

greenMachine®



Quick Reference Guide



Introduction

This quick reference guide provides information related to the greenMachine HDR Static initial setup and configuration. The greenMachine HDR Static, 1 RU half 19" rackmount, is a real-time broadcast-quality HDR to SDR, SDR to HDR, or cross-standards HDR to HDR converter with frame sync supporting formats up to 4K UHD (3840x2160). HDR Static applies color and contrast parameters equally throughout a specific piece of content, i.e. an average brightness/color range is determined across an entire program. HDR Static greenMachine processor has an advanced algorithm that overcomes the issues arising from "round-tripping" SDR>HDR>SDR. The SDR signal at the production end and the distribution end of the round trip are visually identical, making the whole SDR>HDR>SDR conversion process transparent. Supporting 4 x 3G or 1x 4K/UHD processing channel, HDR Static provides up, down, and cross-conversions in HDR and SDR curves through appropriate static tone mapping. It also supports Wide Color Gamut (WCG) needs of broadcasters, and professional AV live events requirement. HDR Static is most suitable for the environments outdoor/ indoor where the light conditions do not change dynamically.

This Quick Reference Guide is designed to help you setup greenMachine HDR Static and provides the step-by-step instructions to configure your HDR Static constellation to achieve the best possible up/down/cross conversion between HDR and SDR for your operations. For additional information, please refer to the "HDR Static Reference Manual."

Unpacking greenMachine HDR Static

The greenMachine HDR Static comes with the following items:

- 1x Static HDR Conversion Constellation: GMC-HDR-STATIC-titan
- 1x greenMachine Titan: GM6840
- 1x external power supply (RPS 6120)
- 1x power cord (EU, UK or US)
- 1x SubD 25 audio adapter PCB
- 1x quick reference guide
- 1x warranty card

Quick-Setup Guide

The following sections will guide you in setting up a new greenMachine HDR Static. The quick setup is divided into two sections:

Section 1: This section will demonstrate the initial preparation of hardware and software setup

Section 2: This section will demonstrate the HDR Static setup configured in Quad 3G Channel (four discrete 3G SDI) mode or 4K UHD mode for HDR<->SDR conversion.

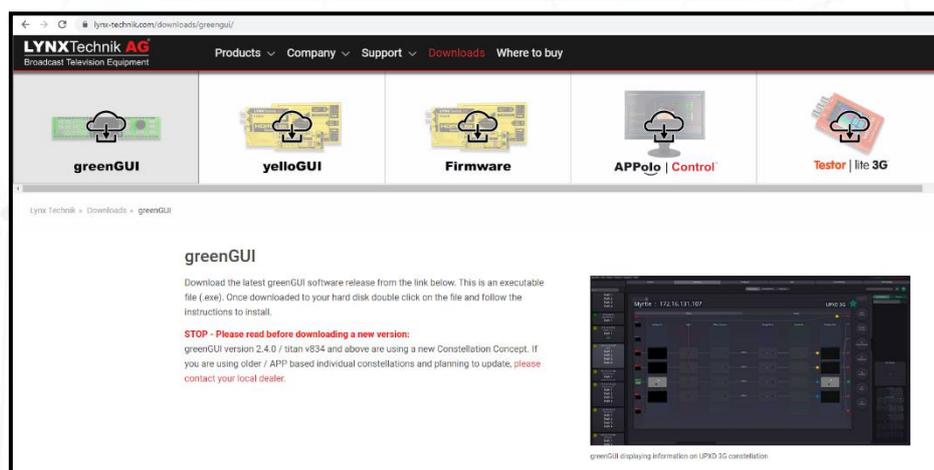
Section 1: greenGUI (Software) and greenMachine (Hardware) setup

This section will demonstrate how to setup greenGUI software on a PC or MAC and will also demonstrate how to set up the greenMachine hardware.

1. greenGUI Installation

If you do not already have the greenGUI software installed on your PC or MAC, then download and install the greenGUI software from Lynx Technik AG website from the link below:

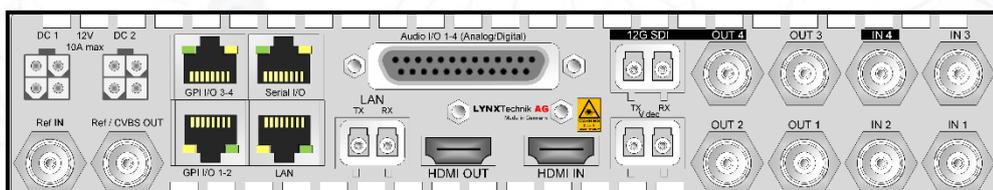
<https://www.lynx-technik.com/downloads/greengui/>



Install and start the greenGUI software on your PC or MAC.

