RS232 Control for

Clarity™ Matrix LCD Video Wall System with G2 Architecture

The ascii protocol for RS232 lets you use English words with a minimum of mysterious code.

What's in this document:

You should already know how to operate Clarity Matrix Video Wall with the remote control and how to read the menus. See the Guide for more information.

Connecting RS232 Communication

RS232 control is not necessary for operation, but is a convenient way to control displays from a computer at a distance. If your installation will not use RS232 control, skip this section.

Everything you can do with the remote, you can do with RS232 commands. Plus, you can send inquiries to the displays and find out the current settings and values.

RS232 connections are made with cables like Ethernet straight-through cables. This is the common type of LAN connection cable sometimes called a Cat 5 cable.

Connecting RS232 Cables

1. Connect the cable to the serial output connector of the controlling computer. (This computer does not have to be the same one as the computer used as a picture source.) The serial output is sometimes called the Comm Port, and sometimes there is more than one.

How to Form Commands

Basic Rules

- RS232 commands consist of a string of ascii characters.
- All numeric values are decimal; you do not need to use hex or binary digits in the commands.
- Spaces or tabs may be used in the commands to separate the parts and make them easier for humans to read. This “white space” is ignored by the command reader in the Clarity Matrix Video Wall.
- You cannot use commas, slashes, or other punctuation as separators. Periods have a special purpose in commands.
- Commands are not case sensitive, so you can use upper and lower case letters as you wish, EXCEPT the first two letters of every command must be both upper or both lower case. After that, it doesn’t matter.
- When a command requires a response, wait for the response before sending another command to this or another display.
- All commands must end with a carriage return character, shown as [CR] in the rest of this document. Depending on your serial communications program, commands may automatically be ended with a [CR]. If you are uncertain whether your application automatically does this, send a test command such as `ky 00 menu` without a [CR]. If the menu displays on screen, you will not need to insert a [CR]. If nothing happens, you will need to add a [CR] at the end of each command.

Connecting RS232 Communication

Types of Commands

Key Commands

Key commands simulate pressing a key on the remote control. This is not very useful unless you can see the screen, because you won't know where the selector is in the menu.

Operation Commands

Tip: Operation commands are more flexible and easier to use than Key commands

Operation commands tell the display exactly what to do.

- Set green in the white color balance to 27
- Save the current settings into memory slot 23
- Recall memory slot 7

Operation commands can ask questions and get answers, such as:

- What is the state of ? (on, off, failed, etc.)
- Which connector is used if memory slot 3 is recalled?

String Commands

String commands send strings of characters to the display.

String commands can also retrieve information from the display. For instance,

```
ST  BUILD.DATE? [CR]
```

returns the build date of the firmware:

```
ST  BUILD.DATE= "JUN 15 2009 08:48:24"
```

Addresses in Commands

All commands must be addressed. Each display has a two-character ID that is unique to it.The first character is called the **Group ID**, and the second one is the **Unit ID.**

- Commands can be addressed to **individual** displays: . When this form of address is used, the display will respond to the host computer.

  Note: Whenever a command is sent to an **individual** ID, wait for the response before sending a second command.

- Commands can be addressed to **all** displays: **
- Commands can be addressed to a **group** of displays: *4 (all displays with 4 as the Unit ID), A* (all displays with A as the Group ID).

Command Structure

All commands start with **two letters**:

`OP` or `op` for operations commands (but not `Op` or `oP`)

`KY` or `ky` for key commands (but not `Ky` or `kY`)

`ST` or `st` for string commands (but not `St` or `sT`)

The next two characters are the **address**.

The next section of the command is the operation, the remote key, or the string, the main part of the command telling the display what to do.

A few commands have a 'target.' For example, to adjust white balance, you must state which color to change: red, green, blue, or all. Or to determine whether a memory slot is empty, you must target the memory slot number. **The target is always in (parentheses).**

The next character is the command function symbol. There are five function symbols:

Function	Symbol	Action on display
Set	=	makes the display take that value
Get	?	asks what the value is
Increment	+	adds 1 to the current value
Decrement	–	subtracts 1 from the current value
Execute	[none]	performs an action, such as a reset

- Some commands are Execute only, such as saving a slot.
- Others are Set and Get only, such as setting the pattern or asking what the pattern is.
- Some are Get only, such as getting the horizontal frequency of the source.
- And some are Set, Get, Increment, Decrement, such as color balance.
- The last part of the command, for Set commands only, is the **value**. The value may be a number or one or two words.

Sample Operation Commands

Command Example[1]	Explanation
`op A3 auto.position.disable = DISABLED [CR]`	Disable the auto position feature in display A3
`op G4 auto.position.disable ? [CR]`	Is the auto position feature enabled or disabled in display G4?
`op A* brightness + [CR]`	Increment the brightness in all displays with Group ID A
`op ** window.reset.size [CR]`	Makes all the Zoom and Viewport settings return to the default values.
`op A1 center.point (red) ? [CR]`	What is the value for the red pixel at the center (sampling) point in display A1?

