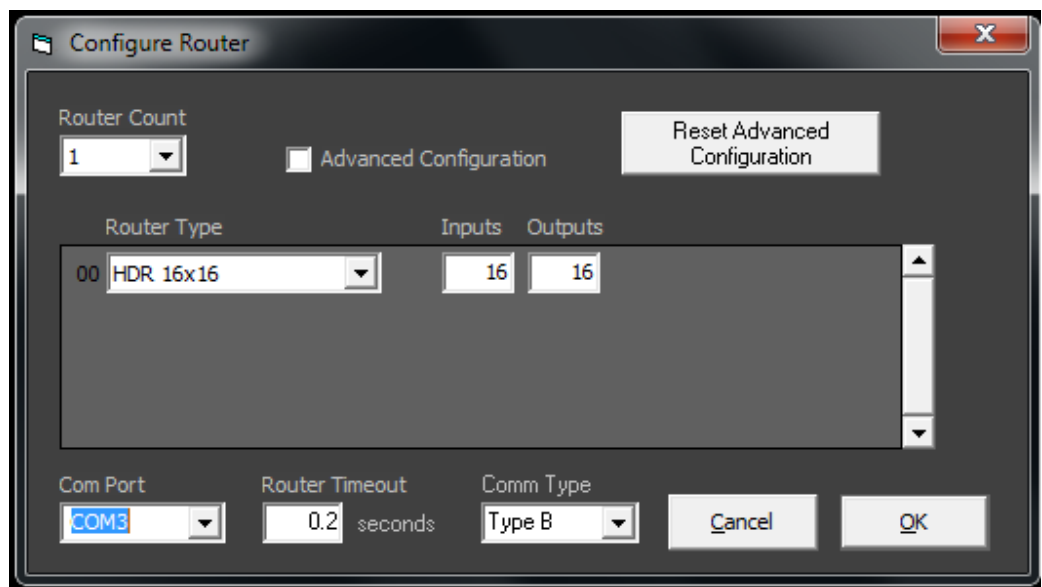
Advanced Configuration:
If you have more than one Router installed you will want to check this box.

Router Type:
Select HDR16X16 Plus

Figure 10-1

Inputs/Outputs:
Enter the number of Inputs/Outputs your HDR16X16 Plus has.
The HDR16X16 Plus can have up to 16 inputs and 16 outputs.

Com Port:
Select the appropriate com port that your computer is using to access the router.
To find the com port number that your computer is using click on the Start Menu. Right click on computer. Click on Properties. Click on Device Manager. Click on the symbol next to Ports (COM & LPT). Your com port number should be listed here.

Router Time out:
This field is set to 0 by default, meaning the computer acknowledges commands almost instantly. Sometimes a computer takes longer to respond. This setting should be left at 0. If you need to change it, it should be no higher than 0.2.

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.

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.

