

NovaCLB-Cabinet

Cabinet Calibrition System

V4.1.1 NS140100039



Quick Start Guide

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Website:

http://www.novastar.tech



Preface

Overview

NovaCLB-Cabinet is a cabinet calibration software. This software is specialized in providing a whole solution for cabinet calibration of LED displays, which is used for calibration of regular cabinets before leaving factory, calibration of old cabinets, calibration of rental cabinets and so on. Calibration is capable of significantly improving the uniformity of LED display and eliminating the differences among cabinets as well as the border lines of cabinets.

Reader

This document is intended for the following personnel:

- Technical support engineers
- On-site operators

Contents

Preface	ii
1 Preparation Before Calibration	1
 1.1 Laying out Darkroom 1.2 Determing Prewarming Plan 1.3 Selecting Calibration Position 1.4 Marking Cabinet Position 	1 2 3 3
2 Calibration of First Cabinet	4
 2.1 NovaLCT Preparation	
3 Calibration of Subsequent Cabinets	22
4 Identification of Simulation Diagram	24
 4.1 Use of Simulation Function	24 26 27 28 29 30 31 32
5 Troubleshooting	33



Preparation Before Calibration

1.1 Laying out Darkroom

- 1. The calibration darkroom must be sealed to avoid interference by external light. It must be also covered with low-reflection black materials around it to reduce reflected light.
- 2. Darkroom width: 3 m (suggested); length: calibration distance of camera, which depends on the pixel pitch:

Pixel pitch × 800 < Calibration distance < Pixel pitch × 3000

However, the recommended best calibration distance for production line is below:

Calibration distance = Pixel pitch × 1500

To guarantee measuring accuracy of colorimeter, the colorimeter is expected to measure a larger LED area, and the measuring distance depends on LED cabinet width (or height) and field angle θ :

Measuring distance = 0.4 × Cabinet height/tan0

With consideration of space reserved for the computer, camera and personnel activities, the maximum distance of darkroom shall be added by 2–3 m;

Pixel Pitch (mm)	Camera Distance (m)	Best Distance (m)
16	13~48	24
10	8~30	15
6	4.8~18	9
3	2.4~9	5
2.5	2.0~6	5
1.4	2.0~6	5

Cabinet Height (m)	Best Measuring Distance of Colorimeter (m)
0.4	9
0.6	14
0.8	18
1	23
1.2	27

3. When the calibration distance is greater than 20 m, please draw a mark on the ground to facilitate calibration distance positioning.

Figure 1-1 Recommend calibration distance



- 4. Install hygrometer to track temperature and humidity changes. The calibration darkroom must be equipped with air conditioners, which must be turned on half an hour before each calibration to adjust the temperature and humidity to the specified values. When calibrating cabinets of the same batch, ensure the temperature fluctuation must be within 2°C.
- 5. Perform fully aging on all cabinets before calibration. Calibrating cabinets with different aging time is not recommended.
- 6. The positions of cabinet and calibration instruments must be fixed during calibration. The cabinet must be placed on a pedestal to prevent it from being affected by the light reflected from the ground.
- 7. Adopt proper cabinet carrying process to avoid wasting time in cabinet replacing.
- 8. Use high performance computer to improve calibration efficiency.

Note:

For fine-pitch displays with different specifications, the recommended camera distance is 5 m. To be compatible with cabinets of most specifications, the ideal darkroom length is about 20 m.

1.2 Determing Prewarming Plan

Choose different prewarming time based on heat dissipation capacity of cabinets.

- No prewarming mode: There is no need to consider changes of brightness and chroma uniformity brought by the temperature changes during cabinet prewarming. The cabinet calibration will be carried out immediately after the cabinet is lighted up. The calibration efficiency of this method is higher, and the calibration time of each cabinet is within 2 minutes.
- **Prewarming mode:** Pre-warm the cabinet in a certain brightness for a specified period of time, and calibrate it after its temperature tends to be stable. The calibration efficiency of this method is lower, and the calibration time of each cabinet is about 4 to 6 minutes. Users can design a special prewarming chamber to pre-warm the cabinets in advance in order to improve calibration efficiency.

Notice:

The pre-prewarming time of each cabinet must be the same, as different pre-warming time will result in brightness and chroma discrepancies among cabinets, which seriously affects the brightness and chroma consistency of the cabinets after calibration.

1.3 Selecting Calibration Position

During measuring, the camera must be placed right ahead of the cabinet and must be perpendicular to the surface of the cabinet.

Figure 1-2 The pedestal height is slightly higher than the camera tripod height (There is no elevation on site. This generally used for indoor screen).



Figure 1-3 Tilt the cabinet to simulate the on-site elevation (There is an elevation on site. This is generally used for outdoor screen).



Notice:

Do not change the pedestal position, camera position and calibration parameters during calibration after they are set.

1.4 Marking Cabinet Position

Mark the position of the first cabinet. You can draw marks or use the black tape to mark the place of the first cabinet. The subsequent cabinets must be placed at the same position, including the placing angle.



2 Calibration of First Cabinet

2.1 NovaLCT Preparation

Run the NovaLCT on the control computer to light up the cabinet and perform some general settings in NovaLCT. The key steps and precautions are illustrated by the figures below. For details about cabinet settings, see NovaLCT LED Configuration Tool for Synchronous System User Guide.

