

Technical Reference

020-101697-05

Boxer 4K

Serial API Commands



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Content

| | |
|---|-----------|
| Communicating with Boxer 4K. | 5 |
| Connection and use. | 5 |
| Connecting to a computer or server. | 5 |
| Configuring the RS232 port. | 5 |
| Setting up the Ethernet. | 6 |
| Understanding message format. | 6 |
| Basic message structure. | 7 |
| Special characters for text. | 8 |
| Sample messages and their meaning. | 9 |
| Sample messages for a single projector. | 9 |
| Sample messages for querying a projector. | 9 |
| What is sent in a message. | 10 |
| Maximizing message integrity. | 10 |
| Error messages. | 11 |
| Descriptive error. | 11 |
| Flow control. | 12 |
| Serial API commands. | 13 |
| ADR–Projector Address. | 13 |
| ALC–Ambient Light Correction. | 14 |
| APW–Auto Power On. | 14 |
| ASU–Auto Setup. | 14 |
| BDR–Baud Rate. | 15 |
| BGC–Base Gamma Curve. | 15 |
| BST–Built-in Self Test. | 16 |
| CCA–Color Adjustment. | 17 |
| CLE–Color Enable. | 20 |
| CSP–Color Space. | 20 |
| DDD–Disable Dual-Link DVI Inputs. | 21 |
| DEF–Factory Defaults. | 21 |
| DTL–Sharpness Detail. | 21 |
| EBB–Black Level Blending. | 22 |
| EBL–Edge Blending Selection. | 22 |
| EDO–EDID Override. | 23 |

| | |
|--|----|
| EME–Enable Asynchronous Serial Messages. | 23 |
| ETP–Engine Test Pattern. | 23 |
| EVT–Event Manager. | 25 |
| FCS–Lens Focus Position Adjustment. | 26 |
| FRD–Frame Delay. | 27 |
| FRZ–Image Freeze. | 28 |
| GAM–Gamma Power Value. | 28 |
| GIO–General Purpose Input/Output. | 29 |
| HIS–Lamp History. | 29 |
| ITP–Test Pattern. | 31 |
| KEN–Keypad Enable. | 32 |
| LCB–Lens Motor Calibration. | 33 |
| LHO–Lens Horizontal Position Adjustment. | 33 |
| LMV–Lens Move. | 34 |
| LOE–Video Loop Out Enable. | 35 |
| LOP–Lamp Selection. | 36 |
| LPL–Lamp Life. | 39 |
| LPP–Lamp Power. | 39 |
| LVO–Lens Vertical Position Adjustment. | 39 |
| NET–Network Setup. | 40 |
| OSD–On Screen Display. | 41 |
| OTR–Output Resolution. | 41 |
| PNG–Ping. | 42 |
| PRO–Profile. | 42 |
| PWR–Power. | 43 |
| RAL–Remote Access Level. | 43 |
| SHU–Shutter. | 44 |
| SIN–Select Input. | 44 |
| SOR–Screen Orientation. | 45 |
| SPS–Splash Screen. | 45 |
| SST–Projector Status. | 46 |
| SZP–Size and Position. | 47 |
| TMD–Time and Date. | 47 |
| UID–User ID. | 48 |
| WRP–Geometry Correction. | 48 |
| ZOM–Lens Zoom Position Adjustment. | 49 |

Asynchronous messages. 50

Communicating with Boxer 4K

Understand the information and procedures for communicating with Boxer 4K from a remote location.

Connection and use

Once you have connected your computer to either the RS232 IN port (depending on which standard is supported by your computer) or to the Ethernet port on Boxer 4K, you can remotely access controls and image setups, issue commands or queries, and receive replies.

Use these bidirectional messages to:

- Control multiple projectors
- Obtain a projector's status report
- Diagnose performance problems

Refer to the User Manual provided with the projector for all cable requirements and other connection details.



Some commands are operational only when projector is powered up.

Connecting to a computer or server

Communicate with a remote computer, server, or an existing network using a RJ-45 cable.

The RS232 port located on the IMXB faceplate uses Christie-proprietary protocol and is intended for Christie accessories or automation controllers only.

1. Use an RJ-45 cable to connect the Ethernet hub or switch to the Ethernet port, located on the projector IMXB faceplate.
2. When using the Christie serial protocol over Ethernet, connect to port 3002.
3. For applications or equipment using serial communications, use the Christie-proprietary serial protocol to communicate with the RS232 port on the IMXB faceplate.

Configuring the RS232 port

Configure the RS232 port to send Christie serial commands using a standard RS232 serial cable.

1. Select **Menu > Communications > Projector Communication**.
2. Use the down arrow to select **Baud Rate**.

3. Select the appropriate baud rate and select **Enter**.
4. Use the down arrow to select **Network Routing**.
5. Select the type network routing appropriate for your projector and select **Enter**.

Setting up the Ethernet

Ethernet is setup to obtain an IP address automatically if a DHCP server is on the network. To modify IP settings, or manually enter an address.

Christie recommends using the Ethernet port on the IMXB as the HDBaseT port is limited to 100 Mb/s.



You cannot change the IP settings using the web interface.

1. From the display panel, use the arrow keys to select **IP Settings**.
2. To set the type of network, select **DHCP** or **Static**.
3. If you selected Static, manually enter the network information for the **IP Address**, **Subnet**, and **Gateway**.
4. Select **Apply** and select **Enter**.
5. Select **MENU** > **Communications** > **Ethernet**.
6. Select **Device name**.
7. Use the up and down keys to enter the name of the projector.
8. Select **Enter**.

Understanding message format

Commands sent to and from Boxer 4K are formatted as simple text messages consisting of a three letter command code, an optional four letter subcode, and optional data.

| Source | Format | Function | Example |
|-----------------|---------------------|---|---------------------------|
| From controller | (Code Data) | SET (set power on) | (PWR1) or (PWR 1) |
| | (Code+Subcode Data) | SET (set input port configuration) | (SIN+PORT 1) |
| | (Code ?) | REQUEST (what is current power state?) | (PWR?) or (PWR ?) |
| | (Code+Subcode ?) | REQUEST (what is current input port configuration?) | (SIN+PORT?) |
| From projector | (Code Data) | REPLY (power state is 1 "On") | (PWR!001 "On") |
| | (Code+Subcode Data) | REPLY (input port configuration is 1 "One-Port") | (SIN+PORT!001 "One-Port") |

Generally, most commands include 0 or 1 data fields or parameters. Where applicable, a message may expand to include additional parameters of related details.

The smallest step size for any parameter is always 1. For some controls (such as Size) the value displayed on the screen has a decimal point (for example, 0.200 to 4.000). In this case, the values

used for the serial communications is an integer value (for example, 200 to 4000), not the decimal value seen on the screen.

Available message types

| Message type | Description |
|--------------|--|
| Set | A command to set a projector parameter at a specific level, such as changing the brightness. |
| Request | A request for information, such as what is the current brightness setting. |
| Reply | Returns the data in response to a request or as confirmation of a command. |

Basic message structure

Understand the component fields that comprise a standard ASCII message.

| Components | Description |
|------------------------------|---|
| Start and end of message | Every message begins with the left bracket character and ends with the right bracket character. If the start character is received before an end character of the previous message, the partial (previous) message is discarded. |
| Prefix characters (optional) | To acknowledge that Boxer 4K has responded, and/or maximize message integrity, insert one or two special characters before the three-character function code: <ul style="list-style-type: none"> • \$ (Simple Acknowledgment)—Causes a dollar sign (\$) character to be sent from Boxer 4K when it has finished processing the message. • # (Full Acknowledgment)—Causes an echo of the message as a reply to be sent from Boxer 4K when it has finished processing the message. • & (Checksum)—Allows a checksum to be put as the last parameter in the message for verification at Boxer 4K. |
| Projector numbers (optional) | To control a selected Boxer 4K or controller within a group, include its assigned number or address just before the three-character ASCII function code. |
| Function code | The Boxer 4K function you want to work with, such as channel selection or gamma, is represented by a three-character ASCII code (A-Z, upper or lower case). This function code appears immediately after the leading bracket that starts the message. In messages sent to Boxer 4K that do not have a subcode, a space between the function code and the first parameter (or special character) is optional. |
| +Subcode | The Boxer 4K function you want to work with may have one or more subcodes that allow you to select a specific source, image, channel or subfunction. The subcode is represented by a four-character ASCII code (A-Z, upper or lower case, and 0-9). This subcode appears immediately after the function code, with a plus sign (+) character to separate the code and subcode. If there is no subcode, the plus sign (+) is also omitted. In messages sent to Boxer 4K that have a subcode, a space between the subcode and the first parameter (or special character) is optional. |
| Request/reply symbols | If the controller is requesting information from Boxer 4K, a question mark (?) appears directly after the function code. If Boxer 4K is replying, an exclamation |

| Components | Description |
|-----------------|--|
| | mark (!) appears directly after the function code. For set messages to Boxer 4K, neither of these characters appear—data directly follows the code and subcode. |
| Data | <p>The value for a given Boxer 4K state, such as on or off, appears in ASCII-decimal format directly after the request/reply symbol. You can add an optional space after the symbol—such as before the data—in a set message, but data in replies follow the exclamation mark (!) symbol without a space. Other details to remember about data</p> <ul style="list-style-type: none"> • All values returned by Boxer 4K (reply messages) have a fixed length, regardless of the actual value. For a specific parameter, the length is always the same (for example, contrast is always returned as three characters, Boxer 4K number is always returned as five characters). The minimum parameter size is three characters. Values less than the predefined size are padded with leading zeros as needed. Parameters which have negative signs are zero padded after the negative sign, and have one less digit to make space for the sign. • If entering a negative number, there must be a space between the code/ subcode and the value for example (CRM3) and (CRM 3) can both be used when the number is positive. (CRM -2) is acceptable, but (CRM-2) is not. • Data in set messages to Boxer 4K do not require padding with zeros. • Within each message, multiple parameters of data must be separated by one space character. • Text parameters such as channel names are enclosed in double quotes following the data, as in Name. |
| Text parameters | <p>Most data is simply a numerical value, however some messages also require text. For example, a channel naming message typically includes a text-based name—enclose this text in double quotation marks, as in "Tilt the Wagon". Use all characters as required except for special characters—these require a two-character combination.</p> |

