



## Instruction Manual

# HDMI-UTPRO-0808

HDMI UTPro 8x8 Matrix Switcher

# HDMI-UTPRO-RX

HDMI UTPro Receiver



# AMX Domestic Channel Partner Limited Warranty, Disclaimer and License

(Excerpt from CHANNEL PARTNER TERMS AND CONDITIONS Version 20100825B+)

## 6. LIMITED WARRANTY; RETURN, REPAIR AND REPLACEMENT

- 6.1 AMX warrants the products to be free of material defects in material and workmanship under normal use for three (3) years from the Shipping Date (or such other period as may be specified below), subject to the following limitations and exceptions (“Limited Warranty”). For any product, “Warranty Period” means the period during which the Limited Warranty is in effect, as set forth herein.
- (a) LCD Panels are warranted for three (3) years from the Shipping Date, except for the display and touch overlay components, which are warranted for a period of one (1) year from the Shipping Date.
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From Page 1 of 7, Version 20100825B+ created August 25, 2010.

**Note:** The complete Warranty is at [www.amx.com](http://www.amx.com).

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## ESD Warning



To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal materials.

When working with any equipment manufactured with electronic devices, proper ESD grounding procedures must be followed to make sure people, products, and tools are as free of static charges as possible. Grounding straps, conductive smocks, and conductive work mats are specifically designed for this purpose.

Anyone performing field maintenance on AMX equipment should use an appropriate ESD field service kit complete with at least a dissipative work mat with a ground cord and a UL listed adjustable wrist strap with another ground cord. These items should not be manufactured locally, since they are generally composed of highly resistive conductive materials to safely drain static charges, without increasing an electrocution risk in the event of an accident. ESD protective equipment can be obtained from 3M™, Desco®, Richmond Technology®, Plastic Systems®, and other such vendors.

# Important Safety Information and Instructions

When using and installing your AMX product, adhere to the following basic safety precautions. For more information about operating, installing, or servicing your AMX product, see your product documentation.

- Read and understand all instructions before using and installing AMX products.
- Use the correct voltage range for your AMX product.
- There are no user serviceable parts inside an AMX product; service should only be done by qualified personnel.
- If you see smoke or smell a strange odor coming from your AMX product, turn it off immediately and call technical support.
- For products with multiple power supplies in each unit, make sure all power supplies are turned on simultaneously.
- Use surge protectors and/or AC line conditioners when powering AMX products.
- Only use a fuse(s) with the correct fuse rating in your enclosure.
- Make sure the power outlet is close to the product and easily accessible.
- Make sure the product is on or attached to a stable surface.
- Turn off equipment before linking pieces together, unless otherwise specified in that product's documentation.
- For safety and signal integrity, use a grounded external power source and a grounded power connector.
- Turn off and unplug an enclosure before adding or removing boards, unless otherwise specified in that product's documentation.
- To avoid shock or potential ESD (Electrostatic Discharge) damage to equipment, make sure you are properly grounded before touching components inside an AMX product.



# Information et directives de sécurité importantes

Veillez vous conformer aux directives de sécurité ci-dessous lorsque vous installez et utilisez votre appareil AMX. Pour de plus amples renseignements au sujet de l'installation, du fonctionnement ou de la réparation de votre appareil AMX, veuillez consulter la documentation accompagnant l'appareil.

- Lisez attentivement toutes les directives avant d'installer et d'utiliser les appareils AMX.
- Le voltage doit être approprié à l'appareil AMX.
- Les appareils AMX ne contiennent aucune pièce réparable par l'utilisateur; la réparation ne doit être effectuée que par du personnel qualifié.
- Si de la fumée ou une odeur étrange se dégagent d'un appareil AMX, fermez-le immédiatement et appelez le Service de soutien technique.
- Veillez à ce que tous les blocs d'alimentation des appareils dotés de blocs d'alimentation multiples dans chaque unité soient allumés simultanément.
- Servez-vous de protecteurs de surtension ou de conditionneurs de lignes à courant alternatif lorsque vous mettez les appareils AMX sous tension.
- Placez uniquement des fusibles de calibre exact dans les boîtiers.
- Veillez à ce que la prise de courant soit proche de l'appareil et facile d'accès.
- Veillez à ce que votre appareil AMX soit installé sur une surface stable ou qu'il y soit fermement maintenu.
- Fermez toutes les composantes de l'équipement avant de relier des pièces, à moins d'indication contraire fournie dans la documentation de l'appareil.
- Par mesure de sécurité et pour la qualité des signaux, servez-vous d'une source d'alimentation externe mise à la terre et d'un connect d'alimentation mis à la terre.
- Fermez et débranchez le boîtier avant d'ajouter ou d'enlever des plaquettes, à moins d'indication contraire fournie dans la documentation du appareil.
- Pour éviter les chocs ou les dommages éventuels causés à l'équipement par une décharge électrostatique, veillez à ce le dispositif soit bien relié à la terre avant de toucher les composantes se trouvant à l'intérieur d'un appareil AMX.

# Notices

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## Liability Notice

No patent liability is assumed with respect to the use of information contained herein.

While every precaution has been taken in the preparation of this publication, AMX assumes no responsibility for error or omissions. No liability is assumed for damages resulting from the use of the information contained herein.

Further, this publication and features described herein are subject to change without notice.

## US FCC Notice

The United States Federal Communications Commission (in 47CFR 15.838) has specified that the following notice be brought to the attention of the users of this product.

Federal Communication Commission Radio Frequency Interference Statement:

*"This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

*If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the booklet, How to Identify and Resolve Radio-TV Interference Problems, prepared by the Federal Communications Commission to be helpful."*

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock N. 004-000-00345-4.

Use shielded cables. To comply with FCC Class A requirement, all external data interface cables and adapters must be shielded.

### British Standards Notice

According to BS EN 55022:2006+A1:2007, the HDMI-UTPRO-0808 and the HDMI-UTPRO-RX Receivers are classified as Class A ITE (Information Technology Equipment).

**Warning:** *This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.*

### Lithium Batteries Notice

Switzerland requires the following notice for products equipped with lithium batteries. This notice is not applicable for all AMX equipment.

Upon shipment of products to Switzerland, the requirements of the most up-to-date Swiss Ordinance Annex 2.15 of SR 814.81 will be met including provision of the necessary markings, documents, and annual reports relative to the disposal of the batteries to the Swiss Authorities.

### Trademark Notices

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Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

HyperTerminal<sup>®</sup> is a copyright product of Hilgraeve Inc.

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ENERGY STAR<sup>®</sup> is a registered trademark of the U.S. Environmental Protection Agency and the U.S. Department of Energy.

Other products mentioned herein may be the trademarks of their respective owners.

### Warnings and Cautions

This manual uses the following conventions and icons to draw attention to actions or conditions that could potentially cause problems with equipment or lead to personal risk.



**ESD Warning:** *The icon to the left indicates text regarding potential danger associated with the discharge of static electricity from an outside source (such as human hands) into an integrated circuit, often resulting in damage to the circuit.*



**Warning:** *The icon to the left indicates text that warns readers against actions or conditions that could cause potential injury to themselves.*



**Caution:** *The icon to the left indicates text that cautions readers against actions that could cause potential injury to the product or the possibility of serious inconvenience.*



# Overview and General Specifications

## Applicability Notice

The information in this manual applies to the HDMI-UTPRO-0808, Twisted Pair Dist Kit (FG1047-88K).

### HDMI-UTPRO-0808, Twisted Pair Distribution Kit (FG1047-88K)

The HDMI-UTPRO-0808, Twisted Pair Distribution Kit contains the following items:

Part	Quantity	FG#
HDMI-UTPRO-0808 (8x8 HDMI Matrix Switcher, UTP Distribution) (includes 8 HDMI patch cables)	1	FG1047-88
KIT, (8) HDMI-UTPRO-RX with power supplies	1	KA1403-155

**Note:** The HDMI UTPro 8x8 Matrix Switcher (FG1047-88) and the Receivers with power supplies (FG1403-20) can also be ordered separately.

## Product Notes

The HDMI UTPro 8x8 Matrix Switcher is used in conjunction with HDMI UTPro Receivers for sending HDMI over long distances on UTP cable.

### HDMI UTPro Features

- True 8x8 HDMI matrix switching, allowing any input to be switched to any or all outputs
- Incorporates HDMI<sup>®</sup> technology
- HDCP 1.3 compatible
- AMX HDCP InstaGate<sup>®</sup> Technology significantly reduces the HDCP latency and interruptions of protected content on all displays in the system
- Native NetLinx<sup>®</sup> device
- AMX Device Discovery enabled through AMX's AutoPatch Duet module.
- Supports computer video up to 1920x1200
- Supports HDTV up to 1080p
- Pre-loaded with the most common EDID settings to ensure proper functionality with source devices
- Features the AMX EDID Programmer allowing specific display EDID settings to be custom loaded on each input
- Global presets and local presets
- TCP/IP (LAN 10/100) port
- RJ-12 (Serial) port
- RS-232 serial (Control) port
- IR Control (optional) via the HDMI-UTPRO-RX Receiver
- Rack mounting ears included
- Backed by AMX 3 year warranty (see warranty on *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com))

## HDMI UTPro Control Features

The HDMI UTPro supports two main protocols: TCP/IP and XNNet (protocol used by control panel). Several control options are available. Multiple control methods can be used on the same system.

- Native NetLinX interface
- Front mounted control panel standard (with security lockout)
- AMX Control Devices – for control programming information, see the instruction manual for the specific interface
- Supports third-party controllers over the Control (DB-9 serial) port (note that this port cannot provide the additional NetLinX functionality which is available through the LAN 10/100 port)

**Note:** Features and specifications described in this document are subject to change without notice.

## HDMI UTPro Front Panel Components

The HDMI UTPro comes standard with a front control panel. Even when another method of control is primary, the control panel can be used for system verification, redundant control, and troubleshooting. Control panel operation is covered starting on page 43.

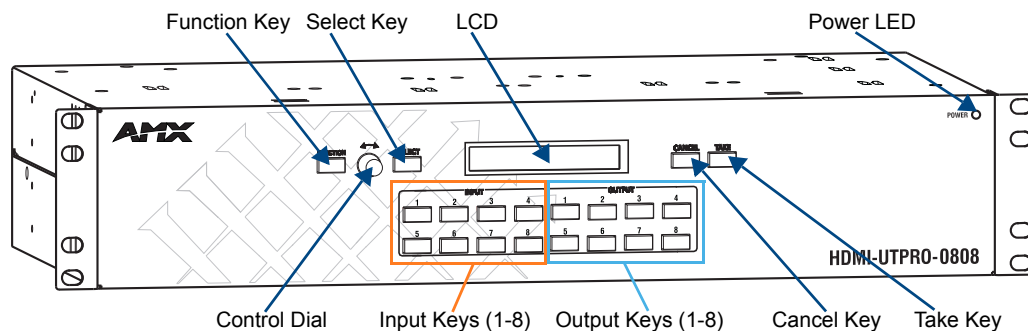


FIG. 1 Front view HDMI UTPro

## HDMI UTPro Rear Panel Components

All connectors are on the rear panel, which is laid out in three main areas.

- Power, control and configuration on the left
- HDMI matrix switching connectors on the top
- HDMI and UTP (RJ-45) transport connectors on the bottom

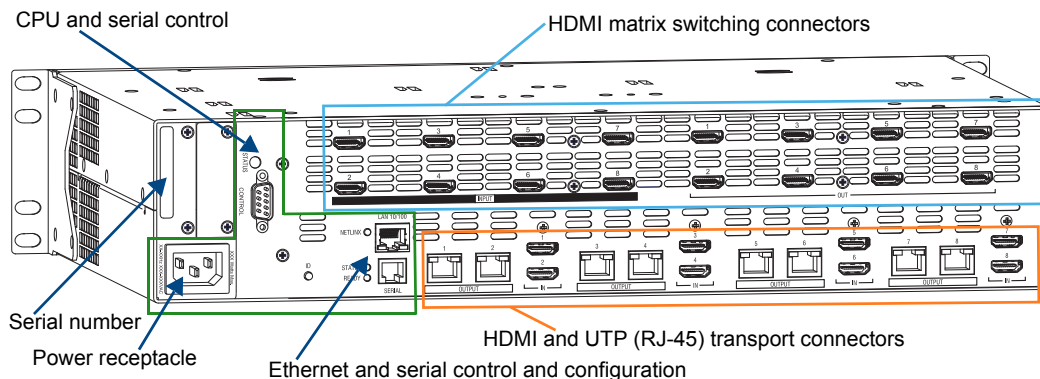


FIG. 2 Rear view HDMI UTPro

The following sections briefly introduce the hardware on the rear panel.

## Power Receptacle

The universal power receptacle is in the lower left hand corner on the rear of the enclosure. Maximum power specifications are on the power receptacle. The power receptacle accepts all major international standard power sources. (Standard US power cords are provided for installations within the US.)

The fuse is internal and is not field serviceable. If you believe the fuse needs to be replaced, contact technical support (see page 41).

## CPU / Serial Control

The CPU is to the right of the power receptacle on the rear of the enclosure.

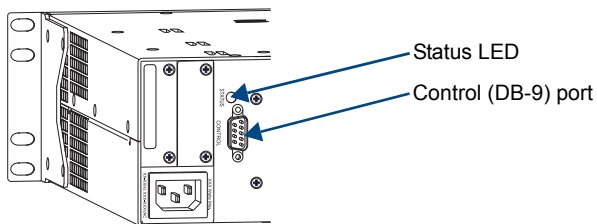


FIG. 3 Control port (DB-9 connector)

### CPU Components:

- Status LED – system status indicator
- Control port – serial port (DB-9) for attaching an external serial control device (see page 36)

The Control (RS-232) port\* can be used for matrix switching control functionality as an alternative to Native NetLinx control. We recommend using only one at a time, with native NetLinx as the preferred method and the RS-232 port as a backup because commands on the Native NetLinx connection will be accepted on a first come/first served basis (which may conflict with the BCS commands).

\* BCS (Basic Control Structure) commands are sent as ASCII characters through the RS-232 port. For information on BCS commands, see the *Instruction Manual – BCS Basic Control Structure Protocol* on the *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com).

## Ethernet Plus Serial Control and Configuration

The Ethernet connector and its LED along with the Serial (RJ-12) connector and its LEDs are to the right of the power receptacle. An ID push button (not required for installation) which places the system in ID mode for setting the NetLinx ID (device only) is to the left of the Serial port. The ID push button is used in conjunction with NetLinx Studio; see NetLinx Studio documentation for details.

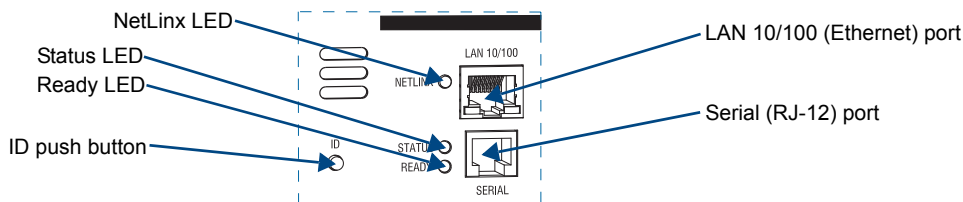


FIG. 4 LAN 10/100 connector, Serial connector, LEDs, and ID push button

### Ethernet and Serial Components

- ID push button (not required for installation) – Places the system in ID mode.
- LAN 10/100 (Ethernet) port – provides 10/100 BaseT connectivity.
- NetLinx LED – blinks at 5 sec. intervals when connection to NetLinx Master is established.
- Serial (RJ-12) – provides serial connectivity for an external device control (e.g., a Blu-Ray).
- Status LED – non-functional.
- Ready LED – solid green indicates that NetLinx has fully booted and is ready.



**Caution:** On some AMX matrix switchers the 10/100 port (RJ-45) is used for linking enclosures. Do not attempt to link the HDMI UTPro Matrix Switcher to other enclosures of any type.

### HDMI Matrix Switching Connectors (1-8 HDMI Inputs and 1-8 HDMI Outputs)

The HDMI matrix switching connectors (8 inputs left and 8 outputs right) are on the top as viewed from the rear of the enclosure. Information on cabling these connectors is on page 26, and special HDMI concerns and considerations are covered in the “Setting Up HDMI Systems” chapter (see page 59).

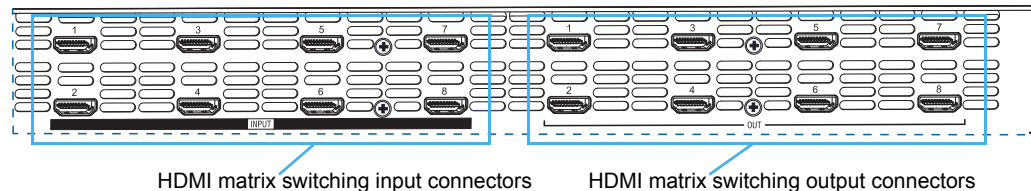


FIG. 5 HDMI matrix switching connectors

### HDMI and UTP Transport Connectors (1-8 HDMI Inputs and 1-8 RJ-45 Outputs)

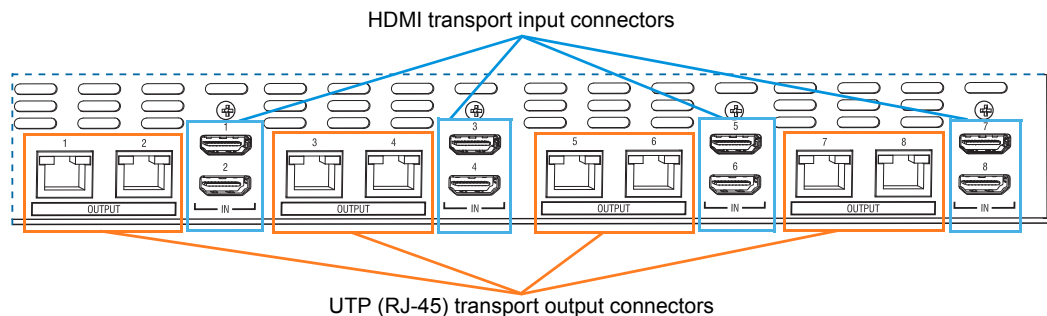


FIG. 6 HDMI and UTP transport connectors

The UTP transport connectors are on the bottom as viewed from the rear of the enclosure.

**Important:** For detailed cabling information for the HDMI and UTP transport connectors, see page 26.

#### Transport Connectors

- HDMI transport input connectors (IN 1-8) – accept cables from the HDMI matrix switching outputs (OUT 1-8); be sure each patch cable is connected to corresponding numbers (1 to 1, 2 to 2, etc.). The number for the HDMI matrix switching output connector and number for the HDMI transport input connector *must* match for each patch cable.
- UTP (RJ-45) transport output connectors (OUT 1-8) – provide connectivity for up to 8 HDMI-UTPRO-RX Receivers (FG1403-20) via UTP cable.

**Important:** Do not use the UTP transport connectors for connecting to a standard Ethernet network.

### System Serial Number

The system’s serial number is normally located in two places on the enclosure. When viewed from the rear, one serial number label is on the left above the power receptacle. The second serial number label is on the left side of the enclosure at the bottom edge near the power receptacle. The label on the side will also have the enclosure number (referred to as the chassis number).

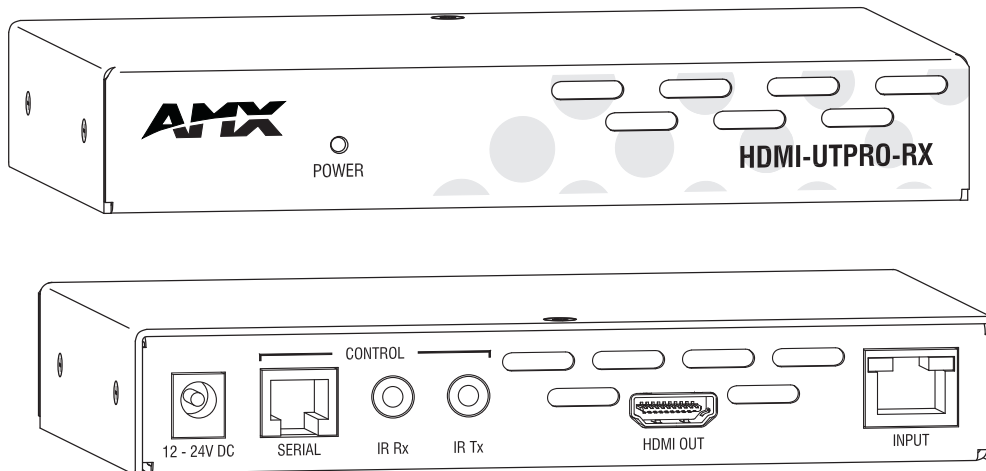
Before installation, we recommend recording the system’s serial number in an easily accessible location.



## HDMI-UTPRO-RX Receiver

The HDMI-UTPRO-RX Receiver is used in conjunction with the HDMI UTPro 8x8 to assist in the transport of HDMI signals over UTP cable. Cables from the HDMI UTPro are connected to the HDMI-UTPRO-RX Receivers, which in turn are connected to the destination devices. In addition, the Receiver has ports for serial communication and IR control (FIG. 7).

The size of the Receiver makes it easy to mount near or behind a high definition monitor. A Surface Mounting Bracket kit (FG525) is available for this purpose. The Receivers should not be stacked to allow for adequate cooling. If mounting in a rack using some type of tray, a minimum of one empty rack unit above and below is recommended (see the section on “Airflow Restriction” on page 21).



**FIG. 7** HDMI-UTPRO-RX Receiver

## HDMI-UTPRO-RX Components

The front of the HDMI-UTPRO-RX Receiver has an LED Power indicator.

The rear components on the HDMI-UTPRO-RX Receiver include the following from left to right:

- Power jack – 12 V to 24 V DC power jack (desktop power supply provided\*)
- Serial port (RJ-12) – optional serial communication for control of the monitor (see page 12)
- IR Rx port – supports generation of NetLinX key presses (channel events) from AMX remote controls (see “IR Control” on page 12)
- IR Tx port – supports wired control of connected IR devices (see “IR Control” on page 12)
- HDMI Out connector – HDMI connector connects via HDMI cable to the destination device
- Input connector – RJ-45 connector connects via UTP cable to an RJ-45 output connector on the HDMI UTPro

\* The automatically adjusting universal 110/220 IEC power supply is ENERGY STAR® qualified to ensure maximum efficiency and savings.

## IR Control (Optional)

### Compatible IR Control Options: UDM-RC05 or MIO-R1

The following three items are required for IR control via the HDMI-UTPRO-RX Receiver. (These items are not included with the HDMI UTPro but must be ordered separately.)

- **UDM-RC05** – The UDM-RC05 (FG1402-70) remote control can be used as a control interface to a UTPro system. If this remote is selected, the key presses will generate channel events from the receiver which may be processed in a connected master and used in the same way as touch panel button presses.

**Or**

**MIO-R1** – The Mio Modero® R-1 Remote (FG147) is an IR remote control unit that can communicate with an HDMI-UTPRO-RX Receiver and provides custom control features. (Requires the KeypadBuilder application for programming of the remote.)

- **IR03** – External IR Receiver Module (FG-IR03). The IR03 connects to the IR Rx jack on the HDMI-UTPRO-RX, allowing IR signals to be received from a compatible IR remote control like the UDM-RC05. The IR03 allows the HDMI-UTPRO-RX to be placed behind the display device if desired.
- **IR01** – IR Emitter Module (FG-IR01). The IR01 connects to the IR Tx jack on the HDMI-UTPRO-RX, allowing IR signals to be sent to the display device.

## Serial Control (Optional)

The Serial port on the HDMI-UTPRO-RX Receiver is an RJ-12 connector and displays in NetLinX Studio as Port 2 of the Receiver. This port may require an adapter cable to connect to the external serial device under control. The information for this port starts on page 34. Cable adapter information is on page 35. The RJ-12 pinout is on page 36.

### Serial Port - Default Communication Settings

The default serial settings are listed in the table below. The settings can be altered by sending SEND\_COMMANDs to Port 2 of the Receiver (see page 95).

Default Serial Settings	
Baud Rate:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	None

## HDMI-UTPRO-0808 Product Specifications

HDMI-UTPRO-0808 Specifications	
Parameter	Value
Approvals	UL, cUL, CE, FCC Class A, RoHS
Humidity	0 to 90% non-condensing
Operational Temperature	32° F to 113° F (0° C to 45° C)
Storage Temperature	-22° F to 158° F (-30° C to 70° C)
AC Power*	100 VAC to 240 VAC, single phase (50 Hz to 60 Hz)
Power Consumption (max.)	110 Watts, fully loaded
Thermal Dissipation (max.)	375 BTU/hr, fully loaded
MTBF	71,000 hours
Dimensions	
Depth	Approximately 12 in. (30.5 cm)
Width with mounting ears	18.9 in. (48.0 cm)
Width without mounting ears	17.4 in. (44.2 cm)
Height	3.5 in. (8.9 cm) (2 RU)
Weight	Approximately 13 lb. (5.9 kg)
Shipping Weight	46 lbs (20.87 kg) for complete system kit including 8 RXs (2 shipping boxes)
Front Panel Components	
Function Key	The Function Key accesses the Function menu on the LCD.
Control Dial	The Control Dial scrolls through menu options and adjusts values, such as global preset numbers.
Select Key	The Select Key enters a menu selection and can be used to execute presets.
LCD Display	The LCD displays the Function menu. The Function menu and its submenus access the different modes and lists used to control the system.
Cancel Key	The Cancel Key clears an incomplete operation and returns the display to the beginning of a submenu or list.
Take Key	The Take Key instructs the system to execute or disconnect a switch.
Input/Output 1-8 Keys	Input and Output Keys (1-8) correspond to the input and output connections on the rear of the enclosure. These keys are used to select the input and outputs for routing source signals to destination devices as well as for status and other operations such as locking and unlocking the control panel.
Power LED	The Power LED illuminates to indicate the unit is receiving power.
Rear Panel Components	
Power Connector	The universal power receptacle accepts all major international standard power sources. <b>Note:</b> <i>The rating along the sides of the power connector contains important installation information.</i>
Control Port (CPU)	Bi-directional RS-232 Baud rates of 9600, 19200, 38400, 57600 (default 9600) DB-9 connector
Status LED (CPU)	System status indicator
ID Push Button	Places the system in NetLinX Device ID assignment mode (requires NetLinX Studio). Not required for installation.
LAN 10/100 port (Ethernet)	Native NetLinX Device TCP/IP (LAN 10/100) Serves built-in WebConsole Auto MDI/MDI-X cross-over RJ-45 connector

\* The fuse is internal and is not field serviceable. If you believe the fuse needs to be replaced, contact technical support (see page 41).

<b>Rear Panel Components (continued)</b>	
Serial Port (RJ-12)	Bi-directional RS-232 Baud rates 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 (default 9600) RJ-12 connector
NetLinx LED	Blinks at 5 second intervals when a connection to a NetLinx Master is established.
Status LED	Non-functional.
Ready LED	Solid green indicates that NetLinx has fully booted and is ready.
HDMI Matrix Switching Input and Output Connectors	<p>The HDMI matrix switching connectors are located on the upper-half of the rear panel.</p> <p>The HDMI input and output connectors allow for the use of cables from source and destination devices with HDMI connectors.</p> <p>These connectors also have local DDC (Display Data Channel) support with plug-and-play information provided by the HDMI UTPRO.</p> <ul style="list-style-type: none"> <li>• HDMI inputs (IN 1-8) accept inputs from up to 8 HDMI source devices.</li> <li>• HDMI outputs (OUT 1-8) connect to HDMI inputs (INPUT 1-8) on the bottom (see HDMI Transport Input Connectors below).</li> </ul> <p><b>Note:</b> Refer to the "Digital Video - HDMI Specifications" table for complete specifications (see page 15).</p>
HDMI Transport Input Connectors	The HDMI inputs (INPUT 1-8) accept HDMI patch cables (provided) from the HDMI matrix switching outputs (OUT 1-8).
UTP RJ-45 Transport Output Connectors	The RJ-45 outputs (OUTPUT 1-8) provide connectivity for up to 8 HDMI-UTPRO-RX Receivers (FG1403-20) via UTP cable.
<b>Other AMX Equipment</b>	
Included Accessories	<ul style="list-style-type: none"> <li>• 8 HDMI-UTPRO-RX Receivers (FG1403-20); for specifications, see page 18</li> <li>• 8 desktop power supplies (12 V 1.25 A) with power cord (FG1090-155)</li> <li>• 8 connection cables (connect between HDMI matrix switching outputs and the HDMI transport inputs)</li> <li>• 1 power cord (standard US power cords are provided for installations within the US)</li> <li>• 2 rack mounting brackets for the enclosure</li> </ul> <p><b>Note:</b> No A/V interface cables are supplied.</p>
Compatible / Optional Equipment	<ul style="list-style-type: none"> <li>• UDM-RC05 IR Remote Control (FG1402-70)</li> <li>• IR01 Infrared Emitter Module (FG-IR01)</li> <li>• IR03 External Infrared Receiver Module (FG-IR03)</li> <li>• MIO-R1 Mio Modero® R-1 Remote Control (FG147)</li> <li>• RS-232 Serial (DB-9/RJ-12) connection cable (FG-RS01)</li> <li>• RS-232 Serial (DB-9/RJ-12) connection cable kit with adapters (FG-RS01K)</li> <li>• 6 ft. (1.83 m) Ethernet crossover cable (CA2179-02)</li> <li>• Surface Mounting Bracket kit - for Receivers (FG525)</li> </ul>

## Digital Video – HDMI Specifications

Digital Video – HDMI Specifications	
Compatible Formats	HDMI, HDCP, DVI (DVI is supported with appropriate conversion cable)
Supported Twisted-Pair Cable Types	Cat5e, Cat6/6e, Cat6a, Cat7, STP, FTP
Supported Twisted-Pair Cable Length	<ul style="list-style-type: none"> <li>Up to 328 ft. (100 m); cable quality required in order to meet 100 meter distance should meet ANSI/TIA/EIA 568A-5 specification or better specification and be rated for 250 MHz or better.</li> <li>For cable runs approaching the 100 meter limit, Cat6/6e, Cat6a, or Cat7 is recommended.</li> <li>It is recommended that the cabling between AMX systems/devices be a uniform run of solid core cabling with no patch cables or extensions.</li> <li>If a patch cable is required (e.g., between a patch panel and an AMX device), the patch cable should be limited to 5 meters total on each end.</li> <li>Best results have been seen using a Cat6 coupling device for attaching the cables together, even when using lower rated Cat5e cabling.</li> <li>If running cables together, then screened cabling should be used to reduce crosstalk.</li> <li>If running Cat5e/6 cables together in a bundle, they can only be coupled for a distance of up to 60 meters before they must be separated over the remainder of the run. Cat6a and Cat7, which are shielded by definition, can be bundled for the entire 100 meter run.</li> </ul>
Transport Layer Throughput (max.)	10.2 Gbps
Video Data Rate (max.)	4.95 Gbps
Video Pixel Clock (max.)	165 MHz
Progressive Resolution Support	480p, 576p, 720p, 1080p and 640x480 through 1920x1200 @ 60 Hz (1600x1200 @ 60 Hz and higher requires reduced blanking)
Interlaced Resolution Support	480i, 576i, 1080i
Audio Format Support	Dolby Digital,* DTS,* L-PCM
Audio Resolution	16 bit to 24 bit
Audio Sample Rate	32 kHz, 44.1 kHz, 48 kHz, 96 kHz,** 192 kHz**
Signal Type Support	HDMI DVI-D (single link with cable adapter)
DDC/EDID Support	EDID provided by the HDMI UTPRO enclosure EDID is user re-programmable
HDCP Support	Yes, full matrix HDCP support (includes any input to any or all outputs) AMX HDCP InstaGate® Technology
CEC Support	No
Input Voltage (nominal)	1.0 Vpp differential
Output Voltage (nominal)	1.0 Vpp differential
Output Re-clocking (CDR)	Yes
Output +5 V DDC pin	50 mA max. per output port
HDMI Propagation Delay	3 uS
Connectors	HDMI Type A female

\* Dolby Digital and DTS support up to 48 kHz, 5.1 channels.

\*\* Two channel L-PCM support up to 192 kHz at 1080p (50 Hz, 59 Hz, 60 Hz).

Two channel L-PCM support up to 96 kHz at 720p, (50 Hz, 59 Hz, 60 Hz), 1080p (24 Hz, 25 Hz, 30 Hz, 50 Hz, 59 Hz, 60 Hz), 1080i (50, 59, 60 fields).

Two channel L-PCM support up to 48 kHz at all resolutions.

## EDID Resolutions Supported through Local DDC for HDMI Connectors

Standard and established timings are provided in the following tables along with detailed timing blocks.

**Note:** The EDID can be re-programmed to support additional resolutions through the local DDC using the EDID Programmer (see page 107).

### Standard Timings

Standard Timing Identification	Resolution	Refresh Rate Max.
ID 1	1920x1080 (This is the preferred timing identified in the EDID.)	60 Hz
ID 2	1680x1050	60 Hz
ID 3	1600x1200	60 Hz
ID 4	1280x800	60 Hz
ID 5	1280x720	60 Hz
ID 6	1280x1024	60 Hz
ID 7	1360x768	60 Hz
ID 8	1440x900	60 Hz
ID 9	2048x1152	60 Hz
ID 10	1600x900	60 Hz
ID 11	1400x1050	60 Hz
ID 12	1280x960	60 Hz

### Established Timings

Resolution	Refresh Rate
640x480	60 Hz, 67 Hz, 72 Hz, 75 Hz
800x600	56 Hz, 60 Hz, 72 Hz, 75 Hz
832x624	75 Hz
1024x768	60 Hz, 70 Hz, 75 Hz, 87 Hz
1280x1024	75 Hz
1152x870	75 Hz

### Detailed Timing Blocks

Resolution	Refresh Rate
1920x1080	60 Hz, 148.5 MHz
1920x1080	60 Hz, 138.5 MHz
1920x1080	60 Hz, 141.5 MHz
1920x1200	60 Hz, 158.25 MHz
1920x1200	60 Hz, 154.0 MHz


*CEA Video Information Code (VIC) Formats*

VIC #	Resolution	Refresh Rate and Aspect Ratio
VIC = 1	640x480p	59.94/60 Hz, 4:3
VIC = 2	720x480p	59.94/60 Hz, 4:3
VIC = 3	720x480p	59.94/60 Hz, 16:9
VIC = 4	1280x720p	59.94/60 Hz, 16:9
VIC = 5	1920x1080i	59.94/60 Hz, 16:9
VIC = 6	720(1440)x480i	59.94/60 Hz, 4:3
VIC = 7	720(1440)x480i	59.94/60 Hz, 16:9
VIC = 14	1440x480p	59.94/60 Hz, 4:3
VIC = 15	1440x480p	59.94/60 Hz, 16:9
VIC = 16	Native 1920x1080p	59.94/60 Hz, 16:9
VIC = 17	720x576p	50 Hz, 4:3
VIC = 18	720x576p	50 Hz, 16:9
VIC = 19	1280x720p	50 Hz, 16:9
VIC = 20	1920x1080i	50 Hz, 16:9
VIC = 21	720(1440)x576i	50 Hz, 4:3
VIC = 22	720(1440)x576i	50 Hz, 16:9
VIC = 29	1440x576p	50 Hz, 4:3
VIC = 30	1440x576p	50 Hz, 16:9
VIC = 31	1920x1080p	50 Hz, 16:9
VIC = 32	1920x1080p	23.97/24 Hz, 16:9
VIC = 33	1920x1080p	25 Hz, 16:9
VIC = 34	1920x1080p	29.97/30 Hz, 16:9
VIC = 39	1920x1080i	50 Hz, 16:9
VIC = 41	1280x720p	100 Hz, 16:9
VIC = 42	720x576p	100 Hz, 4:3
VIC = 43	720x576p	100 Hz, 16:9
VIC = 44	720(1440)x576i	100 Hz, 4:3
VIC = 45	720(1440)x576i	100 Hz, 16:9
VIC = 47	1280x720p	119.88/120 Hz, 16:9
VIC = 48	720x480p	119.88/120 Hz, 4:3
VIC = 49	720x480p	119.88/120 Hz, 16:9

*Audio Data Block*

Channels	Sampling Frequency
2 Channel L-PCM	32, 44.1, 48, 88.2, 96, 176.4, 192 kHz sampling frequency at 16, 20, or 24 bits per sample
AC-3 (Dolby Digital) 6 Channels (5.1)	48 kHz sampling frequency
DTS 6 Channels (5.1)	48 kHz sampling frequency

## HDMI-UTPRO-RX Specifications

HDMI-UTPRO-RX Specifications	
Parameter	Value
Approvals	UL, cUL, CE, FCC Class A, RoHS
AC Power	100 VAC to 240 VAC, single phase (50 Hz to 60 Hz)
DC Power	12 V to 24 V (+/-10%, desktop power supply included*) 
Power Consumption	12 Watts, fully loaded
Thermal Dissipation	41 BTU/hr, fully loaded
Operational Temperature	32° F to 113° F (0° C to 45° C)
Humidity	0 to 90% non-condensing
MTBF	203,000 hours (combined set of 8 RX modules)
Serial Port	Bi-directional RS-232 Baud rates 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 (default 9600) RJ-12 connector
IR Control (Optional)	IR Rx Jack: 3.5 mm input port for connection of an IR03 Receiver module (see page 11). "MIO" protocol is loaded as the default. IR Tx Jack: 3.5 mm output port for connection of an IR01 Emitter module (see page 11). The *.IRL file must be loaded for the destination device (see page 103). For information on compatible IR remote controls, see page 12 and page 14.
HDMI Output Connector	HDMI connector connects via HDMI cable to destination device
RJ-45 Input Connector	RJ-45 connector connects via UTP cable to RJ-45 output connector on the HDMI-UTPRO-0808 enclosure
Dimensions	3.8 in. (9.69 cm) depth 6 in. (15.24 cm) width 1 in. (2.54 cm) height
Weight per Module	Approximately 1.5 lbs (0.68 kg) (for shipping weight, see enclosure specifications)

\* We recommend using a regulated power supply for the HDMI-UTPRO-RX. If you exceed the specified voltage level for the power jack on the RX, the warranty will be void.

AMX reserves the right to modify its products and their specifications without notice.

## Common Applications

Whether your displays are across the room, on the other side of the house, or in a classroom down the hall, your sources can be distributed to up to 8 different displays located remotely. In addition, since UTPRO signals are carried over commonly available Unshielded Twisted Pair (UTP) cable, the HDMI-UTPRO-0808 is also an extremely cost effective solution to install.

## Configuration Information and Control Options

### Routing Configuration Information

The HDMI UTPro systems specify two identical virtual matrices for switching signals: VM 0 = All and VM 1 = Video. These two VMs function the same for this product. Additional VMs can be created with XNConnect configuration software as one way to deal with sources with limited sink support (see page 65 and page 127).

### Configuration Options

- The WebConsole can be used to configure the master connection for the HDMI UTPro, as well as networking and time settings. Refer to the "HDMI UTPro WebConsole" chapter on page 71 for details.
- Use NetLinx SEND\_COMMANDs to configure and control the HDMI UTPro. Refer to the "HDMI UTPro NetLinx Programming" chapter on page 85 for programming details.



## Control Options

HDMI UTPro systems support two main protocols: TCP/IP and XNNet (protocol used by control panel). Several control options are available. Multiple control methods can be used on the same system.

### *Native NetLinx Interface*

The HDMI UTPro can be integrated with any NetLinx Central Controller and appears in NetLinx Studio (Version 3 or higher is required) as a NetLinx device.

### *Front Control Panel*

The HDMI UTPro comes standard with a front control panel. Even if another method of control is preferred, the control panel can be used for system verification, redundant control, and troubleshooting.

