Advanced Guide to Using the Sekonic C-7000 for Virtual Production Calibration

Introduction

The **Sekonic C-7000 Spectrometer** is an essential tool in virtual production, allowing precise measurement of spectral properties to align **LED wall output, camera color science, and lighting conditions**. This guide provides a **step-by-step calibration workflow**, covering:

- **LED wall spectral analysis**
- **Camera color matching and LUT creation**
- **Lighting adjustments for seamless blending**
- **Troubleshooting color inconsistencies**

By following these steps, you ensure that the **LED volume, practical lights, and talent integrate seamlessly**, maintaining a photorealistic look across different production environments.

1. Equipment and Preparation

Before calibration begins, ensure you have the **correct setup** and the necessary equipment.

Essential Tools

✔ **Sekonic C-7000 Spectrometer** (for precise color measurement)
✔ **LED volume with LED control system** (Brompton Tessera, Novastar, Megapixel, Disguise, etc.)

✔ **Cinema Camera with RAW or Log profile** (ARRI, RED, Sony Venice, etc.)
✔ **Reference white card / 18% gray card** (X-Rite, DSC Labs, or equivalent)
✔ **Spectral reference charts** (X-Rite ColorChecker, ChromaDuMonde, etc.)
✔ **Lighting system** (RGBWW LED panels, practical lights, traditional film lights)
✔ **LUT Creation Software** (DaVinci Resolve, Pomfort Livegrade, or ColourSpace)

Setup Positions

- **For LED Calibration:** Place the C-7000 directly in front of the LED wall at working camera distance.
- **For Camera Calibration:** Place the C-7000 at the camera position, facing the LED wall.
- **For Lighting Calibration:** Position the C-7000 at the talent's location, aimed toward key and fill lights.

2. LED Wall Calibration

Before integrating the camera and lighting, the LED wall must be **color-accurate** and **free of spectral anomalies**.

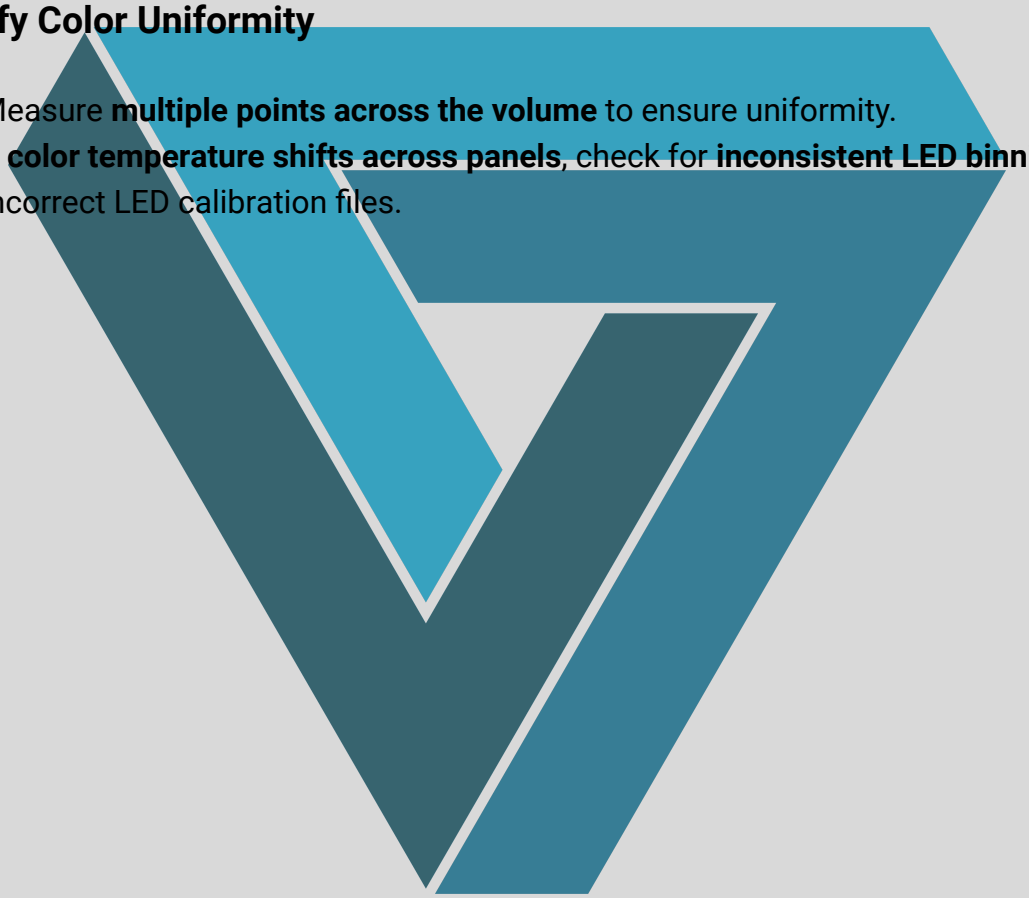
A. Measure the LED Wall's Spectral Output

