

Control Programming Tips for Pulse Projectors

DATE 2/07/2020

DOCUMENT VER. 1

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Introduction

The purpose of this guide is to provide programmers with relevant information regarding the setup and configuration of Pulse platform projectors (which include; Medea, Bragi, Balder, Loki and Wodan), so that they can better plan and deploy their control program into systems using Barco Residential projectors.

This document focuses on firmware release 1.10.xx, the current firmware at the time of writing. It has been generalized, therefore, some functionality and/or menu structures may differ slightly from model to model.

Firmware: Updates and General Information

We recommend using the latest firmware release for maximum functionality and video performance. Please read the firmware release notes, update guide and historic notes (below), before commencing any updates;

[Download: Firmware Release\(s\) for Medea, Balder, Loki](#)

[Download: Firmware Release\(s\) for Bragi](#)

[Download: Firmware Release\(s\) for Wodan](#)

[Jump to: Firmware and Control Driver compatibility chart](#)

Note that if you are updating from older firmware versions, you may be required to re-program some aspects of the control system and update the control driver;

Updating Historic Firmware to Release 1.6.xx or Greater

This firmware update included two major changes that impact the control system integration;

- **Color Gamut Remapping**

This feature enables the projector to detect whether the incoming video signal is SDR (Rec.709) or HDR (DCI/P3) and automatically switch to the correct color gamut without the need of a control system (required in earlier releases). Placing the projector into RealColor mode “HDR” enables this feature. Note that the RealColor P7 mode will continue to display “HDR”, however when SDR (Rec.709) content is detected, the color space will adjust accordingly.

For integrators looking to create separate calibration profiles for SDR and HDR content, you must select RealColor P7 mode “HDR” and “Rec.709” (SDR) via the control system. The projector can be used to generate a flag for this information, automating the end-user experience. [Jump to: RealColor P7 Modes](#)

Historically the projector may have been recalling different RealColor P7 Modes and will need to be reprogrammed in accordance with how the integrator wishes to use the system (most commonly the automated version; RealColor P7 Mode “HDR”).

- **Automatic HDR Screen Luminance Adjustment**

This feature enables the projector to adjust the screen luminance automatically based on the content metadata (Mastering Luminance) to optimize the HDR image quality without the need for control system intervention.

Historically the control system would have entered an integrator / programmer defined value for each of the different mastering luminance levels (1,000 nits, 2,000 nits and 4,000 nits).

Now the integrator enters a single value (calibrated peak white) and the projector will use an algorithm to adjust the screen luminance without the need for the control system. Therefore, the old programming for this feature will need to be altered so that the value (calibrated peak white) remains static.

Firmware and Control Driver compatibility chart

Please check the control driver compatibility with the firmware release you are using. This will insure you have all the latest functionality available and that there are no conflicts between the projector configuration and the control system as highlighted within the previous section;

Firmware Version	Control Platform	Document Reference	Control Driver Release Version	MyBarco Version History #
1.10.xx	Control4	R3306815	<i>Coming Soon</i>	<i>Coming Soon</i>
1.10.xx	Crestron	R3306813	<i>Coming Soon</i>	<i>Coming Soon</i>
1.10.xx	Savant	R3306814	<i>Coming Soon</i>	<i>Coming Soon</i>

1.9.xx	Control4	R3306815	<i>Coming Soon</i>	<i>Coming Soon</i>
1.9.xx	Crestron	R3306813	<i>Coming Soon</i>	<i>Coming Soon</i>
1.9.xx	Savant	R3306814	<i>Coming Soon</i>	<i>Coming Soon</i>

1.8.xx	Control4	R3306815	Version 19	v19.0.0.0
1.8.xx	Crestron	R3306813	1.5	v1.5.0.0
1.8.xx	Savant	R3306814	1.9	v1.9.0.0

1.6.xx	Control4	R3306815	Version 19	v19.0.0.0
1.6.xx	Crestron	R3306813	1.5	v1.5.0.0
1.6.xx	Savant	R3306814	1.9	v1.9.0.0

Connecting to Pulse services

Network

If the projector is on a network, TCP/IP can be used to connect to Pulse services. The service is available on port number 9090.

Serial Port

A serial cable can be connected to the projector in order to access the Pulse services.

Connect the projector and host using a standard serial cable with 9-pin female to the host, and 9-pin male to the projector. Pin 2 connects to pin 2, pin 3 connects to pin 3 and pin 5 connects to pin 5.

RS232 Communication Parameters

Baud Rate	19200
Parity	None
Data Bits	8
Stop Bits	1
Flow Control	None

Interfacing with Prospector

General Information

The recommended interface for setting up Pulse platform projectors is our web-based interface called Prospector.

To access Prospector, connect to the same network as the projector and enter its IP address into a web browser (preferably Google Chrome) followed by port number 9999

Example: 192.168.1.100:9999

Within Prospector many settings can be applied and manipulated to configure the projector. This guide will explain only those settings necessary for the purpose of integrating a control system most efficiently.

