

# RS232 Control for Clarity™ Matrix Video Wall with G2 Architecture

*The ascii protocol for RS232 in Clarity™ Matrix Video Wall with G2 Architecture lets you use English words with a minimum of mysterious code.*

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You should already know how to operate Clarity™ Matrix Video Wall with G2 Architecture with the remote control and how to read the menus. See the Clarity™ Matrix Video Wall with G2 Architecture 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.

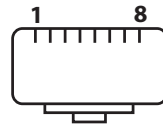
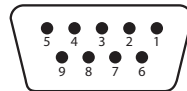
**Note:** It is important that the RJ-45 cable has “straight through” connections. To see if your cable is correct, hold the two connectors side by side with the ends pointing in the same direction. Look at the sides of the connectors that do not have the locking tab. If the colors of the wires inside the connectors are the same left to right for both connectors, this is the correct cable. If the colors are mirror reflections of each other, it is the wrong type.

You need an adapter to go from the computer’s 9-pin serial output connector to an RJ-45 connector. Adapters of this type are readily available at computer and electronic supply stores. The adapter is not pre-wired. You will make three connections inside the adapter, as described below.

### Wiring the adapter

To go from 9-pin D-sub serial connector on the back of the computer to an RJ45 connector, use a standard RJ45-to-9-pin adapter. Wire it internally as shown. The wiring shown for this adapter is correct for *straight-through* cables. Straight-through cables are wired 1-to-1, 2-to-2, etc.

	RJ45	9-pin
Yellow wire	6	3
Black wire	3	2
Green wire	5	5



RJ45 looking into the socket

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## Connecting RS232 Cables

- 1 Connect the 9-pin adapter 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.

For more information about configuring RS232 communications, see the Clarity Matrix Video Wall Installation Guide.

## 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 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.

### 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

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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).

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## 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 K<sub>Y</sub> or k<sub>Y</sub>)

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

<sup>1</sup>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).

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## Sample Key Commands

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<b>Command Example</b>	<b>Explanation<sup>1</sup></b>
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

---

<sup>1</sup>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

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<b>Command Example</b>	<b>Explanation</b>
st A1 revision ?[CR]	What is the revision level of display A1?

---

---

## Using the Operation Commands Table

The Operation Commands table starts on page 18.

### 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]
```



## 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 <code>op A* white.balance (all) = 100 [CR]</code>	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 <code>op A1 contrast ? [CR]</code>	Tells display A1 to send the value of contrast to the host computer. Note that the display will <i>only</i> respond if it is addressed individually.
+	Increment	increments the value <code>op ** gray.balance(red) + [CR]</code>	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 <code>op ** white.balance(green) - [CR]</code>	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) <code>op ** slot.save (0) - [CR]</code>	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
<code>op A1 ascii.response = symbolic [CR]</code>	<code>OPALASCII.RESPONSE=SYMBOLIC</code>	The display received the command and has set the response type to symbolic and replies will be ascii characters
<code>op A1 pattern ? [CR]</code>	<code>OPALPATTERN=BLACK</code>	The current test pattern is black.

Command Sent	Response	Explanation
op Al 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 Al pattern ? [CR]	OPA11036=6	The current test pattern is black.
op Al 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 Al pattern ? [CR]	6	The current test pattern is black.

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

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## 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.target = 39`. Likewise, to recall the first slot, you'd specify `slot.target = 0`.

### Recalling Memories Directly

Use `slot.recall ( )`. Put the memory number (minus 1) in the parentheses. What is the difference between `slot.recall.target` and `slot.target`? 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:



The following series of example commands show the difference between `slot.target` and `slot.recall.target` and which memory slot the command is pointing to.

---

```
op slot.target = 3 [CR]
```

This sets the memory slot to #4 in display . Any further commands that need a memory slot will use this one until it is changed.

---



?

---

```
op slot.action (save) [CR]
```

This saves all the current settings into memory slot #4 with the default memory name.

---



?

---

```
op slot.target = 4 [CR]
```

This sets the memory slot to #5, which is empty.

---



?

---

```
op slot.action (recall) [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.target = 5 [CR]
```

Sets the memory slot to #6.

---



---

```
op slot.action (recall) [CR]
```

This recalls slot #6 because the target was set to #6 in the previous command.

---



---

