DVI Buffer Box

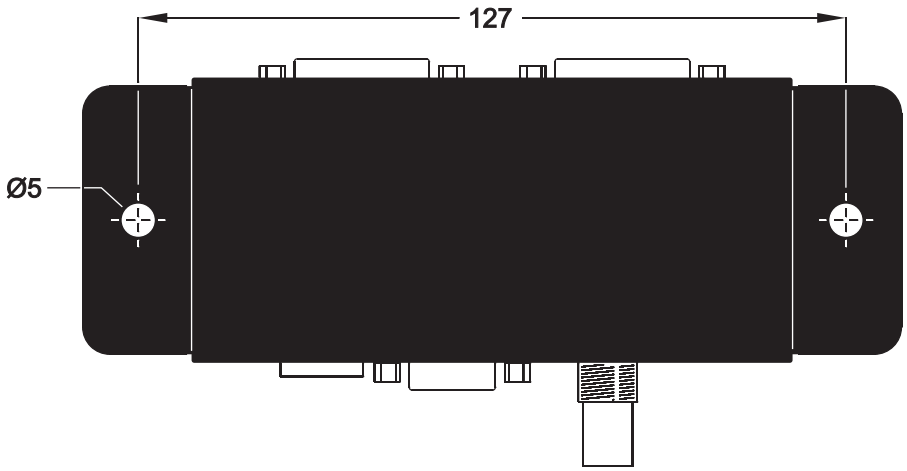
for LC Series Video Screen

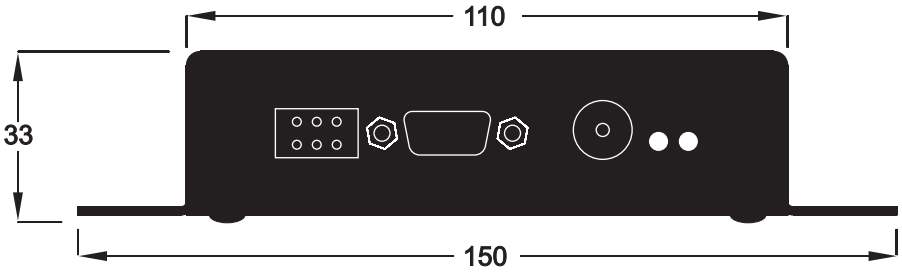
user manual

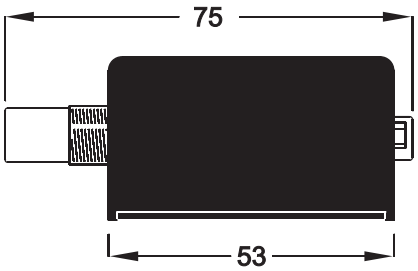
Martin

Dimensions

All dimensions are in millimeters







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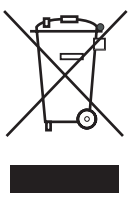

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Introduction

Thank you for selecting the DVI Buffer Box for LC Series LED video display panels from Martin®. This document describes how to connect the DVI Buffer Box, and how to install and use the included LC software.

For the latest software updates, documentation, and other information about this and all Martin® products, please visit the Martin® web site at http://www.martin.com

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About the DVI Buffer Box

The DVI Buffer Box is an accessory device for use with LC Series LED video panels. It serves the following functions:

- 1024 x 768 XGA monitor emulation (required by the PC or Maxedia media server)
- Genlock synchronization with other video devices
- Interface between panels and LCS, the LC series panel management PC software

About LCS

The LC software allows the user to:

- Set video curtain luminance and color levels
- Adjust individual panel levels
- View and set each panel's XY coordinate address (overriding the panel DIP-switch)
- Tune the panel frequency for the video source
- Set vertical and horizontal video offset
- Generate test colors
- Select panel cooling mode and view panel temperature
- View panel firmware version number
- Upgrade panel firmware

Intended users

As part of a video display system, the DVI Buffer Box is intended to be installed by qualified video technicians. The product is for professional use only. It is not for household use.

LCS is intended for use by qualified video technicians and projectionists.