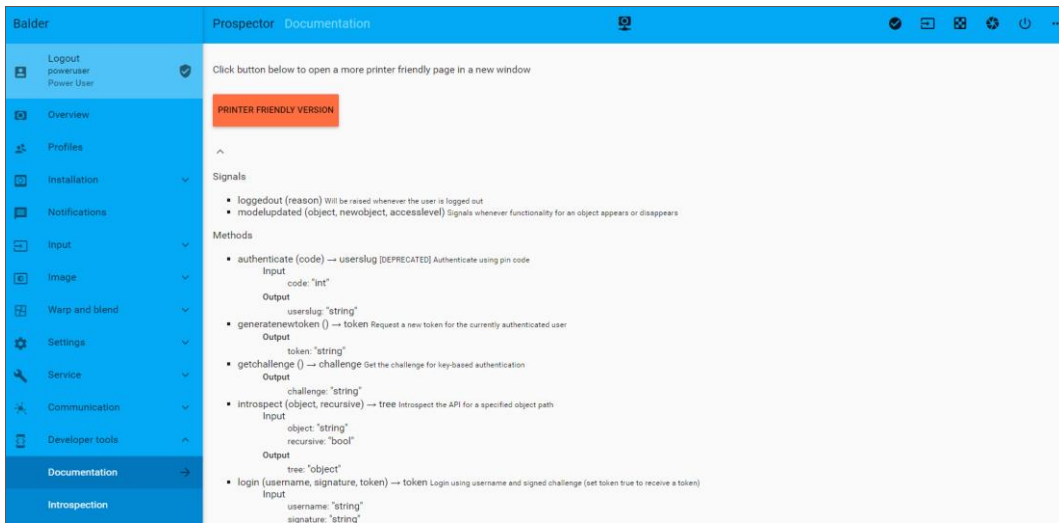
If you require more information on general configuration of the projector, please download our [Integration Guide](#).

Internal Documentation - Pulse API

Within the Prospector web interface, it is possible to extract the Pulse API: JSON RPC Reference documentation. This provides more detailed control information, supplementing this document.

Note: The documentation created is specific to the projector model and its firmware revision.

- Navigate to the Developer Tools >>> Documentation Menu (this menu will take a few moments to refresh).

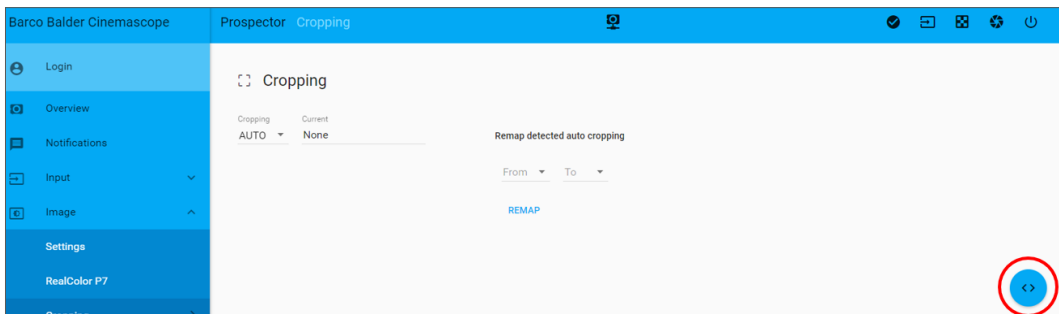


Prospector Menu: Developer Tools >>> Documentation

JSON RPC Console

It is possible to view and test JSON commands from within Prospector, which can then be extracted and incorporated into a control system. The following steps highlight how to do this;

- Within Prospector, most menu pages include a JSON RPC Console output menu (located in the bottom right-hand corner), as highlighted below.

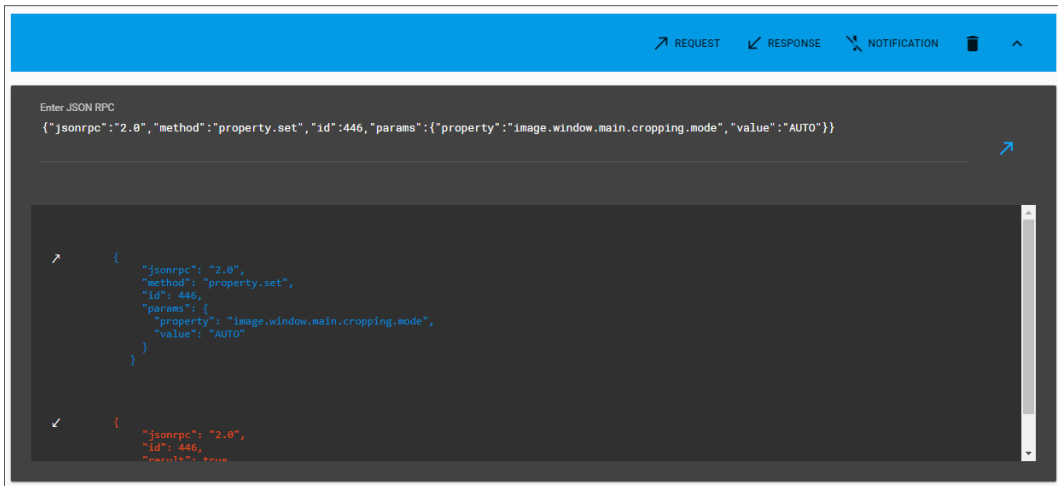


Prospector: JSON Commands

- Clicking the < > button will open the JSON RPC output console options menu, click the highlighted symbol to expand this menu so that you can see the dialog window.
- Click the button once more to re-open the banner menu and filter which operations you wish to view / hide.