Related information

Special characters for text (on page 8)

Maximizing message integrity (on page 10)

Special characters for text

To use special characters in the serial API commands, you must use a two-character combination.

| Special character | Two-character combination | Description |
|-------------------|---------------------------|---|
| " | \" | Double quotation mark |
| \ | \\ | Backslash |
| (| \(| Left bracket |
|) | \) | Right bracket |
| Line break | \n | New line —If the text can be displayed on more than one line, this sets the line break. |

| Special character | Two-character combination | Description |
|---------------------|---------------------------|--|
| Send arbitrary code | \h## | Sends one arbitrary code defined by the two hexadecimal digits ##. |

Sample messages and their meaning

For a more detailed understanding of messages and their meaning, review the provided sample messages.

Sample messages for a single projector

Messages can be sent and received for a single projector.

| Message format | Function | Example |
|---------------------|---|---------------------------|
| (Code Data) | SET Power on | (PWR 1) |
| (Code+Subcode Data) | SET input port configuration | (SIN+PORT 1) |
| (Code?) | REQUEST (what is current power state?) | (PWR?) |
| (Code+Subcode?) | REQUEST (what is current input port configuration?) | (SIN+PORT?) |
| (Code!Data) | REPLY (power state is 1 "on") | (PWR!001 "On") |
| (Code+Subcode!Data) | REPLY (input port configuration is 1 "One-Port") | (SIN+PORT!001 "One-Port") |
| (\$Code Data) | SET AND ACKNOWLEDGE MESSAGE (change test pattern and request acknowledge) | (\$ITP 1) |
| \$ | REPLY with acknowledgment (from projector) | \$ |

Sample messages for querying a projector

Messages to query a list, enabled state, and minimum/maximum values can be sent and received for a projector.

| Options | Function | Example |
|--------------|----------------------------|--|
| Query a list | QUERY test pattern options | (ITP?L) |
| | REPLY test pattern options | (ITP!L001 001 00000 "Off") (ITP!L001 001 00001 "Grid") (ITP!L001 001 00002 "Gray Scale 16") (ITP!L001 001 00003 "Flat White") |

| Options | Function | Example |
|-----------------------|------------------------------------|---|
| | | (ITP!L001 001 00004 "Flat Gray") ... (ITP!L000 001 00024 "Flare") (ITP!L111 "---END---") |
| Query enabled state | QUERY test pattern enabled state | (ITP?E) |
| | REPLY test pattern (enabled) | (ITP!E000) |
| | REPLY test pattern (disabled) | (ITP!E001) |
| Query minimum/maximum | QUERY gamma slider minimum/maximum | (GAM?M) |
| | REPLY gamma minimum/maximum | (GAM!M1000 3000) |

What is sent in a message

Although you send and read messages as strings of ASCII characters, the actual message travels as a sequence of bytes. Each character in this sequence requires one byte.

The following example illustrates a lamp limit is 2000 hours reply from the projector.

| | | | | | | | | | | |
|---------|------|-----|------|------|------|------|------|------|------|------|
| ASCII = | (| L | P | L | ! | 2 | 0 | 0 | 0 |) |
| HEX = | 0x28 | 0x4 | 0x50 | 0x28 | 0x21 | 0x32 | 0x30 | 0x30 | 0x30 | 0x29 |

Maximizing message integrity

For additional reassurance and/or maximum message integrity, insert one or two special characters.

| Message requirement | Description |
|---------------------|---|
| Acknowledgments | <p>For assurance from Boxer 4K (or group of projectors) that a set message has been processed, request an acknowledgment.</p> <p>The acknowledgment is returned after the message has been received and fully executed by Boxer 4K (such as in the case of a source switch it is not sent until the switch is complete). If the message cannot be executed for some reason (such as invalid parameters, time-out, and so on) a NAK is returned instead (not-acknowledge). Requesting an acknowledgment serves no purpose when included in a request message, as the acknowledgment is redundant to the actual reply from Boxer 4K. However, if requested, the dollar sign (\$) acknowledgment from Boxer 4K follows the reply.</p> <p>There are two types of acknowledgments:</p> <ul style="list-style-type: none"> Simple Acknowledgments—Insert a dollar sign (\$) character just after the start code bracket. This only returns a \$. This only returns a dollar sign (\$) on success, or a caret (^) on failure (NAK). |

| Message requirement | Description |
|---------------------|---|
| | <ul style="list-style-type: none"> • Full Acknowledgments—Insert a hash (#) character just after the start code bracket. This returns the message sent, as a reply. <p>This is a quick way to confirm success with set messages and is useful with long distance communication links or where the projectors and/or images are not visible from the controller. Acknowledgments can also be a type of flow control.</p> |
| Checksums | <p>For maximum message integrity, add a checksum character ampersand (&) just after the start code bracket. You must also include the correct checksum total (0-255) just before the end code bracket. Make sure to add a space before the calculated checksum to separate it from the last data parameter:</p> <p>The checksum is the low byte of the sum of the ASCII values of all characters between the start bracket and the beginning of the checksum, but not including either. It does include the space in front of the checksum.</p> <p>Calculate the checksum for the above set contrast to 64 command as follows:</p> <p>CHECKSUM EXAMPLE = & + c + o + n + 6 + 4 + 'space'</p> <p>= 26h+63h +6Fh +6E h +36h +\$34h +\$20h</p> <p>= 01F0h</p> <p>= F0h when only the low byte is used</p> <p>= 240</p> <p>Boxer 4K collects all of the message bytes as defined in the first byte of the message, then creates its own checksum value for comparison with the checksum included in the controller's message. If the values match, the message is considered to have been correctly received; otherwise, the message is discarded.</p> <p>Note the following:</p> <ul style="list-style-type: none"> • h indicates a hex number. • If a request message has a checksum, so does the reply. • If using both acknowledge and checksum, either character can occur first. |

Error messages

If a command cannot be performed, a descriptive error identifying the problem appears.

For example, the following message indicates a syntax error:

```
(ITP) - (65535 00000 ERR00005 "ITP: Too Few Parameters")
```

Descriptive error

The following error codes indicate a problem if a command cannot be performed.

| Error code | Description | Error code | Description |
|------------|---------------------|------------|--------------------|
| 3 | Invalid parameter | 105 | Disabled control |
| 4 | Too many parameters | 106 | Invalid language |
| 5 | Too few parameters | 107 | Exceeded list size |

| Error code | Description | Error code | Description |
|------------|-----------------------------|------------|-------------------------------|
| 6 | Channel not found | 110 | Communication timeout |
| 7 | Command not executed | 111 | Communications failure |
| 8 | Checksum error | 112 | Failed to set hardware |
| 9 | Unknown request | 113 | Bad file |
| 10 | Error receiving serial data | 114 | Memory failure |
| 101 | Control not found | 115 | Not implemented |
| 102 | Subcontrol not found | 116 | Invalid security |
| 103 | Wrong control type | 117 | Invalid access group |
| 104 | Invalid value | 118 | System busy - Try again later |

Flow control

Normally messages can be sent to the projector before processing of earlier messages is complete—Boxer 4K stores messages in a buffer until ready to process. However, if a series of messages is sent, Boxer 4K may not be able to process them as fast as they arrive and the buffer becomes full.

If this happens, Boxer 4K sends the 13h (Xoff) code to instruct the controller (or any devices preparing to transmit) to cease transmission. At this point, the controller must respond immediately and send no more than 10 extra characters or they may be lost (such as, Boxer 4K can accommodate the receipt of up to 10 more bytes after it sends 13h (Xoff)). When the buffer is once again available, Boxer 4K sends a 11h (Xon) command to resume transmission.



Xon and Xoff controls apply to both directions of communication. Boxer 4K does not send more than three characters after it has received a 13h (Xoff) code.

Serial API commands

The Boxer 4K commands can be used to modify product settings.

