AEO-Light 2.2 (Beta)
General Information*

- AEO-Light 2 (Beta) produces a broadcast WAV file. In its current configuration it does not synchronize audio to source video/DPX. By default the program outputs dual mono sound but users can opt for stereo when such tracks are present.

- The frequency response of an input file will depend in large part on the number of pixels in the sound track region available for analysis. In general, the lower the scan resolution, the lower the frequency response. The frequency response is also limited by characteristics of the original film source.

- AEO-Light 2 (Beta) is produced with the generous support of the National Endowment for the Humanities.

- Users are encouraged to submit bug reports and issues at the GitHub repository

* This manual version, dated October 7, 2016.

AEO-Light 2.2 (Beta)
System Requirements

- AEO-Light 2 (Beta) is written in OpenGL and derives its speed and functionality from the computer's GPU. It requires OpenGL 2.0 or higher.

- Windows version: x86-64 processor; 64-bit Windows 7 or later; OpenGL 2.0

    - On Windows, AEO-Light requires an additional Microsoft Visual Studio library to run. If you don't have Microsoft Visual Studio installed already, AEO-Light may issue error messages saying that MSVCP140D.dll and VCRUNTIME140.dll are missing.To fix this, download the free Visual C++ Redistributable for Visual Studio 2015 from Microsoft—If it gives you a choice for which version, choose the x64 libraries. https://www.microsoft.com/en-us/download/details.aspx?id=48145

- Mac version: Intel processor; 64-bit OSX 10.8 or later; OpenGL 2.0

- Linux version: x86_64, Unbuntu 16.04, linux 4.4.0

fps setting for video input

Soundtrack Bounds Sliders

Frame Pitch Sliders

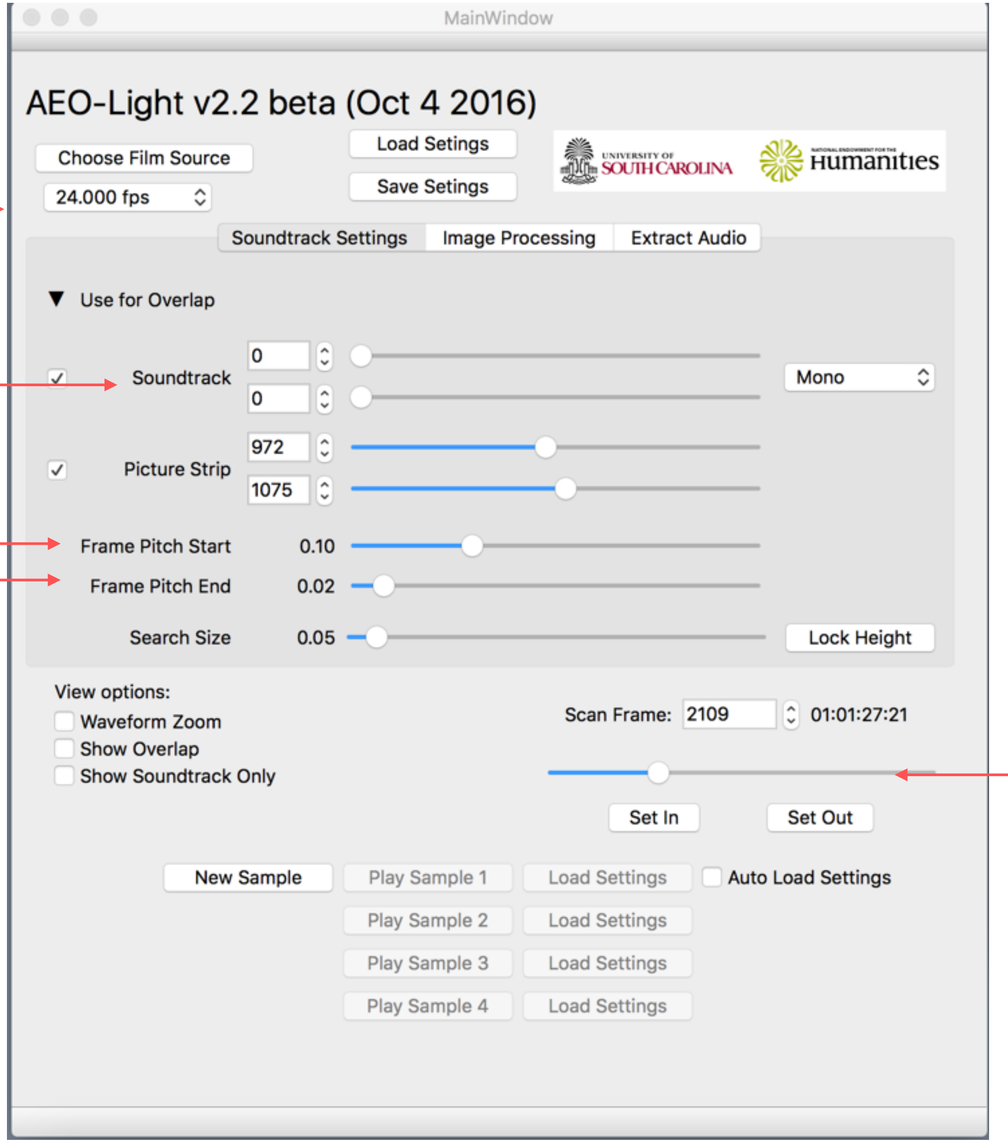


Image Sequence Slider

AEO-Light 2.2 (beta)

AEO-Light 2.2 (Beta)
Basic Operation—Soundtrack Settings Only

1) Open source file. If loading a video source, opt to buffer the video when prompted.

2) Move the “soundtrack sliders” to frame the left and right bounds of the optical track—this is an initial setting. Click through the Image Sequence slider until the sound track contains a signal.

3) Set the “frame pitch” sliders so that the top (start) and bottom (end) of the film frame is defined. Note: the entirety of the optical sound information contained vertically in a given frame region must fall between the start and end frame pitch.

4) Click on the “show track only” button at bottom of GUI. Scroll through frames to refine the adjustment for variable areas tracks to ensure there is no signal clipping. Deselect “show track only.”

