# User Manual



**Model HMX-144**
**HDMI Matrix Router**

Audio Authority®

# Table Of Contents

## Liability Statement

Every effort has been made to ensure that this product is free of defects. Audio Authority cannot be held liable for the use of this hardware or any direct or indirect consequential damages arising from its use. It is the responsibility of the user of the hardware to check that it is suitable for his/her requirements and that it is installed correctly. All rights reserved. No parts of this manual may be reproduced or transmitted by any form or means electronic or mechanical, including photocopying, recording or by any information storage or retrieval system without the written consent of the publisher.

Audio Authority reserves the right to revise any of its hardware and software following its policy to modify and/or improve its products where necessary or desirable. This statement does not affect the legal rights of the user in any way.

Audio Authority and the Double-A Symbol are registered trademarks of Audio Authority Corp. Copyright February, 2009, all rights reserved. All third party trademarks and copyrights are recognized.

HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC. HDCP (High-bandwidth Digital Content Protection) is licensed by Digital Content Protection, LLC. Dolby is a trademark of Dolby Laboratories, Incorporated.

## 1.0  INTRODUCTION

Thank you for purchasing this Model HMX-144 HDMI Matrix Router from Audio Authority. It is designed to route digital audio and video signals from four different HDMI sources to four HDMI displays without signal degradation or loss of encryption. The HMX-144 is HDCP v1.1 compliant, and HDMI v1.3 compliant, supporting deep color video, Dolby TrueHD, and DTS-HD Master Audio.

Audio Authority also offers an extensive line of audio and video switchers, converters, extenders and distribution amps available for purchase online at www.audioauthority.com.
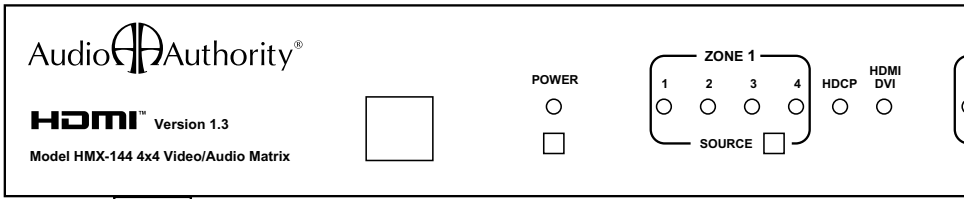
## 1.1  FEATURES

• Delivers four HDMI source signals to any or all of four compatible displays

• Supports deep color: 10 bits per TMDS channel (30 bit, sum of all channels)

• Supports 480i, 480p, 720p, 1080i, 1080p and multiple PC resolutions

• Supports Dolby Digital Plus, Dolby® Digital TrueHD, DTS-HD: Master Audio, and LPCM

• HDMI version 1.3 compliant, HDCP version 1.1 compliant

• IR remote control, RS-232 control, or front panel control

• Accepts locking HDMI cables

• IR extender included

## 2.0  CHECKING PACKAGE CONTENTS

Before attempting to use this matrix router, please check the packaging and make certain the following items are contained in the shipping carton:

• HDMI matrix router

• IR remote control and IR extender

• 5V DC power adapter

• Rack mount hardware

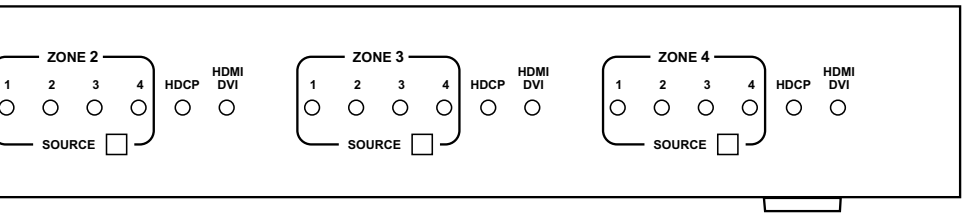• Jack screws (for locking HDMI ports)

• User manual

Note: please keep the original packing material in case the matrix ever needs to be returned. If you find any items are missing, contact Audio Authority immediately. Have the model number and invoice available for reference when you call.

Audio⊕Authority®

HᗰᑕᗰI™ Version 1.3

Model HMX-144 4x4 Video/Audio Matrix

POWER

**ZONE 1**

1  2  3  4  HDCP  **HDMI DVI**

SOURCE

## 3.0 GETTING THE BEST RESULTS

Many factors influence the quality and reliability of HDMI signal distribution installations. The following are the main factors to consider, and basic precautions that will ensure the best possible performance.