### *AMX Control Devices*

The HDMI UTPro is compatible with a number of AMX control devices. For control programming information, see the instruction manual for the specific interface.

### *Third-Party Controllers*

A third-party controller can also be attached to the Control (DB-9 serial) port on an HDMI UTPro enclosure (note that this port cannot provide the additional NetLinx functionality which is available through the LAN 10/100 port). If using a third-party controller, see the controller documentation for operating instructions.

## System Diagnostics (Programmer's Interface)

The HDMI UTPro displays system information in its splash screen for diagnostic purposes. The information indicates the current status and well-being of the system components. The splash screen can be accessed using a terminal emulation program (e.g., HyperTerminal). For additional information, see Appendix B on page 113.



# Installation and Setup

## Site Recommendations

When placing the enclosure, follow the recommendations and precautions in this section to reduce potential installation and operation hazards.

### Environment

- Choose a clean, dust free, (preferably) air-conditioned location.
- Avoid areas with direct sunlight, heat sources, or high levels of EMI (Electromagnetic Interference).
- To make control panel operations easier, mount the enclosure with the control panel in the rack at eye level.

### Chassis Accessibility

Make sure the front and rear panels of the enclosure are accessible, so that you can monitor the LED indicators. Leaving adequate clearance at the rear will also allow for easier cabling and service.

### Power

The source's electrical outlet should be installed near the router, easily accessible, and properly grounded. Power should come from a building branch circuit. We recommend using a dedicated line for the system's power. To avoid an overload, note the power consumption rating of all the equipment connected to the circuit breaker before applying power.

## General Hazard Precautions

These recommendations address potential hazards that are common to all installations:

### Elevated Operating Temperature

The maximum rated ambient temperature for the HDMI UTPro enclosure is 113° F (45° C).

All equipment should be installed in an environment compatible with the manufacturer's maximum rated ambient temperature. In a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the ambient room temperature.



**Caution:** To protect the equipment from overheating, do not operate in an area that exceeds 113° F (45° C) and follow the clearance recommendation below for adequate airflow.

### Airflow Restriction

The HDMI UTPro enclosure is designed to adequately dissipate the heat it produces under normal operating conditions; however, this design is defeated when high heat producing equipment is placed directly above or below the enclosure. The previous statement also applies to the HDMI-UTPRO-RX Receivers.



**Caution:** To prevent overheating, avoid placing high heat producing equipment directly above or below the enclosure or the Receivers. The enclosure requires a minimum of one empty rack unit above and below (three empty rack units are recommended). The Receivers should not be stacked to allow for adequate cooling. If mounting in a rack using some type of tray, a minimum of one empty rack unit above and below is recommended. Verify that the openings on the sides of the enclosure and the front and back of the Receivers are not blocked and do not have restricted air flow.

## Mechanical (Rack) Loading

When installing equipment in a rack, distribute the weight to avoid uneven mechanical loading.

## Circuit Overloading

When connecting the equipment to the supply circuits, be aware of the effect that overloading the circuits might have on over-current protection and supply wiring.

## Reliable Earthing (Grounding)

Reliable earthing of rack-mounted equipment should be maintained. If not using a direct connection to the branch circuit (e.g., plugging into a power strip), pay particular attention to supply connections.



**Caution:** *We recommend attaching all power cords to a surge protector and/or an AC line conditioner.*

## Unpacking

The HDMI-UTPRO-0808 Kit is shipped in two boxes (one contains the HDMI UTPRO and the other contains the HDMI-UTPRO-RX units). The invoice is sent separately; a packing slip is attached to the outside of each box. The complete kit includes following items:

- ☐ HDMI-UTPRO-0808 Kit (enclosure, 8 receivers, 8 desktop power supplies)
- ☐ Standard US power cord (if shipped within the US)
- ☐ Rack ears with 8 screws per kit
- ☐ Other enclosure products as needed

The documentation includes:

- ☐ AMX HDMI-UTPRO-0808, Twisted Pair Dist Kit Quick Start Guide
- ☐ *AMX AutoPatch CD*

Shipping boxes are marked as “Box \_\_ of \_\_,” where the first blank is the box number and the second blank is the total number of boxes in the shipment.

## Unpacking Tips

- ☐ Before fully unpacking the enclosure, *inspect the shipping box for any signs of damage.* If a box is partially crushed or any sides have been broken open, notify the shipping agency immediately and contact your AMX representative (see the warranty on the *AMX AutoPatch CD* or at **www.amx.com**).
- ☐ Once unpacking is complete, closely check the physical condition of the enclosure.
- ☐ Collect all documentation.

**Note:** *Please save the original shipping container and packing materials. AMX is not responsible for damage caused by insufficient packing during return shipment to the factory. Shipping boxes are available; contact your AMX representative for details.*

## System Diagram

The diagram in FIG. 8 illustrates a basic A/V distribution system using an HDMI-UTPRO-0808 Matrix Switcher and eight HDMI-UTPRO-RX Receivers.

**Important:** Each HDMI matrix switching output connector must be connected (with HDMI patch cable - provided) to its corresponding HDMI transport input connector (1 to 1, 2 to 2, etc.).

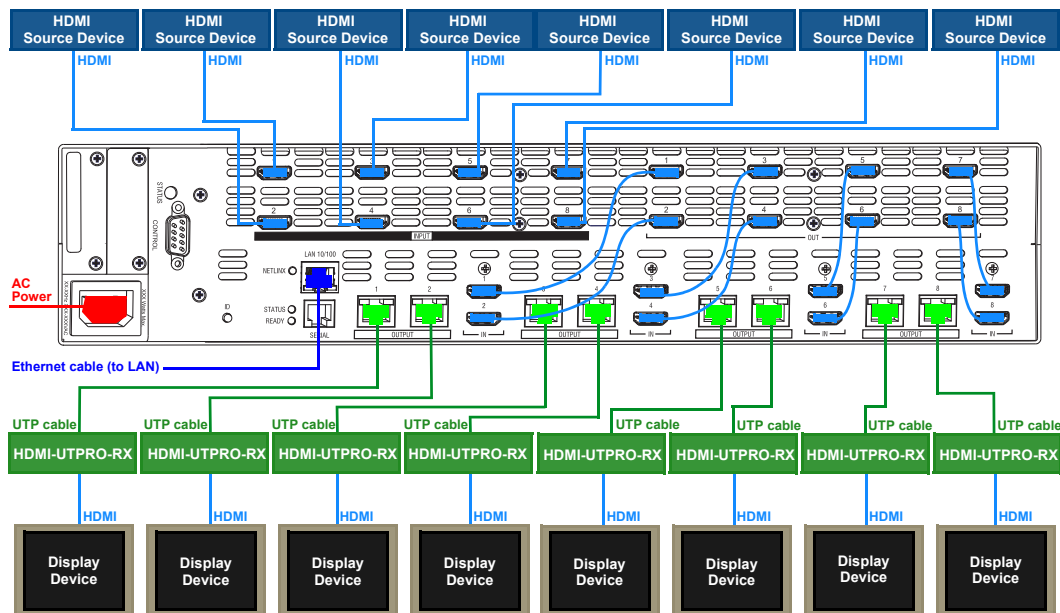


FIG. 8 System Diagram

## Rack Installation and System Setup

The HDMI UTPro enclosure can be mounted in a standard EIA 19 in. (48.26 cm) rack. Rack installation ears are included, and directions for mounting the rack ears are included in the rack installation instructions on page 25.

**Important:** The system requires at least one empty rack unit above and below the enclosure to allow adequate airflow; three empty rack units are recommended.

### Required items for rack installation:

- ☐ Enclosure
- ☐ Standard EIA 19 in. (48.26 cm) rack
- ☐ Rack ears with 8 screws per kit
- ☐ Screwdriver
- ☐ Screws that fit your rack for mounting the enclosure
- ☐ Standard US power cord (if shipped within the US)

### Optional items for rack installation:

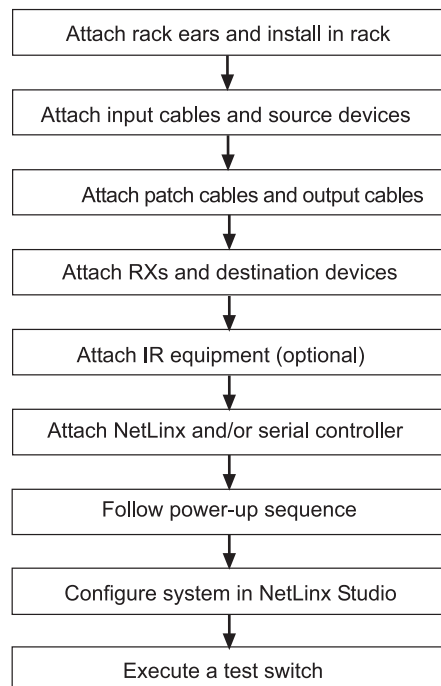
- ☐ Surge-protector(s) – highly recommended
- ☐ A laptop computer or PC with a null modem cable  
(for communication with the HDMI UTPro via the Control / RS-232 port)

## Installation Recommendations

- Write the system's serial number in an easily accessible location before installing the HDMI UTPro in a rack. The system's serial number is located in two places on the enclosure: on the left rear and on the left side of the enclosure near the power receptacle. The serial number also displays at the end of the product name in NetLinx Studio's ZeroConfig tree.
- Use an earth-grounded power cord / system with the HDMI UTPro.
- Attach all power cords to a single surge protector and/or an AC line conditioner.
- Apply power to the HDMI UTPro enclosure before applying power to its source and destination devices.

## Installation Procedure

A flow chart showing the installation sequence is in FIG. 9. The procedure on page 25 provides general steps with references to detailed information found in later sections of the manual.



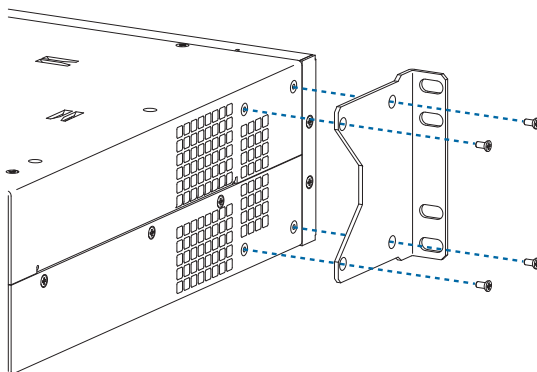
**FIG. 9** Installation procedure



**Caution:** To prevent overheating, avoid placing high heat producing equipment directly above or below the enclosure or the Receivers. The enclosure requires a minimum of one empty rack unit above and below (three empty rack units are recommended). Stacking Receivers will not allow the units adequate cooling. If mounting in a rack using some type of tray, a minimum of one empty rack unit above and below is recommended. Verify that the openings on the sides of the enclosure and the front and back of the Receivers are not blocked and do not have restricted air flow.

### To install and set up an HDMI UTPro in a rack:

1. Attach the rack ears per FIG. 10 (ears provided).



**FIG. 10** Attach rack ears to sides of enclosure

2. Place the enclosure in the rack and attach front-mounting screws to hold it firmly in place.

**Tip:** When placing an enclosure, keep in mind that the optimal viewing angle for a control panel is eye level.

3. Attach the source devices; see “Attaching Cables for Switching/Transport” on page 26 and “Setting Up HDMI Systems” on page 59.  
*Do not apply power to the devices until after the HDMI UTPro has power (Step 10).*
  4. Attach the patch cables from the HDMI outputs on the top to the HDMI inputs on the bottom; be sure each patch cable is connected to corresponding numbers (1 to 1, 2 to 2, etc.).
  5. Attach the HDMI-UTPRO-RX Receivers and destination devices see “Attaching Cables for Switching/Transport” on page 26. For mounting information for the Receivers, see page 11.
  6. Optional for HDMI-UTPRO-RX Receivers – Connect IR equipment; see page 29.
  7. Establish network communication with a NetLinx Controller; see “Establishing an Ethernet 10/100 Network Connection” on page 30.
  8. Optional for the Serial port (RJ-12 / RS-232) – Establish serial communication with an external serial control device; see “Serial Port (RJ-12)” on page 34.
  9. Optional for the Control port (DB-9 / RS-232) – Establish serial communication with an external serial control device; see “Control Port (DB-9)” on page 36.
  10. Apply power to the system according to the power-up procedure; see “Applying Power and Startup” on page 38.
  11. Configure the system via the Zero-Config utility in NetLinx Studio (Version 3 or higher is required) and the WebConsole; see the “HDMI UTPro WebConsole” chapter on page 71.
- Note:** We recommend using a surge protector and/or an AC line conditioner.
12. Execute a test switch to make sure the system is working properly; see “Executing a Test Switch” on page 39.

### Additional Installation Options

- We recommend priming the system for InstaGate® Technology, which will significantly reduce the HDCP latency and interruptions on all displays in the system (see page 67).
- If necessary, EDID Programmer software (located on the *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com)) is available for re-programming the HDMI connectors (see page 107).

## Important Twisted Pair Cable Recommendations

The requirements are the same for the twisted pair cable used with the ICS LAN 10/100 (Ethernet) connector and with the DXLink (RJ-45) connector.

Twisted pair cable is designed to carry Full HD content over 100 meter (328 ft.) cables with control. For cable specifications, see page 15. In a typical installation, the cables should be stretched to their full length between the Transmitters and Receivers and the enclosure.

- To keep from incurring video issues, the installation must use quality Cat5e, Cat6/6e, Cat6a, Cat7, SF/UTP, S/FTP, or F/UTP cable. Do not use low skew cable or media twist category cable.
- Twisted pair cable quality required in order to reach the 100 meter distance should meet ANSI/TIA/EIA 568A-5 or better specification and be rated for 250 MHz or better. For cable runs approaching the 100 meter limit, Cat6/6e, Cat6a or Cat7 is recommended.
- Do not use a tightly bundled or rolled cable.
- Be sure to avoid kinks by following the manufacturer's minimum bend radius.
- Minimize service loops or coils whenever possible as they will reduce overall cable performance.
- Transmission line performance can be impaired by the cable being placed in close proximity to electrically noisy devices or other cables. Tight bundling of cables should be avoided in long run applications to reduce crosstalk issues.
- Cable end terminations should meet the TIA specification of the cable used to ensure optimal performance.
- If running Cat5e or Cat6 cables together in a bundle, they can only be coupled for a distance of up to 60 meters before they must be separated over the remainder of the run. Cat6a and Cat7, which are shielded by definition, can be bundled for the entire 100 meter run.

**Important:** *DXLink twisted pair cable runs for DXLink equipment should only be run within a common building.*



## Attaching Cables for Switching/Transport

### Top – HDMI Inputs and HDMI Outputs (Used for Matrix Switching)

The HDMI matrix switching inputs and outputs are on top and provide the system its switching capability. The 8 input connectors are on the left side, and the 8 output connectors are on the right. The input and output connectors are numbered separately. The source devices connect to the HDMI input connectors. The HDMI output connectors connect to the HDMI input connectors on the bottom that are used for transport.

**Note:** *If the installation requires only local destinations (not long cable runs), you can cable the HDMI matrix switching outputs directly to the local devices. However, by using the transport connectors and included Receivers, you gain the benefit of the NetLinx functionality of end point control which is included in the HDMI UTPro's transport function. (Also note that short and long cable runs can be mixed-and-matched within an installation.)*

### Bottom – HDMI Inputs and UTP Outputs (Used for Transport)

The 8 HDMI input and 8 UTP (RJ-45) output connectors used for transport are on the bottom and enable the system to transport the HDMI signals over UTP cables. The HDMI matrix switching output connectors connect to the HDMI transport input connectors. The UTP output connectors connect to the HDMI-UTPRO-RX Receivers, which in turn connect to the destination devices.

**Important:** Do not use a tightly bundled or rolled cable. In addition, minimize service loops or coils whenever possible as they will reduce overall cable performance.

#### LEDs on RJ-45 Connectors

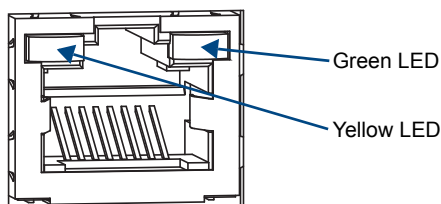


FIG. 11 RJ-45 connector LEDs

The following information applies to the LEDs on the UTP (RJ-45) transport connectors on the HDMI UTPro enclosure and to the Input (RJ-45) connector LEDs on the Receivers.

- **Green:**
  - On – link has been established
  - Off – no link
- **Yellow:**
  - On – HDCP handshaking has occurred successfully
  - Blinking – no HDCP
  - Off – no HDMI

### UTP Cable Requirements

UTP cable was designed to carry Full HD content over 100 meter (328 ft.) cables with control. For cable specifications for the HDMI UTPro, see page 15.

In a typical installation, the cables should be stretched to their full length between the HDMI UTPro enclosure and its Receivers. Service loops or coils of the cable will reduce the overall cable performance and should be minimized whenever possible. The total run of a UTP cable installation may include up to two patch cables, typically as connections to RJ-45 wall jacks (FIG. 12).

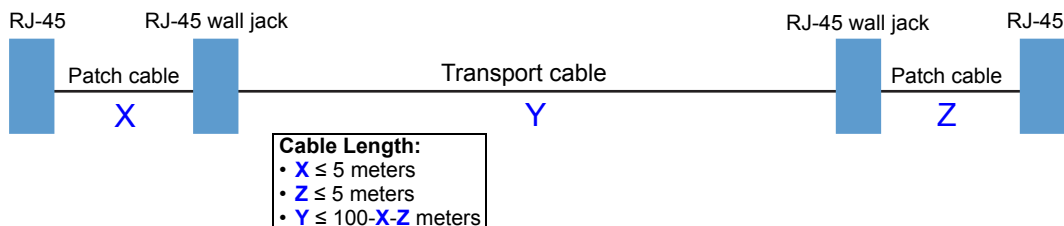


FIG. 12 UTP cable installation (only X and Z can be patch cables)

### UTP Cable Pinouts

We recommend using the T568A pinout specification for termination of the UTP cable used with the UTP transport connectors on the HDMI UTPro enclosure. The T568B pinout specification is also supported.

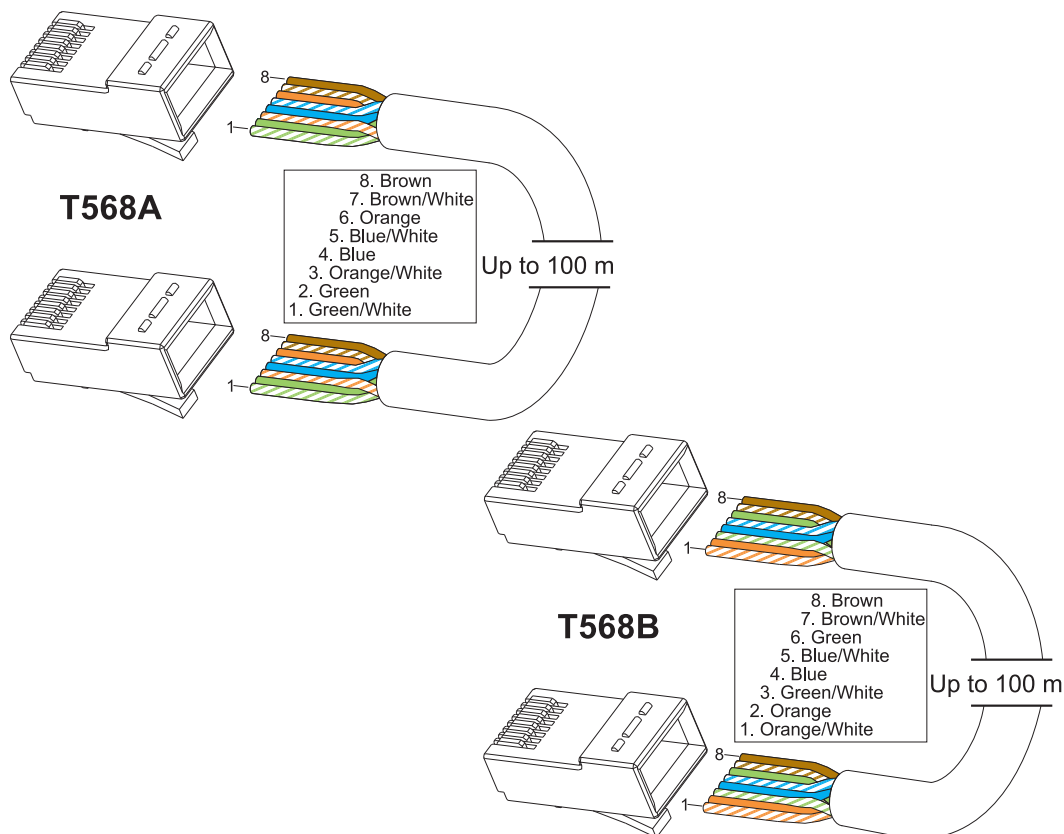
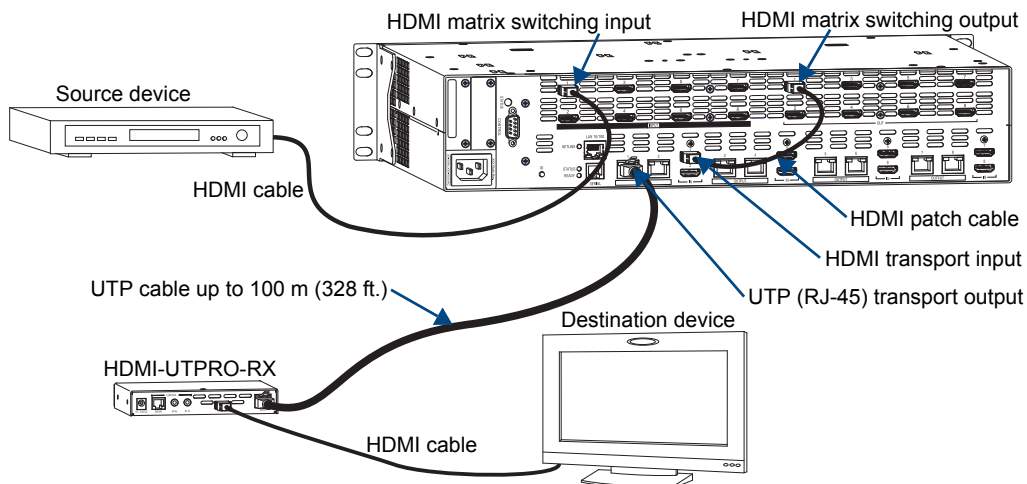


FIG. 13 UTP cable pinouts for T568A and T568B specifications

**Important:** Before attaching source and destination devices, we recommend reading the “Setting Up HDMI Systems” chapter for information on concerns and considerations you should be aware of when switching HDMI (see page 59).



**FIG. 14** Cables connected for switching/transport from the first source to the first destination device

**Important:** UTP cable quality required in order to meet 100 meter distance should meet ANSI/TIA/EIA 568A-5 or better specification and be rated for 250 MHz or better.

#### To attach cables for switching/transport:

1. Attach an HDMI cable from the first source device to the first HDMI matrix switching input connector.
2. Attach one end of an HDMI patch cable (provided) to the first HDMI output connector.
3. Attach the other end of the HDMI patch cable to the first HDMI transport input connector.
4. Repeat Steps 1 through 3 for the remaining source devices; be sure each patch cable is connected to corresponding numbers (2 to 2, 3 to 3, etc.). The number for the HDMI matrix switching output connector and number for the HDMI transport input connector *must* match for each patch cable.
5. Attach a UTP cable to the first UTP (RJ-45) transport output connector.
6. Attach the other end of the UTP cables to the RJ-45 input connector on the first HDMI-UTPRO-RX Receiver. For mounting information for the Receivers, see page 11.
7. Repeat Steps 5 and 6 for the remaining Receivers.
8. Connect the HDMI-UTPRO-RX Receivers to the destination devices using HDMI cables.

## IR Control (Optional)

For information on the equipment needed for IR control, see page 12.

#### IR Receiver



**FIG. 15** IR Receiver (FG-IR03 - not included)

#### To connect an IR Receiver to the HDMI-UTPRO-RX Receiver:

1. Connect the IR03 IR Receiver (FG-IR03) cable to the IR Rx port on the Receiver.

2. Run the cable and attach the IR receiver bud so that it has a clear line-of-sight with the intended remote control device.
3. Repeat Steps 1 and 2 as necessary for additional IR remote units.

#### IR Emitter



FIG. 16 IR Emitter (FG-IR01 - not included)

#### To connect an IR Emitter to the HDMI-UTPRO-RX Receiver:

1. Connect an IR01 IR Emitter cable (FG-IR01) to the IR Tx port on the Receiver.
2. Run the other end of the IR TX cable to the display device and locate the IR window.
3. Attach the IR Emitter bud over the device's IR sensor by removing the cover on the reverse side of the Emitter and sticking the bud directly over the IR window.
4. Repeat Steps 1 through 3 as necessary for additional IR remote units.

When installation of the IR Receiver and IR Emitter is complete, load the appropriate driver (see page 103) and program the IR remote according to the product's documentation.

## Establishing an Ethernet 10/100 Network Connection

The LAN 10/100 (RJ-45) port provides Ethernet 10/100 BaseT connectivity. The following table lists the pinouts, signals, and pairing for the port.

Ethernet Pinouts and Signals				
Pin	Signals	Connections	Pairing	Color
1	TX+	1 ----- 1	1 ----- 2	White / Orange
2	TX-	2 ----- 2		Orange
3	RX+	3 ----- 3	3 ----- 6	White / Green
4	no connection	4 ----- 4		Blue
5	no connection	5 ----- 5		White / Blue
6	RX-	6 ----- 6		Green
7	no connection	7 ----- 7		White / Brown
8	no connection	8 ----- 8		Brown

FIG. 17 diagrams the pinouts and signals for the network RJ-45 connector and cable.

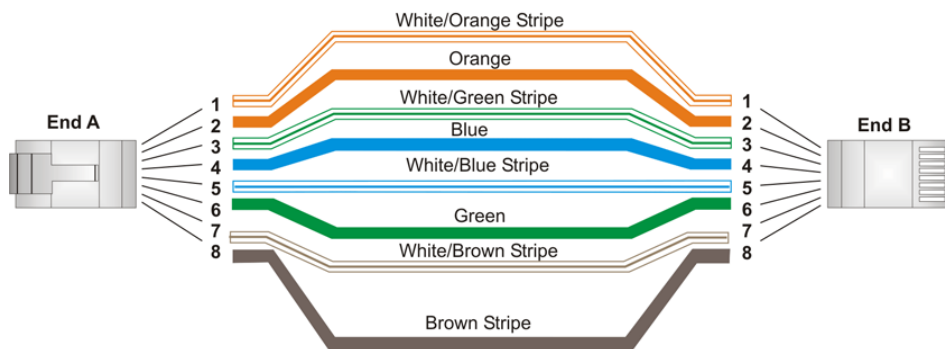


FIG. 17 Ethernet RJ-45 wiring diagram

**Important:** By default, the HDMI UTPro is configured for DHCP. For details, refer to the IP Settings section on page 77.

**Note:** Consult the Network Administrator for correct cabling from the HDMI UTPro onto the network. For remote connectivity, the Firewall may have to be configured to open port 1319 for remote connectivity over UDP.

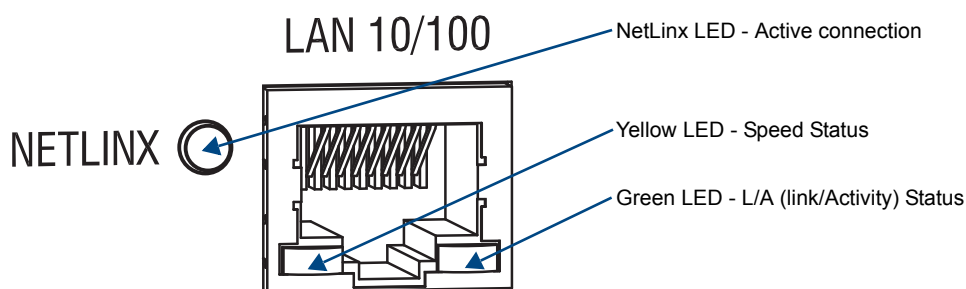
#### *Cable Requirements for LAN Connection (or a PC's NIC card)*

An RJ-45 cable (either crossover or straight-through) is required to connect the HDMI UTPro to a LAN. The same type of cable can also be used to connect the HDMI UTPro directly to a network card in a PC; for special instructions, see *Workaround* on page 32.

#### *NetLinx LED*

The NetLinx LED is to the left of the LAN 10/100 connector. When the LED is illuminated, the NetLinx connection is active.

#### *LEDs on LAN 10/100 (Ethernet) RJ-45 Connector*



**FIG. 18** LAN 10/100 port LEDs

The LAN 10/100 port is an Ethernet link connector, handling Ethernet 10/100 connections for 100 Mbps (megabits per second) and 10 Mbps. (This connection is compatible with most Ethernet based LANs.)

The two small rectangular LEDs on the LAN 10/100 connector indicate the following.

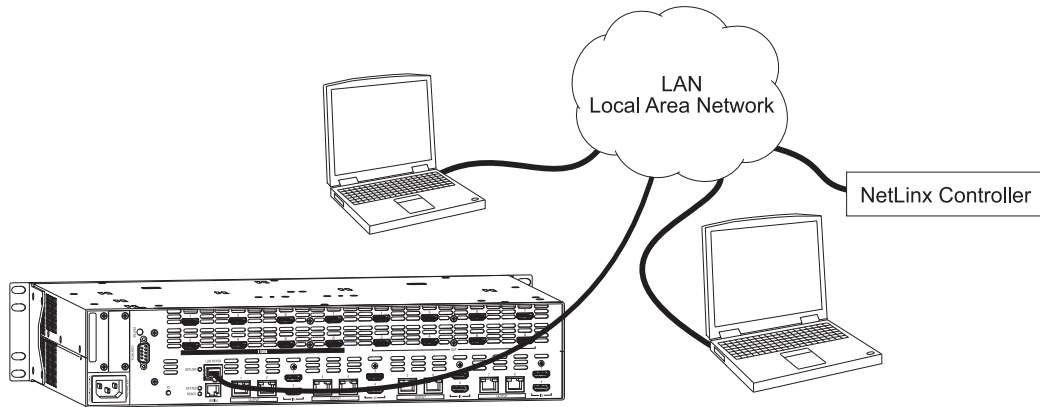
- **Yellow Speed Status LED:**
  - *ON* – Speed status is 100 Mbps
  - *Off* – Speed status is 10 Mbps
- **Green L/A (Link/Activity) Status LED:**
  - *ON* – Link status is active (when Ethernet cables are connected and terminated correctly); blinks when receiving Ethernet data packets
  - *Off* – Link status is not active

**Note:** When the connection is made, the DHCP server on the network will automatically assign an IP address. If you power down and power back up, the DHCP server will reassign the IP address, which may or may not be the same address it assigned before. To prevent the possibility of the IP address changing at power up, you can change the DHCP IP address to a static IP address (see page 77).

## System Setup for a LAN Connection

**Important:** *The HDMI-UTPro uses DHCP by default.*

The system setup example below illustrates an HDMI UTPro connected to a LAN. Both computers in the illustration have access to the enclosure, as does the NetLinx Controller.



**FIG. 19** HDMI UTPro connected via a LAN to two PCs and a NetLinx Controller

**Tip:** *The directions below assume that you are connecting the HDMI UTPro to an active LAN (network) that utilizes DHCP. If not, see the “Workaround” below the instructions first.*

### To connect an HDMI UTPro to a LAN:

1. Complete the installation of the HDMI UTPro including power up of the system.
2. Insert one end of the RJ-45 link cable into the LAN 10/100 port on the enclosure.
3. Connect the other end of the RJ-45 link cable to a LAN hub or switch. The network will automatically assign a DHCP IP address (the assigned IP address can then be changed to a static IP address, see page 77). If the LAN does not utilize DHCP, see the “Workaround” below.
4. Check the indicator LEDs for the LAN 10/100 connector (see page 31).
5. Determine the IP address by accessing Zero-Config information NetLinx Studio WebConsole (see the top of page 33). Make note of the IP address to use in the test procedure at the bottom of page 33. NetLinx start up takes approximately 3 minutes.
6. Complete the installation by testing the connection (see the instructions on page 33).

**Note:** *The LAN 10/100 port can also be used to Telnet into the HDMI UTPro to determine its MAC Address (see page 131).*

### Workaround for Networks that Do Not Utilize DHCP

If the network does *not* utilize DHCP, you *must* connect either to a standalone router that supports DHCP or to a PC that is running DHCP emulation software. Once the router or PC assigns a DHCP IP address, that IP address is used to access the WebConsole from which you *must* then change the DHCP IP address to the static address provided by your Network Administrator before you connect the HDMI UTPro directly to the LAN.

## Determining IP address for HDMI UTPro

The HDMI UTPro features a built-in zero-configuration networking client that allows you to determine the unit's IP address for the HDMI UTPro WebConsole via Bonjour for Windows® or a similar zero-configuration client. Zero-configuration (or zeroconf, also known as “Bonjour”) technology provides a general method to discover services on a local area network. In essence, it allows you to set up a network without any configuration.

To determine the DHCP IP address that the network assigned to the HDMI UTPro in Step 3 of the previous instructions, you can access the unit via NetLinx Studio.

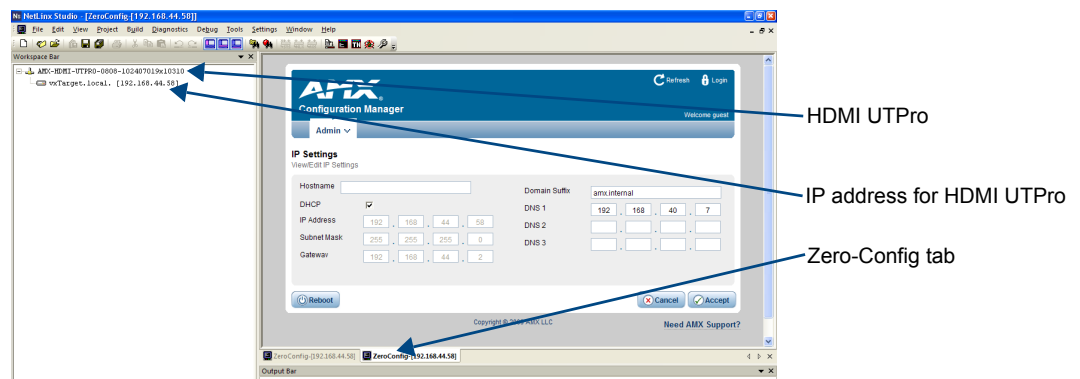
NetLinx Studio version 3.0 (or higher) features a “Zero-Config” tab in the Workspace window. This tab provides Zero-Config networking functionality within NetLinx Studio.

**Note:** Refer to the NetLinx Studio online help for details on using Zero-Config.

The following assumes that the WebConsole connection (LAN 10/100 port) is to the same LAN as the PC running NetLinx Studio and the NetLinx Master for the HDMI UTPro.

### To determine the IP address by accessing the HDMI UTPro via Zero-Config:

1. In NetLinx Studio (v3.0 or higher), left-click the Zero-Config tab on the Workspace Bar to open the tab.



**FIG. 20** NetLinx Studio showing the Zero-Config tab and the IP address for an HDMI UTPro

2. Right-click anywhere in the Workspace and select Refresh Zero-Config List to generate an initial listing of all Zero-Config devices that have been detected (FIG. 20).
3. Click the plus symbol (+) to the left of the “AMX HDMI-UTPRO-0808” in the Zero-Config list to expand its information. The HDMI UTPro’s current IP Address is listed below the device name.

### To test the HDMI UTPro WebConsole connection:

1. Launch a browser on your PC.
2. In the address bar of the browser, type the IP address and press Enter (to determine the IP address, see the previous instructions or contact your Network Administrator).  
If the WebConsole does not open, see the “WebConsole Troubleshooting” section on page 82.

For WebConsole setup details, see the “HDMI UTPro WebConsole” chapter on page 71.

**Note:** For additional information on Zero-Config or the WebConsole, see the “Programming Guide – NetLinx Integrated Controllers” at [www.amx.com](http://www.amx.com).

## Serial Port (RJ-12)

The Serial port displays in NetLinX Studio as Port 2 of the HDMI UTPro and can be used to control an additional local device. The port is an RJ-12 connector and may require an adapter cable to connect to the external device under control (e.g., a Blu-Ray player). The Serial port on the HDMI UTPro has same functionality as the Serial ports on the Receivers (which also display as Port 2 in NetLinX Studio). For cable adapter information, see page 35. Pinout information is on page 36.

**Important:** This port cannot be used to control the HDMI-UTPRO-0808 or to send serial commands to any of the Receivers (the LAN 10/100 port is used for both of these functions).

**Note:** Attaching an additional external device is an optional procedure in the installation process.

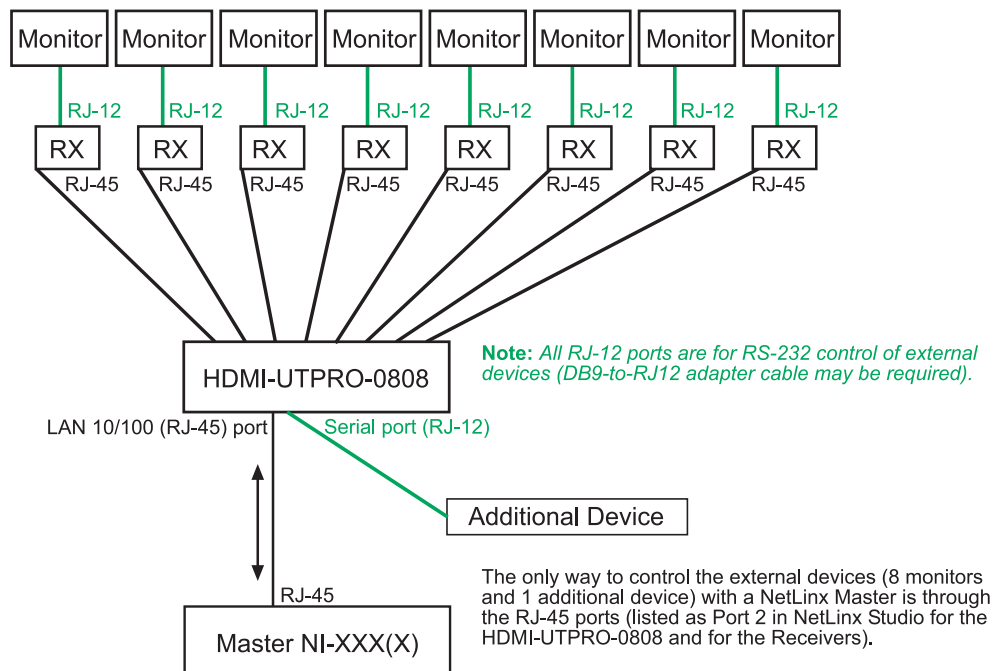


FIG. 21 Device control flow diagram

## Serial Port - Default Communication Settings

The default serial settings for the Serial port are listed in the table below. The settings can be altered by sending SEND\_COMMANDs to Port 2 of the HDMI UTPro (see page 89) or the Receiver (see page 96).

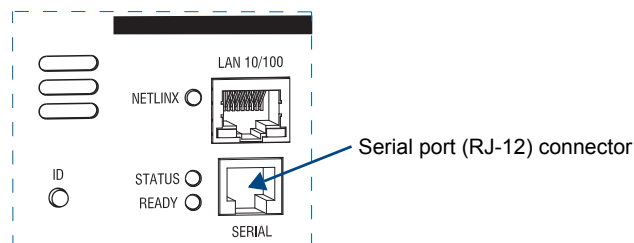


FIG. 22 Serial (RJ-12) port on the HDMI UTPro

Default Serial Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None



### Cable Adapter Kit (FG-RS01K)

A cable adapter kit is available that contains an RS-232 serial transmit, straight-through, adapter cable and two adapters. The kit allows you to use the adapter cable in one of three ways depending on your needs.

