GENERIC SERVICE
VANGUARD® VC6
LARGE MATRIX SERIES

DISPLAY MANUAL

17 October 2018
DD4007298
Rev 00

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DAKTRONICS

Table of Contents

1 Introduction

How to Use This Manual

This manual explains the installation, maintenance, and troubleshooting of a large matrix VC6 series display. For information regarding the safety, installation, operation, or service of this system, refer to the telephone numbers on the cover page of this manual.

Please read and understand all steps in this manual before beginning the installation process.

For a smooth installation, complete the steps in this manual in order. Contact Daktronics Technical Support with any questions before or during the installation process.

Daktronics identifies manuals by the ED or DD number located on the cover page of each manual. For example, this manual is referred to as **DD4007298**.

Daktronics builds displays for long life and little maintenance. However, from time to time, certain display components need replacing. Refer to the **Daktronics Exchange and Repair & Return Programs (p.21)** section if any component needs replacement or repair.

Limitation of Liability

The factory warranty will be nullified if:

- The display is not installed according to the steps in this manual.
- Proper electrical service is not provided or the display is not grounded properly.
- Unauthorized modifications are made to the display, display cabinet, or the control system.

Model Number Guide

A typical display system consists of a Windows®-based computer running Vanguard® software. Refer to the **Vanguard® Software Help File [F1]** for installation and maintenance information about Vanguard® software.

An example of Large Matrix Vanguard® model numbers are described as follows:

VC6-RxC-19-RGB		
VC6	=	Outdoor Standard Galaxy® display
R	=	Number of pixel rows high
C	=	Number of pixel columns long
19	=	Pixel pitch in millimeters
RGB	=	Full Color

2 Installation Preparation

This section explains what to consider before installing a Daktronics Vanguard® VC6 display.

Follow all guidelines and safety precautions in this manual when installing the display. Do not modify the display or control system in any manner without the written permission of Daktronics' engineering staff.

Any unauthorized modifications will nullify the display warranty.

Pre-Installation Checklist

- The display is in good condition after shipping and uncrating.
- A straight and square mounting frame is provided for the display.
- The support structure can carry the weight of the display and meets local and national codes.
- Ensure proper power is available at sign structure.
- Ensure the display cabinet has no holes (accidental or intentional) that will allow water to enter the display.
- All display modules are fully latched into the display cabinet.

Structure Requirements

Support structure design depends on mounting method, installation height, display size, and weight. Because every installation site is unique, Daktronics approves no single procedure for mounting displays.

Things to consider prior to installation:

- The display mounting requires a continuous horizontal stringer across the back attached to all display mounting points to provide adequate wind load support for the cabinet.
- The structure can carry the weight of the display and wind load.
- Display structure and mounting must not obstruct air flow.
- Light sensor must not be obstructed for the display to function properly.

Daktronics is not responsible for the installations or the structural integrity of support structures done by others.

Required Tools

The following table lists the minimum tools Daktronics recommends having on site for each installation. Daktronics only provides the specialized tools needed to complete the installation.

Daktronics Provided	Customer Provided
Splice Wrench	Hex Head Wrenches – $^{1}/_{8}$" and $^{3}/_{16}$"
	Flathead and Phillips Head Screw Drivers
	Crane or Lift Truck
	Step Ladders
	Computer with Vanguard® Software and Internet access
	Ratchet and/or Impact Wrench – $^{11}/_{16}$"
	Socket Set – Sizes up to 1 $^{1}/_{16}$" Needed
	Tape Measure
	Utility Knife

3 Display Installation

This section explains the steps necessary for proper lifting and installation of the display to the sign structure.

Follow all guidelines and safety precautions in this manual when installing the display.

Do not modify the display or control system in any manner without the written permission of Daktronics' engineering staff. Any unauthorized modifications will nullify the warranty.

Display Installation Dos

Inspect the display for damage prior to installation.

- Use all T-clips for mounting.
- Provide an adequate support structure that is straight and level.
- Provide adequate ventilation that meets or exceeds display specifications.
- Use all T-clips for mounting using a continuous horizontal member.
- Use all lift eyes when lifting the display.

Display Installation Don'ts

- Open the controller enclosure.
- Block display ventilation system.
- Use the lift eyes for display mounting.
- Hang additional signage from the display.

Display Installation

1. Use a utility knife to carefully cut away all of the white packaging material from the display. Be careful not to damage the face of the display or LEDs.
2. If the display is multi-sectional, refer to the **Section Splicing (p.6)** section before continuing.
3. Attach a crane or lift truck to the lift eyes on the display's top.

> **Note:** Lift eye spacing is set at Daktronics and should not be moved. Lift eyes should also remain in place after installation is complete.

> **Note:** Ensure the angle between the top of the display and the lifting strap is greater than 55 degrees, as shown in **Figure 1**.

4. Apply tension to the lift lines.
5. Attach tag lines to the bracket.
6. Unbolt the display from the shipping braces.
7. Lift the display off the truck to the display structure.

> **Note:** Do not lift displays in wind speeds greater than 20 mph.

