

# Galaxy<sup>®</sup> AF-3500/3550

## Installation and Operation Manual

*DD1377306*

*Rev 16—10 July 2014*

# DAKTRONICS

Complete the chart with specific information about this display so the details are readily available when calling for service or replacement parts.

Information needed for technicians and/or Customer Service	Fill in the blank
Location address of the display:	
Model number of the display:	
Version of software being used:	
Method of communication being used:	
Controller version used in the display:	



**DAKTRONICS**

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# Section 1: Overview of the Displays

**Note:** This manual provides installation, maintenance, and troubleshooting information to help ensure the optimal performance of Daktronics Galaxy® AF-35XX displays. Diagnostic information and parts replacement are also included and a “Glossary” is found near the end of this manual.

## 1.1 Display Details

The Galaxy® model numbers are described as follows:

AF-35XX-RRxCCC-MM-R,A,RGB-XX		
AF-35XX	=	Outdoor Galaxy display
RR	=	Number of pixel rows high
CCC	=	Number of pixel columns long
MM	=	Pixel pitch in millimeters
R, A, RGB	=	LED Color: R (Red), A (Amber), RGB (Full Color – Red, Green, Blue)
XX	=	SF (Primary) or 2V (Primary/Mirror)

Displays are either single-face or 2V (Two View) units. In 2V units, the first display is referred to as primary. The second display is called the mirror.

A typical display system is controlled with a Windows®-based computer running Venus® 1500 software.

Figure 1 shows front and back views of a typical display.

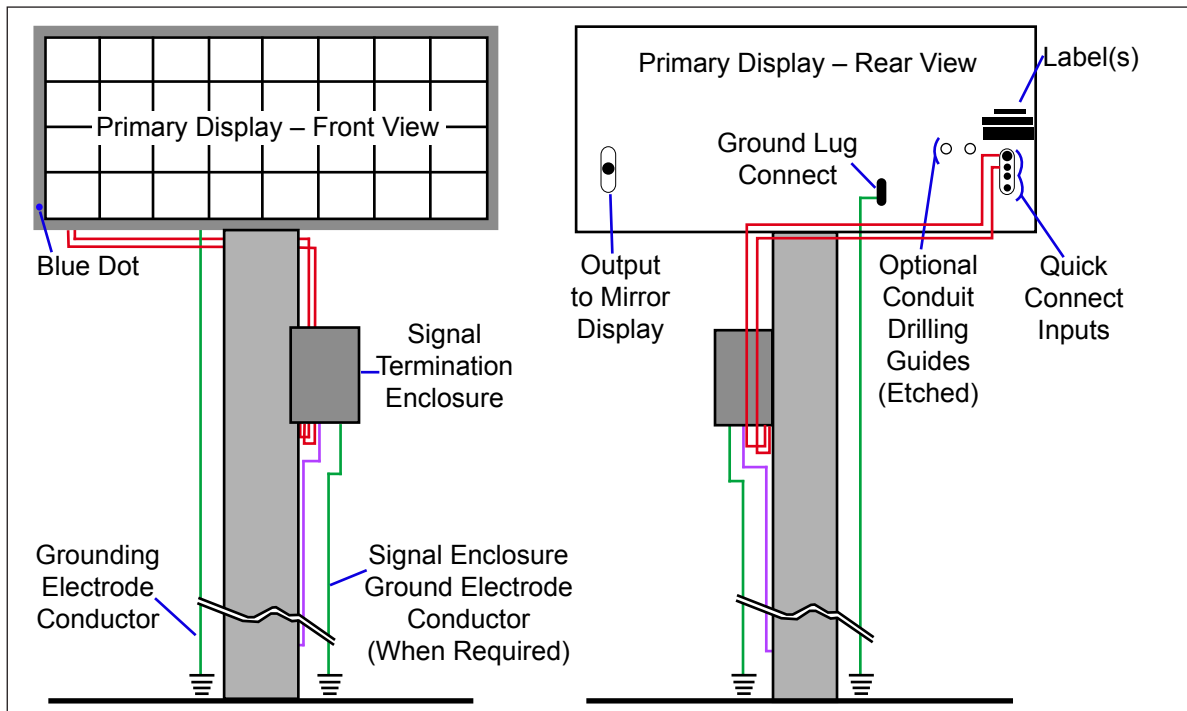


Figure 1: Display Components



## Section 2: Mechanical Installation

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Read the Mechanical, Power and Signal Installation sections before installing the display(s).

