ZIGEN

User Manual

Matrix Routing Switch
HDMI 4x4

HX-44

V.2012HX44.00

Before You Begin

- Follow all instructions marked on the device during using.

- Do not attempt to maintain the device yourself.

- Provide proper ventilation and air circulation and do not use near water.

- The system should be installed indoor only. Install either on a sturdy rack or desk in a well-ventilated place.

- Do not use liquid cleaners to clean the device.

- Always unplug the power to the device before cleaning.

- Unplug the power cord during lightning or after a prolonged period of non-use to avoid damage to equipment.

Table of Contents

1.0 Matrix System Overview

1.0.1 Introduction

ZIGEN HX-44 Matrix Switcher is high performance HDMI matrix switcher designed for applications where routing of high resolution digital video signals are required. HX-44 Matrix switch is HDMI 1.3c compatible and supports resolutions up to 1920x1200 and HDTV 1080p/60, HX-44 also ensures simultaneous distribution of any input source signal to one or more compliant displays.(one-to-one / one-to-many combination)
HX-44 matrix switchers are ideal for use in smaller bars, restaurants, commercial and residential environments where distribution of high resolution, digital video signals are needed and digital pathway is essential for maintaining the highest possible image quality from all sources.
HX-44 can be operated via the front panel, RS-232 serial control or IR

Figure 1-1 HX-44 Matrix

1.0.2 Packing

	HDMI Matrix Host
	RS-232 Communication Connecting Cable
	Adapter
	IR Extended Line
	Controller
	HDMI Matrix Software CD
	User Manual
	2 Rack-Mount Bracket
	6 Screws (for Brackets)

2.0 Host Installation

The HDMI Series Matrix Host is made of metallic housing. It can be placed on a sturdy desk directly or installed on a 19-in bracket. See Figure 2-1 below:

Figure 2-1 Mount the HDMI Matrix Host on a Standard Bracket

3.0 Specifications

Function	HX-44
Input Connector	4 x HDMI Type A
Output Connector	4 x HDMI Type A
RS-232 Connector	DB9 Female
Select Switch	13
LCD Module	1
Max. Resolution	1080P
Highest TMDS Frequency	225 MHz
HDMI Cable Distance	10 meter (Max.)
Power Adapter (Min.)	DC 12V
Housing	Metal
Weight	2350 g
Dimensions (LxWxH)	440x185x42mm

4.0 Front/Rear Panels

4.0.1 Rear Panel

Figure 4-1 HX-44 Front Panel

The HX-44 Matrix Switching System supports up to 4 Output/Input switching keys on the front Panel allow you to switch signals quickly.

Operation methods as follows:
"Output Channel" + "Input Channel"

- **OUT 1~4 keys** (output channel)**:** Indicate the Channel 1~Channel 4 for HDMI signal output to peripheral display. You can also use these keys to adjust the status or access the settings

- **IN 1~4 keys** (input channel)**:** Indicate the Channel 1~Channel 4 for HDMI signal input. You can use these keys to switch to the connection of the connected signal source channels.

- **IR1:** Infrared receiver.

- **All:** This key allows you to set single input channel to all output channels.
    - Press **"All"** key.
    - Select one of the IN 1~4 keys.
    - The selected **IN x** key will deliver the signal to all output channels.
    - You can also press **"All"** key and then the **"OFF"** key to disable all the displayed images.

- **OFF:** Disable the entire output channels. Press one of the **OUT x** keys that you want to disable, then press the **OFF** key.

- **STO:** The **"Store Key"** saves all current input/output corresponding relations.
    - Press the **"STO"** key.
    - Arrange the Output and Input channel combinations.
    - The relation between the Output and Input settings will be saved in the memory temporarily.

- **RCL:** The **"Retriever Key"** retrieves the saved input/output corresponding relations.
    - Press the **"RCL"** key.
    - Then press the previously saved output channel key
    - The system will retrieve the saved input/output status and implement current status switching.

- **EDID: FIX** (fix mode) and **TV1** (access the first output channel) selection key.
    - **FIX mode:** The **HX-44** will supply a set of fixed **EDID** values to support up to 1080P high performance TV.
    - **TV1 mode:** The **HX-44** will access the **EDID** values of high performance TV that is connected to the first output channel, and copy the **EDID** value to all the input channels so that the DVD player can support all the HDTV's.

- **LCD:** LCD display shows current HDMI matrix status and operation status.

4.0.2 Rear Panel

Figure 4-2 HX-44 Rear Panel

The HX-44 supports up to 4 input/output jacks on the rear panel, each 4th row HDMI female terminals form the signal input/output jacks.

- **RS-232:** Use the **RS-232** connection cable to connect the computer serial port (COM1 or COM2) to the **RS232** communication port of the HDMI matrix host. The computer can then be used to control the HDMI matrix after installation of application software. The RS-232 port is a 9-pin female connector.
- **DC 12V:** The Power is applicable for DC12V
- **IR2:** Connect to the IR Extended Receiver.
- **INPUT 1~4:** HDMI input Channels for source devices
- **OUTPUT 1~4:** HDMI output Channels HDTV's or Monitors.

HDMI Type A Connector pin definition:

Pin #	Signal	Pin #	Signal
1	TMDS Data2+	11	TMDS Clock Shield
2	TMDS Data2 Shield	12	TMDS Clock-
3	TMDS Data2-	13	NC
4	TMDS Data1+	14	NC
5	TMDS Data1 Shield	15	DDC-SCL
6	TMDS Data1-	16	DDC-SDA
7	TMDS Data0+	17	DDC-Ground
8	TMDS Data0 Shield	18	+5V Power
9	TMDS Data0-	19	Hot Plug Detect
10	TMDS Clock+		

5.0 HDMI Matrix and Peripherals Connection
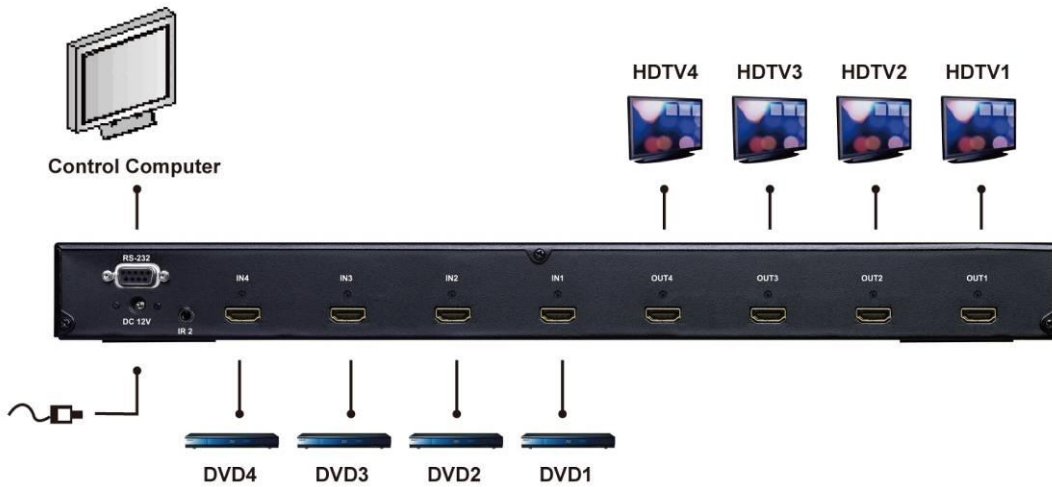
Figure 5-1 HDMI Matrix System Connections

