

Models AC1120A 1121A 1122A 1123A *
16x16 and 8x8 VGA/HDTV Video Matrix
Switch with Front Panel, RS232, and
Optional Audio & IP Control




* This user's manual pertains to a variety of Black Box 16x16 and 8x8 video matrix switches that are constructed in a compact 2RU chassis. Some models have audio switching and IP control port, and some models do not.

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Table of Contents

1.0 GENERAL5

 1.1 FEATURES6

2.0 INSTALLATION6

 2.1 INPUT AUDIO & VIDEO CONNECTIONS6

 2.1.1 AV INPUTS ON STANDARD UNIT6

 2.1.1.1 VIDEO INPUTS.....7

 2.1.1.2 AUDIO INPUTS7

 2.1.2 AUDIO INPUTS ON UNITS WITH RJ458

 2.1.2.1 RJ45 input with Video and Power8

 2.1.2.2 RJ45 input with Video and Audio8

 2.2 OUTPUT AUDIO & VIDEO CONNECTIONS.....8

 2.2.1 AV outputs on standard unit8

 2.2.2 AV outputs on units with RJ45.....9

 2.2.2.1 RJ45 output with Video and Power (JP)9

 2.2.2.2 RJ45 output with Video and Audio (JA).....9

 2.2.2.3 RJ45 output with Video and RS232 Serial (JR)10

 2.3 POWER INPUT CONNECTION10

 2.4 CONTROL INPUTS.....11

 2.4.1 Basic Unit with RS-232 Control (no IP).....11

 2.4.1.1 Primary RS-232 Control Port.....11

 2.4.1.2 Auxiliary RS-232 Control Port11

 2.4.2 Units with IP control.....12

3.0 OPERATION.....12

 3.1 FRONT-PANEL BUTTONS AND INDICATORS.....12

 3.1.1 Viewing Audio and Video Routings or “Ties”13

 3.1.1.1 Viewing ties by Video and Audio.....13

 3.1.1.2 Viewing ties by Video only.....14

 3.1.1.3 Viewing ties by Audio only.....14

 3.1.2 Making Audio and Video Routings or “Ties”15

 3.1.2.1 Making a tie by Input.....15

 Video and Audio to follow each other15

 Video only or Audio only15

3.1.2.2 Making a tie by Output	16
Video and Audio to follow each other	16
Video only or Audio only	16
3.1.3 Recalling Presets (routing patterns)	16
3.1.4 Saving Presets (routing patterns)	16
3.1.5 Disconnecting all AV outputs (blank preset)	16
3.1.6 To reset system to factory defaults	17
3.1.7 To set the audio output level to high (+4dBu)	17
3.1.8 To adjust audio input gain and attenuation	17
3.1.8.1 Using the Front Panel VU meter	18
3.1.8.2 Adjusting the input audio Gain or attenuation	19
3.2 CONTROL COMMANDS (RS-232 AND IP)	20
3.2.1 Naming Functions	21
3.2.2 Routing Functions	21
3.2.2.1 To make a video tie:	22
3.2.2.2 To make an audio tie:	22
3.2.2.3 To make a synchronized audio/video tie:	22
3.2.3 Preset Pattern Saving and Routing Functions	22
3.2.3.1 To recall a saved preset Video routing pattern:	22
3.2.3.2 To save the current Audio & Video routing pattern to a preset:	22
3.2.4 Restoring Factory Defaults	23
3.2.5 Rebooting the System	23
3.2.6 Setting Outputs to PRO Audio Line Levels	23
3.2.7 To Adjust Audio Input Gain and Attenuation	23
3.2.8 To Read Volume Units (VU sound level) of output #1	24
3.2.9 To Read Temperature inside the Matrix	24
3.2.10 To Read the Firmware Version	24
3.2.11 To Read Supply Voltages	24
3.2.12 Real Time Clock Functions	25
3.2.12.1 To read or set date & time:	25
3.2.12.2 Scheduling Auto recall of Preset Patterns	25
3.2.12.3 To read or set a schedule	26
3.2.13 Routing RS-232 Communication through the Matrix	27
3.2.13.1 Basics of Serial Communication with the Outputs	27
3.2.13.2 Commands for Serial Communication with each Output	28

- 3.2.12 *IP Control Basics*29
 - 3.2.12.1 IP Setup Commands using the RS-232 Serial Port.....30
 - 3.2.12.2 IP Configuration through port 23.....32
- 4.0 MAINTENANCE AND TROUBLESHOOTING.....35**
 - 4.1 MAINTENANCE35
 - 4.2 TROUBLESHOOTING.....35
 - 4.2.1 *Calling Black Box*.....35
 - 4.2.2 *Shipping and Packaging*36
- 5.0 SPECIFICATIONS36**
- APPENDIX 1 – FRONT PANEL QUICK REFERENCE GUIDE.....37**
- APPENDIX 2 – COMMAND SUMMARY38**

About This Manual

This user's manual covers several variations of Black Box's 8x8 and 16x16 VGA/HD matrix switches. Five configurations of the matrix are discussed in this user manual per the table below. Since this is an all-encompassing user's manual, portions of this guide may not pertain to any specific unit.

AC1120A	8x8 VGA Matrix Switch With Serial Control
AC1121A	8x8 VGA & Audio Matrix Switch with IP and Serial Control
AC1122A	16x16 VGA Matrix Switch with Serial Control
AC1122A-RJ45	16x16 VGA to RJ45 Output Matrix Switch with Serial Control
AC1123A	16x16 VGA & Audio Matrix Switch with IP and Serial Control

*** Upon power-up, the switches output a string on their RS-232 port that identifies the unit's capabilities such as "BBox-I-A-8-8" (I=IP port, A= Audio, 8-8 = number of inputs and outputs respectively) There is also a command (RI) for reading the identity of the switch.

1.0 General

The AC1120A through AC1123A are compact high-end matrix switches for video and audio. The matrices are used for cross-point switching of video and audio signals. The switch provides 8 or 16 video (and audio) outputs, each capable of independently displaying any of 8 or 16 inputs in any combination. Additionally, the outputs can be blanked out and/or muted. The Matrices can be used in TV broadcasting environments, multi-media conference halls, public facilities, large display projects, schools, courtrooms, and command & control centers.

The units are compatible with PC video from 640x480 to 1920x1600 or analog SD/HDTV Component Video (YPbPr) from 480i to 1080p. The Matrix can be controlled in three ways: manually using the buttons on the front panel, through one or two serial RS232 control ports, or remotely via IP port.

1.1 Features

- ✓ Allows cross-point switching of PC or HD video and audio signals
- ✓ Multiple control methods including front panel, serial and IP ports
- ✓ Switched output can be blanked or muted
- ✓ Wide bandwidth to support PC resolutions to 1920x1200 or HD to 1080p
- ✓ Balanced stereo audio outputs allow interference free connections
- ✓ VU meter (sound level) bar graph display on the front panel
- ✓ Battery-backed Real-time clock on all models with scheduling capability
- ✓ Monitors system voltage levels and temperature
- ✓ Alerts user with a blinking CHECK light if system faults are detected
- ✓ Built-in universal power supply
- ✓ Inputs and/or outputs can be on RJ45 connectors for using Cat5 cables
- ✓ Embed audio, power, or RS232 along with the video on UTP
- ✓ Compact, Rugged, Reliable, and Economical
- ✓ Made in USA

2.0 Installation

The matrix is housed in a 2RU 19" wide rack mountable enclosure. All of I/O, control, and the power connections are on the rear of the unit.



Figure 1 – Rear panel of AC1123A showing all the connections

2.1 Input Audio & Video Connections

Below the input connections are described first for standard units (those with HD15 connectors) and then for units having RJ45 inputs. Please keep in mind that some of the following information may not apply to every matrix switch.

2.1.1 AV Inputs on standard unit



Figure 2 - Audio and video inputs on AC1123A

2.1.1.1 Video Inputs

The video connectors on the basic unit are HD15 female. These are compatible with PC's VGA video signal (RGBHV). The Matrix is also compatible with analog SD or HDTV signals (YPbPr) with resolutions from 480i to 1080p. To connect these types of signals to the Matrix, HD15 to 3-RCA cables may be required.