Step 1 Log into NovaLCT as an advanced user.

ſ	Svetom(S)	Sottings (C)	Toole(T) Bl				olo(H)		
	System(S)	Settings (C)	TUUIS(I) PI	ug-in (<u>r</u>)	User(U) Lang	uage(<u>L</u>) H	eip(<u>H</u>)		
					Advanced S	ynchronous S	System UserL	.ogin(<u>A</u>)	
				2	Demonstrat	ion Login(<u>E</u>)			
	Brightness Screen Control Monitoring Multi-fu Media Player Login(T)								
	-Local System	Information							
	Control Sys	stem 1	Of	her Device	0	View	v Details of D	<u>evice</u>	
	- Monitor Inform	nation							
						V	U	-	
\square									
	Service Status:	Service version	1:3.1						
-									
	User Login	Section Card	Sec. 1	X					
		admi	n						
	Pass	word *****							
		ogin	Cancel						

Figure 2-1 Logging into NovaLCT as an advanced user

Step 2 Set parameters of sending card.

System(S) Settings (C) Tools(T) Plug-in (P) Use	r(U) Language(L)	Help(H)	
				No. 150
			5.41000	
Screen Configuration Brightness	Calibration Screen	Control Monitoring	Multi-function Card	Test Tool 💂
Local System Information				
Control System 1	Other Device	0	iew Details of Device	
Monitor Information				£2
		😸 🔍	🚺 ┥	
	<u> </u>	<u> </u>		
Service Status: Service version:3.1				
Screen Configuration		X		
-Select Communication Port				
Current Operatio USB@Port_#0	009.Hub_#0001	•		
Configure Screen				
Load Config		Browse		
	Nevt	Close		
	INEX		4 0	
Sending Card Receiving Card Screen Connect	tion			
Display Mode				
The two re	acolutions must	he the same	Refresh	
Current Display Mode	esolutions must	be the same.		
Sending Card 1440 x 900	Graphics Output R 14	40 X 900		
Source Conliguration				
Resolution: 1440 x 900 px 🗸	Custom	1920 x 1080 x		
Refresh Rate T 60) Hz			
			Set	
Redundancy				
Set the Current Devi 🔲 Set as Primar	ry 📄 Set as Ba	ickup		
Primary		Backup		
Serial Number of Corial	Number of Serial N	umber of Seriel N	umber of	
Primary Sending Prin Card Prin	nary Port Backup	Sending Backu	ip Port	
Refresh		Add	Delete	

Figure 2-2 Setting parameters of sending card

- Step 3 Light up the screen (See NovaLCT LED Configuration Tool for Synchronous System User Guide).
- Step 4 Set parameters of receiving card.

Note:

The outdoor screens generally have high brightness, which causes overexposure of photos easily. To avoid this problem, please set the **Grayscale Mode** as **Grayscale First** or **Performance Balancing** since the brightness efficiency in those two modes is lower.

Step 5 Configure the screen.

Figure 2-3 Configuring the screen

Sending Card Receiving Care Screen Connection	
	Quantity o 1 Configur
Screen1	
Screen Type:	Complex Screen
Sending Card Number	Basic Information
	Coordinate: X: 0 Y: 0 Virtual Mo E Enabl Screen Ar 1440 x 900
Ethernet Port No.	Columns 1 Rows 1 ResetAll Hided Red 🗸 🛧 🕤
	1 Sending Card 1
	1 Port 1 Receiving 1.
Receiving Card Size	Card:1 Width:128
Width: 128 🖨 Apply to Entir	
Height: 128 🚔 Apply to Entir	
Set Blank Apply to the current.	
Quick Connection	
귀 데 딕 메	
드 때 큰 때	
N	Zoom: 1 Note: Click or drag the left mouse button to confi
	2.
Detect Communic Read the Number	Enable Mapping Load from File Save to File Read from HW Send to HW
Restore Factor.	Save System Co., Back Up Termi, Save Close

Step 6 Start calibration.

As illustrated below, if "Enable network monitoring successfully" appears, it indicates NovaLCT is ready for online calibration

Port

-

System(S)	Settings (C)	Tools(T)	Plug-in (P)	User(U)	Language(L)	Help(H)		
Screen Conf	iguration Brig	ghtness Ca			Monitoring	Multi-function Card	Test Tool	
- Local System	Information				-			•
Control Sy:	stem 1		Other Device	e O	V	iew Details of Device		
- Monitor Inform	nation							
	即						U	
		(
Service Status	: Service version	on:3.1					$\overline{\mathbf{A}}$	
Screen Cal	ibration	44.1	-	1	-	0.1		
Single-Scr	een Mode Co	ombined-Sc	On	line Calibratio	Offline Cal	bration Manage Co	efficients	

Network Setting

172.17.11.122

Local IP

Figure 2-4 Starting calibration

Screen1

 Communication Information

 16:58:13 Enable network monitoring successfully

-

2.2 NovaCLB-Cabinet Operation

Current Operation

Current Screen

COM99

Communication Port

2.2.1 Calibration Preparation

Input the number of cabinets to be calibrated and click **New** to create a database.