Included items

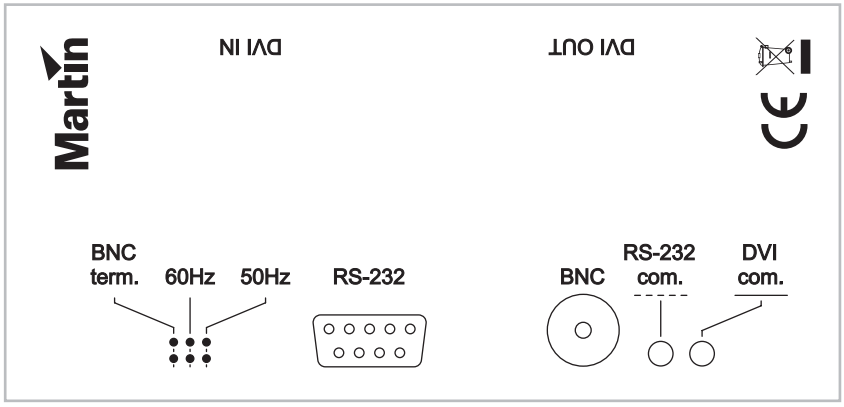
The DVI Buffer Box is shipped with the following items:

- LC software CD-ROM
- RS-232 serial cable
- 2 jumper caps
- User manual (on CD-ROM)

Installation and setup

Important! ***Always remove power from the system before connecting or disconnecting video cables.***

DVI Buffer Box connections and jumper settings



DVI IN socket
DVI-D single-link digital input from video source. *Connect with video devices powered off.*

DVI OUT socket
DVI-D single-link digital output to splitter or LC panel. *Connect with video devices powered off.*

BNC term. jumper
Provides BNC cable termination. Used when the DVI Buffer Box is the last device on the cable.

60 Hz jumper
Selects 60 Hz monitor emulation.

50 Hz jumper
Selects 50 Hz monitor emulation.

RS-232 socket
Serial data port for connection to PC.

BNC socket
Genlock/composite video signal input from video control desk or other video device.

RS-232 com. LED (blue)
Flashes when data is exchanged with PC.

DVI com. LED (red)
Lights when the box is receiving 5V power through the video input.

Figure 1: Connections overview

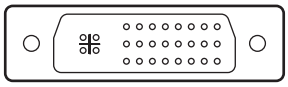
DVI video connection

The DVI Buffer Box accepts a 1024 x 768 XGA DVI-D single link (digital and DDC) signal.

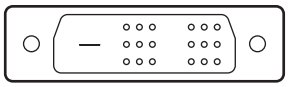
It has two DVI connectors: one for input and one for output. Although the video signal is DVI-D single link, the connectors are DVI-I dual link type. The advantage of this solution is that any DVI cable can be used, although only the pins that carry the DVI-D single link signal are actually used.

The DVI Buffer Box is powered by the 5 V power line in the DVI input cable. The “DVI Com.” LED lights when the device is receiving power.

Up to 6 panels may be connected in series (daisy-chained) to the DVI output in first generation. For more information regarding DVI link configuration, please refer to the LC 1140/2140 LED Video Screen user manual.



DVI-I dual link connector



DVI-D single link pins

Figure 2: DVI connectors

To connect the DVI signal:

1. Power all panels and devices off while making connections.
2. Use a short (1.5 m) DVI-D cable to connect the DVI output from the source (Martin Maxedia, for example) to the DVI Buffer Box input.
3. Use a short (1.5 m) or medium length (3.2 m) DVI-D cable to connect the DVI output from the DVI Buffer Box to the first panel or splitter. The total DVI-D cable length from the video source to the first panel or splitter may not exceed 5 m (16 ft.)

Genlock connection

The video curtain can be synchronized with other video devices via an external synchronization signal connected to the DVI Buffer Box. A composite video signal or master sync pulse signal may be used.

When using an external signal, connect the cable from the signal source or previous video device to the BNC terminal. You will need a cable splitter (T-connector, not included) if the signal must be fed to additional devices.

Select a BNC termination option as described below, under “Jumper settings”.

PC connection

The DVI Buffer Box communicates with the LC software through the PC’s serial (COM) port. To connect the DVI Buffer Box to a PC, connect the included serial cable to the RS-232 port on the buffer box and a COM port from 1 to 4 on the PC. LCS automatically detects the hardware when it starts up.

The serial cable connects pins 2, 3, and 5 on each end. Tip: If a longer serial cable is needed, use a shielded data cable with the shield connected to pin 5 on each end.

No documentation or support is available for the selection or use of an accessory serial port adaptor.

Jumper settings

DVI signal frequency and BNC cable termination are selected with the jumpers on the DVI Buffer Box. Set as follows.

- Place one jumper cap on either the 50 Hz or 60 Hz jumper to match the frequency of the DVI source.
- If the DVI Buffer Box is the last device connected to the sync cable, place a jumper cap on the “BNC term.” jumper. When not used, store the termination jumper cap by placing it on one pin as shown to right.

Using LCS

Software installation

LCS runs on Windows XP.

