



Connect with Confidence

Mondo Matrix

Installation & Setup Guide



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1 Specifications

Video & Aux Signals:

Signal configuration.....	4 identical, individually routable channels per RJ-45 jack.
Input impedance.....	100Ω balanced (Compatible with all MultiView equipment)
Nominal input amplitude.....	1 Volt P-P
Dynamic headroom	>3dB
Gain from transmitter input to receiver output through switch	Unity
Coupling from transmitter input to receiver output.....	DC
Circuitry bandwidth	>220MHz
Signal type	1,2,3,4 & 5 component video + aux channels (Via MultiView)
Input connectors (UTP).....	RJ-45 Female
Input connectors (VGA).....	HD15 female, 1/8" audio socket
Loop out connectors.....	RJ-45 Female
Output connectors.....	RJ-45 female

Audio:

Audio signals are ported into the MondoMatrix via MultiView components. The type of transmitters and receivers used therefore defines audio specifications. Please refer to the spec sheets for those components.

Control:

Protocol to switch.....	RS-232/RS-422, Selectable; 9600 baud standard
Protocol between master and slave frames.....	RS-232
Interface connector, input.....	7 position Phoenix
Interface connector, output.....	7 position Phoenix

All input to output switching commands are received and processed by the master frame. Additional frames used within the matrix are connected in a daisy chain and receive processed commands from the master frame.

Power:

Power input	90~264 V / 50~60Hz
Consumption.....	200 W Max

Environmental:

Temperature/humidity	
Storage	-40° to +158°F (-40° to +70°C) / 10% to 90%, non-condensing
Operating.....	0° to +100°F (0° to +37°C) / 10% to 90%, non-condensing

Mechanical:

Rack mount	Standard, 4U 19" EIA
Enclosure type	Front Panel: Powder coat over aluminum Enclosure: Aluminum
Enclosure dimensions	6.7" H x 19" W x 10.5" D (170 mm H x 483 mm W x 267 mm D)
Weight	16 lbs (7.3 kg) fully populated
Compliances	CE, FCC Class B, VCCI, AS/NZS, ICES
MTBF	100,000 hours, nominal

2. Introduction

2.1 Overview

The Mondo Matrix CAT5 routing switch is a full matrix platform to easily distribute and route video, audio, and serial signals using the MultiView series of video over Cat5 products. Available in configurations ranging from 16 inputs to 16 outputs up to 256 inputs to 256 outputs and fully expandable.

The Mondo Direct option allows a direct video connection (15HD VGA) into the Mondo Matrix without using a MultiView transmitter. An 1/8" stereo audio jack is available for audio inputs. This jack can also be configured for transmit only serial or SPDIF digital audio at time of purchase. RJ45 cascade loop throughs provide connections to subsequent slave frames. It is only required to have the Mondo Direct option on the Master frame. A maximum of 32 Mondo Direct inputs can be configured. It is possible to mix one Mondo Direct card and one or two standard Mondo RJ45 input cards as well.

The Mondo is controlled via an RS 232 interface either through a simple terminal program or any third party control systems such as Calypso Control Systems, etc. There are no manual or front panel control options for the Mondo Matrix.

2.2 Design Guidelines

When designing or installing a Mondo system, the following should be adhered to:

Equalize all Cat5 Input Cables to the Mondo Matrix

All Cat5 cable inputs should be as equal as possible between source transmitter and Mondo Matrix switch. (This does not apply to Mondo Direct inputs with VGA inputs) Otherwise video quality may be affected when switching as cable compensation settings at the receiver will change due to cable lengths changing.

This can be accomplished by measuring all Cat5 cables and ensuring they are within 30 ft of variance. Add service loops as necessary.

Another option is to use the MorphIT Dual EQ option between the transmitter and switch input to normalize all cables to 0 ft prior to the switch. Contact Magenta for details.

Mondo Matrix Sizing

Mondo Matrix frames are available in 16 output sizes. Inputs may vary from 1 to 64 in 16 port increments.

To add outputs, frames are cascaded "vertically" in "rows".

