PTN Electronics

MMX88A Modular Matrix Switcher

User Manual

MMX Series ---Combo Matrix Switcher

Please read this manual carefully before using this product.

Notice：

This **MMX88A Series Matrix Switchers User Manual** is only an instruction for operators, not for any maintenance usage. The functions described in this version are updated till 29th March 2012. Any changes of functions and parameters since then will be informed separately. Please refer to the dealers for the latest details.

⚠ **Safety Operation Guide**
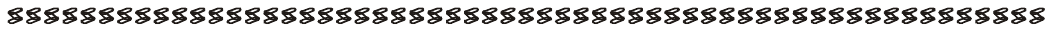
In order to ensure the credibility use of the product and the user's safety, please comply with the following items during installation and maintenance:

①

The system must be earthed properly. Please do not use two blades plugs and ensure the alternating power supply ranged from 100v to 240v and from 50Hz to 60Hz.

②

Do not put the switcher in a place of too hot or too cold.

③

To avoid any damage by over heat, please keep the working environment good in ventilation to radiate the heat when running the switcher.

④

The switchers should be turned off when in rainy and humid days or nonuse for a long time,

⑤

The alternating power supply line should be disconnected with the power socket during the following operation.
  A. Take out or reinstall any component of the switcher
  B. Disconnect or re-connect any connector of the switcher

⑥

Please do not attempt to maintain and uncover the switcher for there is a high-voltage component inside and the risk of the electric shock.

⑦

Do not splash any chemical product or liquid on or near the equipment.

# Contents

1. Introduction

1.1 About MMX88A Modular Matrix Switcher System

MMX88A is a high performance video and audio modular matrix switcher. Various changeable cards make MMX88A flexible and all-in-one solution for different projects. It can support different video signals with cross switching. Every video or audio signal is transmitted and switched independently, this will cause the least signal attenuation, so that make the output signal keep at high fidelity.

There are two series of changeable cards work with MMX88A, input card MMX-4I series and output card MMX-4O series, all the cards support hot plug & play. Users can choose the right card for different application. There are different signal card is used for processing different video signal, including: HMDI, DVI, VGA, SDI, OPTICAL and HDMI TP etc.

MMX88A have power fail memory function and audio can break away from or follow the video to switch. It has RS232 port for serial control and optional IP port for TCP/IP control, easily to be controlled by third-part devices.

MMX88A can be used for different project, because of its changeable card design. It is the combo solution for multimedia conference rooms, control rooms, broadcasting rooms, shopping center etc. It will handle all the audiovisual management, including the switching, driving, scaling etc.
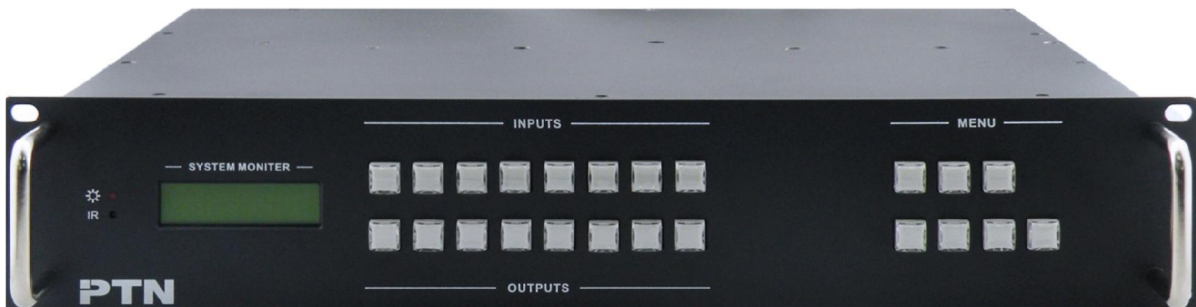
1-1 MMX88A

1.2 MMX88A Modular Matrix Switcher Models

1.2.1 The MMX88A chassis (main unit)

Specifications Models	Height	Maximum Slot	Power supplies	RS232 control	Network control
MMX88A	2U	2 input card slots & 2 output card slots	Single	√	Optional

1.2.2 MMX88A signal card (changeable cards)

To meet different situation and users, the MMX88A cards are classified into the following models:

1) MMX88A input cards

Specifications Models	Inputs	Signal Format
MMX-4I-HD	4	HDMI
MMX-4I-DV	4	DVI
MMX-4I-VG	4	VGA

1
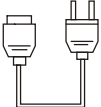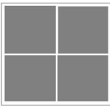
Specifications Models	Inputs	Signal Format
MMX-4I-SD	4	SDI
MMX-4I-FO	4	Fiber Optical
MMX-4I-TP	4	RJ45

2) MMX88A output cards

Specifications Models	Input	Signal Format
MMX-4O-HD	4	HDMI
MMX-4O-DV	4	DVI
MMX-4O-SD	4	SDI
MMX-4O-FO	4	Fiber Optical
MMX-4O-TP	4	RJ45

2. Packing of the Product

Pictures	Description
	MMX88A modular matrix switcher (with empty slot and empty cover)
	RS-232 Communication Cord
	Power Supply Cord
	User manual
	Rubber cushion

3. Installation

MMX88A modular matrix switchers adopt aluminium shell and can be stacked with other device. Moreover, it is rack-mountable to install in the standard 19 inches case.