ADR–Projector Address

Sets or queries the device address.

This command also helps to identify where a response or asynchronous message originates from. Generally, this command is used for projectors that are daisy-chained together using the RS232 style communication.

Commands

| Command | Description | Values |
|-------------|---|--|
| ADR <value> | Sets the projector address to <value>. (Saved value) | 0 to 999 65535 = Reserved broadcast address |

Examples

Set all devices to address 0:

```
(65535 ADR 0)
```

Set first device at address 0 to address to 5:

```
(0 ADR 5)
```

Query address for all devices and return results to address 1001:

```
(65535 1001ADR?)
```

Result:

```
(01001 00005ADR!005)
```

ALC–Ambient Light Correction

Adjusts the image to help compensate for brighter or darker ambient light conditions.

Commands

| Command | Description | Values |
|-------------|--|---|
| ALC <value> | Adjusts the image to help compensate for ambient light conditions. This command is only available if the video electronics are on. (Saved value) | 0 = No correction 1 to 100 = Adjusts the image for darker environments -1 to -100 = Adjusts the image for brighter environments |

APW–Auto Power On

Automatically powers up the projector to the on state if the projector was on when the AC power was lost.

Commands

| Command | Description | Values |
|-------------|--|---|
| APW <0 1> | Automatically powers up the projector to the on state. (Saved value) | 0 = Disables auto power up 1 = Enables auto power up |

Related information

PWR–Power (on page 43)

ASU–Auto Setup

Automatically readjusts various video controls for the active video source to produce an optimal image on screen.

Commands

| Command | Description | Values |
|---------|--|--------|
| ASU | Automatically readjusts various video controls for the active video source to produce an optimal image on the screen. This command is only available if the active display has a signal. | — |

Examples

Perform auto setup on the active video source:
(ASU)

BDR–Baud Rate

Sets the baud rate for a serial communications port.

Commands

| Command | Description | Values |
|------------------|---|--|
| BDR+PRTA <value> | Sets the baud rate for the RS232-IN port. This command requires service level access. (Saved value) | 1 = 2400 2 = 9600 3 = 19200 4 = 38400 5 = 57600 6 = 115200 (Default baud rate on each port) |

Examples

Set baud rate on port A to 115200 bits per second:

```
(BDR+PRTA 6)
```

Verify that RS232-IN is set to 115200bps:

```
(BDR+PRTA?)
```

Result:

```
(BDR+PRTA!006 "115200")
```

BGC–Base Gamma Curve

Applies a predefined gamma transfer function to the image.

Commands

| Command | Description | Values |
|-------------|--|--|
| BGC <value> | Applies a predefined gamma transfer function to the image. This command is only available if the video electronics are on. (Saved value) | 0 = sRGB (Default) 2 = Power Law Function 3 = M-Series (Standard) 4 = ITU-R BT.1886 |

Examples

Select the sRGB gamma transfer function:

```
(BGC 0)
```

Select a Power Law function with a 2.6 exponent:

```
(BGC 2)
```

Result:

(GAM 2600)

BST–Built-in Self Test

Performs self-checks in Boxer 4K that can be safely executed either in standby, on, or cool down mode. Do not execute this command while Boxer 4K is warming up.

Commands

| Command | Description | Values |
|------------------|--|---|
| BST?L | Returns a list of available test suites. (Read-only) | — |
| BST <suite> | Executes the test suite specified. | 0 = All Tests 1 = Image processor board tests 2 = Formatter tests 3 = Active backplane tests 4 = Video path tests |
| BST+TEST?L | Returns a list of available tests. (Read-only) | — |
| BST+TEST <index> | Executes the specified test. | <index> = Test provided by the BST+TEST?L command |

Examples

Retrieve the list of test suites/tests as of v1.1.0 software:

(BST?L)

Result:

```
(BST!L001 001 00000 "All Tests")
(BST!L001 001 00000 "All Tests")
(BST!L001 001 00001 "Image Processor Board Tests")
(BST!L001 001 00002 "Formatter Tests")
(BST!L001 001 00003 "Active Backplane Tests")
(BST!L001 001 00004 "Video Path Tests")
(BST!L111 "--END--")
```

Retrieve the list of test suites/tests as of v1.1.0 software:

(BST+TEST?L)

...

```
(BST+TEST!L001 001 00000 "ABP: Check FPGA voltages")
(BST+TEST!L001 001 00001 "HIP: Check FPGA voltages")
...
(BST+TEST!L111 "--END--")
```

Run all tests successfully:


```
(BST 0)
```

Result:

```
(BST!000 "--OK--")
```

Example of failed tests within the All Tests test suite:

```
(BST 0)
```

Result:

```
(BST!001 "Fail" "no response on pin 1")
```

```
(BST!002 "Fail" "no additional details")
```

```
(BST!000 "Fail")
```

Example of failing test 1:

```
(BST+TEST 1)
```

Result:

```
(BST+TEST!001 "Fail" "no response on pin 1")
```

CCA—Color Adjustment

Configures the color adjustments for the projector.

Use this command to also set the native colors for the projector.

Commands

| Command | Description | Values |
|---|---|--|
| CCA+SLCT <value> | Sets the color table. This command is only available if the video electronics are on. (Saved value) | 0 = Max Drives—Turns off all color adjustments, projector runs at maximum brightness 1 = Color Temperature—Selects color adjustments based on a color temperature 2 = HD Video (ITU-R BT.709) 3 = Custom settings |
| CCA+CTMP <value> | Sets the color temperature of the projector. This command is only available if the video electronics are on, the projector is configured to use Color Temperature for its color table, and Color Temperature is selected. (Saved value) | 3200 to 9300 |
| CCA+RDCX <x coordinate for red> CCA+RDCY <y coordinate for red> CCA+GNCX <x coordinate for green> | Defines a custom color table using x,y coordinates, scaled by a factor of 10,000. For example, an x value of 3350 corresponds to x=0.3350 in the CIE 1931 chromaticity scale. This command is only available if the video electronics are on and Custom is selected. (Saved value) | The valid range for each value depends on which of the red/green/blue point is being adjusted. |

| Command | Description | Values |
|--|---|---|
| CCA+GNCY <y coordinate for green> CCA+BLCX <x coordinate for blue> CCA+BLCY <y coordinate for blue> CCA+WHCX <x coordinate for white> CCA+WHCY <y coordinate for white> | | |
| CCA+GOFR <green of red saturation value> CCA+BOFR <blue of red saturation value> CCA+ROFG <red of green saturation value> CCA+BOFG <blue of green saturation value> CCA+ROFB <red of blue saturation value> CCA+GOFB <green of blue saturation value> | Defines a custom color table using saturation values. Each control represents a percentage of each native RGB component needed to produce a target RGB space. This command is only available if the video electronics are on and Custom is selected. (Saved value) | -1000 to 1000, where 1000 = 100% A negative value reduces the influence of the component by scaling up the other two components. |
| CCA+ROFR <red of red saturation value> CCA+GOFG <green of green saturation value> CCA+BOFB <blue of blue saturation value> | Defines a custom color table using saturation values. Each control represents a percentage of each native RGB component needed to produce a target RGB space. <ul style="list-style-type: none"> • Red of red is equivalent to red of white. • Green of green is equivalent to green of white. • Blue of blue is equivalent to blue of white. This command is only available if the video electronics are on and Custom is selected. (Saved value) | 0 to 1000, where 1000 = 100% |
| CCA+ROFW <red of white saturation value> CCA+GOFW <green of white saturation value> | Defines a custom color table using saturation values. Each control represents a percentage of each native RGB component needed to produce a target RGB space. This command is only available if the video electronics are on and Custom is selected. (Saved value) | 0 to 1000, where 1000 = 100% |

| Command | Description | Values |
|--|---|--|
| CCA+BOFW <blue of white saturation value> | | |
| CCA+RDPX <x coordinate for red> CCA+RDPY <y coordinate for red> CCA+GNPX <x coordinate for green> CCA+GNPY <y coordinate for green> CCA+BLPX <x coordinate for blue> CCA+BLPY <y coordinate for blue> CCA+WHPX <x coordinate for white> CCA+WHPY <y coordinate for white> | <p>Sets the native color primaries for the projector using the x,y coordinate form, scaled by a factor of 10,000. For example, an x value of 3350 corresponds to x=0.3350 in the CIE 1931 chromaticity scale.</p> <p>This command is only available if the video electronics are on and Max Drives is selected. It is only available to a service user.</p> | The valid range for each value depends on which of the Red, Green, Blue, or White point is being adjusted. |
| CCA+COPY <value> | Copies the values from one of the other pre-defined color tables into the custom color table. This command is only available if video electronics are on. | 0 = Max Drives 1 = Color Temperature 2 = HD Video (ITU-RBT.709) |
| CCA+SAVE | <p>Saves the current primary settings (for example, CCA+RDPX, and so on) as the new default color primary settings.</p> <p>Save these settings after calibrating the color primaries (such as measuring the primary x,y coordinates using a spectroradiometer or similar equipment).</p> <p>This command is only available if video electronics are on. It is only available to a service user.</p> | — |
| CCA+RSET | <p>Resets the native color primary settings to their defaults.</p> <p>If primary settings have not been saved (CCA+SAVE), this resets the primary settings to hard-coded defaults.</p> <p>This command is only available if video electronics are on. It is only available to a service user.</p> | — |

Examples

Use a custom color table:

(CCA+SLCT 3)

Reset values to "HD Video (ITU-R BT.709)":

(CCA+COPY 2)

Change the x-coordinate of the custom color table to 0.6753:

(CCA+RDCX 6753)

Save the current color primary settings as the new calibrated defaults:

(CCA+SAVE)

Reset the color primary settings to the saved calibrated defaults:

(CCA+RSET)

CLE—Color Enable

Enables specific colors in the video path.