*	
Preparation 🛠	Nova Calibration for Cabinet
Database	
Cabinet Control	Important notes: Each batch of cabinets requires a corresponding information file (database), the file will record the correction factor of each cabinet in the batch, please keep
Cabinet Paras	it properly. Calibration Mode
Calibration Paras	💿 Cabinet Calibration 💿 New Module
Measurement Tool 🛠	Screen Parameters (optional)
Camera	Screen – Description:
Colorimeter	Screen Information File
Barcode gun	New Load Save As
Correct target 余	Directory:
Correct target	✓ Backup database <u>Why back-up?</u>
Calibration 🛛	Images saving address
	Browse
Tools 🏼 🕹	Save all cabinets' images (Need large space)
Authorization lock	Back
Camera:Disconnected	Colorimeter:Disconnected Barcode Gun:Disconnected Callibrated:0 Times: 00:00:00

Online: In NovaCLB-Cabinet, input the IP address and port No. of the computer on which the NovaLCT is running. Then, click **Connect** to establish communication between NovaCLB-Cabinet and NovaLCT.

Receiving card configuration files: Click **Acquire receiving card parameter file** to get the receiving card parameters (the last receiving card parameters sent by NovaLCT).

Screen Calibration
Single-Screen Mode Combined-Sc Online Calibration Offline Calibration Manage Coefficients Double Calibration Coefficients Current Operation Network Setting
Communication Port Local IP 172.18.12.38 Port 8080 Reconnect
Curr 🕐 NovaCLB-Cabinet
Preparation
Database Online 1 2 Connect Disconnect
Cabinet Control
Cabinet Paras LCT Load Area: Cols: 128 Rows: 96 Advanced settings
Calibration Paras Receiving card parameter files
Measurement Tool > Sending Ethernet Receiving File Modify
Correct target ¥
Calibration * Acquire receiving 3 4 Send file to receiving card parameter file 3
Figure 2-6 Cabinet parameters

Figure 2-5 Online calibration



ſ	*	
	Preparation 😞	Environmental Parameters
	Database	Led Spacing: 20 mm
	Cabinet Control	Distance: 15 m (Recommended 16m-50m)
	Cabinet Paras	Information
	Calibration Paras	Led Arrangement: Three Four Other
	Measurement Tool 🛠	Screen Type O Irregular Screen
	Camera	
	Colorimeter	
	Barcode gun	
	Correct target 🛠	
	Correct target	
	Calibration 💝	
	Tools 🛛 🕹	
	Authorization lock	Back Next
		Colorimeter:Disconnected Barcode Gun:Disconnected Callibrated:0 Times: 00:00:00

Preparation 😞	Audio Prompt Parameters
	Audio Prompt: 💿 Continuous 🔘 Once 💿 Close
Database	Audio File: C:\Program Files (x86)\Nova Star\NovaCLB-Cabinet' Select
Cabinet Control	Led Identification
Cabinet Paras	Allowed Dead Leds Ratio: 10 📥 ‰ <u>Note</u> Advanced
	Identification Direction: Automatic
Calibration Paras	Cabinet number
Measurement Tool 🌫	Set whether to enable automatic case numbering and numbering rule under enabled status
	Display color setting after correction
Correct target 🍣	Display color: 💿 White 🔘 Black
Calibration 💝	Brightness Data Correction
Tools 🛛 🕹	Edge correction parameter
Authorization lock	Edge correction Automatic Select specified configuration
Language(语言) >	
	2
	Back Next
Camera:Disconnected	Colorimeter:Disconnected Barcode Gun:Disconnected Callibrated:0 Times: 00:00:00

Figure 2-7 Calibration parameters

2.2.2 Configuration of Measuring Instruments

Step 1 Make camera preparations (for digital cameras).

- Connect the camera to PC via USB cable and toggle the camera switch to ON. Then, click **Connect** on the **Camera** page in NovaCLB. After the software prompts that the camera is connected successfully, the camera can be controlled automatically via the software.
- b. Set the mode dial is to M gear (manual) and set the lens focus to M (manual)
- c. Switching between eyepiece framing and LCD framing: Enable "Real-time display shooting" in camera menu and then you can press to switch.

Step 2 Focus the camera (for digital cameras).

When calibrating cabinet, place the camera lens towards the cabinet to be calibrated and adjust the focal length to include the cabinet into the field of the



camera. The number of pixels of cabinet is generally less than the pixels that can be collected by the camera each time (The digital camera collects less than or equal to 224×150 pixels each time and the Caliris camera, 480×330 pixels.) Therefore, adjust the focal length to let the cabinet locate in the center of the camera imaging and let the cabinet take up half of the width and length of the imaging, i.e., reserve 1/5 of the total length and width on the four sides.



Figure 2-8 Standard imaging size

Figure 2-9 Imaging size too small



Figure 2-10 Imaging size too large



After adjusting the imaging size, focus the camera to make the pixel imaging vague a little bit. It may need to adjust focusing to make the imaging clear when analyzing camera parameters later.