To install the software:

1. Save your documents and close any open programs.
2. Insert the LCS CD-ROM in the disk drive.
3. Locate and double-click the installation file named “lcs_XXX” or “lcs_XXX.exe”, where the “XXX” is the software version number.
4. An installation wizard opens. You are prompted to close all applications. Click **OK** to continue or **Exit Setup** if you need to go back.
5. The next dialog prompts you for the installation destination. The default location is C:\Program Files\lcs. To select another location, click **Change Directory**.
6. Click the install button shown below.

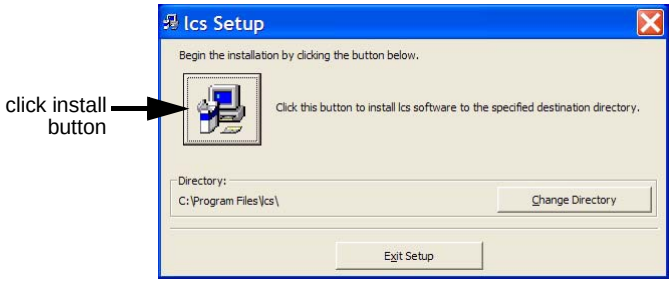


Figure 3: Destination dialog

7. The Choose Program Group dialog opens. The text entered in the **Program Group** field determines the name that appears in the “All Programs” list. Change the name if desired.

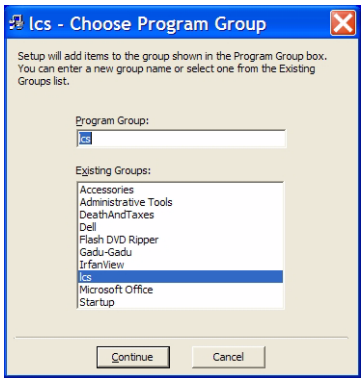
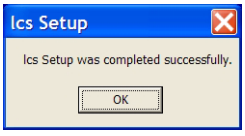


Figure 4: Program Group dialog

8. Click **Continue** to finish the installation process. When completed successfully, a confirmation dialog opens. Click **OK**.



Starting the application

The installation wizard places a shortcut to LCS in your program list.

To start LCS:

1. Connect the DVI Buffer Box to the computer's COM port and verify that its "DVI com." LED is lit.
2. Click the Windows **start** button, then click **All Programs**.
3. Point to the LCS program group and click the LCS icon.
4. If starting LCS for the first time, click the **Factory Default** and **300Hz** buttons.

Figure 5: LCS icon

After starting, LCS automatically detects connected panels and displays their firmware version numbers in the grid display. If no version numbers appear in the grid display, check all connections and verify that the DVI Buffer Box is connected.

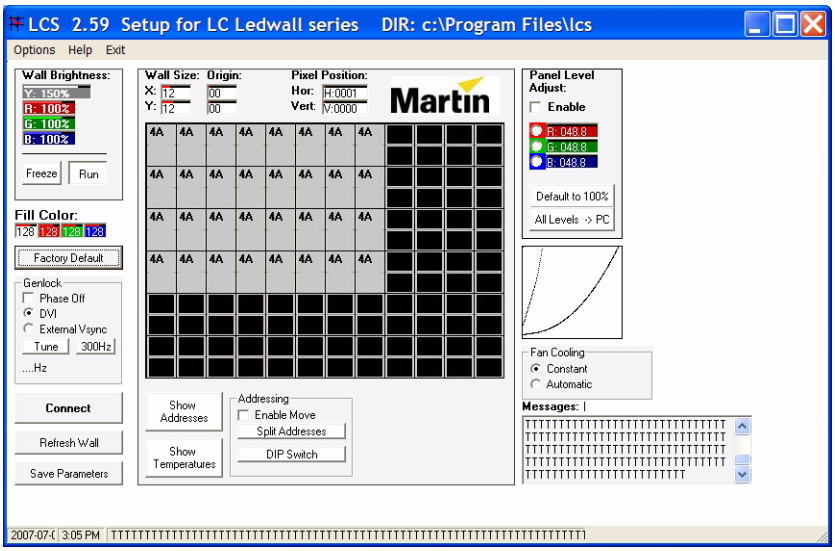


Figure 6: LCS screen

Important usage tips

How to change numeric values

In LCS, you change numeric values by moving the PC's pointing device (a trackball is recommended) while holding down the left button as follows:

1. Place the cursor over the field to modify.
2. Hold down the left button of the pointing device.
3. Move the pointing device up or to the right to increase the value, or down or to the left to decrease the value.
4. Release the left button.