To add inputs beyond the 64 input single frame limit, frames are cascaded "horizontally" in "columns".

In the case of Mondo Direct frames, a maximum of 32 inputs is allowed.

All frames must have the same number of inputs within a system.

See Addressing chart and diagram on pages 6-7

2. Introduction

2.2 Design Guidelines, cont.

Eight Frame Cascade Limit

All inputs to the Mondo are cascaded to subsequent frames via Cat5 cascade loop throughs on each input card.

It is recommended to loop through no more than 8 frames or video performance may be affected beyond 8 frames.

If using more than 8 frames, the source signals must be split using multiple transmitters, cascading transmitters via the local monitor output frames, using T4 multi output transmitters, or the MultiView 9D Cat5 distribution amplifier.

Frame Addressing is Important

All control of the Mondo is input via the master frame which is addressed 00. There can only be one master frame in a system.

The Mondo master frame intelligently configures itself when powered on by locating all other slave frames and based on a specific addresses can route switch commands to the correct frame. The master frame should be powered on last for this to occur.

There is no need to configure the Mondo beyond setting frame addresses.

Please follow the table on Pages 6-7 for address guidelines.

Frame addressing is done via a push button interface and appears in an LED window.

It is necessary to power cycle the frame to make the address change go into effect.

The master frame also requires to be re-initialized when a slave frame address is changed or added. This can be accomplished using the #1 command or a power reset.

Switching Individual Signals (Pairs) on a single input/output

It is possible to switch individual pairs of the Cat5 switch inputs and outputs to one or different locations.

This is useful when sending audio or serial signals from one source to locations that have different video sources.

For example, a different source of video may be displayed while a single audio or serial signal is broadcast to one or more displays without changing the video signal.

Reference command set in Section 4.

Local Breakout of Signals

It is possible to breakout source input signals such as video, audio, or serial by utilizing the input card cascade loop outs to the appropriate Magenta receiver. Note that these signals do not pass through the switch.

Controlling the Mondo Matrix

The Mondo Matrix does not offer manual or front panel control options.

All commands are input via the RS232 serial port on the master frame via a third party control system such as Calypso Control Systems, Crestron, or AMX.

Additionally a simple terminal program such as Hyperterminal (available as part of the Windows operating system) may be used to send individual commands to the Mondo.

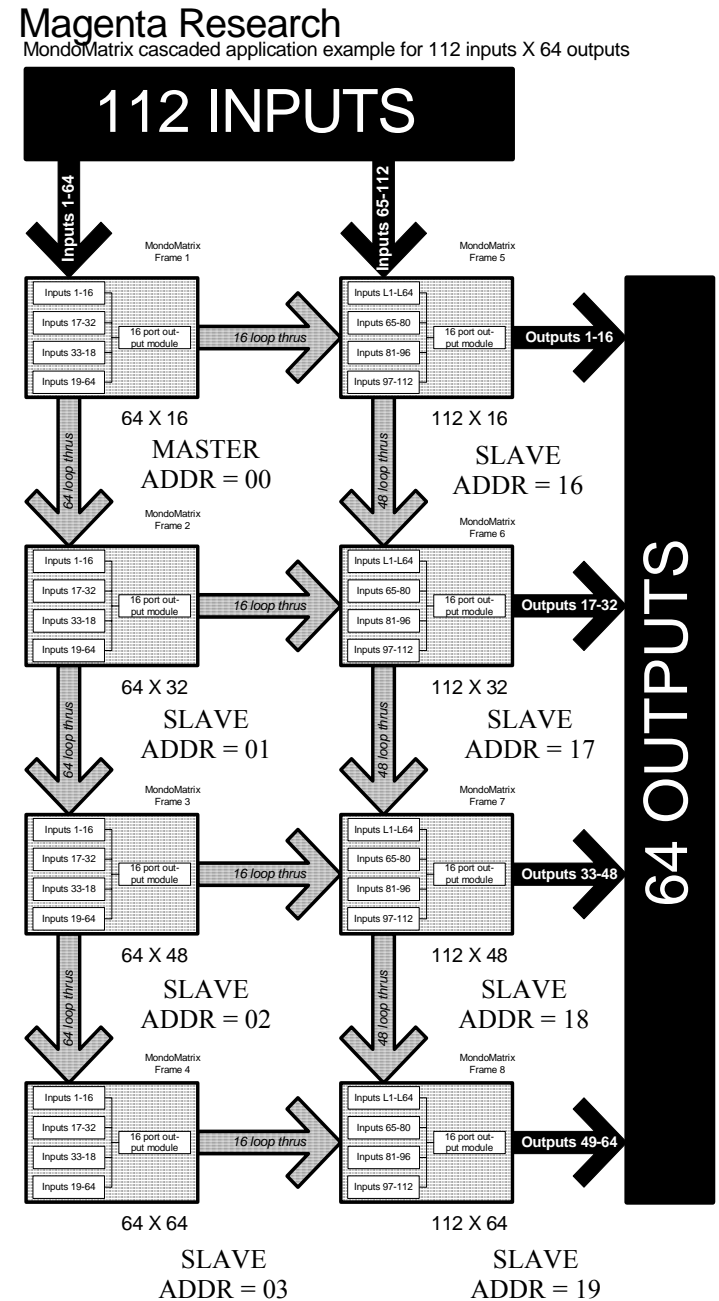
This program is also useful for troubleshooting serial connectivity issues and diagnostic testing.