```
op slot.action (recall) [CR]
```

Recalls settings from memory slot #1.

---



?

## 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.

#### Symbolic Response Examples

Command and Response Examples	Explanation
op auto.lamp ? [CR]	Would get the Symbolic response
OPAUTO.LAMP=DISABLE	Text in responses are all caps, regardless of what you sent.

#### Numeric Response Examples

Command and Response Examples	Explanation
op auto.lamp ? [CR]	Would get the Numeric response
OP1037=0	Notice that you can send commands as text and get the response as numeric. 1037 is the Operation Number for auto.lamp, and 0 means Disabled. It works the other way, too. Ask the question with all numbers and get a text response, if ascii.response is set to Symbolic.

#### Data Response Examples

Command and Response Examples	Explanation
op auto.lamp ? [CR]	Would get the Data response
0	You get only the answer and only in numeric form. This is used mainly when a sequence of commands is sent and the data is acted upon by the program. For instance, the program might query each display as to its lamp state, on or off, then send a Lamp On command to just those displays that are off.



---

**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 67 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 <i>must</i> 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	allow.deep.color	1459						
2	ambient.lux	1087			?		0 : 1846	The current lux read by the ambient light sensor.
3	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
4	app.byte	1405						
5	ascii.eol	1138			= ?	CR CRLF LF LFCR	0 1 2 3	Determines the End Of Line character used in replies.
6	ascii.response	1137			= ?	SYMBOLIC NUMERIC	0 1	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

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Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number must be in parentheses.	(Target number)	Command	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
7	aspect	1054			= ?	FILL 16X9 WIDESCREEN 4X3 VIDEO ONE.TO.ONE LETTERBOX CROP	0 3 3 5 5 4 2 1	
8	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.
9	auto.frequency.disable	17421				NOT.DISABLED DISABLED TOGGLE	0 1 2	
10	auto.lamp	1037			= ?	DISABLE ENABLE	0 1	<b>Note:</b> This command only applies to LED-based products.
11	auto.level	1116				BLACK WHITE	1 2	
12	auto.level.disable	17423				NOT.DISABLED DISABLED TOGGLE	0 1 2	
13	auto.level.status	1115						
14	auto.phase.disable	17420				NOT.DISABLED DISABLED TOGGLE	0 1 2	
15	auto.position.disable	17422				NOT.DISABLED DISABLED TOGGLE	0 1 2	

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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
16	auto.resync.disable	17438				NOT.DISABLED DISABLED TOGGLE	0 1 2	
17	auto.setup	16899						
18	backlight	1063		0 1	= ?	OFF ON	0 1	Turn the backlight on or off. If set with a target of 1 to processor A1, the command will be broadcast to all displays in the wall. With a target of 0, individual displays may be controlled separately.
19	backlight.hours.high	1111			= ?	0-32767		The upper portion of the number of hours on the backlight. If there are 25432 hours and 54 minutes on the backlight, this would return 25.
20	backlight.hours.low	1102			= ?	0-9999		The lower portion of the number of hours on the backlight. If there are 25432 hours and 54 minutes on the backlight, this would return 432.
21	backlight.hours.reset	1104						Zeroes the backlight hours and minutes.
22	backlight.intensity	1085			= ? + -	0-100	0 : 100	100 is maximum intensity
23	backlight.minutes	1103			= ?	0-59		The minutes portion of the number of hours on the backlight. If there are 25432 hours and 54 minutes on the backlight, this would return 54.

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Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number must be in parentheses.	(Target number)	Command	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
24	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
25	baud	1143			?	2400 4800 9600 19200		Baud rate
26	big.picture.key	1119						
27	bits.per.pixel	1460				BPP30 BPP24 BPP20 BPP18 BPP16 BPP8 BPP4	0 1 2 3 4 5 6	
28	bl.clipped	1419			?	NO YES	0 1	If the current bl.offset combined with the backlight setting result is beyond what can physically be accomplished, this command return Yes. For example, if bl.offset y is set to +20 (value 148) and backlight is set to 90, bl.offest is Yes because the combination is 110, and 100 is the highest possible setting.

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

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					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
29	bl.offset	1367			= ? + -	(-100..100)	28 : 228	Individual offset for the backlight of the connected LCD. This is a signed byte with allowable values from -100 to 100. To convert from the desired offset to the value to use add 128. For example, an offset of -50 would be 78. This value is stored on the LCD interface board and a copy is kept in the module. If no display is attached, the copy is used.
30	bl.status	1287				ERROR FAILED NORMAL UNKNOWN	0 1 2 3	
31	blue.only	1057				DISABLE ENABLE	0 1	
32	border.color	1151				RED GREEN BLUE DKBLUE DKGREEN DKRED BLACK WHITE	63488 2016 31 8 1024 32768 0 65535	

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
33	border.color.custom	1457	RED GREEN BLUE ALL	0 1 2 3		0-1023		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
34	brightness	16387			= ? + -	0 – 255		Used when digital source is YPbPr.