Technical Note about the Video Inputs

The HD15 inputs of the matrix handle only the color and sync signals. EDID (extended display identification data) is absent. EDID is normally used by the source PC to read pertinent information from the connected display. This information includes a list of the resolutions that are supported by the LCD. If EDID is not implemented, the source PC is unaware of the specific LCD connected to it. Generally this is not a problem since in the absence of EDID, most PC's allow the user to select from a set of default resolutions for output. Some PC's may not output any video signal, or only allow limited resolution settings with the absence of EDID. One way to resolve this is to change the display settings of the PC to show all modes and not detect Plug and Play LCD. The procedure for doing this varies depending on the operating system and the video card in the PC. It is generally found under: Control Panel > Display Settings > Advanced > Monitor tab.

An alternative method is a hardware solution which does not require any changes to the PC's display settings. Black Box manufactures EDID emulators that are constructed as simple HD15 pass-through adapters. Inside, they emulate an LCD's EDID supporting a wide range of 4x3 and 16x9 PC resolutions. These EDID emulators are sold separately.

2.1.1.2 Audio Inputs

The audio input on the basic unit uses standard 3.5mm mini-stereo connectors. To use these with PC audio, standard male-to-male audio extension cables would be required. To connect from typical TV sources with separate right and left connectors, 3.5mm male to 2 RCA cables would be needed. For mono audio, then the tip of the 3.5mm connector (tip=left channel) should be used.

Technical Note about the Audio Inputs

Since the audio inputs are unbalanced (single ended), the ground reference of the source has to be the same as the matrix. Of course the cable connecting the two is tying the grounds across but if there are currents flowing in the ground it can create potential differences that would manifest as noise. The quality of grounding at the audio source and the matrix are important. For example if the input source is a desktop PC, as long as the PC is properly grounded and the audio cable length is not excessive, you can expect good results. On the other hand if the input is a notebook PC running on battery, there is no ground reference at the source so it gets its reference through the audio (and video) cable connection to the matrix. This should also be okay. However if it is plugged in through its external power brick, noise can be induced. This is because most notebook power supplies do not properly provide an AC ground path to the system ground (some only have only 2 prong AC cords). The switching power supply circuit will inject noise into the audio lines. In this case the solution may be to attach a low resistance ground strap to the notebook. The other option for eliminating the noise is to use a stereo audio Balun (or isolator). The Balun essentially couples the audio through a transformer so the audio grounds are isolated. Baluns can also cure noise pickup in long cable runs.

2.1.2 Audio Inputs on units with RJ45

Two types of RJ45 input configurations may be possible. Please contact Black Box for availability and delivery information. The model number designates the input either as **RJ45 with power** or **RJ45 with Audio**.

2.1.2.1 RJ45 input with Video and Power

The **RJ45 with power** units are compatible with Black Box AC504 and AC602 series of senders. The Matrix can also send power to one channel senders via the Cat5 cable so that no external power supply would be needed.

2.1.2.2 RJ45 input with Video and Audio

The **RJ45 with audio** units are compatible with Black Box AC154A series of senders. These senders transmit VGA video and audio to the matrix. The audio is received as a balanced signal and is immune to noise pickup or ground noise.

2.2 Output Audio & Video Connections

The output connections are described below first for standard units (with HD15) and then for those with RJ45 outputs.

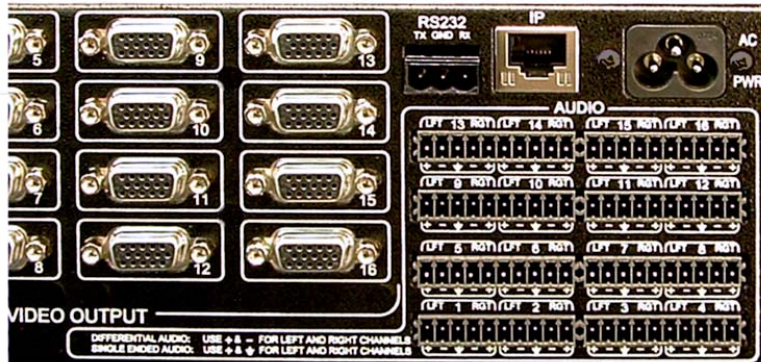


Figure 3 – Standard matrix audio and video outputs

2.2.1 AV outputs on standard unit

The video output connectors on the basic unit are HD15 female. These are compatible with PC's VGA video signal (RGBHV). The Matrix is also compatible with YPbPr HDTV signals with the use of HD15 to 3 RCA adapter cables.

The audio outputs of the matrix are balanced. So a + and a - are provided for each side. There is also a ground connection available. If you are going to connect the matrix output to a single-ended audio device (one with RCA or phono connectors); then use the + of the left, + of the right, and ground. On the other hand, if you will be connecting the output to professional audio gear it is best to use the differential + and - (balanced) outputs of each side that offer immunity to noise.

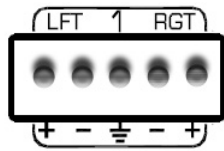


Figure 4 – Typical balanced audio output connector

The balanced audio outputs are provided on detachable screw-terminals. Mating connectors for all outputs are also provided.

Technical Note about Professional Audio Output

Matrices with Pro Audio option can individually adjust the audio levels at each input. Additionally they can set all the outputs to “pro line-level” of +4dBu. This is a global setting which boosts all the outputs to a high line level.

2.2.2 AV outputs on units with RJ45

Currently there are three types of RJ45 output configurations possible. Please contact Black Box for availability and delivery information. The model number designates the outputs either as **Video on RJ45 with power**, **Video on RJ45 with Audio**, and **Video on RJ45 with RS-232 Serial**.

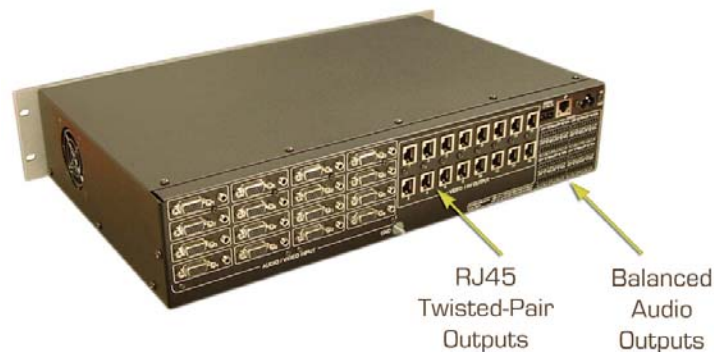


Figure 5 – Matrix Switch with UTP outputs

2.2.2.1 RJ45 output with Video and Power (JP)

Matrices with the **Video on RJ45 with power** output feature are compatible with Black Box AC504 and AC602 series of receivers. The Matrix can also send power to the remote receivers via the Cat5 cable so that no external power supply would be needed there.

2.2.2.2 RJ45 output with Video and Audio (JA)

The **Video on RJ45 with Audio** units are compatible with Black Box AC155 series of receivers. The audio is sent as balanced signal and is immune to noise pickup or ground noise.

Note about Screw-Terminal Audio Outputs on units with RJ45

If the matrix has the audio switching feature, then the balanced audio outputs are always active even if the RJ45 outputs have audio. It is important to note that the channel number for the audio output is the same. So RJ45 output #1 has the same audio as screw-terminal audio output #1.

2.2.2.3 RJ45 output with Video and RS232 Serial (JR)

The **Video on RJ45 with RS-232 Serial** units are compatible with the Black Box series of receivers for unidirectional (send only) and bidirectional RS-232 communications.

Technical Note about Video + RS232 Outputs

The matrices with **Video on RJ45 with RS-232 Serial** output option are capable of sending and receiving RS232 data independently at each of the RJ45 outputs with the video on the same Cat5 cable. The output channel number and baud rate are dynamically set by the user (via serial or IP control port). The matrix then sends user's command at the specified baud rate to the designated output and buffers any response from the selected end-point for the user to read back. This is described in further detail later in this manual.