Use the following table to determine the correct address assignments and Input Output connections for each switch frame.

Table 2-1 Mondo Matrix Frame Addresses

	COL 1: INPUT 1 - 64	COL 2: INPUT 65 - 112	COL 3: INPUT 113 - 160	COL 4: INPUT 161 - 208	COL 5: INPUT 209 - 256	
ROW 1:	MASTER Addr 00	SLAVE Addr 16	SLAVE Addr 32	SLAVE Addr 48	SLAVE Addr 64	OUTPUT 1 - 16
ROW 2:	SLAVE Addr 01	SLAVE Addr 17	SLAVE Addr 33	SLAVE Addr 49	SLAVE Addr 65	OUTPUT 17 - 32
ROW 3:	SLAVE Addr 02	SLAVE Addr 18	SLAVE Addr 34	SLAVE Addr 50	SLAVE Addr 66	OUTPUT 33 - 48
ROW 4:	SLAVE Addr 03	SLAVE Addr 19	SLAVE Addr 35	SLAVE Addr 51	SLAVE Addr 67	OUTPUT 49 - 64
ROW 5:	SLAVE Addr 04	SLAVE Addr 20	SLAVE Addr 36	SLAVE Addr 52	SLAVE Addr 68	OUTPUT 65 - 80
ROW 6:	SLAVE Addr 05	SLAVE Addr 21	SLAVE Addr 37	SLAVE Addr 53	SLAVE Addr 69	OUTPUT 81 - 96
ROW 7:	SLAVE Addr 06	SLAVE Addr 22	SLAVE Addr 38	SLAVE Addr 54	SLAVE Addr 70	OUTPUT 97 - 112
ROW 8:	SLAVE Addr 07	SLAVE Addr 23	SLAVE Addr 39	SLAVE Addr 55	SLAVE Addr 71	OUTPUT 113 - 128
ROW 9:	SLAVE Addr 08	SLAVE Addr 24	SLAVE Addr 40	SLAVE Addr 56	SLAVE Addr 72	OUTPUT 129 - 144
ROW 10:	SLAVE Addr 09	SLAVE Addr 25	SLAVE Addr 41	SLAVE Addr 57	SLAVE Addr 73	OUTPUT 145 - 160
ROW 11:	SLAVE Addr 10	SLAVE Addr 26	SLAVE Addr 42	SLAVE Addr 58	SLAVE Addr 74	OUTPUT 161 - 176
ROW 12:	SLAVE Addr 11	SLAVE Addr 27	SLAVE Addr 43	SLAVE Addr 59	SLAVE Addr 75	OUTPUT 177 - 192
ROW 13:	SLAVE Addr 12	SLAVE Addr 28	SLAVE Addr 44	SLAVE Addr 60	SLAVE Addr 76	OUTPUT 193 - 208
ROW 14:	SLAVE Addr 13	SLAVE Addr 29	SLAVE Addr 45	SLAVE Addr 61	SLAVE Addr 77	OUTPUT 209 - 224
ROW 15:	SLAVE Addr 14	SLAVE Addr 30	SLAVE Addr 46	SLAVE Addr 62	SLAVE Addr 78	OUTPUT 225 - 240
ROW 16:	SLAVE Addr 15	SLAVE Addr 31	SLAVE Addr 47	SLAVE Addr 63	SLAVE Addr 79	OUTPUT 241 - 256