2. greenMachine Network Connection

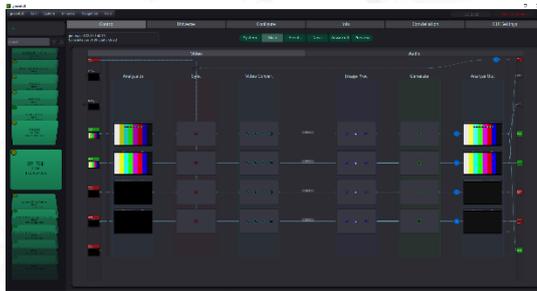
Connect the greenMachine via LAN Port to the same network with your PC or MAC on which the greenGUI is installed.



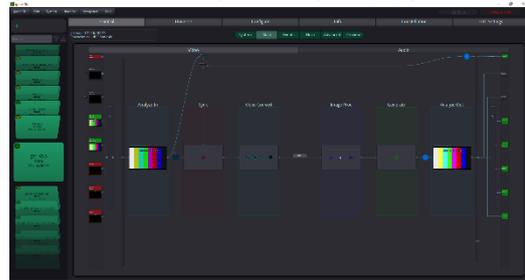
Power up the greenMachine and wait for it to finish booting.

3. IP Network Settings

The greenMachine is a networked device and may require network settings for it to be connected to the network. By default, the IP setting of the greenMachine is set to DHCP. If the network to which greenMachine is connected uses a DHCP server, then the greenMachine will automatically capture the IP address and other settings. The greenMachine will appear on the greenGUI.



greenMachine Static in Quad 3G Config.



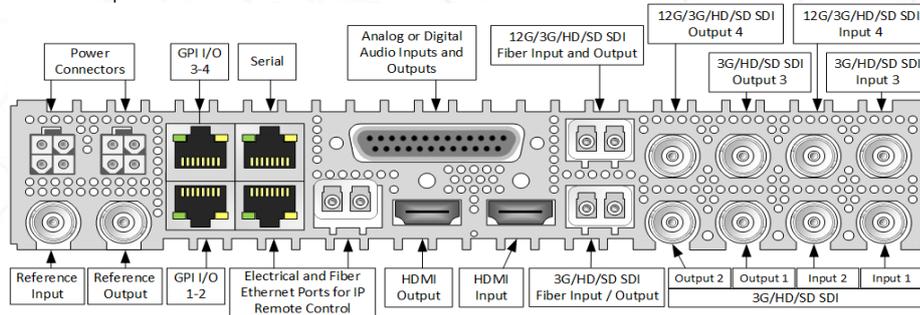
greenMachine Static in 4K UHD Config.

If the network to which greenMachine is connected to does not have a DHCP server, then configure the IP settings manually from the front panel of the greenMachine as shown in the steps as below:

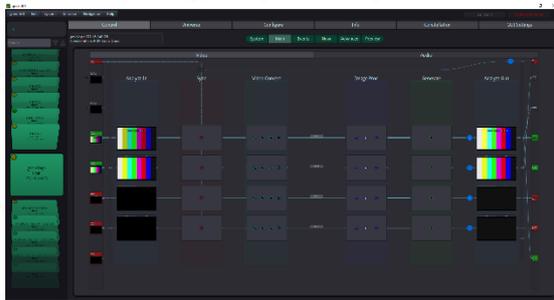
	<p>1 Press the “System” button to access the Menu</p>
	<p>2 Using the rotary knob, highlight “IP settings” and press to enter</p>
	<p>3 Highlight IP mode and rotate the knob to select “static” in the middle of the screen and press to enter (default is DHCP mode).</p>
	<p>4 Using the menu system and rotary control, make the required manual numeric entries for the IP address, Gateway, and Netmask. Please ask your network/IP support for the settings if needed.</p>
<p>Note: The values given in the pictures above are for demonstration purposes only. Once IP settings are completed, exit the IP setting menu. The greenMachine will now be visible on the greenGUI running on your PC or MAC.</p>	