- Serial port as DTE (data terminal equipment) interface with male connection:

**Note:** This cable configuration provides the equivalent of a serial port connection to a NetLinX Master.

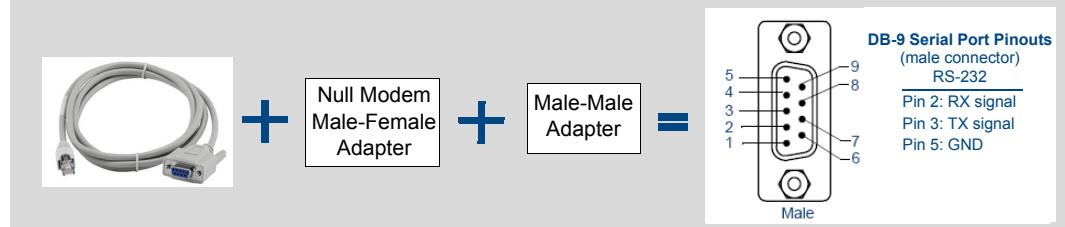


FIG. 23 DTE interface with male connection

- Serial port as DTE interface with female connection:

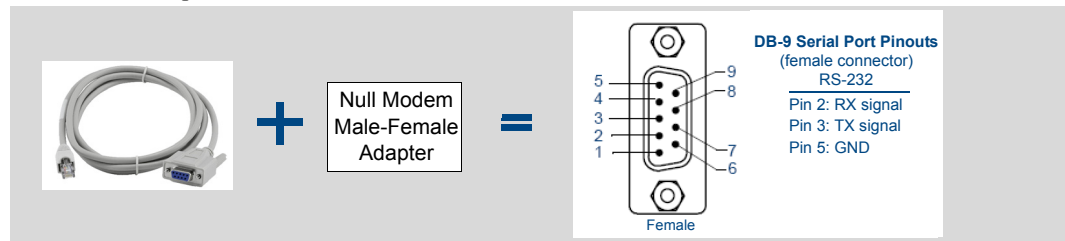


FIG. 24 DTE interface with female connection

- Serial port as DCE (data circuit-terminating equipment) interface with male connection:

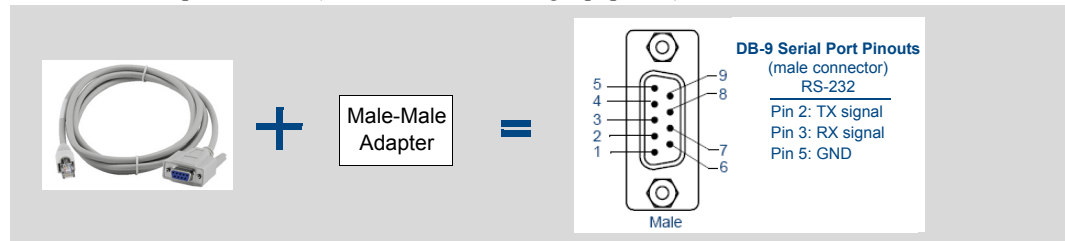


FIG. 25 DCE interface with male connection

### RS-01 Adapter Cable (FG-RS01)

The adapter cable can be ordered by itself for a DCE interface with female connection.

- Serial port as DCE interface with female connection:

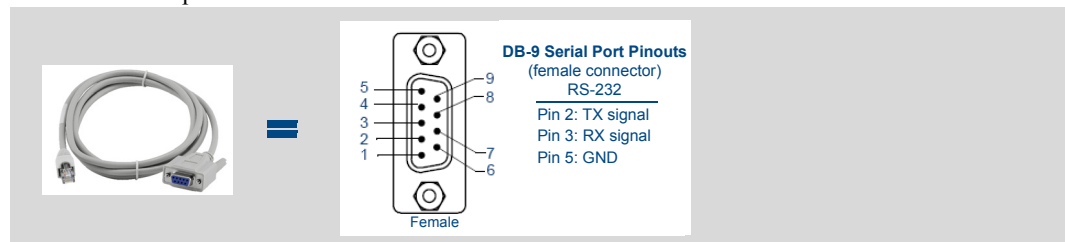
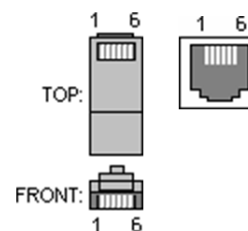


FIG. 26 DCE interface with female connection

### Serial Port (RJ-12) Pinout

The following table provides the pinout configuration for the RJ-12 connector (Serial port) on the HDMI-UTPRO-0808 and also on the HDMI-UTPRO-RX Receiver.

RX RJ-12 Pinout		
Function	Abbreviation	RJ-12 Connector
Data Set Ready	DSR	Pin 1
Transmit Data	TD or TX or TXD	Pin 2
Receive Data	RD or RX or RXD	Pin 3
Signal Ground	GND	Pin 4
Signal Ground	GND	Pin 5
Data Terminal Ready	DTR	Pin 6



### To connect an external serial device:

1. Plug the RJ-12 end of the adapter cable into the Serial port on the HDMI UTPro (or Receiver).
2. As needed – Connect cable adapter(s) per the desired Cable Kit option on the previous page.
3. Plug the DB-9 end of the adapter cable (or the end cable adapter) into the serial port on the external device.
4. Check to be sure that the device's serial port settings and serial port settings on the enclosure (see table to the right) correspond to each other. If necessary, the default settings on the HDMI UTPro can be changed; see page 89.



**Caution:** To avoid system damage, follow the power-up sequence on page 38.

HDMI UTPro RJ-12 Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

### Control Port (DB-9)

The Control (DB-9 port) on the HDMI UTPro is reserved for firmware upgrades to the CPU. If needed, this port can also attach to a PC for using EDID Programmer or XNConnect software or for other traditional serial port functions (e.g., BCS commands or third-party control\*).

The Control port can be used for matrix switching control functionality as an alternative to Native NetLinx control (which is accessed through the LAN 10/100 port and includes additional NetLinx functionality). We recommend using only one at a time, with native NetLinx as the preferred method and the RS-232 port as a backup because commands on the Native NetLinx connection will be accepted on a first come/first served basis (which may conflict with the BCS commands).

\* If using a third-party controller, see the controller documentation for operating instructions.

**Note:** Attaching an external serial controller is an optional installation procedure.

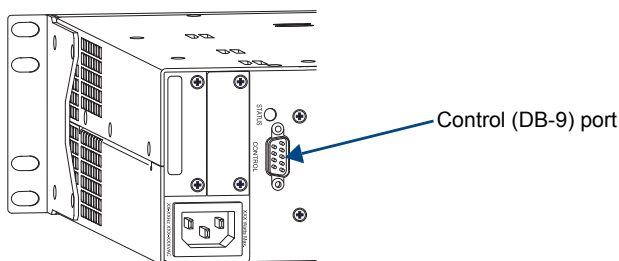


FIG. 27 Control port (DB-9 connector)

## Attaching Control Port to an External Serial Controller

An external serial controller is any device that can send and receive ASCII code over an RS-232 (null modem) serial cable attached to the Control port on the rear of the enclosure. PCs are common serial controllers. PC requirements for BCS (Basic Control Structure) commands are provided below; for the EDID Programmer, see page 109; and for XNConnect, see page 118.

### PC Requirements for BCS

- ☐ Windows XP Professional® or Windows 2000®
- ☐ Terminal emulation program (e.g., HyperTerminal)
- ☐ Serial port

### To establish external serial control over a null modem serial cable:

1. Use a null modem cable that matches the pin diagram in FIG. 28 for RS-232 without hardware flow control. The AMX equipment requires pins 2, 3, and 5 only.

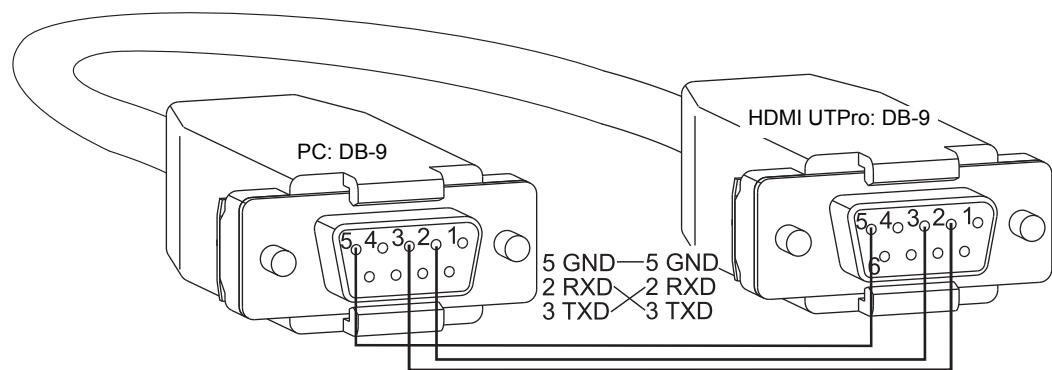


FIG. 28 RS-232 null modem pin diagram, no hardware flow control

2. Plug one end of the null modem serial cable into the Control (RS-232) port on the enclosure.

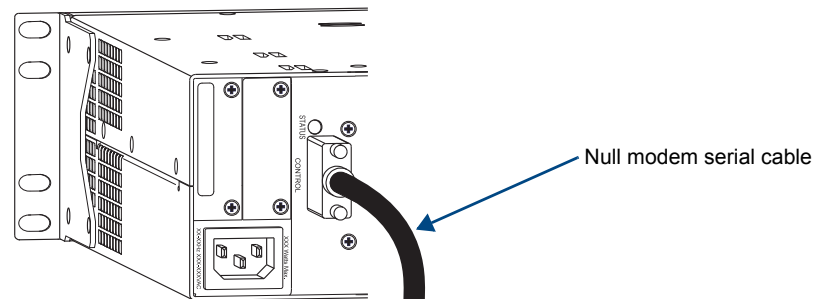


FIG. 29 Attach null modem serial cable to serial port

3. Plug the other end of the serial cable into the serial port on the PC (or serial controller/device).
4. Open the serial communication software and set the PC's port settings to match the HDMI UTPro default port settings (see table to the right). In addition to the default baud rate of 9600, the HDMI UTPro enclosure supports baud rates of 19200, 38400, and 57600. The settings on the PC serial communication software and the enclosure *must* correspond to each other.

HDMI UTPro DB-9 Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None



**Caution:** To avoid system damage, follow the power-up sequence on page 38.

## Applying Power and Startup

The universal power receptacle on the enclosure will accept all major international standard power sources. Standard US power cords are provided for installations within the US. Maximum power specifications are on the power receptacle (also listed on page 13). Always use an earth-grounded power cord / system with an HDMI UTPro.

The source electrical outlet should be installed near the HDMI UTPro, easily accessible, and properly grounded. Power should come from a building branch circuit. We strongly recommend using a dedicated line for the system's power. To avoid an overload, note the power consumption rating of all the equipment connected to the circuit breaker before applying power.



**Caution:** We recommend attaching all power cords to a surge protector and/or an AC line conditioner.

### Power-Up Sequence

The power-up sequence provided assumes that the following items have already been completed:

- The sources and destinations are attached (see page 26).
- External control has been attached (unless the control panel is the primary source of control).

#### To apply power:

1. Plug the power cord into the power receptacle on the enclosure.
2. Plug the other end of the power cord into a power strip (we recommend a 30 A power strip) *that is turned off*.
3. Turn on the power strip. The Power Indicator on the front of the enclosure illuminates.

**Important:** We recommend using a regulated power supply for the HDMI-UTPRO-RX. If you exceed the specified voltage level for the power jack on the RX (see page 18), the warranty will be void.

4. Apply power to the HDMI-UTPRO-RX Receivers.
5. Apply power to the source and destination devices.  
The Power indicator on the front of the enclosure illuminates (green), indicating that the enclosure is receiving power.

The system is ready for a test switch (see the next page).

**Note:** For information on checking the software version, see page 55.

### Control Panel Startup

After applying power and turning on the enclosure, the LCD on the control panel illuminates and displays the Function menu screen (FIG. 30).

The system is ready for a test switch (see the next page).

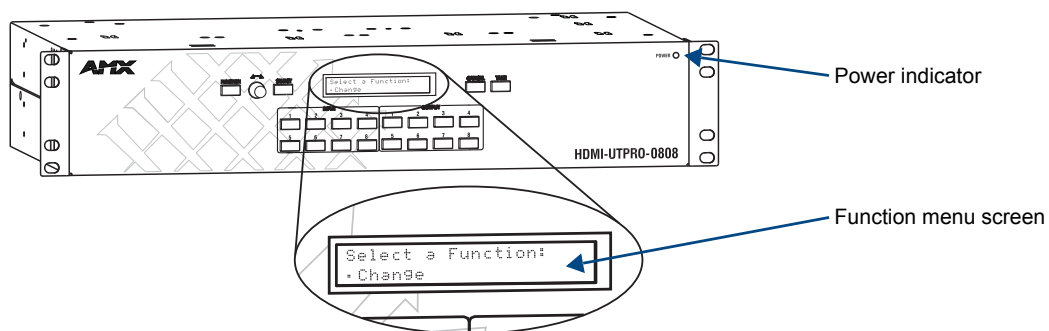


FIG. 30 Control panel startup screen

## Executing a Test Switch

For the HDMI input connectors, the system stores sink information when a switch is executed and retains that information even after the switch is disconnected. Therefore, we recommend becoming familiar with how HDMI switching works in the HDMI UTPro by reading the “Setting Up HDMI Systems” chapter (see page 59) before executing a test switch. Then execute the test switch to verify the system is working correctly, disconnect the test switch, and clear the sink key cache (see page 69) before finishing the installation.

We suggest executing a test switch to verify the system is working properly before attaching *all* inputs and outputs. Aside from having cables attached, the system is ready to execute switches when it ships from the factory.

The first two source and destination devices *must* be cabled according to the directions on page 29. After the devices are connected, power *must* be applied to the enclosure and then to the devices before executing a test switch.

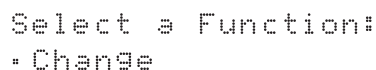
A test switch can be executed from any control method you plan on using with the system. Instructions for executing a test switch with the control panel and with BCS commands are provided.

The following test switch procedure routes Input 1 to Output 2 (Level 0), disconnects all currently routed signals, and clears the cache.

### Executing a Test Switch Using the Control Panel

#### To execute a test switch from the control panel:

1. Press the Function Key.  
The Function menu appears.



```
Select a Function:
- Change
```

2. Press the Select Key to choose Change.  
This places the system in Change Mode (available Input and Output Keys turn blue).



```
Change:          VM0
Press I/O then Take
```

3. Press Input Key 1.  
Input Key 1 flashes indicating that it is ready to switch.  
(Any outputs currently connected to Input 1 will turn white.)
4. Press Output Key 2.  
Output Key 2 illuminates indicating that it is ready to accept the switch.
5. Press the Take Key.  
Input 1 switches to Output 2, and the keys turn blue.
6. Clear the sink key cache (use either method) –  
**NetLinx commands:** Enter `SEND_COMMAND dvUTPro, "INSTAGATECLEAR"` (clears the cache and disconnects all currently routed signals).  
Enter `SEND_COMMAND dvUTPro, "INSTAGATEPERSIST"` (persists the empty cache).  
**Or**  
**BCS commands:** Enter `@et` (clears the cache and disconnects all currently routed signals).  
Enter `~app!` (persists the empty cache). Note that the response to the `@et` command is `@eV`.

## Executing a Test Switch Using BCS Commands

To enter BCS commands, the system *must* be attached via the Control (DB-9) port using a null modem serial cable to a serial control device running HyperTerminal (or another terminal emulation program). The settings on the PC serial communication software and the enclosure *must* correspond to each other.

When using HyperTerminal, command characters are entered and sent to the enclosure's CPU (when the enclosure responds, the command characters appear in HyperTerminal). When all of the entered characters appear in HyperTerminal, the command has been executed successfully.

The following test switch procedure routes Input 1 to Output 2 (Level 0), disconnects all currently routed signals, and clears the cache.

### To execute a test switch using BCS commands:

1. Enter the following BCS command line: `CL0I1O2T`  
When the "T" appears, the system has successfully executed the command. If any other characters appear, the command was not successful. Verify that the source signal is present (visible and/or audible) at the destination.
2. Enter `@et` (disconnects all currently routed signals and clears the sink key cache). Note that the response to the `@et` command is `@eV`.
3. Enter `~app!` (persists the empty sink key cache).

For a complete list of BCS commands and responses, see the *Instruction Manual – BCS Basic Control Structure Protocol* on the *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com).

## Installation Troubleshooting

If the test switch did not execute correctly:

- ☐ Check the power indicator on the front of the enclosure.  
If it is not illuminated, check the power cords.
- ☐ Verify the status of the test switch.  
If using the **control panel**, press the Function Key, locate Status by scrolling with the Control Dial, press the Select Key, and press Output Key 2.  
If Input Key 1 illuminates, the system established a connection between the specified input and output connector within the enclosure.
- or**  
If using **SEND\_COMMANDs**, enter `SEND_COMMAND dvUTPro,"'?C2'"`  
If `C2-I1` appears, the test switch is routed.  
If the status returns as routed correctly, the system established a connection between the specified input and output connector within the enclosure.
- or**  
If using **BCS commands**, enter `SL0O2T`.  
If `SL0O2T(1)` appears, the test switch is routed.  
If the status returns as routed correctly, the system established a connection between the specified input and output connector within the enclosure.
- ☐ Check all link and signal connections on the rear of the enclosure to make sure everything is physically set up correctly.
- ☐ Check all power switches on the source and destination devices to make sure they are all turned on.
- ☐ Check all signal connections on the source and destination devices to make sure everything is physically set up correctly.
- ☐ Isolate source and destination equipment and cable problems by patching around the router using cable adapters to check the overall signal path.
- ☐ Attempt the switch again.  
If the switch still does not work, contact technical support (see next page).

## Technical Support

If this *Instruction Manual* has not satisfactorily answered your questions regarding the HDMI-UTPRO-0808, please contact your AMX representative or technical support. Have the system's serial number ready. The system's serial number is normally located in two places on the enclosure: on the left rear and on the left side near the power receptacle.

We recommend recording your system's serial number in an easily accessible location.

### *AMX Contact Information*

- 3000 Research Drive, Richardson, TX 75082
- 800.222.0193
- 469.624.8000
- Fax 469.624.7153
- Technical Support 800.932.6993
- [www.amx.com](http://www.amx.com)

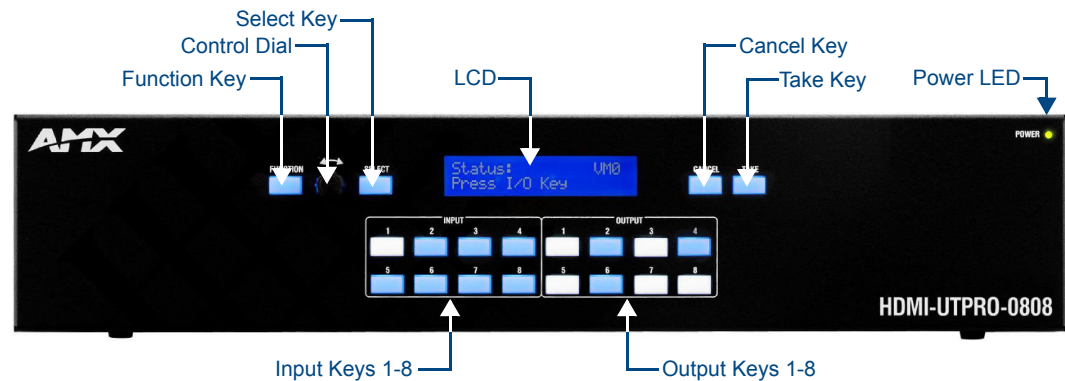




# Operating the Control Panel

## Control Panel Overview

This section describes the components and features on the control panel on the front of the enclosure of the HDMI UTPro.



**FIG. 31** HDMI UTPro - control panel components

The HDMI UTPro control panel features an LCD, a Function Key, a Control Dial, a Select Key, a Cancel Key, a Take Key, Input and Output Keys, and a Power Indicator.

The Control Dial and Select Key work together for scrolling through the menus displayed on the LCD to place the system into various modes (the types of operations, e.g., Change Mode) or to access lists for control operations. Once in the desired mode, use the Input and Output Keys to select values and the Take Key to execute the operations (some modes require using the Control Dial and Select Key to select values).

### Function Key

The Function Key accesses the Function menu on the LCD.

As the Control Dial is turned, this menu displays the various command options, e.g., Status, Disconnect, etc. The Function Key can be pressed at anytime to return the display to the Function menu.

### Control Dial

The Control Dial scrolls through menu options and adjusts values.

The Control Dial is used in conjunction with the Select Key to choose commands and values on the LCD.

### Select Key

The Select Key enters a selection. In addition, the Select Key can be used to execute global presets; however, the Select Key cannot execute or disconnect switches. Pressing the Take Key executes or disconnects switches.

### LCD (Function Menu)

The LCD displays the Function Menu. For an overview of menu options, see page 45.

### Cancel Key

Pressing the Cancel Key clears an incomplete operation and returns the display to the beginning of a submenu or list. The Cancel Key cannot undo a completed operation, i.e., an operation followed by the pressing of the Take Key.

**Important:** *If the Cancel Key flashes, an error has occurred; a flashing Cancel Key must be pressed before continuing.*

### Take Key

The Take Key functions much like the Enter Key on a computer keyboard. Pressing the Take Key instructs the system to execute or disconnect a switch. Prior to pressing the Take Key, the individual operation components are selected by pressing the appropriate keys.

### Input Keys (1-8) and Output Keys (1-8)

The Input and Output Keys correspond to the input and output connections on the rear of the enclosure. These keys are used to select (or deselect) the inputs and outputs for routing source signals to destination devices as well as for status operations. Input Keys are also used for locking and unlocking the control panel.

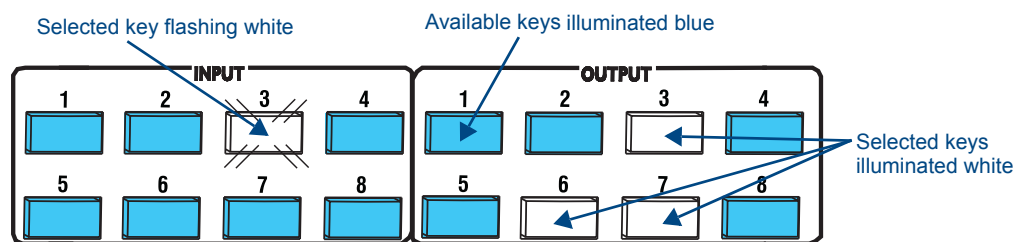
When an Input or Output Key is pressed, the channel name (e.g., O\_Ch:0003 for Output 3) displays on the LCD. Hold the key down to display the name longer.

**Note:** *Custom channel names can be created in XNConnect (see page 120).*

The Input and Output Keys illuminate depending on the mode (the type of operation) the HDMI UTPRO is in:

- **Blue key** – indicates that it can be selected as part of the current operation.
- **White or flashing white key** – indicates that it has been selected and that further action is required to complete the operation. A white key can also indicate routing status. White keys can be deselected. When a key is flashing white, it cannot be deselected and does not display label information on the LCD when pressed (to clear the operation, press the Cancel Key).
- **Non-illuminated key** – is not available for the current operation.

### Key State Example



**FIG. 32** Example of key states during Change Mode

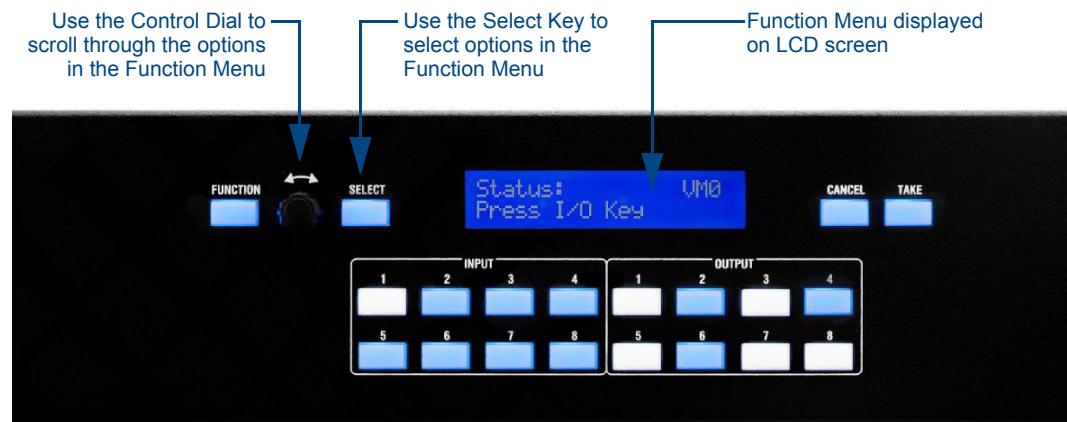
In the Key State example in FIG. 32, Input 3 is flashing white, indicating that it was selected first. Outputs 3, 6, and 7 are illuminated white, indicating that they have also been selected (and can be deselected). The switch from Input 3 to Outputs 3, 6, and 7 will be executed when the Take Key is pressed.

### Power LED

The green Power LED illuminates when the HDMI UTPRO is receiving power.

## Function Menu Overview and Options

The Function Menu is displayed on the control panel LCD screen and provides access to various control and setup options for the HDMI UTPro (FIG. 33).



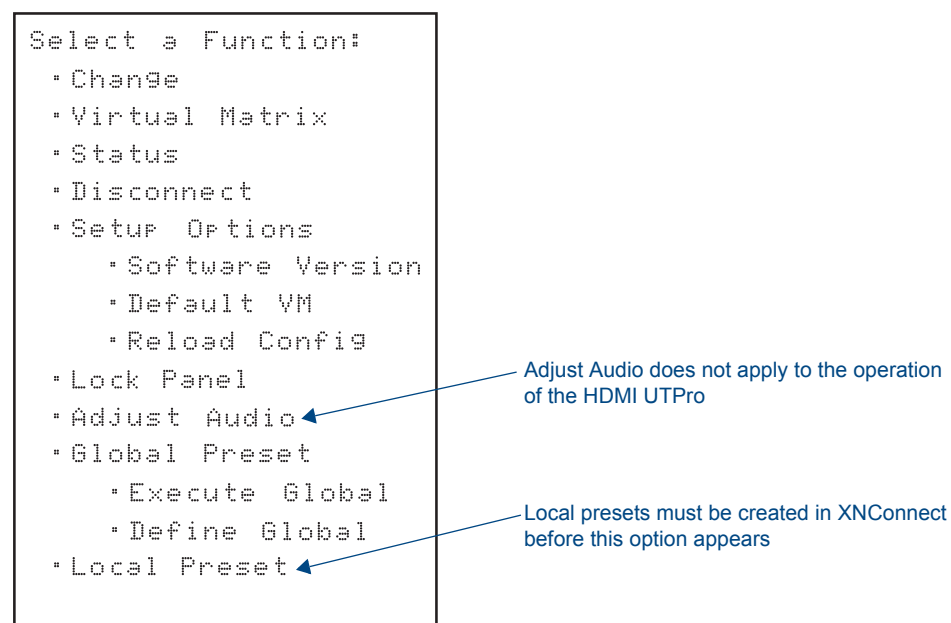
**FIG. 33** Function Menu displayed on the control panel LCD screen

The modes that apply to the HDMI UTPro are **Change**, **Disconnect**, **Status**, **Lock**, and **Global Preset**. While in a mode, the same type of operations can be performed, e.g., when in Status Mode you can select various inputs to check the status on without having to repeatedly put the control panel into Status Mode. This section provides an overview of the menus and modes. Detailed information and instructions on the individual modes are provided in the remainder of the chapter.

Use the Control Dial and Select Key to navigate the Function menu, submenus, and lists. The menus are loop menus (each menu returns to the first item after you scroll past the last item).

### Function Menu Options

The Function menu (FIG. 34) and its submenus access the different modes and lists used to control the system.



**FIG. 34** Function menu options

The Function menu and its submenus access the following modes and lists:

Function Menu	
<b>Change</b>	Selecting Change places the system in Change Mode. <ul style="list-style-type: none"> <li>The control panel must be in Change Mode to execute switches.</li> <li>While in Change Mode, select the Input and Output(s) Keys followed by the Take Key to execute switches (see page 47).</li> </ul>
<b>Virtual Matrix</b>	Selecting Virtual Matrix accesses the VMs that are defined for the system. <ul style="list-style-type: none"> <li>The list contains 0:All and 1:Video.</li> <li>The setting does not need to be changed as the system functions the same for either VM. The exception is if you create VMs to manage control of sources with limited sink support (see page 127).</li> </ul>
<b>Status</b>	Selecting Status places the system in Status Mode. <ul style="list-style-type: none"> <li>While in Status Mode, signal status can be verified to confirm correct routing or routing to multiple outputs without risk of accidentally executing a switch (see page 50).</li> </ul>
<b>Disconnect</b>	Selecting Disconnect places the system in Disconnect Mode. <ul style="list-style-type: none"> <li>While in Disconnect Mode, select the Input or Output Key(s) followed by the Take Key to disconnect switches (see page 49).</li> <li>While in Disconnect Mode, the control panel does not indicate the current routing of selected inputs or outputs.</li> </ul>
<b>Setup Options</b>	Selecting Setup Options accesses this submenu's option for checking the <b>Software Version</b> (see page 55). <ul style="list-style-type: none"> <li>Two submenu options, <b>Default VM</b> (Virtual Matrix) and <b>Reload Config</b>, do not normally apply unless the configuration file has been modified (see page 117 and page 127).</li> </ul>
<b>Lock Panel</b>	Selecting Lock Panel places the panel in Lock Mode at which time the password is entered to lock the panel. <ul style="list-style-type: none"> <li>Locking the control panel limits access which can prevent accidental switches (see page 54).</li> </ul>
<b>Adjust Audio</b>	This submenu and the options under Adjust Audio do <u>not</u> apply to the HDMI UTPro.
<b>Global Preset</b>	Selecting Global Preset accesses this submenu's options <b>Execute Global Presets</b> and <b>Define Global Presets</b> (see page 51).
<b>Local Preset</b>	Selecting Local Preset accesses local presets that can be executed (see page 122).

### Working With the Function Menu

- **To choose a mode, submenu, or list** – Press the Function Key to access the Function menu. Use the Control Dial and Select Key to choose the desired mode, submenu, or list.
- **To select inputs or outputs** – Press the corresponding Input or Output Key. Selected keys will change color or flash, depending on the routing state (see page 44).
- **To select values for fields** (such as a global preset value) – Use the Control Dial and Select Key.
- **To execute a command** – Press the Take Key.

## Executing Switches (Change Mode)

A switch is an active connection between an input (source) device and one or more output (destination) devices. The signals routed in a switching operation are individual signals or groups of individual signals coming through the connectors on the rear of an enclosure. Executing a preset is a quick way to execute multiple switches at a time. For information on local presets, see page 53; for information on global presets, see page 51.

**Note:** The number of the virtual matrix (default VM 0) that operations are currently being executed on is displayed in the upper-right corner of the display. The HDMI UTPro functions the same for its two VMs, VM 0 and VM 1.

You can execute switches from the control panel using the steps below or by executing a global preset (see page 51).

When an Input or Output Key is pressed, the channel name displays on the LCD (e.g., O\_Ch:0003 for Output 3). Hold the key down to display the name longer.

**Note:** When you put the panel in Change Mode, available keys will be blue and any unavailable ones will not be illuminated. The first blue key selected flashes white and the next key(s) selected turns white. You can toggle the non-flashing white keys between the selected (white) and deselected (blue) state before pressing the Take Key. For more information, see page 44.

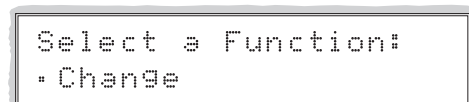
In an execute switch command either an input or an output can be selected first. To switch to multiple outputs, the Input Key must be selected first. With the control panel you can select and deselect Input and Output Keys to modify the switch as long as the keys are not flashing. Once satisfied with the switch selections, press the Take Key to execute it.

For new installations, we recommend that before attaching all inputs and outputs, you execute a test switch routing Input 1 to Output 2 (the example used in the instructions below).

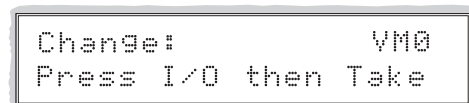
**Note:** You can return to the Function menu at any time by pressing the Function Key.

#### To execute a switch:

1. Press the Function Key.  
The Function menu appears.



2. Press the Select Key to choose Change.  
This places the system in Change Mode (available Input and Output Keys turn blue).



3. Press Input Key 1.  
Input Key 1 flashes indicating that it is ready to switch.  
(Any outputs currently connected to Input 1 will turn white.)
4. Press Output Key 2.  
Output Key 2 illuminates indicating that it is ready to accept the switch.
5. Press the Take Key.  
Input 1 switches to Output 2, and the keys turn blue.
6. Execute additional switches.  
**Or**  
Press the Function Key to return to the Function menu.

**Note:** The panel remains in Change Mode until the Function Key is pressed.

## Changing the Virtual Matrix

Selecting Virtual Matrix accesses the VMs that are defined for the HDMI UTPro.

- The list contains 0:All and 1:Video (unless custom VMs have been created in XNConnect).
- The setting does not need to be changed as the system functions the same for either VM.

**Note:** *Virtual matrices are defined in XNConnect and stored in the system's configuration file.*

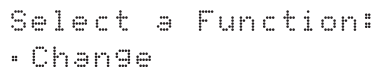
If you use VMs to limit control of sources with limited sink support, the VMs may need to be changed when you are switching different inputs (for information on creating VMs for this purpose, see page 127).

Changing the virtual matrix does not change the default virtual matrix. The system will revert to switching on the default virtual matrix when the power is cycled. For information on changing the default virtual matrix, see page 56.

The example below assumes additional VMs have been created and provides instructions for changing from routing signals on VM 0 to routing on VM 2, a hypothetical VM labeled "Custom."

### To change the virtual matrix:

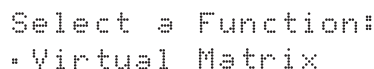
1. Press the Function Key.  
The Function menu appears.



```

Select a Function:
- Change
  
```

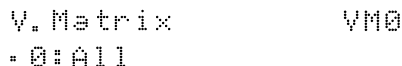
2. Locate Virtual Matrix by scrolling with the Control Dial.



```

Select a Function:
- Virtual Matrix
  
```

3. Press the Select Key.  
The V.Matrix list appears.



```

V.Matrix          VM0
- 0: All
  
```

4. Scroll to 2:Custom.



```

V.Matrix          VM0
- 2: Custom
  
```

5. Press the Select Key to enter your selection.  
The display returns to the top of the V.Matrix submenu.  
VM 2 becomes the new virtual matrix used for all operations.



```

V.Matrix          VM2
- 0: All
  
```

VM used for all operations

6. Press the Function Key to return to the Function menu.  
The HDMI UTPro is ready to make changes on VM 2.  
The HDMI UTPro will remain on VM 2 for all operations until the virtual matrix is changed or power is cycled (to set the virtual matrix as the default, see page 56).

## Disconnecting Switches (Disconnect Mode)

Disconnecting a switch deactivates the connection between an input (source) and one or more output (destination) devices. Disconnecting an input disconnects all outputs currently receiving that source signal. An output can only be connected to one input; therefore, disconnecting an output will only disconnect the connection between the output and the input that is routed to it.

You can disconnect a switch by selecting either inputs or outputs from the control panel. Inputs and outputs can be selected in the same disconnect command.

Although switches can be disconnected when the panel is in Change Mode, the advantage of using the Disconnect Mode is that it can be used to quickly disconnect multiple outputs receiving a signal from the same input (by disconnecting the input) or from different inputs (by disconnecting the outputs).

**Note:** When you put the panel in Disconnect Mode, available keys will be blue and any unavailable ones will not be illuminated. When you select a blue key, it turns white. You can toggle the keys between the selected (white) and deselected (blue) state before pressing the Take Key. For more information, see page 44.

Once the control panel is in Disconnect Mode, inputs and outputs can be selected and deselected by pressing the corresponding Input and Output Keys. The disconnect command is not executed until the Take Key is pressed.

While in Disconnect Mode, the control panel will *not* show current routing for the inputs and outputs that are selected.



**Caution:** Disconnecting an input disconnects all outputs receiving that source signal even if a specific output(s) is selected at the same time.

**Note:** You can return to the Function menu at any time by pressing the Function Key.

### To disconnect inputs and outputs:

This example disconnects Inputs 1 and 3 and all outputs connected to them as well as Output 9.

1. Press the Function Key.  
The Function menu appears.

```
Select a Function:
• Change
```

2. Locate Disconnect by scrolling with the Control Dial.

```
Select a Function:
• Disconnect
```

3. Press the Select Key.  
The system is in Disconnect Mode (all the available Input and Output Keys turn blue).

```
Disconnect:      VM0
Press I/O then Take
```

4. Press Input Keys 1 and 3 and Output Key 9.  
The keys turn white indicating that they are selected.

5. Press the Take Key.  
Inputs 1 and 3 (and all outputs connected to them) and Output 9 are disconnected as soon as the Take Key is pressed, and the keys turn blue.
6. Execute additional disconnects.  
**Or**  
Press the Function Key to return to the Function menu.

## Verifying Signal Status (Status Mode)

Signal status can be verified to confirm that a switch has executed properly or to confirm correct routing to multiple outputs (destinations). Input status and output status both function on the control panel. An output can only be connected to one input (source); therefore, verifying the status of an output will illuminate only the one input it is currently connected to. Verifying an input will illuminate all outputs currently receiving the input's signal.

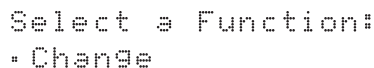
The advantage of using Status Mode (instead of Change Mode, which also indicates routing) is that status is verified without the risk of inadvertently executing unwanted switches.

Once the control panel is in Status Mode, inputs and outputs can be selected by pressing the corresponding Input and Output Keys without changing the routing state. The control panel stays in Status Mode until the Function Key is pressed.

**Note:** You can return to the Function menu at any time by pressing the Function Key.

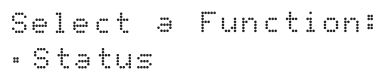
### To verify the status of a signal:

1. Press the Function Key.  
The Function menu appears.



```
Select a Function:
* Change
```

2. Locate Status by scrolling with the Control Dial.



```
Select a Function:
* Status
```

3. Press the Select Key. The system is in Status Mode (all available Input and Output Keys turn blue).



```
Status: VM0
Press I/O Key
```

4. Press the Input Key that corresponds to the input you want to check.  
The selected Input Key turns white, and any Output Keys receiving the input signal also turn white.  
**Or**  
Press the Output Key that corresponds to the output you want to check.  
The selected Output Key turns white, and any Input Key routed to it also turns white.
5. Select another signal to verify.  
**Or**  
Press the Function Key to return to the Function menu.



## Defining and Executing Global Presets (Global Preset Mode)

A global preset is a snapshot of an entire system's state which enables that system state to be replicated at a later time. The system state includes all current signal routings (regardless of the number of virtual matrices involved). Before defining a Global Preset, route the system to the desired state. A global preset number is assigned to a system state during runtime using the control panel (or BCS commands) and is stored in the switcher's non-volatile memory. That system state can then be restored at any time by selecting the assigned global preset number.