35	bulk.op.get	1429						
36	bulk.op.set	1362						
37	bytes.received	1140	RS232 RS485 AUX232	0 1 2	?	0 – 32767		Used only to indicate that bytes have been received. Resets to zero upon reaching its maximum value.
38	bytes.sent	1141	RS232 RS485 AUX232	0 1 2	?	0 – 32767		Used only to indicate that bytes have been sent. Resets to zero upon reaching its maximum value.
39	center.point	1110	RED GREEN BLUE ALL	0 1 2 3	?	0 – 255		The center point is the one pixel used by auto level.
40	center.point.raw	1461	RED GREEN BLUE ALL	0 1 2 3				
41	clear.input.memory	16902			[execute]			Makes the display “forget” any sources it has seen before.

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					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
42	clipboard.bl.offset	1397			?			Backlight offset value that is currently in the clipboard.
43	clipboard.gray.balance	1163	RED GREEN BLUE ALL	0 1 2 3	?	0 – 15		
44	clipboard.recall	1161			[execute]			
45	clipboard.save	1162			[execute]			
46	clipboard.white.balance	1164	RED GREEN BLUE ALL	0 1 2 3				
47	clone.setting	1391		0-8 255	=	<operation>		<p><i>Applicable only to display A1. Other processors will NAK.</i></p> <p>Force the settings from display A1 onto all other displays in the system.</p> <p>Targets:</p> <p>0: Clone only the operation given in the data</p> <p>1: Clone items on Backlight Menu</p> <p>2: Clone items on Miscellaneous menu</p> <p>3: Clone items on Input Setup Menu</p> <p>4: Clone items on Size &amp; Position menus</p> <p>5: Clone items on Big Picture Setup menu (except for row and column)</p> <p>6: Clone items on Color Balance Menu</p> <p>7: Clone items on Scaling Menu</p> <p>8: Clone items on Factory Settings Menu</p> <p>255: All items from targets 1-8</p>



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

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					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
48	color.depth	1456						
49	color.temp	1268			= ?	8500K 6500K 5500K 3200K NATIVE CUSTOM	3 2 1 0 4 5	
50	colorspace	1364			= ?	RGB YPBPR AUTO (default) RGB.VIDEO	0 1 2 3	
51	commands.received	1107	RS232 RS485 AUX232	0 1 2	?	0 – 32767		Used only to indicate that commands have been received. Resets to zero upon reaching its maximum value.
52	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 displayed. (To remove the pattern, send the operation PATTERN=NONE)
53	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
54	display.power	1094			= ?	OFF ON	0 1	This turns on/off .

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
55	display.type	1416			?	LX46S3D MX55HDS MX46HDS LX46HDS LX55HDS LX55HDS3D MX55HDU MX46HDU LX46HDU LX55HDU LX46 LG55HD MX46 LX46 MX55HD HX60 MX46HD LX46HD LX55HD	1 2 5 6 7 8 9 10 12 11 1 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
56	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.
57	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.
58	edid.mailbox	1261			?			
59	edid.native	1440				DISABLE ENABLE	0 1	

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					set	get	inc	dec			
60	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.
61	edid.timing.1 [LIST]	1451	UPDATE SPECIFY HACTIVE VACTIVE VREFRESH PCLK HBLANK HFP HSYNC VBLANK VFP VSYNC NEED.UPDATE FACTORY	0 1 2 3 4 5 6 7 8 9 10 11 12 13	=	?					For <i>set</i> , if the number of parameters sent is 3, they are interpreted 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 <i>get</i> , all 9 parameters are returned in the order given above.
62	edid.timing.2 [LIST]	1452	UPDATE SPECIFY HACTIVE VACTIVE VREFRESH PCLK HBLANK HFP HSYNC VBLANK VFP VSYNC NEED.UPDATE FACTORY	0 1 2 3 4 5 6 7 8 9 10 11 12 13	=	?					For <i>set</i> , if the number of parameters sent is 3, they are interpreted 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 <i>get</i> , all 9 parameters are returned in the order given above.

# 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
63	fan.state	1096	POWER.SUPPLY QUAD.MODULE	0 6		ON UNKNOWN FAILED	0 1 2	
64	frame.compensation	1284			= ?	DISABLE ENABLE	0 1	Turn on or off frame compensation. Frame compensation hides a number of pixels at the outer edge of a display that has wall mode enabled. The image appears more natural, as if viewing it through a window with a
65	frame.height	1283			= ? + -		0 : 250	The number of pixels to hide between rows when compensation is enabled.
66	frame.lock.enable	1292			= ?	DISABLE ENABLE	0 1	When disabled, display will not try to frame lock.
67	frame.locked	1275			?	DISABLE ENABLE	0 1	
68	frame.width	1282			= ? + -		0 : 250	The number of pixels to hide between columns when compensation is enabled.
69	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.
70	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.

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
71	framelock.type	1464				DEFAULT ABORT NEAREST EXTEND	0 1 2 3	
72	frequency	16404						
73	frequency.horizontal	1070			?	[KHz*100]		
74	frequency.pixel	1069			?	[MHz*100]		
75	frequency.vertical	16403			?	[Hz]		
76	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.
77	gain.blue	16394			= ? + -	0 – 255		gain.whatever adjusts the White Level; offset.whatever adjust the Black Level. Applies to analog sources only.
78	gain.green	16392			= ? + -	0 – 255		
79	gain.red	16390			= ? + -	0 – 255		
80	gamma	1086				DISABLE ENABLE	0 1	
81	gray.balance.fine	1401	RED GREEN BLUE ALL	0 1 2 3	= ? + -	0 – 15		
82	hires	1407				DISABLE ENABLE	0 1	
83	horizontal.period	1264			?			