Allow commands to execute

Commands must be allowed to execute before launching new commands. Execution is indicated by rotation of the line above the **Messages** field. Wait until rotations stops before continuing.

Tip: To minimize the time it takes to execute commands, set the wall size (see page 9) to the minimum required to display the video curtain.

Figure 7: Execution status indicator

Main window controls

This section describes the controls found in the main LCS window.

Grid display

The grid display represents the panels in the video curtain and is used to select panels.

Panels are shown in grey. A single grey cell represents an LC 1140 panel. A double grey cell represents an LC 2140 panel.

The selected panel is shown in green. Empty cells are shown in black.

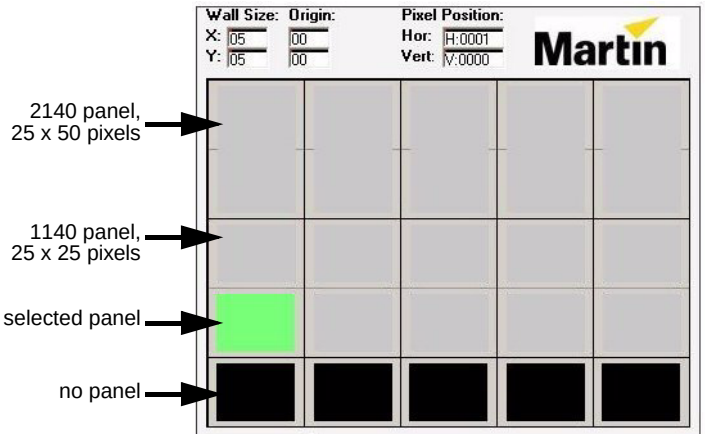


Figure 8: Grid display

Wall Size and origin fields

The **Wall Size** fields determine the number of cells in the grid display. The **Origin** fields determine the XY coordinates of the top-left cell, which are 0,0 by default. Change the values as described on page 8, under “How to change numeric values”.

To adjust the wall size and origin for optimal display:

1. Click **Connect**.
2. Increase the top **Origin** field (X) to eliminate empty rows above the panels.
3. Increase the bottom **Origin** field (Y) to eliminate empty columns to the left of the panels.
4. Adjust the X and Y **Wall Size** fields as required to display all panels.

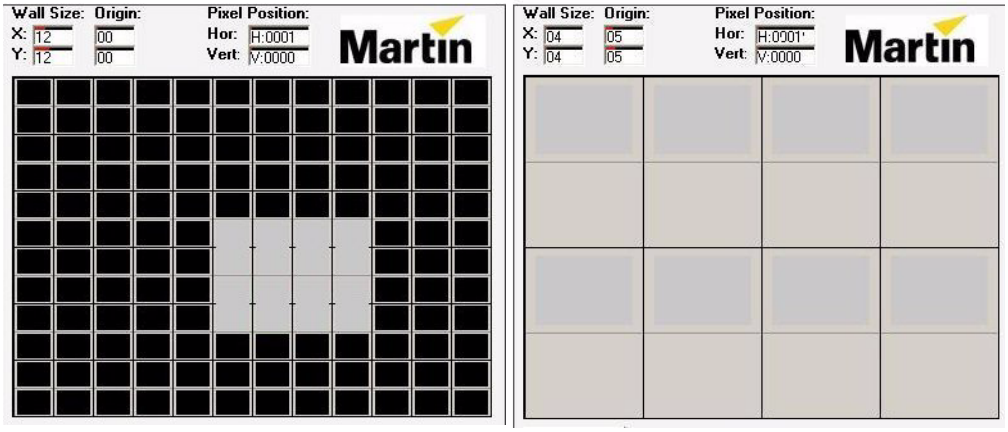


Figure 9: Opt mini zing the grid

Pixel Position fields

The position fields allow you to fine tune the pixel coordinates of the video image. The values in the horizontal and vertical fields are pixel offsets that are added to each panel's video coordinates as determined by its XY address.

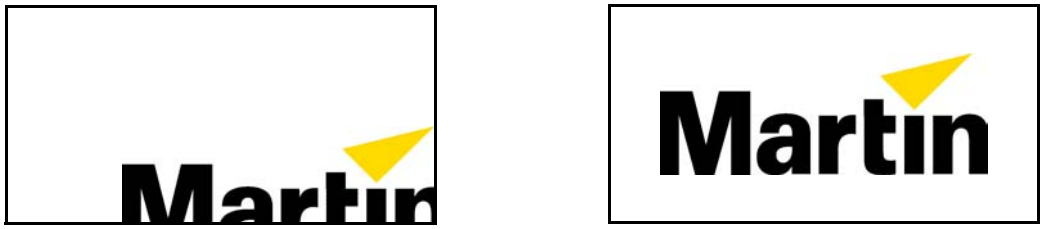


Figure 10: Pixel position adjustment

Change the pixel position values as described on page 8, under "How to change numeric values". To adjust the pixel position of the video image:

1. Click **Run** to view the image on the LED curtain.
2. To move the image to the right or left, adjust the **Hor:** value up or down.
3. To move the image up or down, adjust the **Vert:** value up or down.
4. To save the settings in each panel's non-volatile memory, click **Save Parameters**.