[1]The command line must always end with a carriage return character, noted in the examples above as [CR]. The Clarity Matrix Video Wall will not act on the command unless the last character is a carriage return character (ascii hex value: 0D).

Sample Key Commands

Command Example	Explanation[1]
ky menu [CR]	Press the MENU button on the remote
ky down [CR]	Press the down arrow on the remote
ky enter [CR]	Press the ENTER button on the remote

[1]As you can see from Sample Key Commands sequence, if you are not looking at the screen, you won't know what you just did. You don't know where the cursor was at the start.

Sample String Commands

Command Example	Explanation
st revision ?[CR]	What is the revision level of display ?

Using the Operation Commands Table

The Operation Commands table starts on page 15.

Operations and Operation Numbers

The commands are listed in alphabetical order by Operation. In a command, you may use either the **ascii text** of the operation or its **Operation Number**. For instance, to get the display power, all these commands are equivalent:

```
op A3 display.power ? [CR]
opA3display.power? [CR]
op A3 1094 ? [CR]
opA31094? [CR]
OP  A3   dIsplAy.Power ?     [CR]
```

Target

If the Target column has anything in it, the command must use one (and only one) of the targets, and it must be in parentheses. Use either the ascii text or the Target Number. These are equivalent commands:

```
opa2 center.point (red) ? [CR]
opa21110(0)? [CR]
```

Using the Operation Commands Table

Command Types Allowed

Use only the types listed in the first column.

Symbol		Meaning	Example	Result
=	Set	tells the display to take the value that follows	`op A* white.balance (all) = 100 [CR]`	All displays with a Group ID of A (and Unit ID of anything) will set their white balance levels for red, green and blue to their maximum of 100
?	Get	asks for the value	`op A1 contrast ? [CR]`	Tells display A1to send the value of contrast to the host computer. Note that the display will *only* respond if it is addressed individually.
+	Increment	increments the value	`op ** gray.balance(red) + [CR]`	Makes all the displays increase their Gray Balance value by one. Note that any display whose value is already at the top (in this case 15) will not increase it.
–	Decrement	decrements the value	`op ** white.balance(green) - [CR]`	Makes all the displays decrease their White Balance value by one. Any display that had a white balance of 1 before the decrement will not change.
[none]	Execute	means the command is executed. No character follows the command (or the Target, if it has one)	`op ** slot.save (0) - [CR]`	Saves slot 1 to memory.

Note: Any word or character or phrase that appears between [square brackets] is for information or clarification only. It is not sent to the display or received from it.

Values

The Value may be sent as text or as a value number.

Text values can be sent in upper or lower case or with mixed case. They are listed in UPPER CASE in the table to make it easier to see the difference between the value and any [explanation].

[varies] means the range of acceptable values and replies varies with the type of source.

Reading the Response

Two commands establish the features of the replies. (Remember the displays only reply when individually addressed.)

`ascii.eol` determines the End Of Line character the display will send at the end of every command.

`ascii.response` determines how you want the replies to look when they come back to you.

- `Symbolic` means the replies will come back as ascii characters, if the value column allows them.
- `Numeric` means that the Value Number will come back.
- `Data` means that only the value is returned, not the preceding information.

The following table shows examples of each setting for `ascii.response` and three possible responses:

Command Sent	Response	Explanation
`op A1 ascii.response = symbolic [CR]`	`OPA1ASCII.RESPONSE=SYMBOLIC`	The display received the command and has set the response type to symbolic and replies will be ascii characters
`op A1 pattern ? [CR]`	`OPA1PATTERN=BLACK`	The current test pattern is black.

Using the Operation Commands Table

Command Sent	Response	Explanation
op A1 ascii.response = numeric [CR]	OPA11137=1	The display received the command and has set the response type to numeric and will reply with the value number
op A1 pattern ? [CR]	OPA11036=6	The current test pattern is black.
op A1 ascii.response = data [CR]	ACK	The display received the command and has set the response type to data and will reply with only a number
op A1 pattern ? [CR]	6	The current test pattern is black.

Note: Replies are always in ALL CAPS, regardless of how the query was sent.

Using Key Commands

Key commands always start with `ky` or `KY`. There are two kinds of key commands, command word and numeric equivalent commands.

Command Word Key Commands

Command word key commands simulates pressing a button on the remote. For example, the command:

```
ky A1 menu  [CR]
```

simulates pressing the menu button. All the other named buttons on the remote control can be “pressed” in this manner by using the name on the remote. This picture shows the command for each named key:

Numeric Equivalent Commands

Numeric equivalent commands also simulate pressing a remote button. For example, the command:

```
ky  r   [CR]
```

simulates pressing the MENU key on the remote. All the keys have “R” numbers associated with them, even keys that don’t exist on the real remote.