Daktronics' engineering staff must approve any changes that affect the weather-tightness of the display. Prior to making any modifications, detailed drawings of the changes must be submitted to Daktronics for evaluation and approval, or the warranty will be null and void.

Daktronics is not responsible for installations or the structural integrity of support structures done by others. The customer must ensure a qualified structural engineer approves the structure and any additional hardware.

### 2.1 Pre-Installation Checklist

Verify the following before installation:

- The display is in good condition after shipping and uncrating.
- A straight and square mounting frame is provided for the display.
- Height variation in any 4' (1.2 m) horizontal section must not exceed  $1/4$ " (6.3 mm).
- Adequate support is provided for the display so that the structure will not yield at any unsupported points after mounting.
- Leave 4" (10.2 cm) of unobstructed space above the display so the eyebolts can be removed. No clearance is required once the eyebolts are removed.
- Maintain clearance around the display to allow unobstructed air flow through the vents and fans and to allow access to internal components.
- Assure the display cabinet has no holes (accidental or intentional) that could allow water to enter the display.
- Check that all display modules are fully latched into the display cabinet.

### 2.2 Support Structure Requirements

The installer must ensure that the mounting structure and hardware can support the display, and that the structure follows all local codes.

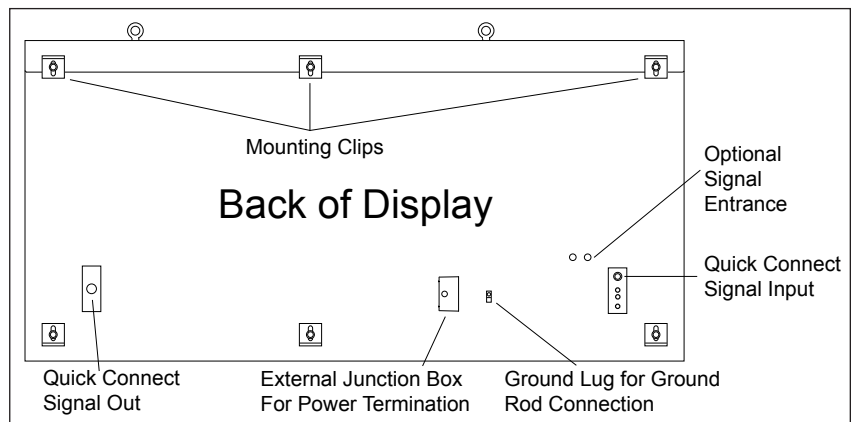
Support structure design depends on the mounting methods, display size, and weight. Because every installation site is unique, no single procedure is approved by Daktronics for mounting Galaxy® displays. The information contained in this section is general information only and may not be appropriate for all installations. Refer to **Figure 2** for basic display set ups.

Mounting plans need to take into account the ventilation system and face-mounted light sensor. In general, the entire front of all displays must be completely unobstructed to allow for air flow and internal access. Displays contain fans that pull air in from the lower vents and exhaust it out adjacent vents.

Also, keep in mind the location of mounting clips and the clearance needed for the power and signal terminations on the back of the display shown in **Figure 2**. Display height and wind loading are also critical factors to consider. Consult the Shop Drawing, which is included with the display.

## 2.3 Display Mounting

To maintain the structural integrity of the display cabinet, keep a 90-degree angle between the cabinet and the lifting method.

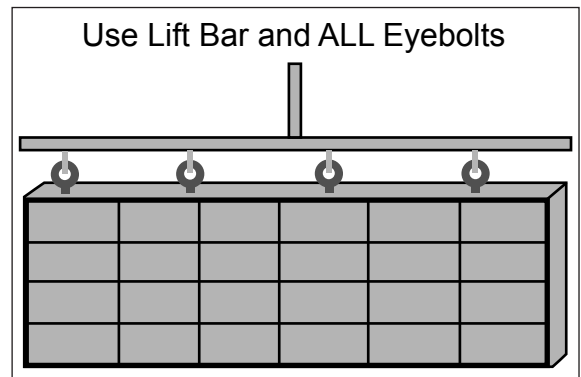


**Figure 2:** Back View of Typical Display

If damage occurs because of improper lifting procedures, the warranty will be void.