Figure 2-11 Cabinet imaging



<pre>Calibration Paras Calibration Paras Measurement Tool Camera Colorimeter Barcode gun Correct target ></pre>	Camera Opera Digital C Test Saturation # The recomm area is lo and analys	ation Camera © Calir: Adjustment ended interva: satu w.please adjust the is again.	is ration[60-100], LED ar camera micro coke ma	Connect ea[50-150]. If saturation de the image blur on th	Disconnect n is normal but e camera window Saturation Adjustment		
Calibration 💝	Color	Brightness (%)	Exposure	Saturation	Area		
Tools	R	20	300	N/A	N/A		
	G	20	300	N/A	N/A		
Authorization lock🌫	В	20	300	N/A	N/A		
Language (语言)				0			
中文(zh-CN)							
English (en)							
한국어 (ko-KR)							
				Paula	Neut		
*				Dack	Mext		
Camera:Connected Co	olorimeter:Disc	onnected Barcod	e Gun:Disconnected	Callibrated:0 Times:	00:00:00 .::		

Figure 2-13 Caliris camera settings

The two figures above are the pages after the digital and Caliris cameras are connected successfully. The Caliris camera does not have the preview window. To view the position of the screen in the Caliris camera, choose **Saturation Adjustment** > **Live Preview**. You can adjust the camera parameters to adjust the saturation and area. Saturation adjustment for the digital camera can be automatic or manual, and for the Caliris camera, it has the real-time analysis, automatic and manual modes.

- Automatic Mode: Click Auto All, and the brightness, exposure, aperture and ISO parameters will be adjusted automatically until the Saturation and Area values become Normal.
- Manual Mode: Modify the brightness, exposure, aperture and ISO parameters manually to adjust the **Saturation** and **Area** values until they become **Normal**.

If a Caliris camera is connected, click **Saturation Adjustment** to enter the adjustment page.

🖶 Saturation Adjustment	
Live Freview Inage Viewing Note: This red area is the imaging area proportion of the smallest image. Flease adjust the image to be larger than or equal to this area.	IS y Parameter Adjustment ■ Real-Time Analysis ■ Real-Time Analysis ● Automatic Wode ● Manual Hode Auto All Color B 20 ▼ 300 ● Automatic N/A N/A B 20 ● Automatic N/A N/A N/A B Col
	Notice Ensure that images of LEDs do not overlap after saturation analysis! Images of LEDs overlapped: Images of LEDs not overlapped: Images of LEDs not overlapped:

Figure 2-14 Saturation adjustment

As shown in Figure 2-14, the adjustment page has 2 tabs, described as below.

- Live Preview: Preview the live image of LED screen shown in the camera. The preview image can be zoomed by the following 2 methods with a zooming range of 15%–3200%.
- Drag the slider.
- In the preview area, click to zoom in and right-click to zoom out.
- **Image Viewing**: View the images captured by the camera during saturation analysis. Users can view the image in Red, Green and Blue separately.
- Parameter Adjustment: The Real-Time Analysis function is available only for Caliris camera.
- If **Real-Time Analysis** is selected, after users select a color for preview, the system will analyze the image of that color in live preview in real time and adjust its **Saturation** and **Area** values to be **Normal**.

If **Real-Time Analysis** is not selected, the color selection buttons are hidden, but the **Automatic Mode**, **Manual Mode**, and **Auto All** buttons appear. The adjustment parameters for Caliris and digital cameras are the same.

For the Caliris camera, after saturation analysis, ensure that the images of LEDs are not overlapped. If they are overlapped, please adjust the camera parameters again to ensure that the saturation analysis result is normal and they are not overlapped.

Step 4 Set the colorimeter.

Select **No** if a light gun (a kind of colorimeter) is not needed to measure the brightness and chroma values after calibration.



♣ Preparation ⇒	Is colorimeter carried?
Measurement Tool ☆ Camera	Yes Colorimeter means light gun, color analyzer and other instruments of measuring LED color characteristic.
Colorimeter	
Barcode gun	

Select **Yes** if a light gun is needed. Users can manually measure the values, or connect the light gun and the values can be measured automatically by NovaCLB-Cabinet.

	☆ Preparation ⇒	Is colorimeter carried?
R	easurement Tool 🛠	Yes Colorimeter means light gun, color analyzer and other instruments of
	Camera	measuring LED color characteristic.
	Colorimeter	Colorimeter operating
	Barcode gun	Manual Manual
	Correct target 💝	Auto by Colorimeter (more accurate) Settings
	Calibration 🛛 💝	Model: CS2000 -
	Tools 💝	COM: Connect Disconnect
Au	thorization lock%	
	Language(语言) 🕹	
6	44	
	*	Back Next
Can	nera:Disconnected	Colorimeter:Disconnected Barcode Gun:Disconnected Callibrated:0 Times: 00:00:00

2.2.3 Calibration Target

• No light gun connected

♣ Preparation ★	The case to be corrected belongs to
Measurement Tool 🛠	There is no bright and color difference among cabinets or modules
Camera	
Colorimeter	There is some bright and color difference among cabinets or modules(Example:rent cabinets, mixed cabinets, tail cargo cabinets, etc.)
Barcode gun	\odot Supplementary order (cases delivered from godown in different time need to be put together)
Correct target 🛠	
Correct target	
Calibration 🛛	
Tools 🛛 🕹	
Authorization lock#	$-O^{1}$
Language (语言) 😵	
×	Back Next
Camera:Disconnected	Colorimeter:Disconnected Barcode Gun:Disconnected Callibrated:0 Times: 00:00:00

There are 3 types of calibration targets, provided for **Brightness correction**, **Ordinary chroma correction**, and **Multiple bin chroma correction**. For the cabinets which evenly use LEDs of multiple batches, use the multiple bin chroma correction mode. For cabinets of which the LED chroma discrepancy is within 5nm, use the brightness correction or ordinary chroma correction mode.

