

ARRI Look Files in the ALEXA Camera

WHITEPAPER

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Introduction

Since ALEXA Software Update Packet (SUP) 4.0, ARRI ALEXA cameras can apply user defined looks to customize the rendering of video images.

The user can choose if the camera should apply an ARRI Look File only to the monitoring outputs (non-destructive mode) or if the look file shall be baked into the recorded image (destructive mode). Either way, the look file is embedded as metadata in the recorded QuickTime ProRes or DNxHD MXF clip as well as in the header of every ARRIRAW frame.

This document addresses the use of ARRI Look Files with an ALEXA camera.

Background

A pleasant image of a scene is not a one-to-one reproduction. The dynamic range of many scenes is much higher than what a typical monitor or digital projector can reproduce and the conditions under which the image is viewed (e.g. dim room, low luminance) differ generally from the conditions of the scene (e.g. bright daylight). Therefore, one cannot simply transfer the original brightness and color values into the image of the scene. The technical term for transforming the captured scene information into a pleasant reproduction is rendering.

While there is a broad agreement on what is regarded as a pleasant photographic reproduction, people have different expectations in several details like the overall amount of color saturation or the lightness level of mid gray. Those expectations are influenced by the creative intent, personal preferences and by the viewing conditions under which the images will be watched. The ALEXA cameras, for example, may be used for feature films as well as for TV documentaries.

The ARRI User Looks allow a tuning of the camera output for different applications and for individual preferences.

Table of contents

Introduction	2
Background	2
ARRI Look Files	3
ARRI Look File Controls	3
Using Look Files in the Camera	3
Workflow Options	4
Non-destructive Mode	4
Non-destructive Step by Step	4
Destructive Mode	4
Destructive Step by Step	4
Use Case for Destructive Mode (LCC Look File)	4
LCC Step by Step	5
ARRI Look Creator	5
Format of ARRI Look Files	6
Example	6

ARRI Look Files

ARRI Look Files allow changing the parameters that control the rendering of images for the video output. Look files can be created using the ARRI Look Creator (ALC) or ARRIRAW Converter (since version 3.0). Using the ALC, a look is created based on a Log C DPX grab taken from an ALEXA

ARRI Look File Controls

An ARRI Look File contains a set of parameters specific to the ALEXA camera. The look files can be converted into 3D LUT files using the ARRI LUT Generator at

http://www.ari.com/camera/digital_cameras/tools/lut_generator/

A conversion of 3D LUT files into ARRI Look Files, however, is not possible.

The following parameters may be used in a look file:

- Color saturation value (called Saturation)
- RGB offsets (called PrinterLight)
- A mono free form curve applied to all RGB channels (called ToneMapLut)
- The three primitives of the ASC Color Decision List (CDL), separate for each R, G, and B channel (called SOP Node – Slope Offset Power)

This set of transforms cannot compare to the possibilities of modern DI systems. They do, however, provide enough room for a wide range of creative choices. We also limited the range of possible ASC CDL parameters since we do not regard extreme values to be useful in a camera.

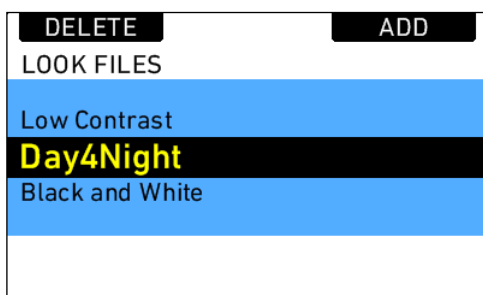
The transforms are applied at different stages of the camera's image processing path. The printer light offsets are applied to the image while it is still Log C. The ASC CDL transform is applied to the image once it is converted to video using the tone map LUT.

Note: The ALEXA saturation parameter differs from the ASC CDL saturation.

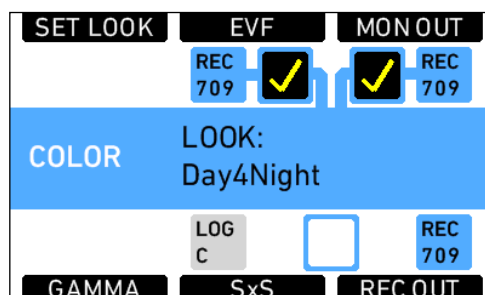
Due to the mechanics of the look management, an output needs to be set to Rec 709 (or DCI P3 – not available anymore since SUP 7.0) color processing ('gamma' in the user interface) so a look file can be applied. If an output is set to Log C color processing or to ARRIRAW output, the look will only be written into the camera metadata.