2.3 Power input connection

The matrix has a built-in universal power supply. The AC input connector on the rear of the matrix is an IEC320/C6 and is always shipped with a North American power cord (shown below). Users in countries with a different plug type should purchase a compatible power cord or user an approved adapter. The Matrix supports both 110 V, 60 Hz and 220 V, 50 Hz power systems. There is a power on indicator light on the front panel



Figure 6 – End of IEC320 / C6 power cord

2.4 Control Inputs

The matrix can be controlled from either RS-232 or through IP.

2.4.1 Basic Unit with RS-232 Control (no IP)

The AC1120A and AC1122A (without IP feature) actually have 2 separate and independent RS-232 control ports.

The main RS-232 port is on a screw terminal and the auxiliary port is on an RJ45.

Caution on RJ45 Control Input

Since the matrices with the IP control and those without both have an RJ45 connector next to the RS-232 screw terminal, it is easy to confuse their function. The function of the connector should be labeled above it. A sure way to tell if the RJ45 control input is LAN or Serial is by the existence of little LED indicators to the sides of the connector. If the connector has these lights, then it is a LAN connection, otherwise it is an RS-232 serial connection.

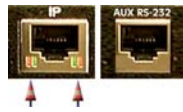


Figure 7 – IP input versus Auxiliary RS-232

2.4.1.1 Primary RS-232 Control Port

This is a 3-terminal captive screw input. A detachable mating connector is provided. The function of each pin is designated on the panel above the connector. Below is a diagram for connection this port to a PC's DB9 serial port.

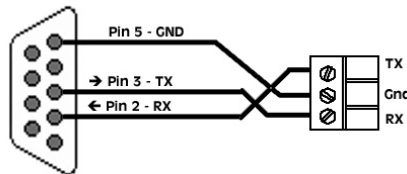


Figure 8 – Primary RS-232 to PC cable

2.4.1.2 Auxiliary RS-232 Control Port

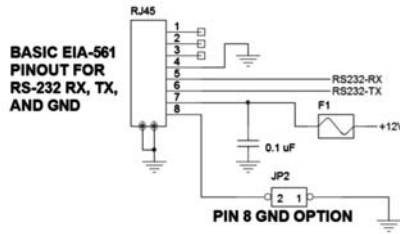
The matrix switches without IP control have a secondary serial port that can work independently of the primary port. The user can control the matrix from either or both ports.

The auxiliary RS-232 is on an RJ45. **Make sure to not connect this to any LAN devices.** The pinout for the auxiliary RS-232 follows the basic EIA-561 for TX RX and Ground. Optional current limited 12v DC may also be provided (max rated output current of 50ma) that can be used to power external keypads or

control devices. Please contact Black Box if you need to draw power from this connector.

Caution High-Voltage

Never open the unit's cover. Lethal voltages exists inside the unit
Opening the unit also voids the warranty on the unit.



The pinout for the RJ45 connector is shown in Figure 9.

Figure 9 – Aux RS-232 port pinout

2.4.2 Units with IP control

Models AC1121A and AC1123A are equipped with 10/100 base-T Ethernet connection and can be controlled via IP. They also have the primary RS-232 serial control port on the screw terminal input. The command set for controlling the matrix via the IP port is exactly the same as the RS-232 port. The basic method of control is via Telnet. Please see section 3.2.12 IP Control Basics for details.

3.0 Operation

The Matrices can be operated using the front panel buttons, by serial commands via RS232, or through the IP port.

3.1 Front-Panel Buttons and Indicators

An image of the front panel for the 8x8 matrix is shown below. The 16x16 units have more INPUT and OUTPUT buttons than shown in this picture.



Figure 10 –AC1120A front panel controls & indicators

The front panel can be used for the following purposes:

- ∞ Monitor Power On/Off status
- ∞ View current routings (ties) either from input or from output
- ∞ Make new ties either from input or from output
- ∞ Blank or mute a particular or all outputs
- ∞ Recall preset patterns
- ∞ Save preset patterns
- ∞ Disconnect all ties
- ∞ Adjust volume (gain level) of each input's audio for Pro versions
- ∞ Display current sound level as a digital light bar VU meter
- ∞ Set the output audio to high line level (of +4dBu) on Pro units
- ∞ Recall factory presets

All of the front panel switches have built-in LEDs that help in the operation. The functions of front panel are carefully designed for intuitiveness. With just a little practice, one can learn to quickly monitor and control the matrix.

3.1.1 Viewing Audio and Video Routings or “Ties”

There are three different ways to view a tie: Video & Audio, Video only, or Audio only. The point of view can also be either from input side (where the selected input is routed to), or from the output side (see which input is feeding the selected output). You can also use the ▲ and ▼ buttons to quickly go through and check status of all channels. Furthermore, during viewing of ties you can make new ties.

3.1.1.1 Viewing ties by Video and Audio

Press and release both VID and AUD buttons so that the LEDs of the VID and AUD buttons are lit, which indicates that you are going to view both together.

At this point you have to decide if you want to view from the point of view of the input or the output side.

... To View from input side

Press and release any **Input** button, the backlit LED of that button will light, and all the backlit LEDs for the outputs whose video and audio are both currently tied to this input will also light up solid.

Note

If there is audio breakaway, the output LED will not be lit. An example may be that output #2 video is tied to input #7 while output #2 audio is tied to input 12. In this case if you start the viewing from input #7, output #2 will not be lit even though input 7 video is routed to it. To see video ties independently from audio ties, only the Video or the Audio LED on the front panel should be lit, not both.

You can now use the ▲ and ▼ buttons to quickly go through all inputs.

You can also make new ties by hitting output buttons. New ties will not take effect unless ENTER is hit (see next section).

When you are done viewing ties, to exit you can hit ENTER. If you don't hit any buttons, then after 8 sec the view function times out and all the input and output LEDs will go out.

... To View from output side

Press and release any **output** button, the backlit LED of that button will light, and if that output's video and audio are tied to one particular input, that input LED will also light.

Note: If there is audio breakaway, the input LED will not be lit

You can now use the ▲ and ▼ buttons to quickly go through all outputs. You can also make new ties by hitting another input button. New ties will not take effect unless ENTER is hit (see next section).

When you are done viewing ties, to exit you can hit ENTER. If you don't hit any buttons, then after 8 sec the view function times out and all the input and output LEDs will go out.

3.1.1.2 Viewing ties by Video only

Press and release the AUD and/or VID buttons so that the backlit LED of the VID button is lit and the AUD button is off

At this point you have to decide if you want to view from the point of view of the input side or the output side.

... To View from input side

Press and release any **Input** button, the backlit LED of that button will light, and all the backlit LEDs for the outputs whose video is currently tied to this input will also light up solid.

You can now use the ▲ and ▼ buttons to quickly go through all inputs.

You can also make new ties by hitting output buttons. New ties will not take effect unless ENTER is hit (see next section).

When you are done viewing ties, to exit you can hit ENTER. If you don't hit any buttons, then after 8 sec the view function times out and all the input and output LEDs will go out.

... To View from output side

Press and release any **output** button, the backlit LED of that button will light, and if that output's video is tied to any input, that input LED will also light.

You can now use the ▲ and ▼ buttons to quickly go through all outputs.

You can also make new ties by hitting another input button. New ties will not take effect unless ENTER is hit (see next section).

When you are done viewing ties, to exit you can hit ENTER. If you don't hit any buttons, then after 8 sec the view function times out and all the input and output LEDs will go out.

3.1.1.3 Viewing ties by Audio only

Press and release the AUD and/or VID buttons so that the backlit LED of the AUD button is lit and the VID button is off

At this point you have to decide if you want to view from the point of view of the input side or the output side.

... To View from input side

Press and release any **Input** button, the backlit LED of that button will light, and all the backlit LEDs for the outputs whose audio is currently tied to this input will also light up solid.

You can now use the ▲ and ▼ buttons to quickly go through all inputs.

You can also make new ties by hitting output buttons. New ties will not take effect unless ENTER is hit (see next section).