AEO-Light 2.2 (Beta)
Basic Operation—Soundtrack Settings Only

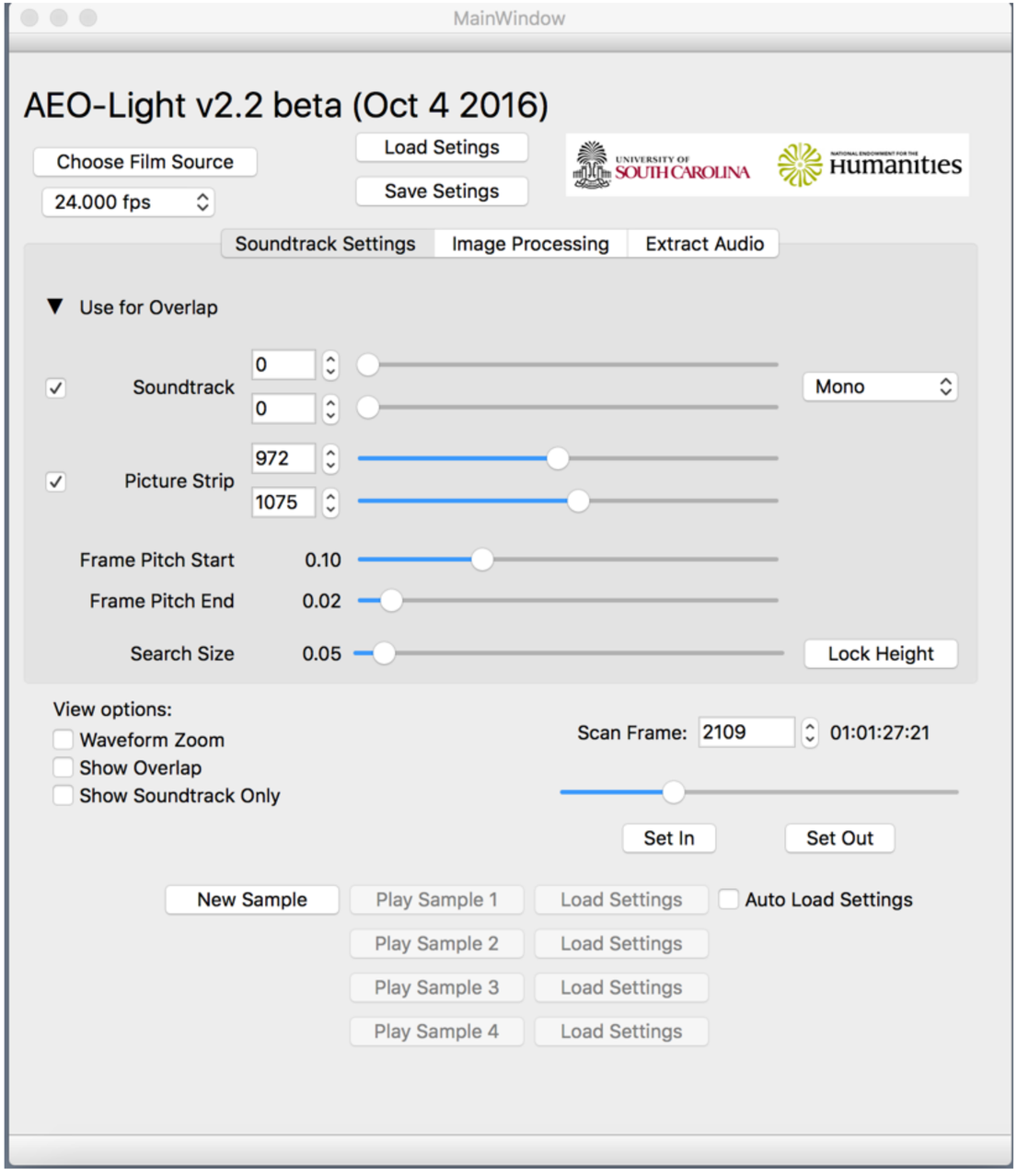
5) Test audio by selecting “new sample” button.

6) If the sample does not produce the desired output, adjust sound bounds, frame pitch and search radius as needed to improve the audio sample. In some cases additional adjustments may be required to improve audio quality—see “Image Adjustments.”

7) Extract the audio and save to a Broadcast Wave file.

STEP #1

Select input file for processing using “Choose Film Source” and then select frame rate of the source file.



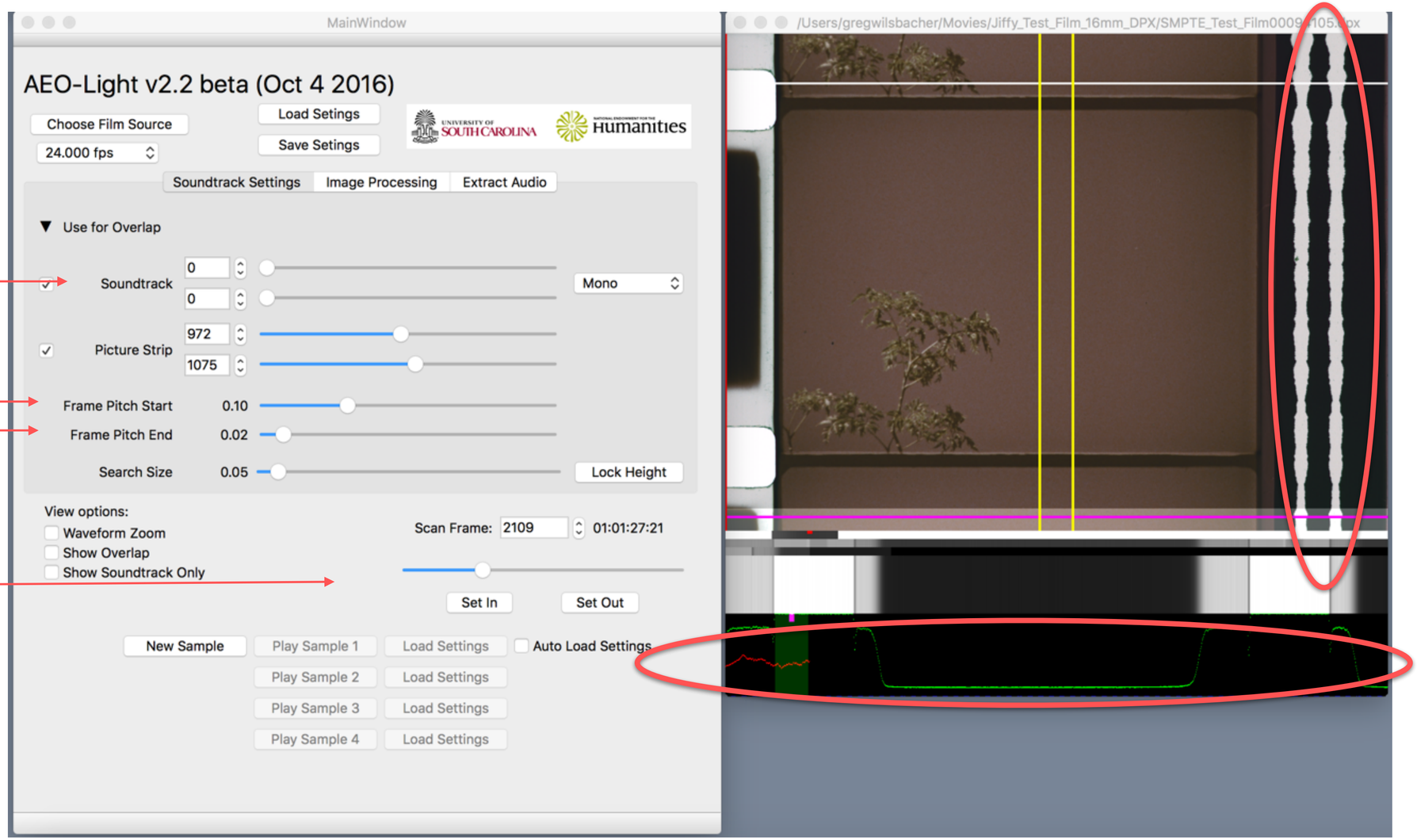
AEO-Light 2.2 (beta)