In the illustration below, the white buttons don’t exist on the remote, and the shaded buttons contain the command key equivalent:

Examples of Operation Commands

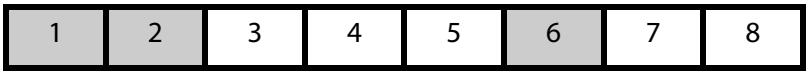
Recalling Memories

Remember: The slot target number used in the command is *one less than* the memory slot number as seen in the menus. For example, to recall memory slot #40, in commands you'd specify `slot.recall(39)`. Likewise, to recall the first slot, you'd specify `slot.recall(0)`.

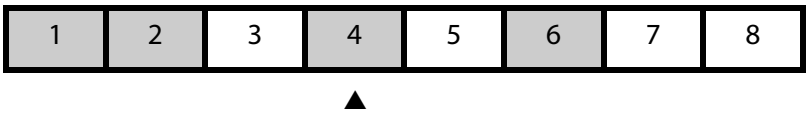
The simplest slot commands are slot.recall(n) and slot.save(n). These are the preferred commands. slot.action and slot.target can also be used but require two commands to accomplish the same thing.

Examples

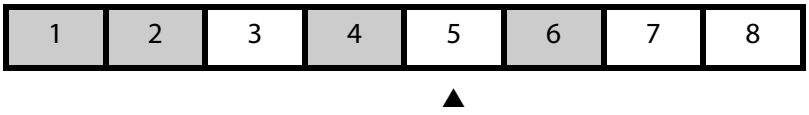
Assume that memory slots #1, #2, and #6 are used (full). Memory slots #3, #4, and #5 all the others are empty, as shown in the illustration below:



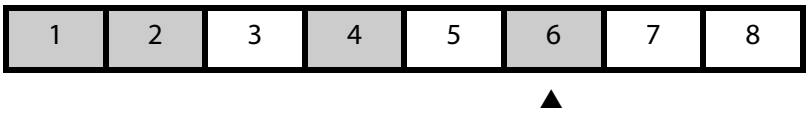
`op slot.save(3) [CR]`	This saves all the current settings into memory slot #4 with the default memory name.



`op slot.recall(4) [CR]`	This action fails, because there is nothing in slot #5. Nothing happens to the picture on the screen; it does not change.



`op slot.recall(5) [CR]`	This recalls slot #6.



Examples of Operation Commands

Asking (Get) and Telling (Set)

To ask about a value or condition, use a question mark [?]. No character should follow the question mark. To set a value or condition, use an equal sign [=]. A value must follow the equal sign.

Types of Responses

Response from the display can be Symbolic (mostly text), Numeric (mostly numbers), or Data.Whenever a command is sent to an individual ID, wait for the response before sending a second command.

Note: Remember: displays only respond when they are individually addressed. If you want to know a status or a value in six different displays, you must ask the question six times, and you must wait for the response from each display before sending the question to the next one.

An Index on page 46 lists all the entries, plus other names for the entries. For instance, "memory" in the index will lead to "slot," which is the name used in the commands to refer to memory numbers. All commands are **Operation** commands which should start with "op", except those marked with [ST] which are **String** commands, and those marked [LIST] which are **List** commands.

For **String** commands, use the form `ST -- asset.tag = "This is my asset tag"` and substitute the unit ID for the `--`. There is no target for string commands.

For **List** commands, use the form `LI -- rtc(1)={xx,xx,xx..}` where `xx` is a number, or `LI -- rtc(1)?` and substitute the unit ID for the `--`. The number of items in the list and their ranges depend on the individual command.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set	get	inc	dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
1	ambient.lux	1087				?				0 : 1846	The current lux read by the ambient light sensor.
2	ambient.threshold	1167			=	?	+	–		0 : 1846	When BACKLIGHT.MODE is set to auto, an AMBIENT.LUX reading lower than this value will cause the backlight intensity to change to the value set in DIMMED.INTENSITY
3	ascii.eol	1138			=	?			CR CRLF LF LFCR	0 1 2 3	Determines the End Of Line character used in replies.
4	ascii.response	1137			=	?			SYMBOLIC NUMERIC DATA [onli]	0 1 2	Determines the style of the reply: SYMBOLIC replies with the Value [except for what is in square brackets] NUMERIC replies with the Operation number and Value number DATA replies with the Value number only

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5	aspect	1054			= ?	FILL CROP LETTERBOX 16X9 ONE.TO.ONE 4X3	0 1 2 3 4 5	
6	aspect.status	1092			?	EQUAL TALLER WIDER	0 1 2	TALLER and WIDER refer to the source picture being taller than or wider than the aspect ratio of the screen or wall.
7	asset.tag [ST]	16		0 : 20	= ?			A usel-settable string of up to 25 characters
8	auto.frequency.disable	17421			= ?	NOT.DISABLED DISABLED TOGGLE	0 1 2	
9	auto.lamp	1037			= ?	DISABLE ENABLE	0 1	**Note**: This command only applies to LED-based products.
10	auto.phase.disable	17420			= ?	NOT.DISABLED DISABLED TOGGLE	0 1 2	
11	auto.position.disable	17422			= ?	NOT.DISABLED DISABLED TOGGLE	0 1 2	
12	auto.resync.disable	17438			= ?	NOT.DISABLED DISABLED TOGGLE	0 1 2	
13	backlight.intensity	1085			= ? + −		0 : 100	