4. Video/Audio Connection

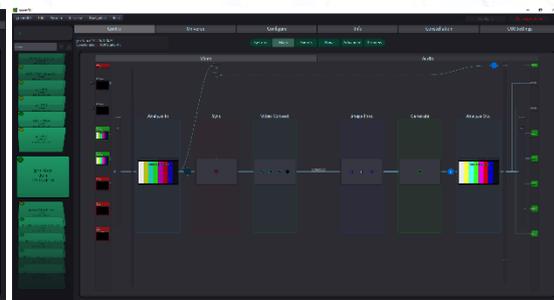
Connect your HDR Video Signal to the input port/s provided at the back panel of the greenMachine. A user can either select to use four 3G SDI inputs or one 12G SDI/fiber input depending on the requirement. greenMachine provides four 3G SDI outputs or one 12G SDI/fiber output.



For example, if the input video signal from the Camera or any other video source is connected to SDI input 1, on the greenMachine, on greenGUI **Control> Main** would display a similar page as shown below:



greenMachine Static in Quad 3G Config.

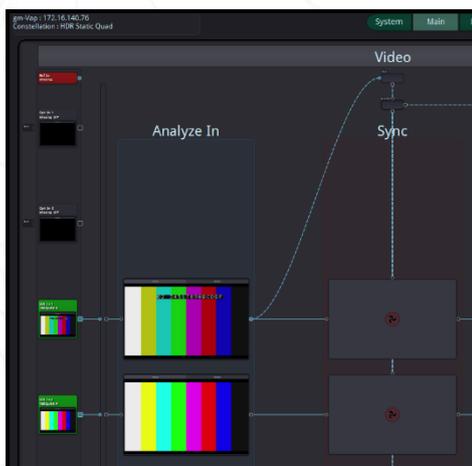


greenMachine Static in 4K UHD Config.

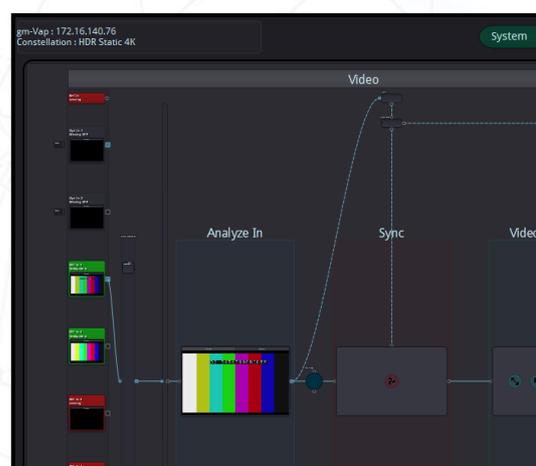
Connect the input ports on the greenMachine as required, considering the limitation of each input and output port. Check greenMachine ports detail in the back-panel picture, as shown above.

5. Reference input connection

Connect the video reference input port on the greenMachine to a reference source. In case no external input reference source is available, the user can take the input video signal as the reference source as shown in the picture below:



greenMachine Static in Quad 3G mode

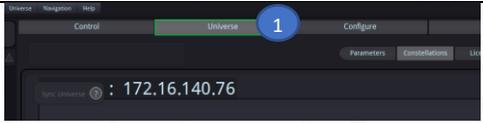
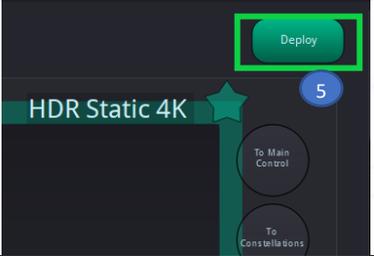


greenMachine Static in 4K mode Config.

6. Deploying Single 4K UHD Channel or Quad 3G channel constellation (Optional*)

Note: To enable zoom in or zoom out, users can use the mouse scroller or can double click.