5.0.1 Input/Output Connections

Use the HDMI connecting cable to connect the Input/Output port (No.1 ~ No.4) to the HDMI port of the DVD Player/HDTV.
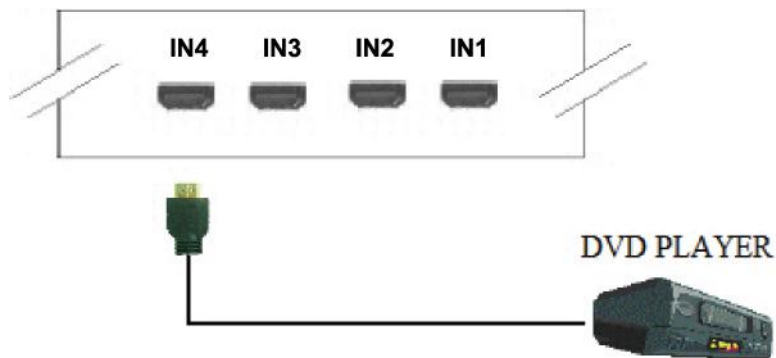
Figure 5-2 Input Connection
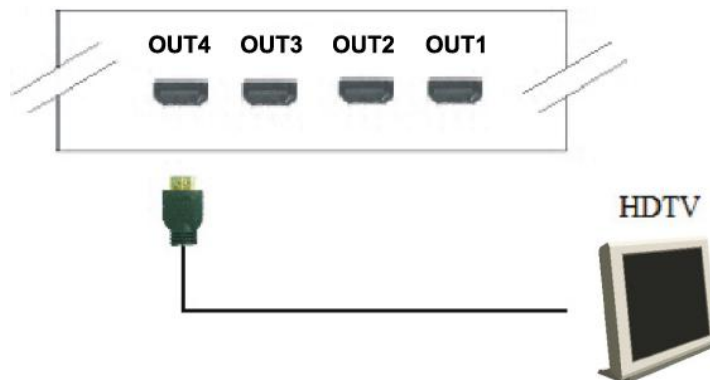
Figure 5-3 Output Connection

5.0.2 HDMI Matrix and Control Computer Connection

Use the RS-232 connecting cable to connect the computer serial port (COM1 or COM2) to the RS-232 communication port of the HDMI matrix host. The computer can then be used to control the HDMI matrix after installation of application software. Aside from using the front panel keys for switching operation, you are also permitted to use the RS-232 connection port for remote operation.
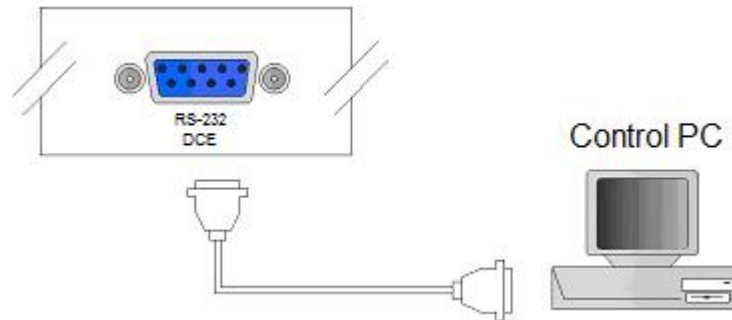
Figure 5-4 HDMI Matrix and Computer Connection

The Leg functions are described as below:

Pin No.	Leg	Description
1	N/u	Null
2	Tx	Send
3	Rx	Receive
4	N/u	Null
5	Gnd	Ground
6	N/u	Null
7	N/u	Null
8	N/u	Null
9	N/u	Null

Female DB9(From PC)
Pin4 Connected to Pin6
Pins 1,7,8 Connected together

Male DB9(To Matrix)

Figure 5-5

Note:Flow control=None

Female DB9(From PC)   Male DB9(To Matrix)

Figure 5-5 (a)

Female DB25(From PC)   Male DB9(To Matrix)
Pin20 Connected to Pin6
Pins 4,5,8 Connected together
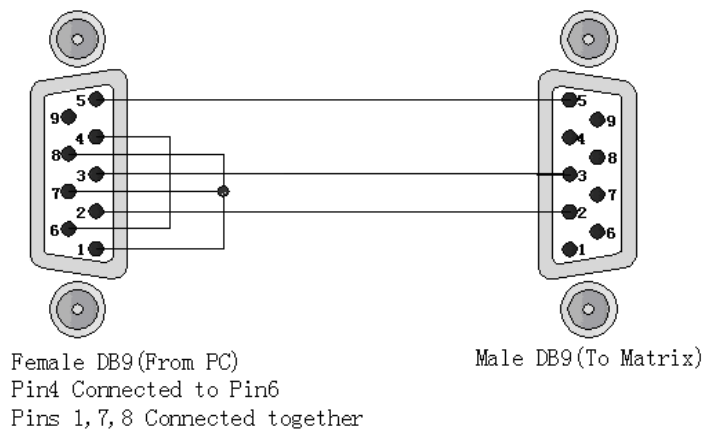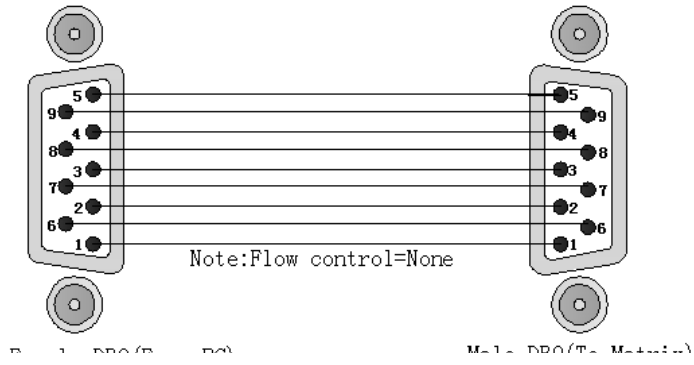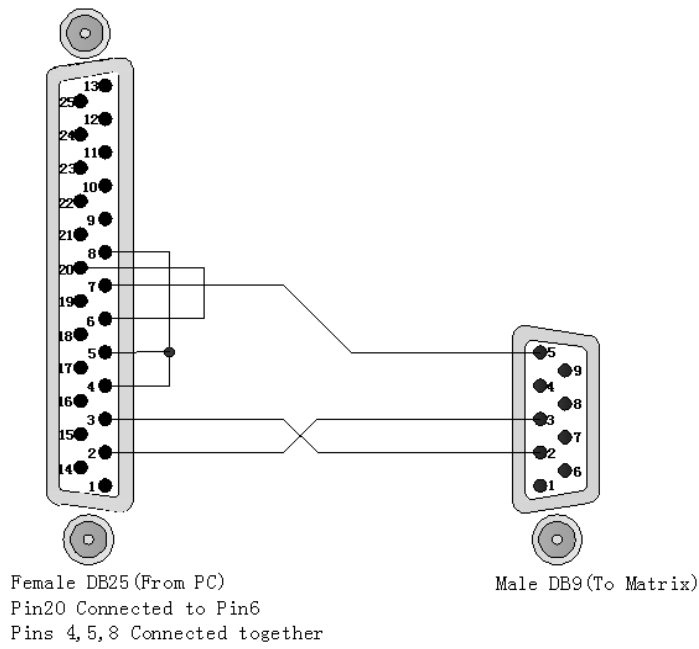
Figure 5-5 (b)

☞ The Matrix RS-232 port is defined as DCE.