STEP #2

Soundtrack Bounds Sliders

Frame Pitch Sliders

Image
Sequence Slider

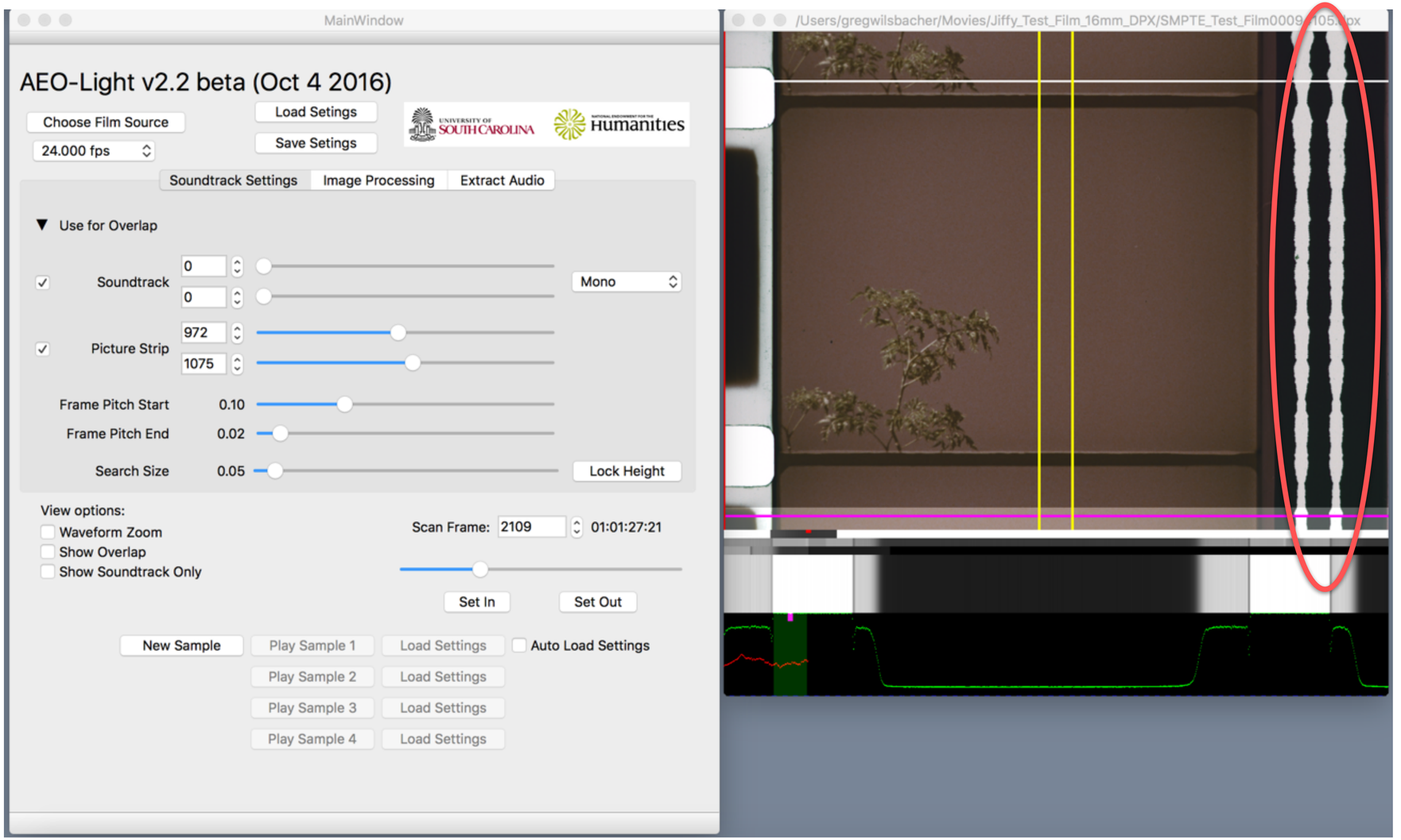


Setting the soundtrack bounds over the optical track creates a corresponding waveform in the signal processing display area.

AEO-Light 2.2 (beta)

STEP #2
(optional)

Picture Sample Bounds Sliders



The “Picture Strip” adjustment selects a region of the image area and converts this data to a wave form *as if it were an optical track*. This data is not visible to the user and is used to help refine frame overlap calculations. *This option should be unchecked for track-only films as the absence of varying data along the picture strip could skew the algorithm’s computations.*

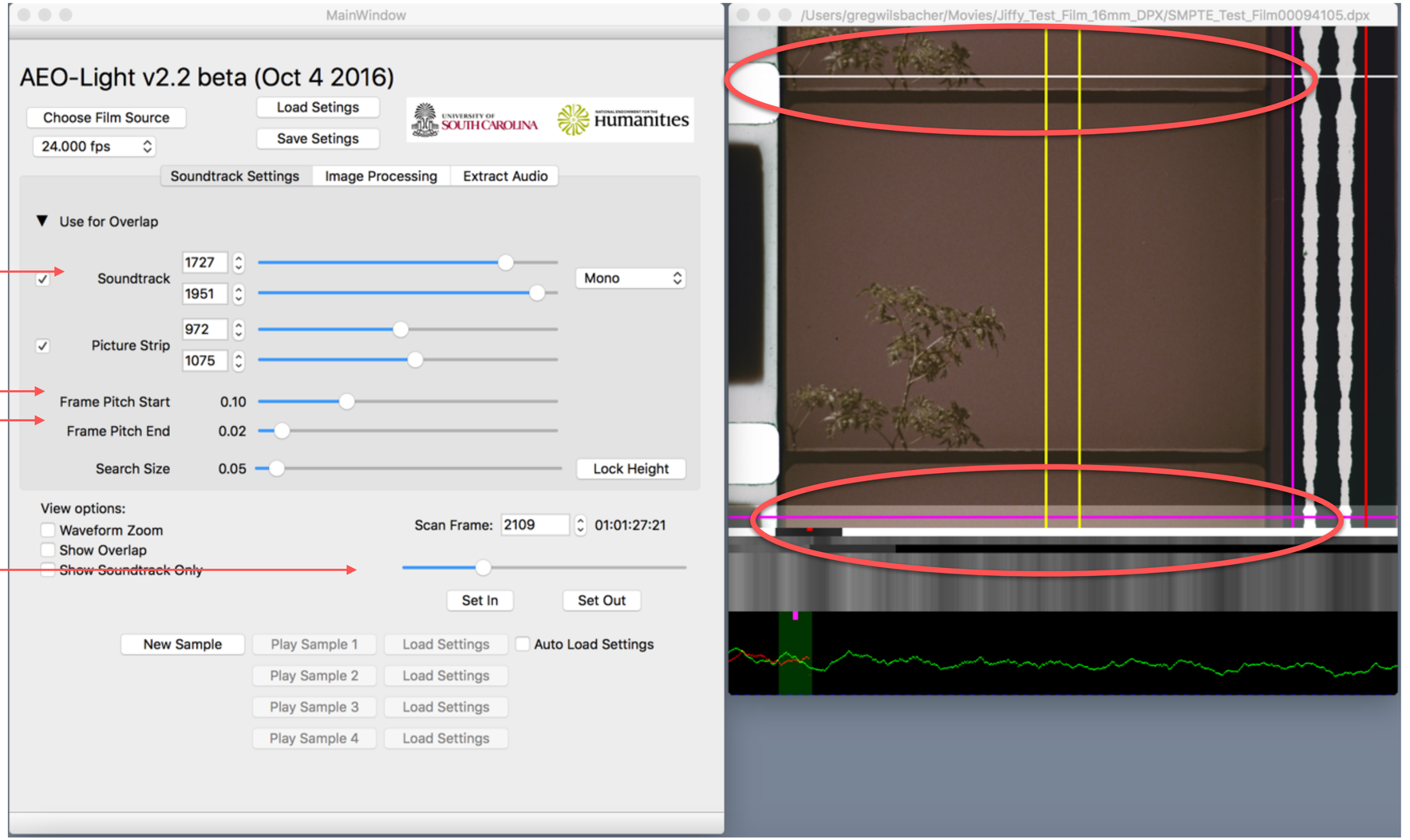
AEO-Light 2.2 (beta)