The HDMI UTPro can support up to 16 global presets.

AMX strongly recommends keeping track of the number used and the system's routing state for each global preset. If another system state is assigned a previously used number, the former state will be automatically overwritten.

**Important:** *Wait approximately ten seconds for the system to permanently store the global preset setting before performing another operation.*

### To define a global preset:

This example defines Global Preset 3, and the example on the next page executes Global Preset 3.

1. Route the system to the desired state.
2. Press the Function Key.  
The Function menu appears.

```
Select a Function:
• Change
```

3. Locate Global Preset by scrolling with the Control Dial.

```
Select a Function:
• Global Preset
```

4. Press the Select Key.  
The Global Preset submenu appears.

```
Global Preset:
• Execute Global
```

5. Scroll to Define Global.

```
Global Preset:
• Define Global
```

6. Press the Select Key again to choose Define Global.  
The Define Global list appears.

```
Execute Global:
• 1:Global Preset 1
```

7. Scroll to Global Preset 3.

```
Define Global:
- 3:Global Preset 3
```

8. Press either the Select Key or the Take Key.
9. Wait approximately ten seconds for the system to store the global preset setting.  
The current routing state can now be recalled as Global Preset 3, and the system returns to the Global Preset submenu.
10. Press the Function Key to return to the Function menu.

#### To execute a global preset:

1. Press the Function Key. The Function menu appears.

```
Select a Function:
- Change
```

2. Locate Global Preset by scrolling with the Control Dial.

```
Select a Function:
- Global Preset
```

3. Press the Select Key. The Global Preset submenu appears.

```
Global Preset:
- Execute Global
```

4. Press the Select Key again to choose Execute Global.  
The Execute Global Preset list appears.

```
Execute Global:
- 1:Global Preset 1
```

5. Scroll to Global Preset 3.

```
Execute Global:
- 3:Global Preset 3
```

6. Press either the Select Key or the Take Key.  
Global Preset 3 is executed, and the system returns to the Global Preset submenu.
7. Press the Function Key to return to the Function menu.

**Note:** *Status is not invalidated by global presets.*

## Executing Local Presets (Local Preset Mode)

A local preset is a predetermined set of switches on a particular virtual matrix that are routed simultaneously. They are stored in each enclosure's configuration file and can be executed at anytime. "Local Preset" will not appear as a submenu option in the Function menu if local presets have not already been defined. In addition, they will not appear if the system is on a virtual matrix that does not have local presets.

Local presets are not programmed (defined) at the factory. To program them, use XNConnect (see page 122) or contact your AMX representative (for contact information, see page 41). Once the local presets have been defined as part of the configuration file, the new file must be loaded to the system's CPU and reloaded to the control panel (see page 57).

Make sure the control panel is on the virtual matrix where the local preset resides. If no local presets have been defined for the selected VM, the Local Preset submenu option will not be available on the Function menu.

**Note:** *Executing a local preset does not change any system routings that are not part of the preset.*

The example below executes Local Preset 3 on VM 0.

### To execute a local preset:

1. Press the Function key.  
The Function menu appears.

```
Select a Function:
• Change
```

2. Locate Local Preset by scrolling with the Control Dial.

```
Select a Function:
• Local Preset
```

3. Press the Select Key.  
The Local Preset list appears.

```
Local Preset:      VM0
• 1:Conference Rm 1
```

4. Scroll to 3:Training Rm 6.

```
Local Preset:      VM0
• 3:Training Rm 6
```

5. Press either the Select Key or the Take Key.  
Local Preset 3 is executed.
6. Press the Function Key to return to the Function menu.  
**Or**  
Execute another local preset.

## Locking and Unlocking (Lock Mode)

Locking the panel prohibits access to the system and can prevent accidental switching. The control panel can be locked by entering a sequence of keys. The factory default password is the first five keys in the top row (Inputs 1, 2, 3, 4 and Output 1). The password can only be changed by using XNConnect (see page 121).

**Note:** *Locking the control panel only locks out operations from the front panel keys. While the control panel is locked, SEND\_COMMANDs and BCS commands are still fully functional through their normal ports. Neither protocol has commands for locking or unlocking the control panel.*

The panel remains locked if the power is cycled.

### Locking the Control Panel

The following example uses the default password of “1 2 3 4 1” entered using the first five keys in the top row (Inputs 1, 2, 3, 4 and Output 1).

If you enter the wrong password while attempting to lock the control panel, an invalid password message appears and the Cancel Key flashes. Press the Cancel Key to clear the error and then enter the correct password.

**Note:** *For security purposes, the Input Keys do not turn white when pressed while locking and unlocking the panel.*

#### To lock the control panel:

1. Press the Function Key.  
The Function menu appears.

```
Select a Function:
• Change
```

2. Locate Lock Panel by scrolling with the Control Dial.

```
Select a Function:
• Lock Panel
```

3. Press the Select Key.  
The system is in Lock Mode.
4. In the following order, press Input Keys **1, 2, 3, 4** and Output Key **1** (default password).

```
Lock Panel:
Password=_____
```

The panel is locked, and all Input and Output Keys turn off.

```
PANEL IS LOCKED
Press any Key
```

## Unlocking the Control Panel

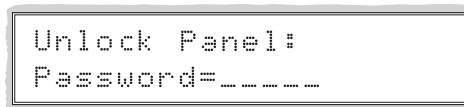
When the panel is locked and you press any key, the Unlock Panel screen appears and you have ten (10) seconds to enter the password, or the control panel remains locked. If you wait longer than 10 seconds, press any key again before entering the password.

If you enter the wrong password while attempting to unlock the control panel, an invalid password message appears and the Cancel Key flashes. Press the Cancel Key to clear the error and then enter the correct password.

The following example uses the default password of “1 2 3 4 1” entered using the first five keys in the top row (Inputs 1, 2, 3, 4 and Output 1).

### To unlock the control panel:

1. Press any key. The Unlock Panel screen appears, and the Input and Output Keys turn blue.



**Important:** You must enter the password within ten (10) seconds.

2. In the following order, press Input Keys **1, 2, 3, 4** and Output Key **1** (default password). The panel unlocks and returns to the Function menu.

## Setup Options

The following options are available under the Setup Options submenu:

- **Software Version** – to display software version information for the control panel
- **Default VM** – to change the factory default virtual matrix
- **Reload Config** – to load local presets information to the control panel after they are created in XNConnect

**Note:** The submenu options *Default VM* and *Reload Config* do not normally apply to the HDMI UTPRO unless the configuration file has been modified (see page 117 and page 127).

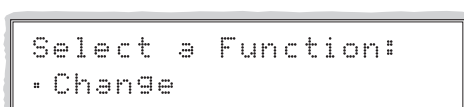
### Checking the Software Version (Software Version Screen)

The Software Version screen provides the following information:

- **Driver** – control panel's firmware version
- **Built** – date the control panel's software was built
- **Host** – software version of the initial operating system (IOS) for the control panel
- **XNet ID** – control panel's XNet device number
- **FP Link baud 115200** – indicates a front control panel and the baud rate

### To check the software version information for the control panel:

1. Press the Function Key.  
The Function menu appears.



2. Locate Setup Options by scrolling with the Control Dial.

```
Select a Function:
• Setup Options
```

3. Press the Select Key.  
The Setup Options submenu appears.

```
Setup Options:
• Software Version
```

4. Press the Select Key again to choose Software Version.  
The Software Version screen appears.

```
Software Version:
• Driver: v a . b . c
```

← Version number

5. Scroll to see additional Software Version information.
6. Press the Cancel Key to return to the Setup Options submenu.  
**Or**  
Press the Function Key to return to the Function menu.

### Default Virtual Matrix

The factory default virtual matrix for the HDMI UTPRO is All. It is *not* necessary to to change the default (the two factory VMs switch identically), unless you have created VMs for control purposes to manage source devices with limited sinks (see page 127).

When you choose a new default virtual matrix, the system will revert to that virtual matrix each time the system is powered up even if you changed the virtual matrix using the V. Matrix list during normal operation. The power must be cycled before the default virtual matrix changes are implemented. If you want to immediately switch on the default matrix, either change the current virtual matrix (see page 48) or cycle the power.

The following example assumes additional VMs have been created and it provides instructions for changing the default virtual matrix from “All” to a hypothetical VM labeled “Custom.” (The VMatrix list contains all VMs that are currently available on the system.)

#### To change the default virtual matrix:

1. Press the Function Key.  
The Function menu appears.
2. Locate Setup Options by scrolling with the Control Dial.
3. Press the Select Key.  
The Setup Options submenu appears.

```
Select a Function:
• Setup Options
```

4. Scroll to Default VM.

5. Press the Select Key.  
The Default VM list appears.

```

Default VM:      VM: 0
- 0: All

```

6. Scroll to 2:Custom.

```

Default VM:      VM: 0
- 2: Custom

```

7. Press the Select Key  
The display returns to the top of the Setup Options submenu.
8. Cycle power to implement VM 2 as the default virtual matrix.  
**Or**  
Change the virtual matrix (see page 48) to immediately perform operations on the new default virtual matrix without cycling power. (The next time power is cycled, VM 2 will be implemented as the default virtual matrix.)

### Reloading the Configuration File

The configuration file contains system information that is loaded to the CPU in the matrix switcher. The Control Panel automatically references this information during all of the control operations.

When changes are made to the configuration file in XNConnect (e.g., customizing channel names or creating presets), the modified configuration file must be loaded to the system's CPU using one of the Configure menu options (see the XNConnect Help file).

If the configuration file was loaded to the system's CPU using any of the following options, the control panel will need to reload the file.

- Configure / Configure Special – Virtual Matrix / any of the three choices
- Configure / Configure Special – Hardware / Configure All Device Names
- Configure Special (from the enclosure's shortcut menu) / Configure Virtual Matrices

The file can be reloaded by following the directions on the next page or by right-clicking the CP-15 icon (this is the icon used for the HDMI UTPro control panel) in XNConnect and selecting Configure from the shortcut menu.

### To reload the configuration file:

1. Press the Function Key. The Function menu appears.
2. Locate Setup Options by scrolling with the Control Dial.

```

Select a Function:
- Setup Options

```

3. Press the Select Key.  
The Setup Options submenu appears.

4. Scroll to Reload Config.



5. Press the Select Key.

The display returns to the top of the Setup Options submenu, and the configuration file reloads from the CPU to the control panel. (Depending on the file size, reloading may take a few moments.)

## System Error Codes on Control Panel LCD

If you are experiencing problems with your HDMI UTPro, you can enable error code reporting on the control panel's LCD (see below). If the system has an error code associated with the problem, the error code will then display on the LCD.

The most common error code likely to appear on the LCD is listed in the table.

Most Common System Error Code			
Error Code	Name	Meaning	Troubleshooting Strategies
EFF8002	Enclosure time out error	The operation was not completed before the timer expired.	<ul style="list-style-type: none"> <li>• Re-send the command.</li> <li>• Check the power indicators.</li> </ul>

Other error codes rarely appear. Note that the error code in the table starts with an E. Error codes can also start with a W (warning), an A (alarm, requires immediate attention), or an I (information). If an error code other than EFF8002 appears, note the specific number and contact technical support (see page 41).

The following instructions are for using HyperTerminal on a PC (see page 37).

### To enable error code reporting:

1. Enter \$ERR=1 !  
The system responds with V

**Note:** If the power is cycled, you will need to enable error code reporting again.

### To turn off error code reporting:

1. Enter \$ERR=0 !

## Error Codes – General Troubleshooting

Error codes can appear either on the control panel or in a terminal emulation program, such as HyperTerminal.

When you are using the control panel, one of the most common troubleshooting strategies is to re-send the command to see if the error was simply a time out error.

When you are using BCS (Basic Control Structure) commands, one common troubleshooting strategy is to enter the command again. Often the command has simply been entered incorrectly (e.g., omitting an output in a Change command).



# Setting Up HDMI Systems

## Applicability Notice

This chapter pertains to using the HDMI UTPro's HDMI matrix switching connectors and the HDMI and UTP transport connectors in conjunction with HDMI-UTPRO-RX Receivers for setting up an HDMI system.

The HDMI connectors are designed to route high-resolution HDMI or DVI signals with or without HDCP (High-bandwidth Digital Content Protection). DVI signals must be, single-link DVI signals and are connected only with the use of a cable adapter. Destination devices with either DVI-I or single-link DVI-D connectors are supported.

The HDMI connectors are HDMI and HDCP 1.3 compatible. The connectors feature AMX HDCP InstaGate® Technology\* for low-latency switching of HDCP protected content and supports computer video up to 1920x1200 and HDTV up to 1080p. The connectors also support embedded audio both linear PCM (stereo audio) and non-linear PCM (Dolby 5.1 and DTS 5.1).

The connectors are pre-loaded with the most common EDID settings to ensure proper functionality with source devices. The EDID Programmer (see page 107) allows specific display EDID settings to be custom loaded on each input if desired and is available on the *AMX AutoPatch CD* or at **www.amx.com**.

\* InstaGate® Technology significantly reduces the HDCP latency and interruptions on all displays in a system. HDCP latency and interruptions are typically experienced when High-Bandwidth Digital Content Protection (HDCP) authenticates HDMI or DVI source and destination devices. InstaGate® Technology effectively “opens the gate” by pre-authorizing connected source and destination devices to satisfy HDCP authentication.

## System Overview

The HDMI UTPro provides true matrix switching for complete distribution of high resolution digital video and embedded audio (cannot breakaway the audio) from 8 sources to any or all of 8 destinations. Full HDMI support allows 1080p protected entertainment content to be switched freely, while high resolution capabilities (1920x1200) provide the advantage of being able to use this solution to switch high resolution computer images or a combination of both.

The HDCP standard was established to prevent the unauthorized transfer of protected audiovisual content between devices.

The HDMI UTPro routes HDCP (content-protected) and non-HDCP digital audiovisual signals. If HDCP is applied, the transmitted video is encrypted. The HDMI matrix switching input connectors act as HDCP receivers (RXs), and the output connectors act as HDCP transmitters (TXs). If the content is protected (HDCP), the HDMI UTPro acts as an HDCP repeater, allowing the source device to authenticate each destination device (and repeater) that it is routed to. Once the authentication is complete, the encrypted content begins to display on the destinations.

**Note:** *The HDMI UTPro does not support CEC.*

## HDMI UTPro System Conditions

- HDCP is used only when the source content is copyright protected. Unprotected content is not affected and may be routed as desired.
- If a source device enforces HDCP compliance, only those destination devices which are HDCP compliant (as judged so by the source device) will be capable of displaying the source's HDCP protected content.
- Each HDMI matrix switching input on the HDMI UTPro supports a maximum of 16 downstream devices, which are referred to as sinks (destination devices and repeaters).

Normally, all devices used in an HDMI system are HDCP compliant. Each HDCP capable device model has a unique set of confidential keys (used to encrypt and decrypt the data).

The content protection process for the point-to-point connection between the upstream transmitter on the source device and an HDMI matrix switching input connector (RX) and on through the HDMI output connector (TX) to the destination device\* includes five steps.

\* This applies whether the HDMI matrix switching output is cabled directly to the destination device or cabled through the HDMI transport inputs, UTP transport outputs, and the HDMI-UTPRO-RX Receivers before reaching the destination device.

## Five Steps in Content Protection Process

1. The HDMI UTPro uses an authentication protocol to verify that the display device is licensed to receive the content.
2. The transmitter on the source device uses authentication protocol to verify that the HDMI UTPro matrix switching input (RX) and any routed downstream sinks are licensed to receive the content.
3. The content is encrypted and transmitted.
4. The source device's transmitter periodically verifies that the HDMI UTPro input is still synchronized and capable of decrypting the protected content.
5. The HDMI UTPro periodically verifies that the display device(s) is still synced and capable of decrypting the protected content.

**Note:** *If the source does not support HDCP, the display device does not need to support HDCP. The unencrypted content from the source is simply routed through the output(s) to the display device(s).*

## Unsuccessful Transmission in System

**Note:** *Be sure the destination devices support the resolution of the source device.*

If an HDMI-UTPRO-0808 system does *not* successfully transmit the protected content to any of the routed sinks, it may indicate one of the following conditions:

- Invalid key – The HDMI-UTPRO-0808 enclosure's output connector detected an invalid authentication key on the destination device.
- Non-compliant device – The sink device is not HDCP compliant or has had its authentication key revoked.\*
- Source sink support limit exceeded – The source device has been routed to more sinks (display devices and/or repeaters) than it can support.
- HDMI-UTPRO-0808 HDMI input sink support limit exceeded – The input is actively routed to more than 16 downstream sinks (display devices and/or repeaters).

\* Key revocation is handled strictly by the source device. The HDMI-UTPRO-0808 does not take any action with respect to revoked keys.

## Supported Number of Sinks

HDCP source devices and the HDMI UTPro inputs each support a specific maximum number of sinks.

### *HDCP Source Device*

Each source has a specific number of sinks (repeaters and/or destination devices) that it can support in addition to the first downstream repeater (which may or may not be an HDMI-UTPRO-0808 enclosure). The number of sinks the source supports downstream of the first repeater is determined by the source's manufacturer.

### *HDMI-UTPRO-0808*

Each input on the HDMI-UTPRO-0808 enclosure supports a maximum of 16 downstream sinks (repeaters and/or destination devices). The HDMI-UTPRO-0808 enclosure, which functions as a repeater, may or may not be the first repeater in the system. *The HDMI-UTPRO-RX Receiver does not count as a sink.*

Once a source is routed through the HDMI-UTPRO-0808 enclosure to a sink, that sink's key is added to the input's sink key cache (list of supported sinks) and remains in the cache even if the sink is disconnected.

### *One Sink Too Many*

**Tip:** *We recommend keeping track of the number of sinks (repeaters and destinations) in a system to avoid the problem of having one too many.*

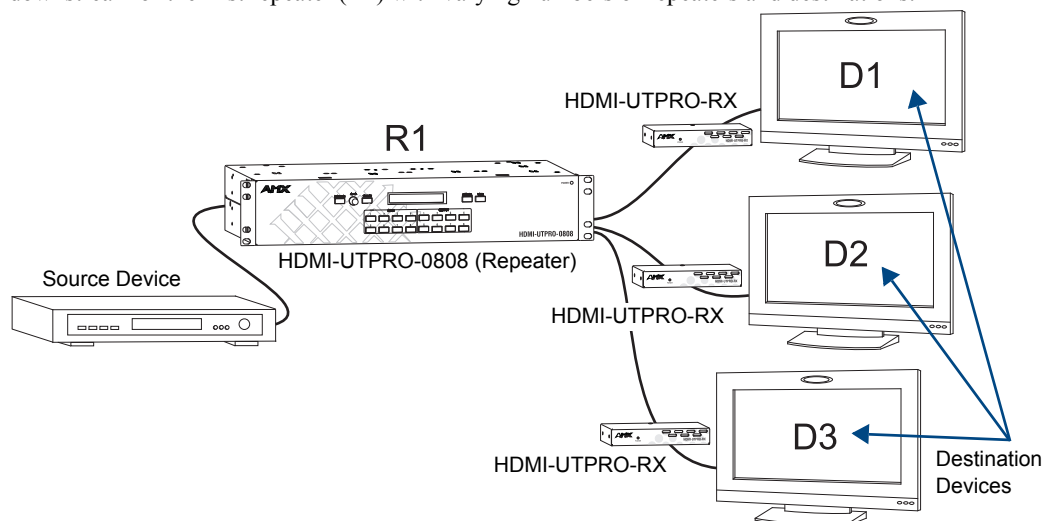
If you attempt to route the source to an additional sink past its limit or the HDMI UTPro input's limit of 16 (whichever occurs first), the protected content will *not* be transmitted to any of the routed sinks.

Having one sink too many can occur in two different cases (the solution for each is also different).

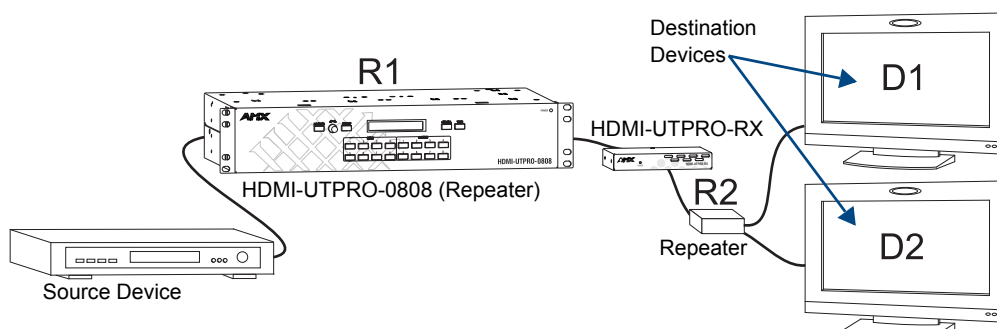
- If a source supports less than 16 sinks downstream from the HDMI UTPro and an additional sink past the source's limit is added anywhere in the system, the protected content stops transmitting. Removing a repeater between the source and the HDMI UTPro enclosure will restore transmission of protected content. Disconnecting a sink downstream from the HDMI UTPro enclosure, will *not* restore the transmission of protected content because the disconnected sink's key is still in the input's sink key cache. The cache needs to be cleared and the cleared state needs to be persisted (if the cache was previously persisted) so authentication can be completed again (for cache information, see page 69).
- If a source could support 16 or more sinks downstream from the HDMI UTPro and a 17<sup>th</sup> sink is added downstream of the HDMI UTPro, the protected content stops transmitting and the HDMI matrix switching input automatically clears its cache. The input will authenticate each of the downstream sinks again, but when it reaches the 17<sup>th</sup> sink, the protected content stops transmitting and the cache is cleared. This process will continue indefinitely until one of the HDMI UTPro's downstream sinks has been unplugged, bringing the number back to 16 (the HDMI UTPro's sink limit).

**Four Examples of HDCP Source Sink Support (FIG. 31 through FIG. 34):**

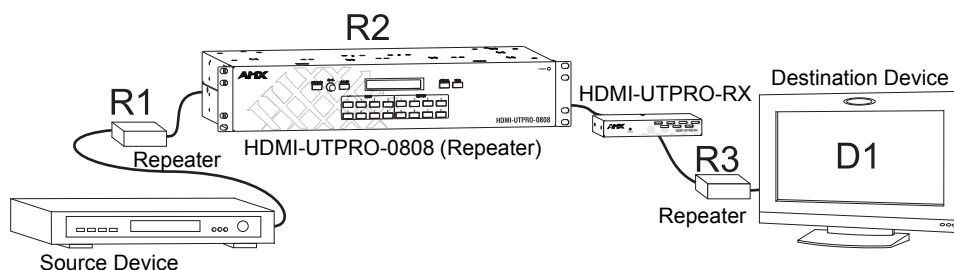
The next four figures illustrate system setups in which the source device supports a maximum of 3 sinks downstream of the first repeater (R1) with varying numbers of repeaters and destinations.



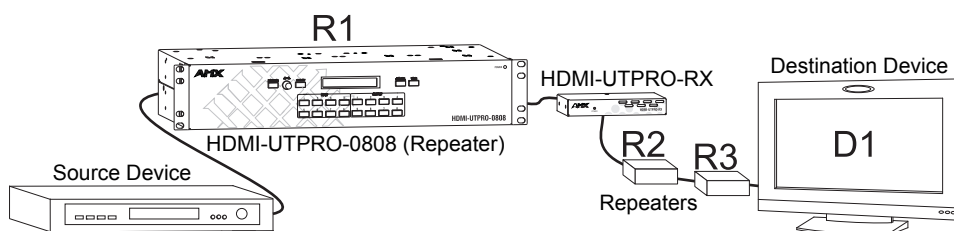
**FIG. 35** Example #1 – Source device supports 3 sinks (three destination devices) downstream of R1



**FIG. 36** Example #2 – Source device supports 3 sinks (R2 and two destination devices) downstream of R1



**FIG. 37** Example #3 – Source device supports 3 sinks (R2, R3, and one destination device) downstream of R1



**FIG. 38** Example #4 – Source device supports 3 sinks (R2, R3, and one destination device) downstream of R1

## Determining Sink Support Maximum on a Source Device

Determining how many sinks the source can support is necessary to make sure the system runs smoothly.

**Note:** If you already know how many sinks each source supports, go to “Initializing InstaGate® Technology” on page 67 to do an initial authentication of HDMI source and destination devices.

This section is intended to help analyze the system based on the types of source devices used, so any limits imposed by the source devices within the matrix switching system can be addressed. For example, if a source that supports a very low number of sinks is switched to more sinks than that source can handle, the protected content will *not* be transmitted to any of the routed sinks.

The easiest way to determine the sink support maximum on a source device is to reference the information from the equipment manufacturer’s product documentation. If documentation is not available, we recommend following the instructions below (an example is also provided on page 64).

**Important:** During the procedure below, keep in mind that the “failure condition” (in which HDCP authentication fails to occur) varies by source device manufacturer and may manifest itself in one of several ways, e.g., snow, static, a solid color, no image at all, or a flashing image (where the image changes back and forth at a high speed from the correct image to a black screen).

As soon as a source is switched to one more output than it can support, the protected content will *not* be transmitted to any of the routed sinks.

### To determine sink support maximum up to 8 on a source device:

1. Connect the source device to an input on the HDMI-UTPRO-0808 enclosure and connect destination devices to all outputs on the 8 HDMI-UTPRO-RX Receivers.
2. Establish serial control between the HDMI-UTPRO-0808 enclosure and the PC with a null modem serial cable via the Control port (see page 36).
3. Using your preferred method of control, send a command to make sure all outputs are disconnected from the input for the source device.
4. On the PC, open HyperTerminal (or other terminal emulation program) and enter @et to clear any keys for supported sinks that may be cached within the InstaGate® layer. Note that the response to the @et command is @eV.

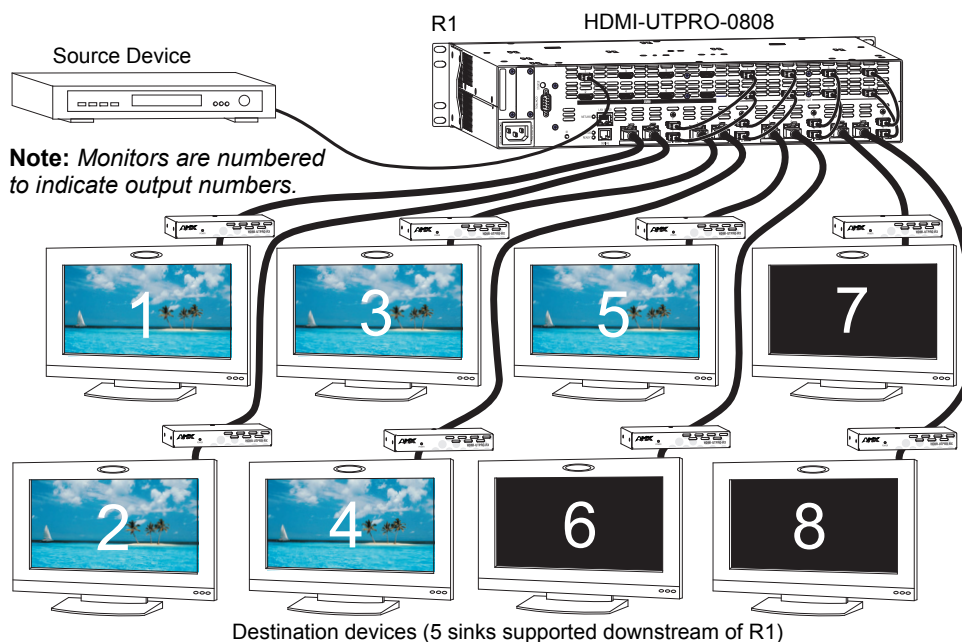
**Note:** During this process, the destination device must be connected directly to the output of the HDMI-UTPRO-RX (which is connected to the matrix switcher) and not going through additional equipment (e.g., a repeater).

5. Execute a switch to the first display device connected to the HDMI-UTPRO-0808 enclosure (i.e., add a sink to the source). A delay in the display of the video image of approximately 3 to 10 seconds\* can be expected due to the source engaging the display device for the first time initialization of HDCP authentication. (It is normal for the remaining monitors to lose and then regain content as each new output is added.)
6. Once a stable video image is seen at the destination device, continue routing the source to one additional output at a time (i.e., add each new sink to the source one at a time) until one of the following occurs (be sure to wait for the HDCP validation process and the resulting stable image to show each time before adding another output):
  - If the source fails to validate a destination device and the image is lost, the number of sinks the source supports is equal to the total number of sinks that properly displayed the image before all video was lost.  
To verify the failure is due to a source support limitation and not a revocation of the destination device’s key, clear the cache on the input (see page 69), then route the source to the last destination device again, and verify stable video.
  - All 8 outputs are validated and show content, i.e., source’s sink support maximum is 8 or more.

\* Time for initial authentication can vary noticeably for different source and destination devices.

Example of Determining Sink Support (FIG. 35):

FIG. 35 illustrates a source device that was checked and found to support only 5 sinks past R1. The check included the following: From a clear matrix state (the cache is clear), the source device was routed to Outputs 1, 2, 3, 4, and 5 one at a time as a stable image appeared on each destination device. When attempting to route the source device to the sixth output, all displays lost content. Only five of the destination devices will be able to receive a signal from this source. At this point, the limitation of the source device was noted and the cache cleared (see page 69). The remaining sources were checked one at a time using the same method, and then the system was initialized using InstaGate® Technology (see page 67) to route each source device to specific destination devices (up to the maximum each source supports).



**FIG. 39** Determining sink support

The previous process works for verifying sink support for a source device up to 8 sinks. If the process did not cover the needs of the installation (extra repeaters, etc.), continue with the next one until full system capabilities are mapped out.

The next process works for determining if additional sinks are supported by the source device up to a maximum of 16 downstream of the HDMI UTPro.

Even though the connected source device may support more than 16 sinks, the HDMI UTPro only supports 16 sinks per input. The HDMI UTPro will not allow the source device to route its signal to more than 16 sinks downstream of the HDMI UTPro.

#### To determine sink support maximum from 8 up to 16 on a source device:

1. If not already completed, complete the previous instructions.
2. Disconnect the first destination device from the HDMI UTPro and connect a new destination device in its place (this increases the total number of sink devices by one). (Alternatively, attach an HDCP supported repeater to the output, and attach the repeater to the same destination device.)
3. Repeat Step 2 for the remaining outputs until either all 8 destination devices show the image from the source or a failure point is reached.

## Dealing with Sources with Limited Sink Support

For sources with limited sink support, the following system design considerations and control suggestions are provided.

### System Design Considerations

- If at all possible, replace the source device with one with that supports more sinks.
- If a repeater is connected between the source and the HDMI UTPro and the repeater is not necessary, remove the repeater and connect the source device directly to the HDMI matrix switching input. The HDMI UTPro becomes the first repeater and one sink is eliminated, allowing you to add one more destination to the system.
- If a repeater is connected between the HDMI UTPro and a display device and the repeater is not necessary, remove the repeater and connect the display device directly to the UTP (RJ-45) output. This eliminates the one sink, allowing you to add one more destination to the system.

#### Example of Reducing Sinks:

A reduction in sinks can be made by removing unnecessary repeaters either upstream or downstream of the HDMI UTPro.

If a source supports five sinks downstream of the first repeater and the sinks (repeaters and destination devices) total six, removing a repeater will reduce the number to five. In this example, the source will *not* transmit the protected content until the number of sinks is reduced to five or less.

**Important:** *If the repeater that is removed is downstream of the HDMI UTPro, you will need to clear the input's sink key cache and then persist the cleared state to eliminate the key(s) before routing the source to any of the destinations; for instructions, see page 69.*

### Control Suggestions

Either a controller or a modified configuration file can provide a workaround for sources with limited sink support.

- Program an external controller so that the source(s) can only be routed to a limited number of specific destination devices.
- Use XNConnect to create a virtual matrix (VM) that limits routing of the source(s) to a limited number of specific destination devices.

#### External Controller

For control programming information for an HDMI UTPro using an external controller, see the external controller's documentation.

**Tip:** *Locking the control panel after routing the desired sources can prevent accidental switching of a source to more sinks than it supports and the resulting need to empty the cache and go through the initial authorization process again. For locking instructions, see page 54.*

#### XNConnect

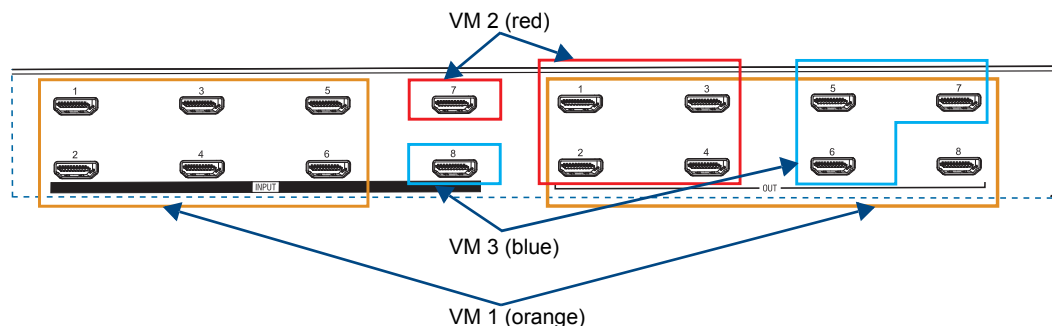
XNConnect can be used to create virtual matrices (VMs) which limit the routing of a source to specific destinations.



**Caution:** *Virtual matrix modifications are an advanced feature of XNConnect that should not be attempted unless you are familiar with XNConnect and the AMX Matrix Switcher being configured.*



To create new virtual matrices, we recommend contacting technical support (see page 41) to request a custom configuration file. If you decide to create them yourself, see page 127 or the XNConnect Help file.



**FIG. 40** Example of VMs created for control of sources with limited sink support

The virtual matrices in this example assume *no repeaters* are used upstream or downstream of the HDMI UTPro. This example is also used in “Appendix D – Creating Virtual Matrices” (see page 127).

- VM 1 – The sources connected to the inputs in orange (Inputs 1 through 6) each support 8 sinks and can be routed to any or all of the outputs in orange on VM 1 (Outputs 1 through 8).
- VM 2 – The source connected to the input in red (Input 7) supports only 4 sinks and can be routed to any or all of the outputs in red on VM 2 (Outputs 1, 2, 3, and 4).
- VM 3 – The source connected to the input in blue (Input 8) supports only 3 sinks and can be routed to any or all of the outputs in blue on VM 3 (Outputs 5, 6, and 7).

**Note:** When an input is routed to an output that is already receiving a signal on a different VM, the previous signal is disconnected and the new one takes its place.

## Troubleshooting Audio

Before troubleshooting audio, it helps to understand how the system handles EDID information.

- The HDMI UTPro reads the destination's EDID to verify that it is HDMI capable.
- The source reads and adapts to the EDID on the HDMI UTPro matrix switching input connector. The factory default EDID is set to support Dolby, DTS, and high PCM frequencies. This EDID can be modified by using the one of the methods described under “Possible Solutions” on the next page.

**Important:** The HDMI UTPro does not pass the EDID information from the destination back to the source, which means the source does not know what the destination's EDID is nor can the source make any destination dependent changes.

### Audio Problems

If the destination device does not output the audio or if the audio crackles, it may indicate that the destination device does not support all of the features in the default EDID on the HDMI UTPro. Some sources can choose what signal types (audio and video) they are sending to a destination based on the destination's EDID. Therefore, connecting the source directly to the destination may work fine because the source chooses, for example, PCM rather than Dolby (since it knows the destination cannot handle Dolby). Then when the HDMI UTPro is installed between the source and the destination, the source reads the HDMI UTPro input's default EDID and so it sends Dolby. But if the destination cannot handle Dolby, the signal will not work.



## Possible Solutions

One thing to try is to use the EDID Programmer to read the EDID from the destination device (see page 110) and to write it to the HDMI UTPro matrix switching input (see page 111).

Another thing to try is to use the EDID Programmer to write an EDID to the matrix switching input connector on the HDMI UTPro that best represents the downstream destination. Check the “EDID Library” file on the *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com) (search for EDID Library) to determine if one of the custom EDID files (which are variants of base EDIDs) meets your needs. For additional information on custom EDID files, see page 112.

## Initializing InstaGate® Technology

InstaGate® Technology significantly reduces latency (time required for authentication) in the matrix switcher for HDCP negotiations with the displays in a system. The latency is typically experienced when HDCP authenticates HDMI source and destination devices. This technology effectively “opens the gate” by pre-authorizing the connected source and destination devices to satisfy HDCP authentication.

After the first time a sink is validated by a source, when the source is routed to that same sink, the time required to authenticate that sink is greatly reduced and protected content is displayed with less delay.

**Note:** *Some destination devices have a longer lag time than others between receiving a signal and displaying that signal. Although InstaGate® significantly reduces latency in the matrix switcher, it cannot reduce the inherent lag time of a device.*

When the system is initially set up, each first time switch to an output *must* go through the lengthy authentication process. After the initial authentication, the system “remembers” the destination device and significantly reduces the latency.

**Note:** *If necessary, EDID Programmer software (located on the “AMX AutoPatch CD” or at [www.amx.com](http://www.amx.com)) is available for re-programming the HDMI connectors (see page 107).*

We recommend using either of the following procedures at installation or whenever source and/or destination devices are changed, so that the system is primed to accept all destinations (given any limitations on the number of sinks each source supports; see page 61).

### To initialize (prime) system for InstaGate® Technology with control panel or software:

**Note:** *The following process can take up to as much as a minute and a half for each one-to-all routing command to complete.\* It is normal for the remaining monitors to lose content as each new output is added.*

1. Check to be sure all source and destination devices attached to the HDMI UTPro are powered up.
2. Route each input to all of the outputs.

**Or**

Route each input to all of the runtime intended outputs.

\* Time for initial authentication can vary noticeably for different source and destination devices.

### To initialize (prime) system for InstaGate® Technology using BCS commands:

1. Check to be sure all source and destination devices attached to the HDMI UTPro are powered up.
2. Plug one end of a null modem serial cable into the Control (RS-232) port on the enclosure. The pinout for the DB-9 connector is: 5 GND to 5 GND, 2 RXD to 3 TXD, and 3 TXD to 2 RXD.

3. Plug the other end of the serial cable into the serial port on the PC.
4. Open HyperTerminal (typically at start/Programs/Accessories/Communications/HyperTerminal) or another terminal emulation program.
5. Select the COM port and set the settings to match the default ones in the HDMI UTPro Serial Port Settings table to the right. Click OK.
6. Apply power to the HDMI UTPro.  
A short splash screen appears.

HDMI UTPro Serial Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

**Important:** As you enter each of the commands in Step 7, check to be sure all destinations display stable video. If a destination (sink) does not support HDCP, its display will turn solid red. (If any of the commands fail, try routing the input to each output individually.)

7. Enter the following sequence of commands, which routes each source to all destinations. (Each one-to-all command can take up to as much as a minute and a half to complete.\* It is normal for the remaining monitors to lose and then regain content as each new output is added.)

```
CI10*T
CI20*T
CI30*T
CI40*T
CI50*T
CI60*T
CI70*T
CI80*T
```

**Or**

Route each input to all runtime intended outputs with BCS commands.

As the process is completed, the keys for the destination devices are stored in the HDMI-UTPRO-0808 enclosure's sink key cache for the input.

The HDMI UTPro caches the keys and continuously sends them to the source (in a cumulative manner) even if the source is only connected to a single output at a time. If that single input has been switched to more of the outputs than its sink key cache will support, the source device will fail.

\* Time for initial authentication can vary noticeably for different source and destination devices.

**Note:** For additional information on BCS commands, see the "Instruction Manual – BCS Basic Control Structure Protocol" on the "AMX AutoPatch CD" or at [www.amx.com](http://www.amx.com).