4. Front View and Rear View of the Product

4.1 Front View of the MMX88A
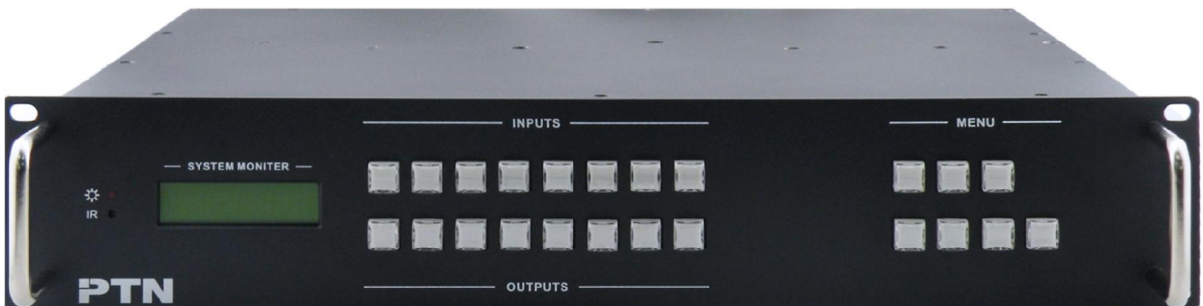
There are two parts in the front panel.

1: System monitor.

The system switching and status monitor.

2: Crystal buttons.

Crystal buttons, with green back-light indicating, which can insert customized label.

4.1 Rear View of the MMX88A

In the rear panel, there are maximum 4 card slots, including 2 input cards and 2 output cards. In MMX series, only MMX88A has in-built audio card.

Remarks: The cards in the pictures are only for reference, user can choose and doing plug and play.

5. Changeable Cards Introduction & Installation

5.1 Introduction of the changeable cards and slots

There are various changeable cards, which can insert to the MMX88A empty slot (hot-swop), include different signals, such as DVI, HDMI, VGA, fiber optical, twisted pair etc.

Now, there is the one by one introduction for every card.

5.1.1 MMX-4I-DV & MMX-4O-DV

DVI signal card. (Please check the specification from 8.2.1)

It is fully compatible with HDMI1.3 and HDCP, not supporting analogy signal.

It is embedded the EDID management technology, supporting CEC, DDC.

MMX-4I-DV: input card, maximum four input signal. Input signal can pass to output device through MMX-4O-DV, also can pass through other kinds of output cards.
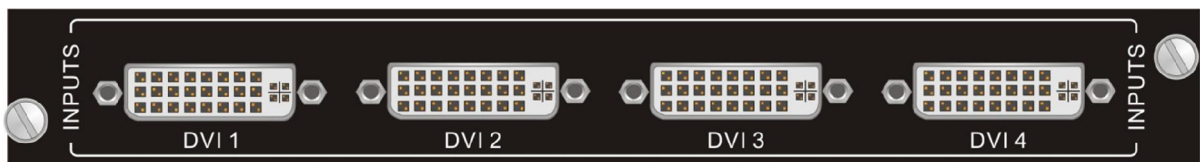
MMX-4O-DV: output card, maximum four output signal. Output signal can come from MMX-4I-DV, also can come from other kinds of input cards.
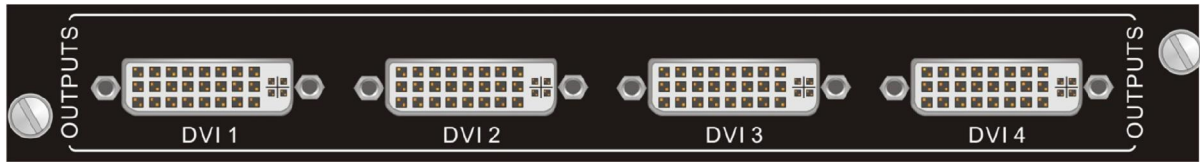
Pin Layout of the DVI-I connector (Dual-Link). (Female)

PIN	Function	PIN	Function
1	T.M.D.S.Data2-	13	T.M.D.S.Data3+
2	T.M.D.S.Data2+	14	+5V Power
3	T.M.D.S. Data 2/4 Shield	15	Ground (for +5V)
4	T.M.D.S. Data 4-	16	Hot Plug Detect
5	T.M.D.S. Data 4+	17	T.M.D.S. Data 0－
6	DDC Clock	18	T.M.D.S. Data 0+
7	DDC Data	19	T.M.D.S. Data 0/5 Shield
8	No Connect	20	T.M.D.S.Data5－
9	T.M.D.S.Data1-	21	T.M.D.S.Data5＋
10	T.M.D.S.Data1+	22	T.M.D.S. Clock Shield
11	T.M.D.S.Data1/3 Shield	23	T.M.D. S. Clock +
12	T.M.D.S.Data3-	24	T.M.D.S .Clock－

5.1.2 MMX-4I-HD & MMX-4O-HD

HDMI signal card. (Please check the specification from 8.2.2)

It is embedded the EDID management technology, supporting CEC, DDC.

It is also compatible with DVI signal (HDCP required)

MMX-4I-HD: input card, maximum four input signal. Input signal can pass to output device through MMX-4O-HD, also can pass through other kinds of output cards.

MMX-4O-HD: output card, maximum four output signal. Output signal can come from MMX-4I-HD, also can come from other kinds of input cards.