8. Mount the display to the structure by welding or bolting all T-Clips to horizontal stringers.

> **Note:** Use all T-Clips when mounting the display.

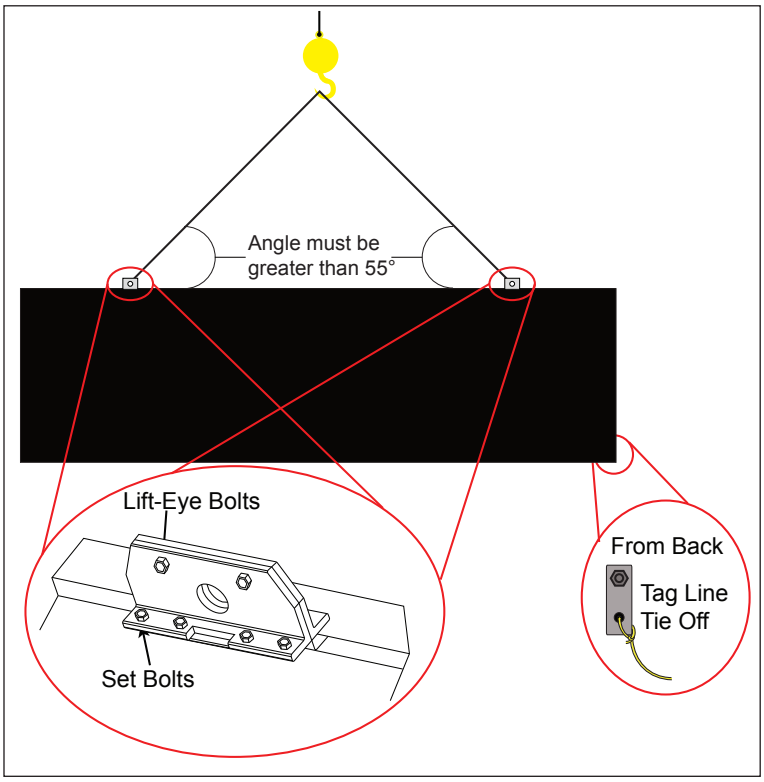

Figure 1: *Proper Display Lifting*

> **Note:** The T-Clips are installed in the recommended locations at Daktronics, but can be moved 12 inches either way to avoid obstructions. Refer to the label on the display for limitations.

9. Remove crane support and tag lines from the display once mounting is complete.
10. Locate the top border caps and install over lift eyes using provided Tek screws.

4 Section Splicing

Display Section Numbering

For displays with multiple sections, each section is numbered for easy installation. For a two-section display, the bottom section is 201 and the top section is 101. Refer to **Figure 2**.

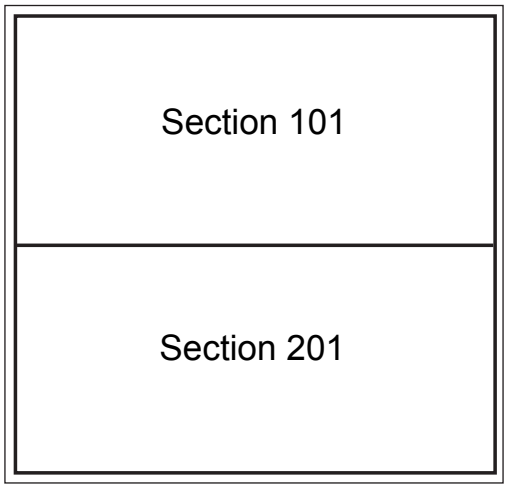

Figure 2: *Two-Section Display Section Numbering*

For four-section displays, when looking from the front, the lower-left display section is 201 and the section to the right is 202; the second row of sections are 101 on the left and 102 on the right. Refer to **Figure 3**.

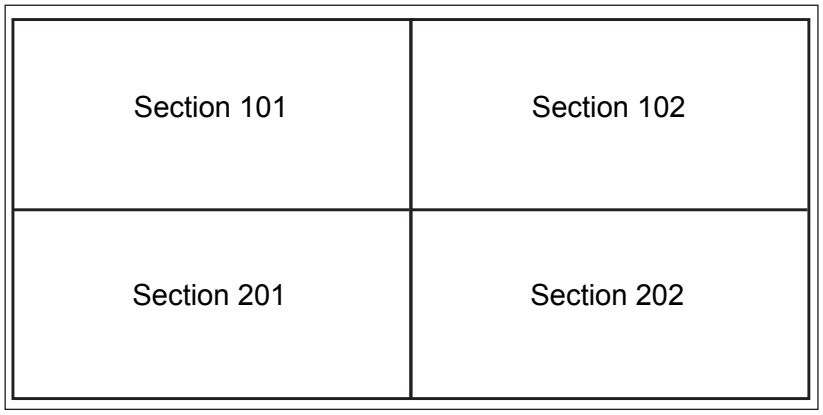

Figure 3: *Four-Section Display Section Numbering*

Section Splicing

1. Ensure the splice key is inserted in the channel of the bottom section, as shown in **Figure 4**.
2. Attach a crane or lift truck to the lift eyes of the top section and apply tension.
3. Unbolt the top section of the display from the truck bed and unbolt A-frame.
4. Lift the display top section off the truck high enough to spin around 180 degrees.

