ALEXA LF / ALEXA SXT / ALEXA 65 / AMIRA / ALEXA Mini

ARRIRAW Converter 3.5.3.5 (CMD)

USER MANUAL

Date: 12 February 2018

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1 ARC CMD Usage

The ARRIRAW converter CMD (hereafter referred to as “ARC CMD”) is a command line tool using the ARRIRAW SDK to convert ARRIRAW images into different file formats. Using a XML based configuration file (the so called short settings), parameters affecting the rendering output can be set.

The settings are explained in more detail in the ARRIRAW SDK documentation.

1.1 Package content

The ARC_CMD is delivered as a package of two (CPU only) or three files:

- ARC_CMD: the main binary, call it for image processing
- Shortsettings.xml: sample configuration file. For documentation purposes, all parameters are shown and commented in it. For a more detailed documentation, this document was created.
- libcudart.dll/so/dylib (optional): builds supporting CUDA necessarily come with the CUDA runtime library libcudart.dll/so/dylib. To ensure the functionality of the ARC_CMD, place this library to a location which is present in the LD_LIBRARY_PATH, DYLD_LIBRARY_PATH or PATH environment variable, according to your operating system, and create an appropriate symbolic link, taking the CUDA version in account (e.g. libcudart.so.8.0 or libcudart.8.0.dylib).

1.2 Command Line Parameters

Possible command line parameters are:

```
-h [ --help ]                 Show this message and exit.
-v [ --version ]              Output version information and exit.
-c [ --config ] arg           Filename of the ArriRaw decoder settings config file
                              (if not set, the settings will be read from the
                              ARRIRAW header).
-i [ --input-file ] arg       input file(s) (--inputfile resp. -i is optional)
                              Cannot be used together with -f.
-f [ --list-file ] arg        text file containing the list of ARRIRAW files to
                              render. Must be a text file containing one ARRIRAW
                              file name per line. Cannot be used together with -i.
--output.directory arg        set or override output directory
--output.filename arg         set or override output filename
--output.format arg           set or override output format
--output.exrcompression arg   set or override compression for exr output format
--output.startnumber arg      set or override output start number
--performance.processors arg  number of CPU cores to be used
--performance.rendermode arg  Name of the render mode (cpu or gpu)
--cpu                         shortcut for --performance.rendermode cpu
--gpu                         shortcut for --performance.rendermode gpu
--gpuNumber arg               select GPU device number (only available on Apple
                              systems)
--monochrome                  sets or overrides colorspace to LogC monochrome.
--verbose                     enables verbose output
--test.forcelocalimagedata    internal option, significantly lowers
                              performance
-r [ --range ] arg            Select index range, e.g. -r 5-17, or -r first|last.
                              Only relevant for MXF/ARRIRAW files
```

A typical command line expression in Linux and Mac OS X is:

```
>/path/to/ARC_CMD -c shortsettings.xml –I
/path/Images/ArriRaw/TestImages_001*.ari
```

In Windows, you can use a cygwin bash shell, for which the syntax is similar to the one above:

```
$/cygdrive/c/path/to/ARC_CMD_Win32 -c /cygdrive/c/path/to/shortsettings.xml -i
/cygdrive/c/Images/ArriRaw/TestImages_001*.ari
```

Under Windows, you can also use a command line prompt (cmd), for which the syntax is:

```
>C:\path\to\ARC_CMD_Win32.exe -c C:\path\to\shortsettings.xml -i
C:\path\to\ari\images\0000.ari C:\path\to\ari\images\0001.ari
```

Note that the windows command line prompt will not let you use wildcards like `*.ari`.

IMPORTANT: If the number of ARRIRAW files to render is large and you are using the `-i` option, you might see the error message "Argument list too long". In that case, the workaround is to create a file containing the list of ARRIRAW files that have to be rendered and to use this file as input for the command line option `-f`. You can do that in a cygwin bash shell, a Linux or a Mac OS X terminal:

```
$ls /path/to/ari/images/*.ari > ari_file_list.txt
$/path/to/ARC_CMD -c /path/to/shortsettings.xml -f ari_file_list.txt
```

or

```
$ cd /path/to/ari/images
$ ls | sed "s#^#`pwd`/#" > ari_file_list.txt
$/path/to/ARC_CMD -c /path/to/shortsettings.xml -f ari_file_list.txt
```

The input sequence can also be specified in the short settings XML file (see section 2.8 Input). In that case, neither `-i` nor `-f` is required. However, if you still specify an input sequence using `-i` or `-f`, the sequence in the XML file will be ignored.

Unless specified otherwise, the converted files will be written in the directory where the ARC CMD executable has been called. The same file name as the input images will be used, with the output format dependent file extension. If you wish to change this behavior, you can use the <output> block described in section 2.9 Output.

If no decoder settings XML file is specified, the values to render the image will be taken from the ARRIRAW header.

If an error occurs while writing the output files, the rendering process will stop.

2 Configuration XML

The configuration XML is logically structured into different sections. A complete configuration XML example is shown in Appendix A.

2.1 Whitebalance

Optional block configuring the whitebalance settings.

If not present, values from the ARRIRAW V3 file header will be taken.

```
<whitebalance>
      <param name="burntinred"           value="1.0" />
      <param name="burntingreen"         value="1.0" />
      <param name="burntinblue"          value="1.0" />
      <param name="desiredred"           value="1.0" />
      <param name="desiredgreen"         value="1.0" />
      <param name="desiredblue"          value="1.0" />
      <param name="WBappliedincamera"    value="false" />
      <param name="usecctandtint"        value="false" />
</whitebalance>
```

2.2 Colorhandling

Optional block configuring settings for colour handling.