Prospector: JSON Commands



Prospector: JSON Commands (Dialog Window)

Note: At the rear of this guide is a [JSON Command Library](#), listing the commands you are most likely to require for your control integration.

Subscriptions and Get Commands

It is possible to subscribe to or get information from variables within the projector, which can be used as a “trigger” to action commands either internal to the projector, or externally.

Subscriptions will update the control system each time the variable changes. However, be aware that you must re-subscribe to these variables each time the projector experiences a soft or hard power cycle or following it's exit from Standby ECO Mode.

Example:

Request: `{"jsonrpc": "2.0", "method": "property.get", "params": {"property": "system.state"}}`

Request: `{"jsonrpc": "2.0", "method": "property.subscribe", "params": {"property": "system.state"}}`

Response: `{"jsonrpc": "2.0", "result": "ready"}`

[Jump To: Subscription & Get Commands](#)

Power States

Power (System) States;

ON	Projector is booted up and the light source is ON
Conditioning	Transition state from Ready Mode to ON as light source conditions ready for use
Deconditioning	Transition state from ON to Ready Mode as light source deconditions following use
Ready Mode	Projector is booted, ready for use, but the light source is OFF
Standby Eco Mode	Light source is OFF, and the projector electronics are powered down

Ready Mode

In Ready Mode (the default standby mode) some internal components will remain functional (fans, pumps etc.); this creates background noise which can present a problem in multi-purpose rooms.

Standby ECO Mode

Standby ECO Mode is an alternative mode that turns off all internal components (with exception of a wake-up controller), after the projector has been idling in Ready Mode for a user defined period (3mins to 2hrs).

Standby ECO Mode can be enabled via Prospector;

- Navigate to the Settings >>> Power Menu
- Enable Standby ECO Mode
- Define the period after which the projector will enter Standby ECO Mode (default will be set to 15mins)

Should you wish to bypass the Standby ECO Mode timer you can do this by forwarding the projector the following command(s) once the projector has entered Ready Mode;

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"system.eco.enable","value":true}}
{"jsonrpc":"2.0","method":"system.gotoeco","params":{}}
```

Once a projector has entered Standby ECO Mode, special handling is required to wake the projector. This can be done by one of the four following methods;

- Send a [Wake on LAN \(WOL\)](#) request, supplying the projectors HW (MAC) address (which can be accessed via the Communications >>> Network Menu). By default, this will wake the projector into Ready Mode.
- Send an IR POWER ON command.
- Use the power button on the projectors integrated keypad.
- Send a special command on the RS232 serial port (see over page).

Waking up the projector using the serial port, send the following ASCII characters:

- For Standby ECO Mode to ON, use :POWR1\r
- For Standby ECO Mode to Ready mode, use :STBY1\r

If you wish to alter the default power state the projector enters following a reboot and/or waking from Standby ECO Mode (regardless of power on mechanism), you can do this by entering the following commands into the [JSON RPC Console](#):

```
{"jsonrpc": "2.0", "method": "property.set", "params": {"property": "system.initialstate", "value": "on"}}
{"jsonrpc": "2.0", "method": "property.set", "params": {"property": "system.initialstate", "value": "ready"}}
```

The first command ensures that Standby ECO Mode is enabled. If this command is not set and Standby ECO Mode is disabled then the unit will not enter Standby ECO Mode.

Power (System) Status Feedback

As described earlier, you can ‘Get’ or ‘Subscribe’ to the projectors power state by sending the below JSON request via the control system. This information can be used for automation, such as projector lift mechanisms.

```
Request: {"jsonrpc": "2.0", "method": "property.get", "params": {"property": "system.state"}}
Request: {"jsonrpc": "2.0", "method": "property.subscribe", "params": {"property": "system.state"}}
Response: {"jsonrpc": "2.0", "result": "ready"}
```

Reboot Command

It may be desired to include a reboot command within a “service/maintenance” menu of the control platform, which forces the projector to perform a soft power cycle.

This can be achieved by forwarding the following two commands;

```
{"jsonrpc": "2.0", "method": "authenticate", "params": {"code": "292920"}}
{"jsonrpc": "2.0", "method": "system.reboot"}
```

The first command places the projector into “Power User” mode, required to perform the reboot, the second command being the reboot command. The reboot sequence will take approximately 3 - 4 minutes.

[Jump To: Power Commands](#)

Profiles & Pre-sets

Introduction

Within Prospector it is possible to save several setting “domains” within a Profile. These can then be recalled as either a Profile or assigned to a Pre-set.

An example use case for how these can be used is;

- Day or Night-time viewing modes for environments with ambient light

There is no differentiation between a Profile and a Pre-set, only that a control system specialist can program the control system to recall up to 30 pre-sets in advance of the installation. The system integrator can then create their desired Profile configurations on-site and assign them to the relevant Pre-set for the control system to recall.

Recalling Profiles

Profiles can be recalled using the following JSON command;