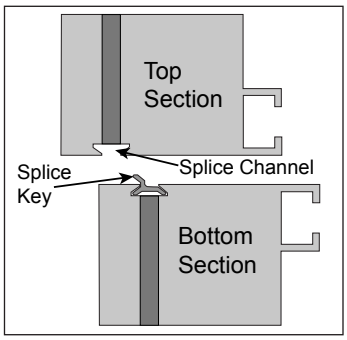

Figure 4: *Installed Splice Key*

5. Starting at one end of the display, use the splice tool to draw the top section into the bottom until the splice key is fully engaged, as shown in **Figure 5**.

6. Ensure display sections are aligned and that LEDs are also in alignment.

7. Attach the splice plates and splice T-clips along the section splice, as shown in **Figure 6**. Use an $^{11}/_{16}$" impact wrench or ratchet to tighten all nuts on the splice plates and splice T-clips.

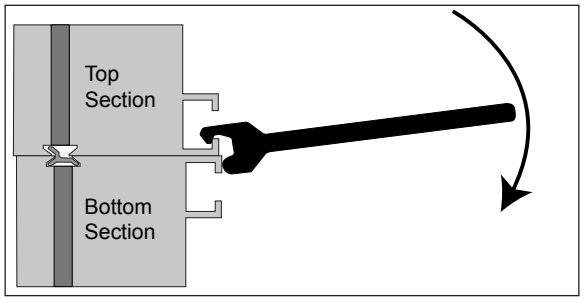

Figure 5: *Aligning Display Sections with Splice Tool*

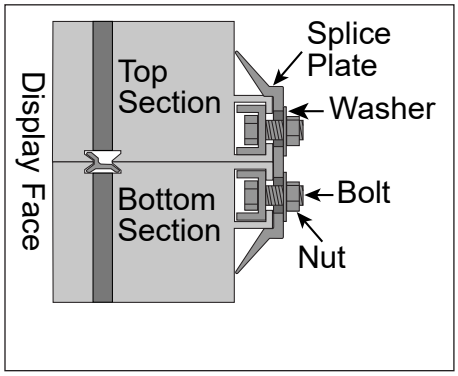

Figure 6: *Installed Flat Splice Plate*

5 Electrical Installation

This section explains the steps necessary to make final electrical connections to the display from the primary power source. For display-specific power requirements, refer to the label on the display's back.

Electrical Installation Dos

- Follow all installation guidelines.
- Route power to the display through a disconnect switch.
- Provide the required power per display requirements.
- Provide a separate circuit for each display.
- Connect each display face to a dedicated earth-ground electrode.
- Follow all local and national electrical codes.

Electrical Installation Don'ts

- Share circuits between displays and other electrical devices.
- Connect the display to any voltage other than that listed on the product label.
- Connect the neutral to the ground at the disconnect or the display.
- Use the display support structure as an earth-ground electrode.

Conduit

Daktronics does not provide conduit. Separate conduit must be used to route:

- Power
- Signal IN wires to the signal termination enclosure (when applicable)
- Signal OUT wires (if not using the provided interconnect cable)

For power, displays have either a J-box or a $^{3}/_{4}$" conduit access hole located near the lower right on the back of the display. For signal, displays have signal input quick connects or etched drilling guides for conduit.

Power Requirements

Install this display according to all applicable local and national electrical codes. This includes proper grounding and bonding of the display.

Do not connect the display to any voltage other than that listed on the Daktronics product label.

Displays use single-phase power. Proper power installation is imperative for display operation.

Important Notes:

- Daktronics recommends that a separate circuit be run to the electronic display(s) to isolate it and prevent any issues that could be caused by line voltage fluctuations or high frequency noise on the power line caused by other types of equipment. A separate circuit also makes display maintenance and troubleshooting easier. Daktronics assumes no liability for any issues caused by line voltage fluctuations or other improper power conditions if these recommendations are not followed.
- Size conductors of circuits that deliver power to the display according to national and local electrical codes so the power distribution system delivers full-load power to the display while maintaining a voltage within 5 percent of the utility nominal voltage.

Main Disconnect

Daktronics requires using a power disconnect switch with the display. Use a disconnect so that all ungrounded conductors can be disconnected near the point of power connection.

Locate the disconnecting means either in a direct line of sight from the display or so it can be locked in the open position. This ensures that power is not reconnected while service personnel work on the display.

> **Note:** Daktronics recommends that a separate circuit be run to the electronic display(s) to isolate it and prevent any issues that could be caused by line voltage fluctuations or high frequency noise on the power line caused by other types of equipment. A separate circuit also makes display maintenance and troubleshooting easier. Daktronics assumes no liability for any issues caused by line voltage fluctuations or other improper power conditions if these recommendations are not followed.

Power Connection

1. Review the power requirements for the display. Requirements are found on the display shop drawing or label on the display's back.
2. Route conduit from the main distribution panel/disconnect to each display power entrance. Each display section has a power entrance and requires a dedicated circuit.