If not present, values from the ARRIRAW V3 file header will be taken.

```
<colorhandling>
      <param name="colorencodingrange"   value="fullRange" />
      <param name="colorspace"           value="ITU709" />
      <param name="illumination"         value="planck" />
      <param name="colorblending"        value="1.0" />
      <param name="cct"                  value="5600.0" />
      <param name="tint"                 value="0.0" />
      <param name="colorimetry"          value="ALEXA" />
</colorhandling>
```

Colorencodingrange (fullrange), illumination (planck), and colorblending (1.0) only support the named values at the moment.

Supported colorspace parameter are:

- **ITU709** (encoding Video)
- **P3** (encoding Video)
- **Video_ITU2020** (encoding Video)
- **Video_DCID60** (encoding Video)
- **Video_DCID65** (encoding Video)
- **Video_ITU2100_PQ** (encoding Video)
- **Video_ITU2100_HLG** (encoding Video)
- **CameraNative** (encoding LogC)
- **WideGamut** (encoding LogC)
- **Film** (encoding LogC)
- **ACES** (encoding scene linear)
- **LogC_Monochrome** (encoding LogC)
- **Video_Monochrome** (encoding Video)
- **SceneLinear_WideGamut** (encoding scene linear)

- **SceneLinear_CameraNative** (encoding scene linear)

"Colorimetry" stands for the colorimetric dataset that is used in the processing. For certain cameras and sensors different colorimetric sets may exist and can then be switched with this parameter. Currently available values: ALEXA, ALEXA65, ALEXA_LF, AMIRA, ALEXA_MINI. Note that these values will only work with the corresponding camera type.

All other values are present in the ARRIRAW V3 file header or will be set depending on the ARRIRAW V3 header values.

2.3 Asalut

Optional block setting the ISO value.

If not present, the value from ARRIRAW V3 file header will be taken.

```
<asalut>
      <param name="iso" value="200" />
</asalut>
```

2.4 Downscale

Optional block configuring downscale parameters.

```
<downscale>
      <param name="mode"            value="TWO_K_FROM_2868PX" />
      <param name="anamorph"        value="1.0" />
      <param name="crispness"       value="1.0" />
</downscale>
```

If not present, for anamorph and crispness values from the ARRIRAW V3 file header will be taken; the mode will then be set to TWO_K_FROM_2880PX for 2.8k images and to TWO_K_1_78_FROM_3414PX for a 3.4k image, which results in the output of a 2K image.

Possible values for the mode parameter are:

- NATIVE_3414PX, NATIVE_2880PX, NATIVE_2868PX, NATIVE_2578PX, NATIVE_6560PX, NATIVE_5120PX, NATIVE_4320PX, NATIVE_3168PX, NATIVE_3424PX, NATIVE_2592PX, NATIVE_3200PX, NATIVE_1920PX, NATIVE_3840PX, NATIVE_4448PX, NATIVE_SCOPE_4448PX
- SD_FROM_2880PX,
- HD_1_78_FROM_3414PX , HD_1_85_FROM_3414PX, HD_2_39_FROM_3414PX, HD_1_78_FROM_2880PX, HD_2_39_FROM_2880PX, HD_2_39_FROM_2578PX, HD_FROM_2880PX, HD_FROM_6560PX, HD_2_39_FROM_6560PX, HD_1_85_FROM_6560PX, HD_1_78_FROM_6560PX, HD_FROM_5120PX, HD_2_39_FROM_5120PX, HD_1_85_FROM_5120PX, HD_1_78_FROM_5120PX, HD_FROM_4320PX, HD_2_39_FROM_4320PX, HD_1_85_FROM_4320PX, HD_1_78_FROM_4320PX, HD_FROM_3168PX, HD_FROM_3200PX, HD_FROM_1920PX, HD_FROM_3840PX, HD_FROM_4448PX, HD_FROM_SCOPE_4448PX, HD_1_78_FROM_3840PX, HD_1_78_FROM_4448PX, HD_1_85_FROM_4448PX, HD_2_39_FROM_4448PX
- TWO_K_1_78_FROM_3414PX, TWO_K_DCI_1_85_FROM_3414PX, TWO_K_1_85_FROM_3414PX, TWO_K_2_39_FROM_3414PX, TWO_K_DCI_1_85_FROM_2880PX, TWO_K_FROM_2880PX, TWO_K_FROM_2868PX, TWO_K_1_78_FROM_2880PX, TWO_K_1_78_FROM_2868PX, TWO_K_2_39_FROM_2880PX, TWO_K_2_39_FROM_2578PX, TWO_K_FROM_6560PX, TWO_K_2_39_FROM_6560PX, TWO_K_1_85_FROM_6560PX, TWO_K_DCI_1_85_FROM_6560PX, TWO_K_1_78_FROM_6560PX, TWO_K_FROM_5120PX, TWO_K_2_39_FROM_5120PX, TWO_K_1_85_FROM_5120PX, TWO_K_DCI_1_85_FROM_5120PX, TWO_K_1_78_FROM_5120PX, TWO_K_FROM_4320PX, TWO_K_2_39_FROM_4320PX, TWO_K_1_85_FROM_4320PX, TWO_K_DCI_1_85_FROM_4320PX, TWO_K_1_78_FROM_4320PX, TWO_K_FROM_3168PX, TWO_K_FROM_3200PX, TWO_K_FROM_3840PX, TWO_K_FROM_4448PX, TWO_K_1_78_FROM_3840PX, TWO_K_DCI_1_85_FROM_3840PX, TWO_K_DCI_1_85_FROM_4448PX, TWO_K_2_39_FROM_3840PX, TWO_K_2_39_FROM_SCOPE_4448PX, TWO_K_2_39_FROM_4448PX
- QUAD_HD_1_85_FROM_3414PX, QUAD_HD_2_39_FROM_3414PX, QUAD_HD_2_39_FROM_2880PX, QUAD_HD_2_39_FROM_2578PX, QUAD_HD_FROM_2880PX, QUAD_HD_FROM_6560PX, QUAD_HD_2_39_FROM_6560PX, QUAD_HD_1_85_FROM_6560PX, QUAD_HD_1_78_FROM_6560PX, QUAD_HD_FROM_5120PX, QUAD_HD_2_39_FROM_5120PX, QUAD_HD_1_85_FROM_5120PX, QUAD_HD_1_78_FROM_5120PX, QUAD_HD_FROM_4320PX, QUAD_HD_2_39_FROM_4320PX, QUAD_HD_1_85_FROM_4320PX, QUAD_HD_1_78_FROM_4320PX, QUAD_HD_FROM_3168PX, QUAD_HD_FROM_3200PX, QUAD_HD_FROM_3840PX, QUAD_HD_FROM_4448PX, QUAD_HD_1_78_FROM_3840PX, QUAD_HD_1_78_FROM_4448PX, QUAD_HD_1_85_FROM_4448PX, QUAD_HD_2_39_FROM_4448PX