```
{"jsonrpc":"2.0","method":"profile.activateprofile","params":["Insert Profile Name"]}
```

Note: Profile names are case sensitive and may contain spaces and special characters.

Recalling Pre-sets

Pre-sets can be recalled using the following JSON command;

```
{"jsonrpc":"2.0","method":"profile.activatepreset","id":16902,"params":2}
```

Note: You can assign up to 30 Profiles to Pre-sets, the value range is 0 - 29.

It is possible to create more than 30 Profiles (should 30 Pre-sets not be enough)

Profile Domain Settings

The below table shows which menu settings are saved within each Profile “domain”;

Domain	Prospector Setting
Source	Currently selected source
Image	<ul style="list-style-type: none"> • Brightness • Contrast • Gamma (Value and type) • Intensity • Saturation • Sharpness • Output resolution (e.g. 4K UHD, 4K UHD S or WQXGA on a WQXGA UDX) • Digital Zoom (Enabled status and factor) • Digital Shift (Enabled Status, X and Y)

PQ	<ul style="list-style-type: none"> • Screen luminance • HDR boost value
RealColor	<ul style="list-style-type: none"> • Brilliant Color mode • P7 desired values • P7 measured values
Installation	<ul style="list-style-type: none"> • Lens parameters, if available (only valid if recalled with same lens) <ul style="list-style-type: none"> - Iris - Focus - Zoom • Lens shift (Vertical / Horizontal) • Motorized Frame parameters, if connected <ul style="list-style-type: none"> - Rotate - Tilt - Skew • Shutter position • Image orientation • Scaling mode
Warp Settings	<p>Note: Only file-based warp supported via profiles</p> <ul style="list-style-type: none"> • Warp enabled status • Selected warp file • Transport delay
Blend	<ul style="list-style-type: none"> • Mask blend <ul style="list-style-type: none"> - Enabled status - Start and Width for each side • File blend <ul style="list-style-type: none"> - Enabled status - Selected files • S-curve ("gamma")
Black Level	<ul style="list-style-type: none"> • Mask Black level <ul style="list-style-type: none"> - Enabled status - Width for each side • File Black level <ul style="list-style-type: none"> - Enabled status - Selected file • R/G/B gain values
Illumination	<ul style="list-style-type: none"> • Illumination power for each source • CLO enabled status • CLO setpoint
Display	<ul style="list-style-type: none"> • Display mode (ActiveStereo, AutoStereo or Mono) • 3D settings <ul style="list-style-type: none"> - Dark time value - Swap Frame Pair On/Off - Sync Delay value - Sync Delay Invert On/Off

Un-supported Setting Domains within Profiles

This section will provide an overview of functions / settings within Prospector that cannot be saved and recalled via a Profile or Pre-set and must therefore be incorporated into the control system;

- **DCI Filter (Bragi Specific)**

Bragi projectors use a DCI Filter to expand the available color gamut when viewing HDR content. This should be enabled / disabled with the selection the desired color gamut.

[Jump To: RealColor P7 Modes](#)

- **Cropping Modes (Cinemascope Models)**

Cropping is the function used to manage aspects ratios such that content can be displayed correctly.

[Jump to: Cropping](#)

[Jump to: Aspect Ratio Management Commands \(For Cinemascope Models\)](#)

- **Warp to Centre (16:9 Models)**

Warp to Centre is the function used to manage aspects ratios such that content can be displayed correctly.

[Jump to: 16:9 Models and Cinemascope Screens](#)

[Jump to: Aspect Ratio Management Commands \(For 16:9 Models\)](#)

- **Non-Linear Stretch**

If you wish to stretch none cinemascope format content to fill a cinemascope screen in a non-linear manor, you must use a combination of Profile & Control System programming.

[Jump To: Applying Linear and Non-Linear Stretches](#)

- **4-Corner Warp**

4-Corner Warp is typically used to correcting image geometry. This setting is generally “set and forget”, it is highly unlikely that you will be required to program multiple 4-Corner warp configurations, however, if you do;

[Jump To: Warp Engine Commands](#)

- **Bow Correction**

Bow Correction is typically used to correcting image geometry, in this use case it is “set and forget”.

[Jump To: Warp Engine Commands](#)

However, it may also be required to apply a non-linear stretch to none cinemascope content.

[Jump To: Applying Linear and Non-Linear Stretches](#)

Aspect Ratio Management

Cropping (Cinemascope Models)

Barco Residential cinemascope projectors use a function called Cropping to manage how content with different aspect ratios are displayed.

- In **AUTO** Mode the projector will analyze the input signal and determine the contents aspect ratio. Using this information, the projector can automatically recall pre-defined aspect ratios and display them as defined by the integrator.