5.0.3 IR2 Connection

The HDMI matrix provides you an IR Extended Line for more convenient to react to the controller. Please connect the IR Extended Line to the IR2 port that is on the rear panel.
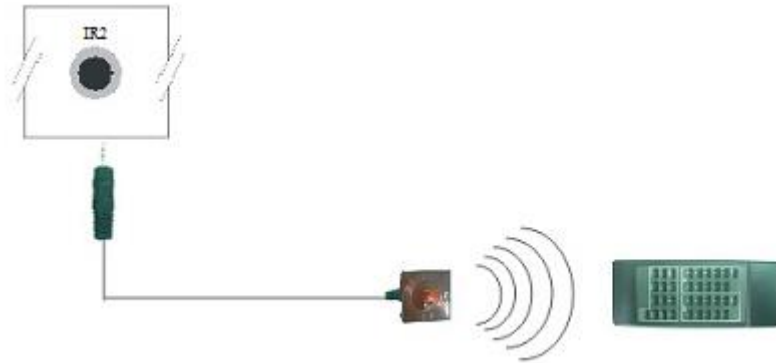
Figure 5-6 IR Connection

5.0.4 Power connection

Use the included adapter to connect from the power port on the rear panel of HDMI matrix host to the outlet.
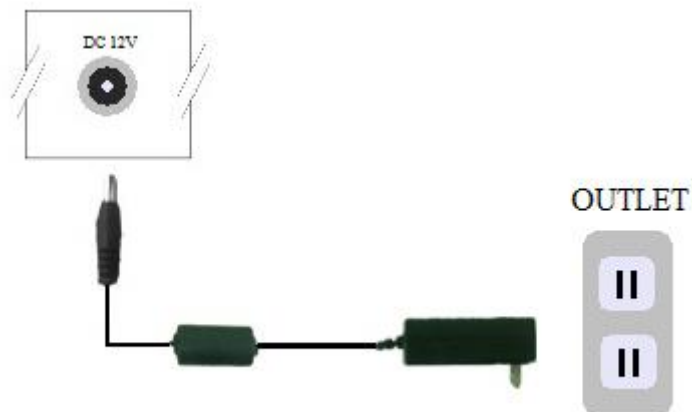
Figure 5-7 Power Connection

6.0 Matrix Application Software

6.0.1 Software Introduction

The 《AV Matrix》 Matrix control software applies to different input/output matrixes.

6.0.1.1 Software Description

The《AV Matrix》matrix testing software is an application tool developed for matrix testing and application. The software operation environment is as follows:

   Window98/2000/NT/XP operating systems
   32M internal memory or above
   10M hard disk space or above
   CD-ROM
   At least one serial communication port

6.0.1.2 Software Activation

First, you must power off both the HDMI matrix and the computer. Then, connect the matrix RS-232 port to the PC RS-232 port with the bundled communication cable. (Refer to the previous section **"HDMI Matrix and Control Computer Connection".**

Power on the **HDMI** matrix and the computer:
Activate the **AV Matrix.exe** on the bundled CD-ROM in the control computer to enter the software configuration screen.

6.0.2 Software Features

The software controls signal connection between the corresponding input port and output port as required. The main configuration screen is shown below:
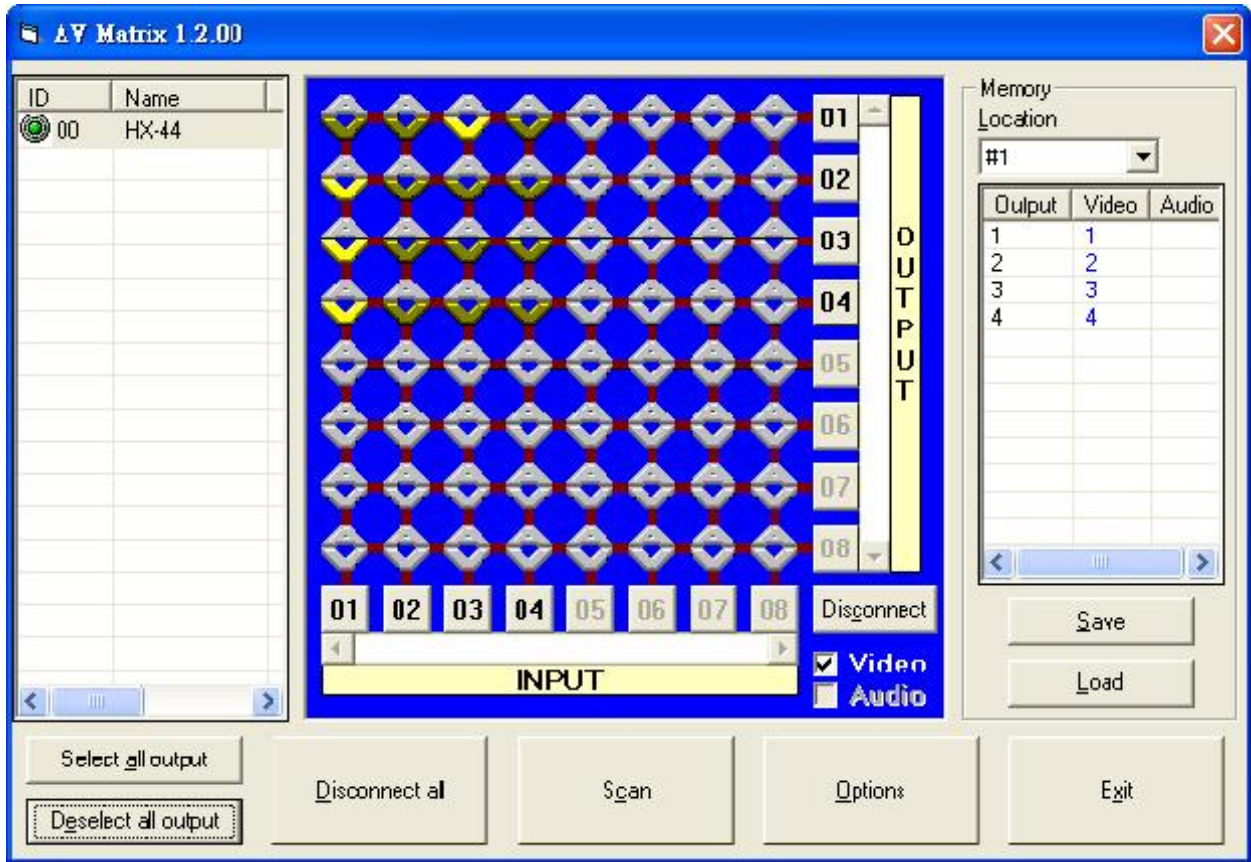
Figure 6-1 《AV Matrix》Software Configuration Screen

☞ HX-44 is integrated Video/Audio switching equipment; please select the **Video** check box before you begin to operate the software.

Scroll on the left area of the main screen to view contents as shown below.

6.0.2.1 Main Operation Interface Functions

Refer to the main configuration screen as above, the marked blue area shows crossing matrix of output ports 01-04 and input ports 01-04. Basic operation is described as below:

Example, Selecting Matrix Switching Functions:

HX-44 matrix having all the input/output ports properly connected to the equipment. If you want to set channel 1 input to channel 2, 3 and 4 output; channel 3 input to channel 1 output. There are 2 ways to implement the switching. Please follow the ways and steps to finish the switching functions:

First: Make sure you have selected **"Video"** check box (☑ Video). Directly click on the

corresponding icons on the matrix 🔷 to transform them into 🔷 to complete the

switching operation.