- FOUR_K_DCI_1_78_FROM_3414PX, FOUR_K_1_78_FROM_3414PX, FOUR_K_DCI_1_85_FROM_3414PX, FOUR_K_1_85_FROM_3414PX, FOUR_K_2_39_FROM_3414PX, FOUR_K_2_39_FROM_2880PX, FOUR_K_FROM_2880PX, FOUR_K_DCI_1_78_FROM_2880PX, FOUR_K_DCI_1_85_FROM_2880PX, FOUR_K_2_39_FROM_2578PX, FOUR_K_FROM_6560PX, FOUR_K_2_39_FROM_6560PX, FOUR_K_1_85_FROM_6560PX, FOUR_K_DCI_1_85_FROM_6560PX, FOUR_K_1_78_FROM_6560PX, FOUR_K_FROM_5120PX, FOUR_K_2_39_FROM_5120PX, FOUR_K_1_85_FROM_5120PX, FOUR_K_DCI_1_85_FROM_5120PX, FOUR_K_1_78_FROM_5120PX, FOUR_K_FROM_4320PX, FOUR_K_2_39_FROM_4320PX, FOUR_K_1_85_FROM_4320PX, FOUR_K_DCI_1_85_FROM_4320PX, FOUR_K_1_78_FROM_4320PX, FOUR_K_FROM_3168PX, FOUR_K_FROM_3200PX, FOUR_K_FROM_4448PX, FOUR_K_DCI_1_85_FROM_3840PX, FOUR_K_DCI_1_85_FROM_4448PX, FOUR_K_2_39_FROM_3840PX, FOUR_K_2_39_FROM_SCOPE_4448PX, FOUR_K_2_39_FROM_4448PX

The parameter “factor” is deprecated and was dropped in a former release. Please use the following downscale modes instead:

1.0 -> NATIVE_2880PX
1.40 -> TWO_K_FROM_2880PX
1.50 -> HD_FROM_2880PX
3.75 -> SD_FROM_2880PX.

2.5 Camera

Optional block describing the cameratype.

If not present, the value from the ARRIRAW V3 file header will be taken.

```
<camera>
      <param name="cameratype" value="D21" />
      <param name="inputContainer" value="FullOpenGate" />
</camera>
```

Values for the parameter cameratype can be “D20,” “D21”, “ALEXA”, “ALEXA65”, “ALEXA_LF”, “ALEXA_MINI”, or “AMIRA”

Values for the parameter inputContainer can be “FullOpenGate”, “OpenGateWith4by3”, “OpenGateWith6by5”, ”OpenGateWith8by9” or “Classic16by9”

2.6 Orientation

Optional block describing possible flipping and rotation. If not present, the value from the ARRIRAW V3 header will be taken.

```
<orientation>
      <param name="flip" value="none" />
</orientation>
```

Values for flip may be none, horizontal, vertical, rotate (where “rotate” means a 180° counterclockwise rotation).

2.7 Quality

Optional block describing the output quality.

```
<quality>
      <param name="mode" value="HQ" />
      <param name="debayer" value="ADA-5 SW" />
      <param name="ada5finetuningred" value="100" />
      <param name="ada5finetuninggreen" value="100" />
      <param name="ada5finetuningblue" value="50" />
      <param name="denoise" value="2.5" />
</quality>
```

Possible “mode” parameters are:

- **HQ**: high quality image that also needs the longest processing time.
- **proxy1**, **proxy2:** smaller and much faster rendered images of lower quality.

If not present, “HQ” will be assumed.