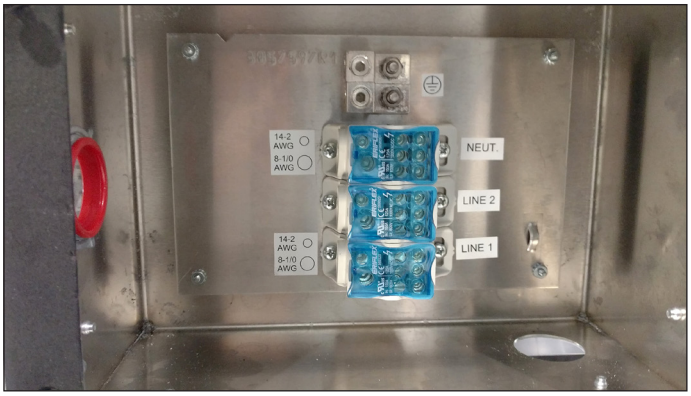

Figure 7: *Power Entrance Box*

3. Remove the four screws that attach the power entrance access door.
4. Connect conduit to the 2" Myers hub at the left of the power entrance box.
5. Feed power cable from the conduit into the power entrance box.
6. Connect primary power lines to appropriate taps in enclosure, shown in **Figure 7**. Refer to label on enclosure for wiring diagram.

7. Reinstall power entrance cover.

8. Connect grounding electrode to ground lug, show in **Figure 8**, on each section.

Figure 8: *Ground Lug*

Grounding

All components of a display system—including but not limited to displays, control equipment, and connected peripheral equipment—must be electrically grounded. Only qualified individuals may perform electrical work, including verification of ground resistance. Daktronics is not responsible for improper grounding or damage incurred as a result of improper grounding.

Grounding methods must meet the provisions of all applicable local and national codes. Inspect and verify all grounding methods meet the provisions of all applicable local and national codes.

Proper grounding is necessary for reliable equipment operation and general electrical safety. Failure to properly ground the display system may void the warranty, disrupt operation, damage equipment, and cause bodily harm or death.

Sectional Display Signal Connections

For sectional displays, data is transmitted from one section to the next through fiber cables connected to the outside of each section.

Each section has multiple jacks labeled either A or B. For cable routing between display sections, refer to the label on the display's back that illustrates how to connect the cables.

6 Start-Up Procedure

Start-Up Checklist

Note: Before starting up the display, review this checklist to ensure that all parts are ready to operate correctly.

- Confirm that power is correctly connected to the display.
- Confirm there is sufficient power according to display requirements.
- Confirm a main disconnect is installed.
- Confirm the display is connected to an earth-ground electrode.
- Confirm the external communication equipment (signal enclosure, client radio, etc.) is properly installed.
- Inspect signal connections at the control computer.
- Confirm that any necessary network connections have been made.
- Inspect peripheral equipment (temperature sensor, light sensor, etc.) for proper installation.
- Confirm that the control computer is correctly configured according to the **Vanguard® Software Help File [F1]**.

7 Network and Communication Installation

This section explains how to set up communications with a VC6 series display through a network or an individual computer.

Daktronics is not responsible for setting up a customer's network system as either a Local Area Network (LAN) or a Wide Area Network (WAN).

Network and Communication Installation Dos

- Complete all network and communication installation prior to turning display on.
- Have a laptop on site with Internet access (preferred).
- Work with the customer's IT professional for network integration.

Vanguard® Software

Daktronics Vanguard® software allows the VC6 operator to check display status and to control messages. Refer to the **Vanguard® Software Help File [F1]** for information about operating Vanguard® software.

Refer to that product's help file for system requirements, installation, and configuration information.

8 Display Maintenance

This section explains the steps necessary to maintain the Vanguard® VC6 display. Daktronics Vanguard® VC6 displays are front accessible only. Remove modules on the front of the display to gain access to internal components. **Figure 9** shows internal component locations.

> **Note:** Component locations may vary depending on display size. Refer to drawings included with the display.

> **Note:** Turn OFF power before any repair or maintenance work is done on the display.