When you are done viewing ties, to exit you can hit ENTER. If you don't hit any buttons, then after 8 sec the view function times out and all the input and output LEDs will go out.

... To View from output side

Press and release any **output** button, the backlit LED of that button will light, and if that output's audio is tied to any input; then that input LED will also light.

You can now use the ▲ and ▼ buttons to quickly go through all outputs.

You can also make new ties by hitting another input button. New ties will not take effect unless ENTER is hit (see next section).

When you are done viewing ties, to exit you can hit ENTER. If you don't hit any buttons, then after 8 sec the view function times out and all the input and output LEDs will go out.

3.1.2 Making Audio and Video Routings or “Ties”

This procedure is an extension of “Viewing Ties” described in above paragraphs.

3.1.2.1 Making a tie by Input

Video and Audio to follow each other

Make sure both VID and AUD LEDs are lit, indicating that your changes will be synchronized (audio and video are together). Video and audio will be routed to the same input channel.

Press and release any **Input** button, the backlit LED of that button will light, and all the backlit LEDs for the outputs tied to it will light up solid. At this point, pressing any output buttons will be breaking or making connections.

To disconnect a tie, press the lit output button once. To make new ties, press any of the unlit output buttons. The output LED will be blinking to indicate a pending change of state. If you change your mind simply press the blinking output LED again and it will go back to its previous state.

When you are done, press ENTER to save new changes. If you wait too long (8 seconds of inactivity) your changes will be lost and all the input and output LEDs will go out.

Video only or Audio only

Press and release the AUD and/or VID buttons so that the backlit LED of the desired button is lit and the other one is off.

Follow the same procedure as described above

3.1.2.2 Making a tie by Output**Video and Audio to follow each other**

Make sure both VID and AUD LEDs are lit, indicating that your changes will be synchronized (i.e. audio and video are from the same input).

Press and release any **Output** button, the backlit LED of that button will light, and all the backlit LEDs for the input tied to it will light up solid. At this point, pressing any output buttons will be breaking or making connections.

To disconnect a tie, press the lit input button once. To make a new tie, press any of the unlit input buttons. The new input LED will be blinking to indicate a pending change of state. If you change your mind simply press the blinking input LED again and it will go back to its previous state.

When you are done, press ENTER to execute and save the changed route. If you wait too long (8 seconds of inactivity) your changes will be lost and all the input and output LEDs will go out.

Video only or Audio only

Press and release the AUD and/or VID buttons so that the backlit LED of the desired button is lit and the other one is off. Follow the same procedure as described above.

3.1.3 Recalling Presets (routing patterns)

The number of presets accessible from front panel is the same as # of inputs (however through the IP or Serial port, the unit can store and recall up to 16 presets even for an 8 input Model)

Press and release the Preset button. The button will light up solid. Then press and release the input button (it will light up) and hit ENTER. You have 8 seconds to hit ENTER or the action will be cancelled. This will recall the desired preset tie pattern.

Note that a recalled preset replaces the current tie configuration, which will be lost unless it has been stored as another preset.

3.1.4 Saving Presets (routing patterns)

The current tie configuration can be saved as a preset to be called up later on.

To save the current AV routing pattern, press and hold the PRESET button for 3 sec, the backlit LED will start flashing (this means that save preset function has been activated). Press the desired input button to save the preset (the button with light up). Then hit the ENTER button to complete the operation. Again, you have 8 seconds to complete this sequence.

3.1.5 Disconnecting all AV outputs (blank preset)

There is a hidden blank preset (think of it as Preset #0) in the system that can be very useful in clearing all ties. A blank preset is a preset without any ties selected in it. To Recall a blank preset, press and release the Preset button, press and hold the ARROW UP (▲) button, and simultaneously press the ARROW DOWN (▼)

button. This will clear all ties. From here, the user can make new ties or save the blank tie over a preset that had ties in it which effectively erases that preset.

3.1.6 To reset system to factory defaults

Disconnect the AC power from the unit. Press and hold the ENTER button on the front panel while plugging in AC power. Continue to hold the ENTER button until all LEDs on the front panel flash on. System reset clears all ties, presets, schedule settings, and unit name.

3.1.7 To set the audio output level to high (+4dBu)

This function is applicable to units with Pro Audio option only. The matrix's Audio outputs can be globally set for high pro-audio line levels of (+4dBu). Setting the pro output affects all the outputs simultaneously.

Press and hold the AUD button for approximately 3 seconds until the backlit LED starts to blink. Either the ▲ (for high output) or the ▼ (for low output) button LED should be lit indicating a Pro-audio level (of +4dBu) or a standard-audio level setting (of -10dBV).

Note

If you select an input channel in this mode, the Output level setting mode will be terminated and the unit will enter input gain attenuation setting. To go back to the audio-level changing mode again, unselect the current input channel by pressing it once

3.1.8 To adjust audio input gain and attenuation

This function is applicable to units with Pro Audio option only. It is very useful for ensuring no noticeable volume difference among the audio sources, and compatibility with a mixture of consumer and pro line levels at the inputs.

Press and hold the AUD button for approximately 3 seconds until the backlit LED starts to blink. Press and release an input button whose audio you want to adjust. The associated input LED lights up, the matrix will temporarily route the audio input from the selected channel to audio output #1 and monitor its level on the front panel. Any other outputs tied to this selected input channel stay connected during this adjustment procedure.

The installer can connect an external VU meter to output #1 or rely on the front panel (bottom row of lights) that would act as a digital VU meter.

In this mode both rows of 16 LED's on the front panel serve a function.

The top row not only shows the channel for which you are adjusting the audio (solid lit), but it also shows audio volume setting blinking position. The bottom row (output LED's) acts as a VU meter.

Note about VU Meter Function

The front panel VU meter function is available on both the 16x16 and the 8x8 units with standard or Pro audio versions. However on the standard version the ▲ and ▼ buttons do not change the volume level. The user can do that at the source and use the matrix to monitor the level.

3.1.8.1 Using the Front Panel VU meter

This function is useful for ensuring no noticeable volume difference among the audio sources for models AC1121A and AC1123A.

All units with audio option have this feature. Enter the audio adjustment mode as described above. The bottom row of LEDs (output channel row) indicates the sound level. The indicated gain/attenuation is based on the matrix's internal reference level of -10dBV (standard line-level).

On a 16x16 matrix LED position 10 corresponds to 0 VU (desired peak level). Position 1 corresponds to -20 VU and position 16 corresponds to +6 VU.

The bottom row of 8 or 16 LEDs indicate the sound level. Position 10 (or 5 for 8x8 matrix) is used to correspond to 0 VU (desired peak level).



Figure 11 –Comparison with Analog VU meter on 16x16 Matrix

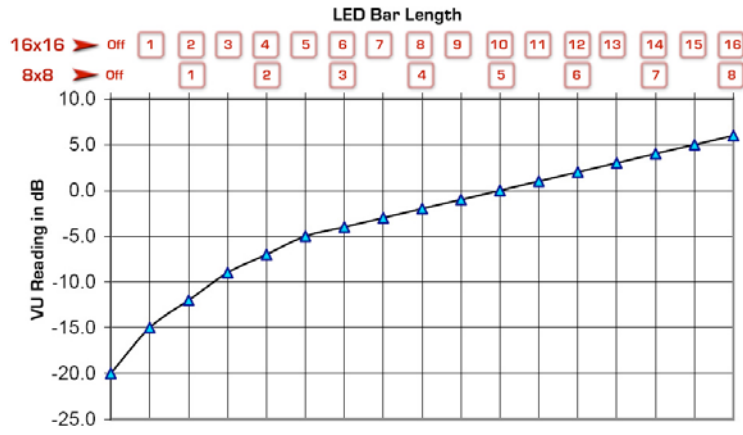


Figure 12 – Graph of VU dB level versus LED bar length

3.1.8.2 Adjusting the input audio Gain or attenuation

Enter the audio adjustment mode as described above.