STEP #3

Soundtrack Bounds Sliders

Frame Pitch Sliders

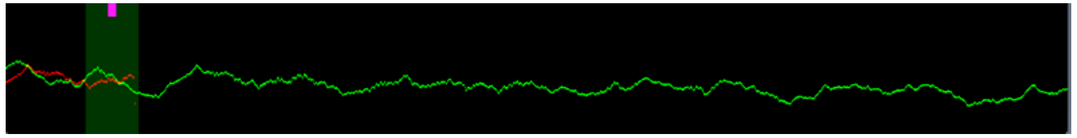
Image
Sequence Slider

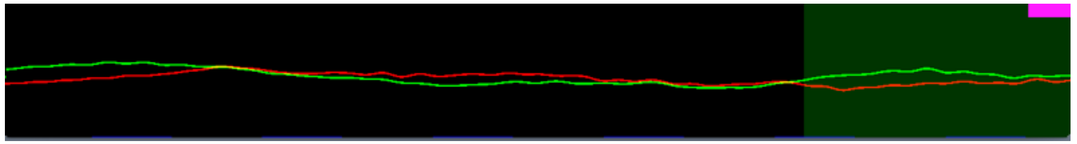


Adjust the frame pitch sliders to define the start (top) and end (bottom) of the film frame until the waveform shows a good overlap—see next page for details.

AEO-Light 2.2 (beta)

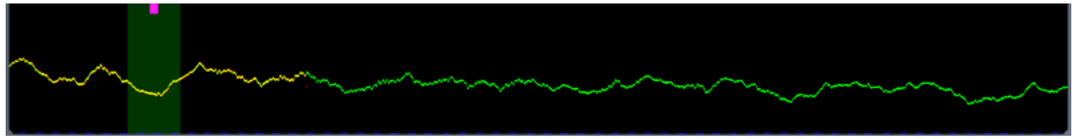
STEP #3 (details)

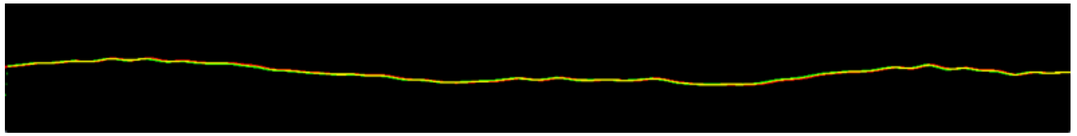




Prior to adjusting the frame pitch the signal processing window will show green (current frame) and red (previous frame) waveforms. Above left is the normal view; above right is the same frame sequence using the “Waveform Zoom” mode.

Poor Overlap





After adjusting the frame pitch to the correct location the signal processing window should show green (current frame) and yellow (previous frame) waveforms. Above left is the normal view; above right is the same frame sequence using the “Waveform Zoom” mode.

Good Overlap

Note: after adjusting the the frame pitch, click the image sequence slider forward or backward one frame to ensure that the waveform information has been refreshed.

AEO-Light 2.2 (beta)

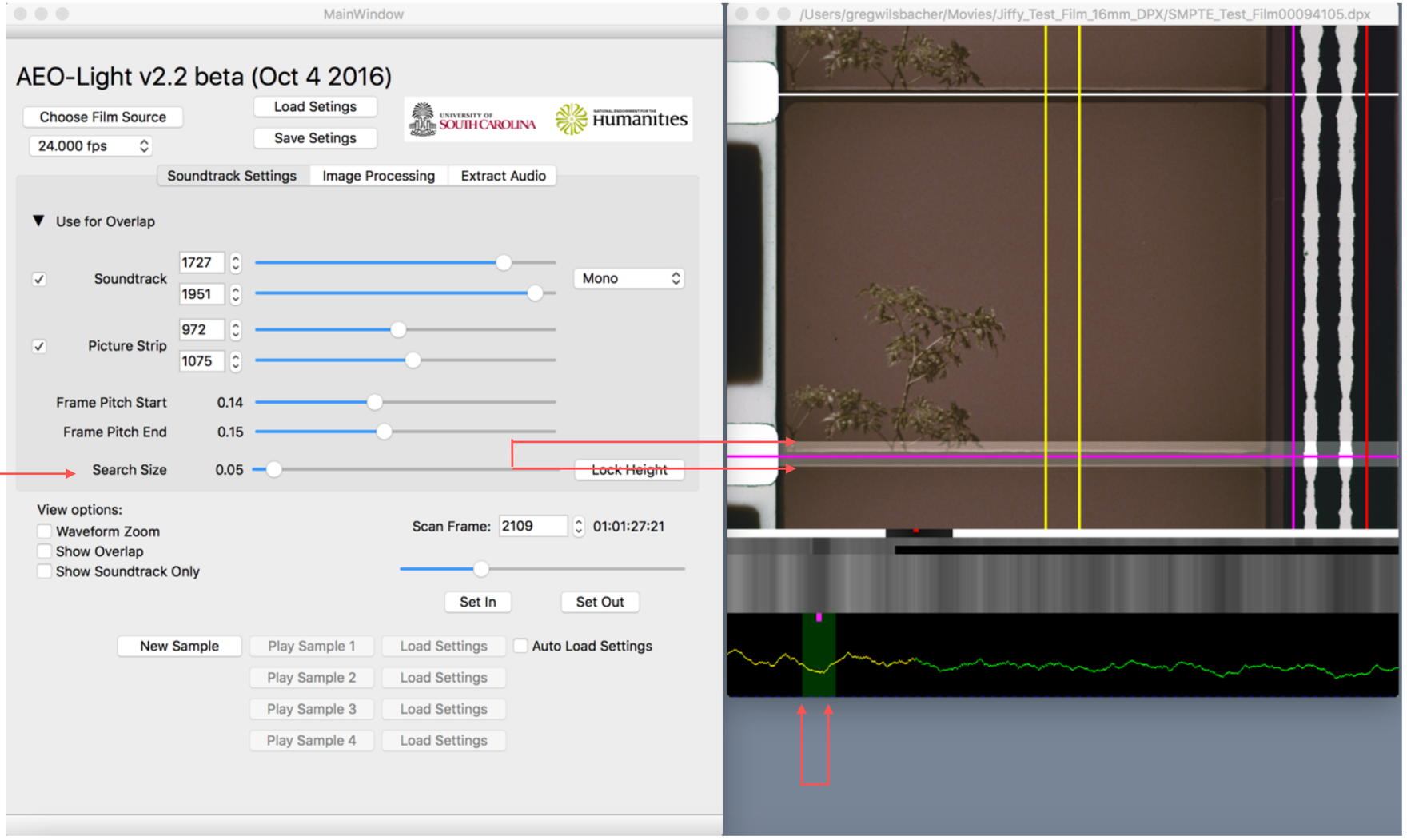
Audio of current

Audio of following

Matching overlapped

STEP #3 (details)