The “debayer” parameter offers different (in speed and quality) debayer algorithms that can be used:

- **ADA-1 HW**: identical to the debayering used in the camera types D20, D21, and ALEXA (until SUP 6).
- **ADA-2 SW**: even higher quality debayering, but also more resource intensive.
- **ADA-3 HW**: newest ARRI Debayering Algorithm used in the ALEXA camera (SUP 7 or higher).
- **ADA-3 SW**: newest ARRI Debayering Algorithm, with again enhanced quality.
- **ADA-5 HW**: brand new ARRI Debayering Algorithm, with again enhanced quality, less complex version to be used in hardware.
- **ADA-5 SW**: brand new ARRI Debayering Algorithm, with again enhanced quality.

The “adafinetuningred/green/blue” parameters have a value range from 0 to 100 with a default of 100, 100, 50 for red, green, blue.

The “denoise” parameter describes a temporal denoising algorithm and defines its strength. Value space is from 1.0 to 3.5, default is 2.5. As this value is present in the fileheader’s metadata, use this node to either override an existing denoising strength or switch on/off the denoising overriding the fileheader’s content. If the denoising is switched of in the metadata, use a value between 1.0 and 3.5 to switch it on applying the used strength. Enter 0.0 here to switch the denoising off.

2.8 Input

Optional block describing the input sequence.

```
<input>
  <param name="sequence" value="/img/ARRIRAW/Take058_18004-18157#####.ari" />
  <param name="mxfStartFrame" value="0" />
  <param name="mxfEndFrame"   value="0" />
</input>
```

Example: To render a specific range of a sequence that consists of the files `Take058_18000.ari` … `Take058_18190.ari` but you only want to render the images from 18004 up to 18157, use the pattern `Take058_18004-18157#####.ari`.

The values for `mxfStartFrame` and `mxfEndFrame` are zero based. Using `-1` for `mxfEndFrame` means rendering to the end of the clip.

Warning: If the `-I`, the `-f` or the `-r` option has been specified in the command line, it will take precedence and this block will be ignored.

2.9 Output

Required block specifying the output settings for the rendered images.

```
<output>
      <param name="format"         value="tiff" />
      <param name="exrcompression" value="none" />
      <param name="directory"   value="./" />
      <param name="filename"    value="$inputfile#####" />
      <param name="startnumber" value="-1" />
</output>
```

The “format” parameter determines the output file format and accepts the following values: **tif**, **tiff**, **dpx**, **dpx_16bit**, **dpx_16bit_bgr**, **cineon**, **jpg**, **jpeg**, **exr,** or **openexr**. It must be set.

The “exrcompression” parameter sets the compression, that is used when writing openexr files. Possible values are **none**, **rle**, **zips**, **zip**, **piz**, **pxr24**, **b44** and **b44a**. Please note that for the ACES colour space, only **none**, **piz** and **b44a** are allowed

The “startnumber” parameter allows you to specify the start value that is used for the numbering of the output files, and must be set, too. A value of **-1** will take the original numbering of the input files, only if the -i or the -f option has not been specified in the command line. Otherwise it must be set to a value **>= 0**.

The “directory” and “filename” parameters are optional. The “directory” parameter specifies the target folder for rendered images, and the “filename” parameter specifies the naming of the output files.

The following variables can be used to specify the directory and filename:

- **$resolution**: the output resolution of the rendered images
- **$seqdir**: the source path to the sequence
- **$reel**: the reel name written in the ARRIRAW header of the file
- **$scene**: the scene name written in the ARRIRAW header of the file
- **$take**: the take name written in the ARRIRAW header of the file
- **$format**: the output format of the rendered images

2.10 Performance

Optional block to set processing performance parameters.

```
<performance>
      <param name="processors" value="8" />
      <param name="rendermode" value="GPU" />
</performance>
```

Set “processors” to the desired number of CPUs that will be used by the ARRIRAW SDK in order to increase rendering speed.

Set “rendermode” to GPU to use your graphics adapter. Depending on the performance of the graphics adapter, this can speed up rendering even more.

To force usage of CUDA, set the “rendermode” parameter to “CUDA”. This is only possible when using a NVIDIA GPU with at least CUDA 5.0 and compute capability 3.0.

2.11 Processing

Optional block that specified the color processing version.
If not present, the value from the ARRIRAW V3 file header will be taken.

```
<processing>
      <param name="version" value="5.0" />
</processing>
```

Used for compatibility reasons to different camera firmware versions.

2.12 Studio

Optional block that specifies the ND color compensation filter type for ALEXA Studio cameras.

```
<studio>
      <param name="ND-filter" value="0" />
</studio>
```

Specify the ND filter by using the value from the meta data field “ND Filter Type” which describes the used filter type or set the parameter to **0** in order to deactivate the ND filter compensation.