Commands

| Command | Description | Values |
|-------------|--|--|
| CLE <color> | Enables specific colors in the video path. This command is only available if video electronics are on. | 0 = White 1 = Red 2 = Green 3 = Blue 4 = Yellow 5 = Cyan 6 = Magenta |

CSP—Color Space

Changes the color space of the active signal for all inputs on the screen.

Commands

| Command | Description | Values |
|-------------------|---|---|
| CSP <color space> | Changes the color space of the active signal on the screen. This command is only available if video electronics are on. (Saved value) | 0 = Auto Detect—Uses the detected colorspace in the active signal. (Default) 1 = RGB (full range) 2 = RGB (limited range) 3 = YCbCr HDTV (ITU-R BT.709) 4 = YCbCr HDTV (expanded range) |

Examples

Set the color space to RGB irrespective of which channel is selected:

(CSP 1)

Set the projector to always automatically detect the color space:

(CSP 0)

DDD–Disable Dual-Link DVI Inputs

Enables or disables the secondary DVI receiver on all Dual-Link DVI cards.

Commands

| Command | Description | Values |
|-------------|--|---|
| DDD <0 1> | Enables or disables the secondary DVI receiver on Dual-Link DVI cards. This command is only available if video electronics are on. (Saved value) | 0 = Enables Dual-Link support (Default) 1 = Disables Dual-Link support |

DEF–Factory Defaults

Resets Boxer 4K to its factory default values.

Note the following about this command:

- Performing this command while the power is on does not reset the Lamp Selection value while in limited mode.
- Resets the network settings to be DHCP enabled.
- Deletes all user profiles, warps, and blends.

Commands

| Command | Description | Values |
|---------|--|--------|
| DEF 111 | Restores all settings to the factory defaults. To prevent accidental use of this command, the number 111 must follow the command. | — |

Examples

Reset Boxer 4K to factory defaults:

(DEF 111)

DTL–Sharpness Detail

Adjusts the sharpness of scaled video to alter the amount of visible detail.

This command does not affect unscaled video.

Commands

| Command | Description | Values |
|-------------|--|---|
| DTL <value> | Adjusts the sharpness of scaled video to alter the amount of visible detail. This command is only available if video electronics are on. (Saved value) | 0 to 49 = Softens the image 50 = Applies a moderate amount of filtering to the image (Default) 51 to 100 = Sharpens the image |

EBB—Black Level Blending

Selects the black level blend to use on the projector.

Commands

| Command | Description | Values |
|------------------|--|---|
| EBB+SLCT?L | Retrieves a list of available black level blends. | — |
| EBB+SLCT <value> | Selects the black level blend to use on the projector. This command is only available if video electronics are on. (Saved value) | 0 = Turns off black level blending (Default) 1 to 4 = Selects one of the four black level blends, if available 11 = Selects basic black level blending (onboard black level blending) |

EBL—Edge Blending Selection

Selects the edge blend to use on the projector.

Basic edge blending can be configured using the projector's display panel, on-screen display or web interface. To add complex or advanced edge blend configurations, use the Twist (AutoCal) application.

Commands

| Command | Description | Values |
|------------------|---|---|
| EBL+SLCT?L | Retrieves a list of available edge blends. | — |
| EBL+SLCT <value> | Selects the edge blend to use on the projector. This command is only available if video electronics are on. (Saved value) | 0 = Turns off edge blending 1 to 4 = Selects one of the four edge blends, if available 11 = Selects basic edge blending (onboard edge blending) |

EDO–EDID Override

Configures which EDID is presented using inputs that support EDIDs (such as DisplayPort, HDMI, DVI, and so on).

Use this command to configure what Boxer 4K advertises regarding the type of signals it accepts. This command does not need to be set to accept a particular type of signal.

Commands

| Command | Description | Values |
|------------------|---|---|
| EDO <rate> | Defines the expected frame rate regardless of the active window size of the signal. This command is only available if video electronics are on. (Saved value) | 24 25 30 48 50 60 (Default) |
| EDO+COLM <value> | Defines the expected active window size of the incoming signal. This command is only available if video electronics are on. (Saved value) | 0 = Auto Detect (Default) 1 = 4K—Columns 2x1 2 = 4K—Columns 4x1 3 = 4K - Quadrants 2x2 |

EME–Enable Asynchronous Serial Messages

Enables or disables the asynchronous serial messages that the projector occasionally transmits.

Commands

| Command | Description | Values |
|-------------|---|---|
| EME <0 1> | Enables or disables asynchronous serial messages. (Saved value) | 0 = Disables all asynchronous FYI/ERR serial messages 1 = Enables asynchronous FYI/ERR serial messages (Default) |

ETP–Engine Test Pattern

Enables or disables the engine diagnostic test patterns.

Commands

| Command | Description | Values |
|-------------|---|-----------------------------|
| ETP <index> | Enables the engine diagnostic test patterns, indicated by the <index> parameter. This | 0 = Flat Black 1 = Green |

| Command | Description | Values |
|---------|--|---|
| | command is only available if video electronics are on. | 2 = Red 3 = Blue 4 = White 5 = 8x8 Green Checker 6 = 8x8 Red Checker 7 = 8x8 Blue Checker 8 = 8x8 White Checker 9 = Convergence Border & Cross (Green) 10 = Convergence Border & Cross (Red) 11 = Convergence Border & Cross (Blue) 12 = Convergence Border & Cross (White) 13 = Convergence Border & Cross (Multi-color) 14 = Convergence Border & Square (Green) 15 = Convergence Border & Square (Red) 16 = Convergence Border & Square (Blue) 17 = Top Blue, Bottom Black 18 = Left Blue, Right Black 19 = Top Green, Bottom Black 20 = Left Green, Right Black 21 = Top Red, Bottom Black 22 = Left Red, Right Black 29 = Convergence Border & Cross (Multi-color2) 45 = Convergence Border & Cross (Multi-color3) 235 = Moving Circles (Green) 236 = Moving Circles (Red) 237 = Moving Circles (Blue) 238 = Color Bars 239 = Edge Blend Grid (Green) 240 = Edge Blend Grid (Red) 241 = Edge Blend Grid (Blue) 242 = Edge Blend Grid (White) 243 = 17 Point 244 = Magenta 245 = Cyan 246 = Yellow 247 = Diagonal Lines 248 = Dark Segmented Ramp 249 = Bright Segmented Ramp 255 = Off |

EVT–Event Manager

Retrieves a list of log messages for the current AC cycle from the projector.

Commands

| Command | Description | Values |
|---------------------------------------|---|--|
| EVT | Returns all events starting from the most recent event on the projector back to AC start. (Read-only) | — |
| EVT <max> | Returns at most <max> events starting from the most recent event on the projector back to AC start. (Read-only) | max = Maximum number of events to return |
| EVT <start timestamp> | Returns all events from <start timestamp> back to current time. (Read-only) | start timestamp = String in the following format: yyyy=mm-dd hh:mm:ss |
| EVT <start timestamp> <end timestamp> | Returns all events from <end timestamp> back to <start timestamp>. (Read-only) | start timestamp = String in the following format: yyyy=mm-dd hh:mm:ss end timestamp = String in the following format: yyyy=mm-dd hh:mm:ss |

Examples

Retrieve all events since last AC start:

(EVT)

Result:

```
(EVT!000 "2013-03-17 04:47:18.340" "OK" "Setting Time to 06:47:17")
(EVT!001 "2013-03-17 04:01:13.860" "Error" "(SST+TEMP?003) Lamp Exhaust Temperature
(Temp 3) = Communication fault (shutdown)")
(EVT!002 "2013-03-17 04:01:13.855" "Error" "(SST+TEMP?002) Air Intake Temperature
(Temp 2) = Communication fault (shutdown)")
(EVT!003 "2013-03-17 04:01:13.824" "Error" "(SST+TEMP?000) Integrator Rod Temperature
(Temp 1) = Communication fault (shutdown)")
(EVT!004 "2013-03-17 04:01:12.663" "Error" "(SST+VERS?017) Lamp Power Supply Version
= Detection fault")
(EVT!"--END--")
```

Retrieve two most recent events:

(EVT 2)

Result:

```
(EVT!000 "2013-03-17 04:47:18.340" "OK" "Setting Time to 06:47:17")
(EVT!001 "2013-03-17 04:01:13.860" "Error" "(SST+TEMP?003) Lamp Exhaust Temperature
(Temp 3) = Communication fault (shutdown)")
```

```
(EVT! "--END--")
```