Pin layout of the HDMI connectors (female).
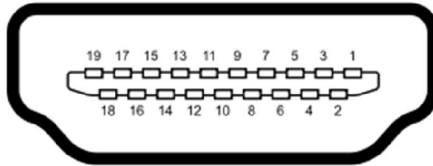
Pin Number	Signal Name	Pin Number	Signal Name
1	TMDS Data 2+	20	SHELL
2	TMDS Data 2 Shield	19	Hot Plug Detect
3	TMDS Data 2-	18	+5V Power
4	TMDS Data 1+	17	Ground
5	TMDS Data 1 Shield	16	DDC Data
6	TMDS Data 1-	15	DDC Clock
7	TMDS Data 0+	14	No Connect
8	TMDS Data 0 Shield	13	CEC
9	TMDS Data 0-	12	TMDS Clock-
10	TMDS Clock+	11	TMDS Clock Shield

5.1.3 MMX-4I-VG

VGA signal card. (Please check the specification from 8.2.3)

Compatible with C-Video, YUV, YC (Factory preseted function).

The bandwidth is up to 350MHz (-3dB);

Supporting RGBHV, RGsB, RGBS, RsGsBs, YUV, YC and Composite video.

MMX-4I-VG: input card, maximum four input signal. Input signal can pass to output device through other kinds of output cards.

Pin layout of the VGA connectors (female):

6
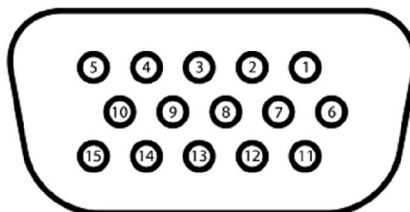
Pin Number	Signal Name	Pin Number	Signal Name
Pin 1	RED	Pin 9	KEY/PWR
Pin 2	GREEN	Pin 10	GND
Pin 3	BLUE	Pin 11	ID0/RES
Pin 4	ID2/RES	Pin 12	ID1/SDA
Pin 5	GND	Pin 13	HSync
Pin 6	RED_RTN	Pin 14	VSync
Pin 7	GREEN_RTN	Pin 15	ID3/SCL
Pin 8	BLUE_RTN		

5.1.4 MMX-4I-SD & MMX-4O-SD

SDI signal card. (Please check the specification from 8.2.4)

It is compatible with different SDI signal formats, including SD/HD/3G-SDI (adaptive)

Every port has loop output for local monitoring.

MMX-4I-SD: input card, maximum four input signal. Input signal can pass to output device through MMX-4O-SD, also can pass through other kinds of output cards.
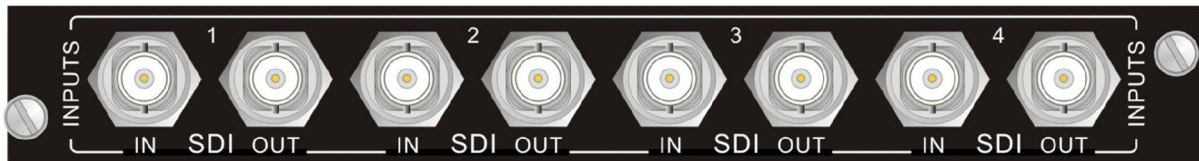
MMX-4O-SD: output card, maximum four output signal. Output signal can come from MMX-4I-SD, also can come from other kinds of input cards.
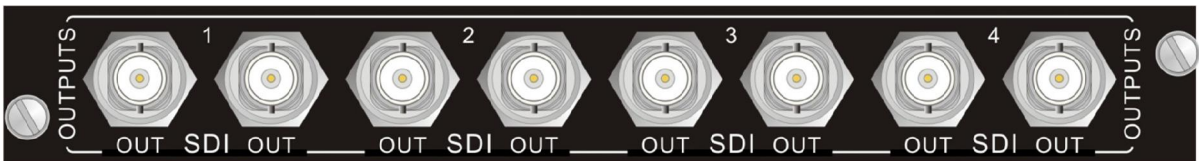
The BNC connector is shown as the figure below.
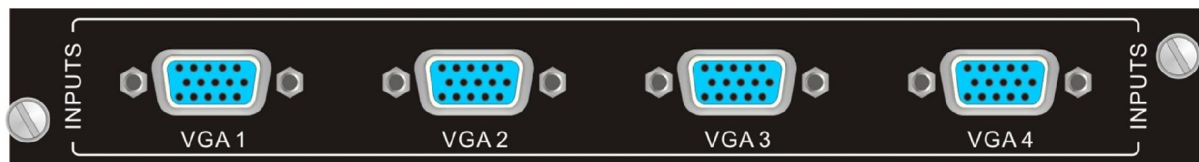

BNC Connector
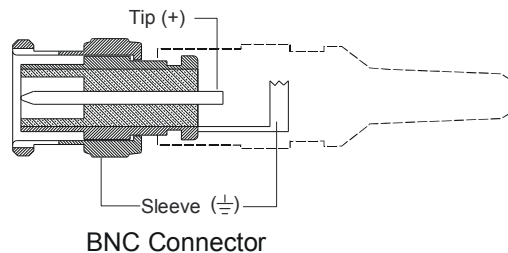
5.1.5 MMX-4I-TP & MMX-4O-TP

Twisted pair card (HDMI/DVI extend). (Please check the specification from 8.2.5)