* A new greenMachine HDR Static comes with the pre-deployed HDR Static constellation. In case the constellation type needs to be changed, follow the below steps:

	<p>1 On the greenGUI software, click on the Universe page</p>
	<p>2 Zoom in to greenMachine. Verify the name or the IP address of the greenMachine for which the constellation type needs to be changed. (Reconfirm if the correct greenMachine is selected). In case there are many greenMachines connected on the network, double click on the greenMachine box on the left of the UI on the Rolodex, as shown in the picture below in blue color, and the system will zoom on to the correct machine.</p>
	<p>3 On the right pane under the Constellation tab, use the mouse to scroll down to HDR Static. Press the left mouse button on the HDR Static box and drag and drop it on the left inside the HDR Static window. The user will see the gear icon  if done correctly, and the window shown in next will appear.</p>
	<p>4 Choose the correct type of HDR Static constellation from the two options:</p> <ul style="list-style-type: none"> • HDR Static 4K • HDR Static Quad
	<p>5 Click on the Deploy button to deploy the HDR Static constellation</p>

Section 2: HDR Static Configuration

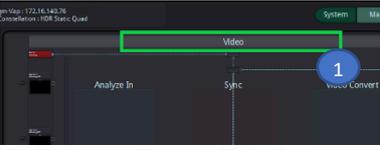
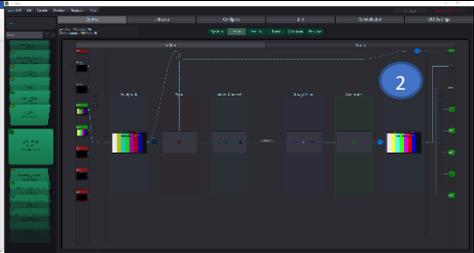
This section will guide you in setting up a new greenMachine HDR Static constellation.

Note: The settings shown in this quick reference guide is for demonstration purpose only. The user should set the values and parameters depending on the actual operational requirements and preferences. Use mouse scroller to Zoom in/out on the page **Control > Main** on greenGUI.

1. HDR Static Video Parameters

Perform the following steps to set up your greenMachine HDR Static video Settings.

Note: To enable zoom in or zoom out, users can use the mouse scroller or can double click.

	<p>1 Go to Control > Main and click on the Video tab as shown in the picture</p>
	<p>2 The window shown in the picture will appear</p>
	<p>3 Zoom in to Video Convert processing block as shown in the picture</p> <p>4 The window, as shown in the picture, will appear. The page displays the input characteristics and gives an option of selecting the parameters for the output. There are four tabs provided at the top of this window which are:</p> <p>Scaler: It provides a high-quality spatial converter with a powerful region of interest (ROI) selection and scaling.</p> <p>MetaData: It provides the management of the embedded metadata of the video signal, which can be monitored and converted. The selections provided for the MetaData are <i>Closed Captions, Time Code, Teletext, and Misc.</i></p> <p>3G Level A/B: It provides automatic detection of 3G-level A or Level B inputs and can convert between 3G level A input signal and 3G Level B dual-link output signals. It provides a selection for transport format for 3G-SDI output streams (<i>Auto, Level A, Level B -Dual Link</i>). For Level B, it provides options to select the stream/s in which the audio will be embedded, as well as the stream/s in which the audio control packet will be embedded.</p> <p>Global Settings: It provides the selection of image content for the output when no input is present/detected. The options provided are <i>Test Pattern, Black, or Freeze.</i></p>



5

Zoom out and zoom in to **Image Proc** as shown in the picture

6

The window shown in the picture will appear.

The options provided to the user are:

1. Video Adjust
2. Color Correction
3. HDR



7

Click on the **Video Adjust** tab

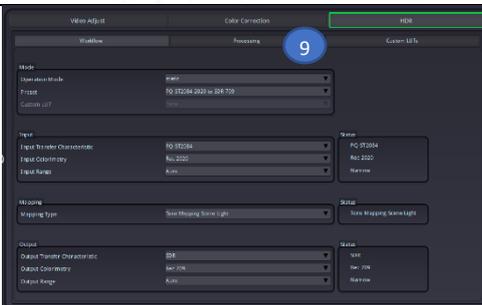
In the Video Adjust settings, the user is provided with the options for clipping *YCrCb headroom*, *Horiz Flip*, *Blanking (H/V Blanking)*, and video settings like *Gain*, *Sat*, *Black*, *Hue*, and *Aperture*. Set the parameters as required.