### General Mounting Procedure

1. Lift the display into position on the support structure, following the example in **Figure 3**.  
**Note:** Do not attempt to permanently support the display by the eyebolts.
2. Weld or use 1/2" grade-5 (or stronger) bolts and hardware to secure ALL of the clip angles to the support structure as shown in the Shop Drawing which is included with the display.  
**Note:** Alternative mounting methods are acceptable as long as all bolt locations are used.
3. Refer to **Section 3** for power routing and to the appropriate communication manual for signal connections to the display.
4. After installation is complete, carefully inspect the display for any holes that may allow water to seep into the display and seal any openings with silicone.



**Figure 3:** Correct Lifting

If the eyebolts on the top of the display were removed, plug the holes with bolts and the rubber-sealing washer that was removed with the eyebolt unless an overhead structure protects the area.



## Section 3: Power Installation

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Only a qualified individual should terminate power and signal cable at this Daktronics display.

All proposed changes must be approved by Daktronics' engineering staff or the warranty will be null and void.

### 3.1 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  $\frac{3}{4}$ " 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.

### 3.2 Overview of Power/Signal Connection

1. Power to the display is terminated externally in most cases. **Section 3.6** shows external wiring examples.
2. Possible methods for signal termination are shown in the various communication manuals.
3. Power is routed to the display through a fused disconnect switch capable of opening all ungrounded power conductors. Install the disconnect within the line of sight of any personnel performing maintenance on the display, unless it can be locked in the open position.

**Note:** Displays are equipped with circuit breakers that carry a UL489 or UL1077 (IEC 60947, VDE 660) rating. These devices are intended only to protect the components within the display.

4. Route power conductors from the disconnect to the display through conduit following local code specifications.
5. Display power terminates either to the J-box or internally at the power termination panel.
6. Connect the grounding conductor to the grounding lug on the back of the display.
7. Route signal cable to the signal termination enclosure. Ground the enclosure to an isolated earth-ground connector (when required).
8. Route signal into the enclosure through conduit. The knockouts on the enclosure require the use of  $\frac{3}{4}$ " conduit.
9. Route signal quick-connect cables from the enclosure to the display either through conduit or through the display pole if power is not also routed in the display pole.

**Note:** Daktronics strongly recommends that the quick-connect cables be secured to protect them from weather or vandalism.

### 3.3 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. Find power specifications on drawings shipped with the display.

#### 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.

### 3.4 Power Grounding

Ground displays according to the provisions outlined in local and national electrical codes.

Install these displays using the provided ground and neutral conductors. The power cable must contain an isolated earth-ground conductor.

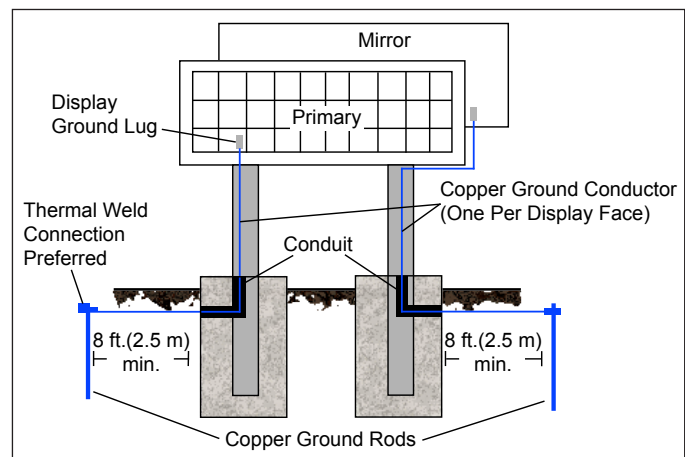
Do not connect neutral to ground at the disconnect or at the display. This violates electrical codes and voids the warranty.