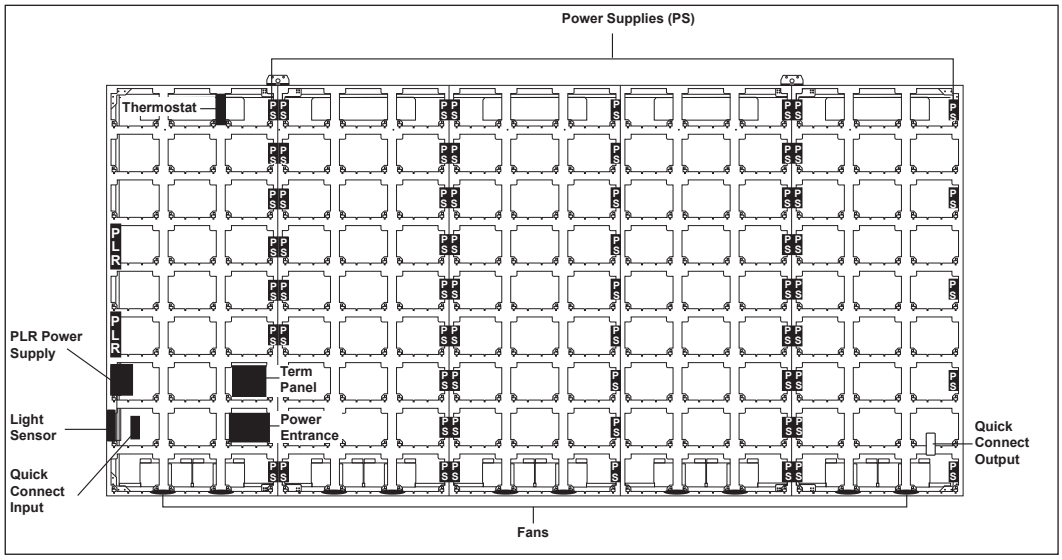

Figure 9: *Component Locations In 9x15 Display*

Internal Display Access

1. Disconnect power to the display.
2. Locate the latch fastener on the module. One is centered near the top of the module, as shown in **Figure 10**. Insert a $^{1}/_{8}$" hex head wrench into the hole and turn it a quarter turn counter-clockwise.
3. Gently tip the top of the module outward slightly. Then lift the module upward to disengage the tabs at the bottom of the module from the slots on the display's face sheet.

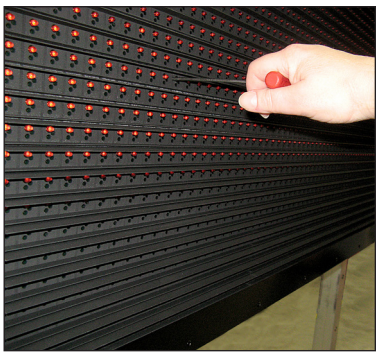

Figure 10: *Remove Modules*

4. Disconnect the SATA cables and unplug the power cable by squeezing the tabs on the sides of the plug head and pulling it out.
5. When ready to reinstall the module, reconnect the cables, push the cables into the display so they do not get pinched, and latch the module using a $^{1}/_{8}$" hex head wrench.

> **Note:** A fully seated module should be flush with the modules around it.

Ventilation System

Vanguard® VC6 displays are equipped with a ventilation system that helps keep internal components at operable temperatures. Vanguard® VC6 displays are rear ventilated, so the display support structure must allow adequate space or air movement for proper ventilation.

Fans help bring fresh air into the display while exhausting hot air through the upper vents. Fans are controlled via a thermostat in the display cabinet. The thermostat is equipped with a bypass button for testing fan operation. Replace fans that are not working properly.

Display Face Cleaning

Wet Cleaning Process

1. Turn off power to the display.
2. Mix a mild, non-abrasive, non-petroleum-based detergent and cold water, one ounce of detergent to one gallon of cold water.
3. Saturate a light/medium duty cleaning brush with the soapy water.
4. Use horizontal brush strokes to loosen and remove dirt and grime, washing the display from top to bottom. Use light pressure so as not to damage the LEDs. Clean only an area that is safely within reach from a lift or stage, and then move on to the next section of modules.
5. Rinse the display face with generous amounts of cold water under low pressure. A spot-free rinse agent can be used to reduce water spots.
6. Use soft, dry terry cloth to dry and remove any excess water. Take care not to damage LEDs by catching the cloth on them.
7. Allow the display to completely air-dry for 12 hours before applying power to the display.

Dry Cleaning Process

1. Turn off power to the display.
2. Rub a dry, soft terry cloth towel horizontally across each row of LEDs. Make four passes per row of LEDs before moving to the next row of LEDs. Work from top to bottom safely within reach from a lift or a stage. Take care not to damage LEDs or the plastic louvers by catching the cloth on them.

9 Display Troubleshooting

This section provides basic display information such as power and signal routing as well as basic troubleshooting tips for common problems. For issues not addressed in this manual, please contact Daktronics Technical Support.

Power and Signal Routing

Understanding power and signal flow through the display can help a technician troubleshoot an issue.

Power Routing

Figure 11 shows an example of how power is routed through the display.

> **Note:** Power routing may vary depending on display size.