If you need to move the image more than the position fields allow, change the XY coordinates of the video wall with the addressing controls.

Addressing controls

Show Addresses button

Clicking **Show Addresses** freezes the video output and displays the XY coordinates on the panels. Click **Run** to clear the address display.

Enable Move check box

When **Enable Move** is selected, the XY coordinate address of the selected panel can be set using LCS. This overrides the panel's DIP-switch address setting.

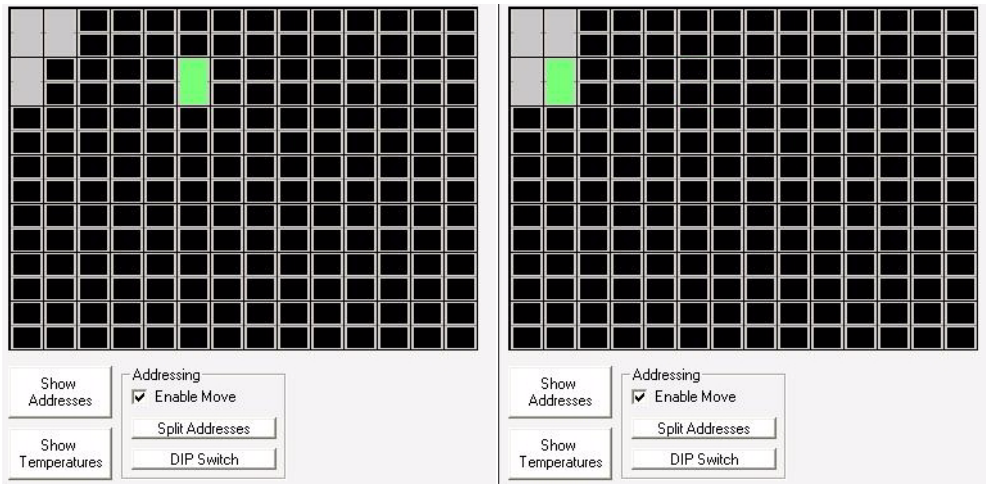


Figure 11: Moving a panel in LCS

To change a panel address:

1. Click the **Show Addresses** button.
2. Place a check in **Enable Move** check box.
3. In the grid display, left-click the panel to move.
4. Right-click the cell at the desired XY coordinates for the panel.
5. Click **Show Addresses** to update the address displayed on the panel.
6. To save the new address in memory, click **Save Parameters**.
7. *When all panels are addressed, remove the check from the **Enable Move** check box to prevent accidental changes.*

Split Addresses button

Click **Split Addresses** when 2 or more panels have the same XY coordinates. This gives each panel a new, randomly assigned XY coordinate address. Once split into individual addresses, the panels can be moved to new positions.

Note: This procedure will reset the grid display's origin to 0, 0.

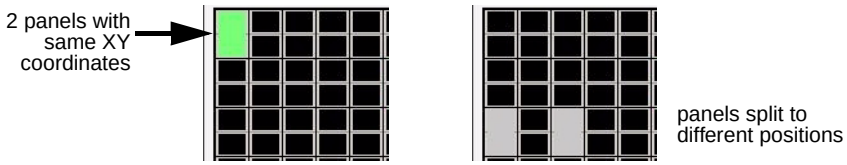


Figure 12: Splitting identical addresses

To split 2 or more panels with identical addresses:

1. If there are no empty cells in the grid display, add a row or column to the grid using the **Wall Size** fields.
2. Click the **Show Addresses** button.
3. In the grid display, click the cell at the position of the panels with the same address.
4. Click **Split Addresses**.
5. Click **Show Addresses** to refresh panel address display.
6. Move the XY coordinate addresses of each of the split panels as described above.

DIP Switch button

Setting the XY coordinate address in LCS overrides a panel's DIP-switch address. Clicking **DIP Switch** erases the software-set address and returns the selected panel to its DIP-switch-set address.