Search radius slider



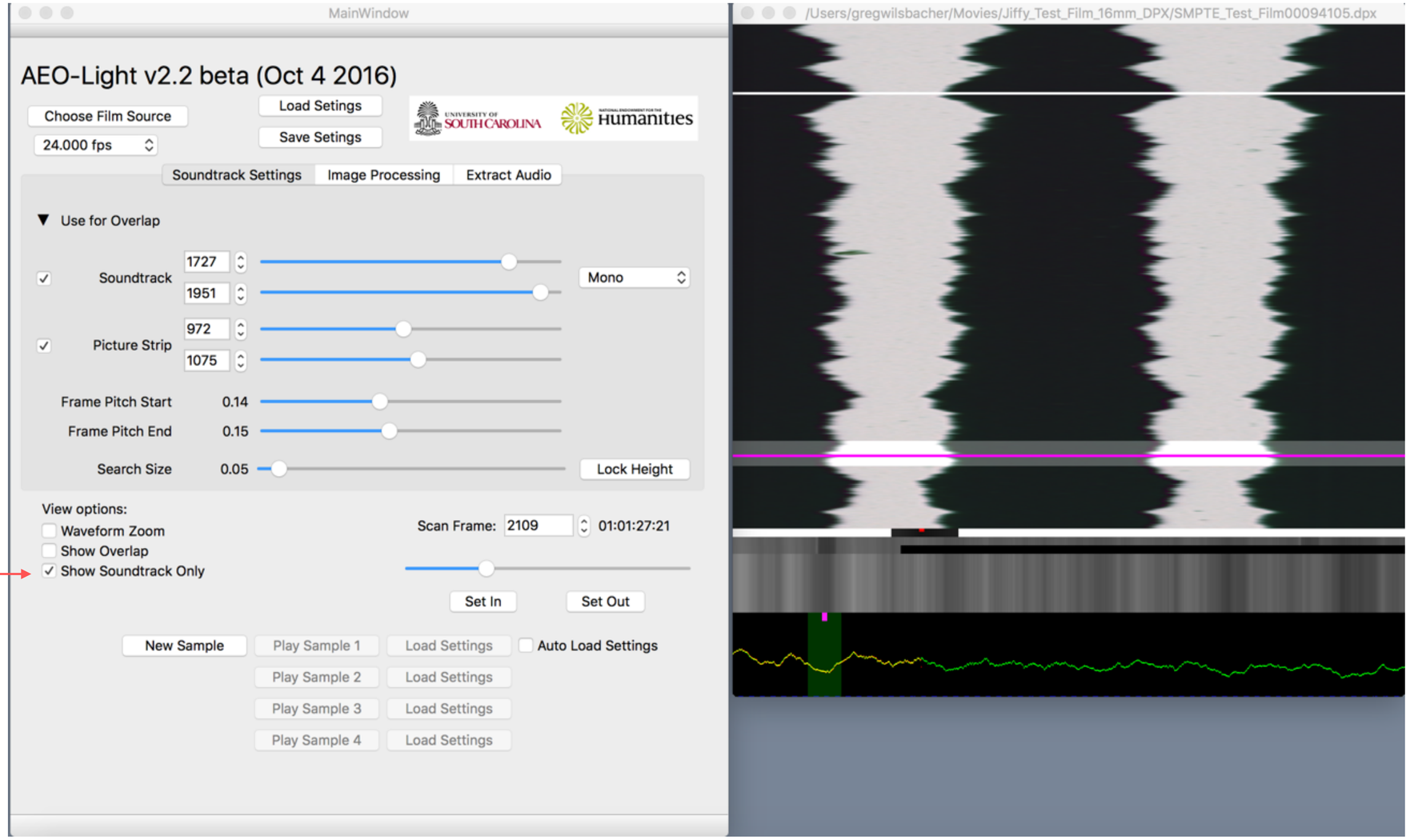
AEO-Light 2.2 (beta)

Note: The search radius for matching the overlap of every frame pair can be adjusted to accommodate vertical movement (e. g., unsteady scans). In general, it should be left at the default until testing determines that a larger or smaller radius is required.