Second:

    Step 1: Make sure you have selected **"Video"** check box (☑ Video).

    Step 2: Select the **"Output"** number keys 02, 03 and 04 to the right of the blue configuration area, and select the **"Input"** number key 01 below. Then, press consecutively the previously selected **"Output"** number keys 02, 03 and 04 (or you can press the **"Deselect all output"** key). This way, you have selected **"Input"** 01 and **"Output"** 02, 03 and 04 switching.

    Step 3: First select the **"Output"** number key 01 to the right of the blue configuration area, and select the **"Input"** number key 03 on the bottom. Then, press the previously selected **"Output"** number key 01 (or you can press the **"Deselect all output"** key). This way, you have selected Input 03 and Output 01 switching.

Upon completion of the above 3 steps, you have actually completed the switching operation of having channel 1 input to channel 2, 3 and 4 output while at the same time successfully switched from channel 3 input to channel 1 output.

The main configuration screen also shows you some function buttons for easy operation:

Disconnect: To disable the connections. After you had configured the connection between input and output ports, you can click this button to disable the connections.
Select all output: Click this button to select all output ports including output 01~04.
Deselect all output: Click this button to cancel presently selected output ports. After you had configured a connected combination, please click this button first for next settings.
Disconnect all: To stop feed to all connections.

Scan: To refresh the values of the configuration screen. Any changed settings directly on the HX-44 equipment will not respond to the AV Matrix operating interface, you have to click the **Scan** button to refresh the configuration screen so that it may show the changed values.

Options: Allows you to configure the **Port number** and **Baud rate**.

Exit: Click this button to exit the configuration screen.

Save: Click this button to save the connected combinations for both output ports and input ports.

Load: Click this button to retrieve the previously saved settings.

For more information and operations, please refer to next chapters.

6.0.2.2 Disconnect Function Keys

Disable all the unused output ports.

A specific example of operation is described as below:

The present input and output relations are shown in Figure 6-2 below:
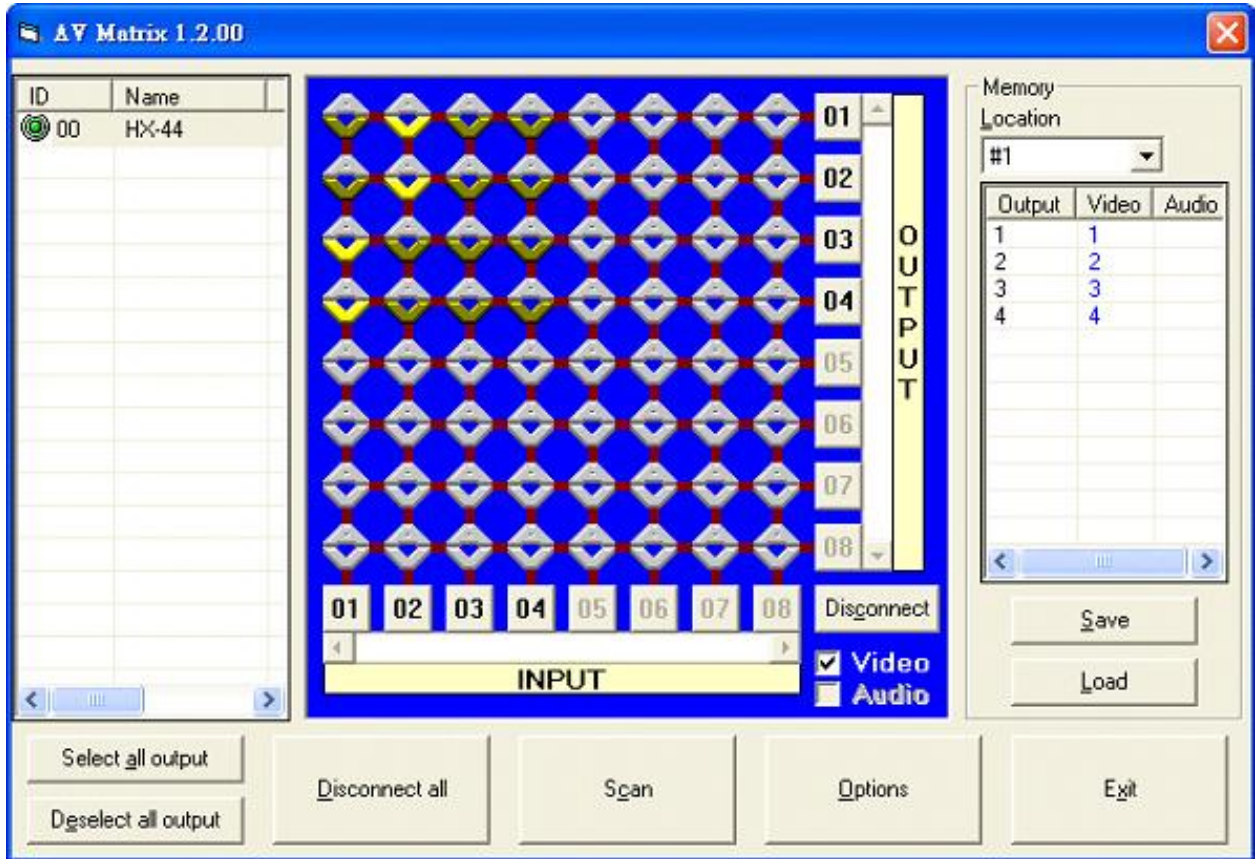
Figure 6-2

First you have to disable the output ports including port 03、02、and 01.

> **Step 1:** First press down the output number keys 03, 02 and 01 to the right of the blue configuration area.
>
> **Step 2:** Press the **"Disconnect"** key;
>
> **Step 3:** Press the previously pressed output number keys 03, 02 and 01 (or press the **"Deselect all output"** key) to complete the operation.