Users can drag the sliders to adjust the brightness decay proportion, which is 10% in general. When **Multiple bin chroma correction** is selected, please adjust the color gamut, or change the color gamut when calibrating the first cabinet.

*	Correction m	ode						
Preparation 💝	Brightness correction		(Ordinary chroma correction		Multiple correcti	Multiple bin chroma correction	
Measurement Tool 🛠	Target value	setting						
Comorro		Brightness	Сх	Су		Brightness decay p	roportion	
Camera	Red	805.62	0.6870	0.3000	•	+	10%	
Colorimeter	Green	1790.64	0. 1730	0.7306	•	•	10%	
Barcode gun	Blue	300.83	0.1330	0.0820	•	4	8%	
Correct target 🛠	White	2897.09	0.3131	0.3290	•	•	10%	
Correct target	E	nable colour	temperati	ure			6483 K	
Calibration 🛛 🕹		5000 Ĵ [↑] 5000						
Tools 💝								
Authorization lock								
Language(语言) 🟅								
¥			2	-		Back	Completion	
Camera:Disconnected	Colorimeter	:Disconnecte	d Barc	ode Gun:Disc	onnected	d Callibrated:0 Ti	imes: 00:00:00	

For the multiple bin chroma correction, please select **Blue correction**.



*	Convertion	ada						
Preparation 🛠	Brig corr	ode htness ection	(D Ordinary o correction	chroma 1	Multi corre	ple bin cl ction	hroma
Database	Target value	setting						
Cabinet Control		Brightness	Cx	Cy		Brightness dec:	ay proport	ion
	Red	805.62	0.6870	0.3000	•		▶ 10%	
Cabinet Paras	Green	1790.64	0.1730	0.7306	•		▶ 10%	
Calibration Paras	Blue	300. 83	0.1330	0.0820	•		▶ 8%	
Measurement Tool 🛠	White	2897.09	0.3131	0.3290	•		▶ 10%	
Camera	 P	nable colour	r temperatu	re				
Colorimeter		5000 ⊥ 650	↑ 0 9300				6483	K
Barcode gun								
Correct target 💲	☑ Blue calil	correction() bration effe	Dptimizing ct, may cau:	the blue se white loss	s) Advan	ced		
Correct target								
Calibration 💝								
Tools 🛛 🕹								
Authorization lock								
¥						B	ack	Completion
\$]			2				
Preparation 🛛 💝	Original	value			-Targe	t value Brightness	Сx	Cv
Measurement Tool 🛠	Red:	Brightness	Сж	Cy 0,3000	Red:	805.620	0.6870	0.3000
Camera			0.0000	0.0000	Green	n: 1790.640	0. 1730	0. 7306
Colorimeter	Green:	1990.000	0. 1700	0. 7400	Blue	: 300.830	0.1330	0.0820
Barcode gun	Blue:	327.000	0.1300	0.0800	Whit	e: 2897.0901	0.3131	0. 3290
Correct target 🛠	Correctio	n mode: Or	dinary chro rrection	oma	Colou	r temperature:	6483	
Correct target	Reset							
Calibration 💝								
Tools 💝								
Authorization lock>								
Language (语言) 💝								
							contra	¥
*							ack	Next
amera:Disconnected	Colorimeter	r:Disconnecte	ed Barco	ode Gun:Disc	connected	Callibrated:0	Times: 0	0:00:00



2.2.4 Calibration of First Cabinet

Click Start to start calibration and enter the cabinet ID.

- If you need to write the calibration coefficients to the module's flash, select **Write** in module flash in the **Customize Steps**.
- If you need to write the module ID to the module's flash, select **Save module ID** and then set the numbering rules for the module ID.