- **Resolution tracking.** Refer to 4.0 "Planning a Matrix System" Set up the sources to output the best resolution that all TVs can accept.

- **Source resolution and video/sound quality.** Sources, such as satellite receivers or cable boxes may output at low resolutions or deliver extremely compressed video material, yielding poor results. Consider the sources when planning and troubleshooting your system.

- **Output display devices.** The quality of the output signal depends largely upon the type and quality of the HDMI display devices used.

- **Connection cables.** HDMI cable design and quality are extremely important in long cable runs where capacitance can severely degrade performance. Use premium cables; low quality cables are susceptible to interference. Always use locking cables or good strain relief methods to prevent cables from becoming loose over time.

- **Distance between the sources and the displays.** Using premium quality cables the sources may be located up to 20m from the matrix, and the matrix may be up to 15m from each display device. Longer distances are possible using advanced HDMI extenders with DDC correction.

- **Interference.** Nearby electrical devices can have an adverse effect on signal quality. For example, older computer monitors often emit very high electromagnetic fields that can interfere with the performance of adjacent video equipment.

| ┌─── ZONE 2 ───┐ | | | | | | | ┌─── ZONE 3 ───┐ | | | | | | | ┌─── ZONE 4 ───┐ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | HDCP | HDMI DVI | | | 1 | 2 | 3 | 4 | HDCP | HDMI DVI | | | 1 | 2 | 3 | 4 | HDCP | HDMI DVI |
| ○ | ○ | ○ | ○ | ○ | ○ | | | ○ | ○ | ○ | ○ | ○ | ○ | | | ○ | ○ | ○ | ○ | ○ | ○ |
| └── SOURCE ☐ ──┘ | | | | | | | └── SOURCE ☐ ──┘ | | | | | | | └── SOURCE ☐ ──┘ | | | | | | |

## 4.0  PLANNING A MATRIX SYSTEM

- Each display should be individually tested by connecting it directly to each source to ensure basic compatibility before connecting them to a matrix. After testing the sources with the displays, temporarily connect all of the sources and displays to the matrix using short HDMI cables to verify compatibility and function.

- Since all of the displays connected to a particular source will be receiving the same video signal resolution and format (e.g. 1080p@60Hz) produced by the source, make sure the source is set up to output the highest resolution that *all of the displays can accept*. For instance, if one display can accept a maximum input resolution of 720p, all of the sources are limited to 720p output, and all displays will receive a maximum resolution of 720p. This consideration is particularly important if the TVs have a wide range of resolution capabilities because the highest resolution sets may not be allowed to perform to their best advantage.

- HDMI cable lengths should be kept as short as possible. Use high quality HDMI extenders (such as our Model 1391A) where cable lengths must exceed 15m. Use of high resolutions, refresh rate, or deep color may limit maximum cable run length.
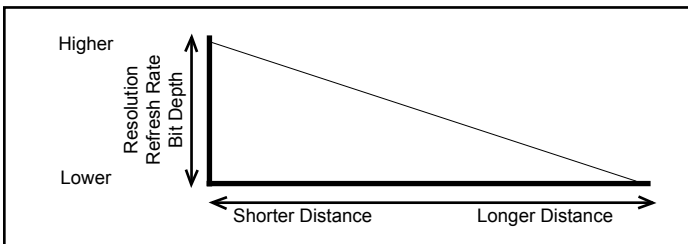


To the extent that high resolutions, refresh rate, or deep color are used, cable run length is diminished. Use high quality HDMI cable extenders for long distance, high bandwidth applications.

5
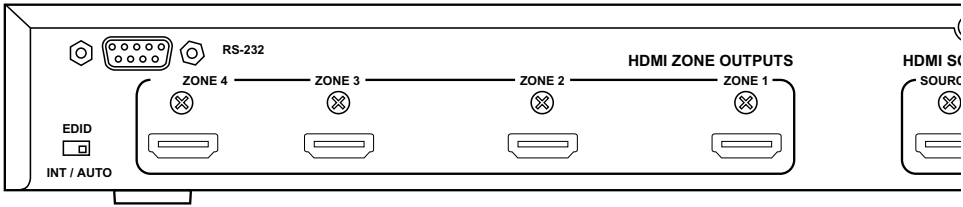
## 5.0 CONNECTING THE HARDWARE

- Turn off equipment that will be connected to the matrix. Mount the matrix in an equipment rack if desired, using the included rack ears. Otherwise, place the matrix on a flat surface with adequate ventilation and access to the front and rear panels.