Retrieve all events from a specific point in time until now:

```
(EVT "2013-03-17 04:01:13")
```

Result:

```
(EVT!000 "2013-03-17 04:47:18.340" "OK" "Setting Time to 06:47:17")
```

```
(EVT!001 "2013-03-17 04:01:13.860" "Error" "(SST+TEMP?003) Lamp Exhaust Temperature (Temp 3) = Communication fault (shutdown)")
```

```
(EVT!002 "2013-03-17 04:01:13.855" "Error" "(SST+TEMP?002) Air Intake Temperature (Temp 2) = Communication fault (shutdown)")
```

```
(EVT!003 "2013-03-17 04:01:13.824" "Error" "(SST+TEMP?000) Integrator Rod Temperature (Temp 1) = Communication fault (shutdown)")
```

```
(EVT! "--END--")
```

Retrieve all events between two specific points in time:

```
(EVT "2013-03-17 04:01:08" "2013-03-17 04:01:12")
```

Result:

```
(EVT!004 "2013-03-17 04:01:12.663" "Error" "(SST+VERS?017) Lamp Power Supply Version = Detection fault")
```

```
(EVT! "--END--")
```

FCS—Lens Focus Position Adjustment

Sets the lens focus to an absolute position.

This command is only enabled when the projector is on.

Commands

| Command | Description | Values |
|----------------|---|---|
| FCS <position> | Adjusts the lens focus to the specified position. The position is persistent across AC cycles. | position = A numerical value subject to the range returned in FCS?m |
| FCS?m | Returns the minimum/maximum range of the zoom axis based on the last lens calibration performed. The returned range is persistent across AC cycles. | — |

Examples

Move lens focus to position 500:

```
(FCS 500)
```

FRD–Frame Delay

Sets the delay between the input sync timing and the output sync timing.

The actual delay can vary based on the amount of processing applied to the image.

Commands

| Command | Description | Values |
|-------------|---|---|
| FRD <delay> | Sets the frame delay, measured in 1/1000ths of a frame. This command is only available if video electronics are on. (Saved value) | 1000 to 3000 2000 = 2 frames (Default) |
| FRD+STAT? | Returns the actual frame delay in 1/1000ths of a frame. This value may be higher than the required delay as the minimum allowed delay differs for each of the various channel configurations. (Read-only) | — |
| FRD+TIME? | Returns a string representation of the actual frame delay, in milliseconds. (Read-only) Note: This representation in milliseconds is approximate and is for reference only. | — |

Examples

Query the actual frame delay:

```
(FRD+STAT?)
```

Result:

```
(FRD+STAT!1250)
```

Query the actual frame delay, in microseconds:

```
(FRD+TIME?)
```

Result:

```
(FRD+TIME!"33.33")
```

Set the frame delay to 2.25 frames:

```
(FRD 2250)
```

Set the frame delay to 1.1 frames:

```
(FRD 1100)
```

FRZ–Image Freeze

Freezes the active video or test pattern to allow a detailed examination of a single frame of an otherwise moving image.

Commands

| Command | Description | Values |
|-------------|---|---|
| FRZ <0 1> | Freezes the active video or test pattern. This command is only available if video electronics are on. | 0 = Disables freezing of current video (Default) 1 = Freezes the current video |

GAM–Gamma Power Value

Defines the exponent used in a standard Power Law function.

This command is only available if the base gamma curve is set to Power Law function.

The gamma control and files are set when the PIU command is off.

Commands

| Command | Description | Values |
|------------------|---|--------------------------------|
| GAM <exponent> | Sets the exponent for the Power Law function used for the gamma transfer function. | 1000 to 3000 2200 (Default) |
| GAM+SLOP <value> | Defines the slope of the linear section at the bottom of the curve. | 1 to 100 1 (Default) |
| GAM+BLKA <value> | Adjusts the contrast ratio of the ITU-R BT.1886 gamma curve. The contrast ratio value is approximate. This command is only available if video electronics are on. (Saved value) | 1000 to 5000 2000 (Default) |

Examples

Set the base gamma curve function to 2.6:

(GAM 2600)

Set the base gamma curve function to 1.0:

(GAM 1000)

Related information

BGC–Base Gamma Curve (on page 15)

GIO—General Purpose Input/Output

Controls or monitors the state of the general purpose inputs and outputs.

The pins reserved for 12V and ground cannot be read, set, or configured. For a mapping of the IO pins to the physical connector pins, refer to the *Boxer 4K User Manual (P/N: 020-101777-XX)*.

Commands

| Command | Description | Values |
|---------------------|---|--|
| GIO +STAT <XXXXXXX> | Gets the state of all inputs or sets the state of all outputs. | H = High L = Low X = No change |
| GIO+CNFG <XXXXXXX> | Sets the direction for the individual pins to input or outputs. | I = Input O = Output X = No change |

Examples

Get the status of all the inputs:

```
(GIO+STAT?)
```

Result:

```
(GIO+STAT! "LLLLLLL")
```

All inputs are low.

Set the status of the general purpose outputs:

```
(GIO+STAT "HXLHLLL")
```

Result:

Pins 1 and 4 are set to high; pin 2 has no change; Pins 2, 5, 6, and 7 are set to low.

Set pins 1, 2, and 6 to input and set pins 3, 4, 5, and 7 to output:

```
(GIO+CNFG "IIOOOIO")
```

Set pins 1 and 2 to output and ignore the rest:

```
(GIO+CNFG "OOxxxxx")
```

HIS—Lamp History

Retrieves a history of lamps installed in the projector, including the currently installed lamp.

Each entry indicates lamp identification as well as various usage statistics collected while the lamp was installed.

The list is in reverse chronological order—meaning the first entry describes the current lamp, followed by the next most recent lamp, and so on, up to a maximum of 50 total entries.

Commands

| Command | Description | Values |
|--|---|--|
| HIS? | Returns a list of entries in the lamp history. Each entry has the following format: <entry number> <install date> <serial #> <lamp type> <strikes> <failed strikes> <failed re-strikes> <unexpected lamp offs> <pre-installation hours> <total lamp hours> | <entry number> = Unique number identifying the entry <install date> = Date that the lamp entry was created <serial #> = Serial number of the lamp (an arbitrary string) <lamp type> = Type of lamp used |
| HIS+LMP1 HIS+LMP2 HIS+LMP3 HIS+LMP4 HIS+LMP5 HIS+LMP6 | Returns all the entries found in the lamp memory module. Each entry has the following format: <entry number> <install date> <serial #> <lamp type> <strikes> <failed strikes> <failed re-strikes> <unexpected lamp offs> <pre-installation hours> <total lamp hours> | <strikes> = Number of lamp strikes performed for this entry <failed strikes> = Number of failed strikes that occurred for this entry <failed re-strikes> = Number of times the lamp failed a re-strike for this entry <unexpected lamp offs> = Number of times the lamp unexpectedly turned off for this entry <pre-installation hours> = Number of hours that this lamp has been on, prior to being installed in the projector <total lamp hours> = Total number of hours (including the pre-installation hours) that the lamp has been on |

Examples

Return the list of all lamps that have been installed in the projector:

(HIS?)

Result:

```
(HIS!0000 "2015/05/19 09:37:50" "New_May15" "" 0094 0000 0000 0000 0153)
(HIS!0001 "2015/04/27 15:03:10" "NewA2_Mar30" "" 0343 0000 0000 0505 0513)
...
(HIS!0049 "2015/02/12" "Lamp4" "" 0000 0000 0000 0004 0000)
```

Return the list of entries in the Lamp A1 Lamp Memory Module:

(HIS+LMP1?)

Result:

```
(HIS+LMP1!0000 "2015/05/19 09:37:50" "New_May15" "" 0094 0000 0000 0000 0153)
```

ITP–Test Pattern

Displays a test pattern.