Calibration Methods Preparation Z Calibration Manual Automatic Customize Correct target Z Calibration A Calibration Becord Uplaod Coeffs Save To Flash Save To Database Authorization lockz Language (Immi) Z Frite in module Image Test Chrons distributi Peedback Peedback Dead Leds: Red 0 Kate of value Common parameter The first: Uncreated The first: Uncreated The first: Uncreated The first: Uncreated The first: Uncreated Save To Calibrated Calibrated I Image Cost I Control C			
Messurement Tool × Manual Automatic Customize Prefurn Correct target × Calibration Process Calibration Process O Gauge one by one Calibration Red Green Blue Red & Green Blue Calibration Enable Gap Calibration Start Analyze Rel Led >> Calibration Vplaod Coefficients Start Analyze Blue >> Tools × Uplaod Coefficients Save To Flash Save To Database Authorization lock Write in module Image Test Chrona distributi Feedback Dead Leds: Red 0 Rate of value Save To Flash Dead Leds: Red 0 Rate of value Save anolule ID Save anolule ID Save raceiving Carrent ID: Save raceiving Current ID: Current ID: Keek Incertify Sacond: Uncreated in The The Next	* Preparation *	Calibration Methods	Send Cabinet Parameters
Correct target * Calibration Process Calibration % Red Green Blue Red. Green Blue Calibration % Red Green Blue Red. Green Blue Calibration % Image Calibration Sturt Calibration Record Vplaod Coefficients Tools * Vplaod Coeffs Authorization lock? Vplaod Coeffs Language (清音) * Frite in module Peedback Red 0 Dead Leds: Red 0 Rate of value Dead Leds: Red 0 The first: Uncreated 1 The first: Uncreated 1 The first: Uncreated 1 The first: Uncreated 2 The first: Uncreated 2 Camera:Disconnected Colorimeter:Disconnected Calibrated:0 Times: 00:00:00	Measurement Tool 💝	🔘 Manual 💿 Automatic 🛛 Customize	🖸 Pre-Warm
Calibration Red Green Blue Red、Green、Blue Analyze Red Led () Calibration Image Galibration Start Analyze Green) Calibration Record Uplaod Coefficients Image Calibration Image Calibration Image Calibration Collibration Record Uplaod Coefficients Image Calibration Image Calibration Image Calibration Image Calibration Collibration Record Uplaod Coefficients Save To Flash Save To Database Image Calibration Imag	Correct target 💝	Culiburation Process	O Gauge one by one
Calibration Red Green Blue Red Green, Blue Calibration Image Calibration Start Analyze Green Led Calibration Record Uplaod Coeffients Create Coefficients Create Coefficients Tools Uplaod Coefficients Uplaod Coefficients Uplaod Coefficients Uplaod Coefficients Authorization lock Uplaod Coefficients Save To Flash Save To Database Save To Database Image Test Chrona distributi Save cabinet name Save cabinet name Dead Leds: Red O Rate of value third: Uncreated Save receiving card parameters The first: Uncreated The second: Uncreated The third: Uncreated Save receiving card parameters Camera:Disconnected Colorimeter:Disconnected Barcode Gun:Disconnected Callibrated:0 Times: 00:00:00 ;;		Calloration frocess	💽 Analyze Red Led 姠
Calibration Image Calibration Start Analyze Blue Image Calibration Calibration Record Uplaod Coeffients Image Calibration Image	Calibration 🛠	🔿 Red 💿 Green 💿 Blue 💿 Red 🖲 Green 🔋 Blue	* 👌 Analyze Green 🎪
Calibration Record Uplaod Coeffients ① Create Coefs Tools > Uplaod Coefs Save To Flash Save To Database Authorization lock Write in module Image Test Chroma distributi Save To Database Language (语言) * * Peedback Save To Batabase ③ Save Cabinet Peedback Dead Leds: Red ○ Rate of value ③ Save To Flash Dead Leds: Red ○ Rate of value ③ Save To Flash Common parameter The The Uncreated The Save receiving The first: Uncreated The Uncreated The Current ID: Back Next Camera:Disconnected Colorimeter:Disconnected Barcode Gun:Disconnected Callibrated:0 Times: 00:00:00	Calibration	🕼 Enable Gap Calibration Start	🚺 🚺 Analyze Blue 🍌
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Customize Steps	
Steps	_
📝 Send Cabinet Parameters	
🥅 Pre-Warm Display white screen in a	
Brightne 30 🔺 %	
period 0 🔹 : 5 🐳 : 0 丈	
🕼 Analyze Red Led	
📝 Analyze Green Led	
📝 Analyze Blue Led	
🕼 Create Coefs	
📝 Upload Coefs	
💿 Quick uploading 🛛 💿 Stable uploading	
📝 Save To Database	C, V
👽 Save cabinet name	
Save module ID	
Numberi Not set	KE .
🕼 Save To Flash	
🔲 Write in module flash	
Save receiving card parameters	
OK	
Cabinet ID X	
Please For example: A-1.1-1. 001, etc.	
Tip:Cabinet ID can not contain any of the following characters:	
ν <i>Λ</i> , :, *, ?, ⁻ , ζ, λ, ⁻ , [
OK	

Before generating a coefficient, a page of modifying target value will show. After modifying the target value, click **Preview** to preview the effect. After you confirmed the effect, click **Apply**. At this time, the calibration of the first cabinet is finished.



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3 Calibration of Subsequent Cabinets

Remove the first cabinet and place the next cabinet on the pedestal. Then, Click **Start** to start calibration.