Figure 2-1 Mondo Matrix Sample Application for a 112 by 64 matrix



3. Installation

(Reference Figure 3-1 and 3-2 for cable connections)

1. Install the Mondo Matrix switch frames in a suitable rack fixture. The Mondo Matrix is designed to install into a standard 19" wide cabinet. Ensure there is adequate ventilation space on side and rear of unit. It is recommended to leave 1 or 2 U of space between additional Mondo Matrix enclosures.
2. Before any cables are connected, determine the Input / Output assignments for each switch frame. The address assigned to the switch frame determines the Input / Output range in the Mondo Matrix system.
3. Apply power to each individual Mondo Matrix frame and assign / verify proper switch frame addresses according to intended Input / Output assignments. Each switch frame must have a unique address. Use the configuration buttons next to the display to configure the address. Power unit off when finished.
4. Each switch frame has two I/O Comm Ports: A Primary (bottom) and a Secondary (top) port. Install communication link cables between each Mondo Matrix switch frame. Starting with the Master frame (address "00") connect the Secondary Port to the Primary Port of the next switch frame. Do this for every switch frame except the last one. The last switch frame should not have anything connected to the Secondary Port.
5. Connect the control cable (RS-232) between the controller device (PC or third party control system) and the Master switch frame Primary Port.
6. Connect Cat5 Input Loop cables between switch frames as required. **Insert RJ45 cables gently — pushing too hard may damage connector pins.**
7. Connect Cat5 Input cables from source devices to MondoMatrix inputs. **Insert RJ45 cables gently — pushing too hard may damage connector pins.** If a Mondo Direct input card is used, connect video sources directly into the HD15 connectors.

NOTE

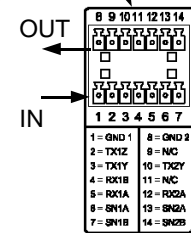
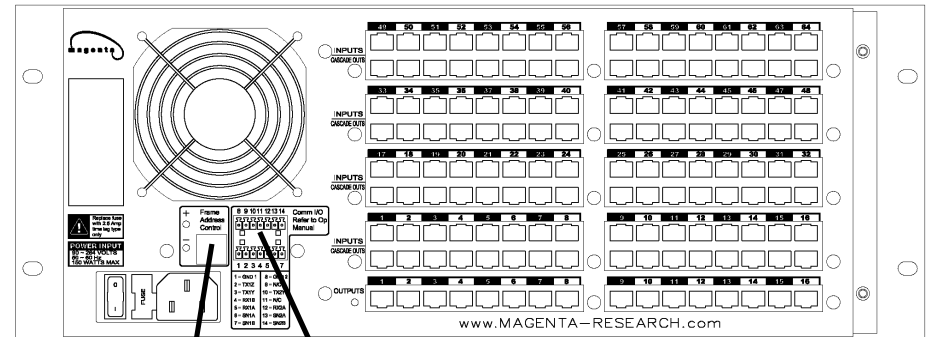
It is recommended to maintain cable lengths as equal as possible from each transmitter unit to the switch. This is due to all adjustments for cable length compensation are done on receiver units. Switching between inputs with unequal cable lengths may cause display images to change due to incorrect cable compensation settings on the receiver. The *Morph-It Cable EQ* option can be used to add/subtract cable lengths. Contact Magenta Research for details