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Row	Operation or String [ST] or List [LIST]	Operation or String number	(Target) Target or Target number must be in parentheses.	(Target number)	Command	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
84	hue	16395			= ? + -	0 – 180		Used when digital source is YPbPr. This controls the color hue. Default value is 90.
85	interlaced	1065			?	OFF ON	0 1	
86	ir.remote	1095			= ?	DISABLE ENABLE	0 1	
87	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.
88	lamp.saver	1105			= ?	DISABLE ENABLE	0 1	This enables/disables DPMS delay. (All lamp.saver commands are related to products with LEDs.)
89	lamp.saver.delay.discrete	1286			= ?	0MIN 5MIN 10MIN 15MIN 30MIN 45MIN 1HR 2HR 4HR 6HR 8HR 12HR	0 1 2 3 4 5 6 7 8 9 10 11	
90	lamp.saver.delay.hours	1145			= ? + -	0 – 23		This is DPMS delay.
91	lamp.saver.delay.minutes	1144			= ? + -	0 – 59		This is DPMS delay with fine control.

# 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 <i>must</i> be in parentheses.	(Target number)	Command	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
92	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.
93	last.fault	1147				NO.FAULT FAN.LAMP FAN.BALLAST.1 FAN.BALLAST.2 FAN.OPTICS FAN.EXHAUST FAN.INTAKE LAMP.1 LAMP.2 FAN.PS.LCD	0 2 3 4 5 6 7 30 31 1	
94	last.fault.hours	1149						
95	last.fault.minutes	1148						
96	lcd.horizontal.resolution	1125			? ?	1366, 1920		

# 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)				Value If numbers listed first, use numbers only. Data in [square brackets] is for information only.	Value number	Notes
					set	get	inc	dec			
97	lcd.position	1369	CURRENT ROW COLUMN ALERT STORED	0 1 2 3 4		?	?			<p>Returns the row/column position of the connected LCD. The position starts at 1 and goes up to 64.</p> <p>Targets 0,1 &amp; 2 return the current position discovered at the sensors. If the panel is removed from the array (as in service mode) this position will be 1,1. If no display is connected, the last known position will be used. If there was never a connected display, 254 will be returned.</p> <p>Target 4 returns the position that has been stored after the last MATRIX.LAYOUT command and is the one used for subsequent MATRIX.ROUTE.QCONFIG operations. If there has never been a MATRIX.LAYOUT command, 254 will be returned.</p> <p>Target 0&amp;4: Column is in the upper byte of a word, row is in the lower byte (i.e. Column*256+row).</p> <p>Target 1&amp;3: Returns only the row or column.</p> <p>Target 3: Returns non zero if the stored value matches the current value.</p>	
98	lcd.vertical.resolution	1126				?	?	768, 1080			
99	lcd.voltage	1396				?	?	0-2600		Returns the voltage read by the attached LCD. Values below 22v is cause for concern. Value is multiplied by 100 to give hundredths precision. Returns NAK if no LCD is connected.	
100	list	List#									



# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
101	localdim	1434			= ?		0 : 1	Setting this to non-zero turns on AP/LED (local dimming) in the LX55HDS3D panel
102	localdimlevel	1442						
103	long.reach.enable	1465						
104	m	577						
105	matrix.layout	1377	AUTO RESET	0 2	=	NOT.STARTED IN.PROGRESS COMPLETE ERROR WONT.FIT	0 1 2 3 4	<i>Applicable only to display A1. Other processors will NAK.</i> Force the system to re-discover the layout by polling all possible displays for their position. Targets: 0 or 1: Perform Discovery 2: Re set system to default A get returns the status of the discovery process. WONT.FIT means the discovered layout is wider or taller than 9x9 and so won't fit on the GUI. This is not an error. ERROR means that more than one display reported the same position. This usually happens if a display is in service mode.
106	matrix.layout.module.at	1380	(column-1)*256 + (row-1)		? ?	0-15, 255		<i>Applicable only to display A1. Other processors will NAK.</i> Returns the module (A=0,B=1...) of the LCD which is currently at the requested row and column Returns 255 if there is no LCD at that location.

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
107	matrix.layout.module.exists	1381	A1-P4 SUBWALL.1 SUBWALL.2 SUBWALL.3 SUBWALL.4 SUBWALL.DPORT SUBWALL.DUAL.LINK SUBWALL.TWO.INPUT DPORT CUSTOM NONE	0-63 64 65 66 67 68 68 69 70 254 255	?			Applicable only to display A1. Other processors will NAK. Returns non 0 if the requested processor exists in the system even if there is no LCD connected. This command is useful for knowing what inputs exist in the system.
108	matrix.layout.position	1398	A1-P4 SUBWALL.1 SUBWALL.2 SUBWALL.3 SUBWALL.4 SUBWALL.DPORT SUBWALL.DUAL.LINK SUBWALL.TWO.INPUT DPORT CUSTOM NONE	0-63 64 65 66 67 68 68 69 70 254 255	?			This command will return the row and column position of the target panel. The row is in the lower byte, the column in the upper byte. If you divide the number by 256, the dividend is the column number and the remainder is the row.
109	matrix.layout.processor.at	1382	(column-1)*256 + (row-1)		?	0-3, 255		Applicable only to display A1. Other processors will NAK. Returns the processor (0=1, 1=2, 2=3,3=4) of the display that is currently at the requested row and column. Returns 255 if there is no LCD attached at that position.

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
110	matrix.layout.size	1386	HEIGHT WIDTH	1 2	?	height and width information (see Notes)		Returns the physical size of the array as determined during discovery. If discovery failed, returns the last known wall size (or else 255 if discovery has never successfully completed).  Targets: 0 Return Width*256+Height 1 Height only 2 Width only