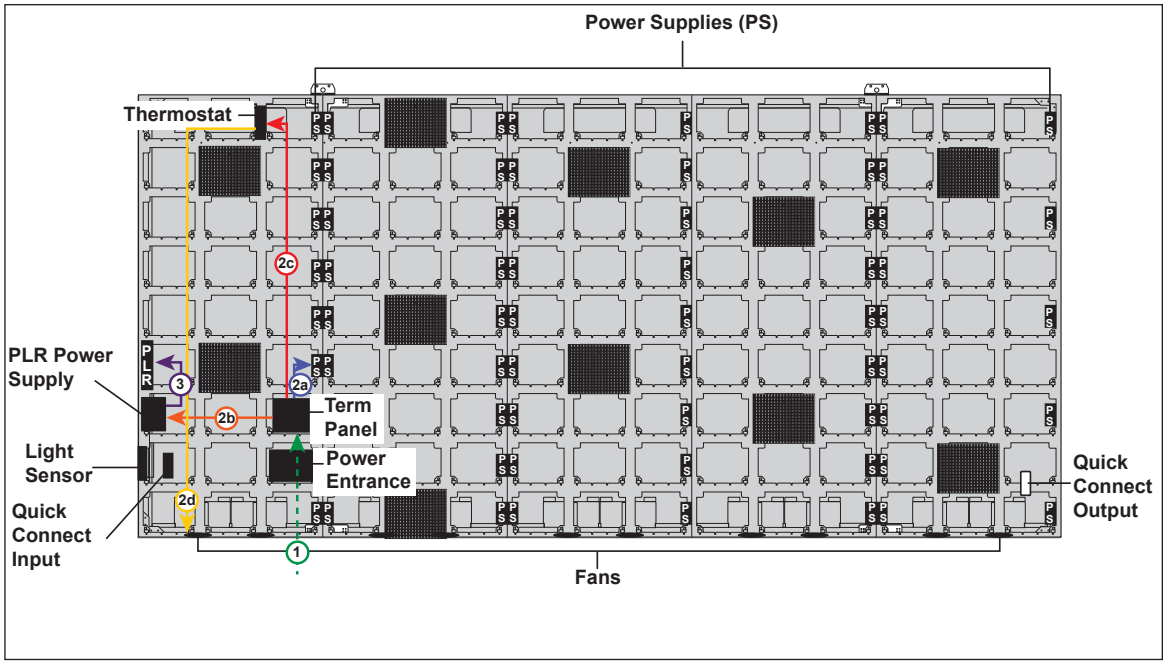

Figure 11: *Power Routing*

1. AC Power enters the display through the power entrance box on the back of the display and travels to the Power Termination Panel.
2. Power is distributed to Module Power Supplies (2a), Player Power Supply (2b), Thermostat (2c), and Fans (2d).
3. DC Power is also supplied to the PLR (4) from the Player Power Supply.

Signal Routing

Figure 12 shows how signal is routed through the display.

> **Note:** Signal routing may vary depending on display size.

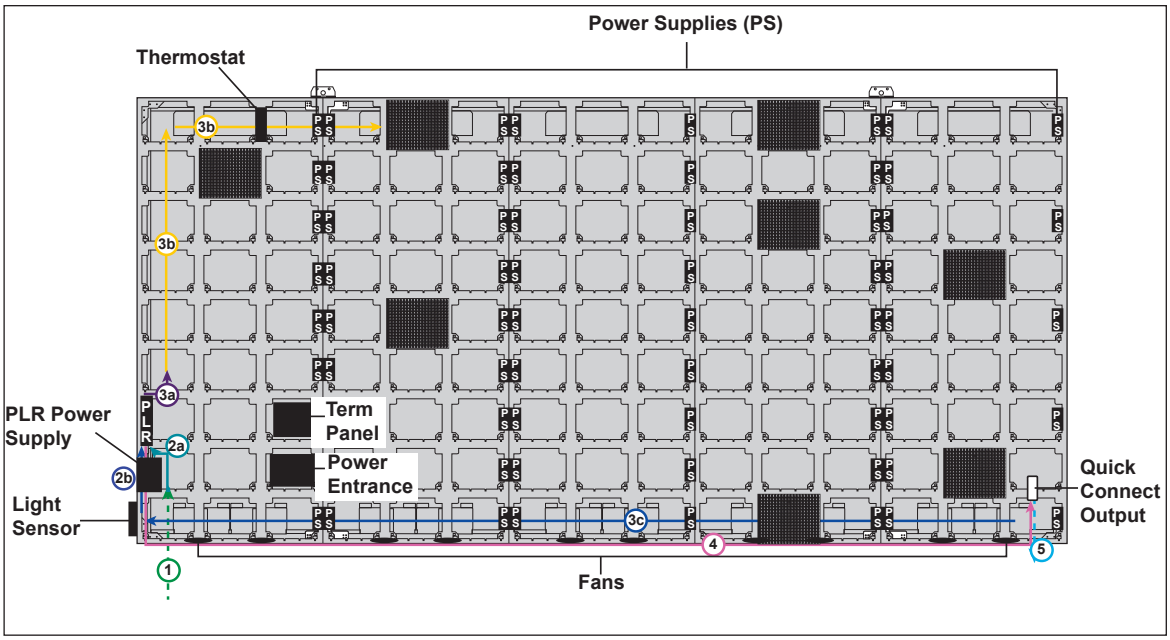

Figure 12: *Signal Routing*

1. Signal enters the display from the external signal enclosure through the knockouts in the back of the display (1).
2. Signal travels from the knockouts to the J10 and J11 fiber jacks on to the PLR (2a). The light sensor is connected to J8 on the PLR (2b).
3. From SATA A on the PLR, signal goes to the first module (3a) and travels from module to module via SATA cables (3b), finally returning to the PLR to SATA B (3c).
4. Signal leaves the PLR from Fiber B and travels to the Output Fiber Quick Connect (4) or to the second PLR Fiber A.
5. Signal from the primary display face Output Fiber Quick Connect travels to the mirror face (5) to jack J32.