Commands

| Command | Description | Values |
|-----------------------|---|--|
| ITP <index> | Enables or disables test patterns. This command is only available if video electronics are on. | 0 = Off 1 = Grid 2 = Grey Scale 16 3 = Flat White 4 = Flat Grey 5 = Flat Black 6 = Checker 7 = 17 Point 8 = Edge Blend 9 = Color Bars 10 = Multi Color 11 = RGBW Ramp 12 = Horizontal Ramp 13 = Vertical Ramp 14 = Diagonal Ramp 15 = Square Grid 16 = Diagonal Grid 17 = Maximum Activity 18 = Prism/Convergence 21 = Boresight 22 = Convergence 23 = Integrator Rod 25 = Resolution Demo |
| ITP+FREQ <value> | Sets the frequency at which the internal test patterns are displayed. This command is only available if video electronics are on. | 24 to 500 60 (Default) |
| ITP+GREY <grey level> | Defines the shade of grey for the Flat Grey test pattern. This command is only available if video electronics are on. | 0 to 4095 2048 (Default) |
| ITP+RMPM <speed> | Defines the motion speed used for the Horizontal Ramp, Vertical Ramp, and Diagonal Ramp test patterns. This command is only available if video electronics are on. | 0 to 100 0 (Default) |
| ITP+RMPS <slope> | Defines the slope used for the Horizontal Ramp, Vertical Ramp, and Diagonal Ramp test patterns. | 1 to 5 1 (Default) |

| Command | Description | Values |
|-----------------------|---|---|
| | This command is only available if video electronics are on. | |
| ITP+RMPL <grey level> | Defines the starting (top/left) grey-level used for the Horizontal Ramp, Vertical Ramp, and Diagonal Ramp test patterns. This setting has no effect when the ramp is moving (such as ITP+RMPM is non-zero). This command is only available if video electronics are on. | 0 to 4095 0 (Default) |
| ITP+GRDP <pitch> | Defines the spacing between lines used for the Square Grid and Diagonal Grid test patterns. This command is only available if video electronics are on. | 2 to 127 32 (Default) |
| ITP+GRDC <0 1> | Enables multi-color or white-on-black grids for the Square Grid or Diagonal Grid test patterns. This command is only available if video electronics are on. | 0 = White-on-black 1 = Multi-color (Default) |
| ITP+GRDM <0 1> | Enables moving or static grid for the Square Grid or Diagonal Grid test patterns. This command is only available if video electronics are on. | 0 = Static (Default) 1 = Moving |

KEN—Keypad Enable

Enables or disables the IR or wired keypad sensors.

Commands

| Command | Description | Values |
|------------------|--|---|
| KEN+FRNT <0 1> | Enables or disables the IR keypad sensor. (Saved value) | 0 = Disables the front IR keypad sensor 1 = Enables the front IR keypad sensor (Default) |
| KEN+REAR <0 1> | Enables or disables the rear IR keypad sensor. (Saved value) | 0 = Disables the rear IR keypad sensor 1 = Enables the rear IR keypad sensor (Default) |
| KEN+WIRE <0 1> | Enables or disables the wired keypad sensor. (Saved value) | 0 = Disables the wired keypad jack 1 = Enables the wired keypad jack (Default) |
| KEN+HDBT <0 1> | Enables IR over HDBaseT. (Saved value) | 0 = Disables IR over HDBaseT (Default) 1 = Enables IR over HDBaseT |

Examples

Get the current wired jack enabled state:

(KEN+WIRE?)

Disable the front IR sensor:

(KEN+FRNT 0)

Disable the rear IR sensor:

(KEN+REAR 1)

LCB–Lens Motor Calibration

Calibrates all of the lens motors.

This command is only enabled when the projector is on.

Commands

| Command | Description | Values |
|------------|---|--------|
| LCB 1 | Runs calibration on all lens motors. | — |
| LCB+HOME | Moves all lens motors back to the center flag for each axis and sets their respective positions to 0. | — |
| LCB+ZOOM 1 | Calibrates the zoom motor. | — |

Examples

Start calibration:

(LCB 1)

Move the lens back to the home position:

(LCB+HOME)

LHO–Lens Horizontal Position Adjustment

Sets the lens horizontal location to an absolute position.

This command is only available when the projector is on.

Commands

| Command | Description | Values |
|----------------|---|--------|
| LHO <position> | Adjusts the horizontal location of the lens to the specified position. The position is persistent across AC cycles. | |

| Command | Description | Values |
|---------|---|--------|
| LHO?m | Returns the minimum and maximum range of the zoom axis based on the last lens calibration performed. The returned range is persistent across AC cycles. (Read-only) | — |

Examples

Move the lens to position 500 on the horizontal axis:

(LHO 500)

LMV–Lens Move

Adjusts all aspects of the lens position using a single command.

Commands

| Command | Description | Values |
|---|--|---|
| LMV <horizontal> <vertical> <zoom> <focus> | Moves the lens to an absolute position as specified by each of the four arguments. | Minimum and maximum of each axis = Dependent on the projector and the installed lens Maximum horizontal range = -1600 to 1600 Maximum vertical range = -1600 to 1600 |
| LMV+HSTP <relative steps> | Moves the horizontal motor a relative number of steps. | negative steps = Moves the display left positive steps = Moves the display right The maximum absolute value is dictated by the current location of the motor and the range of the axis (see the LMV command above). |
| LMV+VSTP <relative steps> | Moves the vertical motor a relative number of steps. | negative steps = Moves the display down positive steps = Moves the display up The maximum absolute value is dictated by the current location of the motor and the range of the axis (see the LMV command above). |
| LMV+FSTP <relative steps> | Moves the focus motor a relative number of steps. | negative steps = Focuses inward positive steps = Focuses outward The maximum absolute value is dictated by the current location of the motor and the range of the axis (see the LMV command above). |
| LMV+ZSTP <relative steps> | Moves the zoom motor a relative number of steps. | negative steps = Makes the display larger positive steps = Makes the display smaller |

| Command | Description | Values |
|-----------------------|--|--|
| | | The maximum absolute value is dictated by the current location of the motor and the range of the axis (see the LMV command above). |
| LMV+HRUN <-1 0 1> | Starts and stops the horizontal motor. | -1 = Moves the display left 0 = Stops the motor 1 = Moves the display right |
| LMV+VRUN <-1 0 1> | Starts and stops the vertical motor. | -1 = Moves the display down 0 = Stops the motor 1 = Moves the display up |
| LMV+FRUN <-1 0 1> | Starts and stops the focus motor. | -1 = Moves the display inward 0 = Stops the motor 1 = Moves the display outward |
| LMV+ZRUN <-1 0 1> | Starts and stops the zoom motor. | -1 = Makes the display larger 0 = Stops the motor 1 = Makes the display smaller |

Examples

Set the lens to H:1000, V:1500, Z:500, F:500:

```
(LMV 1000 1500 500 500)
```

Start to move horizontal motor toward positive max position:

```
(LMV+HRUN 1)
```

Stop the vertical motor:

```
(LMV+VRUN 0)
```

Start moving the zoom motor towards the negative max position:

```
(LMV+ZRUN -1)
```

Move the horizontal motor 45 steps in the positive direction:

```
(LMV+HSTP 45)
```

LOE–Video Loop Out Enable

Enables or disables video loop out on the THIC, 3GIC, and TDPIC cards.

Commands

| Command | Description | Values |
|-------------|---|---|
| LOE <0 1> | Enables or disables video loop out. This command is only available if video electronics are on and it only applies to | 0 = Disables video loop out 1 = Enables video loop out (Default) |

| Command | Description | Values |
|---------|--|--------|
| | option cards that have loop out. (Saved value) | |

LOP–Lamp Selection

Selects a lamp to turn on or off while in limited power mode.

If LOP or LOP+MULT try to enable any lamps that are not installed, the command fails.

Commands

| Command | Description | Values |
|------------------|--|--|
| LOP <lamp> | Selects a lamp to turn on or off while in limited power mode. This command is disabled while in the Power On state. (Saved value) | 1 = Lamp A1 (Default) 2 = Lamp A2 3 = Lamp A3 4 = Lamp B1 5 = Lamp B2 6 = Lamp B3 |
| LOP+MULT <value> | Selects which lamps are meant to be active. At least one lamp must be active. This command is only available in full power mode. (Saved value) Valid bitmapped fields: <ul style="list-style-type: none"> • bit0 = Lamp A1 • bit1 = Lamp A2 • bit2 = Lamp A3 • bit3 = Lamp B1 • bit4 = Lamp B2 • bit5 = Lamp B3 | value = A bitmapped field ranging from 1 to 63 63 = All lamps are active (Default) |

LOP+MULT valid values

The model of projector determines the number of lamps in the projector.

| Value | Lamp A1 (bit0) | Lamp A2 (bit1) | Lamp A3 (bit2) | Lamp B1 (bit3) | Lamp B2 (bit4) | Lamp B3 (bit5) |
|-------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1 | On | Off | Off | Off | Off | Off |
| 2 | Off | On | Off | Off | Off | Off |
| 3 | On | On | Off | Off | Off | Off |
| 4 | Off | Off | On | Off | Off | Off |
| 5 | On | Off | On | Off | Off | Off |
| 6 | Off | On | On | Off | Off | Off |