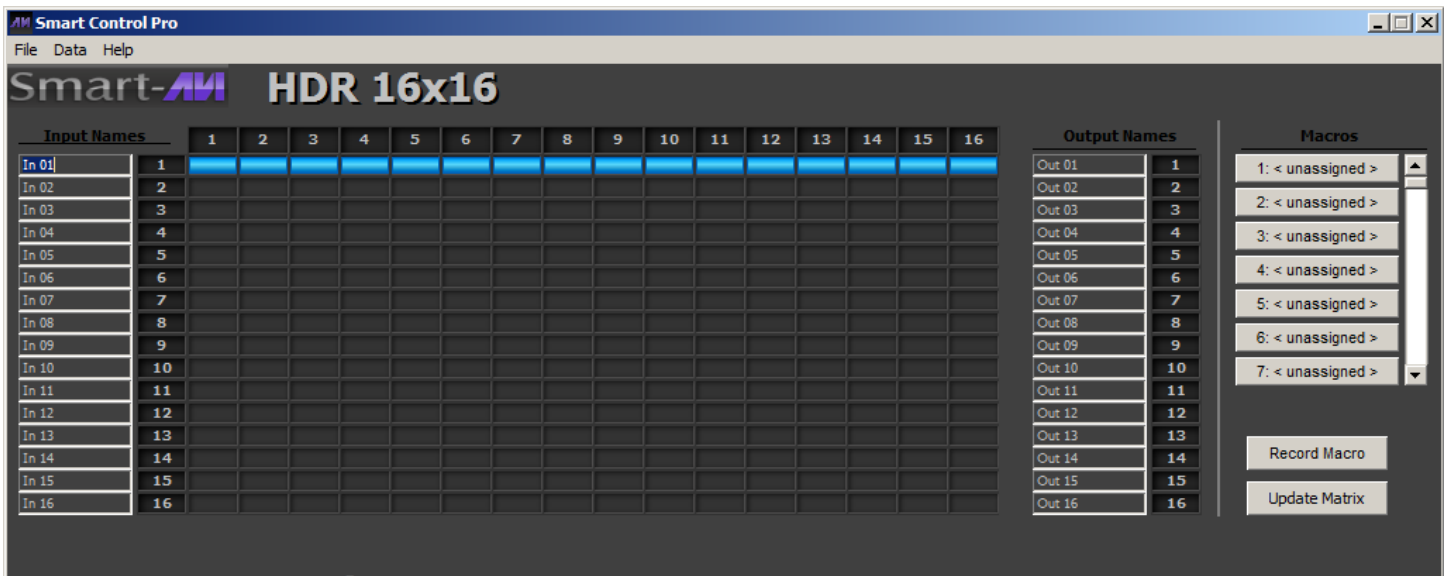**Note:** Inputs can be routed to several different outputs, but each output can only have a single input at

Figure 11-1

On the screen shown in figure 11-1 the input buttons run down the left side and the output buttons run across the top. They're each labeled 1 through 16. This configuration directs video from source 1 to be displayed on all 16 displays.
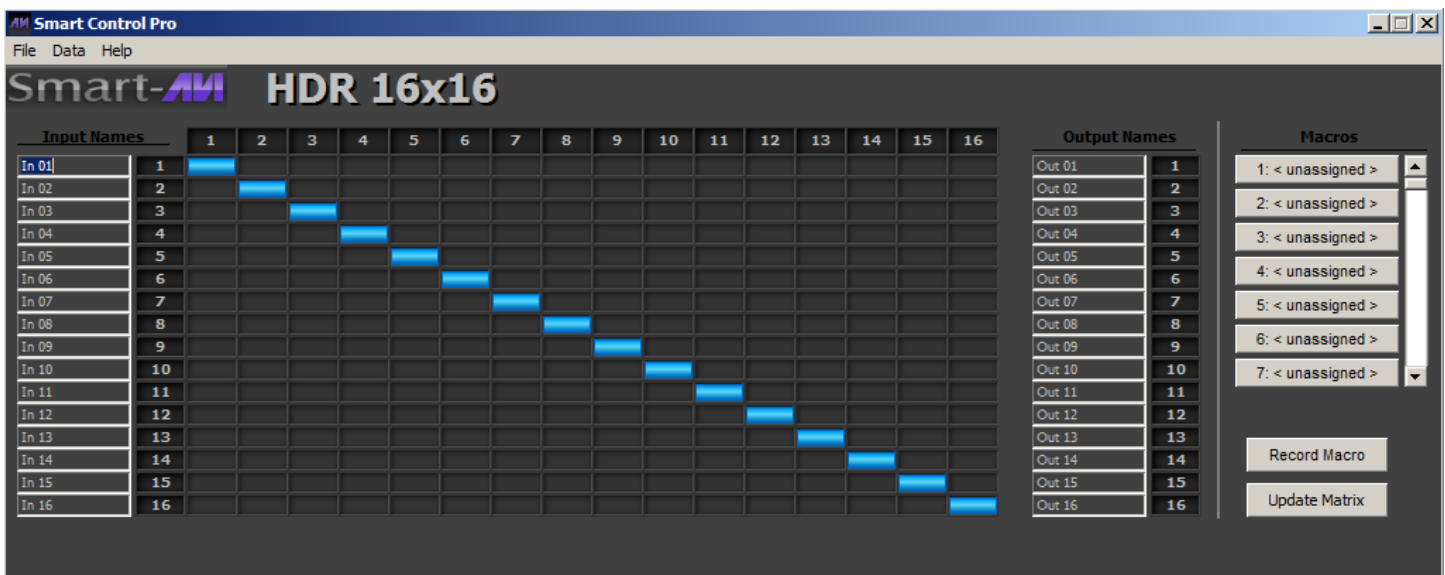