STEP #4

No Clipping

Soundtrack Only View



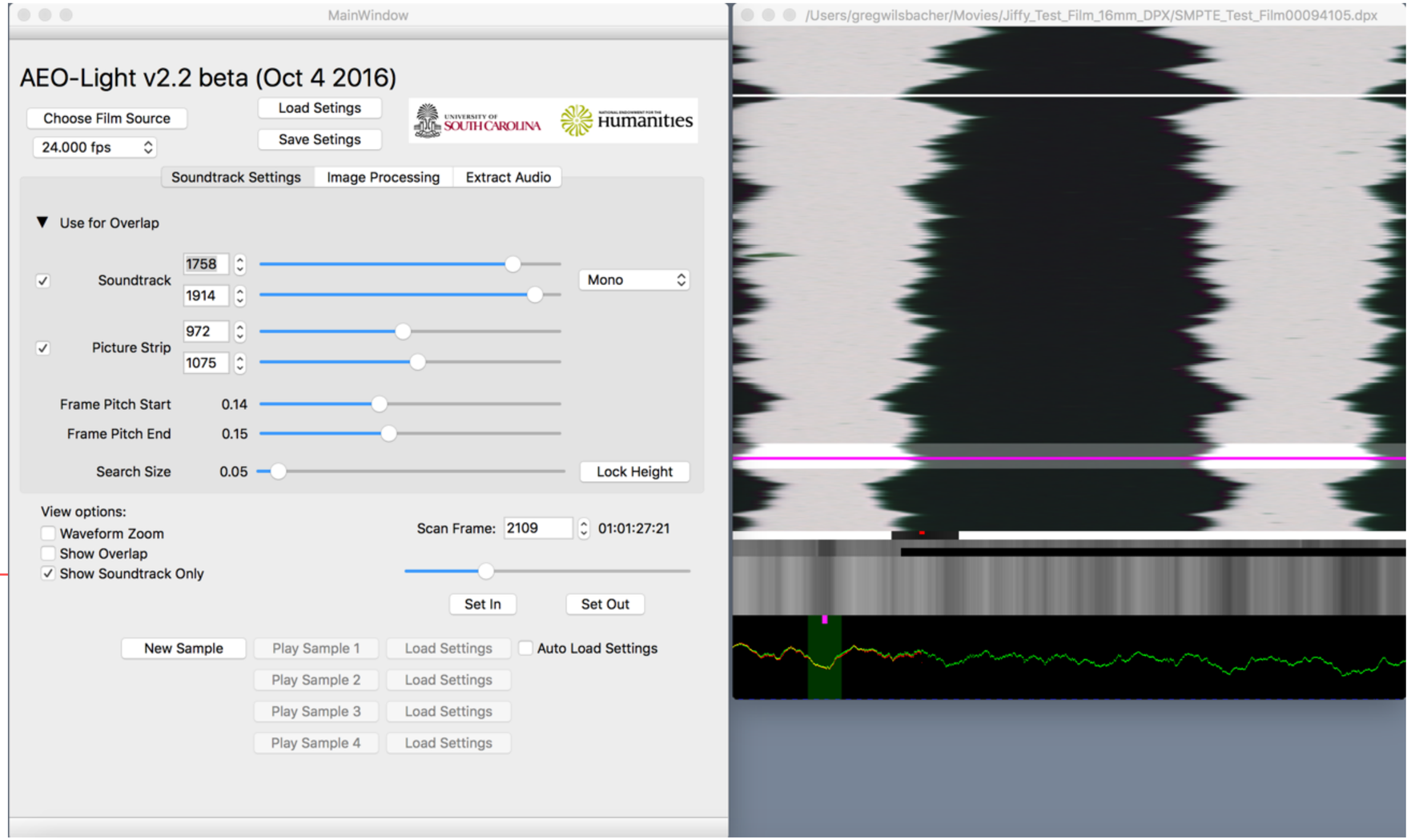
Select “Show Soundtrack Only” and scroll through the image sequence looking to see if (a) the bounding boxes remain within the optical track area of the film and (b) that the boxes are set wide enough to avoid clipping variable area tracks. Adjust the left and right soundtrack bounds as needed.

AEO-Light 2.2 (beta)

STEP #4

Clipping—poor audio

Soundtrack Only View



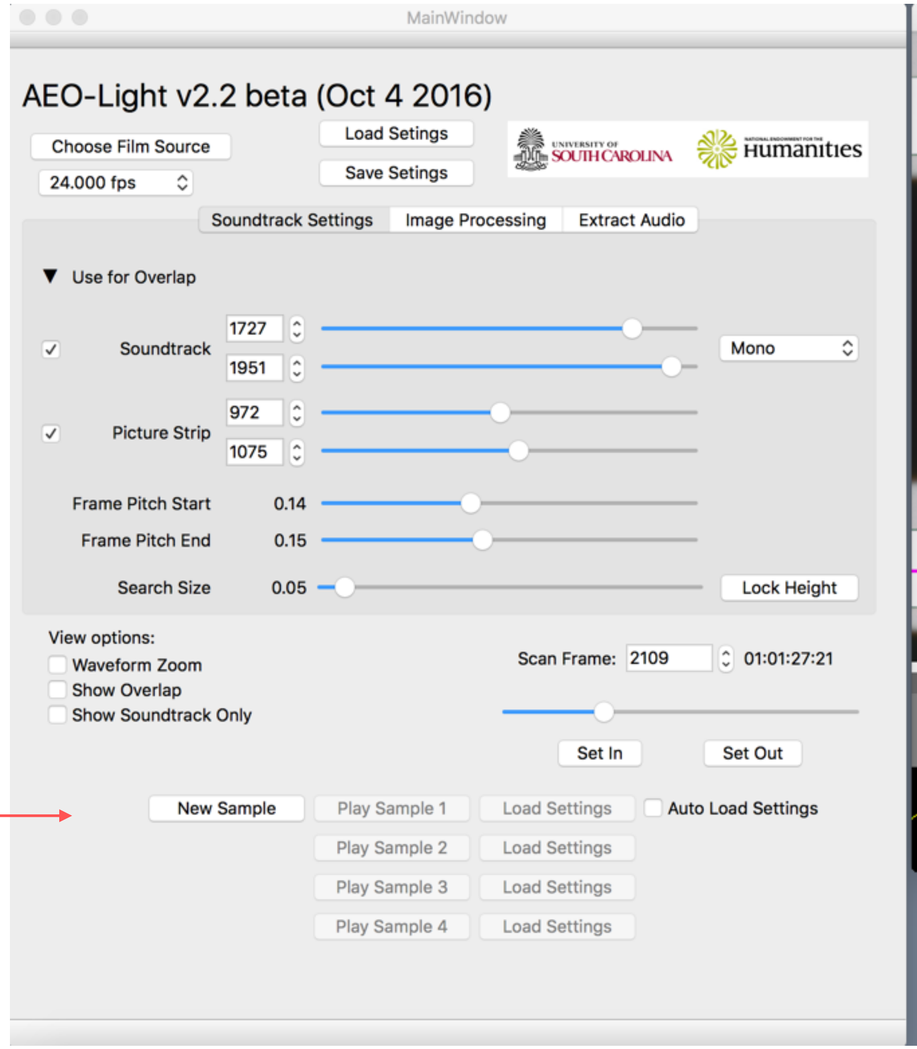
Select “Show Soundtrack Only” and scroll through the image sequence looking to see if (a) the bounding boxes remain within the optical track area of the film and (b) that the boxes are set wide enough to avoid clipping variable area tracks. Adjust the left and right soundtrack bounds as needed.