## The HDMI Connector's Sink Key Cache

If you need to persist the sink key cache on the HDMI UTPro matrix switching input connectors or clear persistence of the cache, follow the instructions provided.

**Important:** *These commands apply to the routing state of the entire system. In addition, all HDMI matrix switching inputs in the system receive the request. These commands cannot be sent to specific inputs.*

### SEND\_COMMANDs

The HDMI UTPro supports SEND\_COMMANDs for saving and clearing the sink key cache on all of its HDMI matrix switching inputs.

#### *Command to Persist (Save) Sink Key Cache*

#### To persist the Sink Key cache using SEND\_COMMANDs:

1. Complete the procedure for initializing the system for InstaGate® Technology (see page 67).
2. Enter `SEND_COMMAND dvUTPro, " 'INSTAGATEPERSIST' "` (persists the cache).

#### *Commands to Clear Persistence of the Sink Key Cache*

#### To clear persistence of sink key cache using SEND\_COMMANDs:

1. Enter `SEND_COMMAND dvUTPro, " 'INSTAGATECLEAR' "` (clears the cache and disconnects all currently routed signals).
2. Enter `SEND_COMMAND dvUTPro, " 'INSTAGATEPERSIST' "` (persists the empty cache).

### BCS Commands

As a backup, the HDMI UTPro also supports BCS commands for saving and clearing the sink key cache on all of its HDMI matrix switching inputs. This procedure requires a terminal emulation program such as HyperTerminal.

#### *Command to Persist (Save) Sink Key Cache*

#### To persist the Sink Key cache using BCS commands:

1. Complete the procedure for initializing the system for InstaGate® Technology (see page 67.)
2. Enter `~app!` (persists the cache).  
The HDMI UTPro will warm boot and display its boot screen.

#### *Commands to Clear Persistence of the Sink Key Cache*

#### To clear persistence of sink key cache using BCS:

1. Enter `@et` (clears the cache and disconnects all currently routed signals).  
Note that the response to the `@et` command is `@eV`.
2. Enter `~app!` (persists the empty cache).



# HDMI UTPro WebConsole

## Overview

HDMI UTPro has a built-in WebConsole that allows you to make various configuration settings via a web browser on any PC that has access to the enclosure. The WebConsole consists of a series of web pages that are collectively called the “Configuration Manager” (FIG. 41).

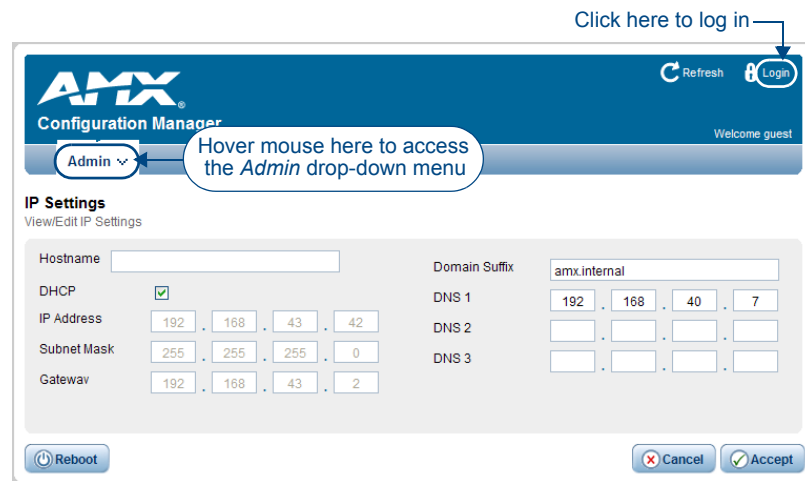


FIG. 41 Configuration Manager - IP Settings page (initial view)

## Minimum Web Browser Requirements

- Microsoft Internet Explorer 7.0 or higher, Firefox 3.68 or higher, or any other web browser compatible with these browsers

**Note:** The instructions in this chapter assume that the HDMI UTPro has established an active connection to a LAN and is receiving power (see page 32).

## Determining the IP Address of the HDMI UTPro

The HDMI UTPro features a built-in zero-configuration networking client that allows you to determine the unit's IP address via Bonjour or a similar zero-configuration client. Zero-configuration (or Zeroconf, also known as “Bonjour”) technology provides a general method to discover services on a local area network. In essence, it allows you to set up a network without any configuration.

### Accessing Zero-Config Information in NetLinx Studio 3.0

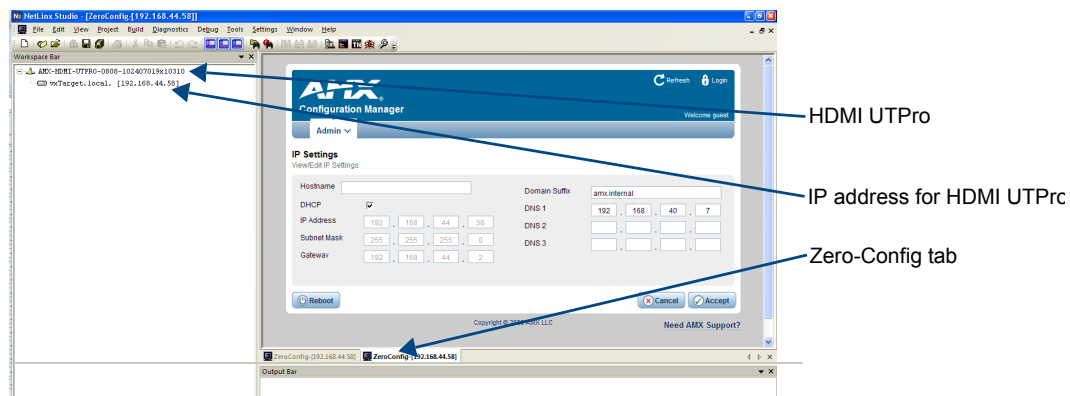
NetLinx Studio version 3.0 (or higher) features a “Zero-Config” tab in the Workspace Window. This tab provides Zero-Config networking functionality within NetLinx Studio.

The following assumes that the HDMI UTPro resides on the same LAN as the PC running NetLinx Studio and the NetLinx Master to which the HDMI UTPro is connected.

### To determine the IP address by accessing the HDMI UTPro via Zero-Config in NetLinx Studio:

1. In NetLinx Studio (v3.0 or higher), left-click the Zero-Config tab on the Workspace Bar to open the tab.
2. Right-click anywhere in the Workspace bar and select Refresh Zero-Config List to generate an initial listing of all Zero-Config devices that have been detected (FIG. 42).
3. Click the plus symbol (+) to the left of any device in the Zero-config list to expand its information.
4. The HDMI UTPro's current IP Address is listed below the device name.

**Note:** Refer to the NetLinx Studio online help for additional details on using Zero-Config



**FIG. 42** Zero-Config list showing network with HDMI-UTPRO-0808

**Note:** The serial number displays at the end of the product name in the Zero-Config tree.

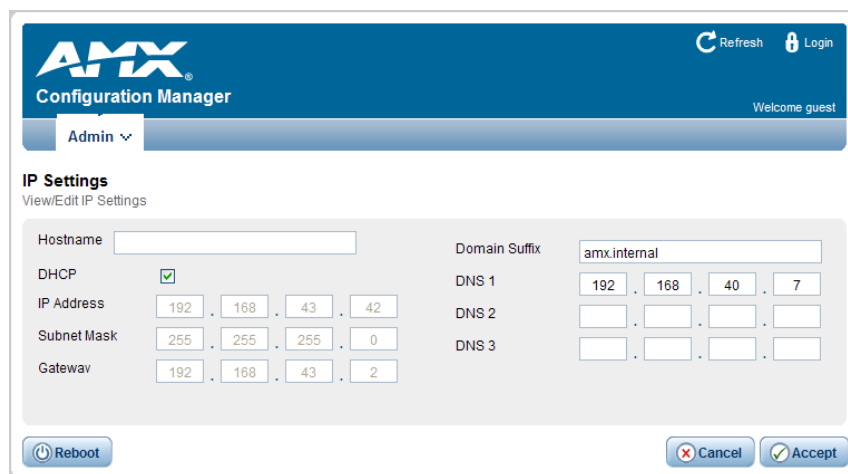
### Accessing the WebConsole



**Caution:** We strongly recommend that the WebConsole site be placed inside your network firewall and that system security be turned on.

#### To access the WebConsole:

1. **From the NetLinx Studio Zero-Config tab** – Double-click on “AMX-HDMI-UTPRO-0808” or right-click and select one of the launch browser options.  
The initial view is a display-only\* view of the *IP Settings* page.  
**Or**  
**In the Address Bar of your PC’s browser** – Type the IP Address of the target HDMI UTPro and press Enter. The PC must be on the same subnet (e.g., 192.168.X.X).  
The initial view is a display-only\* view of the *IP Settings* page.



**FIG. 43** IP Settings page

If the IP Setting page does not open, see the “WebConsole Troubleshooting” section on page 82.

\* Note that the *IP Settings* page is display-only, because you have not yet logged in. You must log in before making changes to the *IP Settings* page and to access the other pages described in this section. To log in, click the Login button in the upper right-hand corner.

## Admin Menu

Several configuration pages are included in the Configuration Manager, all of which are accessed via the *Admin* drop-down menu (FIG. 44).



FIG. 44 Configuration Manager - Admin drop down menu

Click on an option in this menu to access each of the configuration pages, as described in the following sections. The Restore Settings menu option restores the factory default settings on both the *Security Settings* page and the *Port Settings* page.

## Control Page

Select **Control** from the Admin menu to access the *HDMI-UTPRO-0808 Control* page (FIG. 45). Use this page to send NetLinX programming control commands to the HDMI UTPro Matrix Switcher or the HDMI-UTPRO-RX Receivers (Receivers must be connected). This page provides a rudimentary control method if a master connection is not available.

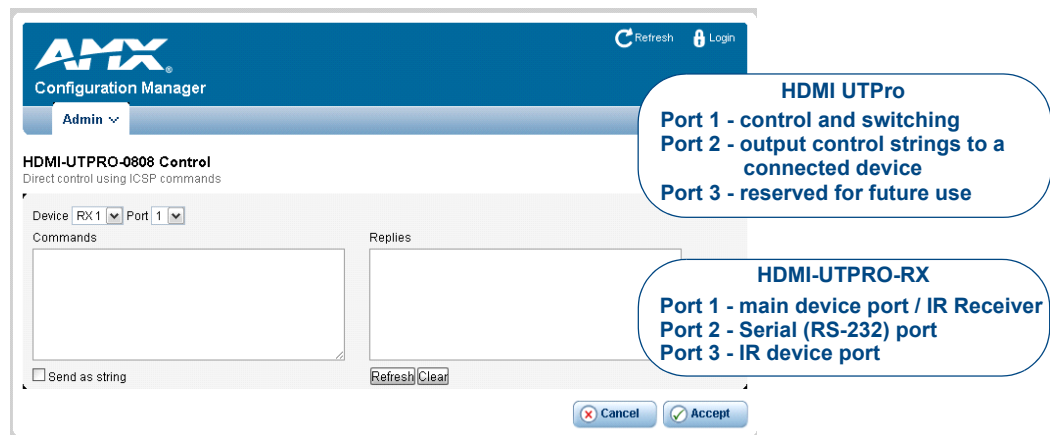


FIG. 45 Configuration Manager - HDMI-UTPRO-0808 Control page

## Control Commands

**Note:** Only ASCII-printable characters are supported.

### To send commands to the HDMI UTPro:

- From the Device drop-down menu, select Hub (for the HDMI UTPro).  
From the Port drop down menu, select the applicable port for the command (FIG. 45).
  - Port 1: SEND\_COMMANDS
  - Port 2: SEND\_COMMANDS to output control strings to a connected device
  - Port 3: reserved for future use
- Enter the SEND\_COMMAND in the Commands field on the left.

3. Click **Accept** to send the command.  
The response appears in the Replies field on the right.
  - Click **Refresh** to receive new replies (notifications) in the Replies field. New replies are added to the bottom of the list.
  - Click **Clear** to clear the Replies field.
  - Click **Cancel** to exit the page without saving any changes.

#### To send commands to an HDMI-UTPRO-RX:

1. From the Device drop-down menu, select the target Receiver (RX 1 - RX 8) – only those connected display in the list.
2. Check to be sure the “Send as String” check box is *not* checked.
3. From the Port drop down menu, select the applicable port on the Receiver to receive the command.
  - Port 1: SEND\_COMMANDs
  - Port 2: SERIAL (RS-232) SEND\_COMMANDs
  - Port 3: IR SEND\_COMMANDs
4. Enter the command in the Commands field on the left.
5. Click **Accept** to send the command.  
The response appears in the Replies field on the right.
  - Click **Refresh** to receive new replies (notifications) in the Replies field. New replies are added to the bottom of the list.
  - Click **Clear** to clear the Replies field.
  - Click **Cancel** to exit the page without saving any changes.

## Device Configuration Page

Select **Device Configuration** from the Admin menu to access the *Device Configuration* page (FIG. 46). Use this page to view/edit the device configuration for the HDMI UTPro. Note that this page has two tabs: *Device Configuration* and *Master Connection*.

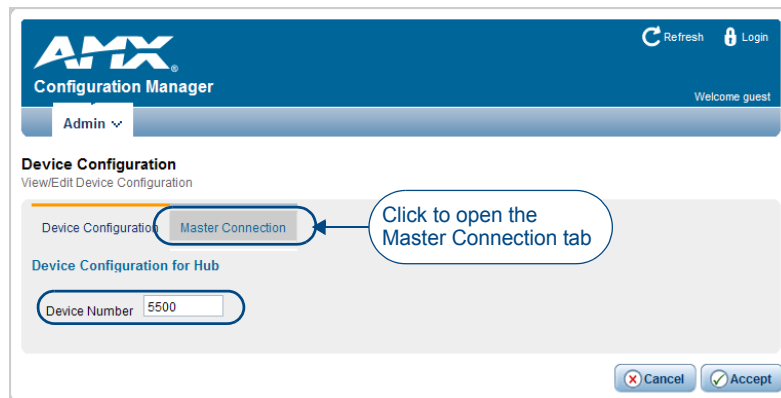


FIG. 46 Device Configuration page (Device Configuration tab)

### Device Configuration Tab

The *Device Number* field in this tab allows you to manually change the device number of the HDMI UTPro.

The default Device Number assigned to the HDMI UTPro is **5500** (in NetLinx Studio, the device number is 05500). The default Device Numbers assigned to the HDMI-UTPRO-RX Receivers are **5501** through **5508**. To change the device number, enter the new device number and click **Accept** (or click **Cancel** to discard changes).



## Master Connection Tab

Click the *Master Connection* tab in the *Device Configuration* page to view/edit the Master Connection for the HDMI UTPro (FIG. 47).

**FIG. 47** Device Configuration page (Master Connection tab)

Use the options on the *Master Connection* page to view/edit the Connection Mode, Mode Settings and Authentication Settings for the HDMI UTPro's connection to the NetLinx Master.

## Changing the Connection Mode

The available connection modes are indicated under Connection Mode (default = TCP/IP Auto). Click on the radio buttons to select the different modes.

**Note:** The options under Mode Settings will change, depending on the Connection Mode selected.

## Changing the Mode Settings

The supported Connection Modes and the available mode settings for each are described in the following table.

Connection Modes and Mode Settings Options	
TCP/IP URL	<ul style="list-style-type: none"> <li>Master IP/URL -</li> <li>Master Port Number - The default value is <b>1319</b>, and <i>should not be changed</i>.</li> </ul>
TCP/IP Listen	<ul style="list-style-type: none"> <li>Master Port Number - The default value is <b>1319</b>, and <i>should not be changed</i>.</li> </ul>
TCP/IP Auto	<ul style="list-style-type: none"> <li>System Number -</li> <li>Master Port Number - The default value is <b>1319</b>, and <i>should not be changed</i>.</li> </ul>
UDP/IP URL	<ul style="list-style-type: none"> <li>Master IP/URL -</li> <li>Master Port Number - The default value is <b>1319</b>, and <i>should not be changed</i>.</li> </ul>
UDP/IP NDP	<ul style="list-style-type: none"> <li>Master IP -</li> <li>Master Port Number - The default value is <b>1319</b>, and <i>should not be changed</i>.</li> </ul>

- Click **Accept** to save the changes. Changes on this page take effect immediately.
- Click **Cancel** to exit the page without saving any changes.

## Authentication Settings

If the NetLinx Master requires authentication, enter the *Master Username* and *Master Password* in the applicable fields.

## Security Settings

Select **Security Settings** from the Admin drop-down menu to open the *Security Settings* page (FIG. 48). Use the options on the page to specify security settings and login information for the HDMI UTPro.

**Note:** If Security Settings are disabled and then enabled again, Login information remains in affect.

FIG. 48 Security Settings page

**Important:** The Admin menu option “Restore Settings” will restore the factory default settings (as specified in the two tables below) for both the Security Settings and the Login Information on the Security Settings page.

### Enable / Disable Security Settings

The security setting options and their functions are described in the following table.

Security Settings Page	
Web Security	Click this box to enable Web Security. When Web Security is enabled, a user name and password are required to access any system Web pages (default = disabled).
Telnet Security	Click this box to enable Telnet Security. When Telnet Security is enabled, a user name and password are required to establish a Telnet or SSH connection (default = disabled).
Admin Security	Click this box to enable Admin Security When Admin Security is enabled, a user name and password are required to modify any system configuration item (default = disabled).

- Click **Accept** to save the changes (applies to the security settings and login information). Changes on the *Security Settings* page take effect immediately.
- Click **Cancel** to exit the page without saving any changes.

### Login Information

Use the Login Information fields to specify a user name and password. Login information is required only if one or more of the Security Settings are enabled.

Login Information	
Username	Enter the user name that will be required to log in to HDMI UTPro information if security is enabled (default = <b>administrator</b> ).
New Password	Enter the new password that will be required to log in to HDMI UTPro information if security is enabled (default = <b>password</b> ).
Confirm Password	Re-enter the new password in this field.

## Logging Into the Configuration Manager (With Security Enabled)

Login is only required if the *Web* and/or *Admin* security options have been enabled on the HDMI UTPro.

### To log into the Configuration Manger (with security enabled):

1. Click the Login link in the upper-right corner of the initial page (FIG. 42 on page 74).  
The Login dialog box opens.



FIG. 49 Configuration Manager - Login popup page

2. Enter the login information:
  - Default Username = **administrator**
  - Default Password = **password**
3. Click the Login button.

Once you have successfully logged into the Configuration Manager, the *IP Settings* page is displayed, and can be edited as necessary.

## IP Settings

Select **IP Settings** from the Admin drop-down menu to open the *IP Settings* page (FIG. 50). Use the options on the page to specify network/IP settings for the HDMI UTPro.

**Important:** By default, the HDMI UTPro is configured for DHCP (when the DHCP check box is not selected, the IP address is static).

**Note:** When the DHCP setting is selected and you power the system down and then power back up, the DHCP server will reassign the IP address, which may or may not be the same address it assigned previously. Setting a static IP address prevents the possibility of the IP address changing at power up.

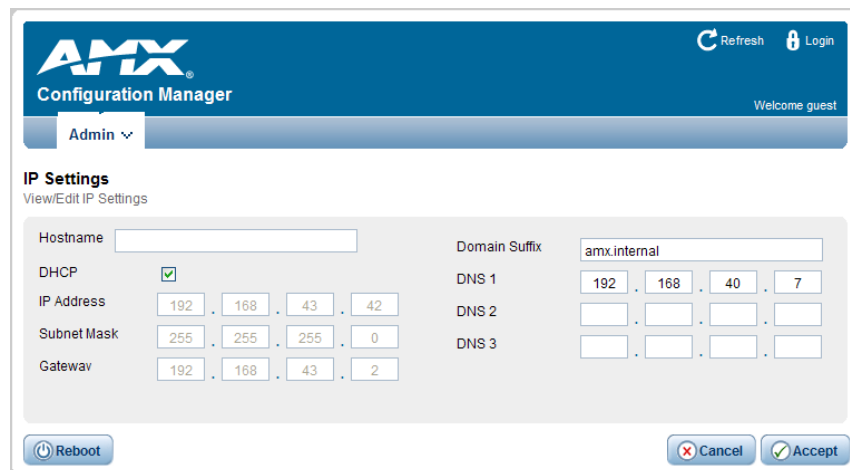


FIG. 50 IP Settings page

Anytime you click Reboot from any page in the WebConsole, the server reboots. The reboot updates information between the HDMI UTPro and the server. (The HDMI UTPro system itself does not reboot.)

IP Settings	
DHCP	<ul style="list-style-type: none"> <li>Click to toggle the DHCP setting on the HDMI UTPro (default = enabled).</li> <li>When the DHCP check box is not selected, a static IP address (with the appropriate subnet) must be entered.</li> <li>When the DHCP check box is not selected, a static IP address (with the appropriate subnet) must be entered in order for the HDMI UTPro to be detected by a zeroconfiguration client (e.g., Bonjour for Windows).</li> <li>The HDMI UTPro will not display in the NetLinx online tree unless it resides on the same LAN and subnet as the PC running NetLinx Studio and the NetLinx Master to which the HDMI UTPro is connected.</li> </ul> <p>See <i>Accessing Zero-Config Information in NetLinx Studio 3.0</i> on page 71 for details.</p>
Hostname	Enter a Hostname for the HDMI UTPro.
IP Address	Enter an IP Address for the HDMI UTPro (enabled only if DHCP is disabled).
Subnet Mask	Enter a Subnet Mask for the HDMI UTPro (enabled only if DHCP is disabled).
Gateway	Enter a Gateway for the HDMI UTPro (enabled only if DHCP is disabled).
Domain Suffix	Enter the Domain Suffix for the HDMI UTPro.
DNS 1, 2, 3	Enter up to three DNS addresses for the HDMI UTPro.

- Click **Accept** to save the changes. IP setting changes require a reboot.
- Click **Cancel** to exit the page without saving any changes.
- Click **Reboot** to initiate a system reboot. IP Settings changes only take effect after a reboot.

## Port Settings

Select **Port Settings** from the Admin drop-down menu to open the *Port Settings* page (FIG. 51). Use the options on the page to specify various Port settings for the HDMI UTPro.

The screenshot shows the AMX Configuration Manager interface. The 'Admin' menu is open, and 'Port Settings' is selected. The 'Port Settings' page displays a table with the following data:

Enable	Port	Number
<input checked="" type="checkbox"/>	HTTP Port Number	80
<input checked="" type="checkbox"/>	HTTPS Port Number	443
<input checked="" type="checkbox"/>	Telnet Port Number	23
<input checked="" type="checkbox"/>	SSH Port Number	22
<input checked="" type="checkbox"/>	FTP Port Number	21

At the bottom of the page, there are three buttons: 'Reboot', 'Cancel', and 'Accept'.

**FIG. 51** Port Settings page

The options on the *Port Settings* page provide inputs for enabling / disabling of HTTP, HTTPS, Telnet, SSH, and FTP ports, plus allowing you to change each port number from its standard default assignment.

Port Settings	
HTTP Port Number	Default = enabled, default port number = 80
HTTPS Port Number	Default = enabled, default port number = 443
Telnet Port Number	Default = enabled, default port number = 23
SSH Port Number	Default = enabled, default port number = 22
FTP Port Number	Default = enabled, default port number = 21

- Click **Accept** to save the changes. Port Settings changes require a reboot.
- Click **Cancel** to exit the page without saving any changes.
- Click **Reboot** to initiate as system reboot. Port Settings changes only take effect after a reboot.

**Important:** The Admin menu option “Restore Settings” will restore the factory default settings as listed in the table above for this page.

## Editing the Clock Manager Settings

The WebConsole provides a Clock Manager (accessible from the Admin drop down menu) for selecting the current mode of the system time. Be sure to click Accept to save your changes. The changes take effect immediately.

### Clock Manager - Mode Manager

#### Time Sync Settings

- Standalone – when this option is selected, the settings are modified on the same page. Be sure to click Accept after clicking Standalone and again after modifying the settings.
- Network Time – this option *must* be selected before the Daylight Saving tab and the NIST Servers tab are enabled. Their settings are modified on separate pages. Be sure to click Accept after clicking Network Time and again after modifying settings.

#### To modify Standalone settings in the Clock Manager:

1. From the Admin drop down menu, select Clock Manager (or select Mode from the Clock Manager submenu).

FIG. 52 Clock Manager - Mode Manager page

2. Under Time Sync, select Standalone and click Accept.
3. Modify any of the settings under Re-Sync Period and Timezone and click Accept.

When Network Time is selected (you *must* click Accept), the Daylight Saving tab and the NIST Servers tab become available; their settings are modified on separate pages.

**Note:** If using the Standalone mode, the time will be valid only until the matrix switcher is rebooted. Once the matrix switcher is rebooted, the time will be lost and will need to be reset.

Clock Manager - Mode Manager	
Time Sync	Use the radio buttons to select either Network Time or StandAlone. <ul style="list-style-type: none"> <li>• If using StandAlone mode, the time will be valid only until the enclosure is rebooted.</li> <li>• The Daylight Savings and NIST Servers tabs are enabled only if Network Time is selected as the mode.</li> </ul>
Re-Sync Period	Select the desired re-synch period for the clock from this drop-down menu. Re-sync period options include 5 minutes, 15 minutes, 1 hour, 2 hours, and 4 hours (default = 1 hour).
Timezone	Select the appropriate Time Zone from the drop-down menu.
Date	Use Date fields to manually enter today's date (mm/dd/yyyy).
Time	use Time fields to manually enter the current time (hh:mm:ss).

- Click **Accept** to save the changes. Changes on the *Mode Manager* page take effect immediately.
- Click **Cancel** to exit the page without saving any changes.

## Clock Manager - Daylight Savings (only available if Network Time is selected)

The options on the *Daylight Savings Manager* page allows you to enable and disable daylight savings and to specify daylight savings start and end times.

### To adjust Daylight Savings setting in the Clock Manager:

1. From the Admin drop down menu, select Clock Manager (or select Mode from the Clock Manager submenu).
2. Under Time Sync, select Network Time and click Accept.
3. Click the Daylight Savings tab.

FIG. 53 Clock Manager - Daylight Savings Manager page

4. Modify any of the settings on the Daylight Savings page and click Accept.

Clock Manager - Daylight Savings Manager	
Daylight Savings	Use these radio buttons to turn daylight savings time on and off (default = Off).
Offset	Use these drop-down menus to specify the amount of time to offset the clock for daylight savings.
Starts	<p>These options allow you to specify when to start using daylight savings time. Select a month and time to start from the drop-down menus.</p> <ul style="list-style-type: none"> <li>• Select <i>Fixed</i> to start daylight savings at a specific Day, Month and Time (an additional field for <i>Day</i> is provided when this radio button is selected).</li> <li>• Select <i>Occurrence</i> to start daylight savings at a specified occurrence (additional fields for <i>Week of the Month</i>, and <i>Day of the Week</i> are provided)</li> </ul>
Ends	<p>These options allow you to specify when to stop using daylight savings time. Select a month and time to start from the drop-down menus.</p> <ul style="list-style-type: none"> <li>• Select <i>Fixed</i> to end daylight savings at a specific Day, Month and Time (an additional field for <i>Day</i> is provided when this radio button is selected).</li> <li>• Select <i>Occurrence</i> to end daylight savings at a specified occurrence (additional fields for <i>Week of the Month</i>, and <i>Day of the Week</i> are provided).</li> </ul>

- Click **Accept** to save the changes. Changes on the *Daylight Savings Manager* page take effect immediately.
- Click **Cancel** to exit the page without saving any changes.

### Clock Manager - NIST Servers (only available if Network Time is selected)

The options on the *NIST Servers* page allow you to select the NIST server that will be queried at each clock synchronization and allow you to add more NIST servers to the list.

**Note:** Only one NIST server is selectable at any given time

#### To adjust NIST Servers settings in the Clock Manager:

1. From the Admin drop down menu, select Clock Manager (or select Mode from the Clock Manager submenu).
2. Under Time Sync, select Network Time and click Accept.
3. Click the NIST Servers tab.

AMX Configuration Manager

Admin ▾

NIST Server Manager

View/Edit Clock Manager NIST Server Settings

Mode Manager Daylight Savings NIST Servers

Select	Server Name	IP	Location	Remove
<input checked="" type="radio"/>	time-a.timefreq.bldrdoc.gov	132.163.4.101	NIST, Boulder, Colorado	
<input type="radio"/>	time-b.timefreq.bldrdoc.gov	132.163.4.102	NIST, Boulder, Colorado	
<input type="radio"/>	time-c.timefreq.bldrdoc.gov	132.163.4.103	NIST, Boulder, Colorado	
<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Cancel Accept

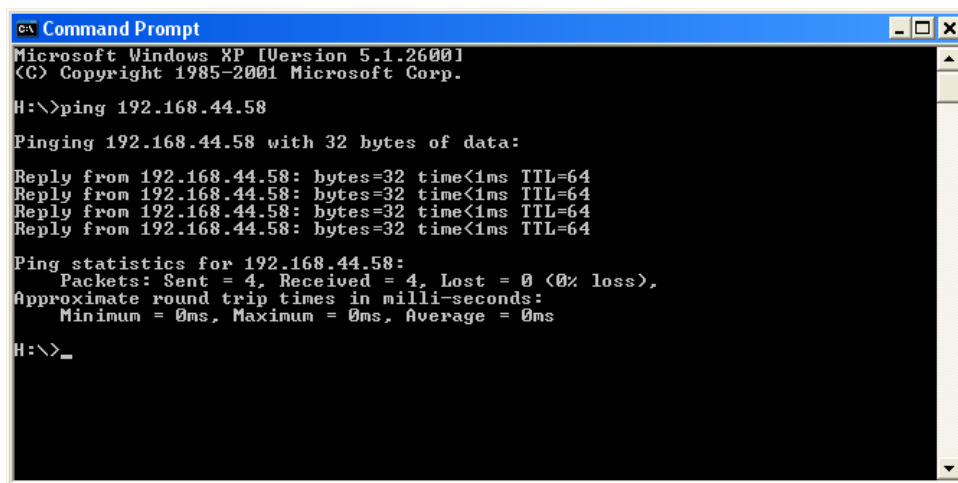
**FIG. 54** Clock Manager - NIST Server Manager page

4. To add a NIST server, enter the *NIST Server Name*, *IP Address* and *Location* in the fields provided.  
Or  
To remove a NIST server from the list, click **Remove**.
5. Click **Accept** to save your changes. Note that changes on this page take effect immediately.  
Or  
Click **Cancel** to cancel any changes.

## WebConsole Troubleshooting

Check the following:

- ☐ Be sure all power, signal, and link connections on all of the equipment are secure.
- ☐ Be sure the HDMI UTPro is correctly plugged into a network with a DHCP server.
- ☐ Be sure the LEDs on the LAN 10/100 connector indicate activity and that the Ready LED is illuminated.
- ☐ Be sure the LED indicators on the NetLinx Master are functioning.
- ☐ Ping the system, i.e., at the DOS prompt enter: ping XXX.XXX.XX.XX (where XXX.XXX.XX.XX is the HDMI UTPro IP address).  
For an example of a typical response showing verification of communication with the HDMI UTPro, see FIG. 55.



```

Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

H:\>ping 192.168.44.58

Pinging 192.168.44.58 with 32 bytes of data:

Reply from 192.168.44.58: bytes=32 time<1ms TTL=64
Reply from 192.168.44.58: bytes=32 time<1ms TTL=64
Reply from 192.168.44.58: bytes=32 time<1ms TTL=64
Reply from 192.168.44.58: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.44.58:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

H:\>_

```

**FIG. 55** Example of typical response when system is pinged

Try the following:

- ☐ Try connecting to the WebConsole again.
- ☐ If the WebConsole still does not open, you may need to add an exception in the Proxy Setting dialog box (see instructions on the next page).

**Tip:** Also check “Installation Troubleshooting” on page 40 and the troubleshooting information in the documentation for the NetLinx Master.

## Changing the Proxy Setting

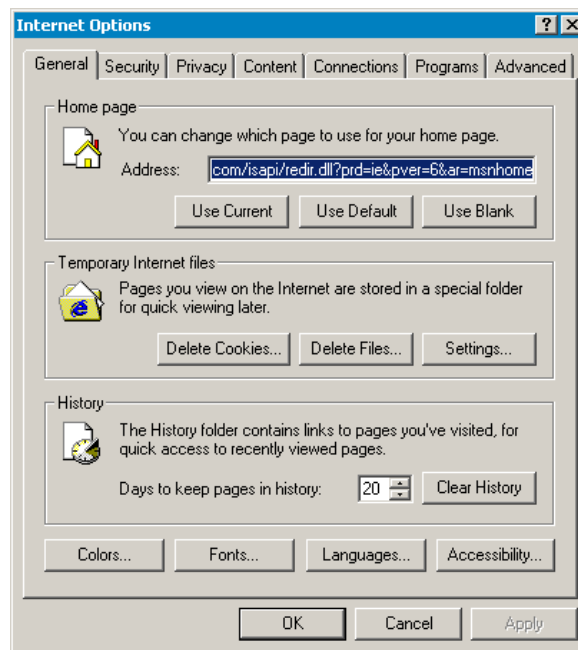
If the HDMI UTPro does not open, you may need to add an exception in the Proxy Setting dialog box.

The instructions on the next page apply to Internet Explorer. To change these settings in another browser, consult its Help file.

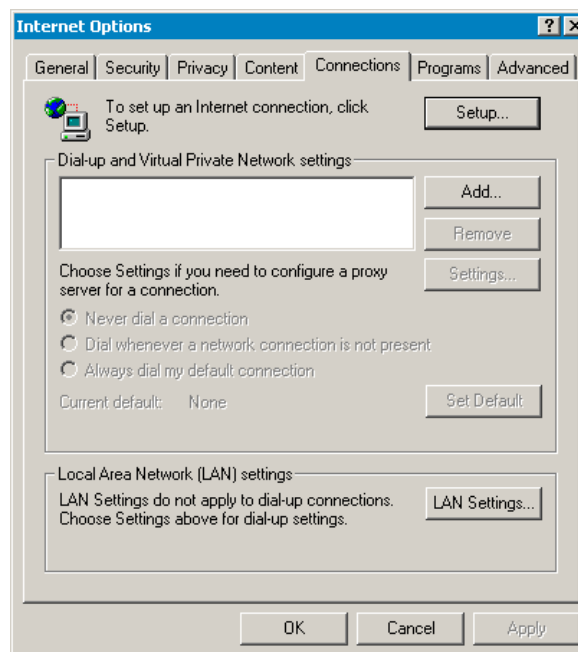


**To add an exception to the proxy setting information:**

1. From the Tools menu on the browser, select Internet Options.  
The Internet Options dialog box opens.



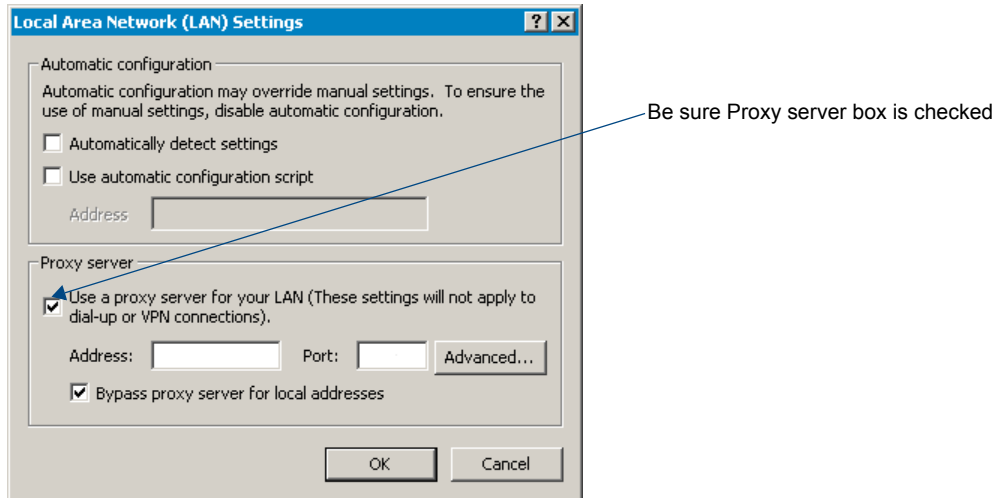
2. Select the Connections tab.



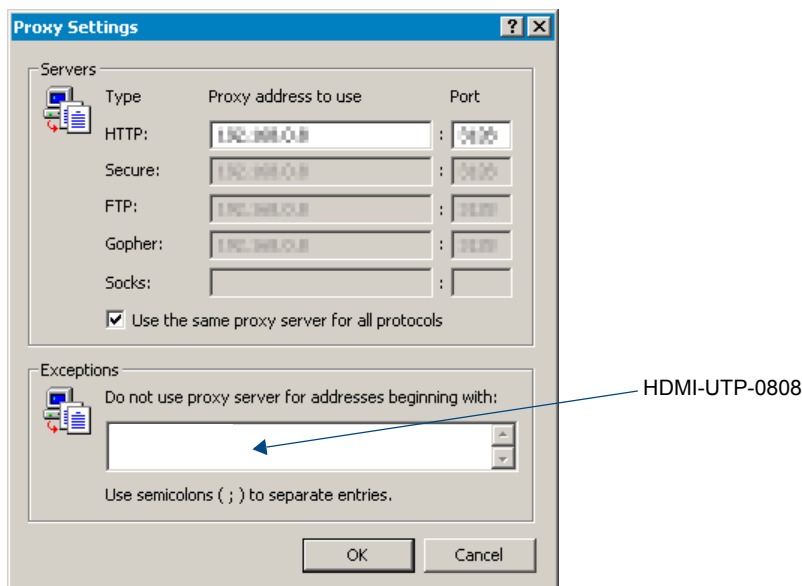
3. Click the LAN settings.  
The Local Area Network (LAN) Settings dialog box opens.

If the Proxy server box is checked, so to Step 4.

If the Proxy server box is not checked, check it before going to Step 4.



4. Click Advanced.  
The Proxy Settings dialog box opens.



5. In the Exceptions field, enter the appropriate HDMI UTPro's IP address (page 71).
6. Click OK to exit each of the dialog boxes used in these steps.

If problems persist, contact technical support (see page 41).

# HDMI UTPro NetLinx Programming

## Overview

The HDMI UTPro recognizes a select number of SEND\_COMMANDs. Use NetLinx Studio (Version 3 or higher is required) to send these commands to the HDMI UTPro.

## Device Numbering

By default, the Device Number assigned to the HDMI UTPro is **05500** (in the WebConsole, the device's number displays as 5500). In NetLinx Studio's Online Tree, the HDMI UTPro is listed as a device with three ports, and each HDMI-UTPRO-RX Receiver connected to the HDMI UTPro is listed as a separate device immediately following the HDMI UTPro (FIG. 56).