111	matrix.layout.unit.at	1385	(column-1) 256 + (row-1)			A1-P4 SUBWALL.1 SUBWALL.2 SUBWALL.3 SUBWALL.4 SUBWALL.DPORT SUBWALL.DUAL.LINK SUBWALL.TWO.INPUT DPORT CUSTOM NONE	0-63 64 65 66 67 68 68 69 70 254 255	<i>Applicable only to display A1. Other processors will NAK.</i> Returns the ID (0=A1, 1=A2, ...63=P4) of the LCD that is currently at the requested row and column. Returns 255 (NONE) if there is no LCD at that position.

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
112	matrix.route.module	1384	A B C D E F G H I J K L M N O P	0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60	?	bit field (see Notes)		<p>Use only on display A1. Other processors will accept the command but the master needs to have the information for all modules. So it must get the command first and then pass it on to the relevant module.</p> <p>Returns a bit field that represents the current FPGA route settings for the module requested. To set each switch individually, use MATRIX.ROUTE.SWITCH.</p> <p>bit 0-1 = switch 1 bit 2-3 = switch 2 bit 4-5 = switch 3 bit 6-7 = switch 4 bit 8-10 = external loop bit 11-12 = internal loop bit 13 = 0 if the external loop is enabled</p> <p>Values for switch 1 &amp; 2: 0= Digital 1 1=Digital 2 2=use loop 3=use loop</p> <p>Values for switch 3 &amp;4: 0= Digital 3 1=Digital 4 2=use loop 3=use loop</p> <p>Values for external loop 0=digital 1 1=digital 2 2=digital 3 3=digital 4 4=Dual Link In</p> <p>Values for internal loop 0=digital 1 1=digital 2 2=digital 3 3=digital 4</p>



# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
114	matrix.route.qconfig	1379	NEXT REFRESH	1 2		A1-P4 SUBWALL.1 SUBWALL.2 SUBWALL.3 SUBWALL.4 SUBWALL.DPORT SUBWALL.DUAL.LINK SUBWALL.TWO.INPUT DPORT CUSTOM NONE	0-63 64 65 66 67 68 68 69 70 254 255	Target 0: Use the data field: Data 0-63: Big picture the input over the entire wall. Data 64-68: Spread 1 input over the whole Quad Controller module (for each module in the system). 64=use Digital 1, 65= Digital 2, 66=Digital 3, 67=Digital 4, 68=Dual Link In Data 69: Spread Digital 1 onto LCD 1&2 and Digital 3 onto LCD 3&4. Data 255 Route each input to its corresponding output and turn off wall mode. A get of this command returns the current configuration. Only the route information, not the wall parameters are used to determine the current configuration. If none of these configurations are set, 254 is returned.

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
115	matrix.route.switch	1383	high byte = module to route (see target for matrix.route.module) Low byte: [external loop] [switch 1] [switch 2] [switch 3] [switch 4] [internal loop]	0 1 2 3 4 6	= ?	[See Notes]		Use only on display A1. Other processors will accept the command but the master needs to have the information for all modules, so it must get the command first and then pass it on to the relevant module. Set the FPGA switch for the specified module. To set all switches in the module at once, use MATRIX.ROUTE.MODULE Values for switch 1-4: 0= self 1=other in pair (if 1, 2; if 2, 1; if3, 4 if 4, 3) 2=use external loop 3=use internal loop Values for external loop 0=digital 1 1=digital 2 2=digital 3 3=digital 4 4=DisplayPort Values for internal loop 0=digital 1 1=digital 2 2=digital 3 3=digital 4
116	menu.position.horizontal	12341			= ? + -	0 – 32767		Horizontal offset from the default side.
117	menu.position.vertical	12342			= ? + -	0 – 32767		Vertical offset from the default side.
118	menu.rotate	1038			= ?	NONE CLOCKWISE INVERTED COUNTER-CLOCKWISE	0 1 2 3	

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					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
119	menu.target	1393			=	ALL A1-P4  SS	65535 2561- 6660 65535	Use only on display A1. Other processors will accept the command but the master needs to send the information to all modules. So it must get the command first and then pass it on. Set which processor will respond when a slave menu is presented.
120	menu.target.move	1392	UP DOWN LEFT RIGHT ALL	0 1 2 3 4	=	ALL A1-P4  SS	65535 2561- 6660 65535	Use only on display A1. Other processors will accept the command but the master needs to send the information to all modules. So it must get the command first and then pass it on. Moves the target processor (the one that responds to input when a slave menu is presented) to the next display in the Matrix in the specified direction. If auto discovery has not been performed or there was an error, it will move in processor order. When the target is "ALL" the target processor is set to **.
121	menu.timeout	8194			= ? + -	0 – 60		Seconds menu will remain on screen; 0 = forever
122	menu.top	1189			[execute]			Used with Key commands to be sure the menu selector is at the top.
123	mode.id	16436						
124	native.frequency	1351				60HZ 50HZ	60 50	



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					set	get	inc	dec			
125	native.gamma	1455							3D TOP 3D MID 3D BOT 2.0 2.025 2.05 2.075 2.1 2.125 2.15 2.175 2.2 2.225 2.25 2.275 2.3 2.325 2.35 2.375 2.4 2.425 2.45 2.475 2.5 2.525 2.55 2.575 2.6	2 3 4 8192 8294 8396 8499 8601 8703 8806 8908 9011 9113 9215 9318 9420 9523 9625 9727 9830 9932 10035 10137 10239 10342 10444 10547 10649	
126	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.	
127	network.reset	1453									
128	o	1450									

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					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