1. **Turn off all external lighting** so only the LED wall emits light.
2. **Set the LED wall to different calibration targets**:
    - Pure **D65 White (6500K)**
    - Pure **D55 White (5500K)**
    - 18% **Gray (Neutral Reference)**
    - **RGB Primary Colors (Red, Green, Blue)** for individual analysis
    - **Test images with skin tones and mixed color gradients**
3. **Use the C-7000 to measure spectral data**:
    - **Correlated Color Temperature (CCT)** – Ensure it aligns with the target (e.g., 6500K).
    - **Spectral Power Distribution (SPD)** – Identify spikes or missing wavelengths.
    - **Color Rendering Index (CRI & TLCI)** – Target values **above 90** for accurate reproduction.
    - **Delta UV (Δuv)** – Measure color deviation from neutral white.

B. Adjust LED Wall Color Balance

- If **CCT is too high (cold blue, > 6500K)** → Reduce **blue gain** in the LED processor.
- If **CCT is too low (warm red, < 6500K)** → Reduce **red gain**.
- If **SPD shows green spike (high Δuv)** → Adjust **G-M tint (Green-Magenta shift)**.
- If **RGB channels are imbalanced** → Modify LED wall **gamma curves** in the processor.

C. Verify Color Uniformity



- Measure **multiple points across the volume** to ensure uniformity.
- If **color temperature shifts across panels**, check for **inconsistent LED binning** or incorrect LED calibration files.

3. Camera Calibration to LED Wall

Once the LED wall is calibrated, the **camera sensor must be adjusted** to match its spectral response.

A. Capture Camera Color Response

1. **Set the camera to its native white balance** (often 5600K or 3200K, depending on sensor).
2. **Record a reference chart** (e.g., X-Rite ColorChecker) displayed on the LED wall.
3. **Use the C-7000 to measure reflected light** from the chart.
4. Compare:
    - **CCT & SPD mismatch** between the chart and LED.
    - **Color shift in RGB channels**.
    - **CRI/TLCI drop-offs** indicating spectral deficiencies.

B. Apply a Custom Camera LUT

- Use **DaVinci Resolve or Pomfort Livegrade** to create a **custom camera LUT**.
- Apply adjustments to correct **RGB balance, contrast, and color mapping**.
- Ensure that the LUT **preserves skin tones** and avoids unnatural saturation shifts.

C. Validate Camera Exposure & HDR Response

- If using **HDR workflows**, test exposure at **different brightness levels**.
- Ensure **dynamic range is preserved** across both LED wall content and practical lighting.

4. Lighting Calibration

After the LED wall and camera are matched, **on-set lighting must blend seamlessly**.

A. Measure Key, Fill & Practical Lights

1. **Measure each light source individually** to record:
    - **CCT**

- **CRI & TLCI values**
- **Spectral response (SPD)**
- **Δuv deviations**

2. Compare with **LED wall color temperature** to identify mismatches.

B. Adjust Lighting to Match LED Wall

- If the **key light is too warm**, increase CCT or apply **1/4 CTB (blue) gel**.
- If the **key light is too cool**, lower CCT or apply **1/4 CTO (orange) gel**.
- Adjust **G-M shift** to eliminate green/magenta color casts.
- If lighting shows **low CRI**, replace with high-quality **RGBWW or bi-color LED fixtures**.

C. Validate with Camera

- Record test footage and compare **skin tones under different lighting conditions**.
- Ensure **practical lights do not introduce unwanted color contamination**.

