



# **Model CMX1616A2**

## **AV Matrix Switch with DSP audio (firmware 1.0)**

### **Overview:**

This product is a full featured video & audio matrix switch. It is most commonly used to independently distribute video & audio to several different viewing areas from a set of common sources. CMX1616A2 provides 16 audio output zones from 16 audio common sources. It also provides 8 video output zones from 8 video common sources.

The matrix switch has 3 control modes to choose from:

- Manual control from the front buttons
- IR control by remote control
- Serial control via the RS-232 port (db9).

### **Unit includes**

- CMX1616A2 matrix switch
- Owners manual
- 12V desktop power supply
- 3 year parts and labor warranty
- Optional rack mounting ears & screws

### **Warranty**

Video Storm LLC products are covered by our manufacture's warranty. Our warranty covers parts and labor for 3 years following purchase. In the unlikely event you receive an item that was not damaged in shipping but is defective please contact support@video-storm.com and we will repair or replace the item promptly.

# Installation

Please use the following steps to install and set up your CMX1616A2.

When looking at the rear of the CMX1616A2, all inputs are on the left half and all outputs are on the right half.

1. Analog audio: Connect the analog stereo audio sources to the input red/white RCA jacks marked 1-16. Connect the output cables to the output red/white RCA jacks marked 1-16. Be sure to match the cable colors to RCA jack color.
2. Composite video: Connect the composite video sources to the input yellow RCA jacks marked 1-8. Connect the output cables to the output yellow RCA jacks marked 1-8. **Note that there are 2 different sets of yellow RCA jacks.** The jacks near the TOSLINK connectors are composite video.
3. Digital coax audio: Connect the digital audio sources to the yellow RCA jacks marked 1-16. Connect the output cables to the output yellow RCA jacks marked 1-16. **Note that there are 2 different sets of yellow RCA jacks.** The jacks next to the red/white jacks are digital audio coax.
4. Digital TOSLINK audio: Connect the digital audio sources to the input TOSLINK jacks marked 1-6. Connect the output cables to the output TOSLINKS jacks marked 1-6.
5. RS-232: If needed, connect your computer or controller to the DB9 jack labeled “Control” using a DB9 male to female normal modem cable.
6. RS-232 expansion: If using a HMX HDMI matrix, connect a DB9 male to female normal modem cable from the RS-232 jack labeled “XP” to the RS-232 jack on the HMX matrix.
7. Connect the supplied wall transformer to a properly grounded power outlet. Plug into DC input of the CMX1616A2.
8. Press one of the front panel buttons; you should see the LED display turn on.

## Controlling the CMX1616A2

The CMX1616A2 can be controlled by 3 methods: front panel switch, infrared remote, or RS-232 serial. You may use any or all methods in any combination. All methods can access all features and modes.

The left front panel button controls the output selection (left two LED digits). Each press will cycle through the available outputs. The right button controls the input selection (right two LED digits). Each press will cycle through the available inputs. Pressing and holding the left button for 3 or more seconds will jump the output selection to the next connector type when released. Pressing and holding the right button for 3 or more seconds is only used in Zerokey programming mode, config mode, for volume mute toggle or for quick select mode.

**NOTE:** Output needs to be selected before setting the input.

Quick select can be used to easily send a single input to all outputs. To use quick select, simply select output 1 using the left button, toggle to the input desired using the right button, and then press and hold the right button for 3 or more seconds.

Flash modes allow the user to save and later recall up to 8 different switch setups. Flash modes are saved to flash memory, so are unaffected by power cycling. To use the flash modes, select “Fx” (x is 1-8) using the left button (or IR). The right LED will display “E” if no saved mode exists in this slot, otherwise “F”. Use a short press with the right button to recall these settings. Use a long press with the right button to save the current switch setup to this flash slot. When using IR, the sequence is (Output type select “F”, input select 0-15). Use input select codes 0-7 to recall flash modes 1-8, and input select codes 8-15 to save to flash modes 1-8.

The IR remote and RS-232 interface can select outputs and inputs directly. If using the RS-232 interface, please refer to the programming guide on our web site. The IR interface is explained later in this document.