Support HDTV, compatible with HDMI1.4 and HDCP

MMX-4I-TP: input card, maximum input four HDMI TP signal. Input signal can pass to output device through MMX-4O-TP, also can pass through other kinds of output cards, works with TPHD402T.
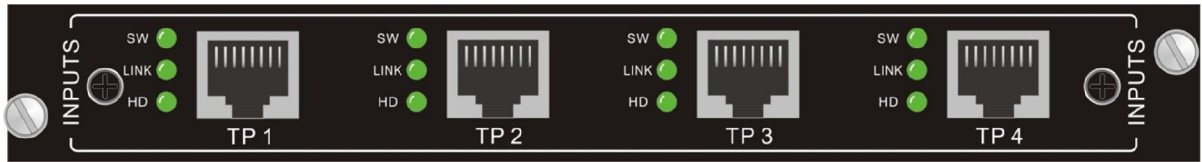
MMX-4O-TP: output card, maximum output four HDMI TP signal. Output signal can come from MMX-4I-TP, also can come from other kinds of input cards, works with TPHD402R.
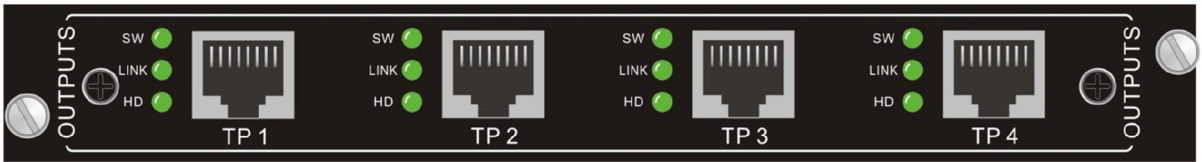
Pin layout of the RJ45 connectors:

Two different connection standards can be chose, the same cable should use the same standard on both sides.

TIA/EIA T568A		TIA/EIA T568B	
Pin	Cable color	Pin	Cable color
1	green white	1	orange white
2	green	2	orange
3	orange white	3	green white
4	blue	4	blue
5	blue white	5	blue white
6	orange	6	green
7	brown white	7	brown white
8	brown	8	brown
1st Ground	4--5	1st Ground	4--5
2nd Ground	3--6	2nd Ground	1--2
3rd Group	1--2	3rd Group	3--6
4th Group	7--8	4th Group	7--8
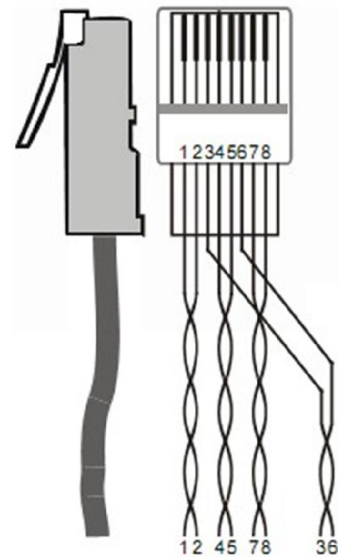
Notice: Cable connectors MUST be metal one, the shielded layer of cable MUST be connected to the connector's metal shell, to make a better transmission.

5.1.6 MMX-4I-FO & MMX-4O-FO

Fiber optical card (Please check the specification from 8.2.6).

Using full digital signal non-compression technology.

Compatible with HDTV, transmitted resolution up to 1080p.

MMX-4I-FO: input card, maximum four fiber optical signal. Input signal can pass to output device through MMX-4O-FO, also can pass through other kinds of output cards, works with FODV300T.

MMX-4O-FO: output card, maximum output four fiber optical signal. Output signal can come from MMX-4I-FO, also can come from other kinds of input cards, works with FODV300R.

5.2 MMX-AU88 Stereo Audio

Stereo audio crosspoint matrix switcher 8x8. (Please check the specification from 8.2.7)
It supports the balanced/unbalanced audio, by different connection.
It is not a hot plug card, fixed on the chassis.
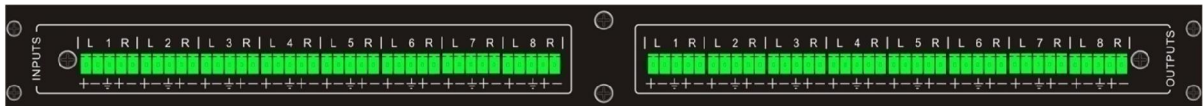
Balanced Audio Connection:
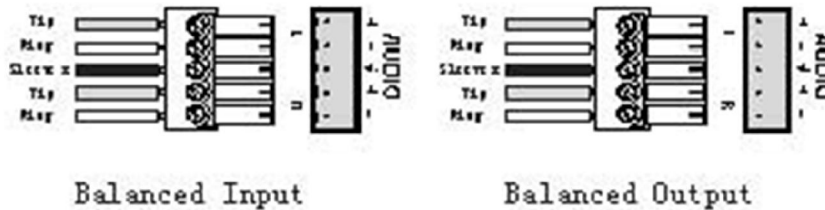
Unbalanced Audio Connection:
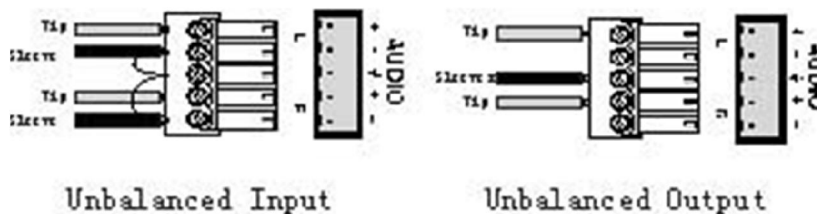
5.3 Connection of RS-232 Communication Port

Except the front control panel, the MMX88A can be controlled by far-end control system or through the Ethernet control via the RS-232 communication port.
This RS-232 communication port is a female 9-pin D connector. The definition of its pins is as the table below.