Initially the audio gain level at the input is set to 0 db (gain of 1). Press and release the ▲ or ▼ button to change the gain settings. Each push is about 1db change (see graph below). Press and hold the UP or DOWN button for more than 1 second, the gain will keep changing at the rate of 3dB per second. As you increase or decrease the volume, besides the LED on the top row that is showing the input channel you are adjusting, another blinking LED indicates the audio gain setting. Again, position #10 indicates 0 db (or gain of 1). The range of adjustment is about -24 dB to +6 dB (position 1 to position 16).

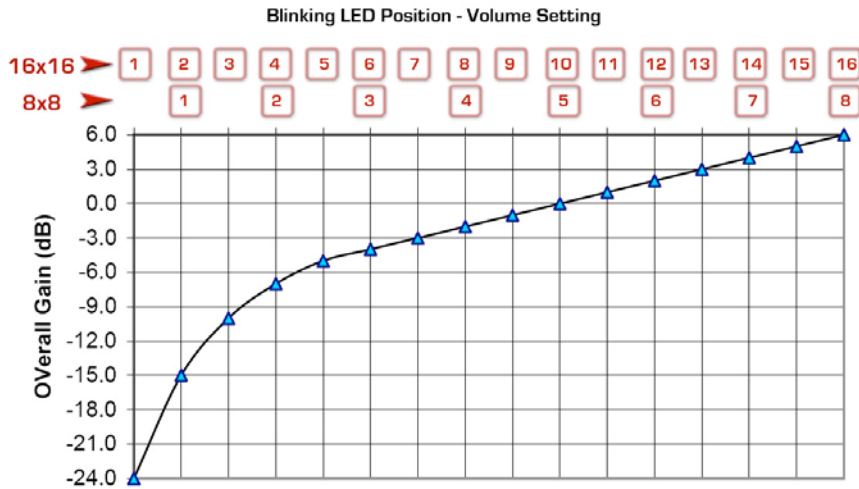


Figure 13 – Graph of Audio Gain level versus Volume setting LED position

In adjusting the volume you want to keep the sound level as read on the VU meter at or below Position 10 (0 VU) for the loudest level at the input.

When finished, press the ENTER button to save any changes or exit the audio adjustment mode. When you exit this mode, the last audio input that was routed to output #1 prior to entering the setting mode will be restored!

Audio Setup mode times out if no activity is detected for 1 minute, the last input gain settings will be saved.

3.2 Control Commands (RS-232 and IP)

The matrices can be controlled via an external control system by using RS-232. Additionally, Models AC1121A and AC1123A can be controlled through an IP port. Any program capable of standard serial communication in ASCII format is capable of working with the matrices. Most PCs with Microsoft Windows operating systems have HyperTerminal™ pre installed with this capability. There are also many free Terminal Emulator and Telnet software programs available for download on the internet.

Note on RS-232 port availability on your PC

Most PCs and notebooks do not have a serial port. So to program the Matrix Switch you may need a USB to RS-232 Serial converter. These are available from Black Box (Model IC199A-R3).



Figure 14 – USB to RS-232 Adapter

Use Figure 8 to connect the unit to the PC's serial port. Use 9600 Baud, 8 bits, No Parity, 1 Stop bit, No flow control.

Upon power up, the matrix will output a screen similar to the figure below through its serial port(s).

```
Unit's name:  
Version 2.4  
Build # 7  
BBox-I-A-8-8
```

Figure 15 – Power on screen

Note on RS-232 commands

When the front panel is in use (for example to make new ties or recall presets, etc), only status request commands are accepted. Any other command will be prompted with the following response:

Front panel is in use<cr>

Fortunately, all front panel operations have a timeout function so even if a user started to use the panel but forgot to finish the process, it will time out in a few seconds and full serial port functionality will be restored.

3.2.1 Naming Functions

The matrix unit can be named. Its name can be up to 10 characters long.

To assign or retrieve a unit name:

Command: NU<cr> *stands for Name Unit*

Response:

XXXXXXXXXX *(current name up to 10 characters)*

Rename unit:

No change<cr>

If you hit <cr> or wait 5 seconds (command times out) the unit will respond with:

Cancelled<cr>

Otherwise you have 5 seconds to change the name by entering up to 10 ASCII characters followed by <cr>. If you just send a <cr> then the stored name will not be changed. If you enter more than 10 characters, then the 1st 10 characters will be saved as the name and the rest discarded.

3.2.2 Routing Functions

Wildcard character

Video routing commands are specified from the point of view of the output.

The **wildcard character** ‘*’ is acceptable for output (but not input). This means that any place a ‘*’ is used as a valid command, it means ALL OUTPUTS. For example, CV*,1 means to connect all outputs to input #1.

Blanking Video or Muting Audio

When a ‘0’ is used as an input channel number, it means that the intent is to either blank (when used with a video command), mute (when used with an audio command) or both. For example, CV*,0 means to blank all video outputs. CA*,0 means to mute all audio outputs.

In addition, these commands can be used to monitor or query the status of system ties. Omitting the input channel will result in a response of the current routing for that output. In entering channel numbers leading zeros are acceptable hence you can specify channel 7 as 07 or just 7.

3.2.2.1 To make a video tie:

Command: CVn,m<cr> *stands for Connect Video n = output, m= input*

Note: Unit accepts leading zeros in the numbers. Spaces are ignored. To check the source of a particular output, omit the input channel and just enter CVn<cr>.

Response: CVn,m<cr>

If you enter CVn<cr> then you will get the response as above for the n output

3.2.2.2 To make an audio tie:

Command: CAn,m<cr> *stands for Connect Audio n = output, m= input*

Note: Unit accepts leading zeros in the numbers. Spaces are ignored. To check the source of a particular output, omit the input channel and just enter CAn<cr>.

Response: CAn,m<cr>

3.2.2.3 To make a synchronized audio/video tie:

Command: CON,m<cr> *stands for Connect Output n = output, m= input*

Note: Unit accepts leading zeros in the numbers. Spaces are ignored. To check the source of a particular output, omit the input channel and just enter CON<cr>.

Response:

CAn,m<cr>

CVn,m<cr>

Note: If the system does not have audio, it will still accept this command but response will be missing audio tie line.

3.2.3 Preset Pattern Saving and Routing Functions**3.2.3.1 To recall a saved preset Video routing pattern:**

Command: PRx<cr> *stands for Preset Recall. x = preset # can be 1 to 16*

Response:

PRx<cr>

CVn₁,m₁<cr>

CVn₂,m₂<cr>

3.2.3.2 To save the current Audio & Video routing pattern to a preset:

Command: PSx<cr> *stands for Preset Save, x = preset # can be 1 to 16*

Response:

PSx<cr>

3.2.4 Restoring Factory Defaults

To restore factory defaults:

Command: FR<cr> stands for *Factory Restore*

Response: Are you sure (Y,N)?<cr>

Note: You have 5 seconds to press Y, or the command is cancelled.

Factory defaults restored<cr> if the "Y" was entered.

Cancelled<cr> if other key was entered or command times out.

Note: Restore Factory command will clear all ties, presets, schedule settings, and unit name. -AP units with input volume adjustment will set input volume to 0 dB (gain of 1) on all channels. Upon completion of this command, all LEDs on the front panel will flash on and off.

3.2.5 Rebooting the System

To perform a system reset/reboot (same effect as cycling AC power):

Command: FB<cr> stands for *Firmware Boot*

Response:

Are you sure (Y,N)?<cr>

Note: You have 5 seconds to press Y, or the command is cancelled.

3.2.6 Setting Outputs to PRO Audio Line Levels

The matrix's outputs can be set for Pro-audio line levels of (+4dBu). Setting the pro output affects all the outputs simultaneously and has no bearing on the audio input volume adjustment procedure.

To set audio output line-level mode:

Command: LPn<cr> stands for *Line level Pro n = 0,1 (0 consumer, 1 pro)*

If the parameter n is missing, then the unit will respond with the current setting.