129	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.
130	offset.blue	16393			= ? + -	0 – 127		offset.whatever adjusts Black Level. gain.whatever adjusts the White Level.
131	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.
132	offset.red	16389			= ? + -	0 – 127		
133	offset.reset	1177			[execute]			Sets offset.red, offset.green and offset.blue to mid levels.
134	ontime.average	1387			?	0-24		Applicable only to processor 1 of a module. Other processors will NAK. Return the number of hours the system has been on per day.
135	ontime.days.overlimit	1389			?			Applicable only to processor 1 of a module. Other processors will NAK. Return the number of days the system has been on for more hours than the limit (20 for Matrix).
136	ontime.days.total	1388						Applicable only to processor 1 of a module. Other processors will NAK. Return the number of days system has been collecting on time statistics. The system must be on at midnight for consecutive days in order to count statistics.

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137	ontime.limit	1390						Applicable only to processor 1 of a module. Other processors will NAK. Return the limit used in ontime.days.overlimit
138	option.key	1119						
139	orbiter	1109		0 1 2	= ?		0 : 1  0 : 65535  0 : 15	When target is 0, this enables or disables the orbiting function.  When target is 1, this sets the number of seconds between shifts.  When target is 2, this sets the number of pixels to shift.
140	osd.enable	1360						
141	overscan	1184			= ? + -	0 – 20 [% of image hidden at edges]		
142	p	578						

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					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
143	pattern	1028			= ?	NONE WHITE GRAY RED GREEN BLUE CYAN YELLOW MAGENTA BLACK RED.SCALE GREEN.SCALE BLUE.SCALE GRAY.SCALE COLOR.BARS LOGO GRID CHECK4X4 COLORSCALE UNIFORMITY ALIGNMENT FOCUS CUSTOM X.ON.WHITE TIR	0 1 2 3 4 5 28 29 30 6 7 8 9 10 11 12 18 20 21 22 24 25 26 27 31	
144	phase	16400						
145	plug.and.play	1152			= ?	DISABLE ENABLE	0 1	Enables/Disables DDC (EDID) response; factory default is enabled.

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146	poll.pause	1400			=	0-65535		Applicable only to display A1. Other processors will NAK. Turn off system polling for the number of seconds specified. 0 = Turns the polling on. 65535 = Turns the polling off forever (until the next AC power cycle). When polling is turned off, the "LCD" LEDs on the front panel of the Quad Controller modules will not be updated. This takes away all periodic communications on the RS485 bus and makes troubleshooting of the communication bus easier.
147	position.horizontal	16398			= ? + -	[varies]		
148	position.vertical	16399			= ? + -	[varies]		
149	preferred.source.detection	1288				5X4 4X3 15X9 16X9	12 13 16 17	
150	product.type	1171			?		13 17	Used to detect what product the Quad Controller is connected to. Matrix ( <b>non-G2</b> ) returns 13 Matrix ( <b>with G2</b> ) returns 17

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

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151	ps.status	1176		1-5		FAULT OK OFF UNKNOWN	0 1 2 3	Applicable only to processor 1 of a module. Other processors will NAK. Return the status of the requested power supply. Not all power supplies may be stuffed in a system. If a power supply is not stuffed, OFF is returned. If the sense cable from the power supply to the Quad Controller module is disconnected, UNKNOWN is returned.
152	q	1372						
153	quad.input.status	1375			?		bit field	Applicable only to processor 1 of a module. Other processors will NAK. Returns the status of the inputs for the five inputs in the Quad Controller module. bit 0: High if sync detected on DIGITAL 1 bit 1: High if sync detected on DIGITAL 2 bit 2: High if sync detected on DIGITAL 3 bit 3: High if sync detected on DIGITAL 4 bit 4: High if sync detected on DUAL LINK IN

# 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 <i>must</i> 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
154	quad.lcd.status	1372			?			Applicable only to processor 1 of a module. Other processors will NAK. Returns the status of the attached LCDS in the Quad Controller module. bit 0-3: LCD 1 status bit 4-7: LCD 2 status bit 8-11: LCD 3 status bit 12-15: LCD 4 status status Each status is a 4 bit bitfield bit 0 display is receiving a video signal bit 1 unused bit 2 display senses power below 24V bit 3 display is communicating to the Quad Controller module. So a good status is binary 1001. If all 4 displays on the module are connected and working, the status will be hex 0x9999 or 39321. This status is known to the Quad Controller module only indirectly. Processor A1 polls all displays for their status and then aggregates the status for each Quad Controller module and communicates it back to the module. This information is used to light the front panel LEDs. If polling is disabled, this information will not be current.
155	quad.ps.status	1402						
156	replies.sent	1139	RS232 RS485 AUX232	0 1 2	?	0 – 32767		Used only to indicate that replies have been sent. 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
157	reset.balance	1034			[execute]			Resets color balance values to 100/7 (white 100; gray 7).
158	resolution.horizontal	16401			= ?	[varies]		
159	resolution.vertical	16402			= ?	[varies]		
160	rs485.termination	1259				ENABLE DISABLE	0 1	