8. Connect Cat5 Output cables from *MondoMatrix* outputs to destination devices. **Insert RJ45 cables gently — pushing too hard may damage connector pins.**

3. Installation (cont)

9. Apply power to the MondoMatrix system. It is recommended that power is applied simultaneously to all switch frames. If this is not practical, then apply power to *Slave* switch frames first, then power up the *Master* switch frame.
10. Mondo is intended to be controlled via a third party application such as AMX or Crestron. A CDROM enclosed with each Mondo also contains a GUI application based on the Knox Chameleon switch software and a user configurable control application from Calypso Control Systems. Instructions on control packages is beyond the scope of this document. For troubleshooting purposes, it is recommended to use a simple terminal control program such as Hyperterminal, part of any standard Windows computer. See Section 4 for set up and commands.

Figure 3-1: Rear View of Mondo Matrix



Serial Interface

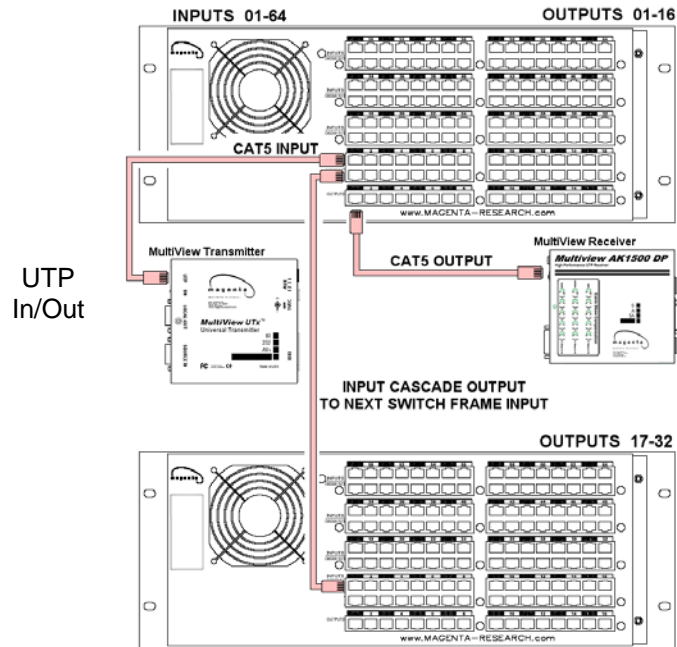
(see Appendix A for cable pinning)
 Pins 1-7 are Serial Input from controller or a Mondo Switch serial output.
 Pins 8-14 are serial output to Mondo Switch slave frames.
 The last frame does not require a terminating connection.

Frame Address Control

Use buttons to increment/decrement address. All frames must have a unique address. When changing addressing, the frame must be power cycled for the change to take effect. **At first power up, an indicator in the lower right will blink until communication has been established with a master frame or controlling device.**

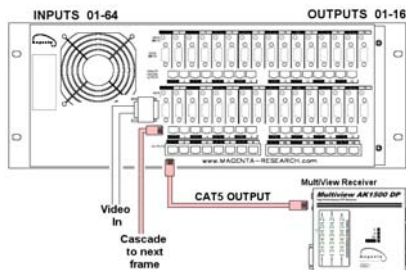
3. Installation (cont)

Figure 3-2: UTP Cabling Examples

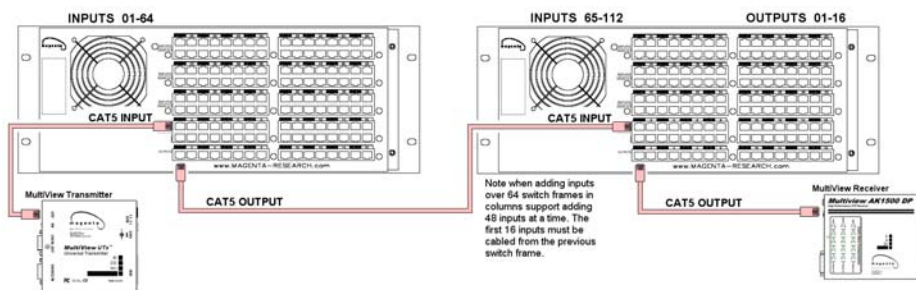


UTP In/Out

Mondo Direct



Adding Inputs beyond 64



4. Commands

Mondo Matrix Serial Communications Requirements:

- 9600 Baud
- 8-bit, No Parity, One Stop Bit
- No Handshaking is required

The Mondo Matrix uses a command set based on the Knox video “SAS” protocol. Additional commands have been added (Extended commands) to support the MondoMatrix specific features.