The table below explains what the LED displays indicate. Note that generally the left two digits display the selected output and the right two digits display the selected input. When selecting an output greater than 9, the letter will flash for 1 second and then the “1” will be displayed. **When “0” is displayed as the selected input that output is powered off.**

Basic mode

Left LED Display (selected output)	Right LED Display (selected input)	Description
A 1-16	0-16	Control for all outputs types
G 1-38	0-16	Volume control for audio outputs. G1-16 is analog audio. G17-32 is digital coax. G33-38 is TOSLINK. The right display is the volume, “00” is min while “16” is max volume. A “.” After the number indicates MUTE is ON
F 1-8	E/F	Flash mode slot 1-8. If right LED shows E, then slot is empty. If right LED shows F, then slot is active.
CF	C-U , O/F	Config menu, please see setting below
SZ	0-40	Zerokey programming mode, please see Zerokey section
SU	00	Audio menu, press hold right button for 6 seconds to enter audio menu

Advanced mode

Left LED Display (selected output)	Right LED Display (selected input)	Description
A 1-16	0-16	Analog audio control.
P 1-8	0-8	Composite video control
G 1-38	0-16	Volume control for audio outputs. G1-16 is analog audio. G17-32 is digital coax. G33-38 is TOSLINK. The right display is the volume, “00” is min while “16” is max volume. A “.” After the number indicates MUTE is ON
F 1-8	E/F	Flash mode slot 1-8. If right LED shows E, then slot is empty. If right LED shows F, then slot is active.
CF	C-U, O/F	Config menu, please see setting below
SZ	0-41	Zerokey programming mode, please see Zerokey section
SU	00	Audio menu, press hold right button for 6 seconds to enter audio menu

Right LED display for configuration menu:

1. **C** Clear memory. Press the right front panel key and hold for 6 seconds to reset all Zerokey IR codes to factory defaults and put the switch into basic mode.
2. **L** LED OFF. Press and hold the right switch to black out the LED display. Any button will restore.
3. **P** Power OFF. Press and hold the right switch to turn off CMX1616A2. Any button will restore power.
4. **U O/F** Controls basic or advanced mode selection. Press & hold the right switch to turn on/off . F means basic mode, O means advanced mode.
5. **1 O/F** Not used
6. **2 O/F** Not used
7. **3 O/F** Power up default. When this control is switched from F to O, it will save the current state of all outputs to flash memory. At power up if this control is O, the saved state will be loaded at power up. If it is F, all outputs will be disabled on power up.

8. **4 O/F** Disable audio gain functions (when set to O)
9. **5 O/F** Expansion mode. This control allows you to add N\*16 to the LED output zone display. Normally this would be used in a 16x32 or larger system. To use this mode:
  - A. Select CFC and press and hold right button for six seconds
  - B. Select "V1" output and then select input 1-5. If you want to display 17-32, use input 1. For display 81-96, use input 5 etc.
  - C. Select CF5F, then press and hold the right button for six seconds.
  - D. You can later exit this display mode by using CFC again

Audio menu

Left LED Display (selected output)	Right LED Display (selected input)	Description
BL 1-38	0-16	Output Balance (8 is nominal)
IG 1-38	0-16	Input gain (8 is nominal)
LO 1-38	0-16	Output bass (8 is nominal)
HI 1-38	0-16	Output treble (8 is nominal)
IS 1-38	0-16	Input delay
OS 1-38	0-16	Output delay
SU	00	Audio menu, press hold right button for 6 seconds to exit audio menu

## IR remote interface

The CMX1616A2 IR interface consists of 239 discrete IR codes. These codes are stored in internal flash memory. When the CMX1616A2 detects a transmitted IR code which matches one or more of the codes in memory, it performs the action dictated by that code. The table below shows what action each code performs. The factory defaults for all codes can be obtained in CCF format from our web site. If you have a fully programmable remote, you can load these codes into the remote. If your remote does not support loading hex IR codes, then you will need to program new codes into the CMX1616A2. See the section on programming the ZeroKey interface for instructions.

The full code list can be accessed at:

<http://www.video-storm.com/Downloads/IR%20mapping.htm>

You can also find a tutorial at:

<http://www.video-storm.com/Downloads/CMX%20IR%20programming.htm>

The sequence for switching an output requires sending 3 IR codes. First send the code to select the output type (code 0-7), then the code to select the specific output (code 8-23), then the code to select the input (code 24 – 40). For example (in advanced mode), to switch analog audio output 3 to input 5 send codes 1, then 10, then 29.

Special considerations:

1. Basic mode: All output types are selected with output type code 0.
2. Set ZeroKey mode cannot be accessed by IR or RS-232. This must be done by front panel buttons if necessary (one time only).
3. Audio gain: The input select codes control volume instead. "0" is mute toggle and "15" is max volume. Code "16" is Volume up (increases volume each press). Code "17" is Volume down. There are also dedicated discrete codes for volume ramp and mute for each output.
4. Config menu: The specific output select code is not used (ignored). The input select codes work as follows.