The final results will be as shown in Figure 6-3 below:
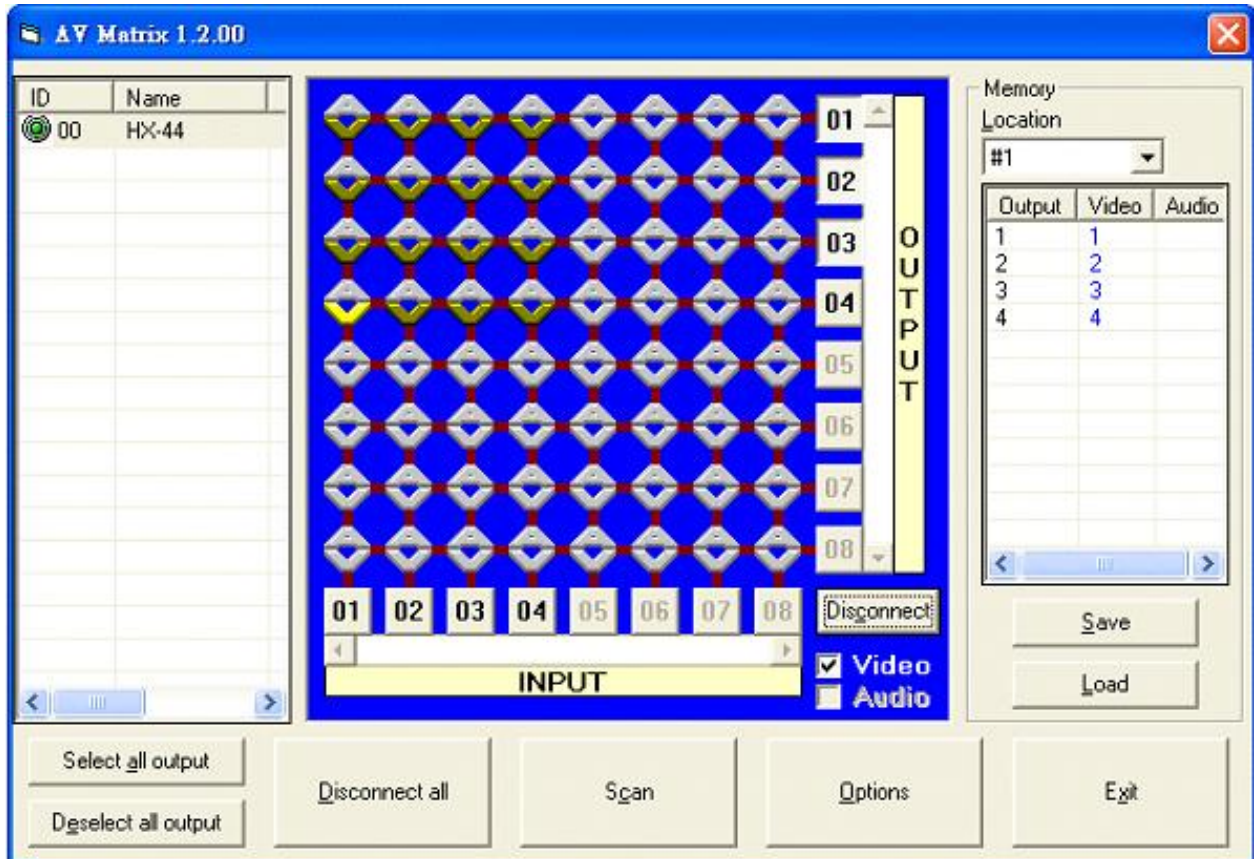
Figure 6-3

6.0.2.3 Select all output, Deselect all output Switching Functions

（1）**Select all output Function Description:** You can use this function to select all output ports to output one input port.

A specific example of operation is described below:
Example: Your HX-44 matrix with all input and output ports properly connected to the equipment. The needed input/output ports should be set to channel 1 input and sent to all output-ports.

Make sure you have selected the **"Video"** check box (☑ Video). Then, press the **"Select all output"** key and select the input number key 01. Click on the matrix icons along the 01 row to transform them into to complete the command operation.

（2）**Deselect all output Function Description:** It is used to disable the **Select all output** function.

6.0.2.4 Disconnect all Command

Function Description: To disable all switching functions. Press the **"Disconnect all"** key to disable all the connections of input and output ports.

6.0.2.5 Memory Function

Function Description: To store and retrieve the settings.

Store Function Description: The **Store Function** saves all the preset input/output switching relations to any Location from #1 to #4 you desire.

A specific example of the Store Function is described below:

Stores all the preset input/output switching relations to Location #1. First, select Location #1, as shown in the figure below. Then click the **Save** key to save all the preset input/output switching relations to Location #1.
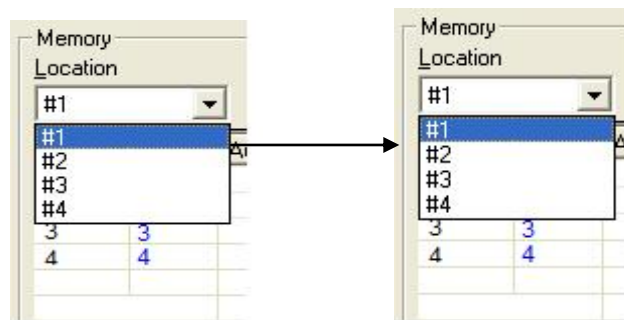
Figure 6-4

Retrieve Function Description: To retrieve the saved input/output switching relations.

A specific example of the Retrieve Function is described below:

To retrieve the input/output corresponding relations saved in Location #1. First, select Location #1 as shown in the figure below. Then click the **Load** key to retrieve all the input/output corresponding relations stored in Location #1.
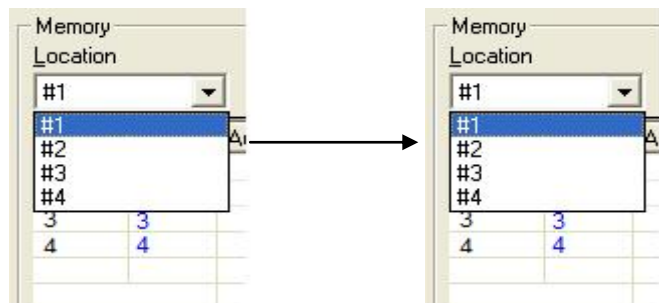
Figure 6-5

6.0.2.6 Options Function

Activation Function:

In the main configuration menu, select **Options** to drop down the **Options Window** as shown in Figure 6-6（a）
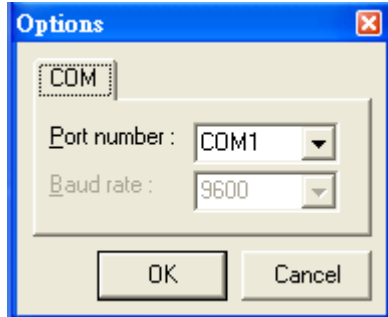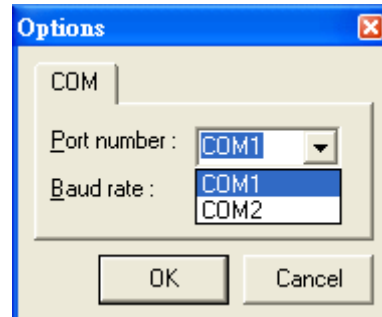
Figure 6-6（a）   Figure 6-6（b）

Function Description:

Linking Methods: In **"Port number"** select either COM1 port or COM2 port as shown in Figure 6-6(b); in **"Baud rate"** select 9600 for signal transmission as shown in Figure 6-6（a）

6.0.2.7 Other Application

Displays the presently saved switching status as shown in Figure 6-7 below:

Figure 6-7

When input corresponding to Output is enabled, it shows the Output ports correspond to the Input ports; when they are disabled, it will show red **"None"** in the relative field.

7.0 Operation Examples

Example 1: Switch the NO.1 input signal to the NO.2 output channel.

Key	LCD Display	Operation
	HDMI MATRIX OUT 1 2 3 4 EDID IN 0 0 0 0 FIX	1. Press the NO.2 key of the output channel for 2 seconds, then the input channels will begin to flicker.
	HDMI MATRIX OUT 1 2 3 4 EDID IN 0 1 0 0 FIX	2. Press the NO.1 key of the Input channel for 2 seconds.
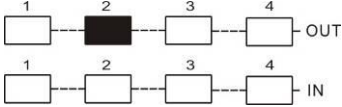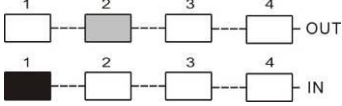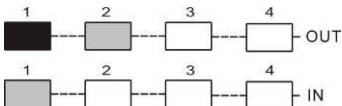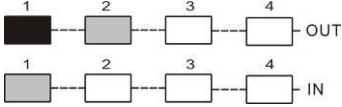
Example 2: Switch the NO.1 and NO.2 input signals to each NO.1 and NO.2 output channels.