| Value | Lamp A1 (bit0) | Lamp A2 (bit1) | Lamp A3 (bit2) | Lamp B1 (bit3) | Lamp B2 (bit4) | Lamp B3 (bit5) |
|--------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| 7 | On | On | On | Off | Off | Off |
| 8 | Off | Off | Off | On | Off | Off |
| 9 | On | Off | Off | On | Off | Off |
| 10 | Off | On | Off | On | Off | Off |
| 11 | On | On | Off | On | Off | Off |
| 12 | Off | Off | On | On | Off | Off |
| 13 | On | Off | On | On | Off | Off |
| 14 | Off | On | On | On | Off | Off |
| 15 | On | On | On | On | Off | Off |
| 16 | Off | Off | Off | Off | On | Off |
| 17 | On | Off | Off | Off | On | Off |
| 18 | Off | On | Off | Off | On | Off |
| 19 | On | On | Off | Off | On | Off |
| 20 | Off | Off | On | Off | On | Off |
| 21 | On | Off | On | Off | On | Off |
| 22 | Off | On | On | Off | On | Off |
| 23 | On | On | On | Off | On | Off |
| 24 | Off | Off | Off | On | On | Off |
| 25 | On | Off | Off | On | On | Off |
| 26 | Off | On | Off | On | On | Off |
| 27 | On | On | Off | On | On | Off |
| 28 | Off | Off | On | On | On | Off |
| 29 | On | Off | On | On | On | Off |
| 30 | Off | On | On | On | On | Off |
| 31 | On | On | On | On | On | Off |
| 32 | Off | Off | Off | Off | Off | On |
| 33 | On | Off | Off | Off | Off | On |
| 34 | Off | On | Off | Off | Off | On |
| 35 | On | On | Off | Off | Off | On |
| 36 | Off | Off | On | Off | Off | On |
| 37 | On | Off | On | Off | Off | On |
| 38 | Off | On | On | Off | Off | On |
| 39 | On | On | On | Off | Off | On |

| Value | Lamp A1 (bit0) | Lamp A2 (bit1) | Lamp A3 (bit2) | Lamp B1 (bit3) | Lamp B2 (bit4) | Lamp B3 (bit5) |
|-------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 40 | Off | Off | Off | On | Off | On |
| 41 | On | Off | Off | On | Off | On |
| 42 | Off | On | Off | On | Off | On |
| 43 | On | On | Off | On | Off | On |
| 44 | Off | Off | On | On | Off | On |
| 45 | On | Off | On | On | Off | On |
| 46 | Off | On | On | On | Off | On |
| 47 | On | On | On | On | Off | Off |
| 48 | Off | Off | Off | Off | On | On |
| 49 | On | Off | Off | Off | On | On |
| 50 | Off | On | Off | Off | On | On |
| 51 | On | On | Off | Off | On | On |
| 52 | Off | Off | On | Off | On | On |
| 53 | On | Off | On | Off | On | On |
| 54 | Off | On | On | Off | On | On |
| 55 | On | On | On | Off | On | On |
| 56 | Off | Off | Off | On | On | On |
| 57 | On | Off | Off | On | On | On |
| 58 | Off | On | Off | On | On | On |
| 59 | On | On | Off | On | On | On |
| 60 | Off | Off | On | On | On | On |
| 61 | On | Off | On | On | On | On |
| 62 | Off | On | On | On | On | On |
| 63 | On | On | On | On | On | On |

Examples

Use lamp A1 in limited power mode:

(LOP 1)

Make all lamps active in the projector:

(LOP+MULT 63)

Make lamp A1 and lamp B1 active:

(LOP+MULT 9)

LPL–Lamp Life

Sets the expected lamp life in hours. If the lamp run time exceeds this value, a warning is displayed in the status system.

The lamp run time is equal to the lamp's original lamp hours plus the amount of time it has been on while installed in the projector.

Commands

| Command | Description | Values |
|-------------|--|--|
| LPL <hours> | Sets the number of hours before a warning is displayed in the status system about the lamp needing to be replaced. (Saved value) | Any positive number 0 = Disables the lamp end-of-life check (Default) |

Examples

LPP–Lamp Power

Sets the amount of power going to the lamp.

Commands

| Command | Description | Values |
|-------------|---|---|
| LPP <power> | Sets the power going to the lamp, in watts. (Saved value) | power = Number of watts to run the lamp at This is dependent on the type of lamp being used. |
| LPP?m | Returns the minimum and maximum power allowed for the current lamp. (Read-only) | — |

Examples

Set the light source to 9:

```
(LPP 0)
```

LVO–Lens Vertical Position Adjustment

Sets the lens vertical location to an absolute position.

This command is only enabled when the projector is on.

Commands

| Command | Description | Values |
|----------------|---|---|
| LVO <position> | Adjusts the vertical location of the lens to the specified position. This position is persistent across AC cycles. (Saved value) | position = A numerical value that is subject to the range returned in LVO?m |
| LVO?m | Returns the minimum and maximum range of the vertical axis based on the last lens calibration performed. The returned range is persistent across AC cycles. (Read-only) | — |

Examples

Move the lens to position 500 on the vertical axis:
(LVO 500)

NET—Network Setup

Modifies the network setup for this device.

By default, DHCP support is turned on.

Commands

| Command | Description | Values |
|-----------------------------|---|--|
| NET <ip> <subnet> [gateway] | Sets the projector network settings as specified. (Saved value) | All three arguments are strings and the gateway is optional. |
| NET+DGRP <group> | Sets the device group name for the projector. (Saved value) This can help simplify broadcast searching by organizing projectors into groups, particularly if a large number of projectors are on the same local network. | — |
| NET+DHCP 1 | Enables DHCP. To turn off DHCP support, switch to a static IP by using the base command. (Saved value) | — |
| NET+ETH0? | Returns the projector IP address. (Read-only) | — |
| NET+GATE? | Returns the projector gateway address. (Read-only) | — |
| NET+HOST <name> | Sets the name for the projector. With this set, devices on the same network subnet as the projector can connect to it using the name: <name>.local. (Saved value) | — |
| NET+MAC0? | Returns the MAC address of the Ethernet port. (Read-only) | — |
| NET+PORT? | Returns the TCP port used for the Christie serial protocol over Ethernet. (Read-only) | 1024 to 49151 (with some exceptions) |

| Command | Description | Values |
|-----------|--|--|
| | | 3003 = Reserved on the projector and cannot be used for the Christie serial protocol |
| NET+SUB0? | Returns the projector netmask. (Read-only) | — |

Examples

Set the static IP address to 192.168.1.100, with a netmask of 255.255.255.0, and no gateway:

```
(NET "192.168.1.100" "255.255.255.0")
```

Turn on DHCP support:

```
(NET+DHCP 1)
```

OSD—On Screen Display

Displays or hides the on-screen display.

Commands

| Command | Description | Values |
|-------------|--|---|
| OSD <0 1> | Enables or disables the on-screen display. | 0 = Hides the on-screen display 1 = Displays the on-screen display |

OTR—Output Resolution

Returns the maximum number of columns and rows for the display.

Commands

| Command | Description | Values |
|-----------|---|--------|
| OTR+HRES? | Returns the maximum number of columns for the display. Always returns 4096. (Read-only) | — |
| OTR+VRES? | Returns the maximum number of rows for the display. Always returns 2160. (Read-only) | — |

PNG–Ping

Returns basic projector information to the user, including the type of device and main software version.

Commands

| Command | Description | Values |
|---------|--|---|
| PNG? | Returns basic projector information (Read-only): <type> <major> <minor> <build> where: <ul style="list-style-type: none"> • <type> = Type of projector • <major>, <minor>, <build> = Software version | <type> valid values: 54 = D4K-60, Mirage 4K 55 = Boxer 4K30 |

Examples

Send a ping to a 4K projector with v1.1.0 software:

(PNG?)

Result:

(PNG!054 001 001 000)

PRO–Profile

Allows selection of a local profile on the projector.

Commands

| Command | Description | Values |
|---------|---|---|
| PRO?L | Returns the list of available local profiles. (Read-only) | — |
| PRO x | Selects local profile x and applies the profile to the projector. Selecting an empty profile does not do anything. | 0 = Default 1 = <custom 1> 2 = <custom 2> 3 = <custom 3> 4 = <custom 4> |

PWR—Power

Changes the power state of the product.

Commands

| Command | Description | Values |
|------------------|--|---|
| PWR <0 1> | Turns the projector on or off. | 0 = Turns the projector off 1 = Turns the projector on |
| PWR+ELEC <0 1> | Keeps video electronics on in standby, regardless of lamp state. | 0 = Disables electronics override 1 = Enables electronics override |
| PWR? | Returns the current power state of the projector. (Read-only) | 000 = Standby 001 = On 010 = Cooling down 011 = Warming up |

Examples

Return the power setting for the projector:

(PWR?)

Turn on the projector:

(PWR 1)

Turn off the projector:

(PWR 0)

RAL—Remote Access Level

Sets the default remote serial protocol access level for any of the serial ports.

Commands

| Command | Description | Values |
|------------------|--|---|
| RAL <value> | Sets the access level on all Ethernet port. (Saved value) | 0 = No Access—Disables the port 1 = Login Required—Sets read-only access until a separate login is performed 2 = Free Access—Executes commands at the operator level unless a separate login is performed (Default) |
| RAL+PRTA <value> | Sets the access level for the RS232-IN port. (Saved value) | |

Examples

Set port to Login Required:

```
(RAL+PRTC 1)
```

SHU–Shutter

Opens and closes the shutter.

The command can also be used check if the shutter is currently opened or closed. It can also return an incorrect result if the shutter was manually opened or closed.

Commands

| Command | Description | Values |
|-------------|--------------------------------|---|
| SHU? | Gets the state of the shutter. | — |
| SHU <0 1> | Opens or closes the shutter. | 0 = Opens the shutter 1 = Closes the shutter (Default) |

Examples

Get the state of the shutter.

```
(SHU?)
```

Result:

```
(SHU!0)
```

Indicates the shutter is open.