- Connect an HDMI approved cable from each HDMI source to an input of the matrix. Cable lengths should be kept as short as possible.

- Since HDMI connectors can sometimes become loose, use locking HDMI cables or mount the matrix to a flat surface and add strain relief tie-downs a few inches away from every HDMI cable connector.

- If using locking cables, remove the Phillips screws above each HDMI port and replace them with the hex-head jack screws provided. Plug in the HDMI cable and insert the cable screws into the jack screw heads.

- Connect the outputs of the matrix to their destination devices.

- If you are using the infrared extension function, connect the extension IR sensor cable and position the sensor.

- Connect the power adapter to the AC source and then to the matrix. Twist the DC plug to 90 degrees in the matrix power port to lock.

- If you are using the RS-232 control function, connect an RS-232 cable with pinout as shown below.
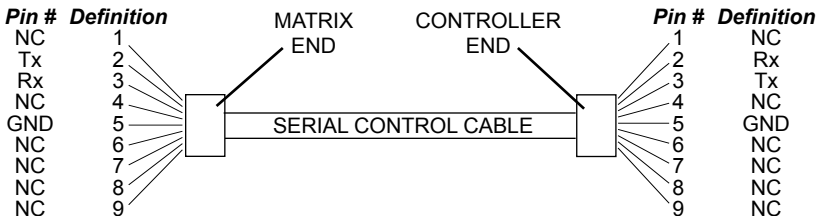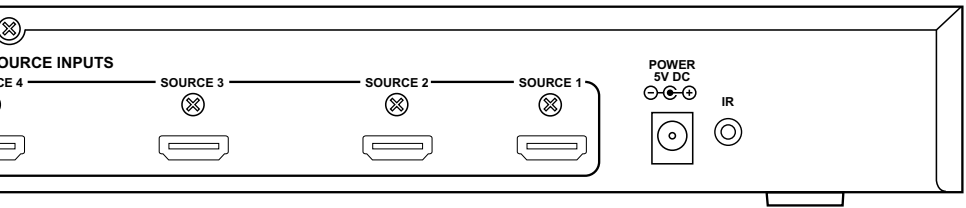
- Turn on the HDMI sources and displays. Turn on the matrix and after a pause for HDCP handshaking, observe the source signals on the displays. The HMX-144 front panel LEDs light, indicating the active sources in each zone, HDCP status and HDMI/DVI status.

*Note: Proper function of HDMI matrix routers and distribution systems depends on the use of high quality HDMI cables with low loss, high bandwidth signal handling capabilities. The distance specification cannot be guaranteed unless cables used throughout the system meet these high standards.*

## 6.0  OPERATING THE MATRIX
The HMX-144 is a matrix router capable of routing audio/video signals from any of four sources to any of four displays. The matrix may be operated by the front panel controls, an IR remote control, or by RS-232 through a computer or other third party controller.

### 6.1  Front Panel Controls
Repeatedly press the SOURCE button in the appropriate zone until the desired source (1, 2, 3, or 4) is selected.



Model HMX-144 front panel controls

- Lights (1-4) indicate the source that is currently selected to the zone output.
- A lit HDCP light indicates that the selected source signal is HDCP encrypted.
- A lit HDMI/DVI light indicates that the selected source signal is compliant with HDMI and/or DVI standards.
- The lit Power light indicates that the unit is receiving power.

7
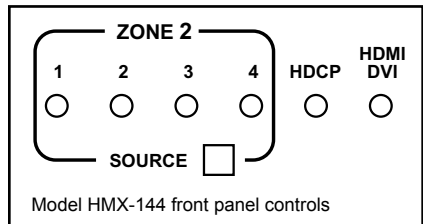
## 6.2  IR Remote Control

The four rows of source selector buttons just below the power button are used to select the source on the four zone outputs. Each row represents a zone.