Note: There are factors that can result in the content aspect ratio detection system reporting an incorrect aspect ratio, these may include the following;

- Broadcast watermarks within the top black section of the content.
- OSD from source devices such as pause icons, or content menus.
- Movies where the contents aspect ratio alters (IMAX content; e.g. Dark Knight Rises)

We always recommend including an override “sidebar” menu within the control system, so that clients can force the projector to the correct aspect ratio if required.

- In **ASPECT** Mode, the projector is forced to the specified aspect ratio. Supported aspect ratios include: 16:9 / 1.85:1 / 2.20:1 / 2.35:1 / 2.37:1 / 2.39:1

For clean ASPECT switching, it is recommended to send the command for the desired aspect ratio first, this will change within the projector’s memory, but will not be applied until the ASPECT command is sent. If the projector is already in ASPECT mode and the desired aspect ratio is changed immediately and the switch will occur cleanly.

- **MANUAL** mode can be used to offer support for newer (presently unsupported) aspect ratios, such as 2.00:1 format which is becoming popular on platforms such as Netflix. Alternatively, it can be used when clients wish to maximize how content with subtitles appears on-screen.

If for example, you only wish to support 2.00:1 aspect ratio, the integrator can pre-define the MANUAL cropping settings for the top and bottom black border, then the control system need only select MANUAL mode.

However, if you wish to support numerous MANUAL cropping formats, such as content with subtitles within the black bars, you will need to recall both the MANUAL mode and the top/bottom cropping value settings.

This latter example is uncommon, you will likely not have to use MANUAL cropping in this way. If this request is made, it is first recommended to see whether the source device can move the on-screen location of the subtitles (not uncommon) as this can save valuable programming time.

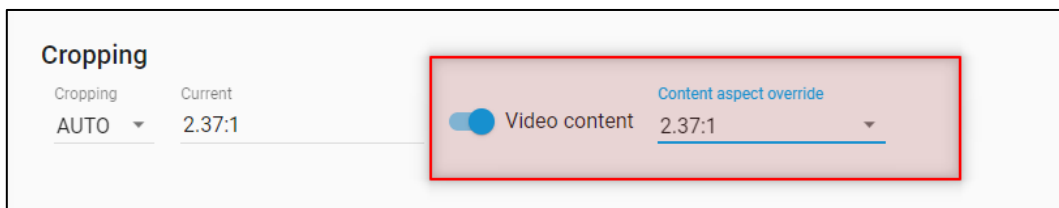
[Jump to: Aspect Ratio Management Commands \(For Cinemascope Models\)](#)

Cinemascope Projectors and Kaleidescape Strato Movie Players

To display the Kaleidescape user-interface correctly on a cinemascope projector there are menu adjustments that need to be made in both devices to allow the user-interface to be displayed correctly in Kaleidescape’s Cinemascope mode. This guide focuses on the control integration of this only, as opposed to the entire setup (see below link if required).

[Download: Kaleidescape Configuration Guide](#)

Kaleidescape Strato players output a metadata flag to indicate whether it is displaying movie content or the user-interface. This information allows the projector to bypass Cropping AUTO Mode and force the projector into 2.37:1 mode. However, some sources use this same metadata flag for alternative information, which can result in those sources being displayed incorrectly (cropped) if the Content Based Auto Cropping (Video Content) toggle switch is enabled.



Prospector Menu: Image >>> Cropping

We therefore recommend that within the source selection programming of the control system, you enable the Content Based Auto Cropping toggle switch when selecting a Kaleidescape Strato Movie Player and disable it when you select any other video source.

[Jump To: Aspect Ratio Management Commands \(For Cinemascope Models\)](#)

Applying Linear and Non-Linear Stretches

It is possible to stretch non cinemascope format content to fill the width of a cinemascope screen. There are two methods to achieve this; a linear stretch and a non-linear stretch.

A linear stretch can be applied by use of Profiles, therefore, for this method the programmer need only recall the desired Profile to activate the stretch.

A non-linear stretch requires an additional function (Bow Correction) to be applied in addition to the linear stretch. Bow Correction settings are not presently available for recall within Profiles; therefore, you must programme these settings separately and recall them in addition to the “Linear Stretch” Profile.

To achieve the non-linear stretch;

- Bow Correction length settings must be applied, these are typically “set and forget”, therefore, should not require programming into the control system.

- Recall the Profile for the linear stretch

Note: You will need a second Profile to disable the linear stretch

- To enable / disable the non-linear element of the stretch you will need to send to enable / disable the Bow Correction toggle switch;