Open the shutter.

```
(SHU 0)
```

Close the shutter.

```
(SHU 1)
```

SIN–Select Input

Selects the active input.

Commands

| Command | Description | Values |
|-------------|---|--|
| SIN <input> | Selects a set of inputs based on the selected port configuration. This command is only available if video electronics are on. (Saved value) | The list of available values is dynamic. Run SIN?L to retrieve the currently available list. |
| SIN?L | Returns a list of available inputs to select based on the selected port configuration. (Read-only) | — |

| Command | Description | Values |
|-------------------|--|--|
| SIN+PORT <config> | Select an input port configuration to use. This command is only available if video electronics are on. (Saved value) | 1 = One-Port (Default) 2 = Two-Port 3 = Four-Port Columns 4 = Four-Port Quadrants |

Examples

Use four DDICs to display a Four-Port Quadrant image:

```
(SIN+PORT 4)
```

Result:

```
($SIN 3)
```

Try to select an unavailable input because there is only one TDPIC in the projector:

```
(SIN+PORT 4)
```

Result:

```
($SIN 1)
```

SOR–Screen Orientation

Selects the orientation of the displayed image.

Commands

| Command | Description | Values |
|-------------|---|--|
| SOR <value> | Changes the orientation of the displayed image. This command is only available if video electronics are on. (Saved value) | 0 = Front projection (Default) 1 = Rear projection 2 = Front projection inverted 3 = Rear projection inverted |

SPS–Splash Screen

Changes the characteristics of the displayed splash screen when no signal is present.

Commands

| Command | Description | Values |
|------------------|--|---|
| SPS+COLR <value> | Changes the background color of the splash screen. This command is only available when video electronics are on. (Saved value) | 1 = Red 2 = Green 3 = Blue 7 = Black (Default) |

SST–Projector Status

Returns status information about the projector in read-only mode.

Status items for Boxer 4K are organized in the following groups:

| Status group | Description |
|--------------------------|---|
| Alarm (SST+ALRM) | Displays any status items not in the OK state. This group contains a dynamic number of status items. If everything in the projector is OK, this group is empty. |
| Configuration (SST+CONF) | Displays values and fault conditions for configuration-related items. |
| System (SST+SYST) | Displays values and fault conditions relating to the system and its health. |
| Signal (SST+SIGN?) | Displays values and fault conditions relating to the video signal status. |
| Lamp (SST+LAMP?) | Displays values and fault conditions for lamp-related items. |
| Version (SST+VERS?) | Displays values and fault conditions related to software and hardware versions. |
| Temperature (SST+TEMP?) | Displays values and fault conditions for temperature-related items. |
| Cooling (SST+COOL?) | Displays values and fault conditions related to cooling and fans. |
| Serial (SST+SERI?) | Displays values and fault conditions related to hardware serial numbers. |

For more information about the status groups, items, and their state, see the *Boxer 4K Status System Guide* (P/N: 020-101695-XX).

Commands

| Command | Description | Values |
|---------------------|--|--|
| SST? | Returns all status items. Each item is listed in the following format: (SST+<group>!<index> <state> "<value>" "<description>") | <group> = Provides the four letter identifier of the Status System group the item belongs to <index> = Indicates the index value of the status item within the group <state> = Indicates the condition of the status item: 000 = No errors or warnings 001 = Warning 002 = Error <value> = Presents the value of the status item <description> = Provides the descriptive name of the status item |
| SST+<group>? | Returns all status items within the specified four-letter group identifier. | |
| SST+<group>?<index> | Returns a specific status item within the specified four-letter group identifier. | |

Examples

Display the temperatures:

```
(SST+TEMP?)
```

Result:

...

```
(SST+TEMP!000 000 "21 °C" "Integrator Rod Temperature (Temp 1)")
(SST+TEMP!002 000 "21 °C" "Air Intake Temperature (Temp 2)")
(SST+TEMP!003 000 "21 °C" "Lamp Exhaust Temperature (Temp 3)")
(SST+TEMP!020 000 "28 °C" "Environmental Board Temperature") ...
```

Return item 20 of the temperature group:

```
(SST+TEMP?20)
```

Result:

```
SST+TEMP!020 000 "28 °C" "Environmental Board Temperature"
```

SZP—Size and Position

Changes the aspect ratio of the display.

By default, the projector maintains the aspect ratio and scale to either full width or full height (whichever edge is reached first). 16:9 content is scaled to full height with pillar boxes.

Commands

| Command | Description | Values |
|-------------|--|---|
| SZP <value> | Changes the aspect ratio of the display. This command is only available if video electronics are on. (Saved value) | 0 = Allows the projector to determine when to scale video (Default) 1 = None 2 = Full size (stretch horizontally and vertically) 3 = Full width (stretch horizontally) 4 = Full height (stretch vertically) |

TMD—Time and Date

Sets the date and time in the real-time clock.

Commands

| Command | Description | Values |
|-----------------|------------------------------|--|
| TMD+TIME <time> | Sets the time for the clock. | <time> = String in the following format: hh:mm:ss |
| TMD+DATE <date> | Sets the date for the clock. | <date> = String in the following format: YYYY/MM/DD |

Examples

Get the local time:

```
(TMD+TIME?)
```

Result:

```
(TMD+TIME! "19:45:23")
```

Set the time to 3pm:

```
(TMD+TIME "15:00:00")
```

Result:

```
(65535 00000 FYI00916 "Setting Time to 15:00:00")
```

Set the date to January 17th, 2016:

```
(TMD+DATE "2016/01/17")
```

Result:

```
(65535 00000 FYI00916 "Setting Date to 2016/01/17")
```

UID—User ID

Changes the access level of the currently connected session.

Commands

| Command | Description | Values |
|------------------------------|---|--------|
| UID <username> <password> | Logs in using the specified user name and password. | — |

Examples

Display the current logged in user and their access level:

```
(UID?)
```

Log in as service using the default password:

```
(UID "service" "service")
```

Log out the current user:

```
(UID)
```

WRP—Geometry Correction

Controls warping settings.

Basic warping/keystoning can be configured using the projector's side panel display, on-screen display or web interface. To add complex or advanced warping/keystone configurations, use the Twist (AutoCal) application.

Commands

| Command | Description | Values |
|------------------|---|--|
| WRP+SLCT? | Retrieves a list of available warp maps. (Read-only) | — |
| WRP+SLCT <value> | Changes the warp map to use on the projector. This command is only available if video electronics are on. (Saved value) | 0 = Turns off warping 1 to 4 = Selects one of four warp maps, if available 11 = Selects onboard keystone correction mode |

ZOM—Lens Zoom Position Adjustment

Sets the lens zoom.

This command requires a zoom motor on the lens for it to work and is only available when the projector is on.

Commands

| Command | Description | Values |
|----------------|---|---|
| ZOM <position> | Adjusts the lens zoom to the specified position. The position is persistent across AC cycles. | position = A numerical value that is subject to the range returned in ZOM?m |
| ZOM?m | Returns the current minimum and maximum values for the zoom position based on the last lens calibration performed. The returned range is persistent across AC cycles. | — |

Examples

Get the current minimum and maximum values for the zoom axis:

```
(ZOM?m)
```

Move the lens to position 500 for the zoom motor:

```
(ZOM 500)
```

Asynchronous messages

The projector can generate some asynchronous messages.

The following lists examples of each message, including why and when they are generated. Bolded and underlined text indicates a fixed part of the message.

| Type | Message | Description |
|------------------|---|---|
| Card Detected | (65535 00000 FYI01901 "Card x detected") | Triggered when a new card is detected in slot X while the video electronics are already on. |
| Card Removed | (65535 00000 FYI01901 "Card x removed") | Triggered when a card is removed from slot X while the video electronics are on. |
| Date/Time | (65535 00000 FYI00916 "Setting Date to 2015/05/20") | Generated when the date or time are changed, respectively. |
| | (65535 00000 FYI00916 "Setting Time to 00:00:00") | |
| Factory defaults | (65535 00000 FYI00919 "All settings have been restored to their factory defaults. Reboot is required to take effect.") | Generated when a factory default has been performed on the projector. |
| Networking | (65535 00000 FYI00915 "Configured network: IP:192.168.228.6 Mask: 255.255.252.0 Gateway:192.168.228.1") | Generated when the network settings have changed. Network settings can change due to a number of specific events such as: <ul style="list-style-type: none"> • Operator changes the network settings (through any of the standard interfaces). • DHCP lease is renewed. • Network cable was unplugged or plugged in. |
| Status | (65535 00000 FYI00000 "(SST+LAMP?001) Lamp Hours = 00:00 (h:m)") | Generated when a status item changes from: <ul style="list-style-type: none"> • An error or warning state to an OK state. • An OK or error state to a warning state. • An OK or warning state to an error state. |
| | (65535 00000 ERR00000 "System Warning: (SST+LAMP?001) Lamp Hours = N/A") | |
| | (65535 00000 ERR00000 "System Error: (SST+VERS?003) Image Processor HW Version = Detection Fault") | |

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