Using Look Files in the Camera

The files can be imported to the camera from an SD card (put the files in /ARRI/ALEXA/LookFiles/) and managed with the COLOR > SET LOOK menu. When a look is selected, it can be applied to any output set to Rec 709 or DCI P3 in the main COLOR menu.



ALEXA: COLOR menu > SET LOOK



ALEXA: COLOR menu

Workflow Options

There are several approaches how ARRI Look Files are being used. The main question is whether a look is recorded with the images or not.

Non-destructive Mode

The typical application for look files is the non-destructive mode. A look is activated only for the monitoring output (MON OUT) of the camera and optionally the electronic viewfinder (EVF). This gives e.g. director and producers an approximate preview of the intended look that shall be applied in color correction. The recorded material, however, contains the clean image and the look information resides only in the metadata.

Non-destructive Step by Step

1. Create at least one ARRI Look File and store it to an SD card.
2. Add and use the look file on the ALEXA.
3. Set MON OUT gamma to Rec709 and activate the look for this output.
4. Set SxS and/or REC OUT gamma to Log C. When recording Log C or ARRIRAW, look files are never recorded and only noted in the metadata.
5. Go to http://www.arri.com/camera/digital_cameras/tools/lut_generator/ and use the ARRI LUT generator to create a Log C to Video 3D LUT including each of your look files.
6. Create video dailies using the Log C to Video 3D LUT corresponding to the look that was used for the material.

This is the most basic workflow. We are talking to a number of manufacturers of digital dailies and color grading systems regarding further support for ALEXA metadata. Such applications could apply some of the parameters (like the printer light offsets) dynamically instead of using different 3D LUT files.

Destructive Mode

In destructive mode, the images are actually recorded with a look baked in. Depending on how drastically a look alters the image, the changes in the image may be completely irreversible. For example, if the look file sets the output to have zero saturation, creating in effect a gray scale image, it will be impossible to dial the colors back in. That is why great care needs to be taken when the look is created.

Destructive Step by Step

1. Create at least one ARRI Look File and store it to an SD card.
2. Add and use the look file on the ALEXA.
3. Set MON OUT, SxS and/or REC OUT gamma to Rec709 and activate the look for these outputs.
4. The recorded images are ready for editing.

Use Case for Destructive Mode (LCC Look File)

An example for a good application of the destructive mode is the use of the so-called Low Contrast Curve Look File (LCC). This Look File contains a custom tone map curve that creates a video image with lower contrast compared to the standard Rec 709 output. As a result, the image holds as much dynamic range information as possible, without using Log C encoding. Highlight definition and some black detail that would be lost in the typical Rec 709 tone mapping can still be accessed. No Log C encoding means that there is no need for Log C to Video dailies conversion using 3D LUTs. For a final image, the footage only needs little color correction adjustments to restore a visually appealing contrast. This is comparable to a technical light or one-light telecine transfer of a film negative – and if ASC CDL controls are used – followed by tape-to-tape color correction.