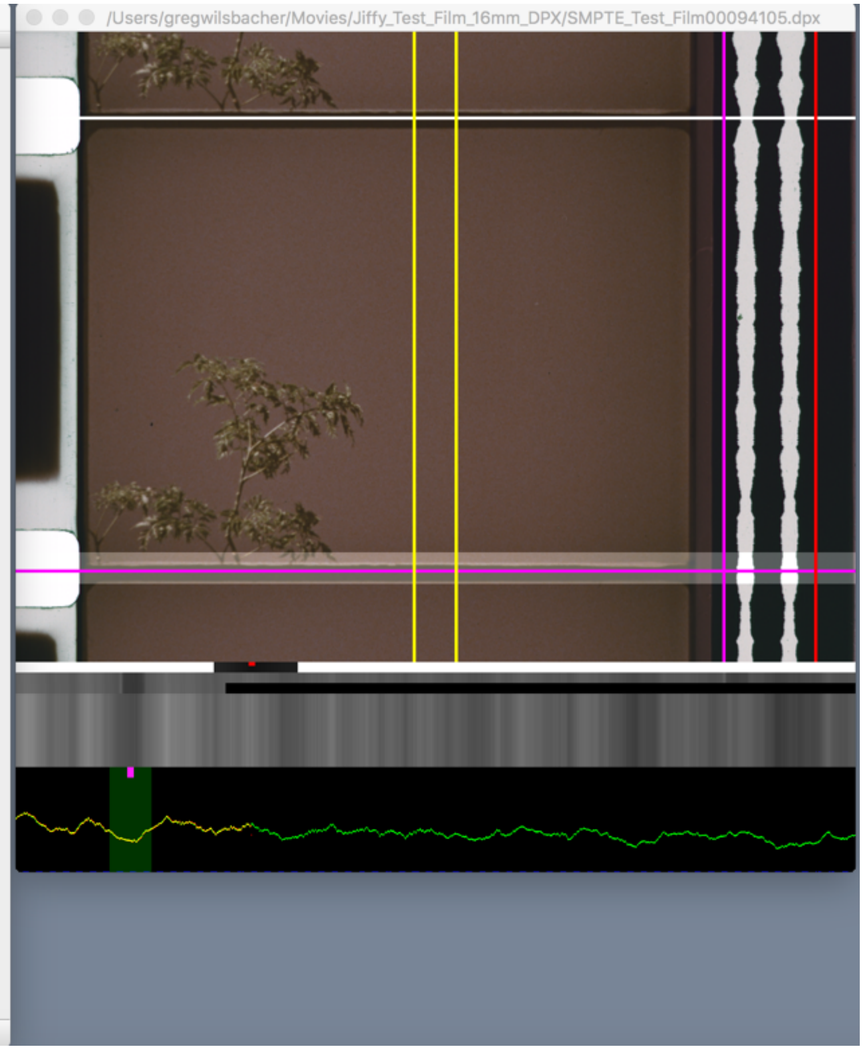
AEO-Light 2.2 (beta)

STEP #5

Listen to a test of your Audio!

Test





Test the audio extraction setting. First identify an interesting section of the track with sound and select “Set In.” Then select “New Sample.” The program will process 5 seconds of audio from the selected in point and then automatically play. It will then ask if you want to save the auto sample and settings.

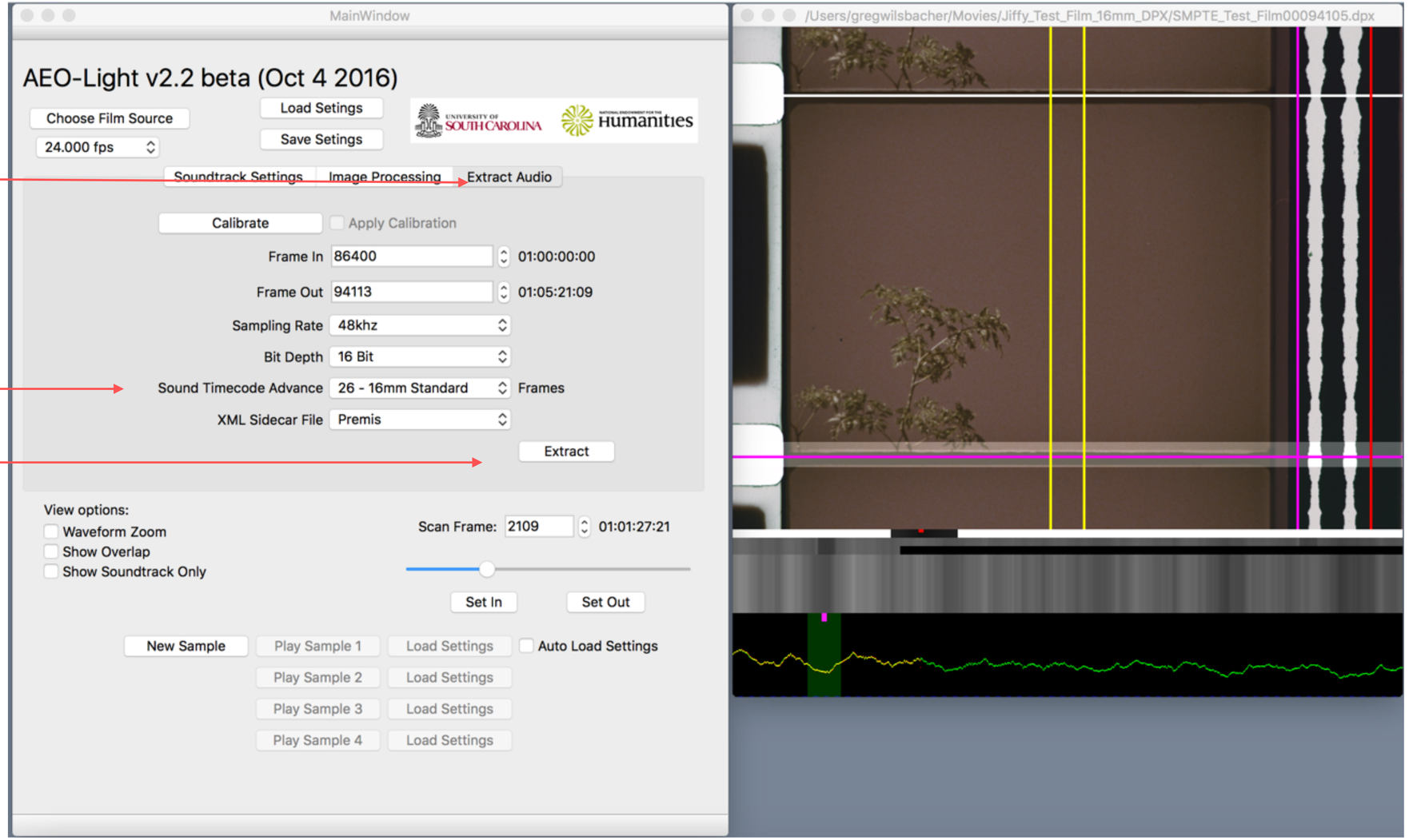
AEO-Light 2.2 (beta)