Characters sent to the Mondo Matrix are not echoed back to the controller. If using a simple terminal application, enable the local echo option.

The Mondo Matrix will reply with either “OK>” (command accepted) or “ER>” (error, command not recognized) after a command string is sent.

Note that all commands are terminated with a carriage return <CR>.

An entire command string may be sent without any character pacing delays, however it is recommended to wait for the “OK>” ready prompt from the switch before sending the next command string.

The Mondo Matrix master frame outputs information on its hardware and firmware platform as well as how many frames are connected at power up. This can be useful to troubleshoot Mondo Matrix communication errors and how many frames the master has found.

Following is the complete Mondo Matrix Command set:

General Commands:

#C = Clear all output assignments - sets all Outputs to OFF (routes to input 0).

#I = Initialize system.
Master frame will detect slave frames and restore power up crosspoint map. Similar to power cycling the master frame.

S = Save current crosspoint map into memory.
This map is restored after power up or when the #I or R command is given.

R = Restore power on crosspoint map.

#\$ = Enable Auto-Save: Current cross-point map is saved into memory and will be restored at power up, or if an #I, R command is received

#& = Disable Auto-Save: Current cross-point map will not be saved into memory

4. Commands, cont.

General Commands:

D = Displays entire crosspoint map of the system

Displays format of xxx Vyyy A zzz

Where xxx is output number, Vyyy is UTP pairs 1,2,3 and Azzz is UTP pair 4

#D = Extended Crosspoint map of the system

Switch will respond with a list of outputs and the inputs connected to them:

zzz Rvvv Gwww Bxxx Ayyy

Where:

Zzz = Output number

vvv = "Red" channel Input assignment (UTP pair 2)

www = "Green" channel Input assignment (UTP pair 3)

xxx = "Blue" channel Input assignment (UTP pair 1)

yyy = "Audio / Aux." channel Input assignment (UTP pair 4)

#M = Cross-point map of selected Input / source

#Maaa(Enter)

Switch will respond with a list of outputs that are connected to the selected input:

zzz Vxxx Ayyy

Where:

aaa = Input

xxx = Video Input assignment

yyy = Audio / Aux. input assignment

zzz = Output

Since it is possible to route video and audio / aux. signals separately, the reply must be analyzed to determine exactly which signals are routed to the selected input. The output will only be included in the list if one or both signals are routed to the selected input.

If no outputs are assigned to the selected input, the switch will issue the ready prompt only (OK>).

#T = Report Temperature (Celsius)

4. Commands, cont.

Standard Routing Commands:

B = Both Video and Audio

V = Video Only (UTP pairs 1,2,3)

A = Audio Only (UTP pair 4)

Parameters:

xxx = Output

yyy = Input (If yyy=0 then the output will be turned off)

Note: Output (xxx) may be 1-3 digits, Input (yyy) may be 1-3 digits, however both must be the same number of digits (append leading zeros if required).

Examples:

Bxxxxyy<CR> Or Vxxxxyy<CR> Or Axxxxyy<CR>

B1314<CR> Audio and Video from Input 14 are routed to Output 13.

V86<CR> Video from Input 6 is routed to Output 8.

A1412<CR> Audio from Input 12 is routed to Output 14.

To turn an output off, route from Input 00

Example:

B1600<CR> turns output #16 off.

Q = Mix Video and Audio

Parameters:

XXX=Output

YYY=Input Video (UTP pairs 1,2,3)

ZZZ=Input Audio (UTP pair 4)

Note: Output (xxx) may be 1-3 digits, Video Input (yyy) may be 1-3 digits, Audio Input (zzz) may be 1-3 digits, however all must be the same number of digits (append leading zeros if required).