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14	backlight.mode	1290			= ?	AUTO MANUAL	0 1	When set to auto, the ambient sensor controls the backlight. When manual, backlight is controlled with the BACKLIGHT.INTENSITY command
15	baud	1143			?	2400 4800 9600 19200		Baud rate
16	blue.only	1057			= ?	DISABLE ENABLE	0 1	
17	border.color.custom	1457	RED GREEN BLUE ALL	0 1 2 3				The border color is the color of the screen when there is no image to display, such as when source is absent, or on the edges of a letterboxed image. With this command you can set the border color to any color within the 30-bit color range. This is used for testing purposes when it is desirable to see the full 10 bits per color output as opposed to the CUSTOM.PATTERN command which only allows 8 bits per color precision
18	brightness	16387			= ? + –	0 – 255		Used when digital source is YPbPr.
19	build.date [ST]	1			?			Retrieves text: firmware compilation date and time.
20	bytes.received	1140			?	0 – 32767		Used only to indicate that bytes have been received. Resets to zero upon reaching its maximum value.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

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21	bytes.sent	1141			?	0 – 32767		Used only to indicate that bytes have been sent. Resets to zero upon reaching its maximum value.
22	center.point	1110	RED GREEN BLUE ALL	0 1 2 3	?	0 – 255		The center point is the one pixel used by auto level.
23	clear.input.memory	16902			[execute]			Makes the display “forget” any sources it has seen before.
24	clipboard.gray.balance	1163	RED GREEN BLUE ALL	0 1 2 3	?	0 – 15		
25	clipboard.recall	1161			[execute]			
26	clipboard.save	1162			[execute]			
27	color.temp	1268			= ?	3200K 5500K 6500K 8500K NATIVE CUSTOM	0 1 2 3 4 5	
28	colorspace	1180			?	RGB YPBPR	0 1	
29	custom.pattern custom.pattern [LIST]	1237	RED GREEN BLUE ALL	0 1 2 3	= ? + –	0 – 255		For the [LIST] command, the 3 elements are the Red, Green and Blue components of the customer test pattern. If the test pattern is not up when this command is sent, it will be dispalyed. (To remove the pattern, send the operation PATTERN=NONE)

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

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30	dimmed.intensity	1462			= ? + –		0 : 100	The backlight value to use when the ambient light is below the AMBIENT.LUX threshold when BACKLIGHT.MODE is AUTO
31	display.power	1094			= ?	OFF ON	0 1	This turns on/off .
32	display.type	1416			?	LX46S3D MX55HDS MX46HDS LX46HDS LX55HDS LX55HDS3D MX55HDU LG55HD MX46 LX46 MX55HD HX60 MX46HD LX46HD LX55HD	1 2 5 6 7 8 9 8 0 1 2 3 5 6 7	Returns the type of display connected. Not all of these types are sold with Matrix with G2 architecture
33	edid.custom.enable	1241			= ?		0 : 1	If a custom EDID has been downloaded via a EDID.CUSTOM.LOAD list command, then this command can be used to enable or disable that EDID. A non zero value enables the custom EDID.
34	edid.custom.load [LIST]	1261			= ?		1 for get 2 : 33 for get	For *set*, the first parameter is the address within the EDID to start the loading. This is followed by up to 32 byte-values to be loaded. For *get*, only the address is sent. The 32 bytes returned start at that address.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

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35	edid.mailbox	1261			?			
36	edid.timing.1.only	1440			= ?	ENABLE DISABLE	0 1	When enabled, all timings will be removed from the EDID except for Detailed Timing 1, also known as the Preferred Timing. Some video drivers get confused by the large resolution timings that are in the default EDID. This is a way to work around those issues.
37	edid.timing.2	1452			= ?		3 or 9	For *set*, if the number of parameters sent is 3, they are interpeted as HACTIVE. VACTIVE, VREFRESH and "Fully Specified" is assumed to be False. If the number of parameters sent is 9, they are GACTIVE, VACTIVE, PCLK, HBLANK, HFP, HSYNC. VBLANK, VFP, VSYNC in that order. For *get*, all 9 parameters are returned in the order given above.
38	edidtiming.1 [LIST]	1451			= ?		3 or 9	For *set*, if the number of parameters sent is 3, they are interpeted as HACTIVE. VACTIVE, VREFRESH and "Fully Specified" is assumed to be False. If the number of parameters sent is 9, they are GACTIVE, VACTIVE, PCLK, HBLANK, HFP, HSYNC. VBLANK, VFP, VSYNC in that order. For *get*, all 9 parameters are returned in the order given above.
39	frame.lock.enable	1292			= ?	DISABLE ENABLE	0 1	When disabled, display will not try to frame lock.