**IR Remote Control**

POWER

OUTPUT
ZONE 1  1 1  2  3  4
OUTPUT
ZONE 2  2 1  2  3  4
OUTPUT
ZONE 3  3 1  2  3  4
OUTPUT
ZONE 4  4 1  2  3  4
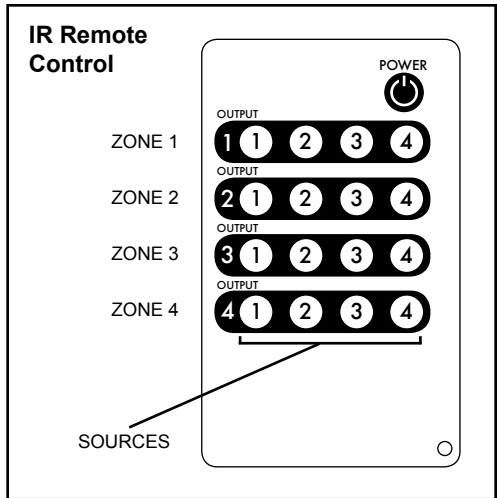
SOURCES

## 6.3  RS-232 Control

Connect a computer or other serial controller to the RS-232 port on the rear panel using a cable with pin connections as shown on page 6. Commands include on, off, and source selection on any zone output.

**RS-232 Transmission Format**
Baud Rate: 9600 bps
Data bit: 8 Bits
Parity: None
Stop Bit: 1 bit

**Serial Commands**

| *Code* | *Definition* |
| --- | --- |
| POWER 00 | Power off (standby) |
| POWER 01 | Power on |
| PORT 11 | Zone 1, select Source 1 |
| PORT 12 | Zone 1, select Source 2 |
| PORT 13 | Zone 1, select Source 3 |
| PORT 14 | Zone 1, select Source 4 |
| PORT 21 | Zone 2, select Source 1 |
| PORT 22 | Zone 2, select Source 2 |
| PORT 23 | Zone 2, select Source 3 |
| PORT 24 | Zone 2, select Source 4 |
| PORT 31 | Zone 3, select Source 1 |
| PORT 32 | Zone 3, select Source 2 |
| PORT 33 | Zone 3, select Source 3 |
| PORT 34 | Zone 3, select Source 4 |
| PORT 41 | Zone 4, select Source 1 |
| PORT 42 | Zone 4, select Source 2 |
| PORT 43 | Zone 4, select Source 3 |
| PORT 44 | Zone 4, select Source 4 |

## 7.0  TROUBLESHOOTING

• Make certain that the matrix is receiving power by looking at the power LED. It should be illuminated and not flickering. Intermittent operation generally means a problem with the DC power adapter or low AC voltage. Check the AC outlet for proper voltage, then consider replacing the DC power adapter.

• If some lower resolution TVs do not display a picture, make sure the source is producing a resolution low enough that all TVs can accept it. Try 1080i, 720p and 480p. If possible, manually set your sources to the desired resolution. In some cases, hot-plugging a high resolution display may actually reset the source to a resolution that cannot be accepted by some other TVs.

• If displays seem to "lose signal" momentarily, this may be normal HDMI switching behavior. All displays connected to a source must handshake again when that source is selected to a new display. This pause is normal and required when switching HDCP encrypted signals.

• If some inputs function correctly and others do not, interchange cables between sources and see if the problem moves with the cables. If it moves, a bad cable or cable connector is the probable reason for the trouble. If the problem remains with one particular input, connect that source to a different input using the same cable and see if the problem moves to the new input. If it does, the problem is with the source. Connect the source directly to the lowest resolution display and adjust its output settings and resolution until satisfactory function is achieved.

• If 1080p resolution is desired, first make certain that the input cable is as short as possible and none of the output cables are more than 15 meters long. HDMI cable design and quality are extremely important in long cable runs where capacitance can severely effect performance. One of our high quality HDMI extenders should be used in extreme length/high bit depth applications.

• Remember that HDMI devices communicate with one another so the source device and all destination devices must be fully HDMI compliant. In addition, HDCP encryption requires processing dependent on the equipment you have connected to both the source and destination devices.


If a problem still persists after trying the above suggestions, contact the Audio Authority Technical Support department via email:
support@audioauthority.com, or call 800-322-8346 or 859-233-4599.