2.13 Look

Optional block that specifies the CDL and printer lights parameters.

```
<look>
      <param name="printerlightsRed"     value="0.0" />
      <param name="printerlightsGreen"   value="0.0" />
      <param name="printerlightsBlue"    value="0.0" />
      <param name="slopeRed"             value="1.0" />
      <param name="slopeGreen"           value="1.0" />
      <param name="slopeBlue"            value="1.0" />
      <param name="offsetRed"            value="0.0" />
      <param name="offsetGreen"          value="0.0" />
      <param name="offsetBlue"           value="0.0" />
      <param name="powerRed"             value="1.0" />
      <param name="powerGreen"           value="1.0" />
      <param name="powerBlue"            value="1.0" />
      <param name="saturation"           value="1.0" />
      <param name="customLut"            value="false"/>
      <param name="lookFileName"         value="/tmp/mylook.xml" />
      <param name="lookMode"             value="Alexa Look" />
</look>
```

The look mode describes the type of look parameters and their position in the image processing chain. “look mode” accepts the following values:

- **Alexa Look**: Look values are applied as described in the colour processing white papers.
- **CDL LogC**: CDL values (slope, offset, power and saturation) are applied on LogC image data.
- **CDL Video**: CDL values (slope, offset, power and saturation) are applied at the end of the processing chain, after colour space matrix and gamma curve.
- **None**: no look is applied

2.14 Look video parameters

```
<lookVideoParameters>
    <param name="BlackGamma"            value="0.5" />
    <param name="Knee"                  value="0.5" />
    <param name="VideoGamma"            value="1.0" />
    <param name="VideoSaturation"       value="1.0" />
    <param name="RedSaturation"         value="1.0" />
    <param name="YelSaturation"         value="1.0" />
    <param name="GrnSaturation"         value="1.0" />
    <param name="CynSaturation"         value="1.0" />
    <param name="BluSaturation"         value="1.0" />
    <param name="MagSaturation"         value="1.0" />
    <param name="RedVideoSlope"         value="1.0" />
    <param name="GrnVideoSlope"         value="1.0" />
    <param name="BluVideoSlope"         value="1.0" />
    <param name="RedVideoGamma"         value="1.0" />
    <param name="GrnVideoGamma"         value="1.0" />
    <param name="BluVideoGamma"         value="1.0" />
    <param name="RedVideoPedestal"      value="0.0" />
    <param name="GrnVideoPedestal"      value="0.0" />
    <param name="BluVideoPedestal"      value="0.0" />
</lookVideoParameters>
```

This node contains look information only available in the new Alexa SXT look, used in processing version 5.0. For details please see the ALF2 documentation.

3 Help

If you have any questions about the general process, please send an email to digitalworkflow@arri.de.

4 External libraries

This software uses the following external libraries:

libtiff www.libtiff.org

License:

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libjpeg www.jpeg.org

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libbzip2 www.bzip.org

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Julian Seward, jseward@bzip.org

bzip2/libbzip2 version 1.0.6 of 6 September 2010

libzlib www.zlib.net

License:

interface of the 'zlib' general purpose compression library version 1.2.7, May 2nd, 2012

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Mesa 3-D graphics library Version: 7.0