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40	frame.locked	1275			?	DISABLE ENABLE	0 1	
41	framelock.delay	1445			?		0 : 4095	This read-only value shows the current delay in line times from the start of input vertical sync to the first output display line.
42	framelock.delay.override	1446			= ?		0 : 4095	When this value is 0, the firmware will calculate the optimal delay. When this value is non-zero, that value will be used, instead of the calculated value, to set the delay in line times from the start of input vertical sync to the first output display line. Using this control might introduce a frame tear in the video.
43	frequency	16404			= ? + –	[varies]		
44	frequency.horizontal	1070			?	[KHz*100]		
45	frequency.pixel	1069			?	[MHz*100]		
46	gain.all	1033			? + –	0 – 255		For ?, returns the average of red, green, and blue. For + and –, adjusts red, green and blue. Applies to analog sources only.
47	gain.blue	16394			= ? + –	0 – 255		gain.whatever adjusts the White Level; offset.whatever adjust the Black Level. Applies to analog sources only.
48	gain.green	16392			= ? + –	0 – 255		
49	gain.red	16390			= ? + –	0 – 255		

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

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50	gray.balance	1031	RED GREEN BLUE ALL	0 1 2 3	=	?	+	–	0 – 15		
51	horizontal.period	1264				?					
52	hue	16395			=	?	+	–	0 – 180		Used when digital source is YPbPr. This controls the color hue. Default value is 90.
53	interlaced	1065				?			OFF ON	0 1	
54	ip.address [ST]	171									Returns the IP address of the (optional) network module.
55	ir.remote	1095			=	?			DISABLE ENABLE	0 1	
56	justify	1053			=	?			LEFT [top] CENTER RIGHT [bottom] FILL	0 1 2 3	The values LEFT and RIGHT are used for top and bottom justification when the source aspect ratio is wider than the screen.
57	lamp.saver	1105			=	?			DISABLE ENABLE	0 1	This enables/disables DPMS delay. (All lamp.saver commands are related to products with LEDs.)

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

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58	lamp.saver.delay.discrete	1286			= ?	0MIN 5MIN 10MIN 15MIN 30MIN 45MIN 1HR 2HR 4HR 6HR 8HR 12HR 24HR	0 1 2 3 4 5 6 7 8 9 10 11 12	
59	lamp.saver.delay.hours	1145			= ? + –	0 – 23		This is DPMS delay.
60	lamp.saver.delay.minutes	1144			= ? + –	0 – 59		This is DPMS delay with fine control.
61	lamp.saver.state	1146			?	DISABLED USER.OFF AUTO.OFF ON WAIT.ON	0 1 2 3 4	USER.OFF = turned off because the user turned off. AUTO.OFF = off because lamp saver turned off. ON = on. WAIT.ON = off, waiting for the cool-down timeout to end so can come on.
62	last.fault.hours	1149			?	0 – 32767		Elapsed system time, not real time, since last fault.
63	last.fault.minutes	1148			?	0 – 59		
64	localdim	1434			= ?		0 : 1	Setting this to non-zero turns on AP/LED (local dimming) in the LX55HDS3D panel

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65	matrix.layout.module.exists	1381	A1	0				
			A2	1				
			A3	2				
			A4	3				
			B1	4				
			B2	5				
			B3	6				
			B4	7				
			C1	8				
			C2	9				
			C3	10				
			C4	11				
			D1	12				
			D2	13				
			D3	14				
			D4	15				
			E1	16				
			E2	17				
			E3	18				
			E4	19				
			F1	20				
			F2	21				
			F3	22				
			F4	23				
			G1	24				
			G2	25				
			G3	26				
			G4	27				
			H1	28				
			H2	29				
			H3	30				
			H4	31				
			I1	32				

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set	get	inc	dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
353 *(CONT.)*	matrix.layout.module.exists (continued)	1381 *cont.*	I2	33							
			I3	34							
			I4	35							
			J1	36							
			J2	37							
			J3	38							
			J4	39							
			K1	40							
			K2	41							
			K3	42							
			K4	43							
			L1	44							
			L2	45							
			L3	46							
			L4	47							
			M1	48							
			M2	49							
			M3	50							
			M4	51							
			N1	52							
			N2	53							
			N3	54							
			N4	55							
			O1	56							
			O2	57							
			O3	58							
			O4	59							
			P1	60							
			P2	61							
			P3	62							
			P4	63							
			SUBWALL.1	64							
			SUBWALL.2	65							

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
353 *(CONT.)*	matrix.layout.module.exists (continued)	1381 *cont.*	SUBWALL.3 SUBWALL.4 SUBWALL.DPORT SUBWALL.DUAL.LINK SUBWALL.TWO.INPUT DPORT CUSTOM NONE	66 67 68 68 69 70 254 255				

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
66	matrix.layout.position	1398	A1	0				
			A2	1				
			A3	2				
			A4	3				
			B1	4				
			B2	5				
			B3	6				
			B4	7				
			C1	8				
			C2	9				
			C3	10				
			C4	11				
			D1	12				
			D2	13				
			D3	14				
			D4	15				
			E1	16				
			E2	17				
			E3	18				
			E4	19				
			F1	20				
			F2	21				
			F3	22				
			F4	23				
			G1	24				
			G2	25				
			G3	26				
			G4	27				
			H1	28				
			H2	29				
			H3	30				
			H4	31				