161	rtc [LIST]	1324		0 : 20	= ?			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 (in order) Frequency: 0=disabled 1=daily 2=weekly 3=one time Action:1=turn on; 2=turn off 3=increment hour 4=decrement hour 5=recall slot Slot number (if action is slot recall) 1..80 Day Of Week 0=Sunday, 1=Monday ... Year 0=2000, 1=2001 ... Month 1=January, 2=February... Date 1..31 Hour 0..23 Minute 0..59
162	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.
163	runtime.hours.low	4100			= ?	[hours mod 10000]		
164	runtime.hours.reset	4613			[execute]			
165	runtime.minutes	4101			= ?	0 – 59		



# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
166	s	1374						
167	saturation	16396			= ? + -	0 – 255 (source into VIM) 0-1024 (digital YPbPr)		This controls color saturation. Used when digital source is YPbPr.
168	select.source	17409				DIGITAL DIGITAL.RGB	0 0	
169	serial.diagnostics.clear	1188	RS232 RS485 AUX232	0 1 2	[execute]			
170	sharpness	16397			= ? + -	0-15		
171	slot.action	1082	SAVE RECALL DELETE NONE	0 1 2 3	[execute]			Performs the action (save, recall, delete) on the currently targeted slot.
172	slot.count	1410		0 1	?			0 returns 40, which is the total number of slots. 1 returns the number of filled memory slots.
173	slot.current	1150			?	0 – 39 [slot # – 1] 255 [none now used]		
174	slot.delete	1174	TARGET		255			
175	slot.full	1114	0 [slot 1] 1 [slot 2] : 39 [slot 40]	0 1 : 39	?	0 [empty] 1 [full]		
176	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 <i>must</i> 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
177	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.
178	slot.name.letter.target	1079						
179	slot.recall	1173	TARGET	255	[execute]			
180	slot.recall.target	1077			=	0 [slot 1] 1 [slot 2] : 39 [slot 40]	0 1 : 39	
181	slot.save	1172	TARGET	255	[execute]			Slot.save, slot.recall and slot.delete are more direct ways of accomplishing what slot.action does.

# 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 <i>must</i> be in parentheses.	(Target number)	Command	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
182	slot.setting	1078	ITEM ITEM.COUNT REVISION NAME NAME.SIZE OPEN CLOSE OFFSET.RED GAIN.RED OFFSET.GREEN GAIN.GREEN OFFSET.BLUE GAIN.BLUE BRIGHTNESS COLORSPACE CONTRAST SHARPNESS HUE PHASE SATURATION SELECT.SOURCE FREQUENCY VERT.TOTAL POSITION.HORIZONTAL POSITION.VERTICAL RESOLUTION.HORIZONTAL RESOLUTION.VERTICAL ASPECT JUSTIFY OVERSCAN VIEWPORT.WINDOW.BOTTOM VIEWPORT.WINDOW.LEFT VIEWPORT.WINDOW.RIGHT VIEWPORT.WINDOW.TOP ZOOM.WINDOW.BOTTOM ZOOM.WINDOW.LEFT ZOOM.WINDOW.RIGHT ZOOM.WINDOW.TOP	0 1 2 3 4 5 6 16389 16390 16391 16392 16393 16394 16387 1180 16388 16397 16395 16400 16396 17409 16404 16405 16398 16399 16401 16402 1054 1053 1184 1042 1039 1040 1041 1047 1044 1045 1046				

# 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 <i>must</i> be in parentheses.	(Target number)	Command	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
183	slot.setting	1078	COLORSPACE WALL.HEIGHT WALL.MODE WALL.COLUMN WALL.ROW WALL.WIDTH MATRIX.ROUTE.MODULE BACKLIGHT.INTENSITY	1180 1049 1052 1051 1050 1048 1384 1085				
184	slot.state	1316				SAVE RECALL DELETE NONE	0 1 2 3	
185	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	
186	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.
187	source.msg	1422				SHOW HIDE	0 1	
188	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	
189	source.supported	1308	DIGITAL DIGITAL.RGB	0 0		DISABLE ENABLE	0 1	

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
190	sync.type	1064			?	UNKNOWN SOG COMPOSITE SEPARATE	0 1 2 3	SOG = sync on green SEPARATE = separate H and V sync
191	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.
192	system.hours.low	4098			= ?	[hours mod 10000]		
193	system.hours.reset	4612			[execute]			
194	system.minutes	4099			= ?	0 – 59		
195	system.state	1059				WAIT READY ON FATAL.FAULT FAULT UNKNOWN	0 1 2 3 4 5	
196	temperature.c	1153	BOARD LCD	0 1	?	0 – 125		Temperature, in Celsius. BOARD = control board
197	uart.clear	1187	RS232 RS485 AUX232	0 1 2	[execute]			
198	uart.errors	1186	RS232 RS485 AUX232	0 1 2	?	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
199	uart.overflows	1185	RS232 RS485 AUX232	0 1 2	?	0 -32767		Resets to zero upon reaching its maximum value.
200	update	1394			=	ALL P2 P3 P4 IDLE	0 1 2 3 255	Applicable only to processor 1 of a module. Other processors will NAK. Force a module to copy its firmware to the specified processor. This process takes a long time. While cloning is in progress, no further RS232 commands are possible. All input to that module (including IR commands) will be ignored. While cloning, the LCD status lights on the front panel will change slowly from red to green. One of the lights will be opposite in color from the other three. That is the processor that is currently being cloned.
201	vertical.lines	1263			?	0 – 65535		Raw number of lines detected by the display.
202	video.standard	17426				NTSC NTSC.60.443 PAL.50.358 PAL SECAM N/A	1 3 4 6 8 22	
203	viewport.window.bottom	1042			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
204	viewport.window.height	1100			?	[pixels]		

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
205	viewport.window.left	1039			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
206	viewport.window.right	1040			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
207	viewport.window.top	1041			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
208	viewport.window.width	1099			?	[pixels]		
209	wall.column	1051			= ? + -	1 – 32		