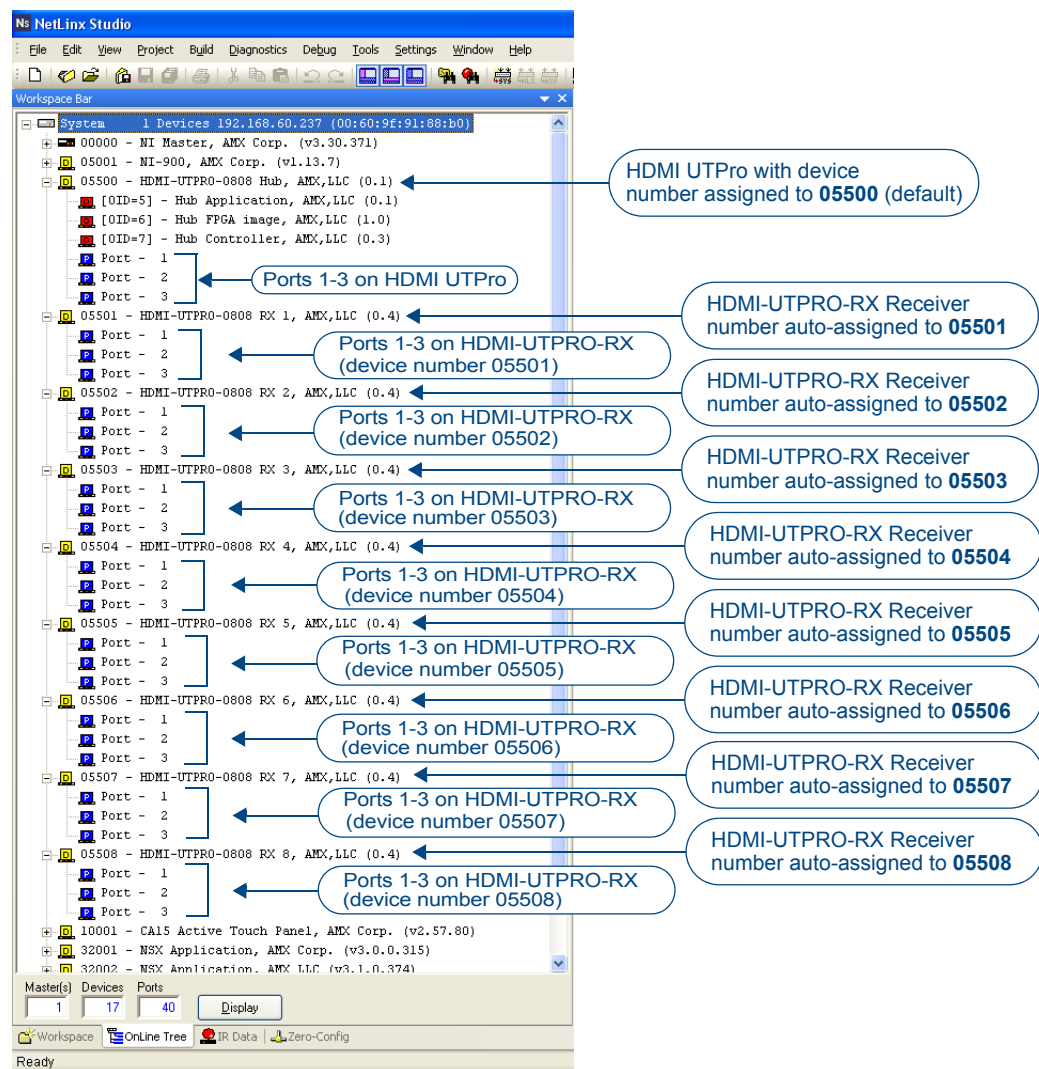


FIG. 56 NetLinx Studio Online Tree - indicating HDMI UTPro and connected HDMI-UTPRO-RX Receivers

The HDMI UTPro's three ports in the Online Tree are:

- Port 1 – Used for SEND\_COMMANDs for HDMI UTPro control and switching.
- Port 2 – Standard NetLinx serial port connected to the LAN 10/100 (RJ-12) port; can be used with SEND\_STRINGS to output control strings to a connected device.
- Port 3 – Reserved for future use.

**Note:** Only HDMI-UTPRO-RX units that are physically connected to the HDMI UTPro will be represented in the Online Tree.

The device number for each HDMI-UTPRO-RX Receiver currently connected to the HDMI UTPro is automatically designated a device number, based on the device number of the HDMI UTPro to which it is connected and to the number of the HDMI UTPro Output UTP (RJ-45) port (1-8) on the HDMI UTPro to which it is physically connected.

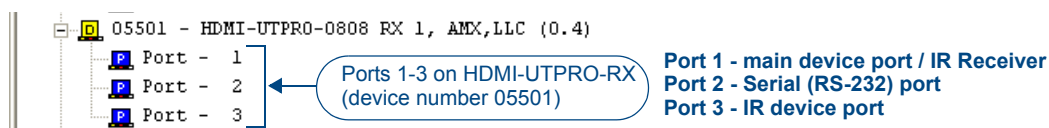
For example, if the HDMI UTPro is using its default device number assignment of **05500**, and eight HDMI-UTPRO-RX Receivers are connected to all eight UTP Output ports on the HDMI UTPro, then the device numbering would be assigned as follows:

- HDMI UTPro = device number **05500**
- HDMI-UTPRO-RX connected to UTP Output Port #1 = device number **05501**
- HDMI-UTPRO-RX connected to UTP Output Port #2 = device number **05502**
- HDMI-UTPRO-RX connected to UTP Output Port #3 = device number **05503**
- HDMI-UTPRO-RX connected to UTP Output Port #4 = device number **05504**
- HDMI-UTPRO-RX connected to UTP Output Port #5 = device number **05505**
- HDMI-UTPRO-RX connected to UTP Output Port #6 = device number **05506**
- HDMI-UTPRO-RX connected to UTP Output Port #7 = device number **05507**
- HDMI-UTPRO-RX connected to UTP Output Port #8 = device number **05508**

Therefore, it is important to avoid assigning device numbers that will conflict with this auto-numbering scheme. Reserve the eight device numbers following the HDMI UTPro's device number assignment for up to eight HDMI-UTPRO-RX Receivers.

**Note:** The HDMI-UTPRO-RX Receivers that are connected to the HDMI UTPro UTP output ports on the HDMI UTPro are not required to be in sequential order. For example, if you had three HDMI-UTPRO-RX units, plugged into UTP Outputs 2, 5 and 7, the device numbers (assuming the default device number of the HDMI UTPro = 05500) would be 05502, 05505 and 05507.

In the device tree, each HDMI-UTPRO-RX Receiver displays three ports (FIG. 57)



**FIG. 57** NetLinX Studio Online Tree - Ports 1-3 on each connected HDMI-UTPRO-RX

These three ports relate directly to the three types of NetLinX commands recognized by the HDMI-UTPRO-RX:

- Port 1 – SEND\_COMMANDs
- Port 2 – SERIAL (RS-232) SEND\_COMMANDs
- Port 3 – IR SEND\_COMMANDs

For instructions on programming the HDMI-UTPRO-RX, refer to the “HDMI-UTPRO-RX NetLinX Programming” chapter on page 95.

**Note:** For additional information on using NetLinX Studio, refer to the “Programming Guide – NetLinX Integrated Controllers” (available at [www.amx.com](http://www.amx.com)).

## SEND\_COMMANDs

SEND\_COMMANDs are sent to Port 1 on the HDMI UTPro.

**Note:** All text is based on a Unicode index.

HDMI UTPro SEND_COMMANDs	
<p><b>CL&lt;L#&gt;I&lt;I#&gt;O&lt;O#&gt;</b></p> <p>Connect inputs to outputs with specified level (for virtual matrices).</p>	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;,"'CL&lt;L#&gt;I&lt;I#&gt;O&lt;O#&gt;'"</pre> <p>Variables:</p> <ul style="list-style-type: none"> <li>• <b>L#</b> = level number (virtual matrix number) either <b>0</b> or <b>1</b> (both switch video and embedded audio)</li> <li>• <b>I#</b> = input number 1-8 = Inputs 1-8 - a value of <b>0</b> means no input (disconnect)</li> <li>• <b>O#</b> = output port number: 1-8 = Outputs 1-8 - a value of <b>0</b> or <b>ALL</b> means all outputs</li> </ul> <p>Example 1:</p> <pre>SEND_COMMAND dvUTPro,"'CL0I2O4'"</pre> <p>Connect input 2 to output 4 on level 0 (virtual matrix 0).</p> <p>Example 2:</p> <pre>SEND_COMMAND dvUTPro,"'CL0I3O2,3,4,5'"</pre> <p><b>or</b></p> <pre>SEND_COMMAND dvUTPro,"'CL0I3O2 3 4 5'"</pre> <p>Connect input 3 to multiple outputs on level 0 (virtual matrix 0).</p> <p><b>Note:</b> Multiple outputs in commands can be entered with either comma or space separators.</p>
<p><b>CI&lt;I#&gt;O&lt;O#&gt;</b></p> <p>Connect inputs to outputs on default level (virtual matrix).</p>	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;,"'CI&lt;I#&gt;O&lt;O#&gt;'"</pre> <p>Variables:</p> <ul style="list-style-type: none"> <li>• <b>I#</b> = input number 1-8 = Inputs 1-8 - a value of <b>0</b> means no input (disconnect)</li> <li>• <b>O#</b> = output port number: 1-8 = Outputs 1-8 - a value of <b>0</b> or <b>ALL</b> means all outputs</li> </ul> <p>Example 1:</p> <pre>SEND_COMMAND dvUTPro,"'CI2O4'"</pre> <p>Connect input 2 to output 4.</p> <p>Example 2:</p> <pre>SEND_COMMAND dvUTPro,"'CI3O0'"</pre> <p>Connect input 3 to all outputs.</p> <p>Example 3:</p> <pre>SEND_COMMAND dvUTPro,"'C0O0'"</pre> <p>Disconnect all outputs from inputs.</p> <p>Example 4:</p> <pre>SEND_COMMAND dvUTPro,"'CI2O1,3,6,7'"</pre> <p><b>or</b></p> <pre>SEND_COMMAND dvUTPro,"'CI2O1 3 6 7'"</pre> <p>Connect one input with multiple outputs.</p> <p><b>Note:</b> Multiple outputs in commands can be entered with either comma or space separators.</p>

HDMI UTPro SEND_COMMANDs (continued)	
<b>?CO&lt;O#&gt;</b> Returns connection status for the HDMI UTPro.	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;, "'?CO&lt;O#&gt;'"</pre> <p>Variables:</p> <ul style="list-style-type: none"> <li><b>O#</b> = output port number: 1-8 = Outputs 1-8 - a value of <b>0</b> or <b>ALL</b> means all outputs</li> </ul> <p>Example 1:</p> <pre>SEND_COMMAND dvUTPro, "'?C'"</pre> <p>Returns which inputs are connected for all outputs.</p> <p>Example 2:</p> <pre>SEND_COMMAND dvUTPro, "'?C1'"</pre> <p>Returns which input is connected to output 1.</p> <p>Return string is of the form:</p> <pre>CO#-II#</pre> <p>Where O# is the queried output port number, and I# is the connected input number (zero if disconnected), for example: C4-I2 Would show that output 4 was connected to input 2.</p>
<b>?FWVERSIOND&lt;D#&gt;</b> Returns the firmware version of various HDMI UTPro components.	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;, "'?FWVERSIOND&lt;D#&gt;'"</pre> <p>Variables:</p> <ul style="list-style-type: none"> <li><b>D#</b> = hub component description <b>HUB</b> <b>MAIN</b></li> </ul> <p>The return value is "FWVERSION-&lt;version&gt;" - if the D and component description are omitted then the command will return the version number of the HDMI UTPro.</p>
<b>INSTAGATECLEAR</b> Clears persistence of the Sink Key cache on the HDMI UTPro.	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;, "'INSTAGATECLEAR'"</pre> <p>Example:</p> <pre>SEND_COMMAND dvUTPro, "'INSTAGATECLEAR'"</pre> <p>Clears persistence of Sink Key cache on HDMI UTPro.</p>
<b>INSTAGATEPERSIST</b> Stores (persists) the current Sink Key cache on the HDMI UTPro.	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;, "'INSTAGATEPERSIST'"</pre> <p>Example:</p> <pre>SEND_COMMAND dvUTPro, "'INSTAGATEPERSIST'"</pre> <p>Stores the current Sink Key cache on HDMI UTPro.</p>
<b>RESET</b> Performs a soft boot on the HDMI UTPro.	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;, "'RESET'"</pre> <p>Example:</p> <pre>SEND_COMMAND dvUTPro, "'RESET'"</pre> <p>Reboots the HDMI UTPro.</p>

## SERIAL SEND\_COMMANDs

SERIAL (RS-232) SEND\_COMMANDs are sent to Port 2 on the HDMI UTPro.

HDMI UTPro SERIAL SEND_COMMANDs	
<b>GET BAUD</b> Get the RX serial port's current communication parameters.	The port sends the parameters to the device that requested the information. Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'GET BAUD' "</pre> Example: <pre>SEND_COMMAND dvUTProRS232,"'GET BAUD' "</pre> The port responds with: <pre>&lt;port #&gt;,&lt;baud&gt;,&lt;parity&gt;,&lt;data&gt;,&lt;stop&gt;</pre> Example: <pre>PORT 2,38400,N,8,1</pre>
<b>SET BAUD</b> Set the serial communication parameters.*	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'SET BAUD &lt;baud&gt;,&lt;parity&gt;,&lt;data&gt;,&lt;stop&gt;' "</pre> Variables: <ul style="list-style-type: none"> <li>• baud = baud rates are: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 (default 9600).</li> <li>• parity = N (none), O (odd), E (even)</li> <li>• data = 8 data bits</li> <li>• stop = 1 and 2 stop bits</li> </ul> Example: <pre>SEND_COMMAND dvUTPro RS232,"'SET BAUD 19200,N,8,1' "</pre> Temporarily sets the HDMI UTPro serial port's communication parameters to 19200 baud, no parity, 8 data bits, 1 stop bit.
<b>TSET BAUD</b> Set the serial communication parameters.*	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'TSET BAUD &lt;baud&gt;,&lt;parity&gt;,&lt;data&gt;,&lt;stop&gt;' "</pre> Variables: <ul style="list-style-type: none"> <li>• baud = baud rates are: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 (default 9600).</li> <li>• parity = N (none), O (odd), E (even)</li> <li>• data = 8 data bits</li> <li>• stop = 1 and 2 stop bits</li> </ul> Example: <pre>SEND_COMMAND dvUTPro RS232,"'TSET BAUD 19200,N,8,1' "</pre> Temporarily sets the HDMI UTPro serial port's communication parameters to 19200 baud, no parity, 8 data bits, 1 stop bit.

\* Both commands for setting the baud rate are accepted by the HDMI UTPro and work the same way. When the system is rebooted or repowered, the serial ports default to 9600, N, 8, 1.





# HDMI UTPro Firmware Upgrades

## Overview

The NetLinX Studio software application (available for free download from **www.amx.com**) provides the ability to transfer KIT firmware files to a NetLinX device such as the HDMI UTPro.

### To prepare for a firmware upgrade:

1. Verify that the latest version of NetLinX Studio is on your PC. Use the Web Update option in NetLinX Studio's Help menu to obtain the latest version.  
**Or**  
Go to **www.amx.com** and login as a Dealer to download the latest NetLinX Studio version.
2. Insert one end of the RJ-45 cable into the LAN 10/100 port on the HDMI UTPro enclosure.
3. Connect the other end of the RJ-45 cable to a network with a DHCP server (the NetLinX Master must be on the same network).
4. Verify that the NetLinX Master is powered on.
5. Launch NetLinX Studio and open the Online Tree.
  - The Online Tree (Online Tree tab of the Workspace Window) displays information about each online device, including the current firmware version.
6. Determine the Device Number assigned to the target HDMI UTPro.
  - By default, the Device Number assigned to the HDMI UTPro in NetLinX Studio is **05500**.
  - The Device Number can be viewed/edited in the HDMI UTPro *Configuration Manager - Device Configuration* page (see the "Device Configuration" section on page 74 for details).
7. Before attempting to upgrade the firmware, you must have the appropriate KIT file for your HDMI UTPro. Go to **www.amx.com** (on the product page in the online catalog) and download the latest firmware file for the HDMI UTPro.

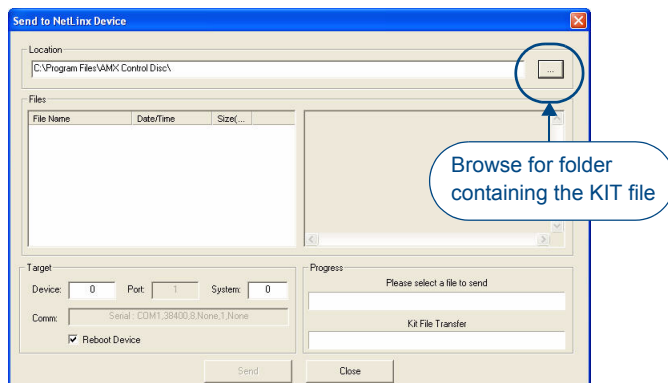
## Sending a Firmware (\*.KIT) File To the HDMI UTPro

Use the Firmware Transfers options in the Tools menu to update the firmware in the HDMI UTPro. NetLinX Devices such as the HDMI UTPro use KIT files for firmware upgrades.

**Note:** A KIT file (\*.KIT) is a package of several files, all of which are required to upgrade the firmware and are available online at **www.amx.com**. Firmware download links are provided in the relevant product page. The firmware for each RX is upgraded at the same time as the HDMI UTPro.

### To send a firmware (\*.KIT) file to the HDMI UTPro:

1. Choose **Tools > Firmware Transfers > Send to NetLinX Device** to open the Send to NetLinX Device dialog (FIG. 58).



**FIG. 58** Send To NetLinX Device dialog (NetLinX Studio)

- Click the Browse (...) button to navigate to the target directory in the Browse For Folder dialog (FIG. 59).

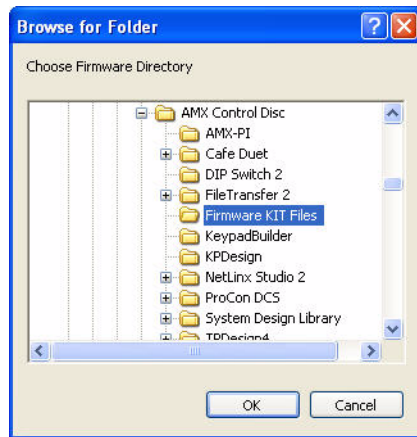


FIG. 59 Browse For Folder dialog (NetLinx Studio)

The Send to NetLinx Device dialog opens

- The selected directory path is displayed in the Location field.
- Assuming that the specified target directory contains one or more KIT files, the KIT files in the selected directory are displayed in the Files list box, with the file's last modified date and time (FIG. 60).

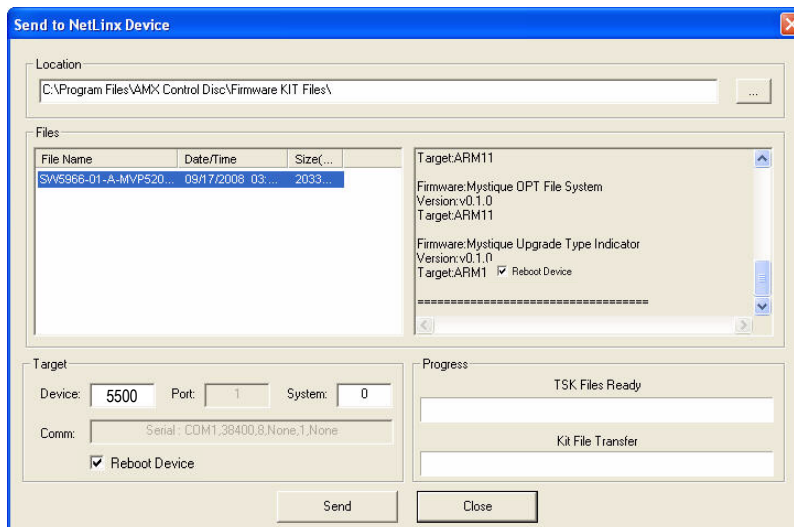


FIG. 60 Send To NetLinx Device dialog (NetLinx Studio)

- Select the appropriate \*.KIT file from the Files list.
- Enter the Device and System ID numbers for the HDMI-UTPRO-0808 in the Device and System text boxes.
  - By default, the Device Number assigned to the HDMI-UTPRO-0808 is **05500**.
  - If the device's assigned ID has been changed, use the Online Tree to determine the new ID.
- Review the File, Connection, Address, and Target Device information before you send the KIT file.
- Important** – Be sure to select the Reboot Device check box before carrying out the firmware transfer, as selecting and choosing fields within the dialog box can clear the check box. Selecting the check box ensures that the HDMI UTPro and the RXs reboot when the upgrade is complete.

7. Click the Send button. A status bar is provided under Progress in the Send to NetLinx Device dialog.
  - NetLinx Studio transfers the files to the HDMI UTPro and its Receivers.
  - The HDMI UTPro and its Receivers go through a selective upgrade process. Depending on the number of individual code components needing upgrading, the amount of time will vary. For additional information, see the *Release Notes*.



**Caution:** *If for any reason your KIT file transfer should fail, continue to retry the transfer until you are successful. Do not reboot the HDMI UTPro or change connections until the transfer is complete. Failure to complete this operation successfully may require a factory repair of the HDMI UTPro.*

**Note:** *For additional information on using NetLinx Studio, refer to the “Programming Guide – NetLinx Integrated Controllers” (available at [www.amx.com](http://www.amx.com)).*



# HDMI-UTPRO-RX NetLinx Programming

## Overview

The HDMI-UTPRO-RX Receiver recognizes a select number of NetLinx CHANNELs and SEND\_COMMANDs.

NetLinx programming is supported only if the HDMI-UTPRO-RX is connected to the HDMI UTPro (a native NetLinx device).

- The main Device SEND\_COMMANDs are described on page 96.
- IR SEND\_COMMANDs are described on page 97.
- SERIAL SEND\_COMMANDs are described on page 100.

## Device Numbering

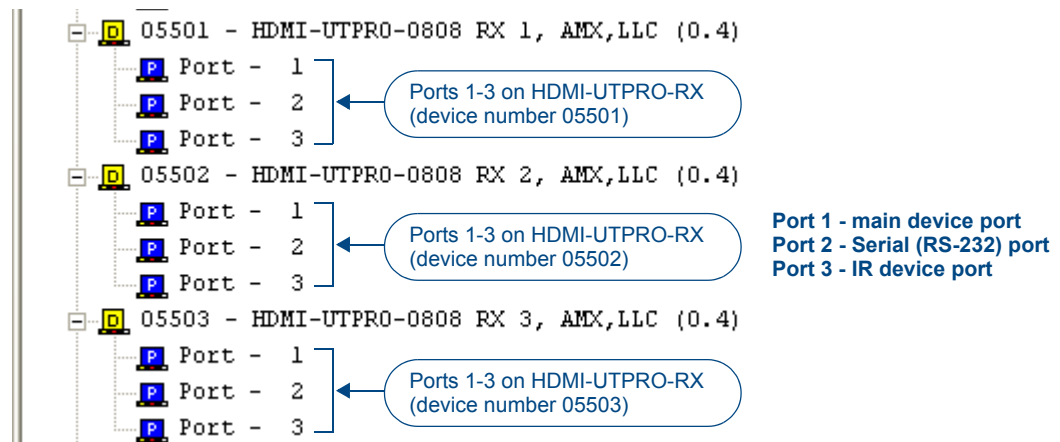
In NetLinx Studio's Online Tree, the HDMI UTPro is listed as a device with a single port, and each HDMI-UTPRO-RX Receiver connected to the HDMI UTPro is listed as a separate device immediately following the HDMI UTPro (the default device number for the HDMI UTPro is **05500**; refer to the *Device Numbering* section on page 85 for details).

**Note:** Only RX units that are physically connected to the HDMI UTPro will be represented in the Online Tree.

The device number for each HDMI-UTPRO-RX currently connected to the HDMI UTPro is automatically designated a device number, based on the device number of the HDMI UTPro to which it is connected and on the number of the UTP OUTPUT port (1-8) on the HDMI UTPro to which it is physically connected.

Therefore, it is important to avoid assigning device numbers that will conflict with this auto-numbering scheme. Reserve the eight device numbers following the HDMI UTPro's device number assignment for up to eight HDMI-UTPRO-RX Receivers.

In NetLinx Studio's Online Tree, each HDMI-UTPRO-RX Receiver displays three ports (FIG. 61).



**FIG. 61** NetLinx Studio Online Tree - Ports 1-3 on first three connected HDMI-UTPRO-RX Receivers

The three ports relate directly to the three types of NetLinx commands recognized by the HDMI-UTPRO-RX:

- Port 1 - SEND\_COMMANDs
- Port 2 - SERIAL (RS232) SEND\_COMMANDs
- Port 3 - IR SEND\_COMMANDs

**Note:** For additional information on using NetLinx Studio, refer to the "Programming Guide – NetLinx Integrated Controllers" (available at [www.amx.com](http://www.amx.com)).

## CHANNELs

### Channel Function

- 255 This channel *on* indicates that the RX has a valid UTP connection to the HDMI UTPro.  
If the channel is *off*, the RX is incorrectly connected.  
1-253 Key presses from selected remote control.

## SEND\_COMMANDs

Device SEND\_COMMANDs are sent to Port 1 on the HDMI-UTPRO-RX.

**Note:** All text is based on a Unicode index.

HDMI-UTPRO-RX SEND_COMMANDs	
<b>?FWVERSION</b> Returns the firmware version the RX.	Syntax: SEND_COMMAND <DEV>, "'?FWVERSION'" Example: SEND_COMMAND dvRX, "'?FWVERSION'" The return value is "FWVERSION-<version>"
<b>RP&lt;P#&gt;</b> Sets the protocol used by the IR remote.	The RX can support a number of different remote units which are mapped through to button pushes. Syntax: SEND_COMMAND <DEV>, "'RP<P#>'" Variables: • P#: <b>MIO, RC05</b> Example: SEND_COMMAND dvRX, "'RPMIO'" Configures the RX to use an AMX remote. The available remote units are: • MIO - AMX R1 remote • RC05 - beige 43 button remote
<b>?RP</b> Returns the protocol used by the IR remote.	The RX can support a number of different remote units which are mapped through to button pushes. Syntax: SEND_COMMAND <DEV>, "'?RP'" Example: SEND_COMMAND dvRX, "'?RP1'" The port would respond with RP-MIO or RP-RC05.

## IR SEND\_COMMANDs

IR CHANNELS and SEND\_COMMANDs are sent to Port 3 on the HDMI-UTPRO-RX.

### IR CHANNELs

#### Channel Function

1-255      Generate the IR or serial command assigned to that channel.

### IR SEND\_COMMANDs

HDMI-UTPRO-RX IR SEND_COMMANDs	
<b>CAROFF</b> Disable the IR carrier signal until a 'CARON' command is received.	Syntax: <code>SEND_COMMAND &lt;DEV&gt;, "'CAROFF'"</code> Example: <code>SEND_COMMAND dvRXIR, "'CAROFF'"</code> Stops transmitting IR carrier signals to the IR port.
<b>CARON</b> Enable the IR carrier signals (default).	Syntax: <code>SEND_COMMAND &lt;DEV&gt;, "'CARON'"</code> Example: <code>SEND_COMMAND dvRXIR, "'CARON'"</code> Starts transmitting IR carrier signals to the IR port.
<b>CH</b> Send IR pulses for the selected channel.	<ul style="list-style-type: none"> <li>• All channels below 100 are transmitted as two digits.</li> <li>• If the IR code for ENTER (function #21) is loaded, an Enter will follow the number.</li> <li>• If the channel is greater than or equal to (<math>\geq</math>) 100, then IR function 127 or 20 (whichever exists) is generated for the one hundred digit.</li> <li>• Uses 'CTON' and 'CTOF' times for pulse times.</li> </ul> Syntax: <code>SEND_COMMAND &lt;DEV&gt;, "'CH', &lt;channel number&gt;"</code> Variable: <ul style="list-style-type: none"> <li>• channel number = 0 - 199 channels</li> </ul> Example: <code>SEND_COMMAND dvRXIR, "'CH', 18"</code> The IR port on the HDMI-UTPRO-RX performs the following: <ul style="list-style-type: none"> <li>• Transmits IR signals for 1 (IR code 11).</li> <li>• The transmit time is set with the CTON command.</li> <li>• Waits until the time set with the CTOF command elapses.</li> <li>• Transmits IR signals for 8 (IR code 18).</li> <li>• Waits for the time set with the CTOF command elapses.</li> </ul> If the IR code for Enter (IR code 21) is programmed, the IRS4 performs the following steps: <ul style="list-style-type: none"> <li>• Transmits IR signals for Enter (IR code 21).</li> <li>• Waits for the time set with the CTOF command elapses.</li> </ul>
<b>CP</b> Halt and Clear all active or buffered IR commands, and then send a single IR pulse.	Pulse and Wait times can be set with the 'CTON' and 'CTOF' commands. Syntax: <code>SEND_COMMAND &lt;DEV&gt;, "'CP', &lt;code&gt;"</code> Variable: <ul style="list-style-type: none"> <li>• code = IR port's channel value 0 - 252 (253 - 255 reserved).</li> </ul> Example: <code>SEND_COMMAND dvRXIR, "'CP', 2"</code> Clears the active/buffered commands and pulses IR port's channel 2.

HDMI-UTPRO-RX IR SEND_COMMANDs (continued)	
<b>CTOF</b> Set the duration of the Off time (no signal) between IR pulses for channel and IR function transmissions. Off time settings are stored in non-volatile memory.	This command sets the delay time between pulses generated by the 'CH' or 'XCH' send commands in tenths of seconds. Syntax: <pre>SEND_COMMAND &lt;DEV&gt;, "'CTOF', &lt;time&gt;"</pre> Variables: <ul style="list-style-type: none"> <li>time = 0 - 255. Given in 1/10th of a second increments. Default is 5 (0.5 seconds).</li> </ul> Example: <pre>SEND_COMMAND dvRXIR, "'CTOF', 10"</pre> Sets the off time between each IR pulse to 1 second.
<b>CTON</b> Set the total time of IR pulses transmitted and is stored in non-volatile memory.	This command sets the pulse length for each pulse generated by the 'CH' or 'XCH' send commands in tenth of a second increments. Syntax: <pre>SEND_COMMAND &lt;DEV&gt;, "'CTON', &lt;time&gt;"</pre> Variables: <ul style="list-style-type: none"> <li>time = 0 - 255. Given in 1/10th of a second increments. Default is 5 (0.5 seconds).</li> </ul> Example: <pre>SEND_COMMAND dvRXIR, "'CTON', 20"</pre> Sets the IR pulse duration to 2 seconds.
<b>IROFF</b> Halt and Clear all active or buffered IR commands being output on the designated port.	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;, "'IROFF'"</pre> Example: <pre>SEND_COMMAND dvRXIR, "'IROFF'"</pre> Immediately halts and clears all IR output signals on the IR port.
<b>SP</b> Generate a single IR pulse.	You can use the 'CTON' to set pulse lengths and the 'CTOF' to set time Off between pulses. Syntax: <pre>SEND_COMMAND &lt;DEV&gt;, "'SP', &lt;code&gt;"</pre> Variables: <ul style="list-style-type: none"> <li>code = IR code value 1 - 252 (253 - 255 reserved).</li> </ul> Example: <pre>SEND_COMMAND dvRXIR, "'SP', 25"</pre> Pulses IR code 25 on IR port on RX.
<b>XCH</b> Transmit the selected channel IR codes in the format/pattern set by the 'XCHM' Send Command.	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;, "'XCH &lt;channel&gt;'"</pre> Variables: <ul style="list-style-type: none"> <li>channel = 0 - 999.</li> </ul> Example: For detailed usage examples, refer to the 'XCHM' command (next in table).



HDMI-UTPRO-RX IR SEND_COMMANDs (continued)	
<b>XCHM</b> Changes the IR output pattern for the 'XCH' send command.	<p><b>Syntax:</b></p> <pre>SEND_COMMAND &lt;DEV&gt;,"'XCHM-&lt;extended channel mode&gt;'"</pre> <p><b>Variables:</b></p> <ul style="list-style-type: none"> <li>extended channel mode = 0 - 4.</li> </ul> <p><b>Example:</b></p> <pre>SEND_COMMAND dvRXIR,"'XCHM 3'"</pre> <p>Sets the IR device's extended channel command to mode 3.</p> <p><b>Mode 0 Example (default): [x][x]&lt;x&gt;&lt;enter&gt;</b></p> <pre>SEND_COMMAND dvRXIR,"'XCH 3'"</pre> <p>Transmits the IR code as 3-enter.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 34'"</pre> <p>Transmits the IR code as 3-4-enter.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 343'"</pre> <p>Transmits the IR code as 3-4-3-enter.</p> <p><b>Mode 1 Example: &lt;x&gt;&lt;x&gt;&lt;x&gt;&lt;enter&gt;</b></p> <pre>SEND_COMMAND dvRXIR,"'XCH 3'"</pre> <p>Transmits the IR code as 0-0-3-enter.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 34'"</pre> <p>Transmits the IR code as 0-3-4-enter.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 343'"</pre> <p>Transmits the IR code as 3-4-3-enter.</p> <p><b>Mode 2 Example: &lt;x&gt;&lt;x&gt;&lt;x&gt;</b></p> <pre>SEND_COMMAND dvRXIR,"'XCH 3'"</pre> <p>Transmits the IR code as 0-0-3.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 34'"</pre> <p>Transmits the IR code as 0-3-4.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 343'"</pre> <p>Transmits the IR code as 3-4-3.</p> <p><b>Mode 3 Example: [[100][100]....]&lt;x&gt;&lt;x&gt;</b></p> <pre>SEND_COMMAND dvRXIR,"'XCH 3'"</pre> <p>Transmits the IR code as 0-3.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 34'"</pre> <p>Transmits the IR code as 3-4.</p> <pre>SEND_COMMAND dvRXIR,"'XCH 343'"</pre> <p>Transmits the IR code as 100-100-100-4-3.</p> <p><b>Mode 4 Example:</b></p> <ul style="list-style-type: none"> <li>Mode 4 sends the same sequences as the 'CH' command.</li> <li>Only use Mode 4 with channels 0 - 199.</li> </ul>

## SERIAL SEND\_COMMANDs

SERIAL (RS-232) SEND\_COMMANDs are sent to Port 2 on the HDMI-UTPRO-RX .

HDMI-UTPRO-RX SERIAL SEND_COMMANDs	
<b>CHARD</b> Set the delay time between all transmitted characters to the value specified (in 100 Microsecond increments).	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'CHARD-&lt;time&gt;' "</pre> Variables: <ul style="list-style-type: none"> <li>time = 0 - 255. Measured in 100 microsecond increments.</li> </ul> Example: <pre>SEND_COMMAND dvRXRS232,"'CHARD-10' "</pre> Sets a 1 millisecond delay between all transmitted characters.
<b>CHARDM</b> Set the delay time between all transmitted characters to the value specified (in 1 Millisecond increments).	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'CHARDM-&lt;time&gt;' "</pre> Variables: <ul style="list-style-type: none"> <li>time = 0 - 255. Measured in 1 millisecond increments.</li> </ul> Example: <pre>SEND_COMMAND dvRXRS232,"'CHARDM-10' "</pre> Sets a 10-millisecond delay between all transmitted characters.
<b>GET BAUD</b> Get the RX serial port's current communication parameters.	The port sends the parameters to the device that requested the information. Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'GET BAUD' "</pre> Example: <pre>SEND_COMMAND dvRXRS232,"'GET BAUD' "</pre> The port responds with: <pre>&lt;port #&gt;,&lt;baud&gt;,&lt;parity&gt;,&lt;data&gt;,&lt;stop&gt;</pre> Example: <pre>PORT 2,38400,N,8,1</pre>
<b>RXCLR</b> Clear all characters in the receive buffer waiting to be sent to the Master.	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'RXCLR' "</pre> Example: <pre>SEND_COMMAND dvRXRS232,"'RXCLR' "</pre> Clears all characters in the RX serial port receive buffer waiting to be sent to the Master.
<b>RXOFF</b> Disable the transmission of incoming received characters to the Master (default).	Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'RXOFF' "</pre> Example: <pre>SEND_COMMAND dvRXRS232,"'RXOFF' "</pre> Stops the RX serial device from transmitting received characters to the Master.
<b>RXON</b> Start transmitting received characters to the Master.  Enables sending incoming received characters to the Master.	This command is automatically sent by the Master when a 'CREATE_BUFFER' program instruction is executed. Syntax: <pre>SEND_COMMAND &lt;DEV&gt;,"'RXON' "</pre> Example: <pre>SEND_COMMAND dvRXRS232,"'RXON' "</pre> Sets the RX serial port to transmit received characters to the Master.

HDMI-UTPRO-RX SERIAL SEND_COMMANDs (continued)	
<b>SET BAUD</b> Set the serial communication parameters.*	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;,"'SET BAUD &lt;baud&gt;,&lt;parity&gt;,&lt;data&gt;,&lt;stop&gt;' "</pre> <p>Variables:</p> <ul style="list-style-type: none"> <li>• baud = baud rates are: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200.</li> <li>• parity = N (none), O (odd), E (even)</li> <li>• data = 8 data bits</li> <li>• stop = 1 and 2 stop bits</li> </ul> <p>Example:</p> <pre>SEND_COMMAND dvRXRS232,"'SET BAUD 19200,N,8,1' "</pre> <p>Temporarily sets the RX serial port's communication parameters to 19200 baud, no parity, 8 data bits, 1 stop bit.</p>
<b>TSET BAUD</b> Set the serial communication parameters.*	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;,"'TSET BAUD &lt;baud&gt;,&lt;parity&gt;,&lt;data&gt;,&lt;stop&gt;' "</pre> <p>Variables:</p> <ul style="list-style-type: none"> <li>• baud = baud rates are: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200.</li> <li>• parity = N (none), O (odd), E (even)</li> <li>• data = 8 data bits</li> <li>• stop = 1 and 2 stop bits</li> </ul> <p>Example:</p> <pre>SEND_COMMAND dvRXRS232,"'TSET BAUD 19200,N,8,1' "</pre> <p>Temporarily sets the RX serial port's communication parameters to 19200 baud, no parity, 8 data bits, 1 stop bit.</p>
<b>TXCLR</b> Stop and clear all characters waiting in the transmit out buffer and stops transmission.	<p>Syntax:</p> <pre>SEND_COMMAND &lt;DEV&gt;,"'TXCLR' "</pre> <p>Example:</p> <pre>SEND_COMMAND dxRXRS232,"'TXCLR' "</pre> <p>Clears and stops all characters waiting in the RX serial port transmit buffer.</p>

\* Both commands for setting the baud rate are accepted by the Receivers and work the same way. When the system is rebooted or repowered, the serial ports default to 9600, N, 8, 1.



# HDMI-UTPRO-RX IRL File Transfers

## Overview

The NetLinx Studio software application (available for free download from [www.amx.com](http://www.amx.com)) provides the ability to transfer IR Library files to a NetLinx device such as the HDMI-UTPRO-RX Receiver. In the case of HDMI-UTPRO-RX Receivers, IRL files are transferred to the RXs, via the HDMI UTPro. FIG. 62 shows how the RXs connected to the first 3 Outputs on the HDMI UTPro appear in NetLinx Studio's Online Tree (for complete details, page 95).