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Pin No.	Name	Function
1	N/u	Unused
2	Tx	Transmit
3	Rx	Receive
4	N/u	Unused
5	Gnd	Ground
6	N/u	Unused
7	N/u	Unused
8	N/u	Unused
9	N/u	Unused

5.3.1 Connection with Control Systems

With the RS-232 port, the MMX88A can be controlled by several kinds of control systems.

5.3.2 Connection with Computer

When the MMX88A connects to the RS232 port of a computer with control software, users can control it by that computer.

To control the switcher, users may use the RS232 software
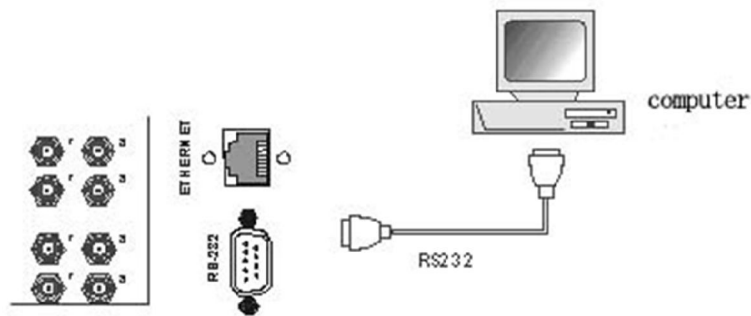
5-1 Connection between MMX88 and the computer

5.4 Connection of TCP/IP Communication Port (Optional Function)

The MMX88A can work with the PTN model "PTNET", to enable the TCP/IP function.

The PTNET is a programmable RCP/IP to RS232 processor, which is built in the FTP and fixed IP address inside and working compatible with internet.

5.5 System Diagram
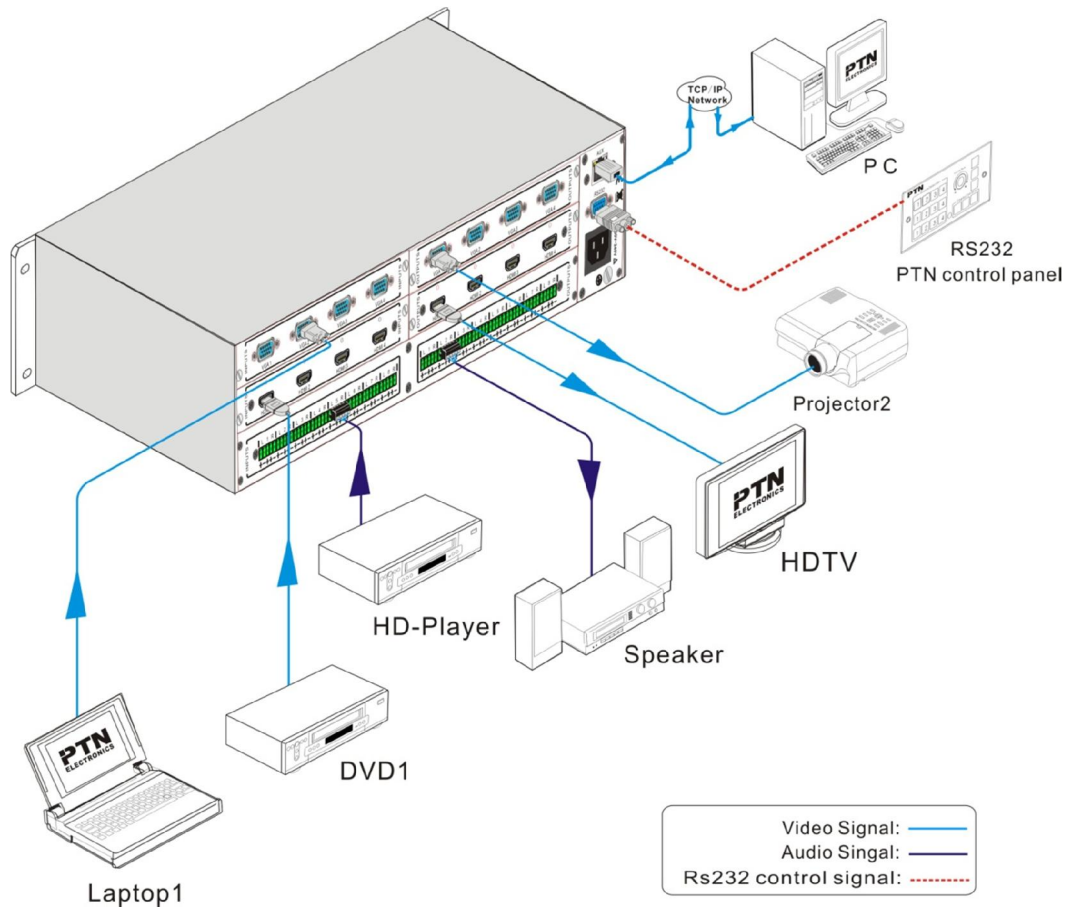
6. Operation of the Control Panel

6.1 Front Panel Description

Buttons	Function Description
INPUTS	Input buttons.　It is the number of every input channel, ranging from "1" to "8".
OUTPUTS	Output buttons. It is the number of every output channel, ranging from "1" to "8".
AV	AV synchronal button: To transfer video and audio signal synchronously by the switcher. Example: To transfer both the video and the audio signals from input channel No.3 to output channel No.4. Operation: Press buttons in this order "AV", "3", "4".
VIDEO	Video button: To transfer only video signals from input channel to output channel Example: To transfer video signals from input channel No.3 to output channel No.4. Operation: Press buttons in this order "VIDEO", "3", "4".
AUDIO	Audio button: To transfer only audio signals from input channel to output channel Example: To transfer audio signals from input channel No.2 to output channel No.3.