Figure 11-2

On the screen shown in figure 11-2 source 1 is sent to display 1, source 2 to display 2, 3 to 3, 4 to 4, 5 to 5, etc.

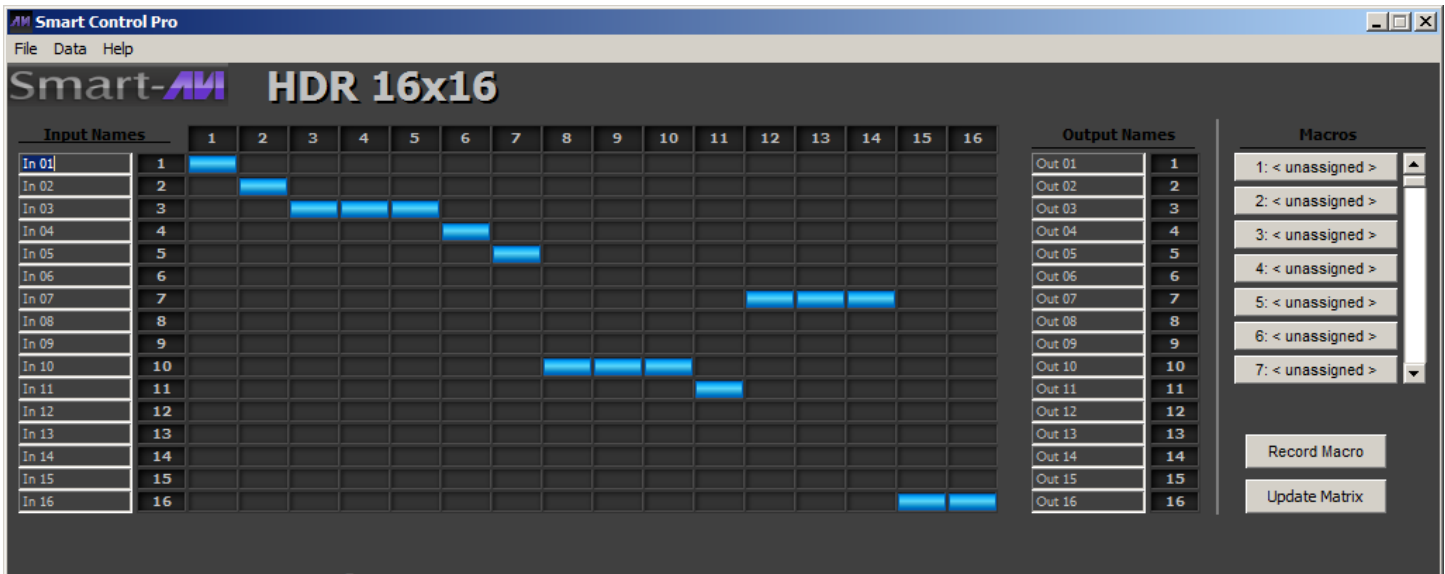# USING THE SmartControl SOFTWARE (continued)