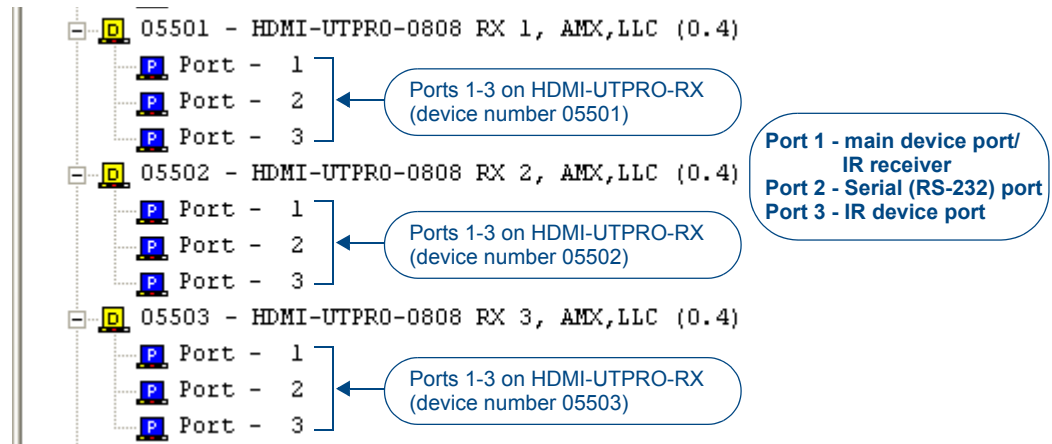


FIG. 62 NetLinx Studio Online Tree - indicating connected HDMI-UTPRO-RX Receivers and their ports

## Preparing for IRL File Transfers

### To prepare for IRL file transfers:

1. Verify you have the latest version of NetLinx Studio on your PC. Use the Web Update option in NetLinx Studio's Help menu to obtain the latest version. Alternatively, go to [www.amx.com](http://www.amx.com) and login as a Dealer to download the latest version.
2. Download the applicable IRL file from [www.amx.com](http://www.amx.com) (Partners / Search Devices) to your PC.
3. Verify that an Ethernet/ICSNet cable is connected from the NetLinx Master to the network and that the HDMI UTPro is connected to the network via the LAN 10/100 port.
4. Verify that the target Receiver is connected to the HDMI UTPro.
5. Verify that the NetLinx Master is powered On.
6. Launch NetLinx Studio and open the Online Tree.\*
7. Determine the Device Number assigned to the target Receiver. For details, see the "Device Numbering" section on page 95.

\* The Online Tree (Online Tree tab of the Workspace Window) displays information about each online device.

Use the *File Transfer* tool in NetLinx Studio to map IRL files to one or more HDMI-UTPRO-RX Receivers connected to an HDMI UTPro.

## Transferring IRL Files

To send an IR Library (\*.IRL) file to the HDMI-UTPRO-RX:

1. Choose **Tools > File Transfer** to open the File Transfer dialog (FIG. 63).

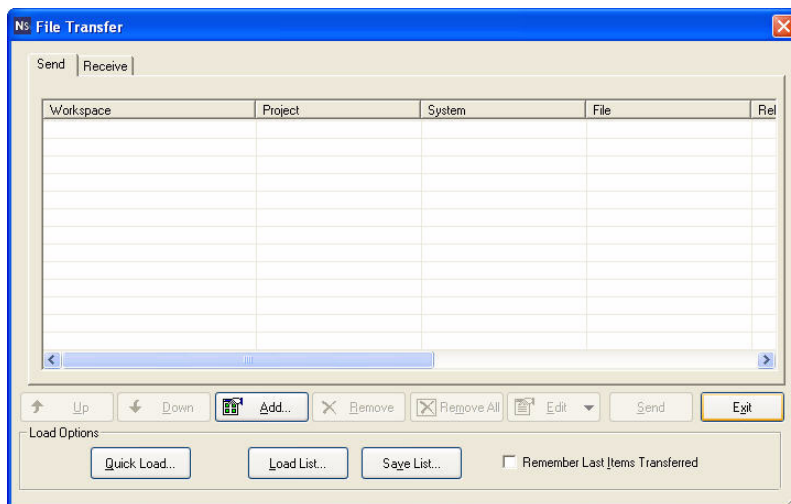


FIG. 63 File Transfer dialog (NetLinx Studio)

2. Click the Add command button to open the Select Files for File Transfer dialog, and open the Other tab (FIG. 64).  
Use the Other tab if the file(s) you want to transfer are not included in the open Workspace. This tab consists of a display of the different types of files that can be transferred to the Master or System devices on the bus.

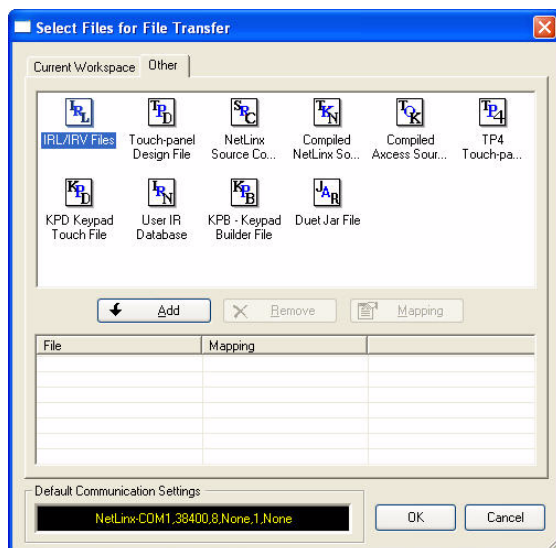
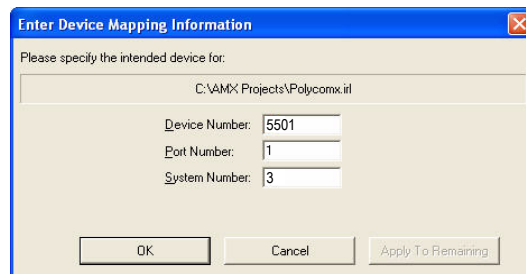


FIG. 64 Select Files for File Transfer dialog (NetLinx Studio)

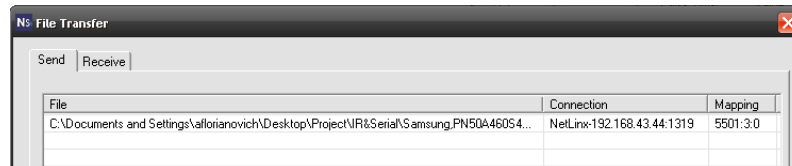
3. Select the type of file (in this case, IRL/IRV Files) that you want to add to the Transfer List.
4. Click the Add button. The Open dialog appears with the files type selection already set to IR Files (\*.irl, \*.irv).
5. Locate and select the IRL file that you want to add.

6. Click Open.
  - a. If the selected file has not been mapped to a device, the Enter Device Mapping Information dialog is displayed (FIG. 65).



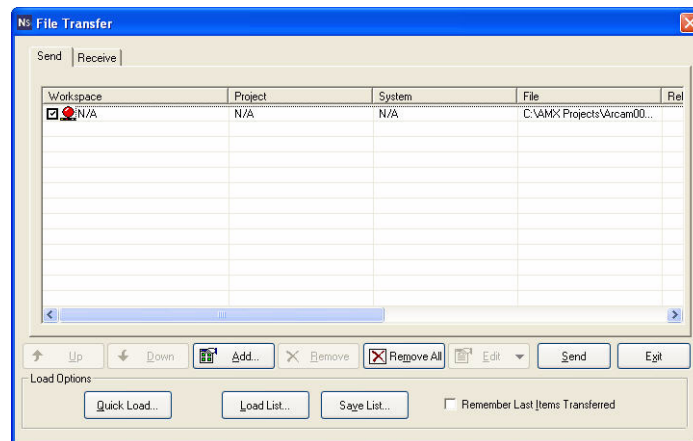
**FIG. 65** Enter Device Mapping Information dialog (NetLinx Studio)

- b. Enter the device mapping information, and click OK to return to the Select Files For File Transfer dialog.
    - IRL Files are sent to Port 3 (IR Device Port) on the HDMI-UTPRO-RX.
    - Refer to the “Device Numbering” section on page 95 for information on device numbering for the HDMI-UTPRO-RX.
    - Use the Online Tree to determine the device’s assigned ID, if it has been changed.
7. At this point, the selected IRL File and mapping information is indicated in the File list (FIG. 66):



**FIG. 66** Select Files for File Transfer dialog - Files To Send queue (NetLinx Studio)

8. Click OK to close the Select Files for File Transfer dialog, and return to the File Transfer dialog. The IR file should now appear in the files queue (FIG. 67).



**FIG. 67** File Transfer dialog (NetLinx Studio)

9. Click Send to transfer the file.

### Additional Documentation

For additional information on using NetLinx Studio, refer to the *Programming Guide – NetLinx Integrated Controllers* (available at [www.amx.com](http://www.amx.com)).





# Appendix A – EDID Programmer

## Applicability

EDID Programmer software is provided for re-programming the EDID EEPROM chips on the HDMI UTPro if necessary. This software is available on the *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com).

## EDID Overview

EDID (Extended Display Identification Data) is a data structure established by the Video Electronics Standards Association (VESA) to enable plug-and-play support by enabling easy configuration of a computer's graphics subsystem based on the capabilities of the attached display device.

EDID information includes items such as the following:

- Manufacturer's name
- Product type
- Supported video resolutions and refresh rates
- Color space and filter chromaticity
- Detailed timing

When a computer is directly connected to a display device, it can use the display device's EDID information to determine an initial compatible video signal to send. With the computer's display controls, the user can modify this selection to another compatible signal based on the provided EDID information.

With High-Definition Multimedia Interface (HDMI) (which requires EDID on the display devices) using EDID information has extended beyond computers to other source devices, such as DVD players. As long as the source device sends a compatible signal, the plug-and-play feature will work.

## Matrix Switchers and EDID

Matrix switchers, such as the HDMI UTPro, provide the ability to route one source signal to many potentially different types of display devices. As long as the source signal being routed is supported by all of the display devices, the result would be a good image on each display. If the source signal being routed is not supported by a display device, the result would be either a badly distorted image or no image at all.

To address these issues, the HDMI UTPro comes with one EDID EEPROM chip per input connector, which has been pre-loaded with an AMX AutoPatch EDID set. This EDID set consists of some of the most common EDID settings in use today, including VESA Established Timings encompassing 8 resolutions at a variety of refresh rates and 8 additional Standard Timings encompassing 8 resolutions and refresh rate combinations. In many cases, the matrix switcher can be used straight out of the box with no adjustments (see "Determining the Need for EDID Programming" on page 108).

The EDID Programmer software has been provided for cases where additional in-field programming of the EDID chips is needed. The EDID Programmer can be used for the following:

- Reading and saving EDID data in Hexadecimal from a device
- Writing EDID data to the HDMI UTPro input connector's associated EDID EEPROM

**Note:** Any analysis or editing of the EDID data necessary to support the equipment specific to your installation will need to be done separately prior to using the EDID Programmer. A variety of freeware tools can be found on the web to help with these tasks.

Keep in mind that the EDID information for some equipment may not be compatible with the remaining equipment even with programming. In those cases, the signals will have limited routing options.

**Tip:** *If the signal from some of the equipment can only be routed to part of the destinations due to incompatible EDIDs, control for the system can be simplified by creating a separate virtual matrix (level) for the inputs and outputs involved.*

The remaining sections in this appendix provide information on:

- Determining the need for EDID programming
- Installing the EDID Programmer
- Reading and saving EDID data from a destination device
- Writing EDID data to an HDMI input connector

## Determining the Need for EDID Programming

Ideally the EDID analysis will have been completed during installation specification. If this was not possible but all of the system's devices are now available, the most effective way to proceed is to test if the HDMI signal from each of the source devices can be routed through the HDMI UTPro to each of the destination devices. If they can, then EDID programming is *not* necessary.

Steps are provided for using NetLinx SEND\_COMMANDs or BCS commands to execute switches from each source device to each of the destination devices. If you are using a different method of control, adjust accordingly.

**Important:** *Do not route a source to all destination devices at the same time, unless you know that the source will support all of the downstream sinks (see page 61). Otherwise, if the source does not support all downstream sinks, the result will be that all of the destinations do not display an image.*

### SEND\_COMMANDs

**To determine if EDID programming of HDMI matrix switching inputs is necessary:**

1. Enter `SEND_COMMAND dvUTPro, "'CL0I101'"` (switches Input 1 to Output 1).
2. Check the destination display to verify that the picture is present, making note if it is not.
3. Enter `SEND_COMMAND dvUTPro, "'INSTAGATECLEAR'"` (clears the cache and disconnects all currently routed signals).
4. Repeat Steps 1 through 3 to switch Input 1 to each of the remaining outputs ("`'CL0I102'"`", "`'CL0I103'"`", etc.).
5. Repeat Steps 1 through 4 to switch each of the remaining inputs to each of the remaining outputs.
6. Enter `SEND_COMMAND dvUTPro, "'INSTAGATEPERSIST'"` (persists the empty cache).

**Important:** *If any destinations do not display a picture or the image is inaccurate (distorted, washed out pink or green, or flickers) or displays a format incompatibility message, analysis or editing of their EDID data may be necessary prior to using the EDID Programmer. A variety of freeware tools can be found on the web to help with these tasks.*

Once any necessary EDID programming is completed, we recommend priming the system for InstaGate® Technology, which will significantly reduce the HDCP latency and interruptions on all displays in the system (see page 67).

## BCS Commands

### To determine if EDID programming of HDMI matrix switching inputs is necessary:

1. Enter `CL0I101T` (switches Input 1 to Output 1).
2. Check the destination display to verify that the picture is present, making note if it is not.
3. Enter `@et` (clears the cache and disconnects all currently routed signals). The response to this command is `@eV`.
4. Repeat Steps 1 through 3 to switch Input 1 to each of the remaining outputs (`CL0I102T`, `CL0I103T`, etc.).
5. Repeat Steps 1 through 4 to switch each of the remaining inputs to each of the remaining outputs.
6. Enter `~app!` (persists the empty cache).

**Important:** *If any destinations do not display a picture or the image is inaccurate (distorted, washed out pink or green, or flickers) or displays a format incompatibility message, analysis or editing of their EDID data may be necessary prior to using the EDID Programmer. A variety of freeware tools can be found on the web to help with these tasks.*

Once any necessary EDID programming is completed, we recommend that you prime the system for InstaGate® Technology, which will significantly reduce the HDCP latency and interruptions on all displays in the system (see page 67).

**Tip:** *If you are experiencing audio problems, it may be because you are trying to pass Dolby or DTS or high PCM frequency rates and the destination device does not support them. If you are experiencing video problems, it may be because you are trying to pass a video format that the destination device does not support. In either of these cases, reprogramming the EDID may help resolve the problem.*

### If EDID programming is necessary, you have two options:

- Install the EDID Programmer. Read the EDID from the destination device and write it to the HDMI input connector.
- Install the EDID Programmer. Check the “EDID Library” file on the *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com) (search for EDID Library) to determine if one of the custom EDID files meets the needs of the equipment. (The custom EDID files are variants of base EDIDs.) Write the custom EDID file to the HDMI input connector.

## Installing the EDID Programmer

### PC System Requirements for EDID Programmer v1.2.0

- ☐ Windows XP Professional®
- ☐ Minimum Hardware: 166 MHz, 128 MB RAM, 20 MB of free disk space\*, 800x600 display, serial port, video card with dual outputs\*\*
- ☐ Recommended Hardware: 2.0 GHz, 512 MB RAM\*

\* The installation process requires 20 MB of disk space for the EDID Programmer installer. Once installed, the EDID Programmer requires 5 MB of disk space.

\*\* We strongly urge the user *not to use video cards with DMS-59 connectors*. Video cards with DMS-59 connectors have been shown to fail consistently and, in the worst case, *can corrupt an EDID data file*. A PC with an HDMI, DVI, or VGA output connector is a good solution. Cards with 2 HDMI connectors, 2 DVI connectors, 2 VGA connectors, or cards with a combination of any two of the three (HDMI, DVI, and VGA) are also acceptable.

### To install EDID Programmer software:

1. Locate and open the installer <EDIDProgrammer\_1.2.exe> on the *AMX AutoPatch CD* or at **www.amx.com**.
2. Follow the directions in the wizard.

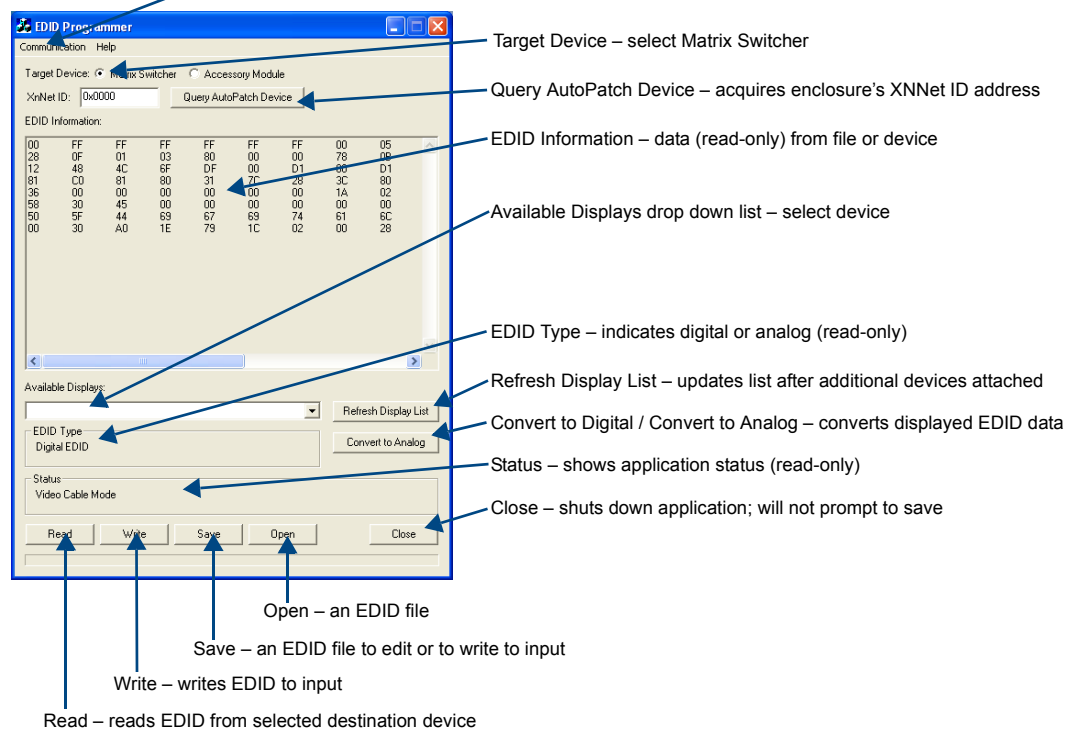
## Reading and Saving EDID Data from a Destination Device

**Tip:** The **Save** button in the *EDID Programmer* can be used to save the *EDID* information as an *.edid* file, which can be opened as a text file (click the **Open** button) and edited or opened and written to an input (click the **Write** button).

### To read and save *EDID* data from a destination device:

1. On the PC, open the *EDID Programmer*.

Communication menu – use to select PC serial port or change baud rate



2. Connect an HDMI cable to the PC using the PC's spare monitor port (if your PC has a DVI port, use a DVI-to-HDMI cable adapter).
3. Connect the open end of the HDMI cable to the destination device (typically a monitor) from which the *EDID* information needs to be read.
4. Click the Refresh Display List button to update the Available Displays drop down list.
5. From the Available Displays drop down list, select the destination device from which you need to read the *EDID*.
6. Click the Read button to read the *EDID* information. The results display in the read-only area.
7. Click the Save button (select location, enter file name, and click Save).  
Leave the *EDID Programmer* open for instructions on writing the *EDID* to the HDMI input (see the next page).
8. Disconnect the HDMI cable from the PC and from the destination device.

### Using Cable Adapters

Cable adapters may be needed depending on the type of ports available on the PC.

- If the PC has a DVI port – from the DVI port, attach a DVI cable; attach a DVI-to-HDMI cable adapter; attach an HDMI cable; attach to the destination device. An HDMI-to-DVI cable adapter can also be used if the available PC and destination device ports are reversed.
- If the PC has an HD-15 port – from the HD-15 port, attach an HD-15 to DVI cable; attach a DVI to DVI barrel; attach a DVI to HDMI cable; attach to the destination device.

**Note:** The EDID information is passed but not video signals.

## Writing EDID Data to HDMI Matrix Switching Input Connector

To write EDID data to the EDID chip for an HDMI matrix switching input connector:

1. Attach a null modem serial cable without hardware flow control to the Control port (DB-9) on the HDMI UTPro. Use a serial cable that matches the pin diagram in FIG. 68 for RS-232. The Control port uses pins 2, 3, and 5 only.

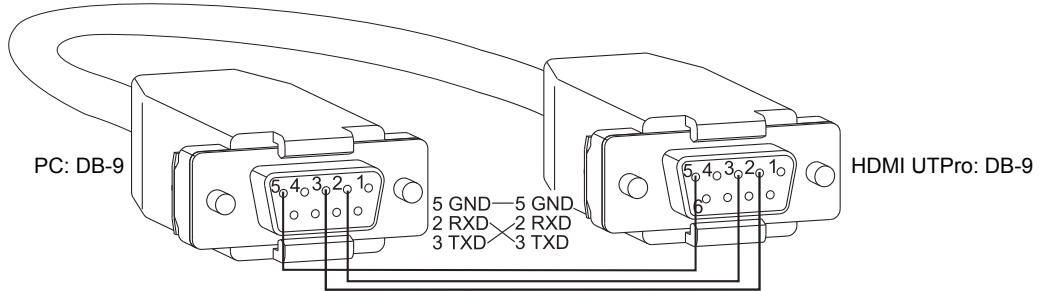


FIG. 68 RS-232 pinout

2. Attach the open end of the serial cable to the PC that the EDID Programmer will be opened on.
3. If necessary – From the Communication menu, select Change Settings to change the baud rate for the PC's serial port, which *must* match the baud rate for the HDMI UTPro. The recommended (default) settings for serial communication with an HDMI UTPro are in the table to the right.
4. Apply power to the enclosure.
5. On the PC, open the EDID Programmer.
6. For the Target Device, select the Matrix Switcher option.
7. Click the Query AutoPatch Device button to obtain the XNNet address from the enclosure.
8. Attach an HDMI cable to the PC using the PC's spare monitor port (if your PC has a DVI or HD-15 port, see "Using Cable Adapters" above).
9. Attach the open end of the HDMI cable to the HDMI matrix switching input connector that requires programming.
10. Save the connector's EDID default as a backup (assumes the connector has factory default EDID programming).
  - Click the Refresh Display List button.
  - Select the device.
  - Click the Read button.
  - Click the Save button (select location, enter file name, and click Save).
11. Click the Open button to select the .edid file to be written to the HDMI input connector.

HDMI UTPro Serial Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

12. Click the Write button to write the EDID information to the HDMI input connector.
13. If applicable – Repeat any of the steps necessary for any of the other HDMI input connectors.
14. Disconnect the HDMI cable from the PC and from the HDMI input connector.
15. Disconnect the serial cable from the PC and from the HDMI UTPro enclosure.

## Custom HDMI EDID Files for Handling Audio Concerns

Since an HDMI UTPro will be installed between multiple source and sink devices which often support different video and audio formats, it is possible that neither the video nor the audio routed by the HDMI UTPro can be displayed on one or more of the destination devices. Customizing the EDID content at the HDMI UTPro's input channels is one way to be sure that the formats provided by the source are compatible with most/all of the destination devices.

The following files can be found on the *AMX AutoPatch CD* or at [www.amx.com/products/EDIDLibrary.asp](http://www.amx.com/products/EDIDLibrary.asp).

The first group of files use 1080p (VIC 16) as the preferred (native) video resolution.

File Name	EDID File Checksum	Monitor Name	Description
AMX_HDMI1_A1.edid	8D	AMX_HDMI1_A1	Default shipped EDID content on each input. Supports audio up to 192 k for L-PCM, 48 kHz Dolby (5.1), and 48 kHz DTS (5.1).
AMX_HDMI1_A1_basicAudio.edid	EE	AMX_0300_001	Supports basic audio only (L-PCM 32 k, 44.1 k, and 48 k).

The second group of files use 720p (VIC 4) as the preferred (native) video resolution.

File Name	EDID File Checksum	Monitor Name	Description
AMX_HDMI1_A1_720p.edid	A2	AMX_0301_002	Supports audio up to 192 k for L-PCM, 48 kHz Dolby (5.1), and 48 kHz DTS (5.1).
AMX_HDMI1_A1_720p_basicAudio.edid	92	AMX_0300_003	Supports basic audio only (L-PCM 32 k, 44.1 k, and 48 k).

## Troubleshooting Example

### Problem:

One example is when a source device that selects the highest supported video and audio formats is installed with a sink whose input is limited to 720p and basic audio. Using the default shipping EDID content would result in 1080p and possibly either 192 k stereo, Dolby 5.1, or DTS 5.1 audio arriving at the sink when a route was completed through the HDMI UTPro. The end result would probably be neither video nor audio.

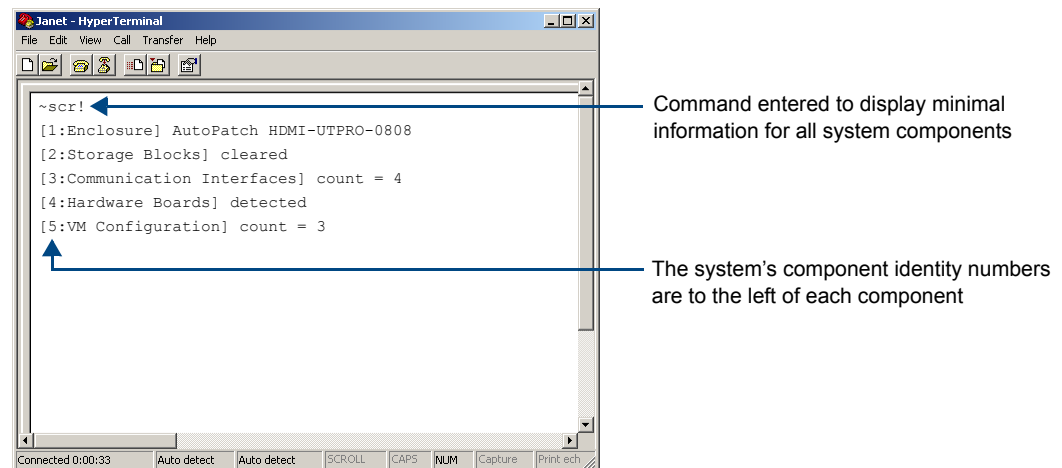
### Solution:

To fix this problem, use the EDID Programmer to reprogram the HDMI UTPro input's EDID to the content supplied in one of the files listed above. For the example given, the best choice would be the file named `AMX_HDMI1_A1_720p_basicAudio.edid`.

# Appendix B – Programmer's Interface for System Diagnostics

## System Component Information

The HDMI UTPro displays system information in its splash screen\* for diagnostic purposes. The information indicates the current status and well-being of the system components.



**FIG. 69** Example of an HDMI UTPro splash screen

The splash screen can be accessed using a terminal emulation program, such as HyperTerminal (see page 36). One of four verbosity\*\* settings is specified as a BCS command\*\*\*, which provides either a list of the five system components with minimal information (FIG. 65) or a level of detailed information on one of the five components. Only one verbosity setting and one component setting can be entered in a command. The order in which the verbosity and component settings are entered is interchangeable.

**Note:** *In a multiple-enclosure system, the splash screen displays information only for the enclosure that is connected directly to the PC.*

\* AMX reserves the right to add to the contents of the splash screen at any time, without notice.

\*\* Verbosity (i.e., wordiness) refers to the amount of information provided; the higher the verbosity setting, the more information is displayed.

\*\*\* BCS (Basic Control Structure) commands are sent as ASCII characters through the RS-232 port. For additional information on BCS commands, see the *Instruction Manual – BCS Basic Control Structure Protocol* on the *AMX AutoPatch CD* or at [www.amx.com](http://www.amx.com).

## Verbosity Settings

The verbosity (v) settings (v0, v1, v2, v3) correspond to the level of detail that will be displayed, with v0 being the lowest level of detail and v3 being the highest level.

## Component Identity Settings

Detailed information for a single system component can be specified by using its identity (i) number setting (i0 through i5) in the following table. Minimal information for all five components can be specified by using the identity number i0.

Component	Identity Number
All Components	i0
Enclosure	i1
Storage Blocks	i2
Communication Interfaces	i3
Hardware / Boards*	i4
VM Configuration	i5

\* In the case of the HDMI UTPro, "Boards" refers to the internal structure of the enclosure.

## Default Settings

- At system boot, the ~scrvi1! setting is displayed (FIG. 70 on page 115).
- If the verbosity setting is omitted, the verbosity level will be the lowest (v0).
- The component setting *must* be included; otherwise, entering any of the verbosity settings alone will result in a display equivalent to v0i0.
- If both settings are omitted during a query (~scr!), the information displayed will be at the lowest verbosity level for all components (v0i0) (FIG. 69 on page 113).

## Using BCS to Access System Diagnostic Information

Instructions are provided for accessing the lowest level of verbosity for all components and for accessing a specific level of verbosity for a specific component.

### To access the lowest level of verbosity for all components:

1. Enter ~scr! or ~scrvi0!

**Note:** Either of these commands provides a "menu" of the identity numbers and their corresponding components (FIG. 65 on page 113).

Only one verbosity setting and one component setting can be entered in a command. The order in which the verbosity and component identity settings are entered is interchangeable.

### To access a specific level of verbosity for a specific component:

1. Enter ~scr (to access the splash screen).
2. Enter the verbosity level setting v# and the component's identity setting i#. Either may be specified first.
3. Enter ! (to send the command).

### Example

~scrvi4! or ~scri4v3! (Either displays the highest level of detail for the Hardware / Boards.)

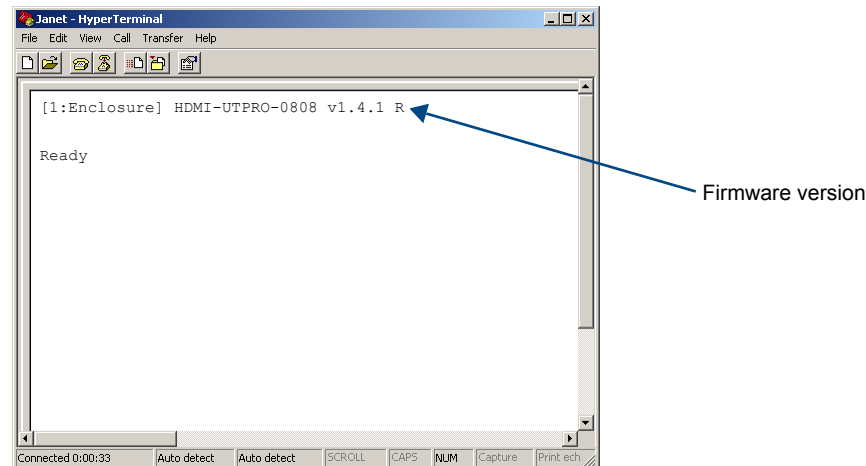


## Splash Screen Examples

**Note:** AMX reserves the right to add to the contents of the splash screen at any time, without notice.

### Power-Up Splash Screen

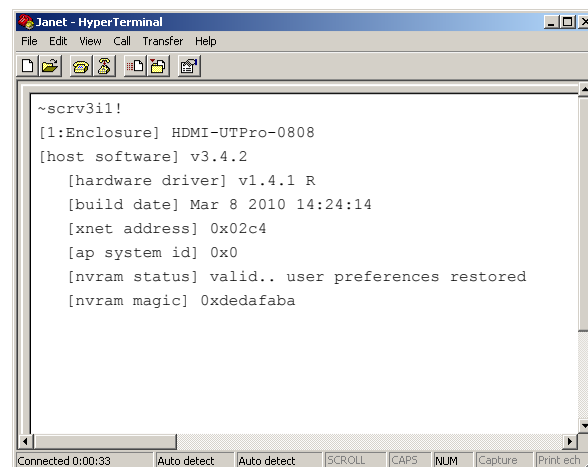
The first example is of the splash screen that displays when power is applied to the enclosure. When “Ready” appears, BCS commands can be entered for executing switches, verifying status, querying the system for diagnostic information, etc.



**FIG. 70** Power-up splash screen in HyperTerminal

### Splash Screens Displaying System Information

Following are four examples of splash screen information that could be displayed when different verbosity/component settings are specified. Depending on the amount of detail provided, you may need to scroll to see the entire display. The command in the first example can be used to check the host software (IOS) version and the hardware driver (appcode) version.



**FIG. 71** Display for v3i1 (verbosity 3, component 1)

```

Janet - HyperTerminal
File Edit View Call Transfer Help

~scrV3i3!
[3:Communication Interfaces] count = 4
  [interface 1] detected
    [type] BCS mode RS232 port, 9600 (8/1/N/E/NS)
  [interface 2] detected
    [type] Block mode FP port, 115200 (8/1/N/NE/S)
  [interface 3] detected
    [type] BCS mode RS232 port, 9600 (8/1/N/E/NS)
  [interface 4] detected
    [type] Neuron bridge undetected.

Connected 0:00:33  Auto detect  Auto detect  SCROLL  CAPS  NUM  Capture  Print ech

```

FIG. 72 Display for v3i3 (verbosity 3, component 3)

```

Janet - HyperTerminal
File Edit View Call Transfer Help

~scrV3i4!
[4:Hardware Boards] detected
  [switching drivers] count = 1
    [mtx driver 1] bcpu 8x8 driver on board 2
      [fpga version] 0xA3
      [bcpu version] v1.0.0
      [interface version] v1.0
      [bcpu state] ready
  [io boards] count = 1
    [board 1] 0000
    [board 2] 43e1
    [board 3] 0000
    [board 4] 0000
  [expansion boards] count = 0

Connected 0:00:33  Auto detect  Auto detect  SCROLL  CAPS  NUM  Capture  Print ech

```

FIG. 73 Display for v3i4 (verbosity 3, component 4)

```

Janet - HyperTerminal
File Edit View Call Transfer Help

~scrV3i5!
[5:VM Configuration] count = 2
  [vm 0] 'ALL' 8x8x1
  [vm 1] 'Video' 8x8x1
  [vm 0 master] 0x2c4 master 0 0 1 (self)
  [vm 1 master] 0x2c4 master 0 0 1 (self)

Connected 0:00:33  Auto detect  Auto detect  SCROLL  CAPS  NUM  Capture  Print ech

```

FIG. 74 Display for v3i5 (verbosity 3, component 5)

# Appendix C – Managing Configuration Files

## Applicability Notice

This appendix applies to XNConnect version 2.10.0. XNConnect's version information is located under its Help menu. Version 2.10.0 supports full Device Discovery.

This appendix covers the following general information on using XNConnect configuration software and basic modifications for customizing the configuration:

- Installing XNConnect (see page 118)
- Discovering the system (see page 119)
- Navigating the interface (see page 119)
- Customizing channel names/labels (see page 121)
- Setting the control panel password for the control panel (see page 121)
- Creating local presets (see page 122)
- Loading an .xcl configuration file (see page 124)
- Device Discovery support (see page 125)

For information on creating virtual matrices, see page 127 and the XNConnect Help file.

## Overview



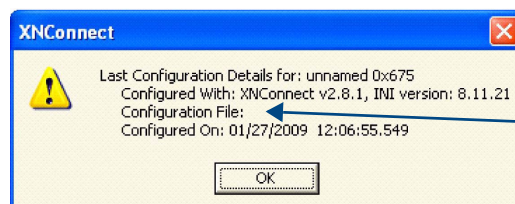
**Caution:** *Unless you need to modify your system's configuration from the original specifications, you will not need to use XNConnect. We recommend making a copy of the current file every time the file is modified.*

XNConnect can be used to modify a system's configuration information which contains routing and control information. XNConnect is provided on the *AMX AutoPatch CD* and at [www.amx.com](http://www.amx.com). Configuration file modifications include basic tasks, such as creating local presets, setting the control panel password, and customizing input and output channel names for control display (e.g., in the APWeb interface).

## Automatic Configuration

An HDMI UTPro system is automatically configured when the system generates its own configuration based on the installed hardware. The configuration of the HDMI UTPro is constructed internally with a set of 2 virtual matrices, VM 0 = all and VM 1 = video (which are identical), by the CPU upon initial boot up of the system.

When a system is automatically configured, the configuration information can be accessed for modification in only one way since an .xcl file does not exist for the system. Use XNConnect to discover the configuration information from the CPU. The discovered configuration information can then be saved as an .xcl file. After the configuration is modified in XNConnect, it is loaded back onto the CPU (replacing the automatically constructed configuration). If necessary, the automatically constructed configuration can be restored (see page 125).



When discovered, an automatically constructed configuration does not show a file name

**FIG. 75** Example of discovery information for automatically constructed configuration

## Installing and Launching XNConnect

Use XNConnect software *only* if you need to customize or change the configuration information from the original specification.

**Important:** *Even if XNConnect is already on your PC, install the newest version from [www.amx.com](http://www.amx.com). We strongly recommend uninstalling the old version of XNConnect before installing a new version.*

### System Requirements

- Windows XP Professional®
- 233 MHz processor
- Minimum of 128 MB of RAM
- 20 MB of available hard drive space
- 800x600 screen resolution (1024x768 is recommended)
- Serial port and RS-232 null modem cable

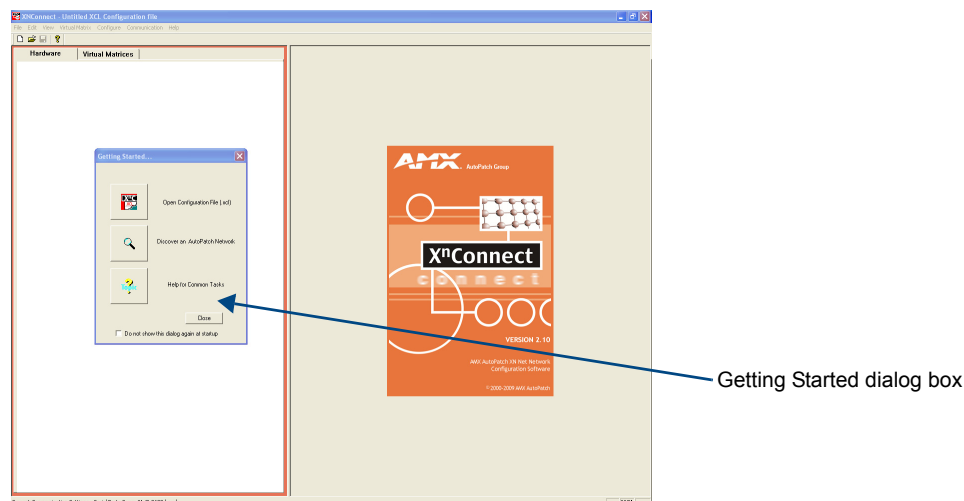
### To install XNConnect from [www.amx.com](http://www.amx.com):

1. Close all other applications currently running on your PC.
2. Go to [www.amx.com](http://www.amx.com) and login as a Dealer to download XNConnect.
3. Optional – Select the Release Notes to read about the software before installation.
4. Select Install.
5. Follow the directions in the subsequent dialog boxes.

**Note:** *If your AMX account has the required permissions, the newest version of XNConnect can be downloaded from [www.amx.com](http://www.amx.com). An AutoPatch INI Updater file can also be found on the AMX website under Tech Center \ AutoPatch Tools for updating XNConnect with information for new support devices (an account is not required).*

### To launch XNConnect:

1. From the Start menu, select Programs.
  2. Select AutoPatch Applications (or other file group you specified during the installation).
  3. Select the XNConnect folder.
  4. Select XNConnect.
- The XNConnect program opens.



## Discovering the System

The discovery process queries the attached system for configuration information and properties, including information regarding assigned signals and virtual matrix definitions. The discovery process may take several minutes to complete. We recommend disconnecting any third-party control devices from the enclosure's serial ports *before* starting the discovery process.

### To discover a system:

1. Disconnect any third-party control devices from the enclosure's serial (Control) port.
2. Connect the enclosure to your PC (see page 36).
3. (If not already open) launch XNConnect (see page 118).
4. Open the Communication menu; select Serial Port.
5. If applicable – For a serial port other than COM 1 (default), open the Communication menu again; select Change Comm Settings. Check the settings for the selected port and adjust if necessary (the default is COM 1, baud rate 9600).
6. Optional – Click the Test button to verify that communication has been established with the enclosure. Click OK.
7. From the File menu, select Discover System (the discovery may take a few minutes).
8. From the File menu, select Save to save the discovered configuration information to the PC.
9. From the File menu, select Save As and save an .xcl file with a new name to the PC.  
(This creates a duplicate copy, which we recommend every time the file is modified.)