Key	LCD Display	Operation
	HDMI MATRIX OUT 1 2 3 4 EDID IN 0 0 0 0 FIX	1. Press the NO.1 key of the output channel for 2 seconds, then the input channels will begin to flicker.
	HDMI MATRIX OUT 1 2 3 4 EDID IN 1 0 0 0 FIX	2. Press the NO.1 key of the Input channel for 2 seconds.
	HDMI MATRIX OUT 1 2 3 4 EDID IN 1 0 0 0 FIX	3. Press the NO.2 key of the output channel for 2 seconds, then the input channels will begin to flicker.
	HDMI MATRIX OUT 1 2 3 4 EDID IN 1 2 0 0 FIX	4. Press the NO.2 key of the Input channel for 2 seconds.

Example 3: Delete **"All"** settings.

Key	LCD Display	Operation
ALL → OFF	**HDMI MATRIX** OUT 1 2 3 4 EDID IN 0 0 0 0 FIX	3. Press the **ALL** key on the front panel, and then press the **OFF** key to cancel all the settings.

Example 4: "STO" and **"RCL"** functions.

Key	LCD Display	Operation
		1. Press the NO.2 key of the output channel for 2 seconds, then the input channels will begin to flicker.
		2. Press the NO.1 key of the Input channel for 2 seconds.
		3. Press the **STO** key on the front panel, then the OUT channels will begin to flicker.
		4. Press the NO.1 key of the output channel to save the setting in the NO.1 channel.
		5. Press the **ALL** key on the front panel, and then press the **OFF** key to cancel the setting.
		6. Press the **RCL** key on the front panel, then the OUT channels will begin to flicker.
		7. Press the NO.1 key of the output channel to Load the previously saved.

22

8.0 Communication Protocol/Control Command Code

Communication Protocol: Baud rate 9600bps, no odd or even calibration bit address, 8bit transmission address, 1bit stop address. Please refer to the **"Command list.pdf"** in the CD-ROM for more related **Command Code** information.

9.0 Troubleshooting

1. What do I do if the HDMI matrix front panel switching keys are not responding?

Answer: The HDMI matrix front panel keys employ scanning testing and require longer response time. Press and hold the keys for 2 seconds. This will ensure key switching will be responsive in operation.

2. What do I do if matrix does not display or color display is abnormal after hot plug?

Answer: Switching of the matrix system goes through the IC chips. If the voltage difference between the input signal equipment and the matrix equipment is too large, hot plug could easily cause damage to the IC chips.   Please turn off the power to the system before plugging or unplugging.

3. What do I do if there is a loss of color reproduction, or no video signal output?

Answer: Please check if connectors at both ends of the HDMI signal cable are correctly connected.

4. What do I do if the serial port (usually refer to the computer serial port) fails to control the HDMI matrix?

Answer: Check that the communication port set by the control software is correctly connected to the corresponding serial port of the equipment. Also, check to see if the computer communication port is in good order.

5. What do I do if the corresponding graphics fail to output during HDMI matrix switching?

 Answer:
(1) Check if there is signal on the input end. If there is no input signal, it could be that the input connection cable is broken or the connector gets loose. You are advised to replace the connection cable.
(2) Check if there is signal on the output end. If there is no output signal, it could be that the cable is broken or the connector gets loose. You are advised to replace the connection cable.

(3) Check if the output port number is the same as the controlled port number.

(4) If none of the above circumstances happen, it could be internal failure of the product itself.

6. What do I do if I sense power leakage during plugging or unplugging of the input/output ports?

Answer: It could be that the equipment power is not properly grounded. You must properly ground your equipment; otherwise product life can easily be shortened.

Appendix A RS-232 Communication Protocol

This AV Matrix RS-232 communication protocol uses fixed length with 5 bytes of information as define below. The default baud rate is 9600 bps, no parity, 8 data bit and 1 stop bit. Command timeout is 300ms, and byte to byte timeout is 30ms.

Use the RS-232 connecting cable to connect the computer serial port to the RS-232 communication port of the Matrix device. The computer can control the Matrix device via RS-232. Aside from using the front panel keys for operation, you are also permitted to use the RS-232 connection port for remote operation.

A-1 Host Request

A standard command is 5 bytes:

Device + Request + Index + Value + CRC

Byte 1: Device Byte (DB)
Byte 2: Request Byte (RB)
Byte 3: Index Byte (IB)
Byte 4: Value Byte (VB)
Byte 5: CRC Byte (CB)

☞ Host must send CRC code to follow the last byte.

A-1.1 Device Byte

Name	*Bit 7*	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
DB	BT	0	1	Device ID (0 - 31)				

BT: Broadcast Command Flag.
    0 - Instruction for Device ID only
    1 - Instruction for all devices. (Device ID must be written 0)

☞ Devices will not response, when receiving the broadcast command.

0: Reserve, Always 0.

1: Identifier, Always 1.

Device ID: Device id ranges from 0 to 31. (Please refer to device's user manual)

A-1.2 Request Byte

Request Byte (RB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
RB	0	0	Request Type (0 - 63)					

0: Reserve, Always 0.

Request Type: Please refer to "Table - Host Request List".

Table - Host Request List

Request Type	Description	Index	Value	ACK Type	Note
0x00	Dummy call	-	-	A	1, 2
Switch Tools					
0x01	Switch Video Output Channel	Output	Input	A	2
0x02	Switch Audio Output Channel	Output	Input	A	2
0x03	Store Video Status	Setting	Memory	A	2, 3
0x04	Store Audio Status	Setting	Memory	A	2, 3
0x05	Recall Video Status	Setting	Memory	A	2
0x06	Recall Audio Status	Setting	Memory	A	2
0x07	Request Video Output Channel	Output	Memory	B	
0x08	Request Audio Output Channel	Output	Memory	B	
Plug Detect					
0x09	Request Video Input Plug Status	Input	0	B	
0x0A	Request Audio Input Plug Status	Input	0	B	
0x0B	Request Video Output Plug Status	Output	0	B	
0x0C	Request Audio Output Plug Status	Output	0	B	
Audio Control					
0x10	Control Audio Output Mute	Output	Enable	A	2
0x11	Request Audio Output Mute Status	Output	Memory	B	
0x12	Control Audio Output Volume	Output	Level	A	2
0x13	Request Audio Output Volume	Output	Memory	B	
0x14	Control Audio Output Bass	Output	Level	A	2

0x15	Request Audio Output Bass	Output	Memory	B	
0x16	Control Audio Output Treble	Output	Level	A	2
0x17	Request Audio Output Treble	Output	Memory	B	
0x18	Control Audio Output Subwoofer	Output	Level	A	2
0x19	Request Audio Output Subwoofer	Output	Memory	B	
0x1C	Control Audio Output Delay Low	Output	Delay1	A	2
0X1D	Request Audio Output Delay Low	Output	Memory	B	
0X1E	Control Audio Output Delay High	Output	Delay2	A	2
0X1F	Request Audio Output Delay High	Output	Memory	B	
Video Control					
0x20	Select Input EDID Type	0	EDID	A	2
0x21	Request Input EDID Type	1	0	B	
Device Information					
0x30	Request Protocol Version	0	0	C	1
0x31	Request Firmware Version	0	0	C	
0x3F	Request Device Information	0	0	D	1
0x3F	Request Extend Information	1	0	E	

Command Note:

1. All devices support the command.
2. Support broadcast commands.
3. Memory # 0 is the current status, it can't be stored. Memory #1 – 8 is allowed to be stored.
4. Use 0x3F to confirm the device connected is properly and supported commands.