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```
<?xml version="1.0" encoding="Windows-1252" standalone="yes" ?>
<arri>
    <arriraw>
        <!--
            Within the shortsettings node, the ARC will be parameterised. As there is already metadata present in the ARRIRAW fileheader,
            only insert values here, that shall be changed from filehader data and default values.
        -->
        <shortsettings name="ARC" version="2">
            <whitebalance>
                <param name="burntinred"            value="1.0" />       <!-- 0.0 to 4.0 value for WB already applied in camera. 0.0 if none. Present in fileheader if WB is applied in
                                                                              camera -->
                <param name="burntingreen"          value="1.0" />       <!-- 0.0 to 4.0 value for WB already applied in camera. 0.0 if none. Present in fileheader if WB is applied in
                                                                              camera -->
                <param name="burntinblue"           value="1.0" />       <!-- 0.0 to 4.0 value for WB already applied in camera. 0.0 if none. Present in fileheader if WB is applied in
                                                                              camera -->
                <param name="desiredred"            value="1.0" />       <!-- 0.0 to 16.0 value for target WB. 0.0 if none -->
                <param name="desiredgreen"          value="1.0" />       <!-- 0.0 to 16.0 value for target WB. 0.0 if none -->
                <param name="desiredblue"           value="1.0" />       <!-- 0.0 to 16.0 value for target WB. 0.0 if none -->
                <param name="WBappliedincamera"     value="false" />     <!-- true if WB is already applied in camera (D21), otherwise false -->
                <param name="usecctandtint"         value="true" />      <!-- true if WB factors shall be computed from cct and tint, otherwise false -->
            </whitebalance>
            <colorhandling>
                <param name="colorencodingrange"    value="fullRange" /> <!-- IGNORED for now. later also legal and extended -->
                <param name="colorspace"            value="WideGamut" /> <!-- ITU709 (implies encoding video), P3 (implies encoding video), CameraNative ((implies encoding logc),
                                                                              WideGamut (implies encoding logc), ACES (implies encoding scenelinear) and Film (implies encoding logc)
                                                                              LogC_Monochrome, Video_Monochrome, SceneLinear_WideGamut, SceneLinear_CameraNative -->
                <param name="illumination"          value="planck" />    <!-- IGNORED for now. later also daylight, led, etc. -->
                <param name="colorblending"         value="1.0" />       <!-- IGNORED for now. later between 0.0 and 1.0, now not used -->
                <param name="cct"                   value="5600.0" />    <!-- correlated colour temperature, depending on camera 2000/3200 to 7000/11000. Present in fileheader -->
                <param name="tint"                  value="0.0" />       <!-- -16.0 to 16.0. Present in fileheader -->
            </colorhandling>
            <asalut>
                <param name="iso"                   value="400" />       <!-- 50 to 500/1600/3200 depending on camera. Present in fileheader -->
            </asalut>
            <downscale>
                <param name="mode"                  value="TWO_K_FROM_2868PX" />     <!-- legal values: NATIVE_3414PX, NATIVE_2880PX, NATIVE_2868PX, NATIVE_2578PX, NATIVE_6560PX,
                                                                                         NATIVE_5120PX, NATIVE_4320PX, NATIVE_3168PX, NATIVE_3424PX, NATIVE_2592PX, NATIVE_3200PX, NATIVE_1920PX,
                                                                                         NATIVE_3840PX, NATIVE_4448PX, NATIVE_SCOPE_4448PX,
                                                                                         SD_FROM_2880PX
                                                                                         HD_1_78_FROM_3414PX, HD_1_85_FROM_3414PX, HD_2_39_FROM_3414PX, HD_1_78_FROM_2880PX, HD_2_39_FROM_2880PX,
                                                                                         HD_2_39_FROM_2578PX, HD_FROM_2880PX, HD_FROM_6560PX, HD_2_39_FROM_6560PX, HD_1_85_FROM_6560PX,
                                                                                         HD_1_78_FROM_6560PX, HD_FROM_5120PX, HD_2_39_FROM_5120PX, HD_1_85_FROM_5120PX, HD_1_78_FROM_5120PX,
                                                                                         HD_FROM_4320PX, HD_2_39_FROM_4320PX, HD_1_85_FROM_4320PX, HD_1_78_FROM_4320PX, HD_FROM_3840PX,
                                                                                         HD_FROM_4448PX, HD_FROM_SCOPE_4448PX, HD_1_78_FROM_3840PX, HD_1_78_FROM_4448PX, HD_1_85_FROM_4448PX,
                                                                                         HD_2_39_FROM_4448PX,
                                                                                         TWO_K_1_78_FROM_3414PX, TWO_K_DCI_1_85_FROM_3414PX, TWO_K_1_85_FROM_3414PX, TWO_K_2_39_FROM_3414PX,
                                                                                         TWO_K_FROM_2880PX, TWO_K_FROM_2868PX, TWO_K_1_78_FROM_2880PX,
                                                                                         TWO_K_1_78_FROM_2868PX,TWO_K_2_39_FROM_2880PX, TWO_K_DCI_1_85_FROM_2880PX, TWO_K_2_39_FROM_2578PX,
                                                                                         TWO_K_FROM_6560PX,TWO_K_2_39_FROM_6560PX, TWO_K_1_85_FROM_6560PX, TWO_K_DCI_1_85_FROM_6560PX,
                                                                                         TWO_K_1_78_FROM_6560PX, TWO_K_FROM_5120PX, TWO_K_2_39_FROM_5120PX, TWO_K_1_85_FROM_5120PX,
                                                                                         TWO_K_DCI_1_85_FROM_5120PX, TWO_K_1_78_FROM_5120PX, TWO_K_FROM_4320PX, TWO_K_2_39_FROM_4320PX,
                                                                                         TWO_K_1_85_FROM_4320PX, TWO_K_DCI_1_85_FROM_4320PX, TWO_K_1_78_FROM_4320PX, TWO_K_FROM_3168PX,
                                                                                         TWO_K_FROM_3200PX, TWO_K_FROM_3840PX, TWO_K_FROM_4448PX, TWO_K_1_78_FROM_3840PX,
