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SONY

Sony Cinema Products Corporation

Tech Note

Basic instructions for setting up the optical playback system of forward scan optical track readers.

Product: Cinema projectors with forward scan readers.
S/N:
Document: **TN99111901**, CC
Summary: Setting up the projector's optical reader.

Digital audio tracks set a very high standard of quality for theatrical sound playback. In order that the difference between sound from digital tracks and sound reproduced from a film's optical tracks is minimized it is essential that care and craft be applied to setting up the optical reader for best performance. The following notes apply to forward scan readers; reverse scan readers have related adjustments which may be slightly different for each brand. Contact the appropriate manufacturer for specific instructions.

When aligning the A-Chain inputs it is not necessary to be concerned about any automation system commands unless the automation is needed to turn on the exciter lamp. The exciter lamp voltage should initially be set to 75-85% of its rated voltage, or according to its manufacturers' recommendations. The following adjustments typically interact with each other and must be rechecked after making the initial settings.

Preliminary sound head alignment.

The first thing to do is thoroughly clean the sound head optics. Replace the exciter lamp if it is discolored or cannot be made to give even illumination across the width of the slit and when its light falls on a white card held about an inch in front of the optics. Be sure the solar cell is mounted so that the slit image falls on its upper third, away from the leads, and fills the cell without falling off the edges. The solar cell should be about 1mm (1/32 inch) behind the film. The slit image should initially be focused by eye on the surface of the film and should fall evenly across the optical tracks. The most common causes of uneven illumination are misaligned optics, dirty or aged exciter lamp, dirty optics or slit, and running the exciter lamp at a voltage that is too low.

Lateral film guide alignment.

The next step in aligning the projector's optical reader is to ensure that the optical pickup is correctly aligned to the optical tracks on the film. This is done by playing a loop of the SMPTE Buzz Track test film and adjusting the projector's lateral film guide for equal and minimum high and low frequency sound from the left and right outputs. If you are adjusting an overscanning reverse scan reader you can also make this adjustment using your X-Y oscilloscope by adjusting to equalize the lengths of the perpendicular X and Y traces.

Lateral exciter lamp alignment.

Next in setting up a forward scan reader, roll a Cat. 97 “left/right” or “crosstalk” loop and observe your dual trace oscilloscope. Adjust the lateral position of the exciter lamp to equalize the left and right signal levels. Generally this is done with the oscilloscope showing the two traces overlapped.

Lateral solar cell alignment.

Still playing the left/right loop, adjust the lateral position of the solar cell so as to achieve minimal crosstalk between left and right output outputs. This is usually done with the oscilloscope traces offset from each other.

Vertical adjustment of the exciter lamp.

Again for forward scan readers, set up your oscilloscope for X-Y display and observe your RTA. Play a black-and-white pink noise loop and adjust the vertical height of the exciter lamp to achieve the highest output and widest frequency response, favoring frequency response if necessary.

Slit lens adjustments.

Adjust the focus of the slit lens for widest frequency response as indicated on the RTA and adjust the slit lens assembly azimuth (rotation) for least amount of phase shift as indicated on the X-Y oscilloscope.

Double check evenness of illumination.

Even illumination of the optical tracks by the slit image is essential to reducing high level distortion and achieving proper matrix decoding of Lt/Rt. Falloff at the outside edges will result in high frequency loss and playback that sounds muffled. Assuring proper playback of high levels is especially important, as modern optical cameras can readily print stereo tracks at 130% modulation without loss of the septum, and this extra range is commonly utilized. To check for proper illumination, play a 100% modulation alignment film, such as the Cat. 97 left/right film, and also a 50% or 60% modulation alignment film, such as the Cat. 69T. The levels of the left signal and right signal should be equal to each other when playing either film. If they are not, the slit image is imperfect in illumination flatness or in its alignment on the solar cell. The result will be distortion of loud sounds and leakage into the surround speakers. This same test can be done using the old evenness of illumination test film, also called the “snake loop” or in Europe “scanning beam,” (SMPTE Test Film No. P35-SB) though this film was designed for mono solar cells. The most direct means of testing for evenness of illumination may be the Cat. 566 Illumination Uniformity test film. This film does not have conventional stereo tracks; instead it has six tracks of 100Hz to 4kHz spread across the entire optical track area. The Lt and Rt outputs are to be summed and sent to a spectrum analyzer, where the relative heights of the six bands gives direct indication of illumination of the slit across the entire solar cell.

Wiring check.

As a basic wiring check, slowly block the reader’s sound lens and note that the right channel level drops before the left channel.

This completes the mechanical alignment of the reader, but remember that these adjustments interact and it may be necessary to repeat these procedures to obtain the very best performance.