

# ACES Working Group Proposal

Proposal submitter  
Joshua Pines

Proposal submission date  
09/20/2019

## Description of the problem or question(s) the Working Group will be investigating

The recommended procedure for the generation of Digital Camera IDTs is detailed in Academy Procedure “P-2013-001 – Recommended Procedures for the Creation and Use of Digital Camera System Input Device Transforms (IDTs).” Practice has shown unexpectedly large variability when the same scene is captured with multiple digital cameras and converted to ACES using the manufacturers’ currently published IDTs (Exhibit A). Variability has been observed in exposure, overall white balance, and multidimensional color conversion.

Further investigation has shown that when properly constructed according to the procedure outlines in P-2013-001 the variability can be significantly smaller than what has been observed in practice (Exhibit B). Some variability is expected due to the mechanical nature of camera exposure controls (e.g. mechanical shutters, physical apertures), variable light sources (e.g. differences in light source SPDs), and non-linear relationship between the various camera spectral sensitivities and the spectral sensitivities of the ACES RICD. However, the various investigations have shown the variability exhibited in practice are significantly greater than those exhibited with careful IDT construction and testing.

In order to reduce the variability seen in practice, it is proposed a working group be formed to:

1. Determine best practices for camera manufacturers and camera operators to ensure digital camera material comes into ACES with the proper exposure and color balance. (e.g. a normally exposed 18% gray card comes into ACES as  $R=G=B=0.18$ )
2. Provide guidance and tools to supplement P-2013-001 in the creation of digital camera IDTs.

## Proposed Working Group deliverable(s)

Proposed deliverables related to #1 include:

- Documentation outlining issues and potential solutions to minimize errors in exposure and white balance associated with converting camera data to ACES.
- Test procedures to verify exposure and color balance.
- Recommendations on test equipment.

Proposed deliverables related to #2 include:

- Documentation outlining the strengths and weakness of various IDT models (e.g. 3x3 matrices, 2D LUTs, 3D LUTs, etc.).
- Offer test procedures to camera manufacturers to verify camera spectral sensitivities.
- Recommended defaults steps in P-2013-001 where options are presented.
- Recommended datasets.
- A reference implementation of the procedure specified in P-2013-001.
- Test procedures to verify the quality of an IDT.

## List of Proponents

EFILM, Technicolor, ARRI, RED, Sony, Canon, Panasonic, BlackMagic

## Anticipated core Working Group contributors

Josh Pines (chair), Joachim Zell, Joseph Goldstone.

## Anticipated Working Group lifecycle

2-4 month

## ACES Leadership Use

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- Approved
- Not approved
- Proposal modifications required

Review date

10/31/2019

### Assigned Working Group Name

Digital Camera IDT Implementation Working Group

### Assigned Working Group Lead

Josh Pines

### Supervising Technical Advisory Committee

Architecture  Implementation

### Anticipated Academy resources required

Staff administration, Staff technical support, Imaging Lab resources, Stella Stage resources

### Notes

ACES Leadership Notes