8

Click on the **Color Correction** tab

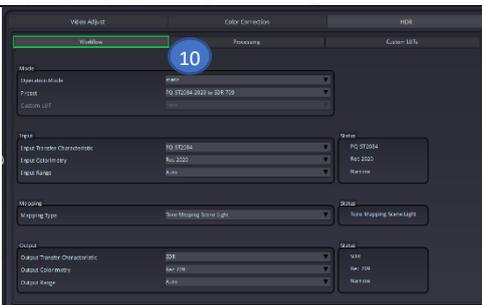
In the Color Correction settings, the user is provided with the options of changing *Gain*, *Lift*, *Gamma* and *Offset* in *RGB*. It also provides gain and offset adjustments in *CMYW*. Click on the tab as shown below and adjust the corresponding parameter in the settings as required



9

Click on **HDR Static** tab

The HDR Static Panel presents **Workflow**, **Processing** and **Custom LUTs** options



10

Select **Workflow** and adjust the parameters as required. (Check description of each parameter below)

10

Check the description of each parameter in the HDR Static > Workflow page

For detailed information on processing parameters, refer to the HDR Static reference manual "Operations Mode."

Setting		Description
Mode	Operation Mode	There are two options provided in Operation Mode which are bypass HDR/SDR, STATIC and Custom LUT

		<p>Bypass HDR/SDR: Selecting this option will bypass the HDR conversion functions such as transfer characteristics, colorimetry, and ranges. It means the incoming signal is transparently passed through the system.</p> <p>Note: In this mode, only “colorimetry” and “range” conversion of SDR signals can be performed.</p> <p>STATIC: Selecting this option activates the actual operation of HDR STATIC constellation. It allows the user to perform up/down/cross conversion between HDR and SDR.</p> <p>Custom LUT: The Operation Mode “Custom LUT” allows users to select their own LUTs to obtain the desired contrast, color, saturation, black and white levels. Users are provided with 20 slots to upload up to 20 custom LUTs.</p> <p><i>For more information on the Operation mode, refer to the HDR Static Reference manual “Operations Mode.”</i></p>
	Presets	<p>There are several useful presets provided for quick operations. The following presets are available to the user for selection:</p> <p>Custom</p> <ul style="list-style-type: none"> PQ-ST2084 2020 to SDR 709 PQ-ST2084 2020 to SLog3 2020 PQ-ST2084 2020 to HLG 2020 PQ-BT2100 2020 to SDR 709 PQ-BT2100 2020 to SLog3 2020 PQ-BT2100 2020 to HLG 2020 SLog3 2020 to SDR 709 SLog3 2020 to PQ-ST2084 2020 SLog3 2020 to PQ-BT2100 2020 SLog3 2020 to HLG 2020 HLG 2020 to SDR 709 HLG 2020 to SLog3 2020 HLG 2020 to PQ-ST2084 2020 HLG 2020 to PQ-BT2100 2020 SDR 709 to PQ-ST2084 2020 SDR 709 to PQ-BT2100 2020 SDR 709 to HLG 2020 SDR 709 to SLog3 2020 Auto to Auto Auto to SDR 709 Auto to PQ-ST2084 2020 Auto to PQ-BT2100 2020 Auto to HLG 2020 Auto to SLog3 2020
Input	Input Transfer Characteristics	<p>The following input transfer characteristics are provided: SDR, HLG, PQ-ST2084, PQ-BT2100, Slog3, Panasonic V-log, Arri LogC, RED Log3G10, Canon C-Log2, BMD Film</p> <p><i>For more information on Transfer characteristics, refer to HDR Static reference manual “Transfer characteristics.”</i></p>
	Input Colorimetry	<p>The following Colorimetry is provided: BT.2020, BT.709, Sony S-Gamut, ACES, DCI-P3, Panasonic V-Gamut, BMD Film, Canon Cinema Gamut, Arri Alexa, Red Wide Gamut</p> <p><i>For more information on Colorimetry, refer to the HDR Static reference manual “Colorimetry / Gamut.”</i></p>
	Input Range	<p>The following input range is provided: Full, Narrow, and Auto</p> <p>Full: Full Range is the complete range of bits used for representing blacks and whites. For example, in a 10-bit signal, 0 bit represents the black, and 1023 bit represents the White.</p>