```
{ "jsonrpc": "2.0", "method": "property.set", "params": { "property": "image.processing.warp.bow.enable", "value": true } }
{ "jsonrpc": "2.0", "method": "property.set", "params": { "property": "image.processing.warp.bow.enable", "value": false } }
```

Note: There is also a “master” switch that enables / disables all warp settings, this must also be enabled for Bow Correction settings to apply. You will likely be able to set the “master” to the enable position and leave it set, so that you need only enable / disable the Bow Correction switch.

[Jump to: Warp Engine Commands](#)

16:9 Models and Cinemascope Screens

Barco Residential 16:9 models use a function called Warp to Centre to manage content of different aspect ratios when combining a 16:9 model projector and a cinemascope format screen;

- Warp to Centre is disabled to show the widest content (i.e. the screens native format, often 2.37:1), and then enabled to activate the function and display narrowed formats (i.e. 1.78:1 / 1.85:1 / 2.00:1 etc.).
- A scaling factor must then be applied to determine how the image is displayed. This factor is calculated by dividing the contents aspects ratio by the screen’s aspect ratio.

Example: $1.78 (\text{Content}) \div 2.37 (\text{Screen Format}) = 0.75$

[Jump To: Aspect Ratio Commands \(For 16:9 Models\)](#)

Using the projector to drive screen masking pre-sets

If you are using a masking screen it is possible to use the detected aspect ratio information from the projector to automate the screen masking, therefore improving the end-user experience.

- Locate the “Content Aspect Ratio”, “Cropping Mode” and “Cropping Aspect” data within the control driver
- Create your desired logic to send the screens masking to the appropriate setting.

Example:

IF “Cropping Mode” EQUAL TO “AUTO” AND “Content Aspect Ratio” EQUAL TO “16:9”

Send screen masking to “16:9”

ELSE, IF “Cropping Mode” EQUAL TO “ASPECT” AND “Cropping Aspect” EQUAL TO “2.37:1”

Send screen masking to “2.37:1”

RealColor P7 Modes

Color Gamut Remapping

As highlighted within the introduction section of this guide there are two methods for selecting the correct color gamut for content; Color Gamut Remapping or Manual Color Gamut Selection

Color Gamut Remapping will detect whether the incoming video signal is SDR (Rec.709) or HDR (DCI/P3) and automatically switch to the correct color gamut without the need of a control system. Simply placing the projector into RealColor P7 mode "HDR" enables this feature.

However, some integrators prefer to create separate video calibration profiles for SDR and HDR content, instead of using Color Gamut Remapping. For this method you must select RealColor P7 mode "HDR" and "Rec.709" (SDR) via the control system for the corresponding content types.

Note: An alternative, method would be to recall a Profile for HDR and SDR (Rec.709) content, as this could include additional setting parameters such as; illumination %, brightness and contrast settings etc.

The video signal information can be used to generate a "trigger" for the RealColor P7 mode to be selected, automating the end-user experience.

- The signal information to look for that indicates SDR content is;
Gamma Type = POWER
- The signal information to look for that indicates HDR content is;
Gamma Type = SMPTE_ST2084
- Based in these "triggers" the RealColor P7 Mode command can be sent to the projector as required.

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.color.p7.custom.mode","value":"HDR"}}
```



```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.color.p7.custom.mode","value":"Rec. 709"}}
```

DCI Filter (Bragi Specific)

Bragi projectors use a DCI Filter to expand the available color gamut when viewing HDR content. This should be enabled or disabled with the selection the desired color gamut as outlined above.

The same "triggers" can be used to initiate this, however, as the DCI filter is not presently available within a setting domain that can be saved within a Profile, you will need to use the following JSON commands to enable and disable the filter as required (enabled = in / disabled = out);