Figure 12-1

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 A TERMINAL APPLICATION FOR REMOTE CONTROL VIA RS-232

Terminal Settings: Open the terminal software of your choice such as PuTTY or Hyperterminal on your PC. Settings MUST match those shown to the right in figure 13-1.
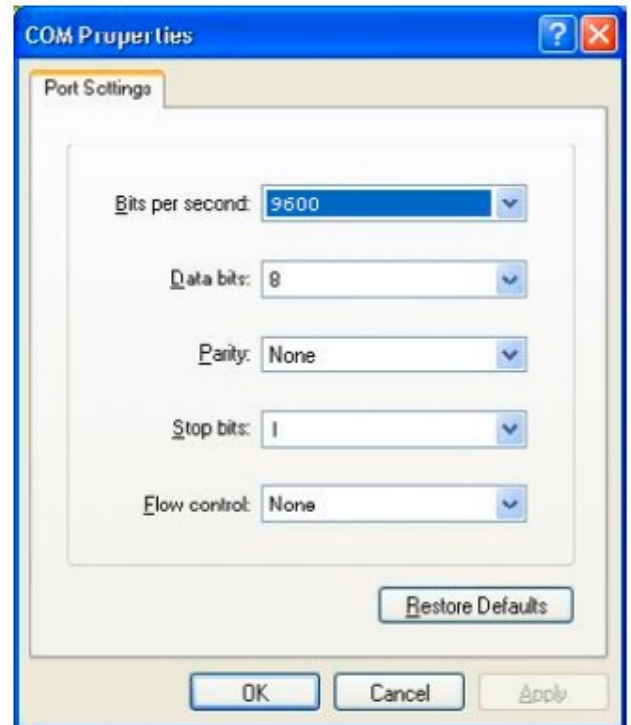

Figure 13-1

There are two primary modes of operation for the HDR16X16: Command Mode and Debug Mode. When connecting to the HDR16X16 via RS-232, it will start in Command Mode. Debug Mode is a more user friendly way of operating the HDR16X16 and includes instructional menus. The following section details the use of the Debug Mode.

When you connect the HDR16X16 to a computer via an RS-232 connection, you will see the following screen.

SmartAVI HDMI 16X16 ver ##.##.####

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.

Debug mode locks out the front panel control and any other serial communication including Smart Control. If terminal software such as PuTTY is running Smart Control won't run and if Smart Control is running other terminal software such as PuTTY won't run. You will get error messages such as "Unable to open com port or com port busy or com port is unavailable".

If you exit terminal software like PuTTY with "d on" and you are getting a "No reply from router" message. Cycling power on the HDR16X16 should correct the problem or you can, 1. Close Smart Control. 2. Open your terminal software and type "d off". 3. Close your terminal software. 4. Re-open Smart Control.

IMPORTANT: Exit Debug mode at end of session or you cannot control until debug times out.

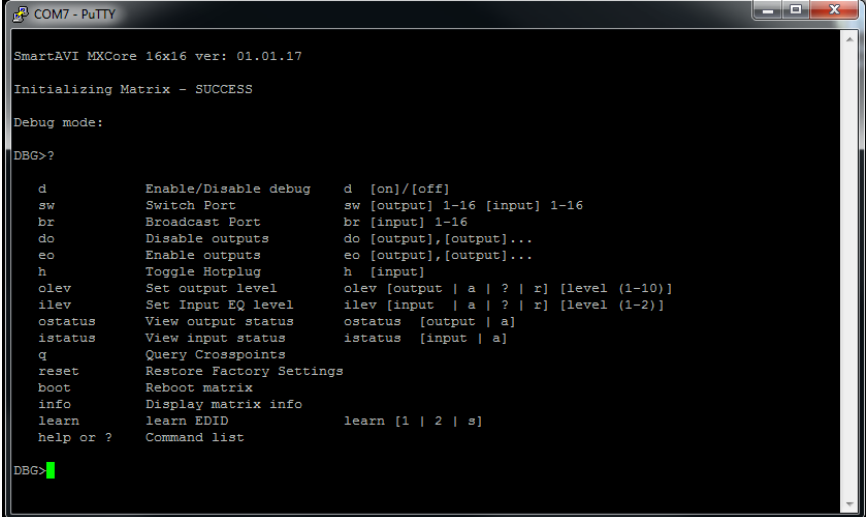## USING A TERMINAL APPLICATION FOR REMOTE CONTROL VIA RS-232 (continued)