PLR Diagnostics

The ProLink Router (PLR), receives signal from the display player, which transfers it on to the modules through SATA cables. Vanguard® VC6 displays are equipped with a redundant signal path, meaning two SATA cables are connected to each module. If one of the two SATA cables fail, the module continues to receive data from the other SATA cable and the display continues functioning normally.When put into self-test mode, the PLR tests for correct operation and displays pass/fail status on the 7-segment display.

To put the PLR into self-test mode, loop a SATA cable between ports A and B. Then take a fiber cable and connect the fiber ports together. Once the cables are connected, cycle power to the PLR and it will boot-up in self-test mode. Following is a table of a few possible messages. Contact Daktronics Technical Support for additional information or questions.

If any Err message is displayed, send the PLR back to Daktronics for repair or replacement.

Code			Description
8	8	8	Testing 7 segments (held for 2 seconds)
t	s	t	Initial test in progress (60-second duration)
P	A	S	All tests passed
E	r	r	Test failures reported
F	0	1	Fiber Port A Error
F	0	2	Fiber Port B Error
F	0	3	RJ45 IN (Port A) Error
F	0	4	RJ45 OUT (Port B) Error
F	0	5	ProLink5 (SATA) Port A Error
F	0	6	ProLink5 (SATA) Port B Error
C	N	P	CAN Light Sensor (J8) Port Pass
C	N	F	CAN Light Sensor (J8) Port Fail

Module Diagnostics

Modules are equipped with a status indicator LED that can help troubleshoot possible issues. Under normal operation, the status indicator LED should flash once every 4 seconds.

If a module is blank, but has power supplied to it, perform a module self-test to diagnose a module or signal cable failure.

To perform a self-test, follow the steps below.

1. Attach a signal cable to Port A and Port B on the module, as shown in **Figure 13**.
2. Disconnect the power to the module for 10 seconds.
3. Reconnect the power to start the self-test.
4. Verify the module is running a self-test.

Remove the signal cable and cycle power to the module to stop the self-test.

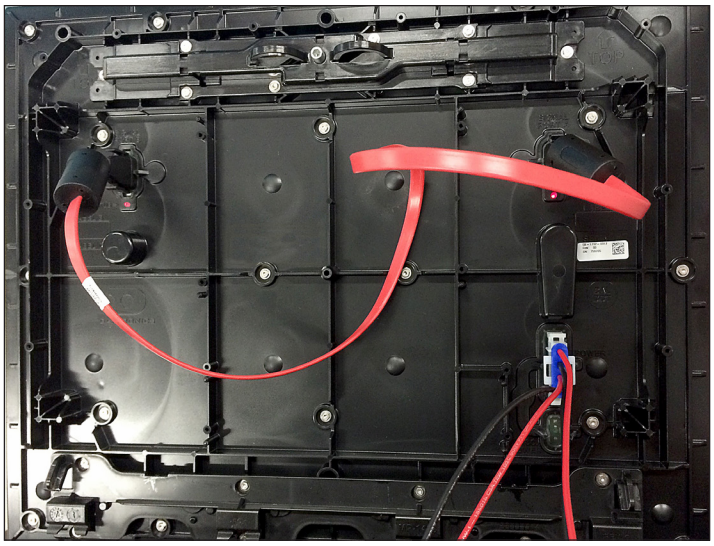

Figure 13: *Module Self Test*

10 Replacing Parts

Module Replacement

> **Note:** When removing modules from the display, do not allow them to hang by the cables.

1. Turn off power to the display.
2. Locate the latch fastener on the module. One is centered near the top of the module.
3. Insert a $^{1}/_{8}$" hex head wrench into the hole and turn it a quarter turn counter-clockwise.
4. Gently tip the top of the module outward slightly. Then lift the module upward to disengage the tabs at the bottom of the module from the slots on the display's face sheet.
5. Disconnect the SATA cables and unplug the power cable by squeezing the tabs on the sides of the plug head and pulling it out.
6. When ready to reinstall the module, reconnect the cables, push the cables into the display so they do not get pinched and latch the module using a $^{1}/_{8}$" hex head wrench

> **Note:** A fully seated module should be flush with the modules around it.

Power Supply Replacement

1. Disconnect the power supply from any wiring harnesses connected to it, as shown in **Figure 14**.
2. Pull the top tab of the power supply bracket outward.
3. Slide the bracket up and pull it out of the cabinet.
4. Push the tab holding the power supply in place out and back.
5. Carefully pull the power supply outward.
6. Secure the new power supply to the bracket.
7. Slide the bracket back into place inside the cabinet.
8. Reconnect the wiring harnesses disconnected in **Step 1**.