STEP #6

Audio Extract Menu

Set sound advance—for ingest into video editors

extract



Create your final audio

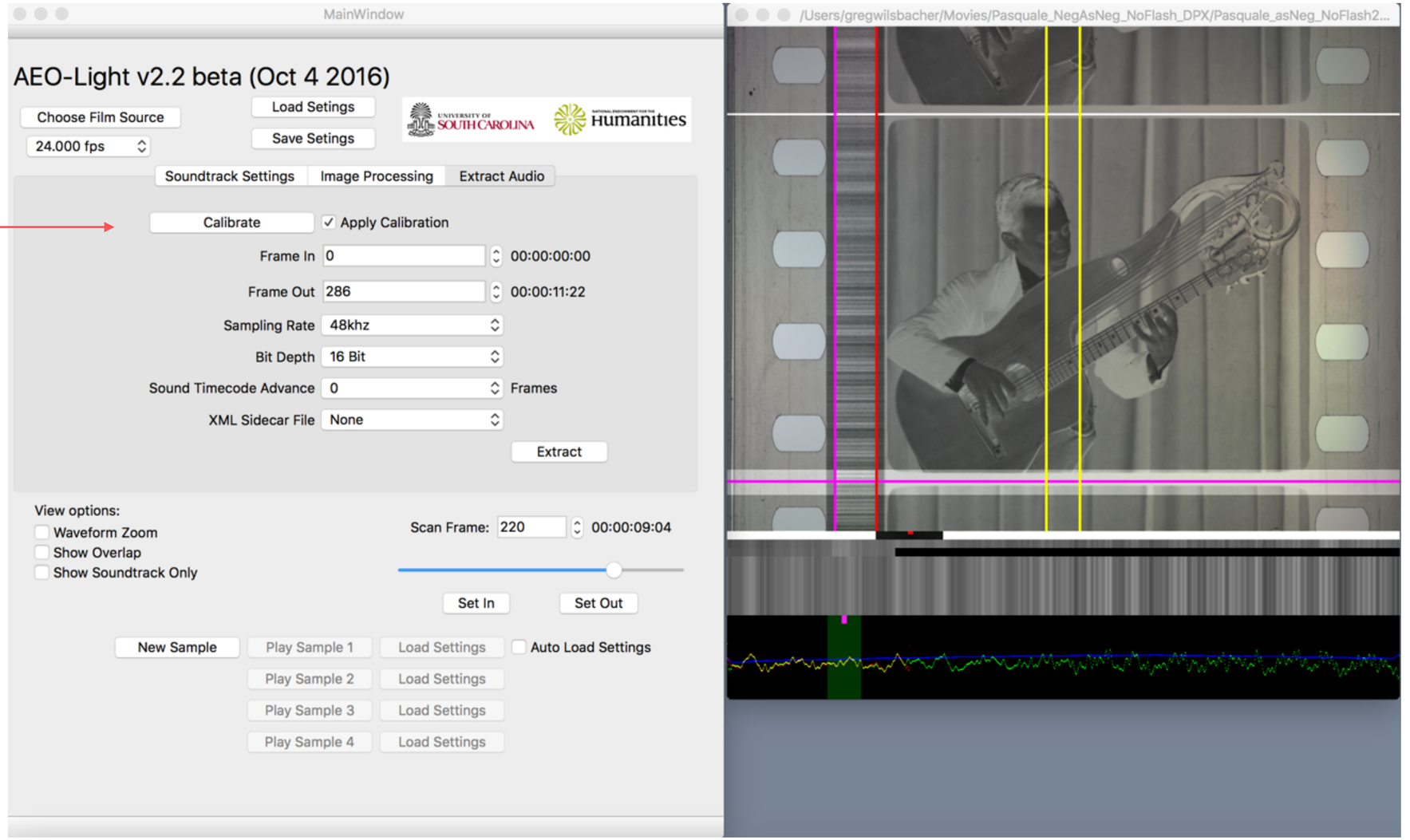
To extract the audio set the desired in and out points for the sequence and set the desired sampling rate (default is 48khz). The select “Extract” and follow the prompts to save the file. Extraction times will vary according to the the file size of the input and the GPU and CPU characteristics of the computer.

AEO-Light 2.2 (beta)

STEP #6
(optional)

calibration

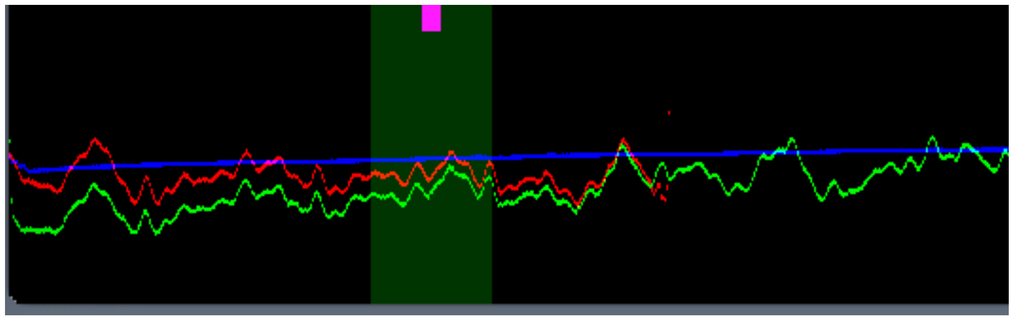
Lamp house calibration



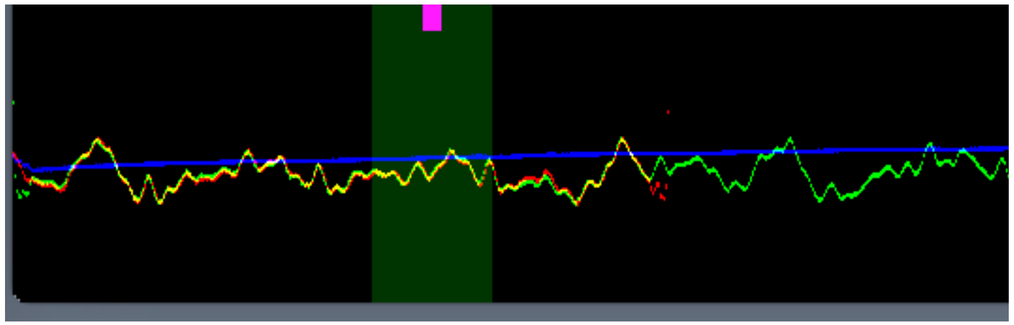
In some cases the lamp house of the film scanner may unevenly illuminate the optical track region. This can negatively impact the audio. Using the calibration feature in AEO-Light 2.x (beta) can reduce the impact of uneven illumination. Once the calibration has been performed, it can be toggled on and off. Once calibrated a blue line showing the ‘curve’ of the illumination will appear in the

AEO-Light 2.2 (beta)

STEP #6
(optional)



Poor lamp house uncalibrated—detail



Poor lamp house calibrated—detail

Note how uneven illumination impacts the audio quality. The uncalibrated signal will never overlap properly resulting in a ticking sound at each frame overlap.

AEO-Light 2.2 (beta)

AEO-Light 2.2 (Beta)
Advanced Operation—Image Processing

The “Image Processing” menu of AEO-Light provides a number of powerful tools to pre-process the audio signal to improve the quality of the final audio output.

Among other things, these tools provide the ability to:

1. compensate for negative variable density tracks using the S-tool slider to adjust the exposure curve;

2. compensate for image spread issues on negative variable area tracks using the blur/sharp tool and S-tool slider;

3. compensate for poor signal characteristics by using the lift/gamma/gain functions.

AEO-Light 2.2 (Beta)
Additional Matter

- AEO-Light 2.2 (Beta) was produced by a team from the University of South Carolina (Greg Wilsbacher, Pencho Petrushev, and L. Scott Johnson) in close consultation with Tommy Aschenbach of Video & Film Solutions). Additional support is provided by Jason Bakos and Krishna Kalusani (Computer Science and Engineering, University of South Carolina) and David Hughey (Mathematics graduate student, University of South Carolina).

- We extend our thanks to all the members of the AEO-Light 1.0 team (Mark Cooper, Borislav Karaivanov, and Brittany Braddock). Thanks go to Ashley Blewer for graphic design and to Diana Diaz for administrative support.

- We also extend thanks to our Board of Advisers: Dimitar Deliyski, Bob Heiber, Ralph Sargent and Ken Weissman.

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- AEO-Light 2.2 (Beta) uses libraries from the FFmpeg project under the GPLv2.0.