Multifunction Matrix System

Operations Manual
V6.5

RGB Matrix Switcher

VGA Matrix Switcher

Audio & Video Matrix Switcher

HDMI Matrix Switcher

For optimum performance and safety, please read these instructions carefully before connecting, operating or adjusting this product. Please keep this manual for future reference.

Safety Precautions

For the sake of safety and proper equipment installation, operation, and maintenance, the following guidelines are provided and should be perused and followed for this unit:

- Use single-phase, three-wire/split-phase electric power and ensure grounding for the entire system. Attach the matrix to true ground and ensure ground resistance is less than one (1) Ohm. Do not use a non-ground power supply and make sure the ground wire is intact. Without proper grounding, signal interference, performance instability, and electric shock may occur.
- Do not use a two-pin plug. The power supply must be 220VAC 50Hz.
- Turn off all power sources when relocating the units, or when performing any operational/maintenance activities.
- The unit contains a 220V high voltage assembly. Please do not disassemble it or repair it without a professional's permission to avoid damages, unit degradation, or accidental mishaps.
- The unit should be powered off during plugging or un-plugging to avoid short circuiting. Any resulting damages will not be covered by the equipment warranty.
- Temperature, humidity and dust may affect the performance of the unit.
- Do not apply pressure to the unit to avoid damage.
- Refer to this manual with queries. Contact us directly for additional comment and questions.

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ABOUT THE MATRIX SWITCHER

1.1. RGB Matrix Switcher

RGB Matrix Switcher is used for routing and distributing RGBHV and component video signals. It routes multiple source of RGBHV signals to multiple destination. It is high efficiency video-signal routing equipment which can be used for various video signals and to supply individual component video input and output signals. The components of a video signal are transmitted and routed as separated signals to avoid interference to maintain the signal clarity.

RGB Matrix Switcher contains a high performance and variable gain technology processor. Each amplified output parameter can be adjusted separately. Digital tuning is also. A disadvantage: (1) the video image can be affected by the length of cable (video appears too dark with long cable and too bright with short cable). A buffered circuit and frequency compensation ensures signal clarity and transmission stabilization for transmitting over longer distances. The unit is equipped with short circuit protection, LCD display, embedded intelligent system, RS232 port, RJ-45 port (optional), and the capability to work with various remote control devices.

The unit can be used in different aspects, e.g. TV broadcast; media conference room; big screen advertising; education and training; data control center; and, other instances requiring multiple routing technology.

1.2. VGA Matrix Switcher

VGA Matrix Switcher is used for routing and distributing VGA signals. The unit routes multiple sources of VGA signals to multiple destination. The high efficiency video-signal routing equipment can be used for various video signals and to supply individual component video input and output signals. The components of a video signal are transmitted and routed as distinct signals to mitigate signal interference and to maintain the signal clarity.

VGA Matrix Switcher contains a high performance and variable gain technology processor.   Each amplified output parameter can be adjusted separately and supports digital tuning.   A disadvantage: (1) the video image can be affected by the length of cable (video appears too dark with long cable and too bright with short cable).   A buffered circuit and frequency compensation ensures signal clarity and transmission stabilization for transmitting over longer distances. The unit is equipped with short circuit protection, LCD display, embedded intelligent system, RS232 port, RJ-45 port (optional), and the capability to work with various remote control devices.

The unit can be used in different aspects, e.g. TV broadcast; media conference room; big screen advertising; education and training; data control center; and, other instances requiring multiple routing technology.

1.3.   Audio   &   Video   Matrix Switcher

Audio & Video Matrix Switcher can used for routing and distributing composite audio and video signals.   The unit routes multiple source of audio and video signals to multiple destinations. The high efficiency video-signal routing equipment can be used for various video-signals, and standard BNC female housings are used for the input and output video port. Standard RCA female housings are used for the input and output audio port. The unit supports Surround Sound is supported.

Audio & Video Matrix Switcher contains a high performance and variable gain technology processor.   Each amplified output parameter can be adjusted individually and supports digital tuning.   A disadvantage: (1) the video image can be affected by the length of cable (video appears too dark with long cable and too bright with short cable).   A buffered circuit and frequency compensation ensures signal clarity and transmission stabilization for transmitting over longer distances. The unit is equipped

with short circuit protection, LCD display, embedded intelligent system, RS232 port, RJ-45 port (optional), and the capability to work with various remote control devices.