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set	get	inc	dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
354 *(CONT.)*	matrix.layout.position (continued)	1398 (cont.)	I1	32							
			I2	33							
			I3	34							
			I4	35							
			J1	36							
			J2	37							
			J3	38							
			J4	39							
			K1	40							
			K2	41							
			K3	42							
			K4	43							
			L1	44							
			L2	45							
			L3	46							
			L4	47							
			M1	48							
			M2	49							
			M3	50							
			M4	51							
			N1	52							
			N2	53							
			N3	54							
			N4	55							
			O1	56							
			O2	57							
			O3	58							
			O4	59							
			P1	60							
			P2	61							
			P3	62							
			P4	63							
			SUBWALL.1	64							

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
354 *(CONT.)*	matrix.layout.position (continued)		SUBWALL.2 SUBWALL.3 SUBWALL.4 SUBWALL.DPORT SUBWALL.DUAL.LINK SUBWALL.TWO.INPUT DPORT CUSTOM NONE	65 66 67 68 68 69 70 254 255				
67	matrix.route.output	1399				DIGITAL.1 DIGITAL.2 DIGITAL.3 DIGITAL.4 DPORT.IN DUAL.LINK.IN	0 1 2 3 4 4	

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
68	matrix.route.qconfig	1379	NEXT REFRESH	1 2		A1 A2 A3 A4 B1 B2 B3 B4 C1 C2 C3 C4 D1 D2 D3 D4 E1 E2 E3 E4 F1 F2 F3 F4 G1 G2 G3 G4 H1 H2 H3 H4 I1 I2 I3 I4 J1 J2 J3	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
356 (cont.)	matrix.route.qconfig (continued)	1379 (cont.)	(continued)	(cont.)		J4	39	
						K1	40	
						K2	41	
						K3	42	
						K4	43	
						L1	44	
						L2	45	
						L3	46	
						L4	47	
						M1	48	
						M2	49	
						M3	50	
						M4	51	
						N1	52	
						N2	53	
						N3	54	
						N4	55	
						O1	56	
						O2	57	
						O3	58	
						O4	59	
						P1	60	
						P2	61	
						P3	62	
						P4	63	
						SUBWALL.1	64	
						SUBWALL.2	65	
						SUBWALL.3	66	
						SUBWALL.4	67	
						SUBWALL.DPORT	68	
						SUBWALL.DUAL.LINK	68	
						SUBWALL.TWO.INPUT	69	
						DPORT	70	
						CUSTOM	254	
69	menu.position.horizontal	12341			= ? + –	0 – 32767		Horizontal offset from the default side.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
70	menu.position.vertical	12342			= ? + –	0 – 32767		Vertical offset from the default side.
71	menu.timeout	8194			= ? + –	0 – 60		Seconds menu will remain on screen; 0 = forever
72	menu.top	1189			[execute]			Used with Key commands to be sure the menu selector is at the top.
73	network.factory	1454						Restores the network module to its default values. This will reset the IP address to its default. Use NETWORK.RESET to force it to get an IP address from the DHCP server.
74	network.module	172						Returns the version information returned by the network module firmware.
75	network.module [ST]	172			?			Firmware version information from the network module
76	network.reset	1453						Resets the network module.
77	offset.all	1032			? + –	0 – 127		For ?, returns the average of red, green, and blue. For + and –, adjusts red, green and blue. Applies to analog sources only.
78	offset.blue	16393			= ? + –	0 – 127		offset.whatever adjusts Black Level. gain.whatever adjusts the White Level.
79	offset.green	16391			= ? + –	0 – 127		When colorspace = YPBPR, this controls the black level (Brightness) of whole picture, not just the green. Default value varies and is set at factory. Not used with digital sources.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
80	offset.red	16389			= ? + –	0 – 127		
81	offset.reset	1177			[execute]			Sets offset.red, offset.green and offset.blue to mid levels.
82	orbiter	1109		0	= ?		0 : 1	When target is 0, this enables or disables the orbiting function.
				1			0 : 65535	When target is 1, this sets the number of seconds between shifts.
				2			0 : 15	When target is 2, this sets the number of pixels to shift.
83	overscan	1184			= ? + –	0 – 20 [% of image hidden at edges]		
84	part [ST]	2			?			Retrieves firmware part number

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
85	pattern	1028			= ?	NONE WHITE GRAY RED GREEN BLUE BLACK RED.SCALE GREEN.SCALE BLUE.SCALE GRAY.SCALE COLOR.BARS LOGO GRID CHECK4X4 COLORSCALE UNIFORMITY ALIGNMENT FOCUS CUSTOM CYAN YELLOW MAGENTA	0 1 2 3 4 5 6 7 8 9 10 11 12 18 20 21 22 24 25 26 28 29 30	
86	phase	16400			= ? + –	[Range 0–31]		Value for = or ? commands is 0 – 31. In the menu, the value is shown in degrees. Each step (0 – 31) is 11.25 degrees.
87	plug.and.play	1152			= ?	DISABLE ENABLE	0 1	Enables/Disables DDC (EDID) response; factory default is enabled.
88	position.horizontal	16398			= ? + –	[varies]		
89	position.vertical	16399			= ? + –	[varies]		