To enable or disable command line communication with the HDR 16X16 Plus via an RS-232 terminal,
After you connect type, "d on<enter>" or "d off<enter>"

After starting command line communication by typing "d on <enter>"
You can display a list of available commands by typing "?<enter>" or "help<enter>"
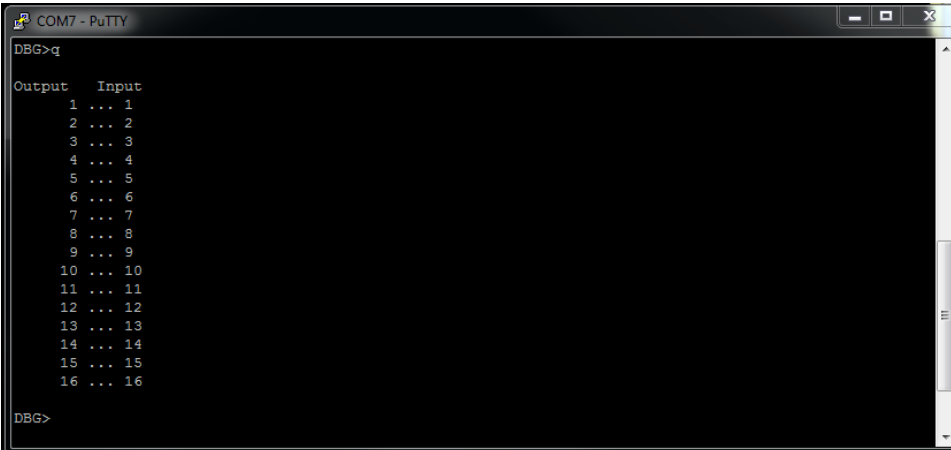See figure 14-1 below.

Figure 14-1

You can display current input output settings:
Type "q<enter>" to see current input output settings. See Figure 14-2

Figure 14-2

Type "boot<enter>" to reboot the matrix.

Type "reset<enter>" to reboot the matrix with factory default settings restored.

To switch ports, type "sw [output] 1-16 [input] 1-16<enter>"
    DBG>sw 2 2<enter>
    Switched Output 2 to Input 2

To set the broadcast port, type "br [input] 1-16<enter>"
    DBG>br 2<enter>
    This sends the specified input 2 to all outputs
    DBG>br \<enter>
    This sends 1 to 1, 2 to 2, 3 to 3, 4 to 4, 5 to 5, etc.
    DBG>br /<enter>
    This sends 16 to 1, 15 to 2, 14 to 3, 13 to 4, etc.

To Toggle Hotplug of any port: "h [input]
    DBG>h 3<enter>
    Port 3 hotplug pin is toggled effectively refreshing port 3.

To change output levels of the video signal, type " olev [out# | ? | r | a] [level (1-8)]"
Output levels default to 5 and this setting will work well for the majority of installations.
Changing the output level for a port may improve a weak video signal or improve the signal when a long cable is in use.
    DBG>olev 3 7<enter>
    Output level on port 3 has been changed to 7.
    DBG>olev ?<enter>
    ? Displays the output levels for all ports.
    DBG>olev r<enter>
    Resets the output levels for all ports to factory defaults.
    DBG>olev a 5<enter>
    Resets the output level for all ports to 5.