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"optics.filter.dci.target","value":"In"}}
{"jsonrpc":"2.0","method":"property.set","params":{"property":"optics.filter.dci.target","value":"Out"}}
```

Note: This should be enabled ("In") when watching HDR content to benefit from the wider color gamut available.

Factory Reset

Should it be necessary to ever factory reset the projector we recommend de-selecting the following settings unless specifically advised not;

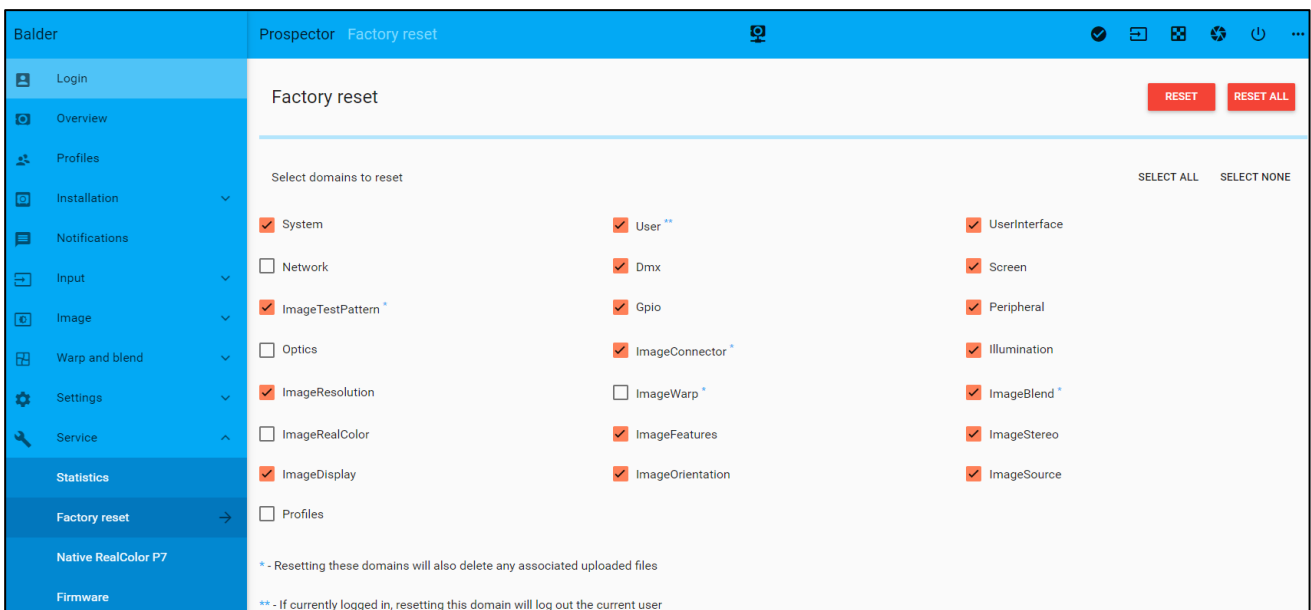
Network: Resetting this will erase the network connection settings and place the projector back to Automatic (DHCP), most likely resulting in the control system losing connection until the Manual (static) network settings have been re-configured.

Optics: Resetting the Optics will result in the zoom, focus, lens shift, orientation etc. settings being erased.

ImageRealColor: Resetting ImageRealColor will result in any video calibration settings being erased from the projector. If reset, a video calibration will need to be re-done.

Profiles: Resetting Profiles will erase all Profiles that may have been configured and are integrated into the control system. If reset, you will need to re-save all settings and ensure they are named exactly the same as before.

ImageWarp: Resetting the ImageWarp settings will erase any 4-Corner and Bow Correction settings that may have been applied to the image. If reset, you will need to reconfigure these settings.



Prospector: Service >>> Factory Reset Menu

If the above reset has not resolved any issue you may be experiencing, please consult the system integrator or a Barco Residential specialist for further advise.

JSON Command Library

This section is intended to provide a useful reference library of the most common JSON Commands that may be required for integration, it is not however a complete list of commands.

Power Commands

Power On

```
{"jsonrpc":"2.0","method":"system.poweron"}
```

Power Off

```
{"jsonrpc":"2.0","method":"system.poweroff"}
```

Note: Projector will enter Standby Ready mode

Force Standby ECO Mod

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"system.eco.enable","value":true}}
```

```
{"jsonrpc":"2.0","method":"system.gotoeco","params":{}}
```

Note: Standby ECO Mode must be enabled within the projector otherwise the unit will not enter this mode.
The first command above ensures Standby ECO mode is activated and may not be required.

Reboot

```
{"jsonrpc":"2.0","method":"authenticate","params":{"code":292920}}
```

```
{"jsonrpc":"2.0","method":"system.reboot"}
```

Note: You must be logged into the projector as a power user to send the reboot command. Therefore, you will require sending both commands to the projector.

Input Select

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.window.main.source","value":"HDMI"}}
```

Note: Common inputs “inserts” include: HDMI / HDBaseT / DVI 1 / DVI 2 / DisplayPort 1 / DisplayPort 2

Profiles & Preset Commands

Recall Profile “Insert Name Here”

```
{"jsonrpc":"2.0","method":"profile.activateprofile","params":{"Insert Name"}}
```

Note: Profile names are case sensitive and may contain spaces and special characters.

Recall Preset #

```
{}"jsonrpc":"2.0","method":"profile.activatepreset","params":0}
```

Note: Present range from 0 - 29

Aspect Ratio Management Commands (For Cinemascope Models)**Cropping Mode: AUTO**

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.cropping.mode","value":"AUTO"}}
```

Enable Content Override (Content Based Auto Cropping)

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.cropping.contentbasedautocropping","value":true}}
```

Disable Content Override (Content Based Auto Cropping)

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.cropping.contentbasedautocropping","value":false}}
```

Cropping Mode: ASPECT

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.cropping.mode","value":"ASPECT"}}
```

Select Aspect Ratio

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.cropping.aspectratio","value":"16:9"}}
```

Note: Supported Aspect Ratio "inserts": 16:9 / 1.85:1 / 2.2:1 / 2.35:1 / 2.37:1 / 2.39:1

Cropping Mode: MANUAL

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.cropping.mode","value":"MANUAL"}}
```

Applying Manual Cropping Values

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.cropping.manual","value":{}"left":0,"right":0,"top":256,"bottom":204}}}
```

Note: For cleaner switching, we recommend applying the desired cropping values, before applying Manual mode.