210	wall.height	1049			= ? + -	1 – 32		
211	wall.mode	1052			= ? + -	DISABLE ENABLE	0 1	
212	wall.row	1050			= ? + -	1 – 32		
213	wall.status	1066			?	0 [ok] 1 [error horizontally] 2 [error vertically] 3 [this cube is blank]		
214	wall.width	1048			= ? + -	1 – 32		
215	white.balance	1285	RED GREEN BLUE ALL	0 1 2 3	= ? + -	0 – 100		

# 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	Value	Value number	Notes
					types allowed (Use only one symbol) set get inc dec	If numbers listed first, use numbers only. Data in [square brackets] is for information only.		
216	white.balance.percent	1285	RED GREEN BLUE ALL	0 1 2 3				
217	window.reset.size	1091			[execute]			Sets zoom and viewport windows back to default values.
218	ybp.r.reset	1181			[execute]	[to factory calibration]		
219	zoom.window.bottom	1047			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
220	zoom.window.height	1098			?	[pixels]		
221	zoom.window.left	1044			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
222	zoom.window.right	1045			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
223	zoom.window.top	1046			= ? + -	0 [-100] : 100 [0] : 200 [+100]	0 : 100 : 200	
224	zoom.window.width	1097			?	[pixels]		



## Key Commands

Key	Key #
MENU	43
R50	43
RIGHT	44
R72	44
DOWN	45
R81	45
LEFT	46
R70	46
UP	47
R61	47
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R20	48
PREV	49
R51	49
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R00	58
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## Key Commands

Key	Key #
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R42	62
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R12	66
TARGET.LEFT	95
R01	95
TARGET.RIGHT	96
R02	96
TARGET.UP	97
TARGET.DOWN	98
TARGET.ALL	99
R11	99
R10	72
R30	76
R31	77
R60	71
R62	73
R80	74
R82	75

## String Commands

String	String #
BUILD.DATE	1
PART	2
PRODUCT	3
REVISION	4
MLIB	6
ASCII.INPUT	7
RTC	9
SLOT.NAME	5
ASSET.TAG	16
SN.LCD	13
SN.LCD.W	14
IP.ADDRESS	171
MAC.ADDRESS	173
NETWORK.MODULE	172

## Slot Commands

Slot Item	Item #
ITEM	0
ITEM.COUNT	1
REVISION	2
NAME	3
NAME.SIZE	4
OPEN	5

## Slot Commands

Slot Item	Item #
CLOSE	6
OFFSET.RED	16389
GAIN.RED	16390
OFFSET.GREEN	16391
GAIN.GREEN	16392
OFFSET.BLUE	16393
GAIN.BLUE	16394
BRIGHTNESS	16387
COLORSPACE	1180
CONTRAST	16388
SHARPNESS	16397
HUE	16395
PHASE	16400
SATURATION	16396
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POSITION.VERTICAL	16399
RESOLUTION.HORIZONTAL	16401
RESOLUTION.VERTICAL	16402
ASPECT	1054
JUSTIFY	1053
OVERSCAN	1184
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## Slot Commands

Slot Item	Item #
VIEWPORT.WINDOW.LEFT	1039
VIEWPORT.WINDOW.RIGHT	1040
VIEWPORT.WINDOW.TOP	1041
ZOOM.WINDOW.BOTTOM	1047
ZOOM.WINDOW.LEFT	1044
ZOOM.WINDOW.RIGHT	1045
ZOOM.WINDOW.TOP	1046
COLORSPACE	1180
WALL.HEIGHT	1049
WALL.MODE	1052
WALL.COLUMN	1051
WALL.ROW	1050
WALL.WIDTH	1048
MATRIX.ROUTE.MODULE	1384
BACKLIGHT.INTENSITY	1085

# 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 64 as necessary.

## Setup

- 1 Connect the RS232 cable from the computer to the RS232 In connector of Quad controller A. Connect the out connector of that display, to the In connector of the next display and so on until all displays are connected.
- 2 Each display in the wall has a unique ID. The display's group ID is the ID of the Quad controller to which it's connected (A-P). The display's unit ID is the output number to which it is connected (1-4).
- 3 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.
- 4 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 64.
  - 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 65.

---

## Individual Command

- 1 For each display in the wall, send the command `op A1 pattern=blue ^M`, substituting each display's ID in turn.
- 2 Did each display turn blue when commanded?
  - a If not, check that you typed the ID correctly to match the display.
- 3 Did you receive an echoed response back each time?
  - a If not, go to Response From Individual Displays on page 66.

## Data Query

- 1 Send a command which asks for information to each display in turn. For example, `op A3 lcd.position(row)? ^M`
- 2 Did each display return its row in the Matrix?
  - a If not, go to Response From Individual Displays on page 66.

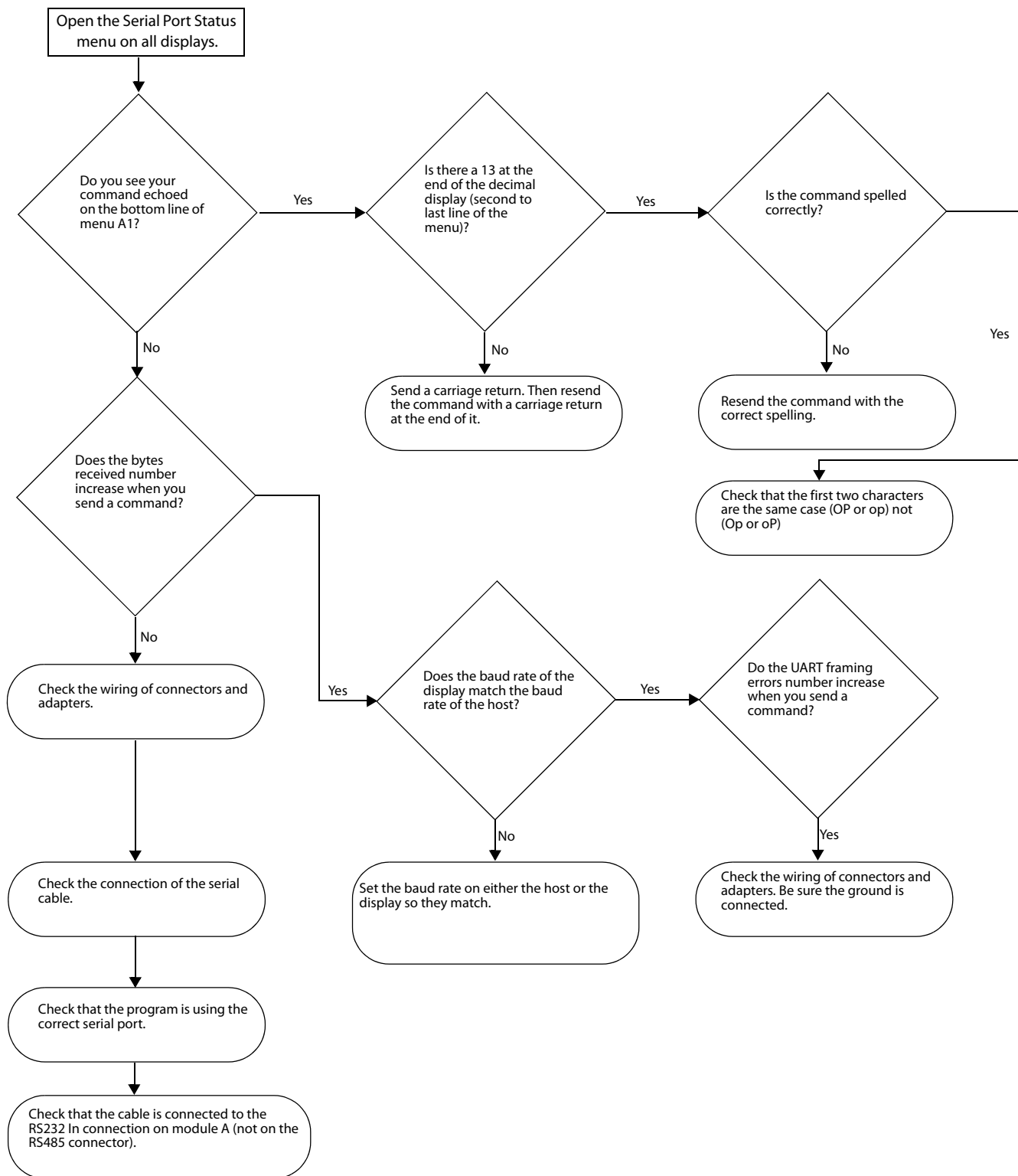
## Troubleshooting Useful Commands

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`.

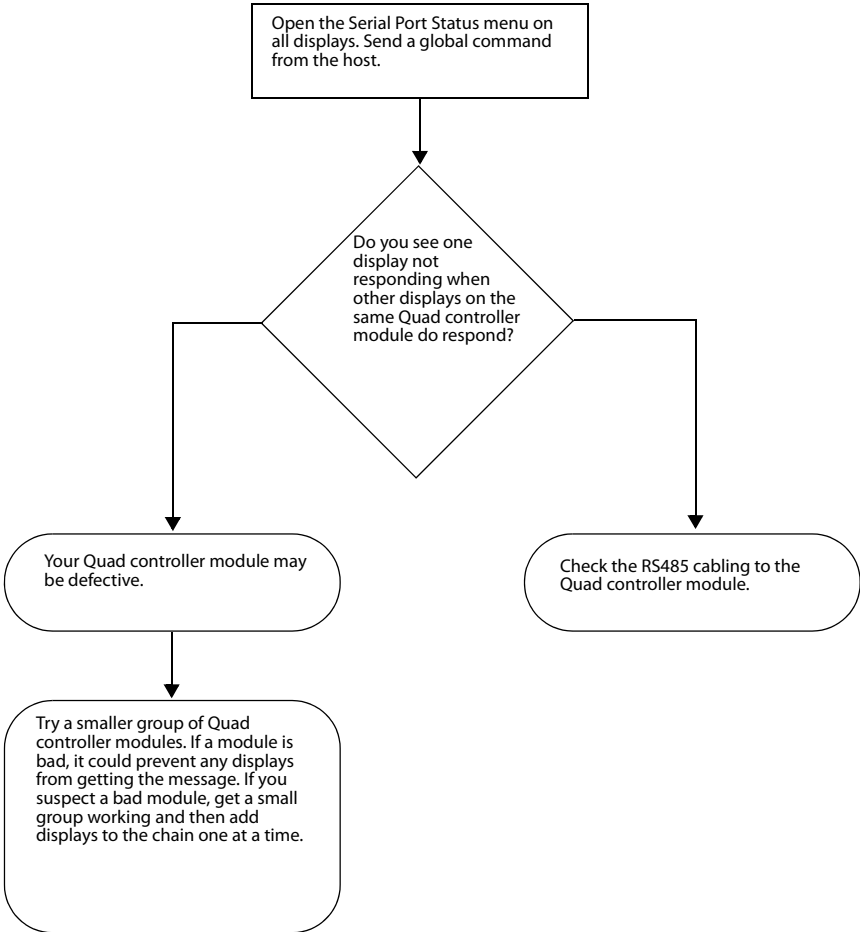
If the Commands Received increases but the display didn't respond, it may be in a state where it cannot respond at this time, or it may have invalid data. Try sending the command with an individual (not global) address, and watch the response. If it sends a `NAK`, it wasn't able to carry out the command. 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

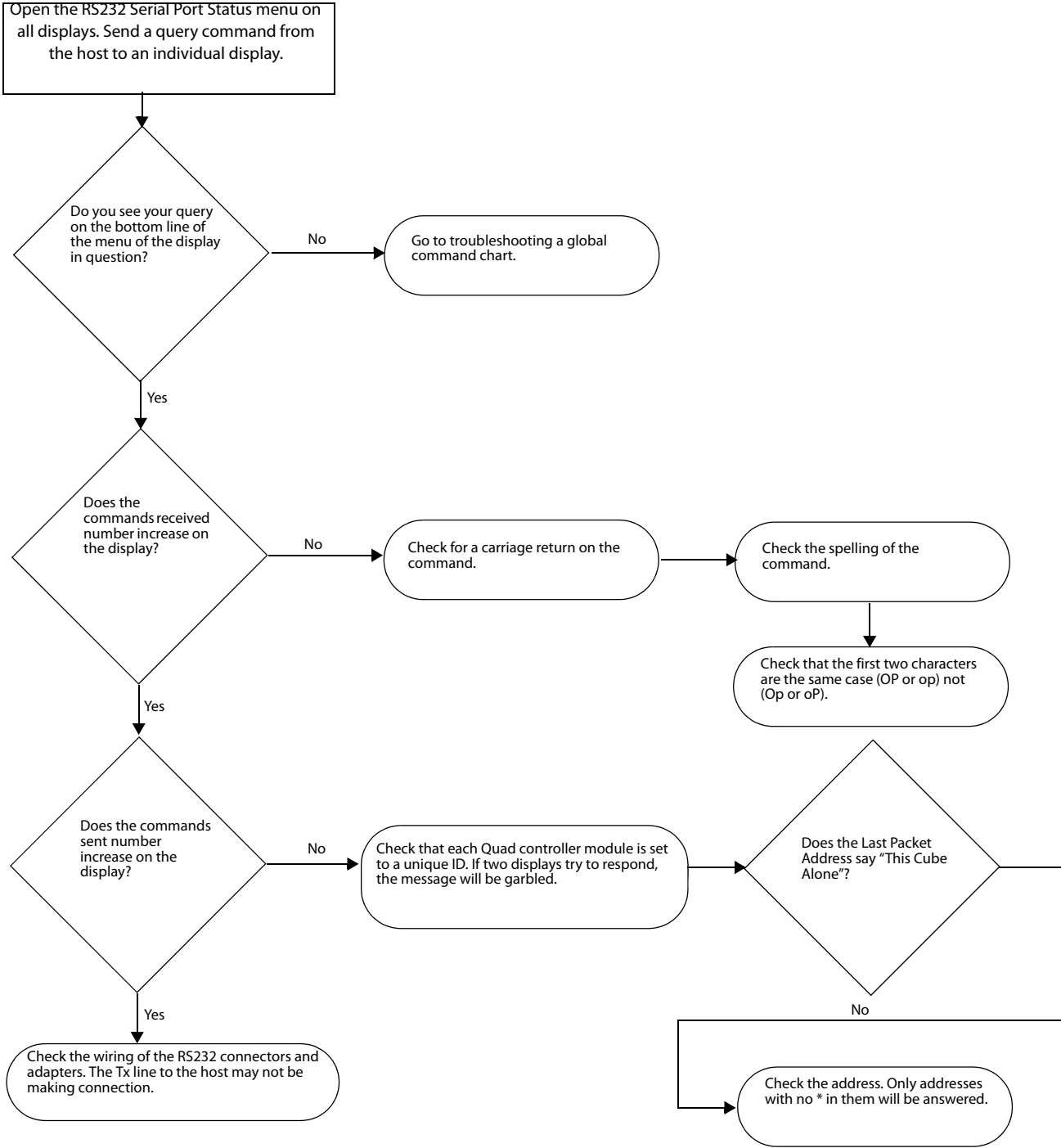




# Global Command to Subsequent Displays



## Response From Individual Displays



# Index

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## Numerics

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1033 29	1104 20
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1037 19	1107 25
1038 39	1109 43
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1040 55	1111 20
1041 55	1112 53
1042 54	1113 48
1044 56	1114 49
1045 56	1125 31
1046 56	1126 32
1047 56	1133 52
1048 55	1137 18
1049 55	1138 18
1050 55	1139 47
1051 55	1140 23
1052 55	1141 23
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1099 55	1188 49
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