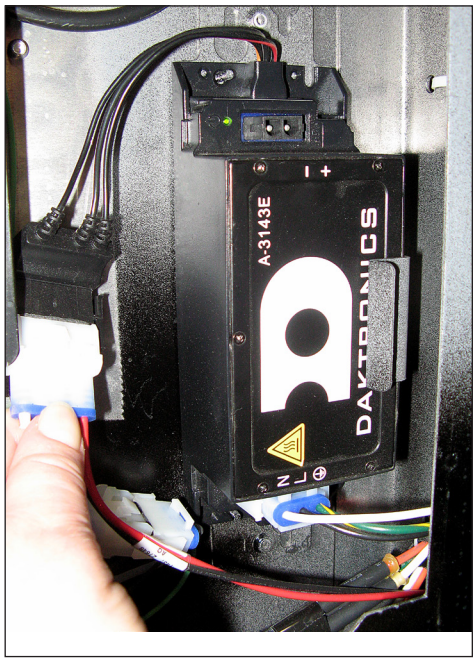

Figure 14: *Power Supply Mounting*

PLR Replacement

The PLR is located behind the third module up from the bottom in the first column of modules, as shown in **Figure 9** on **page 14**. If the display has two PLRs, they are located behind the third and fifth columns. PLRs can be found in both Primary and Mirror display faces as well as all sections of a sectional display.

1. Remove the module in front of the PLR.

   Note: Do not allow module to hang by its cables.

2. Disconnect the two SATA cables, fiber cables, and power cable to the PLR.
3. Loosen the screw at the top of the PLR mounting plate.
4. Lift the mounting plate up and out of the display.
5. Insert the new PLR with mounting plate and tighten the screw.
6. Insert the two SATA cables, fiber cables, and power cable in the appropriate locations.

11 Daktronics Exchange and Repair & Return Programs

Daktronics Part Numbers

All parts in Daktronics displays are assigned a part number. Daktronics part numbers are commonly found on drawings and are used when requesting replacement parts from Daktronics Customer Service. Take note of the following part number formats.

- "0P-_ _ _ _-_ _ _ _" denotes an individual circuit board.
- "0A-_ _ _ _-_ _ _ _" denotes an assembly. An assembly can be a single circuit board or a collection of components that function together, usually mounted on a single plate or in a single enclosure.
- "0Z-_ _ _ _-_ _ _ _" denotes an assembly.
- "PR-_ _ _ _ _-_ _" denotes a specially ordered part.

Most circuit boards and components within this display carry a label listing the part number of the unit. If a circuit board or assembly is not in the replacement parts list, use the label to order a replacement. A typical label is shown in **Figure 15**. The part number is bolded.

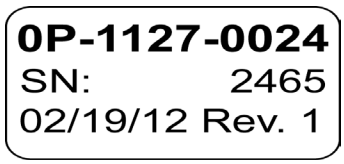

Figure 15: *Typical Label*

Daktronics Exchange and Repair & Return Programs

To serve customers' repair and maintenance needs, Daktronics offers both an Exchange Program and a Repair & Return Program.

Exchange Program

Daktronics offers a unique Exchange Program as a quick service for replacing key parts in need of repair. If a part requires repair or replacement, Daktronics sends the customer a replacement, and the customer sends the defective part to Daktronics. This decreases display downtime.

Before Contacting Daktronics

Identify these important part numbers:

Display Serial Number:
Display Model Number:
Contract Number:
Date Installed:
Location of Display (Mile Marker Number):
Daktronics Customer ID Number:

To participate in the Exchange Program, follow these steps.

1. **Call Daktronics Customer Service:**

Market Description	Customer Service Number
Department of Transportation, mass transits, airports, parking facilities	800-833-3157

2. **When the new exchange part is received, mail the old part to Daktronics.** If the replacement part fixes the problem, send in the problem part which is being replaced.
   a. Package the old part in the same shipping materials in which the replacement part arrived.
   b. Fill out and attach the enclosed UPS shipping document.
   c. Ship the part to Daktronics.
3. **A charge will be made for the replacement part immediately, unless a qualifying service agreement is in place.** In most circumstances, the replacement part will be invoiced at the time it is shipped.
4. **If the replacement part does not solve the problem, return the part within 30 working days or the full purchase price is charged.** If, after the exchange is made the equipment is still defective, please contact customer service immediately. Daktronics expects immediate return of an exchange part if it does not solve the problem. The company also reserves the right to refuse parts that have been damaged due to acts of nature or causes other than normal wear and tear.

Repair & Return Program

For items not subject to exchange, Daktronics offers a Repair & Return Program. To send a part for repair, follow these steps:

1. **Call or fax Daktronics Customer Service:**
   Phone: 800-833-3157 Fax: 605-692-0145
2. **Receive a case number before shipping.**
   To receive a case number, contact a services coordinator via phone, email, or by creating a MySupport account on the Daktronics website. This expedites repair of the part.
3. **Package and pad the item carefully to prevent damage during shipment.**
   Electronic components, such as printed circuit boards, should be placed in an antistatic bag before boxing. Daktronics does not recommend using packing peanuts when shipping.
4. **Enclose:**
   - your name
   - address
   - phone number
   - the case number
   - a clear description of symptoms

Shipping Address

Daktronics Customer Service
600 E 54th St N
Case #_____
Sioux Falls, SD 57104

Email

transportationhelp@daktronics.com