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	Operation: Press buttons in this order "AUDIO", "2", "3"
ALL	All button: To transfer an input channel to all output channels or switch off all the output channels Example1: To transfer video and audio signals from input channel No.7 to all output channels Operation: Press buttons in this order "7", "ALL" Example2: To transfer all input signals to the corresponding output channels respectively. In another word, to switch to this status: 1->1, 2->2, 3->3, 4->4……8->8. Operation: Press buttons in this order "ALL", "THROUGH"
THROUGH	Through button: To transfer the signals directly to the corresponding output channels Example: To transfer the signals from input channel No. 3 to their corresponding output channels Operation: Press buttons in this order "3", "THROUGH"
UNDO	Undo button: To resume to the status before the command just performed
⬅	Backspace button: To backspace the latest input button

6.2 Command Format of the Switching Operation

With the front control panel, the MMX88A could be control directly and rapidly by pressing the buttons under below format.

"Input Channel" + "Switch Mode" +"Output Channel 1"

"Switch Mode": Audio & Video synchronal or break away switching mode, includes buttons "AV", "Audio", "Video".
"Input Channel": Fill with the number of input channel to be controlled
"Output Channel": Fill with the number of output channels to be control

6.3 Examples of Operation

Example 1 : To transfer video and audio signals from input channel No.1 to output channel

No.3,4
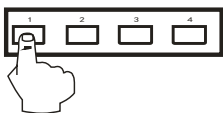
1, Press the button for input channel number"1"
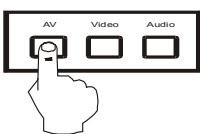
2, Press the button for switching mode "AV" for the switching mode of video and audio ("Audio" for the switching mode of audio only; "Video" for the switching mode of video only)

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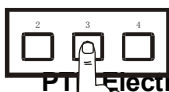
3, Press the button for the first output channel number "3"
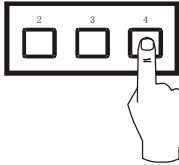
4, Press the button for the second output channel number "4"

Then, switching OK!   Audio/video switching from "1" to "3" and "4"

7. Communication Protocol & Command Codes

7.1 RS232 codes of regular switching

With this command system, using the RS232 software is able to control and operate the MMX88 remotely.

Communication protocol:

Baud rate: 9600   Data bit: 8   Stop bit: 1   Parity bit: none

Command Types	Command Codes	Functions
System Command	/*Type;	Inquire the models information.
	/%Lock;	Lock the keyboard of the control panel on the Matrix.
	/%Unlock;	Unlock the keyboard of the control panel on the Matrix.
	/^Version;	Inquire the version of firmware
	/:MessageOff;	Turn off the feedback command from the com port. It will only show the "switcher OK".
	/:MessageOn;	Turn on the feedback command from the com port.
	EDIDM[X]B[Y].	Manually adjust the EDID data, Copy the EDID data of output[X] to the input[Y].
	EDIDMInit.	Recover the factory default EDID data
	Undo.	To cancel the previous operation.
	Demo.	Switch to the "demo" mode, 1->1, 2->2, 3->3 … and so on.
Operation Command	[x1]All.	Transfer signals from the input channel [x1] to all output channels
	All#.	Transfer all input signals to the corresponding output channels respectively.
	All$.	Switch off all the output channels.

	[x1]#.	Transfer signals from the input channel [x1] to the output channel [x1].
	[x1]$.	Switch off the output channel [x1].
	[x1] V[x2].	Transfer the video signals from the input channel [x1] to the output channel [x2].
	[x1] V[x2],[x3],[x4].	Transfer the video signals from the input channel [x1] to the output channels [x2], [x3] and [x4].
	[x1] A[x2].	Transfer the audio signals from the input channel [x1] to the output channel [x2].
	[x1] A[x2],[x3],[x4].	Transfer the audio signals from the input channel [x1] to the output channels [x2], [x3] and [x4].
	[x1] B[x2].	Transfer both the video and the audio signals from the input channel [x1] to the output channel [x2].
	[x1] B[x2],[x3],[x4].	Transfer both the video and the audio signals from the input channel [x1] to the output channels [x2], [x3] and [x4].
	Status[x1].	Inquire the input channel to the output channel [x1].
	Status.	Inquire the input channel to the output channels one by one.
	Save[Y].	Save the present operation to the preset command [Y]. [Y] ranges from 0 to 9.
	Recall[Y].	Recall the preset command [Y].
	Clear[Y].	Clear the preset command [Y].

Note:

1. [x1], [x2], [x3] and [x4] are the symbols of input or output channels ranged according to the model of the matrix switcher. If the symbols exceed the effective range, it would be taken as a wrong command.
2. In above commands, "["and "]" are symbols for easy reading and do not need to be typed in actual operation.
3. Please remember to end the commands with the ending symbols "." and ";".