Figure 3-1 Starting calibration

*			
Preparation 🛠 Calibration	n Methods	0	Send Cabinet Parameters
Database 🔘	Manual Automatic Customize	0	Pre-Warm
Cabinet Control	Process	0	Gauge one by one
Cabinet Paras 💿 Red	Green Blue @ Red & Green & Blue	0	Analyze Red Led 媡
Calibration Paras 👿 Enabl	e Gap Calibration Start	0	Led Analyze Blue
Measurement Tool ≫ Vplaod Coes	fients	0	Create Coefs
Correct target 💝	d Coefs Save To Flash Save To Database	0	Upload Coefs
Calibration 🙊		0	Save To Database
Calibration	a module Image Test Chroma distributi	0	Save cabinet name
Calibration Record Feedback		0	Save module ID
Module Calibration Dead Led	ls: Red V Rate of value that reaches 100%	0	Write in module
Tools * Common part	ameter The The	0	Save receiving card parameters
Common Color Gamut Tool	Increated 1 second: Uncreated 1 third: Uncreated 1	Curr	rent ID:
Data Analysis And Processing		Bac	:k Next
×			



Figure 3-2 Viewing effect

Notice:

- During the whole calibration process, the location of the cabinet pedestal and the
 position, focal length and configurations of the camera must remain unchanged. If
 improper operation results in any change to the calibration site, a new database must
 be created to calibrate the remaining cabinets which are seemed as another batch.
 Ensure that the brightness and chroma standards must be the same as the first batch).
 - For the first 30 cabinets, every 10 cabinets will be monitored by measurement data simulation software for their calibration effects. After the first 30 cabinets, every 20-40 cabinets will be simulated at the same time. The simulation of calibration database is a very important part of cabinet calibration. In Chapter 4, detailed introduction to the identification of simulation diagram will be given.

4 Identification of Simulation Diagram

The NovaCLB-CabSolver, cabinet database management platform of NovaCLB-Cabinet, is used to make simulation analysis of part of the calibrated cabinets in advance in order to check whether the calibration effect is OK. If the effect is not OK, users can know its reason through the analysis as soon as possible, for example, there is non-standard operation performed (the camera is moved, etc.).

As splicing a simulation diagram by effective utilization of cabinets requires some experience, the simulation function will be introduced next and several cases will be used to illustrate how to judge whether the measured data is ideal with the simulation diagram.

4.1 Use of Simulation Function

Step 1 Click Data Analysis And Processing to open the NovaCLB-CabSolver.

* Preparation *	Calibration Methods	🚺 Send Cabinet
Measurement Tool 💝	🔘 Manual 🔘 Automatic Customize	🚺 Pre-Warm
Correct target 💝	Calibration Process	 Gauge one by one Analyze Red Led
Calibration 💝	🔵 Red 💿 Green 💿 Blue 💿 Red、Green、Blue	🚺 Analyze Green 🔅
Tools 😞	✓ Enable Gap Calibration	🚺 Analyze Blue 🏾 📌
Common Color Gamut Tool	Vplaod Coeffients	Create Coefs
Data Analysis And Processing	Uplaod Coefs Save To Flash Save To Database	 Upload Coefs Save To Database
Database Division		Save cabinet
Cabinet To Screen	Write in module Image Test Chroma distributi	Save module
Authorization lock*	Feedback	Save To Flash
Language (语言) 🗴	Dead Leds: Red - 0 Rate of value that reaches 100%	O Write in module
中文(zh-CN)	Common parameter	Save receiving Current ID:
English (en)	first: Uncreated ! Ine first: Uncreated ! second: Uncreated ! third: Uncreated !	
한국어 (ko-KR)		
*		Dack Next

Figure 4-1 Entering data analysis and processing platform

Step 2 Load the database and click the Simulate and Adjust coefficients tab



- Step 3 Click the Simulation button.
- Step 4 Select the Splice mode: Order or Random.
- Step 5 Choose **Yes** and **No** for **Paint ID** respectively to check whether the splicing among cabinets shown in the simulation diagram is normal.
- Step 6 Switch the **Display** mode. Primary color, gray and false color are three expressions of measuring brightness.



4.2 Cases of Identifying Simulation Diagrams

The simulation diagram of NovaCLB-CabSolver is generated by calculation based on the cabinet calibration coefficients. What the simulation diagram simulates is the splicing results of the cabinets before calibration. The simulation diagram can be considered as the diagram of cabinet brightness simulation before calibration. With the simulation diagram, calibration engineers can see the rough result of spliced cabinets on the site (before calibration). If there is anything wrong with the measured brightness data, the engineers can see the unreasonable situations, for example:

• There are obvious boundary lines or difference between cabinets, but actually there is none (See Case 5).

Reasons: Modules on edges of cabinets or some lines of LEDs may have a problem.

- Most cabinets have serious modularity inside or regular defects (See Case 3 & 4).
 Reasons: It is generally caused by the cabinet process. On-site calibration is recommended.
- On the simulation diagram, a few cabinets have significant differences from other cabinets (gray or false color image) (See Case 6).



Reasons: Maybe the camera is not stable during image capturing. It is recommend that these abnormal cabinets be re-calibrated.

4.2.1 Case 1: Good Effect, No Problems with All Cabinets



Figure 4-2 Case 1 (a) Green in primary color mode

Figure 4-3 Case 1 (b) Green in gray mode



Analysis: The measurement data of green before calibration is quite ideal. There is no significantly abnormal data. It also reflects that this batch of cabinets has no obvious process problems although they have a few modularity phenomena and the LED screen spliced by the cabinets is slightly blurred.

Conclusion: No problem.