A-1.3 Index Byte

Index Byte (IB)

Name	*Bit 7*	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
IB	Index							

Index: Please refer to "Table - Host Request List" and "Table - Command Index List".

Table – Command Index List

Index	Description
Output	The output that will be selected. (Port 1 = 1, Port 2 = 2… Port n = n) 0: All outputs
Input	The input that will be selected. (Port 1 = 1, Port 2 = 2… Port n = n) 0: All inputs
Setting	The setting type that will be selected. 0: All Settings 1: Switch Settings only 2: Video/Audio Settings only
-	Don't care

A-1.4 Value Byte

Value Byte (VB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VB				Value				

Value: Please refer to "Table - Host Request List" and "Table - Command Value List".

Table – Command Value List

Value	Description
Input	The input that will be connected. (Port 1 = 1, Port 2 = 2… Port n = n) 0: Disconnect
Memory	Select Memory Location 0 : Current Status (Can't be stored)
Enable	1: Enable Status (example: Mute, Plug) 0: Disable Status (example: Un-mute, Unplug)
Level	Level Range (0 – 100) 0x81: Increase a step 0x82: Decrease a step
Delay	Audio delay time is 16-bit data. (Unit: 5ms or 10ms) Delay1 - The audio delay time low byte. (Bit0 – Bit7) Delay2 - The audio delay time high byte. (Bit8 – Bit15) The audio delay time unit decided by the DTUF flag of the extend information. The maximum Delay decided by the DTMAX flag of the extended information.
EDID	EDID Type 0: Fixed (Device default EDID) 1: Output 1 (Copy the EDID from the output 1)
-	Don't care

A-1.5 CRC Byte

CRC Byte (CB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
CB	CRC (cyclic redundancy check)							

CRC: Host must send CRC code to follow the last byte.

Table – CRC Table

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	00	5E	BC	E2	61	3F	DD	83	C2	9C	7E	20	A3	FD	1F	41
10	9D	C3	21	7F	FC	A2	40	1E	5F	01	E3	BD	3E	60	82	DC
20	23	7D	9F	C1	42	1C	FE	A0	E1	BF	5D	03	80	DE	3C	62
30	BE	E0	02	5C	DF	81	63	3D	7C	22	C0	9E	1D	43	A1	FF
40	46	18	FA	A4	27	79	9B	C5	84	DA	38	66	E5	BB	59	07
50	DB	85	67	39	BA	E4	06	58	19	47	A5	FB	78	26	C4	9A
60	65	3B	D9	87	04	5A	B8	E6	A7	F9	1B	45	C6	98	7A	24
70	F8	A6	44	1A	99	C7	25	7B	3A	64	86	D8	5B	05	E7	B9
80	8C	D2	30	6E	ED	B3	51	0F	4E	10	F2	AC	2F	71	93	CD
90	11	4F	AD	F3	70	2E	CC	92	D3	8D	6F	31	B2	EC	0E	50
A0	AF	F1	13	4D	CE	90	72	2C	6D	33	D1	8F	0C	52	B0	EE
B0	32	6C	8E	D0	53	0D	EF	B1	F0	AE	4C	12	91	CF	2D	73
C0	CA	94	76	28	AB	F5	17	49	08	56	B4	EA	69	37	D5	8B
D0	57	09	EB	B5	36	68	8A	D4	95	CB	29	77	F4	AA	48	16
E0	E9	B7	55	0B	88	D6	34	6A	2B	75	97	C9	4A	14	F6	A8
F0	74	2A	C8	96	15	4B	A9	F7	B6	E8	0A	54	D7	89	6B	35

Example: switch output 6 to the input 3.

Byte 1 (DB) is 0x20 – Device: Identifier + Device ID = 0x20 + 0 = 0x20

Byte 2 (RB) is 0x01 – Request: Switch Video Output Channel = 0x01

Byte 3 (IB) is 0x06 – Index: Output 6 = 6

Byte 4 (VB) is 0x03 – Value: Input 3 = 3

Byte 5 (CB) is 0x93 – CRC code from Byte 1 to Byte 4. (CRC4)

CRC Calculation

CRC 0 = 0 (initial value)

CRC 1 = CRC_ TABLE [CRC 0 ^ **Byte 1**] = CRC_ TABLE [0x00 ^ 0x20] = 0x23

CRC 2 = CRC_ TABLE [CRC 1 ^ **Byte 2**] = CRC_ TABLE [0x23 ^ 0x01] = 0x9F

CRC 3 = CRC_ TABLE [CRC 2 ^ **Byte 3**] = CRC_ TABLE [0x9F ^ 0x06] = 0x8D

CRC 4 = CRC_ TABLE [CRC 3 ^ **Byte 4**] = CRC_ TABLE [0x8D ^ 0x03] = 0x93

A-2 Device ACK Packet

When the device receives supported commands comes from the host, and then will response with following ACK:

Table – ACK Type List

Ack Type	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	…	Last Byte
Type A	AB							CB
Type B	AB	LB	Index 1	Value 1	Index 2	Value 2	…	CB
Type C	AB	LB	Data 1	Data 2				CB
Type D	AB	LB	INF	OP	IP	Name 1	…	CB
Type E	AB	LB	EXINF	VEINF	AEINF	PLUG	…	CB

A-2.1 ACK Type A

ACK Byte + CRC Byte (Total 2 Bytes)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 – 31)				
CB	CRC							

ACC: The devices acknowledge status. Accept or Reject.

      1: device accepts this request. (ACK; acknowledge)

      0: device rejects this request. (NAK; negative acknowledge)

☞ The device sends the Nak packet is always 2 bytes. (NAK + CRC)

0: Reserve, Always 0.

1: Identifier, Always 1.

Device ID: Device id ranges from 0 to 31. (Please refer to device's user manual)

CRC: Device always sends the CRC code to follow the last byte.

A-2.2 ACK Type B

ACK Byte + LB + Index1 + Value1 + Index2 + Value2 +…..+ CRC Byte

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 – 31)				
LB	Length for the total data bytes (Index + Value)							
IB n	Index							
VB n	Value							
…	…							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is equal to the total data bytes (Index + Value), not include the CRC byte. The maximum LB value of the ACK Type B is twice the total number of output or input.

IB: Often means that the input or output port number. (Port 1 = 1, Port 2 = 2… Port n = n)

VB: Response the status refers to the table.

Request	Description	Index	Value
0x07	Request Video Output Channel	Output	Input
0x08	Request Audio Output Channel		
0x09	Request Video Input Plug Status	Input	Enable 1: Plug 0: Unplug
0x0A	Request Audio Input Plug Status		
0x0B	Request Video Output Plug Status	Output	
0x0C	Request Audio Output Plug Status		
0x11	Request Audio Output Mute Status	Output	0: Un-mute, 1: Mute
0x13	Request Audio Output Volume		Level Range (0 – 100)
0x15	Request Audio Output Bass		
0x17	Request Audio Output Treble		
0x19	Request Audio Output Subwoofer		
0x1D	Request Audio Output Delay Low		Delay1
0x1F	Request Audio Output Delay High		Delay2
0x21	Request Input EDID Type	Input	EDID Type

Please refer to "Table – Command Index List" and "Table – Command Value List".

A-2.3 ACK Type C

ACK Byte + LB + Data 1 + Data 2 + CRC Byte (Total 5 Bytes)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 – 31)				
LB	Length for the total data bytes (This byte is always 2)							
DB 1	Data 1							
DB 2	Data 2							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is always 2 (Data 1 + Data 2). Not include the CRC byte.