Detail Examples:

1、 **Transfer signals from an input channel to all output channels: [x1]All.**
Example: To transfer signals from the input channel No.3 to all output channels.   Run Command: "3All."

2、 **Transfer all input signals to the corresponding output channels respectively: All#.**
Example: If this command is carried out on an MVG1616-A matrix switcher, the status of it will be:
1->1, 2->2, 3->3, 4->4……16->16.

3、 **Switch off all the output channels: All$.**
Example: After running this command, there will be no signals on all the output channels.

4、 **Check the version of the firmware: /^Version;**
To check the version of the firmware.

5、 **Switch off the detail feedback command from the COM port: /:MessageOff;**
Switch off the detail feedback information from the COM port. But, it will leave the "switch OK" as

the feedback, when you switch the matrix.

6、 Switch on the detail feedback command from the COM port: /:MessageOn;

Switch on the detail feedback information from the COM port. it will show the detail switch information when it switch. Example: when switch 1->2 for Audio, it will feedback "A01 to 02".

7、 Transfer signals from an input channel to the corresponding output channel: [x]#.

Example: To transfer signals from the input channel No.5 to the output channel No.5. Run Command: "5#."

8、Switch off an output channel: [x]$.

Example: To switch off the output channel No.5.   Run Command: "5$."

9、Switch video signals command: [x1] V[x2].

Example: To transfer the video signals from the input channel No.3 to the output channel No.5. Run Command: "3V5."

10、Switch audio signals command: [x1] A[x2].

Example: To Transfer the audio signals from the input channel No.10 to the output channel Run Command: "10A2."

11、Switch both video and audio signals synchronously: [x1] B[x2].

Example: To transfer both the video and the audio signals from the input channel No.120 to the output channel No.12,13,15.   Run Command: "120B12,13,15."

12、Inquire the input channel to the output channel [x]: Status[x].

Example: To inquire the input channel to the output channel No.23.   Run Command: "Status23."

13、Inquire the input channel to the output channels one by one: Status.

Example: To inquire the input channel to the output channels one by one.   Run Command: "Status."

14、Save the present operation to the preset command [Y]: Save[Y].

Example: To save the present operation to the preset command No.7.   Run Command: "Save7."

15、Recall the preset command [Y]: Recall[Y].

Example: To recall the preset command No.5.   Run Command: "Recall5."

16、Clear the preset command [Y]: Clear[Y].

Example: To clear the preset command No.5.   Run Command: "Clear5."

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8. Specification

8.1 Main Unit (Chassis)

Control parts			
Serial control port	RS-232, 9-pin female D connector	Pin Configurations	2 = TX, 3 = RX, 5 = GND
Installation	Rack Mountable	Front panel control	Buttons
Options	TCP/IP control by PTNET(PTN's programmable interface)		
General			
Power Supply	110VAC ~ 240VAC, 50/60Hz	Humidity	10% ~ 90%
Temperature	-20 ~ +70□	Power Consumption	50W
Case Dimension	W482.6 x H88 x D320mm	Product Weight	5Kg

8.2 Changeable Cards

8.2.1 MMX-4I-DV & MMX-4O-DV

Input		Output	
Input	4 DVI;	Output	4 DVI;
Input Connector	Female DB24+5	Output Connector	Female DB24+5
Input Level	T.M.D.S. 2.9V/3.3V	output Level	T.M.D.S. 2.9V/3.3V
Input Impedance	75Ω	Output Impedance	75Ω
General			
Gain	0 dB	Bandwidth	340 MHz (10.2 Gbit/s)
Video Signal	DVI 1.0 standard DVI-D full digital T.M.D.S signal HDMI 1.3	Max Time-delay	5nS (±1nS)
Switching Speed	200ns (Max.)	Crosstalk	<-50dB@5MHz
HDMI standard	HDMI 1.3 standard		
EDID and DDC	Supports Extended Display Identification Data (EDID) and Display Data Channel (DDC) data using DVI and HDMI standards. EDID and DDC signals are actively buffered		
HDCP	Compliant with High-bandwidth Digital Content Protection (HDCP) using DVI and HDMI 1.3 standards		

8.2.2 MMX-4I-HD & MMX-4O-HD

Input		Output	
Input	4 HDMI	Output	4 HDMI
Input Connector	Female HDMI	Output Connector	Female HDMI
Input Level	T.M.D.S. 2.9V/3.3V	output Level	T.M.D.S. 2.9V/3.3V

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Input Impedance	75Ω	Output Impedance	75Ω
General			
Gain	0 dB	Bandwidth	340 MHz (10.2 Gbit/s)
Video Signal	DVI 1.0 standard DVI-D full digital T.M.D.S signal HDMI 1.3	Max Time-delay	5nS (±1nS)
Switching Speed	200ns (Max.)	Crosstalk	<-50dB@5MHz
HDMI standard	HDMI 1.3 standard		
EDID and DDC	Supports Extended Display Identification Data (EDID) and Display Data Channel (DDC) data using DVI and HDMI standards. EDID and DDC signals are actively buffered		
HDCP	Compliant with High-bandwidth Digital Content Protection (HDCP) using DVI and HDMI 1.3 standards		