		<p>Narrow: Narrow Range is the limited range of bits used for representing black and whites. For example, in a 10-bit signal, 64 bit represents the Black, and 940 bit represents the White.</p> <p>Auto: In this mode, the system reads the VPID information on the signal to determine the "Narrow" or "Full" range.</p> <p><i>For more information on range, refer to the HDR Static Reference manual "Signal Range."</i></p>
Mapping	Mapping Type	<p>The tone mapping operation can be performed with two possible approaches depending on the user cases:</p> <ol style="list-style-type: none"> 1. Tone Mapping Scene Light 2. Tone Mapping Display Light 3. Direct Mapping Scene Light 4. Direct Mapping Display Light <p>Tone Mapping is preferred for up-and-down conversion for mapping cameras. In the case of up-conversion, when the intent is to create a stronger HDR look and in case of down conversion when the intent is to preserve more contrast, then the Tone Mapping technique is preferred.</p> <p>Direct Mapping is used when the intention is to preserve the SDR content and make up-converted HDR look identical to the original SDR version, or to make the signal from HDR camera look similar to the signal delivered by an SDR camera operated without a "knee" function.</p> <p>Scene Light mapping is used when the goal is to match the colors and relative tones of HDR and SDR cameras.</p> <p>Display Light mapping is used when the goal is to preserve the colors and relative tones, as seen on a reference display.</p> <p><i>For more information on Mapping, refer to the HDR Static Reference manual "Mapping."</i></p>
Output	Output Transfer Characteristics	<p>The output transfer characteristics provided are SDR, HLG, PQ-ST2084, PQ-BT2100, Slog3.</p> <p><i>For more information on Transfer characteristics, refer to HDR Static reference manual "Transfer characteristics."</i></p>
	Output Colorimetry	<p>The following output colorimetry is provided: Rec 709, Rec 2020, and Auto</p> <p>Note: In Auto mode, the output follows the input, and no conversion takes place</p> <p><i>For more information on Colorimetry, refer to the HDR Static reference manual "Colorimetry / Gamut."</i></p>
	Output Range	<p>The following output range is provided: Full, Narrow, and Auto</p> <p>Full: Full Range is the complete range of bits used for representing blacks and whites. For example, in a 10-bit signal, 0 bit represents the black, and 1023 bit represents the White.</p> <p>Narrow: Narrow Range is the limited range of bits used for representing black and whites. For example, in a 10-bit signal, 64 bit represents the Black, and 940 bit represents the White.</p> <p>Auto: In this mode, the output follows the input, and no conversion takes place. For example, if the input range is "Narrow," then the output range will be "Narrow."</p>

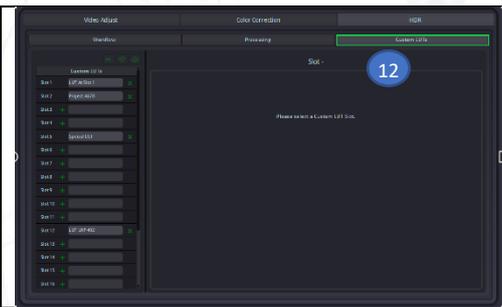
For more information on range, refer to the HDR Static Reference manual “Signal Range.”



11 Select **Processing** in the HDR Static tab and adjust the parameters as required
(Check description of each parameter below)

11 Check the description of each parameter in the HDR Static > processing page
For detailed information on processing parameters, refer to the HDR Static reference manual “Processing Parameters.”

Setting	Description
<i>Gain</i>	<p>This parameter is used to adjust the luminance of the overall image. The default value is set to 0.00 dB and leaves the image unchanged, whilst a value less than 0.00 dB reduces the brightness, and a value greater than the default value increases the brightness of the image. <i>Note: Higher value can lead to flattening of the image impression.</i></p> <p>+12.00 dB: Extremely increased brightness 00.0 dB: Unchanged -12.00 dB: Extremely decreased brightness Default Value: 0.00 dB</p> <p>If the image appears too dark, e.g. after an SDR-to-HDR up-conversion, a luminance gain can be used to adjust the image and achieve better matching to the luminance of native HDR material. This processing can be undone in case of “round-tripping” if the inverse value is used for the reverse conversion.</p>
<i>Saturation</i>	<p>Due to the contrast conversion and a possible gain adjustment, the brightness component of the image is altered. The change in the brightness affects the color impression, such as saturation. If the saturation impression does not match the expectation, then the “saturation” parameter offers the possibility in adjustment. The default value is set to 1.0, which leaves the saturation unchanged.</p> <p>2.0: Extremely increased saturation 1.0: Saturation unchanged 0.0: Extremely reduced saturation Default Value: 1.0</p>