Response: LPn<cr>

3.2.7 To Adjust Audio Input Gain and Attenuation

This command is valid for units with Pro Audio (-AP). The wildcard character '*' is acceptable for input audio channel. In addition, this command can be used to monitor or query the audio input gain. Omitting the gain value will result in a response of the current setting for that output

To set the audio gain (default value is 10 that corresponds to a gain of 0 db):

Command: AGn, g<cr> stands for *Audio Gain n = input channel (could be *), g = value (0 to 16 where 0 is mute & 16 is +6dB see figure 14 X-axis 0 to 16)*-Response: AGn, g<cr>

Note: if you enter AGn<cr> then you will get the response as above for the n input

3.2.8 To Read Volume Units (VU sound level) of output #1

This command returns the height of hypothetical bar LED indicator having a height of 16 segments. It will return a number from 0 to 16 with 10 being 0 db levels. So if the output #1 is at 0 dB (900 mV p-p Sine wave) it returns 10. This value is 0-16 regardless of the type of matrix.

Command: RB<cr> *stands for Read Bar*

Response: 0 ~ 16<cr> *10 would be 0 dB on a VU meter*

3.2.9 To Read Temperature inside the Matrix

Command: RT<cr> *stands for Read Temperature*

Response:

Temperature in degrees C = 32.500000<cr>

Temperature in degrees F = 90.500000<cr>

3.2.10 To Read the Firmware Version

Command: RI<cr> *stands for Read Identity*

Response:

Unit's name: ← *User defined name of the unit*

Version 2.4 ← *Firmware Version*

Build # 7 ← *Build number (for mfg purposes only)*

BBox-I-A-8-8 ← *Model #/Characteristics of the unit*

3.2.11 To Read Supply Voltages

The supply voltages consist of clock battery voltage, 5V supply, and 12V supply.

Command: RV<cr> *stands for Read Voltages*

Response:

RTC Battery Voltage = 2.9876704

+5V Supply = 4.9473252

+12V Supply = 12.4646893

3.2.12 Real Time Clock Functions

3.2.12.1 To read or set date & time:

Command: DS<cr> *stands for Date Set*

Response:

Friday 09/18/08 12:27:15pm

Enter the year (00-99): *Hit Enter if you want to keep previous value; hit Esc to exit*

Enter the month (01-12):

Enter the date (01-31):

Enter the day of the week (1=Sun – 7=Sat):

Enter the hour (1-12):

Enter the minute (00-59):

Enter the second (00-59):

Enter AM/PM (0-1):

Notes: *You have 16 seconds to make your selection, or the command is automatically cancelled. To skip the current prompt without making a change, press ENTER.*

Cancelled <cr> *(if ESC or an invalid value was entered)*

3.2.12.2 Scheduling Auto recall of Preset Patterns

The matrix provides up to 4 specific times throughout the day where any preset patterns (0 to 16) can be recalled. You can set a schedule that is the same every day (daily) or is different for weekdays and weekends. Presets 1 to 16 are those saved by the user, and preset 0 disconnects all video and audio outputs

Notes on Scheduling Presets

When defining a schedule, to skip the current prompt without making a change, press ENTER. Press ESC to exit the schedule setting at any time. Timer values should be entered in the proper order meaning that Timer1 should occur prior to Timer2, Timer2 should occur prior to Timer3, and etc. Timers will be disabled if hour, minute, and AM/PM are set to 0. So if for example, your schedule only has to set the pattern once in the morning, leave the data for timers 2 through 4 at zero and only enter values for timer 1. If Timer values are not set properly (in ascending order), an error message will be prompted

3.2.12.3 To read or set a schedule

Command: SS<cr> *stands for Schedule Set (current schedule is displayed)*

Response:

```

----- Weekday ----- (on/off)
Timer1 = 06:00am   Preset Pattern = 1
Timer2 = 12:05pm   Preset Pattern = 3
Timer3 = 05:30pm   Preset Pattern = 7
Timer4 = 09:00pm   Preset Pattern = 12
----- Weekend ----- (on/off).
Timer1 = 02:00am   Preset Pattern = 1
Timer2 = 06:00am   Preset Pattern = 5
Timer3 = 12:00pm   Preset Pattern = 13
Timer4 = 06:00pm   Preset Pattern = 16
    
```

- (on/off) indicates if the Schedule is in-effect or not.
- Weekday and weekend are both on or both off.
- If the 4 timers are not in ascending order, the unit does not let you turn the schedule on; fix any inconsistencies before turning on.
- 00:00am is not a valid time setting and is used to turn off a timer

Select Schedule Setting

- 1 = Weekday
- 2 = Weekend
- 3 = Daily
- 4 = Schedule On
- 5 = Schedule Off

ESC = Quit

Note: You have 16 seconds to make your selection, or the command is cancelled.

Response: *if "1", "2" or "3" were entered*

Enter weekday Timer1 hour (00-12): *Hit Enter if you want to keep previous value*

Enter weekday Timer1 minute (00-59):

Enter weekday Timer1 AM/PM (0-1):

Enter weekday Timer1 preset pattern (0-16): *Remember Preset 0 disconnects outputs*

..... *(Data for timers 2 & 3, hit Esc if you are done at any time)*

Enter weekday Timer4 hour (00-12):

Enter weekday Timer4 minute (00-59):

Enter weekday Timer4 AM/PM (0-1):

Enter weekday Timer4 preset pattern (0-16):

Response: *if "4" was entered (schedule on).*

Schedule setting is ON<cr>

- - - - Alternate Response: *In case of an inconsistency or error in entry*

Schedule setting cannot be ON because weekday (weekend) TimerX is less than or equal to TimerY<cr>

Response: *if "5" was entered (schedule off).*

Schedule setting is OFF<cr>.

Response: *if "ESC" was entered (Quit).*

Quit schedule setting<cr>.

3.2.13 Routing RS-232 Communication through the Matrix

3.2.13.1 Basics of Serial Communication with the Outputs

The Matrices with the Serial Output Option are capable of sending serial commands to each of the outputs.

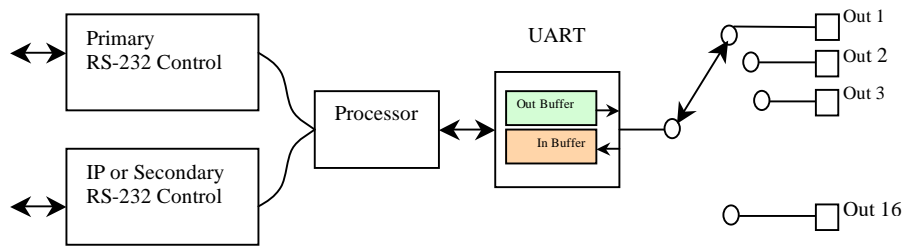


Figure 16 – RS-232 Communication Methodology

The block diagram above depicts the way a user can communicate serially with a remote devices connected to the matrix's outputs. Matrix units with JR output option can send video and serial through the same RJ45 output connector. A compatible receiver must be used at the remote end (such as UR-232 for transmit only).

Referring to the above diagram, two control ports are shown on the left. The user communicates with the matrix's internal processor through either of these ports.

As seen on the right side of the block-diagram, the matrix must first establish UART (RS-232 engine) connection to one of the matrix's output ports. There is a specific command for doing this which makes the connection and also clears both the input and output buffers of the internal UART.

Once the UART is pointed to the desired output, then any data received from the remote device (1~16), is stored in the "IN BUFFER". There is a command to read this buffer. Upon receiving this command the matrix will send the entire contents of the input buffer to the user and erase the buffer.

To send commands out to the remote device (1~16), the user can issue a transmit command followed by a string of characters (ASCII or Hex), these characters are stored in the UART's output buffer. The user's string must end with a special "Terminal Character" followed by a Carriage Return. At that point the UART will empty the output buffer to the selected remote device at the specified baud rate (Terminal Character and subsequent CR will not be sent).

3.2.13.2 Commands for Serial Communication with each Output

All serial communication commands start with the letter X

1. Command: XC,n <Cr> *Stands for X Connect*

Connects the UART an output (n) if n not specified, then it reports which output the UART is pointed to.