8.2.3 MMX-4I-VG

Input			
Input	4 VGA		
Input Connector	Female 15 pin HD		
Input Coupling	AC coupling only		
Input Level	0.5 ~ 2.0Vp-p		
Input Impedance	75Ω		
General			
Gain	0 dB	Bandwidth	350MHz (-3dB), fully load
Video Signal	VGA-UXGA,RGBHV,RGBS, RGsB, RsGsBs, component video, S-video & C-video .	Video Type	VGA-UXGA,RGBHV,RGBS, RGsB, RsGsBs, component video, S-video & C-video .
Switching Speed	200ns (Max.)	Crosstalk	<-50dB@5MHz

8.2.4 MMX-4I-SD & MMX-4O-SD

Input		**Output**	
Input	4 SDI	Output	4 SDI
Input Connector	Female BNC	Output Connector	Female BNC
Input Level	0.8Vp-p ± 10%	output Level	0.8Vp-p ± 10%
Input Impedance	75Ω	Output Impedance	75Ω
General			
Gain	Unity	Maximum Data Rate	2.97 Gbps
Transmission Distance	300M (Max.)	Data rate Lock	Auto
Input Return Loss	<-14 dB @ 1 MHz ~ 1.5 GHz	Input Return Loss	<-14 dB @ 1 MHz ~ 1.5 GHz
Video Standard	SMPTE 292M, SMPTE 259M, SMPTE 424M,	Data Type	8bit, 10bit

ITU-RBT.601, ITU-RBT.1120		

8.2.5 MMX-4I-TP & MMX-4O-TP

Video Input		Video Output	
Input	4 RJ45	Output	4 RJ45
Input Connector	Female RJ45	Output Connector	Female RJ45
Input Impedance	75Ω	Output Impedance	75Ω
Video General			
Gain	0dB ~ 10dB@100MHz	Bandwidth	10.2Gbps
Resolution range	800x600 ~ 1920x1200	Transmission Distance	70M(Max)
SNR	>70dB@ 100MHz-100M	Return Loss	<-30dB@ 5KHz
THD	＜0.005%@1KHz	Min.～Max. Level	＜0.3V ~ 1.45Vp-p
HDMI Standard	Support HDMI1.4 and HDCP	Differential Phasic Erro	±10° @ 135MHz_100M

8.2.6 MMX-4I-FO & MMX-4O-FO

Input		Output	
Input	4 Fiber Optical	Output	4 Fiber Optical
Input Connector	4 SPF Fiber Optical Connector	Output Connector	4 SPF Fiber Optical Connector
Input Level	0.8Vp-p ± 10%	output Level	0.8Vp-p ± 10%
Input Impedance	75Ω	Output Impedance	75Ω
Fiber Type	Single Mode	Fiber Type	Single Mode
Transmission Consumption	-5 dBm	Max. sensitivity	-18 dBm
Maximum loss	13 dB	Max Channel Rate	4.25 Gbps
General			
Gain	Unity	Max. Data Rate	2.97 Gbps
Transmission Distance	20Km (Max.)	Data rate Lock	Auto
Input Return Loss	<-14 dB @ 1 MHz ~ 1.5 GHz	Input Return Loss	<-14 dB @ 1 MHz ~ 1.5 GHz
Video Standard	SMPTE 292M, SMPTE 259M, SMPTE 424M, ITU-RBT.601, ITU-RBT.1120	Data Type	8bit, 10bit

8.2.7 MMX-AU88

Input		Output	

Input	8 stereo	Output	8 stereo
Input Connector	3.5 mm captive screw connectors, 5 pole	Output Connector	3.5 mm captive screw connectors, 5 pole
Input Impedance	>10KΩ	Output Impedance	50Ω
General			
Frequency Response	20Hz~20KHz, ±0.5dB	CMRR	>90dB@20Hz~20KHz
Stereo Channel Separation	>80dB@1KHz	THD + Noise	1% @ 1 KHz, 0.3% @ 20 KHz at nominal level
Audio Bits per Sample	18 bits per channel, 2 channels (L, R)		

9. Troubleshooting & Maintenance

1) When the output image in the destination device connected to the MMX88A has ghost, such as the projector output with ghost, please check the projector's setting or try another high quality connection cord.

2) When there is a color losing or no video signal output, it may be the connectors between the input and output end do not connect tightly.

3) When the remote controller doesn't works:
   A. Maybe the battery is run out of, please change a new one.
   B. Maybe the controller is broken, please ask the dealer to fix it.

4) When user can not control the MMX88A by computer through its COM port, please check the COM port number in the software and make sure the COM port is in good condition.

5) When switching , the beeper beeps but without any output image：

   A. Check with oscilloscope or multimeter if there is any signal at the input end. If there is no signal input, it may be the input connection cord broken or the connectors loosen.
   B. Check with oscilloscope or multimeter if there is any signal at the output end. If there is no signal output, it may be the output connection cord broken or the connectors loosen.
   C. Please make sure the destination device is exactly on the controlled output channel
   D. If it is still the same after the above checking, it may be something wrong in the switcher. Please send it to the dealer for fixing.

6) If the output image is interfered, please make sure the system is earthed well.

7) If the static becomes stronger when connecting the connectors, it may be due to the incorrect grounding of the power supply, Please earth it again correctly, and otherwise it would bring damage

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to the switcher or shorten its natural life.

8) If the MMX88A cannot be controlled by the keys on the front panel, RS232 port or remote controller, the host may has already been broken. Please send it to the dealer for fixing.

Remarks: For any more questions or problems, please try to get help from your local distributor, or email PTN at support@PTN-electronics.com.