The unit can be used in different aspects, e.g. TV broadcast; media conference room; big screen advertising; education and training; data control center; and, other instances requiring multiple routing technology.

1.4. HDMI Matrix Switcher

HDMI Matrix Switcher can used for routing and distributing DVI and HDMI signals (Mixed Matrix Switcher is compatible with composite video, SDI video, and VGA video signals). The unit routes multiple source of audio and video signals to multiple destination. The high efficiency video signal routing equipment can be used for various video-signals and standard housings are used for the input and outputs (details vary relative to the different models).

HDMI Matrix Switcher contains a high performance and variable gain technology processor. Circuit buffering and frequency compensation ensures signal clarity and transmission stabilization over longer distances. The unit is equipped with short circuit protection, LCD display, embedded intelligent system, RS232 port, RJ-45 port (optional), and the capability to work with various remote control devices.

The unit can be used in different aspects, e.g. TV broadcast; media conference room; big screen advertising; education and training; data control center; and, other instances requiring multiple routing technology.

2. EQUIPMENT ITEMS

- Matrix switcher x1
- Power adapter x1
- RS232 serial cable x1
- Operations manual x1
- Instruction CD x1
- Certificate x1

- Warranty form x1

3. INSTALLATION

The Matrix Switcher can be installed onto a standard TV wardrobe or platform.

Signal Connection

There are "input" and "output" ports on the Matrix Switcher. Corresponding cable should be connected to the input and output ports respectively.   The signal from the source (DVD player or PC) should be connected to the input port, while the output port should be connected to the destination display (projector or TV).

RS232 Serial Port Communication

The RS232 serial port on the Matrix Switcher can be used to connect with various remote control devices for remote control operation.   The serial port is D-sub 9-pin (same defined data transmission specification as the serial port on PC).

Details of pin assignments follows:

Pin#	Pin	Description
1	NC	None
2	RXD	Receive data
3	TXD	Transmit data
4	NC	None
5	GND	Ground
6	NC	None
7	NC	None
8	NC	None
9	NC	None

Caution:

When the Matrix Switcher is connected to control devices (e.g.: PC) via RS232, be cognizant of the sequence of TXD and RXD (the actual pin assignment of the device should be considered).   Below diagram shows the connection with the control device:

Matrix switch   Control device (e.g. PC)
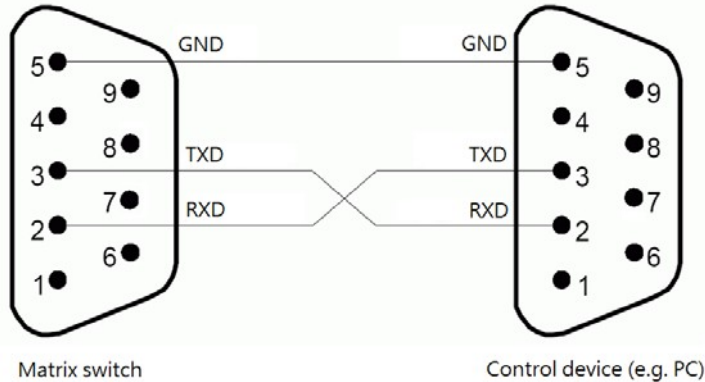
When connected with the PC, the RS232 communication cable should be "cross cable" instead of "direct cable".

Power Connection

Connect the female end of the power cord to the port with 220VAC 50/60Hz labelled on the rear panel of the matrix; meanwhile, connect the male end of the cord to a 220VAC 50/60Hz power supply.   Single-phase three-wire/split-phase electric power must be used to ensure safety and proper operation.

4. RS232 SERIAL COMMUNICATION PROTOCOL (NETWORK CONTROL PROTOCOL)

Control Parameter

Via Serial Port Protocol:

- Baud Rate = 9600
- Serial/Parity = 8N1 (8 data bits, no parity, 1 stop bit.)

Via Internet protocol:

- Default IP address for the Matrix Switcher: 192.168.1.68

- TCP Server
- Gateway 10000
- IP of the device can be modified by installation set-up software

General Control Protocol

The following protocol can be applied to all Matrix Switcher models including VGA, RGB, AV and HDMI series.

1. Routing AV signal at the same time → input port*output port! (e. g.: routing port 2 input to port 15 output, code = 2*15!)

2. Routing AV signal from certain input port to all output ports → input port*N! (e. g.: routing port 2 AV signal to all outputs, code = 2*N!)