Aspect Ratio Management Commands (For 16:9 Models)**Enable Warp to Centre**

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.center16_9.enable","value":true}}
```

Disable Warp to Centre

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.center16_9.enable","value":false}}
```

Warp to Centre Scaling Factor

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.center16_9.factor","value":0.8}}
```

Note: Value range from 0.01 to 0.99 and then 1

Scaling & Screen Menu Commands**Scaling Mode: Fill**

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.scalingmode","value":"Fill"}}
```

Scaling Mode: Stretch

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.scalingmode","value":"Stretch"}}
```

Scaling Mode: Fill Screen

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.window.main.scalingmode","value":"FillScreen"}}
```

Set Screen Width

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.processing.warp.fourcorners.screenwidth","value":1.78}}
```

Note: Consider this value as one element (width) of the desired aspect ratio. i.e. 1.78:1 or 2.37:1

Set Screen Height

```
{}"jsonrpc":"2.0","method":"property.set","params":{}"property":"image.processing.warp.fourcorners.screenheight","value":1}}
```

Note: Consider this value as one element (height) of the desired aspect ratio. i.e. 1.78:1 or 2.37:1

Warp Engine Commands

Enable Warp

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.enable","value":true}}
```

Disable Warp

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.enable","value":false}}
```

Enable 4-Corner Warp

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.fourcorners.enable","value":true}}
}
```

Disable 4-Corner Warp

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.fourcorners.enable","value":false}}
}}
```

Apply 4-Corner Warp Co-Ordinates

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.fourcorners.topleft","value":{"x":0,"y":0}}}
```

Note: You must send the above command with each corner's desired x and y co-ordinates that require manipulation, replacing **topleft** with; bottomleft / topright / bottomright
"x" and "y" co-ordinate values can be positive or negative

Enable Bow Correction

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.bow.enable","value":true}}
```

Note: Warp must also be enabled.

Disable Bow Correction

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.bow.enable","value":false}}
```

Apply Bow Correction Angle & Length Settings

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.processing.warp.bow.topleftu","value":{"angle":0,"length":1}}}
```

Note: You must send the above command with the desired length and angle values required to manipulate the image, replacing **topleftu** with; bottomleftu / topleftv / toprightv
Angle values can be positive or negative

RealColor P7 Modes & DCI Filter Commands

RealColor P7 Mode

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"image.color.p7.custom.mode","value":"HDR"}}
```

Note: Supported mode “inserts”; HDR / Rec. 709

Enable DCI Filter (Bragi Models Only)

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"optics.filter.dci.target","value":"In"}}
```

Disable DCI Filter (Bragi Models Only)

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"optics.filter.dci.target","value":"Out"}}
```

12v Trigger Commands

Enable 12v Trigger

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"gpio.gpo.trigger1.value","value":true}}
```

Note: trigger1 can be replaced with; trigger2 / trigger3

Disable 12v Trigger

```
{"jsonrpc":"2.0","method":"property.set","params":{"property":"gpio.gpo.trigger1.value","value":false}}
```

Note: trigger1 can be replaced with; trigger2 / trigger3

Subscription and Get Commands

System State

Reports status of the power state of the projector

```
{"jsonrpc":"2.0","method":"property.get","params":{"property":"system.state"}}
```

```
{"jsonrpc":"2.0","method":"property.subscribe","params":{"property":"system.state"}}
```

Inlet Temperature

```
{"jsonrpc":"2.0","method":"property.get","params":{"property":"environment.temperature.inlet.observableoutput"}}
```

```
{"jsonrpc":"2.0","method":"property.subscribe","params":{"property":"environment.temperature.inlet.observableoutput"}}
}}
```

Humidity

```
{"jsonrpc":"2.0","method":"property.get","params":{"property":"environment.humidity.observableoutput"}}
```

```
{"jsonrpc":"2.0","method":"property.subscribe","params":{"property":"environment.humidity.observableoutput"}}
```


A/C Voltage

```
{"jsonrpc": "2.0", "method": "property.get", "params": {"property": "environment.power.ac.voltage.observableoutput"}}
{"jsonrpc": "2.0", "method": "property.subscribe", "params": {"property": "environment.power.ac.voltage.observableoutput"}}
}
```

HDMI Signal Information

Reports the signal information for the HDMI input, including; Aspect Ratio, Gamma Type, Color Space and more...

```
{"jsonrpc": "2.0", "method": "property.get", "params": {"property": "image.connector.hdmi.detectedsignal"}}
{"jsonrpc": "2.0", "method": "property.subscribe", "params": {"property": "image.connector.hdmi.detectedsignal"}}
```

Content Based Auto Cropping Properties

Reports status of the Video Content toggle switch from the AUTO Cropping menu

```
{"jsonrpc": "2.0", "method": "property.subscribe", "params": {"property": "image.window.main.cropping.contentbasedautocropping"}}
{"jsonrpc": "2.0", "method": "property.get", "params": {"property": "image.window.main.cropping.contentbasedautocropping"}}
```

Image Processing Warp Properties

Reports status of the "Master" warp toggle switch

```
{"jsonrpc": "2.0", "method": "property.get", "params": {"property": "image.processing.warp.enable"}}
{"jsonrpc": "2.0", "method": "property.subscribe", "params": {"property": "image.processing.warp.enable"}}
```