The discovered configuration is ready to be modified. Whenever changes are made, the new file *must* be loaded onto the system to implement the changes (see page 124).

## Navigating the Interface

XNConnect displays configuration information in two panes. The graphics are located in the left pane, and the properties of the currently selected graphic are in the right pane. At the top of the left pane are two tabs, Hardware and Virtual Matrices, for accessing the Hardware and Virtual Matrices views. To see the details and components of a device or a virtual matrix, click the plus “+” symbol to the left of the device or the virtual matrix.

Most configuration file modifications involve entering information in a series of dialog boxes that are accessed by right-clicking a hardware device or virtual matrix icon and selecting an option from the shortcut menu. If you have a question regarding an open dialog box, press the F1 key for Help.

### Hardware View

The Hardware view (FIG. 76) displays the system's hardware, such as enclosures and serial ports. This is the view used when setting the control panel password (see page 121).

### Virtual Matrices View

The Virtual Matrices view displays properties of the existing virtual matrices. Most common tasks are conducted from this view, including customizing channel names and creating local presets.

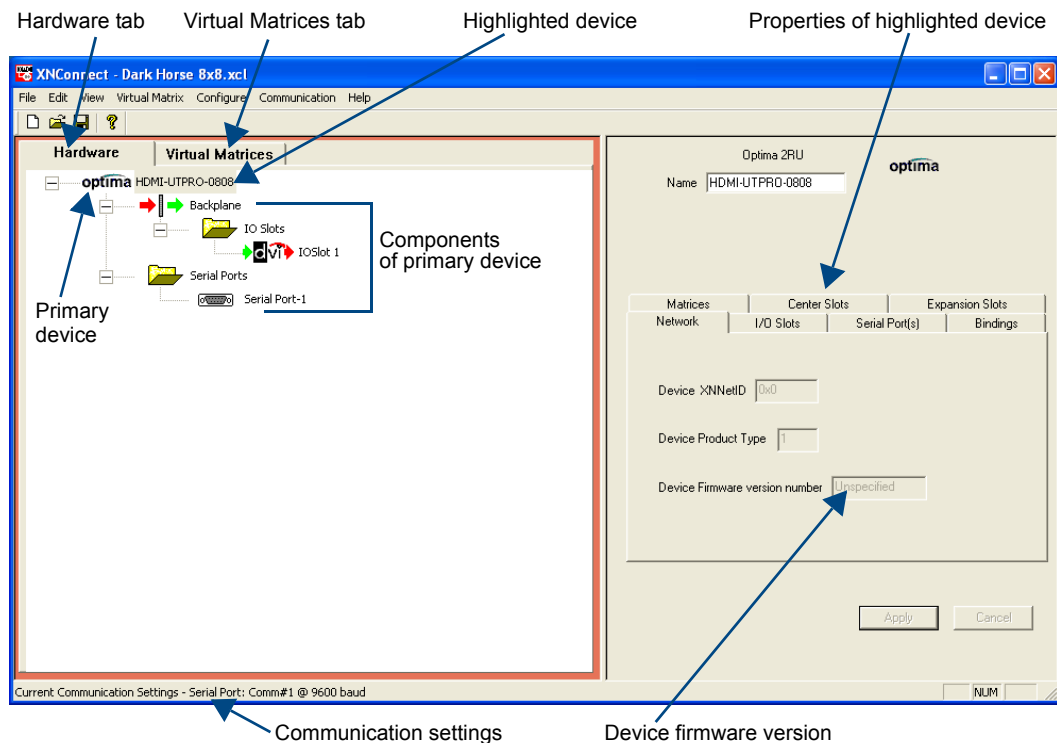


FIG. 76 XNConnect interface with Hardware tab selected

**Note:** The HDMI UTPRO enclosure displays an Optima logo. The IO Slot displays a DVI logo (the system supports DVI as well as HDMI).

## Modifying an .xcl Configuration File

Modifying an .xcl configuration file with XNConnect involves entering information in a field or in a series of dialog boxes. A brief look at the contents in the Help file provides a quick overview of the possible modifications.

This section provides instructions for three common tasks: modifying channel names, setting the control panel password, and configuring local presets. For complete coverage of configuration related tasks, see the XNConnect Help file.

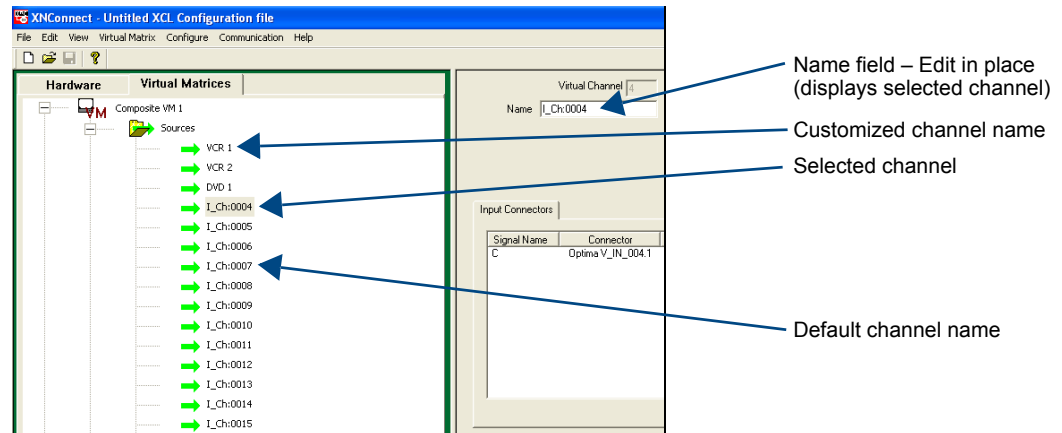
### Modifying Source and Destination Channel Names

If the system is using APWeb for control, the names for the source and destination channels displayed in XBar can be customized in XNConnect. The custom names (labels) can be up to 23 characters and cannot contain the following characters: ‘ “ \ = ? < >

**Note:** The Control Panel can also displays custom names (LCD displays 20 characters only).

### To customize the channel names:

1. In the Virtual Matrices view, click the “+” to the left of the Virtual Matrix.
2. Click the “+” to the left of the Sources or Destinations folder.
3. Select the channel you want to rename.
4. Enter the new name in the Name field in the right-hand pane and press Enter.  
The new channel name replaces the default channel name in the Sources or Destinations list.



**Note:** If a channel is in more than one VM (virtual matrix), you must repeat Steps 3 and 4 for the channel in each of the VMs.

5. Customize additional channels by repeating Steps 3 and 4.
6. Load the .xcl configuration file onto the system (see page 124).  
If the .xcl configuration file has been previously loaded to the system and channel names are the only modifications that have been made to the file, select Configure \ Configure Special – Virtual Matrix \ Configure System Namespace.  
If the .xcl file is being loaded for the first time (assumes an automatically constructed configuration is on the CPU), select Configure \ Configure All.
7. From the File menu, select Save As and save an .xcl file with a new name to the PC.  
(We *strongly* recommend making a duplicate copy every time the file is modified.)



**Caution:** The system must not be actively switching when loading this information onto the system.

### Setting the Control Panel Password

The control panel on the HDMI UTPRO can be locked and unlocked (see page 54). Locking the panel prohibits access to the system and can prevent accidental switching. The password can only be set with XNConnect.

**Important:** The password consists of five digits between 1 and 8 that are entered on the control panel using a combination of five of the eight keys in the top row: Inputs 1, 2, 3, 4 and Outputs 1, 2, 3, 4 (these outputs are designated as 5, 6, 7, 8 for password purposes). Keys can be used multiple times.

The system connected to the PC *must* be powered up before the password can be loaded to the control panel. If not already connected, complete the first five steps of the instructions for “Discovering a System” on page 119.

### To set the password and load it to the control panel:

1. Discover the system (see page 119) or open the .xcl file (see page 118).
2. In the Hardware view, right-click the CP-15 control panel icon – this icon is used for the HDMI UTPro control panel. (If control panel icon is not displayed, double-click the Optima icon.)
3. Select Set Password from the drop-down menu.  
The Set Control Password dialog box opens.



4. Enter a single digit between one and eight (inclusive) in each field (for digit parameters, see the “Important” note at the bottom of the previous page).
5. Check the box for Configure Password Immediately.

**Important:** If you use the *Configure* menu instead of checking the box, the only configuration option that will load password information is *Configure \ Configure Special - Hardware \ Configure All Passwords*.

6. Click OK.  
The updated password information is immediately loaded to the control panel, and the new password sequence *must* be used to lock and unlock the control panel.
7. From the File menu, select Save As and save an .xcl file with a new name to the PC.  
(We *strongly* recommend making a duplicate copy every time the file is modified.)

### Creating Local Presets

A local preset is a predetermined collection of switches on the same virtual matrix to be routed simultaneously. Executing a local preset affects only those inputs and outputs specified, not the whole system. Local presets are defined using XNConnect and can be executed using a control panel (local or remote) or using BCS commands as part of a macro in APCControl 3.0 or APWeb or entered in a terminal emulation program. The process for creating local presets involves three dialog boxes that cover managing, naming, and modifying presets.

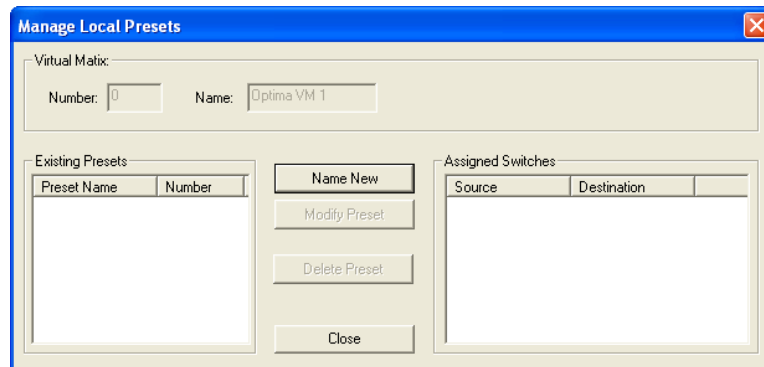
The HDMI UTPro supports a maximum of 16 local presets.

The instructions following are for creating a local preset. For detailed information on modifying and deleting local presets, see the XNConnect Help file.

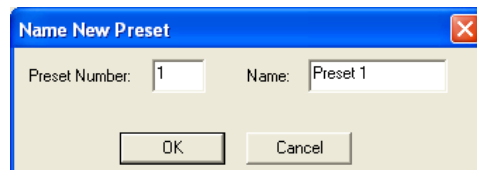


### To create a new local preset:

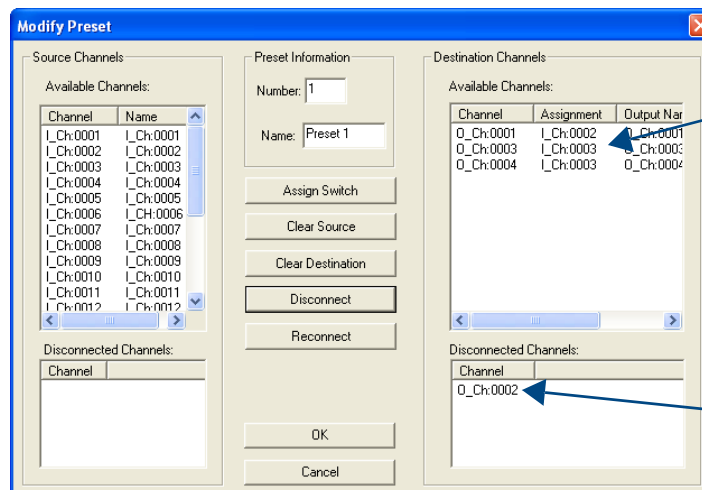
1. In the Virtual Matrices view, right-click the virtual matrix the preset will be created for and select Manage Local Presets from the shortcut menu.  
The Manage Local Presets dialog box opens.



2. Click the Name New button.  
The Name New Preset dialog box opens.



3. Optional – Enter a different preset number (local presets do not need to be numbered sequentially).
4. Enter a name for the new preset.
5. Click OK.  
The Modify Preset dialog box opens.
6. For the first switch, click the source channel (input) and one or more destination channels (outputs).  
Select multiple destination channels by holding down the Control key while selecting the channels.



The Assignment column shows three switches that will be executed as part of Preset 1:  
Input 2 to Output 1  
Input 3 to Output 3 and Output 4

The Disconnected Channels box shows that Output 2 will be disconnected as part of Preset 1.

7. Click the Assign Switch button.  
The input appears in the Assignment column of the Destination Channels list; the switch will execute when the local preset is executed.

8. Disconnect inputs\* or outputs as part of the local preset by selecting either the source or destination channel and clicking the Disconnect button.

The input or output appears in its corresponding Disconnected Channels list; the input or output will be disconnected when the local preset is executed.

\* Disconnecting an input will disconnect *all* outputs it is connected to.

9. Repeat Steps 6, 7, and 8 for all switches and/or disconnects to be included in the preset.

**Note:** For information on the other buttons and preset modifications, press F1 while the Manage Local Presets dialog box is open.

10. After all switches for the preset have been assigned, click OK and then close the Modify Local Presets dialog box.

11. Define additional local presets by repeating the steps.



**Caution:** The system must not be actively switching when loading this information onto the system.

12. Load the .xcl configuration file onto the system (see below).

If the .xcl configuration file has been previously loaded to the system and local presets are the only modifications that have been made to the .xcl file, select Configure \ Configure Special – Virtual Matrix \ Configure All VM Local Presets.

If the .xcl file is being loaded for the first time (assumes an automatically constructed configuration is on the CPU), select Configure \ Configure All.

13. From the File menu, select Save As and save an .xcl file with a new name to the PC.  
(We *strongly* recommend making a duplicate copy every time the file is modified.)

14. If applicable – Reload the .xcl file from the CPU to the control panel according to the directions on page 57.

## Loading an .xcl Configuration File

Once modifications have been made to the configuration file, the new file *must* be loaded onto the system's CPU for the changes to be implemented.

There are two basic options for loading an .xcl configuration file:

- Load the entire file using the “Configure All” option (see Caution below).
- Load part of the file using one of the “Configure Special” options.

To determine which configuration option to use, see “Configure Menu Commands” in the Help file.

When loading any part of a configuration file, the matrix switcher *must not* be actively switching. You may want to disconnect any external controllers to make sure that no switches are executed during the loading of the file. If applicable, you may also want to lock the control panel (see page 54).



**Caution:** Using the “Configure All” option will erase any global presets that have already been defined for the system (to create global presets from the control panel, see page 51).

### To load an .xcl configuration file to the enclosure's CPU:

**Important:** The matrix switcher must not be actively switching when loading any part of or all of the .xcl configuration file.

1. Recommended – Lock the control panel and/or disconnect any external controllers to make sure that no switches are executed during the loading of the file. If you have not already done so – From the File menu, select Save As and save an .xcl file with a new name to the PC. (We *strongly* recommend making a duplicate copy every time the file is modified.)
2. Connect the HDMI UTPro enclosure to the PC (see page 36).
3. In XNConnect, open the Communication menu and select Serial Port.
4. Open the Communication menu again; select Change Comm Settings.
5. Check the settings for the selected port and adjust if necessary (the default is COM 1 with a baud rate of 9600).
6. Optional – Click the Test button to verify that communication has been established with the HDMI UTPro.  
Click OK.
7. From the Configure menu, select the appropriate configuration option. For an explanation of Configuration menu options, see the Help file. (The Configure All option will not load password information. For instructions on loading password information, see page 121.)

The system automatically reboots (applies to non-hardware configuration options only; for hardware, select the appropriate configuration option and then Configure > Reboot All Devices).

**Important:** If the configuration file was loaded to the CPU because local presets were created, it may need to be reloaded from the CPU to the control panel (see page 57).

### Restoring the Automatic Configuration



**Caution:** Restoring the automatically constructed configuration will result in the loss of all custom .xcl configuration file modifications (local presets, passwords, etc.).

#### To restore the automatically constructed configuration:

1. Connect the system to a PC (see page 36).
2. Open a terminal emulation program (e.g., HyperTerminal).
3. Enter: ~def! to restore the configuration.
4. Wait for a “V” to be returned (may take several seconds).

## Device Discovery Support

XNConnect v2.10.0 supports Device Discovery (firmware v1.4.0 or higher is required). Typically the default configuration string generated by XNConnect is all that is necessary. However, certain conditions may warrant a custom string, such as the need to limit the VMs that are available for control by the AMX control system. Or a need may exist to limit the features available for a system, e.g., omitting the ability to adjust input gain, but leaving support for output volume. To customize the configuration string, see the XNConnect Help file topic “Device Discovery Config String Input.”



# Appendix D – Creating Virtual Matrices

**Applicability Notice:** This appendix applies to XNConnect version 2.10.0. XNConnect’s version information is found under its Help menu.

## Overview

The HDMI UTPro Matrix Switcher is pre-engineered at the factory. It is configured and ready to switch once the source devices, receivers, and destination devices are attached.

The HDMI UTPro systems specify two identical virtual matrices for switching signals: VM 0 = All and VM 1 = Video. These two VMs function the same for this product.

Creating new virtual matrices is an advanced feature of XNConnect. The configuration file does *not* need additional virtual matrices unless you decide to use them to limit control of sources with limited sink support. If you decide to do so, we *strongly recommend* contacting technical support to request a modified .xcl file or ask for assistance (for contact information, see page 41).



**Caution:** *Creating virtual matrices is an advanced feature of XNConnect that should not be attempted unless you are extremely familiar with the program and the AMX Matrix Switcher being configured.*

**Important:** *If you find it necessary to modify the file for any reason, save a back up copy of the existing configuration file. We also recommend providing technical support with a copy of the modified .xcl file for future support.*

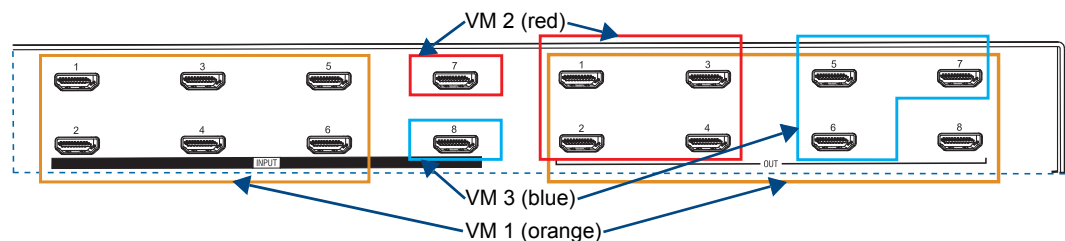
### Example – Virtual Channels and Virtual Matrices

A system’s configuration allows incoming signals from source devices to be routed through the system and out to destination devices.

For the HDMI UTPro, each virtual channel is assigned to a physical connector.

The virtual input and output channels can then be grouped into virtual matrices that define where the virtual channels can be routed. A virtual channel on one VM cannot be routed to a virtual channel on another VM. For the HDMI UTPro, the virtual channels are assigned to a VM in a sequential pattern.

**Note:** *Because a sequential pattern is used for creating VMs, the HDMI UTPro is easiest to configure if sources with the same sink limits are attached to adjacent connectors (FIG. 77).*



**FIG. 77** Example of VMs created for control of sources with limited sink support

The virtual matrices in the example used in this appendix assume *no repeaters* are used upstream or downstream of the HDMI UTPro.

- VM 1 – The sources connected to the inputs in orange (Inputs 1 through 6) each support 8 sinks and can be routed to any or all of the outputs in orange on VM 1 (Outputs 1 through 8).
- VM 2 – The source connected to the input in red (Input 7) supports only 4 sinks and can be routed to any or all of the outputs in red on VM 2 (Outputs 1, 2, 3, and 4).
- VM 3 – The source connected to the input in blue (Input 8) supports only 3 sinks and can be routed to any or all of the outputs in blue on VM 3 (Outputs 5, 6, and 7).

## Creating a New Virtual Matrix

**Important:** Save a backup copy of the existing configuration file if you find it necessary to modify the file for any reason.

### Process Overview

Creating a new virtual matrix involves creating virtual channels which *must* be assigned to the physical connectors and grouped into a virtual matrix. For more information on virtual matrices, see page 127. Four dialog boxes are used for creating a virtual matrix. The first is for assigning the signals to the VM; the second for assigning the signals to the physical matrix; the third for selecting the connector assignment method; and the fourth for completing the connector assignments. To access the Help file regarding an open dialog box, press F1.

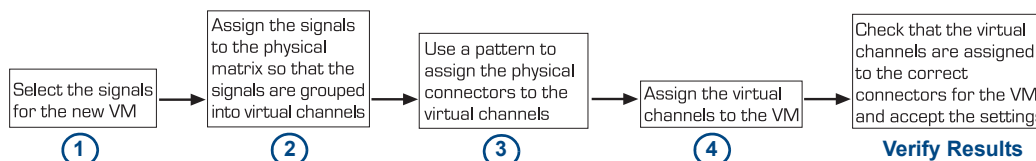


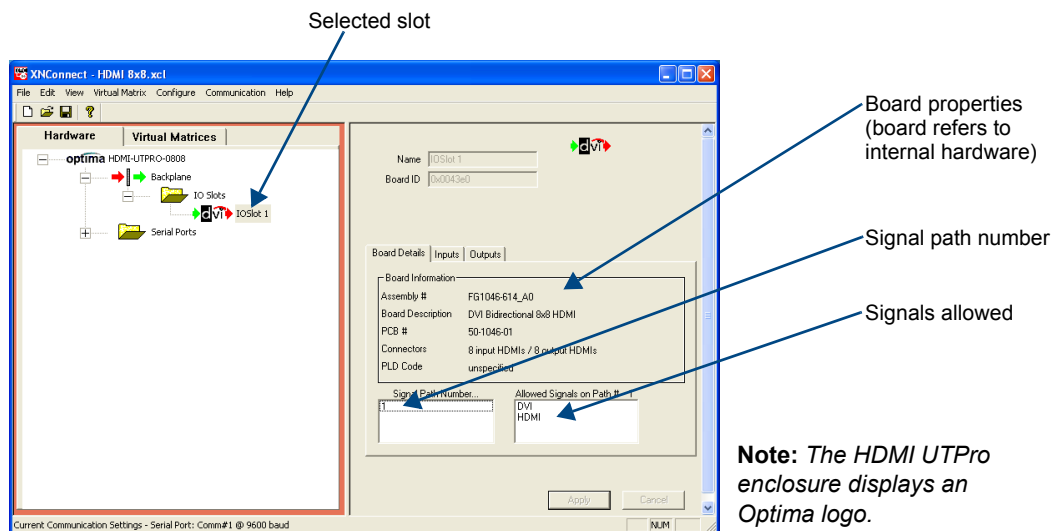
FIG. 78 Four step process for creating a new virtual matrix

### The Physical Matrix

The virtual channels need to be assigned to the physical matrix in the Assign Signals to Matrices box. The list in this box shows only physical matrices that are capable of routing the selected signal.

#### To view the properties of the connectors:

1. Select the Hardware tab.
2. Expand the enclosure and backplane and select the slot.



**Note:** For additional information on creating virtual matrices, see the XNConnect Help file. To access the Help file topic for an open dialog box, press F1.

The information in the instructions that follow is based on the example at the bottom of page 127.

### Existing VMs

We recommend preparing the configuration file for new VMs by making the following changes to the existing VMs.

**Important:** *Using Save As (under the File menu), make a backup copy of the current file with a new name and save it to the PC before making these changes.*

- Change the name of the current VM 0 to a large two digit number (e.g., 55). In the event that you decide to reuse it later, the number can be changed again.
- From the Virtual Matrix View, select the text in the Virtual Matrix field in the right-hand pane, edit in-place, and press Enter. Repeat with the text in the Name field.
- Delete VM 1 (this is a duplicate of VM 0).
- Right click VM 1 and select Delete.

The following procedure assumes that XNConnect has already been used to discover the configuration file (.xcl). For information on discovering a system, see page 119.

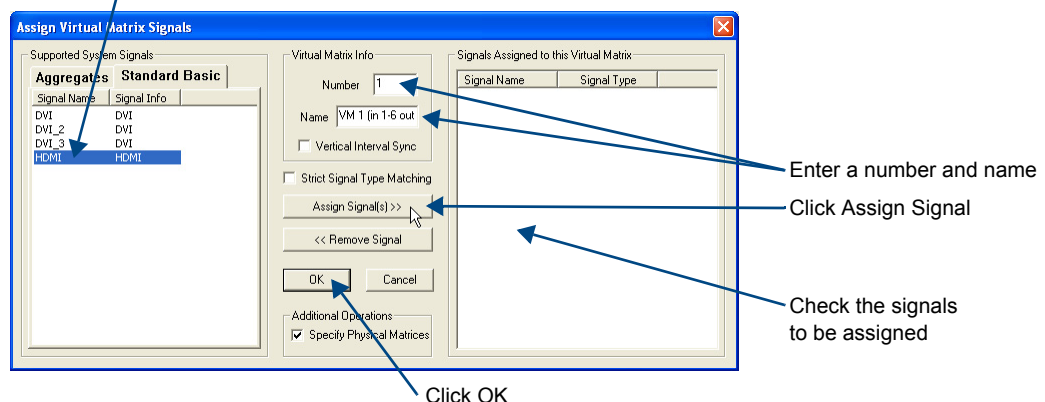
To create the example set of three virtual matrices on page 127, you would need to repeat the entire procedure three times. The first time through creates a new virtual matrix, VM 1. The information in brackets [ ] indicates the changes required on the subsequent times through for VM 2 and VM 3.

**Note:** *The control panel on the HDMI UTPro supports a maximum of two digits for numbering VMs*

### To create a new virtual matrix:

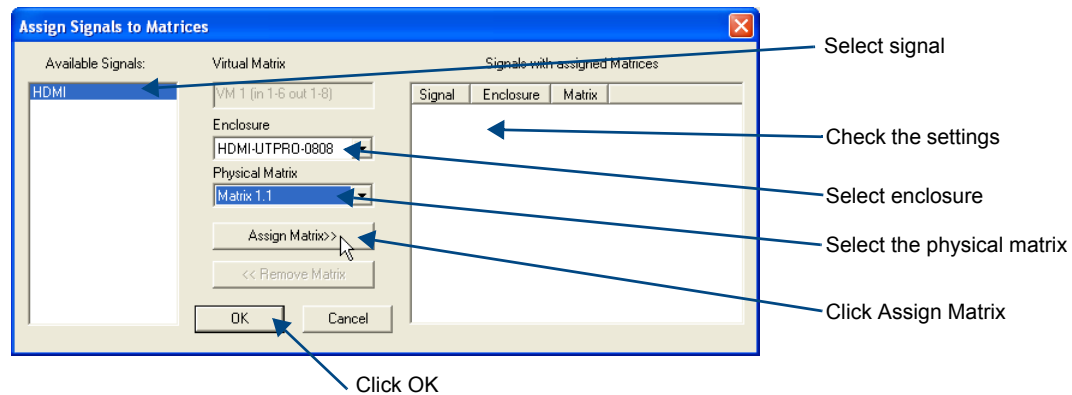
1. *Using Save As (under the File menu), make a backup copy of the current file with a new name and save it to the PC.*
2. Follow the recommendations above for handling the existing VMs.
3. From the Virtual Matrix menu, select Add Virtual Matrix.  
The Assign Virtual Matrix Signals dialog box opens.

Select the signal

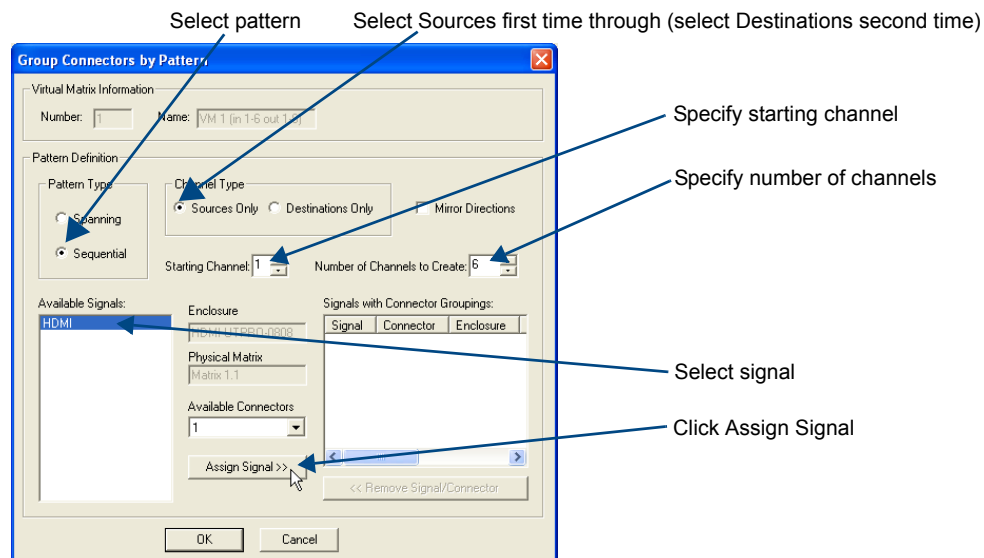


4. Under the Supported System Signals list (use the Standard Basic tab), select the HDMI signal for the new VM and click Assign Signal.  
Under Virtual Matrix Info, enter “1” for Number and “VM 1 (in 1-6 out 1-8)” for the Name.  
[When you create VM 2: enter “2” for Number and “VM 2 (in 7 out 1-4)” for the Name.]  
[When you create VM 3: enter “3” for Number and “VM 3 (in 8 out 5-7)” for the Name.]

5. Click OK.  
The Assign Signals to Matrices dialog box opens.

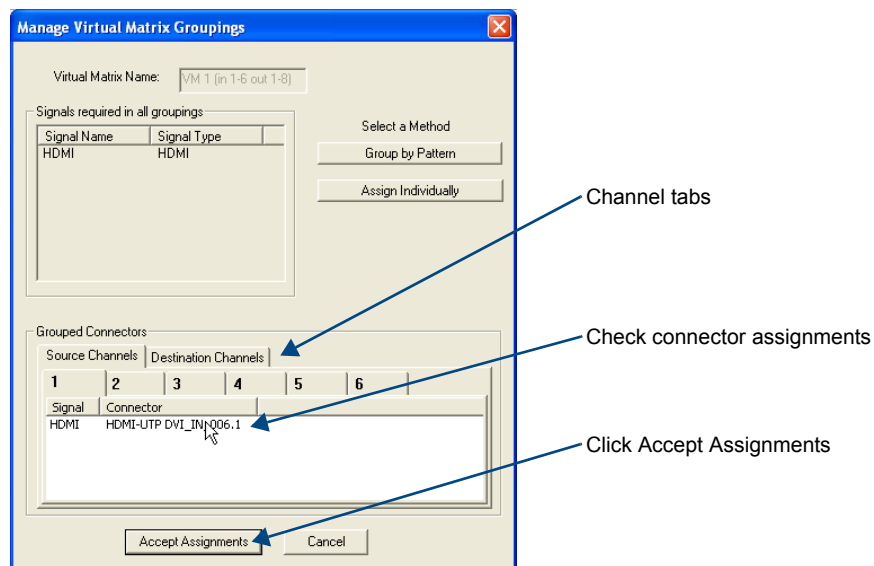


6. From the Available Signals box, select the HDMI signal.
7. From the Enclosure and Physical Matrix drop-down lists, accept the defaults.
8. Click Assign Matrix.
9. Click OK to finalize the settings and close the dialog box.
10. From the Virtual Matrices view, right click the new virtual matrix and select Manage Connector Groupings.  
The Manage Virtual Matrix Groupings dialog box opens.
11. Under Select a Method, click Group by Pattern.
12. Specify the following parameters for the *input channels*:
  - Under Pattern Type, select Sequential.
  - Under Channel Type, select Sources Only (Destinations Only will be selected in Step 17.)
  - From the Starting Channel drop-down list, select the first channel number “1” to be included.  
[When you create VM 2: select “7” for the channel number.]  
[When you create VM 3: select “8” for the channel number.]
  - From the Number of Channels to Create drop-down list, select the number of channels “6”.  
[When you create VM 2: select “1” for the number of channels.]  
[When you create VM 3: select “1” for the number of channels.]





13. Select the HDMI signal from the Available Signals list.
14. Click Assign Signal.
15. Click OK.  
The Manage Virtual Matrix Groupings dialog box opens again.
16. Under Select a Method, click Group by Pattern (this time through, the destinations will be assigned).
17. Specify the following parameters for the *output channels*:
  - Under Pattern Type, select Sequential.
  - Under Channel Type, select Destinations Only.
  - From the Starting Channel drop-down list, select the first channel number “1” to be included.  
[When you create VM 2: select “1” for the channel number.]  
[When you create VM 3: select “5” for the channel number.]
  - From the Number of Channels to Create drop-down list, select the number of channels “8”.  
[When you create VM 2: select “4” for the number of channels.]  
[When you create VM 3: select “3” for the number of channels.]
18. Select the HDMI signal from the Available Signals list.
19. Click Assign Signal and click OK.  
The Manage Virtual Matrix Groupings dialog box opens again.
20. Under Grouped Connectors, check the virtual channel assignment for each connector by selecting the Source and Destination Channels tabs. For VM 1, the Source Channels tab displays 6 channel tabs and the Destination Channels tab displays 8 channel tabs.  
[VM 2 displays 1 and 4 and VM3 displays 1 and 3.]



21. Click Accept Assignments.
22. Repeat Steps 3 through 21 for VM 2 and again for VM 3. See FIG. 79 on the next page for results.
23. Load the configuration file onto the system; see page 124.
24. Using Save As (under the File menu), make a duplicate copy of the modified file with a new name and save it to the PC. (We *strongly* recommend making a duplicate copy any time the file is modified.)



**Caution:** The system must not be actively switching when loading this information onto the system.

The three VMs created for the example on page 127 using the previous procedure are illustrated in FIG. 79. (Note that VM 55 at the bottom of the VM list was the original VM 0 discovered on the system and renamed for possible reuse later.)

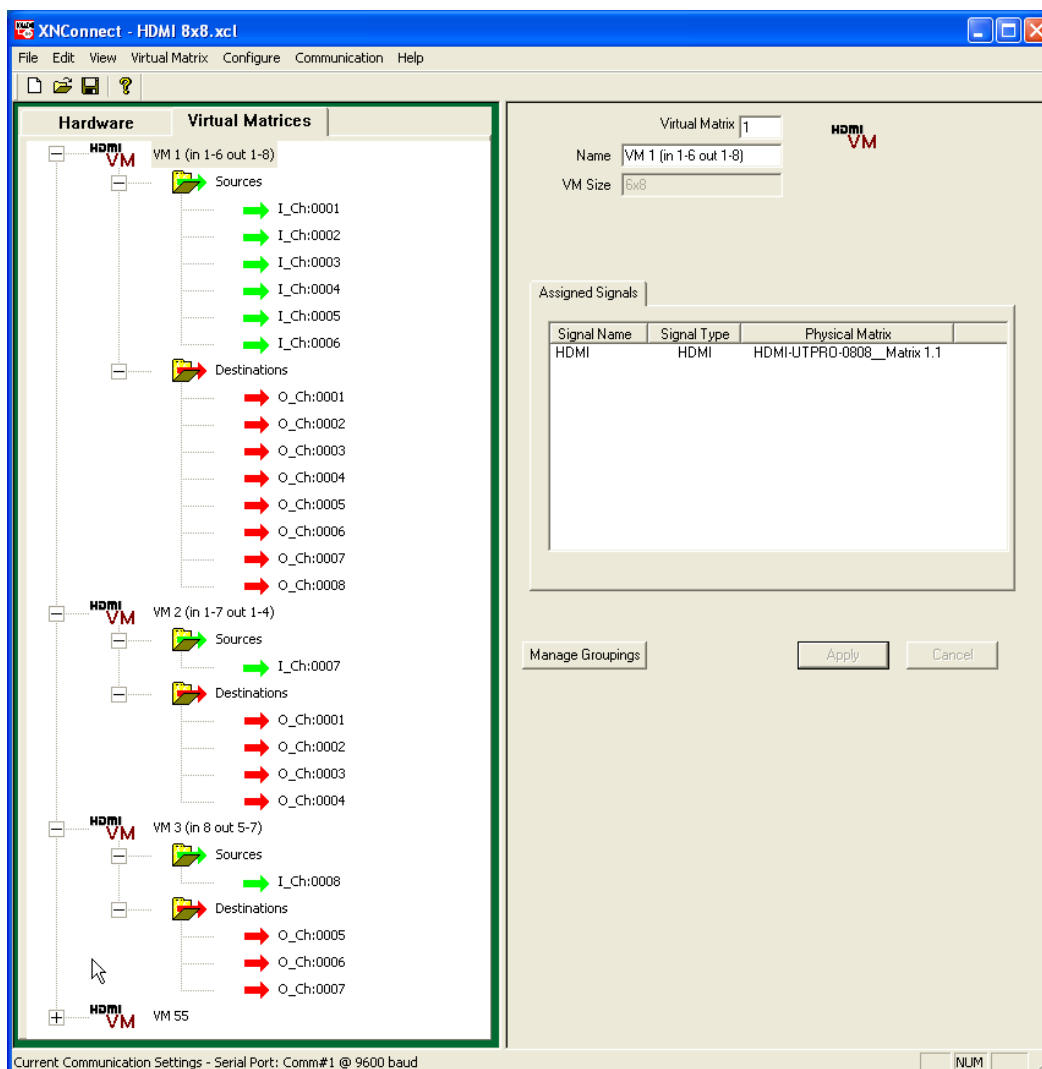


FIG. 79 Virtual Matrices created for example

# Appendix E – ASCII / Hex Conversion

Devices are typically controlled either by using ASCII text strings or the hexadecimal equivalent.

Control codes can be entered into the hardware using ASCII, hexadecimal, or a combination of both where certain ASCII codes are difficult to enter (e.g. a carriage return).

Char	Hex		Char	Hex		Char	Hex		Char	Hex
(nul)	00		(sp)	20		@	40		`	60
(soh)	01		!	21		A	41		a	61
(stx)	02		"	22		B	42		b	62
(etx)	03		#	23		C	43		c	63
(eot)	04		\$	24		D	44		d	64
(enq)	05		%	25		E	45		e	65
(ack)	06		&	26		F	46		f	66
(bel)	07		'	27		G	47		g	67
(bs)	08		(	28		H	48		h	68
(ht)	09		)	29		I	49		i	69
(nl)	0a		*	2a		J	4a		J	6a
(vt)	0b		+	2b		K	4b		k	6b
(np)	0c		,	2c		L	4c		l	6c
(cr)	0d		-	2d		M	4d		m	6d
(so)	0e		.	2e		N	4e		n	6e
(si)	0f		/	2f		O	4f		o	6f
(dle)	10		0	30		P	50		p	70
(dc1)	11		1	31		Q	51		q	71
(dc2)	12		2	32		R	52		r	72
(dc3)	13		3	33		S	53		s	73
(dc4)	14		4	34		T	54		T	74
(nak)	15		5	35		U	55		u	75
(syn)	16		6	36		V	56		v	76
(etb)	17		7	37		W	57		w	77
(can)	18		8	38		X	58		x	78
(em)	19		9	39		Y	59		y	79
(sub)	1a		:	3a		Z	5a		z	7a
(esc)	1b		;	3b		[	5b		{	7b
(fs)	1c		<	3c		\	5c			7c
(gs)	1d		=	3d		]	5d		}	7d
(rs)	1e		>	3e		^	5e		~	7e
(us)	1f		?	3f		_	5f		(del)	7f



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