3. Routing corresponding AV signal → input 1 to output 1, input 2 to output 2......input n to output n, code = N*N!

4. Routing video signal only → input port*output port% (e.g. routing video input 2 to output 15, code = 2*15%)

5. Routing certain video input to all outputs → input port*N% (e.g. routing video input 2 to all outputs, code = 2*N%)

6. Routing corresponding video only → video input 1 to output 1, video input 2 to output 2.......video input n to output n, code = N*N%

7. Routing audio signal only → input port*output port$ (e.g. routing audio input 2 to output 15, code = 2*15$)

8. Routing certain audio input to all output → input port*N$ (e.g. routing audio input 2 to all outputs, code = 2*N$)

9. Routing corresponding audio only → audio input 1 to output 1, audio input 2 to output 2.......audio input n to output n, code = N*N$

10. Save mode → saving the setting of the input and output correspondence, input SAVE+saving no. (Ranges from 1 to 9) e.g. code = SAVE1

11. Select mode → selecting the saved setting, input CALL+saving no. (Ranges from 1 to 9) e.g. code = CALL1

12. Check the corresponding input based on output port → return

corresponding inputs of all outputs by code = QUER00, return corresponding input of certain output by code = QUER+output no. (e. g.: return output 1, code = QUER01)

<u>Individual Control Protocol</u>

1. VGA series control protocol (this does <u>not</u> apply to AV, RGB and HDMI Matrix) - changing the * in general protocol to "**G**".

2. AV series control protocol (this does <u>not</u> apply to VGA, RGB and HDMI Matrix) - changing the * in general protocol to "**V**".

3. RGB series control protocol (this does <u>not</u> apply to AV, VGA and HDMI Matrix) - changing the * in general protocol to "**R**".

4. HDMI series control protocol (this does <u>not</u> apply to AV, VGA and RGB matrix) - changing the * in general protocol to "**H**".

5. OPERATION

5.1. Standby mode

Return to this screen by pressing "Cancel" at any circumstance. (This may vary dependent on model specification)

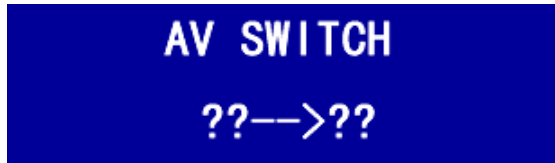## 5.2. SWITCH KEY

Enter the SWITCH MENU by pressing the SWITCH KEY. Below functions can be switched by pressing the key "multiply". (Some of the MENU may not be included in HDMI matrix.)

1. AV SWITCH - Switch audio and video at the same time. Enter the input and output port number under the screen below and then press OK.

2. VIDEO SWITCH - Only video is switched.

3. AUDIO SWITCH - Only audio is switched.

4. AV TO ALL OUTPUT - Route one of the AV input to all outputs.

5. AV N to N - Route one to one for the input and output, 1 to 1, 2 to 2, 3 to 3......N to N.
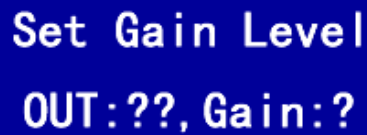
5.3. FUN KEY

Enter the function MENU by pressing the FUN KEY. Below functions can be switched by pressing the key "multiply". (Some of the MENU may not be included in HDMI matrix.)

1. SAVE STATES - Save the current relations between input and output.

2. RETURN STATES - Return the saved relations between input and output.

3. CLOSE (OPEN) BUZZERS

4. Device information

5. SET ID - Set the device ID.

6. SET GAIN LEVEL - Adjust the output amplified gain (Levels 1, 2, 3 and 4). The screen is displayed as below.   Enter the output number you would like to adjust, then input the gain level (1~4) and press OK.

```
Set Gain Level
OUT:??,Gain:?
```