Examples:

Qxxxxyyzzz<CR>

Q011213<CR> Video from Input 12 and Audio from Input 13 is routed to Output 1.

4. Commands, cont.

Salvo Routing Commands:

X = Salvo Both Video and Audio
 Y = Salvo Video Only (UTP pairs 1,2,3)
 Z = Salvo Audio Only (UTP pair 4)

Parameters:

mmm = First Output in range
 nnn = Last Output in range
 ooo = Input number

Note: First Output (mmm) may be 1-3 digits, Last Output (nnn) may be 1-3 digits,
 Input (ooo) may be 1-3 digits, however all must be the same number of digits (append leading zeros if required).

Examples:

Xmmmnnnooo<CR> Or Ymmmnnnooo<CR> Or Zmmmnnnooo<CR>
 X121508<CR> Send Video and Audio from Input 8 to Outputs 12 through 15.
 Y123<CR> Send Video Only from Input 3 to Outputs 1 and 2.
 Z010516<CR> Send Audio Only from Input 16 to Outputs 1-5.

Conference Mode (Cross Connect) Commands:

J=Both Video and Audio
 K=Video Only (UTP pairs 1,2,3)
 L=Audio Only (UTP pair 4)

Parameters:

xxx = Output
 yyy = Input

Note: Output (xxx) may be 1-3 digits, Input (yyy) may be 1-3 digits, however both must be the same number of digits (append leading zeros if required).

Examples:

Jxxxyyy<CR> Or Kxxxyyy<CR> Or Lxxxyyy<CR>
 J1215<CR> Route Both Audio and Video from Input 15 to Output 12 and Input 12 to Output 15
 K1215<CR> Route Video Only from Input 15 to Output 12 and Input 12 to Output 15
 L1215<CR> Route Audio Only from Input 15 to Output 12 and Input 12 to Output 15

4. Commands, cont.

Batch Routing Commands:

E = Both Video and Audio
 F = Video Only (UTP pairs 1,2,3)
 G = Audio Only (UTP pair 4)
 EE = Take (Execute Batch Commands)

Parameters:

xxx = Output
 yyy = Input (If yyy=0 then the output will be turned off)

Examples:

Exxyyy<CR>
 E1211<CR>F1112<CR>G1405<CR>F0812<CR>EE<CR>

As a batch do the following after receiving the EE command:
 Route Both Audio and Video from Input 11 to Output 12 [E1211]
 Route Video Only from Input 12 to Output 11 [F1112]
 Route Audio Only from Input 05 to Output 14 [G1405]
 Route Video Only from Input 12 to Output 08 [F0812]
 Execute [EE]

#R = Red Channel (1st Pair)
 #G = Green Channel (2nd Pair)
 #B = Blue Channel (3rd Pair)
 #A = Auxilliary Channel (4th Pair)
 EE = Take (Execute Batch Commands)

Parameters:

xxx = Output
 yyy = Input (If yyy=0 then the output will be turned off)

Examples:

#Rxxxyyy<CR> Or #Gxxxyyy<CR> Or #Bxxxyyy<CR> Or #Axxxyyy<CR>
 #R11<CR>#G11<CR> #B11<CR>EE<CR>

As a batch do the following after receiving the EE command:
 Route Red Channel Input 1 to Red Channel Output 1
 Route Green Channel Input 1 to Green Channel Output 1
 Route Blue Channel Input 1 to Blue Channel Output 1
 Execute [EE]

#R0116(Enter)#G0116(Enter)#B10(Enter)#A10(Enter)EE(Enter)

As a batch do the following after receiving the EE command:
 Route Red Channel Input 16 to Red Channel Output 1
 Route Green Channel Input 16 to Green Channel Output 1
 Turn Blue Channel Output 1 OFF
 Turn Auxilliary Channel Output 1 OFF
 Execute [EE]

5. Troubleshooting

In most cases, nearly every issue with the Mondo Matrix can be resolved by checking the Cat5 cable terminations and making sure it is pinned to the TIA/EIA 568B specification. However there may be other problems that cause the system to not perform as designed. Below are solutions to the most common installation errors:

Cannot send switch commands or Mondo does not respond.