Response: XC, n <Cr> This indicates that the command completed successfully

2. Command: XT <Cr> *Stands for X Transmit*

After this the matrix will wait for a max of 5 seconds to get the string of bytes that are to be sent out. The number of bytes cannot exceed 64. If you have more than 64 characters to send then you have to use multiple commands.

The unit stores all characters in a buffer and then sends all characters at the specified baud rate to the desired output channel.

The unit does not care what data or characters are sent and they can range from hex 0 to hex FF. What designates the end of the string are two specific bytes:

17h 0Dh -- 17 hex (^W) followed by 0D hex (Carriage Return)

17hex is considered to be a special Terminal Character. When the unit receives 17h then it looks for a CR to follow it. If CR does not follow the 17h, then the 17h is assumed to be part of the user's string.

On the surface there appears to be a restriction in that the user's string cannot contain 17h 0Dh back-to-back. However, the matrix has a special provision for the rare case when the user's data is to contain 17h 0Dh back-to-back. Inserting 17h 17h 0Dh results in the transmission of 17h 0Dh and is not interpreted as a termination of the stream.

After the 17h 0Dh the system initiates transmission of the string received to the target at the specified baud rate. The user must wait for this process to finish prior to issuing another command.

Response: OK <Cr>

3. Command: XR <Cr> *Stands for X Receive*

The matrix stores the last 64 bytes received from the target in a receive FIFO, then upon receipt of this command it sends whatever it has (as binary) out to the user. Nothing if the buffer is empty.

Response: Any characters in the receive FIFO buffer.

4. Command: XB,n <Cr> *Stands for X Baud*

If n is not specified it reports the current baud rate (1-8).

n = 1, 2, 3, 4, 5, 6, 7, 8

Baud = 1200, 2400, 4800, 9600, 19.2k, 38.4k, 57.6k, 115.2k respectively

Response: XB,n <Cr>

5. Command: XP,n <cr> *Stands for X Parity*

n = 0 1 2

Tranmit Parity to target = None, Odd, Even respectively

Response: XP,n <cr>

3.2.12 IP Control Basics

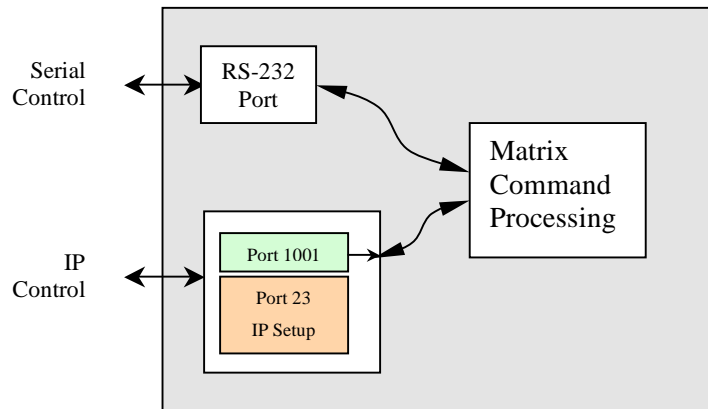


Figure 17 – Control Block Diagram

As shown in the figure above, the matrix can be controlled via RS232 Serial port or through an IP (Ethernet) port if equipped. If the unit is missing the IP port, then in its place, there is an auxiliary 2nd serial control port (see section 2.4.1).

The IP port of the matrix can be accessed via Telnet (interactive TCP connection). Two ports are available, one for controlling the matrix and the other to configure the IP parameters.

Though not recommended, using port 23 you can change the Ethernet interface's IP parameters such as IP address, gateway, port number, etc. The IP settings can also be accessed through the unit's RS232 serial port (recommended).

Port 1001 by default is used to control the matrix (this port number can be changed as part of the IP Settings). The commands used to control the matrix are the same as those through the RS-232 Serial port.

3.2.12.1 IP Setup Commands using the RS-232 Serial Port

IP interface on the matrix has a unique MAC-address, and it must be assigned a valid IP-address to function properly on the network. As shipped from factory this IP is 192.168.123.180

- 1. To get into the IP setting mode:

Note: Inactivity period of 16 seconds causes the system to exit this mode. You can also hit ESC to end the IP setting mode.

Command: IP <cr> stands for IP setting mode

Response:

Enter IP commands:

This is the normal response meaning that IP setting through the RS-232 port is allowed

----- Alternate Response -----

IP commands not enabled. Please refer to the manual

This message indicates that IP setting through the RS-232 port is disabled on your unit. Please refer to section 3.2.12.2 below to enable this mode

- 2. To get the current IP address of the matrix box:

Command: GIP <cr> stands for Get IP address.

Response: 192.168.123.180

- 3. To set a new IP address:

Command: SIP192.168.123.179 <cr> stands for Set IP address.

Response:

OK *if command completed successfully.*

Error *if command failed.*

- 4. To get the current gateway IP address:

Command: GGI <cr> stands for Get Gateway IP address.

Response: 192.168.123.122

- 5. To set a new gateway IP address:

Command: SGI192.168.123.125 <cr> stands for Set Gateway IP address.

Response:

OK *if command completed successfully.*

Error *if command failed.*

6. To get the current subnet mask:

Command: GNM <cr> stands for Get Net Mask.

Response: 255.255.255.0

7. To set a subnet mask:

Command: SNM255.255.255.0 <cr> stands for Set Net Mask.

Response:

OK *if command completed successfully.*Error *if command failed.***8.** To get the current port number (this is the port to access the matrix):

Command: GPN <cr> stands for Get Port Number.

Response: 1001

9. To set a port number (IP port that controls the Matrix):

Command: SPN1000 <cr> stands for Set Port Number.

Response:

OK *if command completed successfully.*Error *if command failed.***10.** To get a device/host name:

Command: GDN <cr> stands for Get Device Name.

Response: BB1123-A

Note on Device Name

This is the host name assigned to the IP port; it is independent of the name assigned to the matrix (NU command), though you can use the same name if you wish!

11. To set a device name:

Command: SDNnew_name <cr> stands for Set Device Name.

Response:

OK *if command completed successfully.*Error *if command failed.***12.** To reboot the system for the changes to take effect:

If you change the IP address, Subnet mask, etc., the changes do not take effect unless you reboot the unit. You can do this by unplugging the AC from the unit and reconnecting it in a few seconds, or by using the FB command discussed earlier. However, you must first exit the IP setup mode by hitting Esc.

3.2.12.2 IP Configuration through port 23

If you were unable to enter the IP setting mode through the serial command, a Telnet TCP programming method should be used to turn on RS-232 serial mode programming, or even to configure the network settings directly through port 23.

To open a Telnet session, a command prompt (Run: CMD) or a HyperTerminal window can be used:

For example, to run a HyperTerminal window, set it up for TCP/IP connection on PORT 23 along with the Matrix's default IP address as the host address.

Telnet commands and replies have the following format:

STX	Command/reply	CR
-----	---------------	----

∞ STX character (ASCII code 2 or CTRL-B from the keyboard)

The unit will respond with <CTRL-B> A for most valid commands.

1. To use the IP configuration Telnet commands, you must first log in using the (L) command.

Command: <CTRL-B> L <CR> stands for Log in

2. To enable a serial IP setting (serial programming) mode, type the following commands:

Command: <CTRL-B> SSE2 <CR> Stands for Set Serial Enable

Command: <CTRL-B> SEC6 <CR> Stands for Serial Enable Char

Command: <CTRL-B> O <CR> stands for log out

Reboot the system by cycling power. Now you should be able to configure IP parameters through the IP port.

Alternatively, instead of rebooting the system you could use <CTRL-B> <E> <CR> to reboot the IP port, this may cause a momentary loss of Telnet connection.