To return a panel to its DIP address:

1. In the grid display, click the desired panel.
2. Click **DIP Switch**.
3. Click **Show Addresses** to refresh panel address display.
4. To undo the change before saving, reset the panel with the **Reset Panel** command in the **Options** menu.
5. To save the setting, click **Save Parameters.**

Note: Any change to the DIP-switch itself also returns the address to the DIP-switch address.

Wall Brightness

The **Wall Brightness** fields adjust the global luminance (Y) and red, blue, and green intensity values.

The panels are factory-calibrated to provide maximum brightness at a luminance value of 150%. Higher Y values may boost dark signals.

Change the overall and individual color values as described on page 8, under "How to change numeric values".

To save the wall brightness values in each panel's non-volatile memory, click **Save Parameters.**

Figure 13: Wall Brightness

Panel Level Adjust

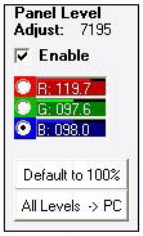


Figure 14: Panel Level Adjust

The **Panel Level Adjust** function allows you to adjust the color levels in individual panels to compensate for differences in performance.

The red, green, and blue fields display the brightness levels for the selected panel. The values can be refreshed by clicking **Connect** or the **All Levels > PC** button. The radio buttons are not intended to be clicked. Use the **Fill Color** fields instead to select the color to adjust.

To adjust individual panel levels:

1. Select red, green, or blue using the **Fill Color** fields. *Do not select the white fill color.*
2. Place a check in the Panel Level Adjust **Enable** check box.
3. An on-panel cursor appears when the panel level adjust function is enabled. Use the trackball (recommended) or other pointing device to select a panel.
4. With the cursor on the desired panel, hold the left button down and move the pointing device up or right to increase the color intensity, or down or left to decrease it. Release the left button.
5. Clicking **Default to 100%** brings all levels to 100% in the selected panel.
6. Using the same fill color, repeat the process for each panel that needs adjustment.
7. Repeat for the other fill colors.
8. When all adjustments have been made, click **Save Parameters** to save the panel levels in non-volatile memory. Remove the check from the **Enable** check box.

Freeze/Run buttons

The **Freeze** / **Run** buttons toggle the video stream on (run mode) and off (freeze mode). Freeze mode is required when displaying addresses or using the color fill function. The other commands can be executed in run or freeze mode.

Factory Default button

Clicking **Factory Default** returns all panels to LCS default values for wall brightness, pixel position, and cooling mode. The settings take effect immediately but are not saved in the panels' non-volatile memories until **Save Parameters** is pressed.

Fill Color

Figure 15: Fill Colors

The **Fill Color** fields allow you to fill the screen with a solid color for test and adjustment purposes.

Each control ranges in value from 0 (off) to 255 (full intensity). The maximum brightness that can be achieved using the Fill Color fields is limited by the Wall Brightness settings.

Change the color values as described on page 8, under "How to change numeric values". To clear the fill color, click **Run.**

Genlock controls

Figure 16: Tuning controls

Phase Off check box

The **Phase Off** check box determines whether panels are phase-synchronized (genlocked) to the selected signal. When checked, panels will be frequency tuned only when you perform the tuning procedure below. This may provide better performance if the sync signal is irregular or unstable.

DVI / External Vsync radio buttons

These radio buttons select the synchronization reference signal.

- To synchronize panels using the signal at the BNC connector, select **External Vsync**.
- To synchronize panels using the DVI signal, select **DVI.**

Tune button

Clicking **Tune** causes LCS to calculate the optimum refresh frequency based on the selected synchronization signal.

To tune the video refresh frequency:

1. Click on any panel in the grid display.
2. Select a signal source: **DVI** or **External Vsync**.
3. For genlock synchronization, remove the check from the **Phase Off** check box. When checked, panels are frequency tuned only.
4. Click **Tune**. The DVI signal and panel refresh frequencies are displayed as the process runs. If the “No Panel” message appears, select a panel and try again.
5. Allow the tuning process 2 to 3 minutes to complete. The **Tune** button changes back to light grey when tuning is completed.
6. Click **Save Parameters** to save the refresh frequency in each panel’s non-volatile memory.

300 Hz button

Clicking **300Hz** resets the panel refresh frequency to approximately 300 Hz. This may be required if the panels cannot be tuned because the video input is unstable or missing.

Connect button

Click **Connect** to refresh the grid display anytime, after changing address settings, and to display the panels’ firmware version numbers.