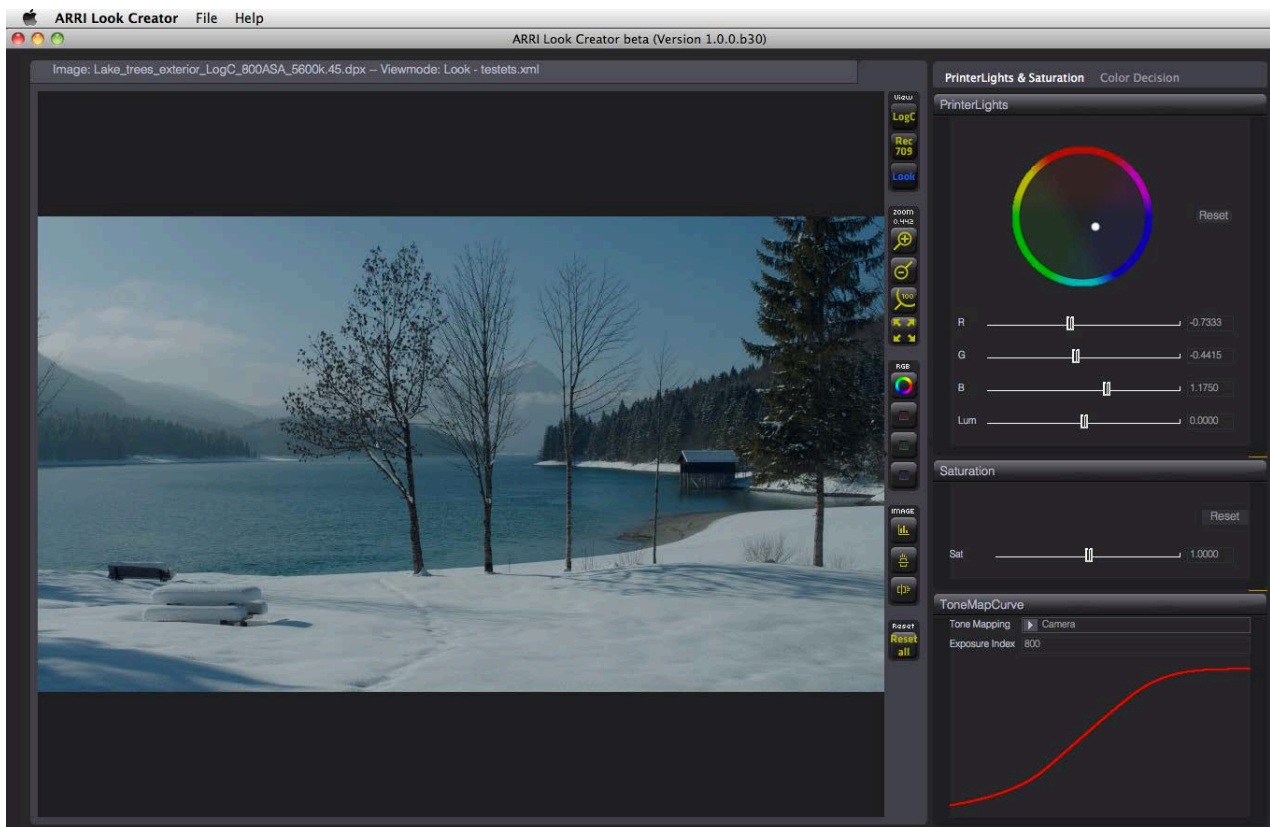
LCC Step by Step

1. Use the LCC tone map curve to generate a soft video image.
2. Apply ASC CDL controls if desired.
3. Set MON OUT, SxS and/or REC OUT gamma to Rec709 and activate the look for these outputs.
4. The recorded images are ready for editing.
5. Master in the same format or convert to an uncompressed video format.
6. Apply color correction in "linear" or video mode. No 3D lookup-tables (3D LUT) are needed for this workflow.

ARRI Look Creator

The ARRI Look Creator is a MAC OS X application, which can create Look Files for ALEXA.

You are invited to download it here: http://www.arri.com/camera/digital_cameras/downloads/ where you will also find the ARRI Look Creator Quick Guide.



Format of ARRI Look Files

The ARRI Look Files use XML file formatting. If a parameter is not specified or absent, the default value will be used.

Example

The following ARRI Look File contains the default values for all parameters.

```
• <adicam version="1.0" camera="alexa">
• <Saturation>
• <!-- A value from 0.0 to 2.0. Default 1.0 -->
• 1.0
• </Saturation>
• <PrinterLight>
• <!-- Offsets applied to Log C data -->
• <!-- Three values from -1.0 to 1.0. Default 0.0 -->
• 0.0 0.0 0.0
• </PrinterLight>
• <ToneMapLut rows="4096" cols="1">
• 0
• 1
• 2
• ...
• 4093
• 4094
• 4095
• </ToneMapLut>
• <SOPNode>
• <!-- Three values each for R, G, and B -->
• <Slope>1.0 1.0 1.0</Slope>
• <Offset>0.0 0.0 0.0</Offset>
• <Power>1.0 1.0 1.0</Power>
• </SOPNode>
• </adicam>
```