3. To get the current IP address:

Command: <CTRL-B> GIP <CR>

Response: <CTRL-B> A 192.168.123.180 <CR>

4. To set a new IP address:

Command: <CTRL-B> SIP192.168.123.179 <CR>

5. To get the current gateway IP address:

Command: <CTRL-B> GGI <CR>

Response: <CTRL-B> A 192.168.123.122 <CR>

6. To set a new gateway IP address:

Command: <CTRL-B> GGI192.168.123.125 <CR>

7. To get the current subnet mask:

Command: <CTRL-B> GNM <CR>

Response: <CTRL-B> A 255.255.255.0 <CR>

8. To set a subnet mask:

Command: <CTRL-B> SNM255.255.255.0 <CR>

9. To get a port number:

Command: <CTRL-B> GPN <CR>

Response: <CTRL-B> A 1001 <CR>

10. To set a port number:

Command: <CTRL-B> SPN1000 <CR>

11. To get the current device name:

Command: <CTRL-B> GDN <CR>

Response: <CTRL-B> A BB1123-A <CR>

12. To set a new device name:

Command: <CTRL-B> SDNconcert_hall <CR>

13. To Reboot device for the new parameters to take effect:

Command: <CTRL-B> E <CR>

Response: none! May lose connection

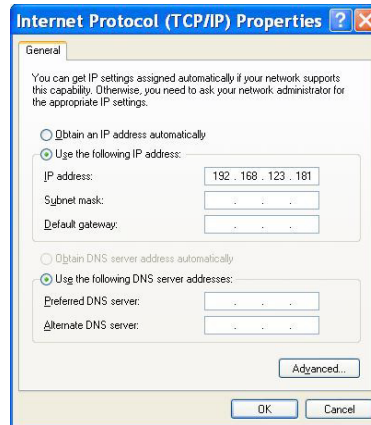
14. To log out :

Command: <CTRL-B> O <CR>

Response: <CTRL-B> <CR>

Note on IP Settings through port 23

If you are unable to access the unit's port 23 from your PC using the matrix's default or last known IP address, it could be that the IP address of the matrix is not compatible on your LAN. One way around this is to connect your PC directly to the Matrix's IP port using a cross over cable, or use a switch or router not connected to anything else but your PC and the Matrix, and then configure your PC for a static IP compatible with the current address of the matrix. If the matrix has the factory default of 192.168.123.180, a PC address of 192.168.123.nnn may be entered where nnn is any number except 180.



Note on Accessing the Matrix via the Internet

It is best to contact your IT or network administrator for assistance. As mentioned earlier you can control the matrix through its IP via port 1001 (default). Most likely, the unit will be on a local network connected to an Ethernet Switch or Router with a WAN connection. To access the matrix from outside your local network, you should configure the Ethernet Switch or Router to treat the IP and port assigned to the matrix as a virtual server this is a setting of your switch or router. Then you can access the matrix from anywhere on the internet via your WAN address and assigned port. It is advised to set the matrix's Gateway address the same as your Ethernet switch or router's Gateway IP address. In case of trouble, please contact your IP administrator for assistance.

4.0 Maintenance and Troubleshooting

4.1 Maintenance

The front panel CHECK button LED starts flashing if one of the following conditions occurs:

- ∞ RTC Battery Voltage is below 2.4V
- ∞ +5V Supply is outside of normal operating range 4.5V – 5.5V
- ∞ +12V Supply is outside of normal operating range 10.8V – 13.2V
- ∞ System temperature is exceeding 122° F (50° C)

If the battery needs changing, please contact Black Box (during the warranty period).

Caution High-Voltage

Never open the unit's cover. Lethal voltages exist inside the unit. Opening the unit also voids your warranty.

If there is a problem with the 12 or 5v supplies, you need to return the unit for repair. Please see next section. If the temperature is excessive in the unit, you must make sure that there is adequate airflow around the unit.

4.2 Troubleshooting

Make sure that all your connections are solid, and check the state of the LED's on the front of the unit. Do not open or try to repair the unit yourself. There is no customer repairable item in the unit and you will void your warranty.

4.2.1 Calling Black Box

If you determine that your unit is malfunctioning, do not attempt to repair the unit. Contact Black Box Tech. Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- The nature and duration of the problem;
- The components involved in the problem
- The results of any testing you have already done.

4.2.2 Shipping and Packaging

If you need to transport or ship your matrix:

- Package it carefully. We recommend that you use the original container.
- Before you ship the unit back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

5.0 Specifications

Video Inputs	8 or 16 HD15 female connectors
Video Outputs	8 or 16 HD15 female connectors
Resolutions Supported	PC resolutions up to 1900x1200 @ 60 Hz & HDTV to 1080p
Video Levels	-0.3v to 0.7v (1 V p-p) on RGB, 0 to 5v DC on Sync
Audio Inputs	Unbalanced Stereo.
Audio Input Levels	0 to +4dBu (0.78 to 1.23Vrms) line level
Audio outputs	Balanced Stereo on screw terminals.
Audio Bandwidth	10 Hz to > 10 MHz (could pass through analog or digital S/PDIF audio sources)
Temperature	Operating: 32 to 122°F (0 to 50°C); Storage: -40 to +185°F (-40 to +85°C)
Enclosure	Steel with Aluminum front panel
Battery Type	CR2032 (3v Lithium)
MTBF	90,000 hours (calculated estimate)
Power	100VAC-240VAC 50/60Hz.
Size	3.5" High x 19" Wide 12.78" Deep
Weight	9.4 pounds

Appendix 1 – Front Panel Quick Reference Guide



Figure 18 – Control buttons on the front panel

Function	Procedure
View ties or Make ties	<ul style="list-style-type: none"> <input type="checkbox"/> Hit VID and/or AUD buttons to light desired <input type="checkbox"/> Hit any of the INPUT or OUTPUT Buttons <input type="checkbox"/> To change ties, hit any INPUT or OUTPUT then hit ENTR <input type="checkbox"/> Use ▲ and ▼ buttons to quickly scroll
Recall Presets	<ul style="list-style-type: none"> <input type="checkbox"/> Hit PRE (button lights up) <input type="checkbox"/> Hit any of the 16 INPUT buttons <input type="checkbox"/> Hit ENTR
Save Presets	<ul style="list-style-type: none"> <input type="checkbox"/> Hold PRE until it starts blinking <input type="checkbox"/> Hit any of the 16 INPUT buttons <input type="checkbox"/> Hit ENTR
Disconnect all outputs	<ul style="list-style-type: none"> <input type="checkbox"/> Hit PRE (button lights up) <input type="checkbox"/> Hold ▲ <input type="checkbox"/> While holding the ▲, hit ▼ button
Reset to Factory Defaults	<ul style="list-style-type: none"> <input type="checkbox"/> Disconnect power <input type="checkbox"/> Hold ENTR <input type="checkbox"/> While holding ENTR, plug power

Appendix 2 – Command Summary

Command	Function
CO _{n,m}	<p>Connect Output (both A&V). n = output, m= input</p> <ul style="list-style-type: none"> ❑ Omitting ,m will show current connections ❑ Substitute * for n to tie all outputs
CV _{n,m}	<p>Connect Video output. n = output, m= input</p> <ul style="list-style-type: none"> ❑ Omitting ,m will show current connection ❑ Substitute * for n to tie all outputs
CA _{n,m}	<p>Connect Audio output. n = output, m= input</p> <ul style="list-style-type: none"> ❑ Omitting ,m will show current connection ❑ Substitute * for n to tie all outputs
PR _x	Preset Recall... x = preset # can be 1 to 16
PS _x	Preset Save ... x = preset # can be 1 to 16
NU	Name Unit
FR	Factory Restore (back to default settings)
FB	Firmware Boot (Resets the entire system)
RT	Read Temperature
RI	Read Identity (firmware version, & characteristics)
RV	Read Voltage levels (battery, power supply)
RB	Read Bar (reads VU level of output #1)

	Left Chan)
DS	Date and Time Set
SS	Schedule Set
IP	Access or change IP settings of Matrix
	<input type="checkbox"/> GIP (get IP) SIP (set IP)
	<input type="checkbox"/> GGI (get Gateway) SGI (set Gateway)
	<input type="checkbox"/> GNM (get Net Mask) SNM (set Net Mask)
	<input type="checkbox"/> GPN (get Port No.) SPN (get Port No.)
	<input type="checkbox"/> GDN (get Dev Name) SPN (set Dev Name)



AC1120A, rev. 2

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