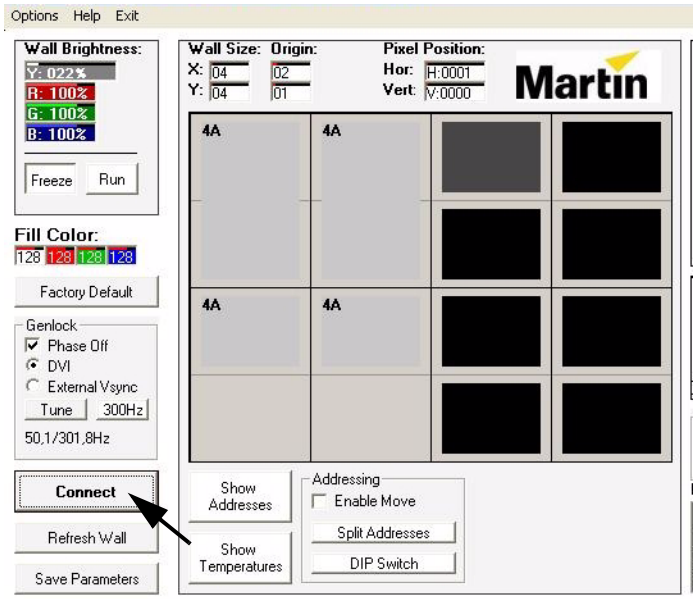


Figure 17: Firmware version display

Refresh Wall button

Clicking **Refresh Wall** refreshes all panels with the current LCS values.

Save Parameters button

Clicking **Save Parameters** saves any changes to settings in each panel's non-volatile memory. *If not saved, changes to the settings will be lost when the panels are powered off.*

Show Temperatures button

Clicking **Show Temperatures** displays the temperature of the LC panels' DSP circuit boards in the grid display. Significantly higher temperature in one panel probably indicates a defective cooling fan, which must be replaced.

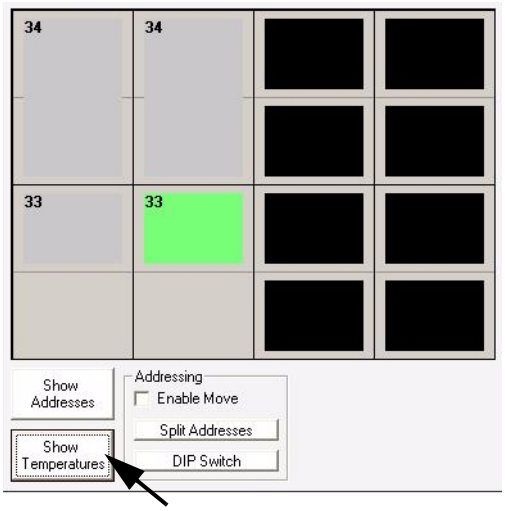


Figure 18: Temperature display

Fan Cooling radio buttons

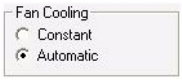


Figure 19: Fan cooling

The Fan Cooling radio buttons determine the operation of the panels' cooling fans.

- **Constant** operates the fans continuously and provides maximum cooling.
- **Automatic** runs the fans at intervals when the panel electronics are below 35° C (95° F), resulting in quieter operation.

To save the fan setting in each panel's non-volatile memory, click **Save Parameters**.

Options menu

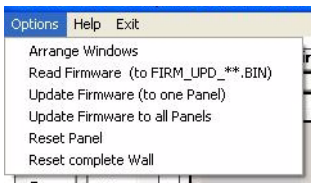


Figure 20: Options menu

Read Firmware (to FIRM_UPD_**.BIN)

This option copies firmware from a selected panel to the "lcs" folder on the PC's C drive. The firmware can then be installed on other panels. This is useful if some panels have outdated firmware but there is no convenient Internet access.

Service technicians with access to an EEPROM burner can use the file to make a copy of the panel's EEPROM, including calibration values.

To copy firmware from a panel to the PC:

1. In the grid display, click the panel to copy from.
2. Select **Options > Read Firmware (to FIRM_UPD_**.BIN)** from the main menu.
3. Allow the process several minutes to complete.
4. To confirm the operation, verify that the firmware is located in the lcs folder.

Update Firmware (to one panel)

This option installs firmware on the currently selected panel.

To install firmware in a single panel:

1. Download the firmware update from the Support Area of the Martin® web site at www.martin.com and save it in the C:/lcs folder.
2. Click in the grid display to select a panel to update.
3. Select **Options** > **Update Firmware (to one unit)** from the menu.
4. Click the firmware file to install. Click **Open**.
5. At the panel reset prompt, click **Yes** or **No**.
6. The panel will flicker and the progress indicator rotates during the update. When the update is completed, LCS writes "Finish, please connect after 20 sec." Wait 20 seconds and press **Connect**.

Update Firmware to all panels

This options installs firmware on all panels.