                                                                                         TWO_K_DCI_1_85_FROM_3840PX, TWO_K_DCI_1_85_FROM_4448PX, TWO_K_2_39_FROM_3840PX,
                                                                                         TWO_K_2_39_FROM_SCOPE_4448PX, TWO_K_2_39_FROM_4448PX,
                                                                                         QUAD_HD_1_85_FROM_3414PX, QUAD_HD_2_39_FROM_3414PX, QUAD_HD_2_39_FROM_2880PX, QUAD_HD_2_39_FROM_2578PX,
                                                                                         QUAD_HD_FROM_2880PX, QUAD_HD_FROM_6560PX, QUAD_HD_2_39_FROM_6560PX, QUAD_HD_1_85_FROM_6560PX,
                                                                                         QUAD_HD_1_78_FROM_6560PX, QUAD_HD_FROM_5120PX, QUAD_HD_2_39_FROM_5120PX, QUAD_HD_1_85_FROM_5120PX,
                                                                                         QUAD_HD_1_78_FROM_5120PX, QUAD_HD_FROM_4320PX, QUAD_HD_2_39_FROM_4320PX, QUAD_HD_1_85_FROM_4320PX,
                                                                                         QUAD_HD_1_78_FROM_4320PX,QUAD_HD_FROM_3168PX, QUAD_HD_FROM_3200PX, QUAD_HD_FROM_3840PX,
                                                                                         QUAD_HD_FROM_4448PX, QUAD_HD_1_78_FROM_3840PX, QUAD_HD_1_78_FROM_4448PX, QUAD_HD_1_85_FROM_4448PX,
                                                                                         QUAD_HD_2_39_FROM_4448PX,
                                                                                         FOUR_K_DCI_1_78_FROM_3414PX, FOUR_K_1_78_FROM_3414PX, FOUR_K_DCI_1_85_FROM_3414PX,
                                                                                         FOUR_K_1_85_FROM_3414PX, FOUR_K_2_39_FROM_3414PX, FOUR_K_DCI_1_78_FROM_2880PX,
                                                                                         FOUR_K_DCI_1_85_FROM_2880PX, FOUR_K_2_39_FROM_2880PX, FOUR_K_2_39_FROM_2578PX, FOUR_K_FROM_2880PX,
                                                                                         FOUR_K_FROM_6560PX, FOUR_K_2_39_FROM_6560PX, FOUR_K_1_85_FROM_6560PX, FOUR_K_DCI_1_85_FROM_6560PX,
                                                                                         FOUR_K_1_78_FROM_6560PX, FOUR_K_FROM_5120PX, FOUR_K_2_39_FROM_5120PX, FOUR_K_1_85_FROM_5120PX,
                                                                                         FOUR_K_DCI_1_85_FROM_5120PX, FOUR_K_1_78_FROM_5120PX, FOUR_K_FROM_4320PX, FOUR_K_2_39_FROM_4320PX,
                                                                                         FOUR_K_1_85_FROM_4320PX, FOUR_K_DCI_1_85_FROM_4320PX, FOUR_K_1_78_FROM_4320PX, FOUR_K_FROM_3168PX,
                                                                                         FOUR_K_FROM_3200PX, FOUR_K_FROM_4448PX, FOUR_K_DCI_1_85_FROM_3840PX, FOUR_K_DCI_1_85_FROM_4448PX,
```

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                                                                    FOUR_K_2_39_FROM_3840PX, FOUR_K_2_39_FROM_SCOPE_4448PX, FOUR_K_2_39_FROM_4448PX -->
    <param name="anamorph"             value="1.0" />       <!-- 1.0 for spherical footage, 1.3 and 2.0 for anamorph. Present in fileheader -->
    <param name="crispness"            value="1.0" />       <!-- 0.0 to 3.0. Present in fileheader with int values from 0 and 300 -->
</downscale>
<camera>
    <param name="cameratype"           value="ALEXA" />     <!-- ALEXA, D21, D20, ALEXA65, ALEXA_LF, ALEXA_MINI, AMIRA. Present in fileheader -->
    <param name="inputContainer"       value="FullOpenGate" /> <!-- FullOpenGate, OpenGateWith4by3, OpenGateWith6by5, OpenGateWith8by9 or Classic16by9.
                                                                    Via size of active image present in fileheader -->
</camera>
<orientation>
    <param name="flip"                 value="none" />      <!-- none, horizontal, vertical, rotate. Present in fileheader -->
</orientation>
<quality>
    <param name="mode"                 value="HQ" />        <!-- HQ, proxy2 (half size, very fast, colour not identical to HQ) or proxy1 (full size, simple debayer) -->
    <param name="debayer"              value="ADA-5 SW" />  <!-- ADA-1 HW (identical to the debayering used in the camera), ADA-2 SW (even higher quality debayering, but
                                                                also more ressource intensive),
                                                                ADA-3 HW (new ARRI Debayering Algorithm, with again enhanced quality, optimised for use in future
                                                                hardware),
                                                                ADA-3 SW (new ARRI Debayering Algorithm, with again enhanced quality)
                                                                ADA-5 HW (brand new ARRI Debayering Algorithm, with again enhanced quality, version optimised
                                                                      for use in hardware)
                                                                ADA-5 SW (brand new ARRI Debayering Algorithm, with again enhanced quality) -->
    <param name="ada5finetuningred"    value="99" />        <!-- fine tuning parameter for ADA-5 SW red channel. Values from 0 to 100, default 100 -->
    <param name="ada5finetuninggreen"  value="98" />        <!-- fine tuning parameter for ADA-5 SW green channel. Values from 0 to 100, default 100 -->
    <param name="ada5finetuningblue"   value="51" />        <!-- fine tuning parameter for ADA-5 SW blue channel. Values from 0 to 100, default 50 -->
    <param name="colourorder"          value="D21_ALEXA" /> <!-- colourorder, i.e. Bayer pattern D21_ALEXA default, present in newer file headers. Possible Values:
                                                                D21_ALEXA and ALEXA65 -->
    <param name="denoise"              value="2.5" />       <!-- denoising, available with processing version 5.0 and higher. Indicates the denoising strength. Values
                                                                possible between 1.0 and 3.5. Default is 2.5, 0.0 indicates denoising is switched off -->
</quality>
<performance>
    <param name="rendermode"           value="GPU" />       <!-- CPU or GPU. CPU means single- or multithreaded on the CPU, GPU on the grafics adapters processor. CUDA
                                                                forces the use of CUDA on an appropriate NVIDIA GPU-->