4.2.2 Case 2: Good Effect, No Problems with All Cabinets



Figure 4-4 Case 2 (a) Green in primary color mode

Figure 4-5 Case 2 (b) Green in gray mode



Figure 4-6 Case 2 (c) Green in false color mode



Analysis: The measurement data of green before calibration is quite ideal. There is no significantly abnormal data. It also reflects that this batch of cabinets has no obvious process problems although the LED screen spliced by the cabinets is blurred to a certain degree.

Conclusion: No problem.

4.2.3 Case 3: Serious Modularity Effect



Figure 4-7 Case 3 (a) Green in primary color mode





Figure 4-9 Case 3 (c) Green in false color mode



Analysis: The measurement data of green has serious modularity effect. In such situation, though the cabinet calibration can greatly improve the uniformity of cabinets, it is difficult to avoid brightness difference between a few cabinets after they are spliced on the site since the brightness values of cabinets vary obviously.

Conclusion: On-site calibration is recommended to ensure desired results. Cabinet calibration can improve effects greatly, but cannot solve the problem completely.



4.2.4 Case 4: Different Views of Cabinets Seen from Different Angles

Figure 4-10 Case 4 (a) Blue in primary color mode



Figure 4-11 Case 4 (b) Blue in primary gray mode



Figure 4-12 Case 4 (c) Blue in false color mode



Analysis: The measurement data of blue has lots of vertical bars before calibration. The cabinet is placed with an 18° back elevation angle during calibration. It is estimated that the vertical bars are caused by the emitting angle of the cabinet. Observe the performance of the cabinet before calibration: 1. The frontage of the cabinet has good performance (0° back elevation angle), and there is no vertical bars. 2. With the increase of the back elevation angle, the vertical bar problem is



getting worse, and the performance on the 18° direction is consistent with the simulation diagram of Case 4. Though cabinet calibration can improve the cabinet uniformity at the 18° elevation direction, it cannot guarantee the screen uniformity at the other angles. In this case, vertical bar may appear on the frontage after the screen calibration.

Conclusion: On-site calibration is recommended to ensure desired results. Cabinet calibration is not recommended for those cabinets which has great difference at different directions.

4.2.5 Case 5: Abnormal Dark Lines at Edge of Cabinet



Figure 4-13 Case 5 (a) Red in primary color mode

Figure 4-14 Case 5 (b) Red in gray mode



Analysis: There are obvious dark lines between the red cabinets. It is estimated that it is caused by the problem of red LEDs on the edge of the cabinet before calibration. After viewing the photographs of the cabinet, find that the last line of red LEDs on the cabinet are darker. Then check the cabinet and find that the last line of red LEDs on the cabinet are tilted.



Conclusion: Make the last line of LEDs upright and then perform calibration. Cabinet calibration can improve this situation at calibration directions, but the dark lines will still exist when the cabinets are viewed from another direction after calibration.

4.2.6 Case 6: Individual Cabinet with Ideal Uniformation

1-1	1-2	1–3	1-4	1–5	1-6	1-7	1-8	1-9
2-1	2-2	2-3	2-4	2–5	2–6	2-7	2–8	2-9
3-1	3–2	3-3	3-4	3-5	3–6	3-7	3–8	3–9
4-1	4-2	4–3	4-4	4-5	4-6	4-7	4-8	4-9
5-1	5-2	5-3	5-4	5-5	5-6	5-7	5-8	5-9

Figure 4-15 Case 6 (a) Green in primary color mode

Figure 4-16 Case 6 (b) Green in gray mode



Analysis: The measurement data of green before calibration is quite ideal. But the uniformity of the cabinet 3-5 is obviously prior to that of all other cabinets, which is extremely unreasonable.

Conclusion: The cabinet 3-5 must be re-calibrated.

5 Troubleshooting

Problem	Troubleshooting
Software alert: Point positioning errors	Change Identification Direction on the Calibration Paras page. Increase Allowed Dead LEDs Ratio on the Calibration Paras page.
Screen blurred after calibration	See Calibration > Measuring image . Normally, one LED lamp is framed by one square. Change Identification Direction and recalibrate the screen.
Software alert: Color error of image data	Check whether the screen is too dark, or the color on the screen when using camera to take pictures is wrong.
Software alert: Camera not connected	Check the connection wire between camera and control computer. Check the camera's remaining battery capacity.
Software alert: Unexpected error	Check whether the cabinet resolution is too large. 7D supports 192*144. Try to restart the calibration software, camera and computer.
Software alert: The cabinet is inclined (Actually it is not).	If the cabinet is seriously modularized, the calibration software may judge the not inclined cabinet as inclined. After you confirm that the cabinet is not inclined, choose to force the calibration to continue.
The screen composed of some calibrated in- line cabinets has great uniformity difference.	Cabinet calibration requires that the cabinets before calibrated has consistent uniformity within a certain angle ranges. Some in-line cabinets have process problems in the angle. Therefore, the screen which is composed of those calibrated in-line cabinets has great uniformity difference at different angles. Cabinet calibration cannot fix the angle process problem. It is recommended that you use NovaStar full screen calibration software to calibrate the screen which is composed of those in- line cabinets.