5.4. Software

For new functions or developments, please contact us for further information.
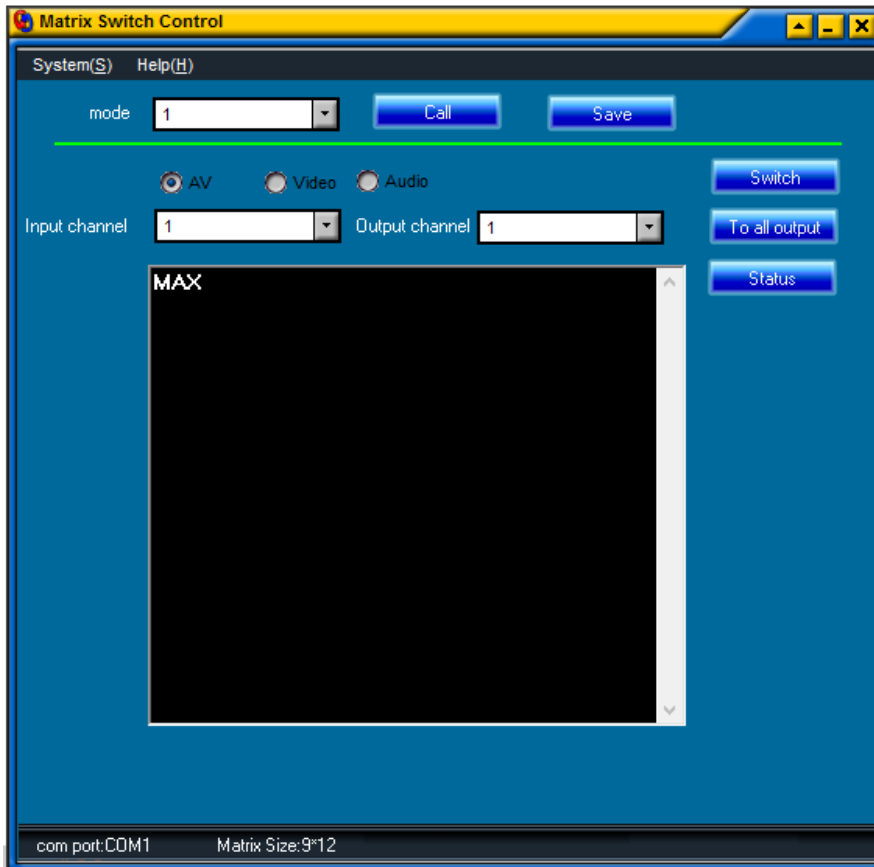
Installation

This software is green, therefore, no installation is required.   The software does not modify the system.   Please copy MaxControl.exe and mswdb.mdb from the CD to PC for installation.

Run

Double click MaxControl.exe to run.　The interface will be displayed as follows:

Caution

Ensure RS232 IN on matrix and PC serial port have been connected by cross cable before using this software.

Switching Operation

First time use - Use the basic setting to set-up the communications port and input/output size.　Then choose the input and output channel and click "SWITCH".　The relationship between input and output will be displayed in the black window.　The information will not update promptly.　Click "STATUS" to read the latest data.　You can switch between AV, Audio Only, or Video Only.

Relationship between Input and Output

The relationship between input and output will be displayed in the black window by clicking "STATUS".

SETTING

Set-up the communications port and input/output size via "SETTING".
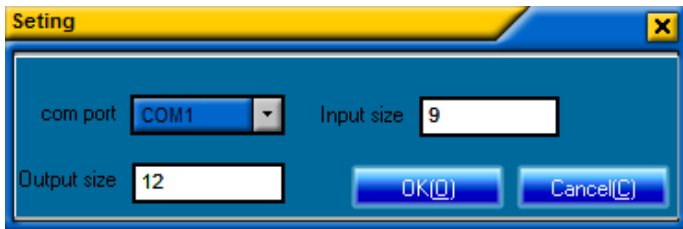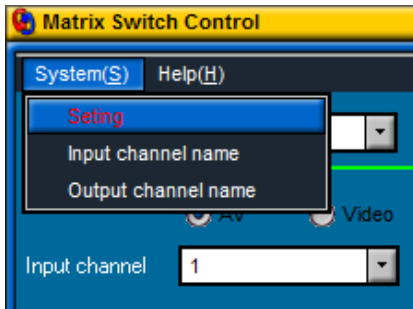
Set the device ID

Modify Device ID via the menu under "SYSTEM".

Input/Output   Channel Name

The input/output channel name can be changed via the menu under "SYSTEM".

Channel	Name
1	
2	
3	
4	
5	
6	
7	
8	
9	

Input Channel Name

6.TROUBLESHOOTING AND MAINTENANCE

1. Significant Signal Interference: check the connection for all cables and ports; the specification of cables; system grounding; and, the consistency and appropriateness of power systems among the devices.