DB: Data Bytes as define below.

Request	Description	Data 1		Data 2
0x30	Request Protocol Version	VER1		VER2
0x31	Request Firmware Version	VERA	VERB	VERC

Version Type A:

RS-232 Protocol Version contains the VER1 and VER2 (ex: VER1.VER2)

VER1: Data 1, Bit 7 - Bit 0 (Range 0 - 99)

VER2: Data 2, Bit 7 - Bit 0 (Range 0 - 99)

If the Data 1 is 0x01 and Data 2 is 0x07; VER1 = 1 and VER2 = 7; RS-232 protocol version is v1.07

If the Data 1 = 0x23 and Data 2 = 0x45; VER1 = 0x23 = 35 and VER2 = 0x45 = 69; RS-232 protocol version is v35.69

Version Type B:

Firmware Version contains the VERA, VERB and VERC (ex: VERA.VERB.VERC)

VERA: Data 1, Bit 7 - Bit 4 (Range 0 - 9)

VERB: Data 1, Bit 3 - Bit 0 (Range 0 - 9)

VERC: Data 2, Bit 7 - Bit 0 (Range 0 - 99)

If the Data 1 is 0x10 and Data 2 is 0x07; VERA = 1, VERB = 0 and VERC = 7; Firmware version is v1.0.07

If the Data 1 = 0x23 and Data 2 = 0x45; VERA = 2, VERB = 3 and VERC = 69; Firmware version is v2.3.69

A-2.4 ACK Type D

ACK Byte + LB + INF + OP + IP + Name 1 + Name 2 + Name 3 +.....+ CRC Byte

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 - 31)				
LB	Length for the total data bytes (INFO +.....+ Name n)							
INFO	Audio	Video	Extend	0	Total Memory Location (0 - 15)			
OP	Total Output Port							
IP	Total Input Port							
NB 1	Device Name (ASCII code)							
…	…							
NB n	Device Name (ASCII code)							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is the total length of the data bytes, not include the AB, LB and CB.
　　The maximum LB value of the ACK Type D is 19.

INFO: Device information

　　　Bit 7: 1 - Support Audio switch tools request. (Request 0x02, 0x04, 0x06 and 0x08)

　　　　　0 - Not support Audio switch tools request.

　　　Bit 6: 1 - Support Video switch tools request. (Request 0x01, 0x03, 0x05 and 0x07)

　　　　　0 - Not support Video switch tools request.

　　　Bit 5: 1 - Extended information exists. (Request 0x3F [0x01])

　　　　　0 - Extended information does not exist.

　　　Bit 4: Reserve, always 0.

　　　Bit 3~0: Total Memory location ranges from 0 to 15.

☞ Request [Index], if 0x3F [0x01] => Request = 0x3F and Index = 0x01

OP: The total number of output.

IP: The total number of input.

NB: Device Name (ASCII code). (The maximum length is 16)

A-2.5 ACK Type E

ACK Byte + LB + EXTI + VIDI + AUDI + PLUG +.....+ CRC Byte

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 - 31)				
LB	Length for the total data bytes (EXINF +.....+ DTMAX)							
EXINF	LBMAX		0	0	0	0	0	FWVER
VEINF	EDID	0	0	0	0	0	0	0
AEINF	DTUF	DELAY	0	0	SW	TRE	BASS	VOL
PLUG	0	0	0	0	AOPD	VOPD	AIPD	VIPD
DTMAX	Delay Time Maximum (unit: 100 ms)							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is the total length of the data bytes, not include the AB, LB and CB.

EXINF: Device extended information

      LBMAX - defines the maximum LB value of the variable length command

          0 - The maximum LB is 64 Bytes (default)

          1 - The maximum LB is 128 Bytes

          2 - The maximum LB is 254 Bytes (255 is reserved)

          3 - Reserved

      The LB value of the Ack packet is not limited by LBMAX.

      If the extended information does not exist, the default maximum length is 128.

      FWVER - Firmware version command flag. (Request 0x31)

          1 - Support Firmware version command.

          0 - Not support Firmware version command.

VEINF: Video Extend Information

      EDID - Input EDID type select command flag. (Request 0x20 and 0x21)

          1 - Support Input EDID type select command.

          0 - Not support Input EDID type select command.

AEINF: Audio Extend Information

      VOL - Volume and Mute command flag. (Request from 0x10 to 0x13)

          1 - Support Volume and Mute command.

          0 - Not support Volume command.

      BASS - Bass command flag. (Request 0x14 and 0x15)

          1 - Support Bass command.

          0 - Not support Bass command.

TRE - Treble command flag. (Request 0x16 and 0x17)

    1 - Support Treble command.

    0 - Not support Treble command.

SW - Subwoofer command flag. (Request 0x18 and 0x19)

    1 - Support Subwoofer command.

    0 - Not support Subwoofer command.

DELAY – Audio delay command flag. (Request from 0x1C to 0x1F)

    1 - Support audio delay command.

    0 - Not support audio delay command.

DTUF - defines the audio delay time scale units.

    1 - Audio delay time scale unit is 10ms

    0 - Audio delay time scale unit is 5ms (default)

☞ If the AEINF is not equal to 0, the device support Request 0x04[0x02] and 0x06[0x02].

PLUG: Plug Detect Support Information.

    VIPD - Video input plug detection command flag. (Request 0x09)

        1 - Support Video input plug detection.

        0 - Not support Video input plug detection.

    AIPD - Audio input plug detection command flag. (Request 0x0A)

        1 - Support Audio input plug detection.

        0 - Not support Audio input plug detection.

    VOPD - Video output plug detection command flag. (Request 0x0B)

        1 - Support Video output plug detection.

        0 - Not support Video output plug detection.

    AOPD - Audio output plug detection command flag. (Request 0x0C)

        1 - Support Audio output plug detection.

        0 - Not support Audio output plug detection.

    Others - Bit 7~4 are reserve, always 0

DTMAX: defines audio maximum delay time. (Unit: 100 ms)

WARRANTY

LIMITED WARRANTY – with the exceptions noted in the next paragraph, ZIGEN warrants the original purchaser that the equipment it manufactures or sells will be free from defects in materials and workmanship for a period of one year from the date of purchase. The proof of sale is required in order to claim warranty. Should this product, in ZIGEN's opinion, prove defective within this warranty period, ZIGEN, at its option, will repair or replace this product without charge. Customers outside of US are responsible for shipping charges to and from ZIGEN. Any defective parts replaced become the property of ZIGEN. This warranty does not apply to those products which have been damaged due to accident, unauthorized alterations, improper repair, modifications, inadequate maintenance and care, or use in any manner for which the product was not originally intended for. Items integrated into ZIGEN products that are made by other manufacturers, notably computer hard drives and liquid crystal display panels, are limited to the term of the warranty offered by the respective manufacturers. Such specific warranties are available upon request to ZIGEN.

ZIGEN makes no other representation of warranty as to fitness for the purpose or merchantability or otherwise in respect of any of the products sold. The liability of ZIGEN with respect to any defective products will be limited to the repair or replacement of such products. In no event shall ZIGEN be responsible or liable for any damage arising from the use of such defective products whether such damages are direct, indirect, consequential or otherwise, and whether such damages are incurred by the reseller, end-user or any third party. The information in this manual has been carefully checked and is believed to be accurate. However, ZIGEN assumes no responsibility for any inaccuracies that may be contained in this manual, even if advised of the possibility of such damages. The technical information contained herein regarding the features and specifications is subject to change without notice.