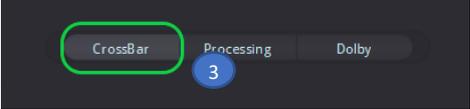
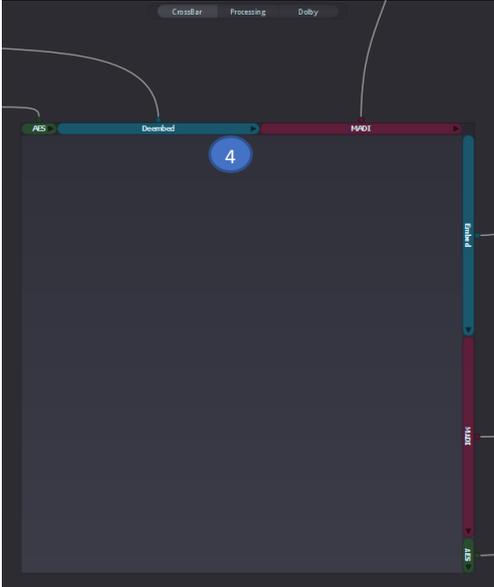
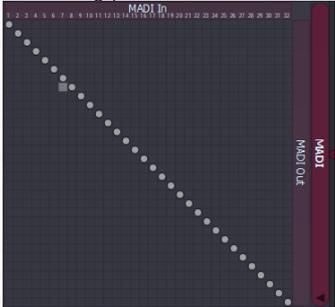


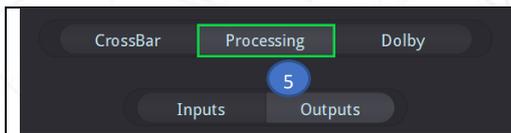
12 Select **Custom LUTs** in the HDR tab to import, export and set parameters for the Custom LUT.

For more information on Custom LUTs, refer to Custom LUTs Quick Reference Guide.

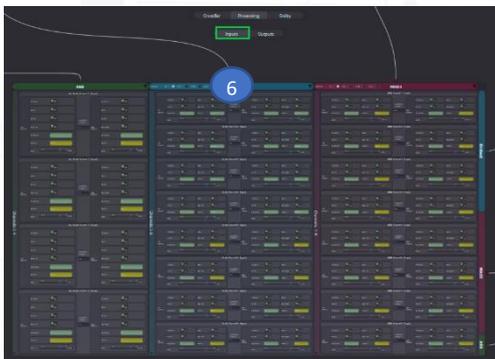
2. HDR Static Audio settings

Perform the following steps to set up your greenMachine HDR Static audio Settings.

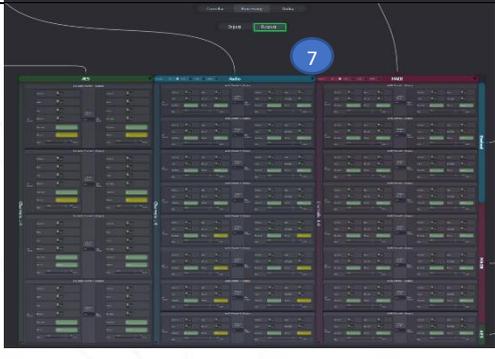
 	<p>1 Click on the Audio button</p> <p>2 The audio page is displayed on the screen</p>
 	<p>3 Click on crossbar</p> <p>4 The following options are displayed to the users. Click on the Dembed bar or icon  if the audio is de-embedded from the input video signal or AES bar  if an AES input source is connected to the external audio interface female Sub-D 25 connector of greenMachine titan. The following picture shows the crossbar:</p>  <p>Click on the MADI bar or icon  to reveal the MADI crossbar. The following picture shows the MADI crossbar</p> 



5 Click on **Processing** to change input and output audio settings



6 Select **Inputs** and click on the icon  if the audio is de-embedded from the video or  if the AES input is connected, to display the input settings. If MADI input is connected, then click on  to display the MADI audio settings. Adjust the audio parameters as required.



7 Select **Outputs** and adjust the audio parameters as required.

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