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
90	preferred. source.detection	1288			= ?	5x4 4x3 15x9 16x9	12 13 16 17	
91	product [ST]	3			?			Retrieves display product name in text
92	product.type	1171			?			
93	replies.sent	1139	RS232	0	?	0 – 32767		Used only to indicate that replies have been sent. Resets to zero upon reaching its maximum value.
94	reset.balance	1034			[execute]			Resets color balance values to 100/7 (white 100; gray 7).
95	resolution.horizontal	16401			= ?	[varies]		
96	resolution.vertical	16402			= ?	[varies]		
97	revision [ST]	4			?			Retrieves the firmware revision number, as shown in the Program Informaton menu.
98	rtc [LIST]	1324			=			This command will get or set a real time clock event. The target is which event to set. Event 0 sets the internal clock. The parameters are
99	rtc [ST]	9		0 : 20	?			Returns what is programmed in the target slot in a human readable form.
100	runtime.hours.high	1113			= ?	[hours / 10000]		Do not set runtime or system hours/minutes unless actual time was lost, such as when the control board is replaced. Note: Product warranties are not based on these timers.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
101	runtime.hours.low	4100			= ?	[hours mod 10000]		
102	runtime.hours.reset	4613			[execute]			
103	runtime.minutes	4101			= ?	0 – 59		
104	serial.diagnostics.clear	1188	RS232	0	[execute]			
105	slot.action	1082	SAVE RECALL DELETE NONE	0 1 2 3	[execute]			Performs the action (save, recall, delete) on the currently targeted slot.
106	slot.count	1410		0 1	?			0 returns 40, which is the total number of slots. 1 returns the number of filled memory slots.
107	slot.current	1150			?	0 – 39 [slot # – 1] 255 [none now used]		
108	slot.delete	1174	0 [slot 1] 1 [slot 2] : 39 [slot 40] 255 [current target]		[execute]			
109	slot.full	1114	0 [slot 1] 1 [slot 2] : 39 [slot 40]	0 1 : 39	?	0 [empty] 1 [full]		
110	slot.name. [ST]	5						Returns the name that will be used when saving the target slot.
111	slot.name.clear	1081			[execute]			Operates on the currently selected slot (see slot.target and slot.recall.target)

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
112	slot.name.letter	1080	0 [1st char] 1 [2nd char] : 23 [last char]	0 1 : 23	= ?	[one ascii character value]		The target is the nth letter of the 24-character string: 0–23. The value is the ascii character to send: numbers, letters, punctuation. Not all punctuation is available.
113	slot.recall	1173	0 [slot 1] 1 [slot 2] : 39 [slot 40] 255 [current target]		[execute]			
114	slot.recall.target	1077			=	0 [slot 1] 1 [slot 2] : 39 [slot 40]	0 1 : 39	
115	slot.save	1172	0 [slot 1] 1 [slot 2] : 39 [slot 40] 255 [current target]		[execute]			Slot.save, slot.recall and slot.delete are more direct ways of accomplishing what slot.action does.
116	slot.status	1083	0 [slot 1] 1 [slot 2] : 39 [slot 40]	0 1 : 39	?	EMPTY FILLED FILLED.AND.CURRENT NAME.EDITED	0 1 2 3	
117	slot.target	1068			= ?	0 [slot 1] 1 [slot 2] : 39 [slot 40]	0 1 : 39	Sets (or recalls) the target slot number for other actions. The target slot is used by slot.action, slot.name.clear, slot.name.letter, and slot.setting.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
118	source.search.status	1133			?	VIDEO.DISPLAYED GRAPHICS.DISPLAYED AUTO.RUNNING AUTO.SETUP.COMPLETE OUT.OF.RANGE SEARCHING DETECTED HOLDING IDLE	0 1 2 3 4 5 6 7 8	
119	sync.type	1064			?	UNKNOWN SOG COMPOSITE SEPARATE	0 1 2 3	SOG = sync on green SEPARATE = separate H and V sync
120	system.hours.high	1112			= ?	[hours / 10000]		Do not set runtime or system hours/minutes unless actual time was lost, such as when control board is replaced. Note: Product warranties are not based on these timers.
121	system.hours.low	4098			= ?	[hours mod 10000]		
122	system.hours.reset	4612			[execute]			
123	system.minutes	4099			= ?	0 – 59		
124	temperature.c	1153	BOARD	0	?	0 – 125		Temperature, in Celsius. BOARD = control board
125	uart.clear	1187	RS232	0	[execute]			
126	uart.errors	1186	RS232	0	?	0 -32767		Resets to zero upon reaching its maximum value.
127	uart.overflows	1185	RS232	0	?	0 -32767		Resets to zero upon reaching its maximum value.