2. Missing color or no video-signal output: the cable may not be connected properly.

3. The Controlling Device via Serial Port Cannot Control the Matrix Switch: ensure that the correct gateway has been selected.

4. Both Input and Output Signals Work Properly with the "BB" Sound: the system may have been muted.

5. When Switching the Signals, the Buzzer Responds But There is No Corresponding Signal Output:
i.) Check the signal from the input end (use an oscilloscope or multimeter). If there is no signal, the cable may be broken or an improper

connection is the cause.   Repair includes changing the cable.

ii.) Check the signal from the output end (use an oscilloscope or multimeter). If there is no signal, the cable may be broken or an improper connection is the cause. Repair includes changing the cable.

iii.) If the above two (2) troubleshooting methods are unsuccessful, the main unit may be damaged (please send the device to a technician for repair).

iv.) If the Power Light is off; there is no display on LCD; and, there is no response on the unit, the power supply may be inoperative or defective. Replace the power supply.

v.) If static electricity gets stronger when connecting the plug/electrical cord, improper grounding may be the cause.   Check the grounding connection, otherwise the main unit may be damaged and service life shortened.

vi.) Malfunctions on the control panel of the Matrix; serial port, or remote control? The main unit may be damaged. Please send the device to a technician for repair.

7. SPECIFICATION

7.1. RGB and VGA matrix switcher specification

Gain: 0dB

Bandwidth: 550MHz (-3dB), full-load, supports HDMI input and output

Crosstalk cancellation: -60dB@10MHz

Switching speed: <150ns

Min/Max input line-level analog signal: 0.5V~2.0V p-p

Input resistance: 75Ω

Echo loss: <-38dB@5MHz

Max DC voltage deviation: 16mV

Max input/output line-level: 2.0V p-p

Output resistance: 75Ω

Synchronized input line-level: 0.5V~5.0V p-p (4.0V p-p nominal)

Synchronized output line-level: 1K

Synchronized output resistance: 75Ω

Max transmission delay: horizontally 92ns, vertically 158ns

Max increase/decrease time: 4ns

Serial control port: RS-232, 9-pin, D-sub

Baud rate and protocol: Baud rate 9600, 8N1 (8 data bits, no parity, 1 stop bit.)

Serial control pin assignment: 2=TX, 3=RX, 5=GND

Power supply: 100VAC~240VAC, 50/60Hz

Temperature: Storage/Operating -20~70°C

Humidity: Storage/Operating 10%~90%

Mean time between failures (MTBF): 31000hours

Warranty: One (1) year free warranty and lifelong maintenance

7.2. Audio and Video matrix switcher specification

Video signal

Gain: 0dB

Bandwidth: 550MHz (-3dB), full-load

Crosstalk cancellation: -60dB@10MHz

Differential phase: <1.28°, 3.58MHz

Differential gain deviation: 0.1%, 3.58~4.43MHz

Differential phase deviation: 0.1°, 3.58~4.43MHz

Max transmission delay: 5ns (+/-1ns)

Signal format: NTSC3.58, NTSC4.43, PAL, SECAM

Signal type: composite video

Video input

Echo phase-locked: 0.3V~0.4V p-p

Min/Max input line-level analog signal: 0.5V~2.0V p-p

Resistance: 75Ω

Echo loss: <-40dB@5MHz & >-30dB@5MHz

Max DC voltage deviation: 15mV

Video output

Min/Max input line-level analog signal: 0.5V~2.0V p-p

Resistance: 75Ω

Echo loss: <-38dB@5MHz

DC voltage compensation: Max+/-7mV

Audio signal

Gain: 0dB

Frequency response: 20Hz~20kHz

Total harmonic distortion: noise 0.03%@1kHz

Signal-to-Noise (S/N): >90dB

Stereo channel crosstalk: >80dB@1kHz

Common-mode rejection ratio (CMRR): >75dB@20Hz~20kHz

Input resistance: >10kΩ

Output resistance: 50Ω

Max line-level: +19.5dBu

Gain deviation: +/-0.1dB

Max output line-level: +19.5dBu

Others

Power: 100~240VAC, 50/60Hz

Temperature: Storage/Operating -20~70°C

Humidity: Storage/Operating 10%~90%

Mean time between failures (MTBF): 31000hours

Warranty: One (1) year free warranty and lifelong maintenance

7.3. HDMI Matrix Switcher Specification

Please contact us for further information (via toll-free number or company url).