## 8.0 SPECIFICATIONS

| | |
|---|---|
| Video Inputs | HDMI video (or DVI w/cable adapters) 4x via HDMI Type A connectors* |
| Video Outputs | HDMI Video (or DVI with cable adapters) 4x via HDMI Type A connectors* |
| Audio Inputs | HDMI embedded digital audio including Dolby® TrueHD & DTS-HD: Master Audio, Dolby Digital Plus |
| Audio Outputs | HDMI embedded digital audio including Dolby® TrueHD & DTS-HD: Master Audio, Dolby Digital Plus |
| Compliance | HDMI v1.3, HDCP 1.1, DVI 1.0 |
| Signal Processing | Compensated, clock phase adjusted |
| Jitter Processing | Reconstituted signal; jitter free |
| Color Processing | 30 bit (10 bits per TMDS color channel) |
| Data Rate | 2.25Gbps (single link) |
| TMDS Clock Speed | 225MHz |
| Video Resolutions | 480i through 1080p, VGA through UXGA |
| Audio Processing | Dolby, DTS 32-192fs sample, LPCM 7.1/ch |
| EDID | Automatic or manual monitor discovery |
| Maximum Cable Length | Input: 20m (66 ft.) @ 1080p/8 bit Output: 15m (49 ft.) @ 1080p/8 bit |
| Control Methods | Front panel, infrared remote, RS-232 |
| Mechanical | Size: (H-W-D) 1.75"x 17.2"x 6.9" (44x438x175mm) |
| | Weight: (Net) 6.8 lbs (3.1Kgs) |
| Limited Warranty | 1 Year Parts and Labor |
| Environmental | Operating temperature: +32º to +122º F (0º to +50º0 C) |
| | Operating Humidity: 10% to 90%, Non-condensing |
| | Storage temperature +14º to +140º F (-10º to +60º C) |
| Storage Humidity | 10% to 90%, Non-condensing |
| Power Requirement | External power supply 5V DC |
| Regulatory Approvals | Matrix unit: FCC, CE, RoHS |
| | Power supplies: UL, CUL, CE, PSE, GS, RoHS |
| Accessories Included | AC power adapter: USA type, locking connector IR remote control Rack mount kit Jack screws for locking HDMI cables IR extender User manual |
| Optional Accessories | HDMI cables, extenders and distribution amplifiers |

*Jack screws have been included to accommodate locking type HDMI connectors.

## 9.0 LIMITED WARRANTY

If this Audio Authority product fails due to defects in materials or workmanship within one year from the date of the original sale to the end-user, Audio Authority guarantees that we will replace the defective product at no cost. Freight charges for the replacement unit will be paid by Audio Authority (Ground service only). A copy of the invoice showing the item number and date of purchase (proof-of-purchase) must be submitted with the defective unit to constitute a valid in-warranty claim.

Units that fail after the warranty period has expired may be returned to the factory for repair at a nominal charge, if not damaged beyond the point of repair. All freight charges for out-of-warranty returns for repair are the responsibility of the customer. Units returned for repair must have a Return Authorization Number assigned by the factory.

This is a limited warranty and is not applicable for products which, in our opinion, have been damaged, altered, abused, misused, or improperly installed. Audio Authority makes no other warranties either expressed or implied, including limitation warranties as to merchantability or fitness for a particular purpose. Additionally, there are no allowances or credits available for service work or installation performed in the field by the end user.

## 9.1 Warranty Service Procedures

If you suspect a product defect, contact Audio Authority's Technical Support Department at 800-322-8346 or 859-233-4599 for assistance in verifying the problem. If a defect or potential defect is suspected, a replacement unit will be shipped immediately on a defect-exchange basis and a Return Authorization Number will be issued for the return of the defective product. Replacement units are sent out at the Manufacturer's Suggested Retail Price which is debited to the Customer's Credit Card at the time of shipment. Once we receive the defective unit back at the factory, it will be evaluated under the conditions of this warranty and if found to be in-warranty, a full credit will be issued to the Customer's Credit Card. Return freight charges for the defective unit are the customer's responsibility. Please contact our Technical Service Department for complete details concerning all in and out of warranty service matters.

We appreciate your confidence in our products and services and will always strive to meet or exceed your needs.

## 10.0  REGULATORY COMPLIANCE

The HMX-144 matrix has been tested for compliance with appropriate FCC and CE rules and regulations and is also RoHS compliant.

The included power supply has been tested for compliance with UL, CE and CSA rules and regulations and is also RoHS compliant.

## 11.0  CONTACT INFORMATION

If you have questions or require assistance with this product in areas not covered by this manual, please contact Audio Authority using the information below.

Audio Authority Technical Support
800-322-8346 M-F 8:30 AM to 5:00 PM, EST
International: 859-233-4599  Fax: 859-233-4510
Send email to: support@audioauthority.com

Audio Authority Corporation
2048 Mercer Road
Lexington, Kentucky 40511-1071
USA

Audio$\bigcirc$Authority®

2048 Mercer Road, Lexington, Kentucky 40511-1071
Phone: 859-233-4599 • Fax: 859-233-4510
Customer Toll-Free USA & Canada: 800-322-8346
Website: http://www.audioauthority.com