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
128	vertical.lines	1263			?	0 – 65535		Raw number of lines detected by the display.
129	video.standard	17426			?	NTSC NTSC.60.443 PAL.50.358 PAL SECAM N/A	1 3 4 6 8 22	If the format is completely unknown, or it is not a video source, the response is N/A.
130	viewport.window.bottom	1042			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	
131	viewport.window.height	1100			?	[pixels]		
132	viewport.window.left	1039			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	
133	viewport.window.right	1040			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	
134	viewport.window.top	1041			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	
135	viewport.window.width	1099			?	[pixels]		
136	wall.column	1051			= ? + –	1 – 32		

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
137	wall.height	1049			= ? + –	1 – 32		
138	wall.mode	1052			= ? + –	DISABLE ENABLE	0 1	
139	wall.row	1050			= ? + –	1 – 32		
140	wall.status	1066			?	0 [ok] 1 [error horizontally] 2 [error vertically] 3 [this cube is blank]		
141	wall.width	1048			= ? + –	1 – 32		
142	white.balance	1285	RED GREEN BLUE ALL	0 1 2 3	= ? + –	0 – 100		
143	window.reset.size	1091			[execute]			Sets zoom and viewport windows back to default values.
144	ypbpr.reset	1181			[execute]	[to factory calibration]		
145	zoom.window.bottom	1047			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	
146	zoom.window.height	1098			?	[pixels]		
147	zoom.window.left	1044			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	

Operation Commands for the Clarity™ Matrix LCD Video Wall System with G2 Architecture

Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number *must* be in parentheses.	(Target number)	Command types allowed (Use only one symbol) set get inc dec	Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
148	zoom.window.right	1045			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	
149	zoom.window.top	1046			= ? + –	0 [–100] : 100 [0] : 200 [+100]	0 : 100 : 200	
150	zoom.window.width	1097			?	[pixels]		

Troubleshooting Serial Connections

There are many small details involved in getting an entire wall or group of displays to communicate over a serial link. By starting with simple commands you can ensure all these details are in place before moving on to more complex control. If you are setting up a wall or group of displays for the first time, follow these steps for easy setup. If you have problems later, you can refer to the troubleshooting flowcharts starting on page page 44 as necessary.

Setup

1. Connect the RS232 cable from the computer to the RS232 In connector of. Connect the out connector of that display, to the RS232 In connector of the next display and so on until all displays are connected.
2. Set the baud rate of the host computer to 19200. If this is not possible, set the baud rate of each display to match the baud rate of the host computer. The baud rate is *not* set automatically. If the baud rate of a display does not match the baud rate of the computer, communication will not happen.
3. Open a program on the host that allows you to easily type commands. Serial Talk, available from our website, is one such program. Be sure you know how to send a carriage return character with whatever program you are using. All commands to the displays must end in a carriage return. The rest of this document will use Serial Talk syntax in the examples.

Global Command

1. Send the command `op ** pattern=red ^M`
2. Did all displays in the wall put up a red test pattern?
   a. If yes, go on to send individual commands.
   b. If none of the displays responded, go to Global Command to First Display on page 44.
   c. If the first display went red, but one or more of the others didn't, go to Global Command to Subsequent Displays on page 44.

Individual Command

1. For each display in the wall, send the command `op  pattern=blue ^M`, substituting each display's ID in turn.
2. Did each display turn blue when commanded?
   a. If not, check .
3. Did you receive an echoed response back each time?
   a. If not, go to Response From Individual Displays on page 45.

Data Query

1. Send a command which asks for information to each display in turn. For example,
2. Did each display return its ?
   a. If not, go to Response From Individual Displays on page 45.

Troubleshooting Useful Commands

If you are trying to send a particular command and are having trouble, first make sure you have established the wiring and settings are correct by using the simple commands suggested above. After you have established that, the problem is probably in the command itself.

If a display doesn't respond to a particular command, look at the "Commands Received" number. If it doesn't increase by one, the display didn't understand the command. Double check the spelling and syntax. Be sure to start operations with `op` or `OP`, not `oP` or `Op`. Be sure to end with a ^M.

If the Commands Received increases but the display didn't respond, it may be in a state where it cannot respond at this time, or it may have invalid data. Try sending the command with an individual (not global) address, and watch the response. If it sends a `NAK`, it wasn't able to carry out the command. For example, you can't change the brightness unless you have a valid source. It will also send a `NAK` if the data is out of range. For example, you can't set the brightness to 1000. If it sends an `ERR`, it didn't understand the command. Perhaps it is spelled wrong, or you are trying a command that is not valid on this product.

Global Command to First Display

Global Command to Subsequent Displays

Response From Individual Displays

Index

The numbers in **Bold** are the Row numbers in the Table of Commands. The non-bold numbers are the numbers in the Operation, String or List column.

Operation Numbers

A

B

C

D

E

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G