To install firmware:

1. Download the firmware file from the Support Area of the Martin® web site at www.martin.com and save it in the C:/lcs folder.
2. Select **Options** > **Update Firmware to all panels** from the menu.
3. Click the firmware file to install. Click **Open**.
4. At the "Overwrite all, or only older versions?" prompt, click **No** unless you are installing an older version of firmware.
5. The update occurs one panel at a time. The panel's firmware version number is displayed while the update is in progress and underlined when completed. When all panels are updated, LCS writes the message "--finish--".
6. Press the **Connect** button to refresh the grid display.

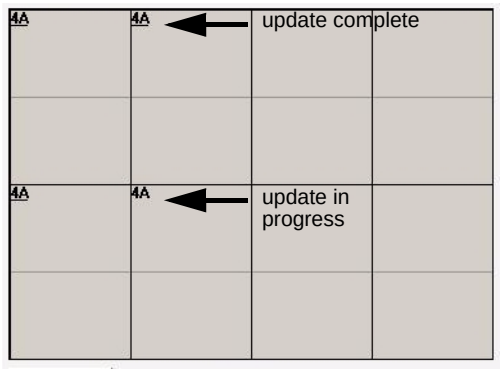


Figure 21: Firmware update progress

Reset Panel

This option resets the selected panel with the settings stored in the panel's non-volatile memory. Unsaved settings will be lost.

Reset complete Wall

This option resets all panels. Resetting is recommended after making settings changes to confirm that the settings have been saved.

Troubleshooting

Problem	Probable cause(s)	Remedy
LCS does not connect to any panels. LCS message bar reads “No RS232-DSP Interface found” at startup.	No power to DVI Buffer Box via DVI input cable.	Check the “DVI com.” LED. If it is not lit, check DVI input connections and verify that the media server is running.
	DVI Buffer Box not connected to a COM port from 1 to 4.	Check the RS-232 connections and verify that the device is connected to a COM port from 1 to 4. When connected properly, the “RS-232 com.” LED will flash in response to commands from LCS. Exit LCS and restart.
	Conflict with another device connected to COM port 1 to 4.	Test system without other devices connected to COM ports 1 - 4. Assign the conflicting to device to COM port 5 or higher.
Some panels respond to LCS, some do not.	The DVI splitter does not relay the DDCCLOCK and DDCDATA signals on pins 6 and 7 to every output.	Short term: reset panels and exit LCS. Long term: replace DVI splitter. See LC Series user manual for recommendation.
	Outdated firmware	Update panel firmware.
Panels do not start up with the expected settings.	Failure to save settings in non-volatile EEPROM memory.	Click **Save Parameters** after making changes to settings.
	Some panels set for a previous application.	Refresh wall, then apply factory default settings and save so all panels have same settings. Adjust settings as desired and save again.

Table 1: Troubleshooting

DVI Buffer Box specifications

Physical

Length . . . . . 75 mm (3 in.)
Width . . . . . 150 mm (6 in.)
Height . . . . . .33 mm (1.3 in.)
Weight . . . . . 0.2 kg (0.44 lbs.)

Monitor Emulation

Monitor type . . . . . .XGA 1024 x 768
DVI signal frequency . . . . . 50 or 60 Hz
DVI signal input . . . . . DVI-D (single-link)

Construction

Casing . . . . . .Aluminum
Color . . . . . Black
Protection rating. . . . . .IP 20

Connections

Video in/out . . . . . DVI-D single link (DVI-I dual link connectors provided)
RS-232 serial port DB9
Sync/composite video in . . . . . BNC

Thermal

Maximum ambient temperature (Ta max.) . . . . . 40° C (104° F)
Minimum ambient temperature (Ta min.) . . . . . 0° C (32° F)

Approvals

CE

EU safety. . . . . .EN 60950
EU EMC . . . . . EN 55022, EN 55024, EN 61000-3-2, EN 61000-3-3

Included Items

RS-232 cable
LC software CD-ROM
2 jumper caps
User manual (included on CD-ROM)

Accessories

DVI-D cable, 1.5 m (59 in.). . . . . P/N 91611265
DVI-D cable, 3.2 m (126 in.). . . . . P/N 91611266
DVI-D cable, 5 m (197 in.) . . . . . P/N 91611267
Martin® DVI splitter, 2-output . . . . . P/N 91611280
Martin® DVI splitter, 4-output . . . . . P/N 91611290
Martin® DVI splitter, 8-output . . . . . P/N 91611281

Ordering Information

Martin® DVI buffer box, LC series . . . . . P/N 91611269

Specifications subject to change without notice