Input select	Action
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(IR code)	
1 (25)	Turns LED OFF
9 (33)	Turns LED ON
2 (26)	Powers OFF CMX
10 (27)	Powers ON CMX
other	All other codes should not be used when in config menu

## Programming the ZeroKey remote interface

The remote control interface can use ZeroKey infrared code cloning to map any remote control key to each of the first 42 IR control codes.

Before starting, you will need a remote with as many unique “keys” as codes you wish to program. Keep in mind; most universal remotes have 5-6 “pages” of codes. For example, when you select “VCR” control the numeric keys on the remote have different IR codes than when you select “DVD” on the remote.

Here are the steps to program the CMX1616A2 Zerokey control codes for your remote.

1. Toggle the left button until “SZ” is displayed on the left LED
2. The right LED will display a number 0-41. This corresponds to the IR code selected.
3. Toggle the right button to the IR code you wish to program
4. Press and hold the right button for 6 seconds. When released the right LED should start to flash.
5. Press the remote button you wish to map to this IR code
6. The right LED should stop flashing, indicating the code was stored.
7. The CMX may switch at this point if programming IR codes 0-7. This is normal, just toggle back to the “SZ” mode.
8. Repeat for all other IR codes you wish to use.
9. When done, test every IR code. If one or more do not work repeat the programming for those codes (sometimes interference will cause the code learn to fail). If you cannot get a specific code to work after multiple attempts, try using a different remote key.

For additional examples of programming the ZeroKey IR interface, please refer to the quick start guide.

ZeroKey technology is compatible with virtually all remote controls, and does not interfere with the normal operation of the remote. You may reset all the ZeroKey codes to the factory defaults by selecting “CFC” and holding the input button for 6 seconds

ZeroKey programming is stored in flash memory, and you will not need to reprogram even if you lose power. If you buy a new remote in the future, don’t worry, the CMX1616A2 can be reprogrammed as much as you like.

# Specifications

- 8 High bandwidth analog inputs (used for composite video)
  - 75Ohm terminated at all frequencies
  - Gold plated matched low impedance RCA jacks
  - 1Vpp nominal input swing (Ypbpr) or 1.3Vpp (Cvbs) 4Vpp maximum (DC invariant)
  - DC rejection via capacitive coupling
  - Crosstalk < -80 dB
- 8 High bandwidth analog outputs (used for composite video)
  - Source impedance 75 Ohms
  - Gold plated matched low impedance RCA jacks
  - All output sets individually controllable/switchable
  - High performance amplifier capable of driving over 300ft of coax cable per output
  - 2V/V (video) gain to properly drive output load termination (zero effective gain at display)
  - 3dB bandwidth > 100 Mhz
- 32 Analog audio inputs
  - 10KOhm terminated at all frequencies
  - Gold plated matched low impedance RCA jacks
  - 4Vrms maximum (DC invariant) input range
  - DC rejection via capacitive coupling
  - 256 step programmable input volume equalization
  - Input audio delay adjustment
  - Crosstalk < -110 dB
- 32 Analog audio outputs
  - Source impedance 220 Ohms
  - Gold plated matched low impedance RCA jacks
  - All output sets individually controllable/switchable
  - 256 step programmable volume control with balance
  - Bass / Treble adjustment
  - Audio delay adjustment
  - Down conversion of PCM audio
  - THD+N < 0.0004%
- 6 Optical Digital audio inputs + 6 Optical Digital audio outputs
  - Optical digital audio inputs have built in shutters, no plugs needed
  - All outputs individually controllable/switchable
  - 256 step programmable volume control with balance
  - Bass / Treble adjustment
  - Audio delay adjustment
  - Up conversion of analog audio
- 16 Coax Digital audio inputs + 16 Coax Digital audio outputs
  - Gold plated matched low impedance RCA jacks
  - AC coupled to protect all connected equipment
  - Capable of driving over 300ft of coax cables
  - All outputs individually controllable/switchable
  - 256 step programmable volume control with balance
  - Bass / Treble adjustment
  - Audio delay adjustment
  - Up conversion of analog audio
- IR receiver (front)
- RS-232 control input (DB9 female) & RS-232 expansion output (DB9 male)
- Internal design
  - Flash programmable micro controller enables ZeroKey remote technology
  - Ultra wide bandwidth integrated buffered t-switch matrix prevents crosstalk or signal distortion
  - Independent professional quality video amplifiers for best performance

High reliability capacitors and self resetting fuse protection for long life  
Designed and manufactured in the USA

- Housing  
Black steel rack mountable housing 17" x 13" x 3.5" (2 RU)