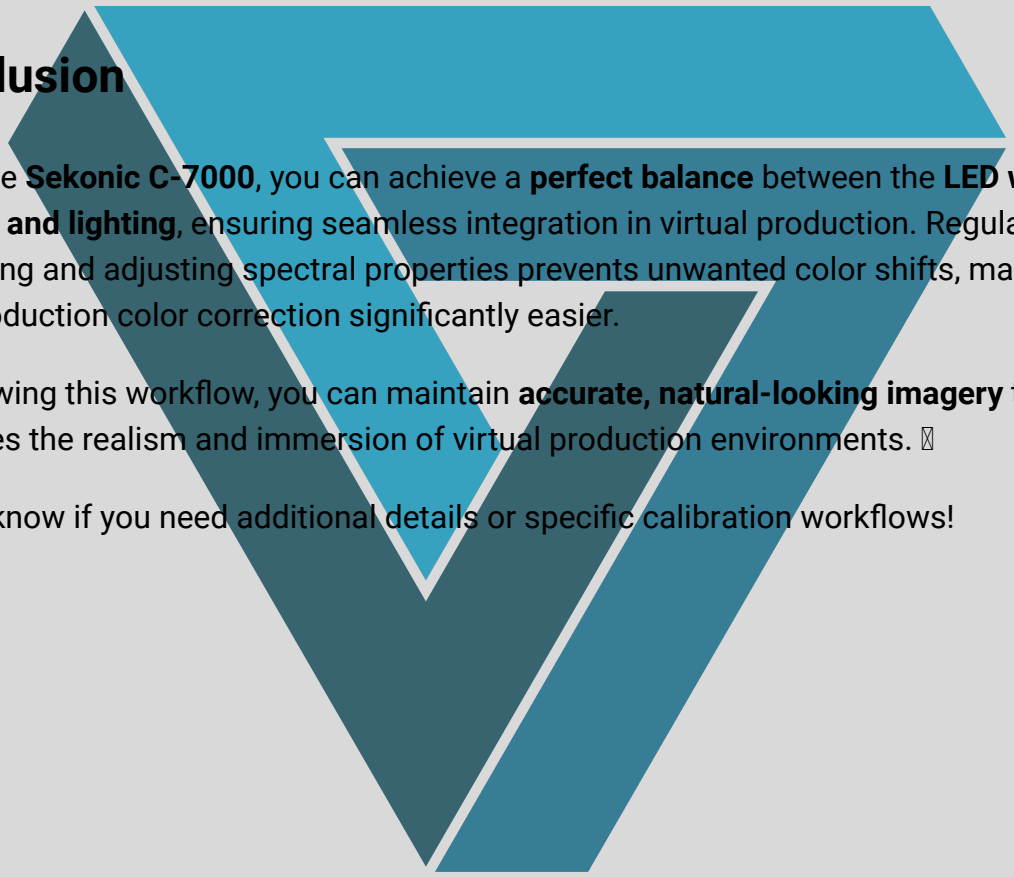
5. Troubleshooting Color Discrepancies

If issues arise, refer to the table below:

Issue	C-7000 Measurement	Solution
LED wall appears too green	**Δuv is positive**	Adjust **G-M shift** in LED processor
LED wall appears too magenta	**Δuv is negative**	Adjust **M-G shift**
LED wall is too cold (blue tint)	**CCT > 6500K**	Reduce **blue gain**
LED wall is too warm (red tint)	**CCT < 6500K**	Reduce **red gain**
Skin tones look unnatural	**Low CRI/TLCI**	Adjust lighting spectrum
Camera image does not match LED	**RGB mismatch**	Use LUT to correct sensor response

6. Final Checks & Best Practices

✔ **Measure at multiple locations** within the LED volume.
✔ **Validate every camera setup** before rolling.
✔ **Re-check lighting conditions if switching LED content** (some virtual environments affect color perception).
✔ **Use spectrometer data to refine color LUTs continuously**.
✔ **Keep records of calibration settings** for consistency across shoots.



Conclusion

Using the **Sekonic C-7000**, you can achieve a **perfect balance** between the **LED wall, camera, and lighting**, ensuring seamless integration in virtual production. Regularly measuring and adjusting spectral properties prevents unwanted color shifts, making post-production color correction significantly easier.

By following this workflow, you can maintain **accurate, natural-looking imagery** that enhances the realism and immersion of virtual production environments.

Let me know if you need additional details or specific calibration workflows!