    <param name="processors"           value="16" />        <!-- number of cpu cores i.e number of parallel threads. In GPU rendermode only used for unpacking of image
                                                                data -->
</performance>
<processing>
    <param name="version"              value="4.0" />       <!-- color processing version -->
</processing>
<studio>
    <param name="ND-filter"            value="0" />         <!-- ND filter type, if ND filter was used, 0 for no ND filter. Currently only type 1 is available -->
</studio>
<look>
    <param name="printerlightsRed"     value="0.0" />          <!-- printer lights red value, range from -1.0 to 1.0 -->
    <param name="printerlightsGreen"   value="0.0" />          <!-- printer lights green value, range from -1.0 to 1.0 -->
    <param name="printerlightsBlue"    value="0.0" />          <!-- printer lights blue value, range from -1.0 to 1.0 -->
    <param name="slopeRed"             value="1.0" />          <!-- CDL slope red value, range from 0.5 to 2.0 -->
    <param name="slopeGreen"           value="1.0" />          <!-- CDL slope green value, range from 0.5 to 2.0 -->
    <param name="slopeBlue"            value="1.0" />          <!-- CDL slope blue value, range from 0.5 to 2.0 -->
    <param name="offsetRed"            value="0.0" />          <!-- CDL offset red value, range from -0.5 to 0.5 -->
    <param name="offsetGreen"          value="0.0" />          <!-- CDL offset green value, range from -0.5 to 0.5 -->
    <param name="offsetBlue"           value="0.0" />          <!-- CDL offset blue value, range from -0.5 to 0.5 -->
    <param name="powerRed"             value="1.0" />          <!-- CDL power red value, range from 0.5 to 2.0 -->
    <param name="powerGreen"           value="1.0" />          <!-- CDL power green value, range from 0.5 to 2.0 -->
    <param name="powerBlue"            value="1.0" />          <!-- CDL power blue value, range from 0.5 to 2.0 -->
    <param name="saturation"           value="1.0" />          <!-- saturation value, range from 0.0 to 2.0 -->
    <param name="customLut"            value="false" />        <!-- flag, if custom LUT present in look data shall be used or not -->
    <param name="lookFileName"         value="Metadata" />     <!-- Possible values: Metadata, Custom, None or a full path file name containing a look -->
    <param name="lookMode"             value="Alexa Look" />   <!-- Possible values: Alexa Look, CDL LogC, CDL Video, None -->
</look>
<lookVideoParameters>                                          <!-- This node contains look information only available in the new Alexa SXT look, used in processing
                                                                    version 5.0-->
    <param name="BlackGamma"           value="0.5" />          <!-- Tonemap parameter black gamma. Default is 0.5, range from 0.0 to 1.0 -->
    <param name="Knee"                 value="0.5" />          <!-- Tonemap parameter knee. Default is 0.5, range from 0.0 to 1.0 -->
    <param name="VideoGamma"           value="1.0" />          <!-- global video gamma. Default is 1.0, range from 0.5 to 2.0 -->
    <param name="VideoSaturation"      value="1.0" />          <!-- video saturation. Default is 1.0, range from 0.0 to 2.0 -->
    <param name="RedSaturation"        value="1.0" />          <!-- red saturation. Default is 1.0, range from 0.0 to 2.0 -->
    <param name="YelSaturation"        value="1.0" />          <!-- yellow saturation. Default is 1.0, range from 0.0 to 2.0 -->
    <param name="GrnSaturation"        value="1.0" />          <!-- green saturation. Default is 1.0, range from 0.0 to 2.0 -->
    <param name="CynSaturation"        value="1.0" />          <!-- cyan saturation. Default is 1.0, range from 0.0 to 2.0 -->
```

```
            <param name="BluSaturation"         value="1.0" />          <!-- blue  saturation. Default is 1.0, range from 0.0 to 2.0 -->
            <param name="MagSaturation"         value="1.0" />          <!-- magenta saturation. Default is 1.0, range from 0.0 to 2.0 -->
            <param name="RedVideoSlope"         value="1.0" />          <!-- red video slope. Default is 1.0, range from 0.5 to 2.0 -->
            <param name="GrnVideoSlope"         value="1.0" />          <!-- green video slope. Default is 1.0, range from 0.5 to 2.0 -->
            <param name="BluVideoSlope"         value="1.0" />          <!-- blue video slope. Default is 1.0, range from 0.5 to 2.0 -->
            <param name="RedVideoGamma"         value="1.0" />          <!-- red video gamma. Default is 1.0, range from 0.5 to 2.0 -->
            <param name="GrnVideoGamma"         value="1.0" />          <!-- green video gamma. Default is 1.0, range from 0.5 to 2.0 -->
            <param name="BluVideoGamma"         value="1.0" />          <!-- blue video gamma. Default is 1.0, range from 0.5 to 2.0 -->
            <param name="RedVideoPedestal"      value="0.0" />          <!-- red video pedestal. Default is 0.0, range from 0.0 to 1.0 -->
            <param name="GrnVideoPedestal"      value="0.0" />          <!-- green video pedestal. Default is 0.0, range from 0.0 to 1.0 -->
            <param name="BluVideoPedestal"      value="0.0" />          <!-- blue video pedestal. Default is 0.0, range from 0.0 to 1.0 -->
        </lookVideoParameters>
        <input>
            <param name="sequence"              value="/media/Build/Images/OneFramePerShot/000000.ari" /> <!-- input sequence-->
            <param name="mxfStartFrame"         value="0" />    <!-- for mxf input this is the zero-based index of the first frame to be rendered -->
            <param name="mxfEndFrame"           value="0" />    <!-- for mxf input this is the zero-based index of the last frame to be rendered.
                                                                     -1 means rendering to the end of the clip -->
        </input>
        <output>
            <param name="format"                value="dpx" />              <!-- jpeg, jpg, tiff, tif, cineon, dpx, dpx_16bit, dpx_16bit_bgr for video or logc encoding, exr,
                                                                                openexr for scenelinear encoding -->
            <param name="directory"             value="./$resolution" />    <!-- variables as in ARC GUI (except for $globaldir) -->
            <param name="filename"              value="$inputfile###" />    <!-- variables as in ARC GUI -->
            <param name="startnumber"           value="-1" />               <!-- -1 = as-source (only supported when using <input>), or integer >= 0 -->
        </output>
    </shortsettings>
  </arriraw>
</arri>
```