Most serial connectivity issues can be solved by ensuring the transmit and receive pins are connected correctly and serial settings are correctly configured.

It is recommended to use a simple serial terminal program such as Hyperterminal (a Windows program) to send simple commands to ensure the Mondo Matrix is functioning (ensure "local echo" mode is enabled to see commands sent).

In the case where a third party control application is used to control the Mondo Matrix, please ensure serial connectivity using a simple terminal program such as Hyperterminal first, then check that the correct signal pins are connected to the Mondo from the third party application. Lastly, ensure serial port settings have been set correctly.

In the case where there are multiple frames, disconnecting slaves from the master first, then adding slaves back in can isolate inter frame connectivity problems.

Remember to power cycle the master when slave frames are added.

When the master is powered on, it outputs information from the serial port on the number of frames it has found. This can be useful in determining serial connectivity issues.

Not all inputs and/or outputs switch correctly

Ensure all slave frames are connected via the RS232 serial bus and have been recognized by the master. An indicator in the address LED will blink until the frame communicates with the master frame. It may be necessary to power cycle slave frames and lastly the master to establish communication.

Check frame addresses (see table 2-1, page 6) and ensure they are correct. Inputs and Outputs are determined by frame address. An incorrectly addressed frame can produce unpredictable results.

If one or two inputs/outputs do not display the intended signal, check the cabling between the transmitter and Mondo or Mondo and receiver unit. See the transmitter/receiver user manuals for additional information on troubleshooting.

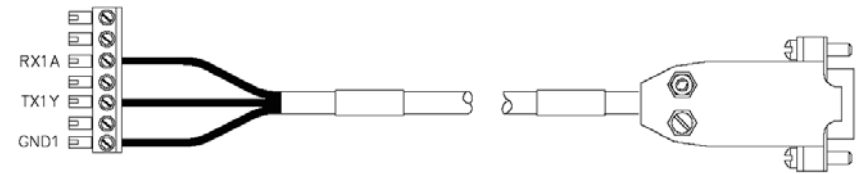
No video is output to display on Mondo Output

Ensure transmitter and receiver are correctly configured and functioning (see respective user manuals for each unit). Ensure Cat5 cables are correctly terminated and connected.

Check source input (connect a transmitter unit to a cascade output of the suspect input card to ensure signal is being transmitted into the Mondo Matrix).

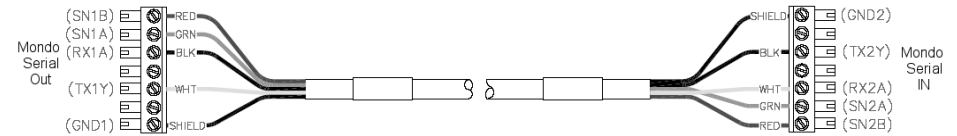
Appendix A Serial Control cables

Table A-1 RS 232 Control cable to Mondo Switch Serial Input



DB9 Serial Pins	DB9 Signal	Phoenix pin	Mondo Signal	Mondo Pin
2	Rx	3	TX1Y	3
3	Tx	5	RX1A	5
5	Gnd	1	GND1	1

Table A-2 Mondo Switch inter frame Control cable



Mondo Serial OUT pin	Mondo Serial OUT Signal	Mondo Serial IN Signal	Mondo Serial IN pin
8	GND2	GND1	1
9	-	-	2
10	TX2Y	RX1A	5
11	-	-	4
12	RX2A	TX1A	3
13	SN2A	SN1A	6
14	SN2B	SN1B	7

Table A-3. 1/8" (3.5 mm) Audio/Serial Connection (Mondo Direct only)

Pin	Signal		
Tip	Serial Tx	SPDIF +	Left +
Ring	N/C	N/C	Right +
Sleeve	Serial GND	SPDIG -	GND