To change EDID settings there are three options:
Type "learn 1" To load default EDID 1 (1920x1080) to all sources.
Type "learn 2" To load default EDID 2 (DTS Audio) to all sources.
Type "learn s" To load the EDID from the monitor connected to output 1 to all sources.

Command Mode

Command Mode allows raw commands to be sent to the HDR16X16 Plus 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 HDR16X16 Plus:

Commands with CHECKSUM and Commands without CHECKSUM. The CHECKSUM is a method of error correction that ensures the command has been properly transmitted to the HDR16X16 Plus. However, it is not necessary to perform the CHECKSUM in most cases. For more detailed information on Command Mode see the **RS-232 Control And Integration With Third Party Software** User Manual.

Commands with CHECKSUM begin with //
Commands without CHECKSUM begin with \\

Sending Commands WITH CHECKSUM
Com Port Settings:
Baud Rate 9600
Start Bits 1
Data Bits 8
Parity None
Stop Bits 1

1) To set a video crosspoint:
   //FxxMyyIzz<CHK><CR>
        e.g. to set video input 3 to output 12 on a router with frame address "0"
        send the command: //F00M12I03<0x42><CR>

2) 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 Output #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.
           0x80 = "1000 0000" input 0
           0x81 = "1000 0001" input 1
           ...
           0x8F "1000 1111" input 15

Notes:
When successful, commands #1-4 will acknowledge by sending the checksum with nibbles swapped & <CR><LF>
e.g. checksum of 0x24 acknowledges with <0x42><CR><LF>

IMPORTANT

CALCULATING THE <CHK>

<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.

Command Mode (continued)

Sending Commands WITHOUT CHECKSUM

1) To set a video crosspoint:

  \\FxxMyyIzz<CR>

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

2) To query crosspoints from PC:

  \\FxxU<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   Output #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.
   0x80 = "1000 0000" input 0
    0x81 = "1000 0001" input 1

    ...
    0x8F = "1000 1111" input 15

Using TCP/IP Control (Optional)

To connect to the HDR16X16 Plus using HTTP or Telnet you need an Ethernet / RS-232 server or adapter like the NET-IP-PRO from SmartAVI. The NET-IP-PRO is an RS-232 control module that allows most SmartAVI switching matrixes to be controlled remotely from anywhere in the world. See the NET-IP-PRO Manual for information on how to connect and set up control of your HDR16X16 Plus using TCP/IP.
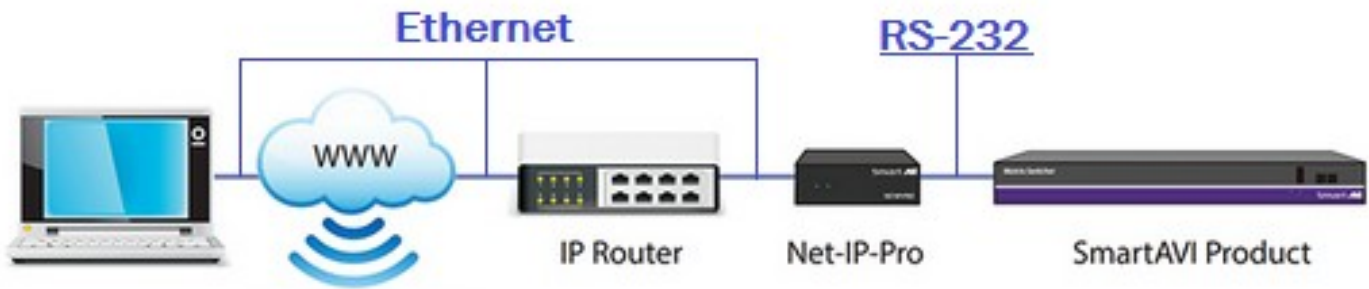
LIMITED WARRANTY STATEMENT

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 extant 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 extant 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.

NOTICE

Designed and Manufactured in the USA

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