### 3.5 Display Grounding

Connect the display system to earth ground as shown in **Figure 4**. Proper grounding protects the equipment from damaging electrical disturbances and lightning. The display must be properly grounded or the warranty will be void.

#### Important Points About Grounding

- **Resistance to ground 10 ohms or less:** This is required by Daktronics for proper display performance. If the resistance to ground is higher than 10 ohms, install additional grounding electrodes to reduce the resistance. The grounding electrode should be installed within 25' (7.6 m) of the base of the display and must be connected to the ground lug on the back of the display. Refer to **Figure 4**.



**Figure 4:** Correct Grounding

- **Follow local and national codes:** The material of an earth-ground electrode differs from region to region and for conditions present at the site. Consult any local and national electrical codes that may apply.
- **Support structure cannot be used as an earth-ground electrode:** Daktronics does not recommend using the support structure as an earth-ground electrode; concrete, primer, corrosion, and other factors make the support structure a poor ground.

**Note:** The support structure may be used as an earth-ground electrode only if designed to do so. A qualified inspector must approve the support structure and grounding methods.

- **One grounding electrode for each display face:** The grounding electrode is typically one grounding rod for each display face. Other grounding electrodes as described in any local and national electrical codes may be used.

### 3.6 Power Connection

Power is most often terminated externally to the J-box on displays. However, larger displays require power to be terminated internally in the Power Termination Panel.

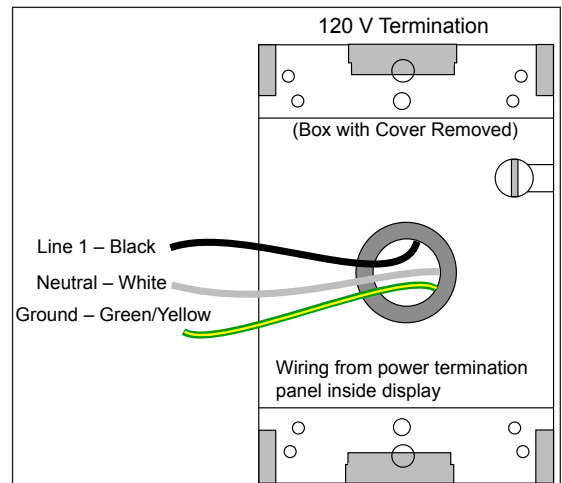
#### For Displays With an External Power Termination J-box

Terminating hot, neutral, and ground wires at the J-box:

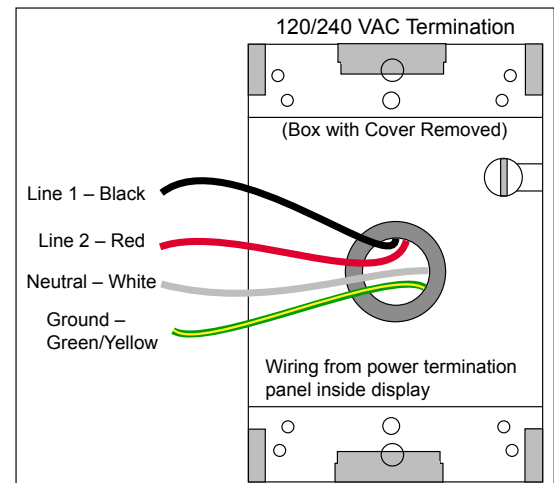
1. Route the power cable through conduit to the rear of the display and into the power termination J-box (the J-box contains  $\frac{3}{4}$ " threaded conduit fittings).
2. The J-box contains two or three wires plus a ground coming from the interior of the display. These wires are pre-terminated to the power termination panel inside the display.
3. Inside the external J-box, connect the power wires to the wires coming from the display interior using wire nuts. Refer to **Figure 5** for 120 VAC and **Figure 6** for 120/240 VAC.

**Note:** The following colors are used for the pre-terminated wires:

120 VAC	120/240 VAC
• Line 1 – Black	• Line 1 – Black
	• Line 2 – Red
• Neutral – White	• Neutral – White
• Ground – Green/Yellow	• Ground – Green/Yellow



**Figure 5:** 120 V J-box Termination

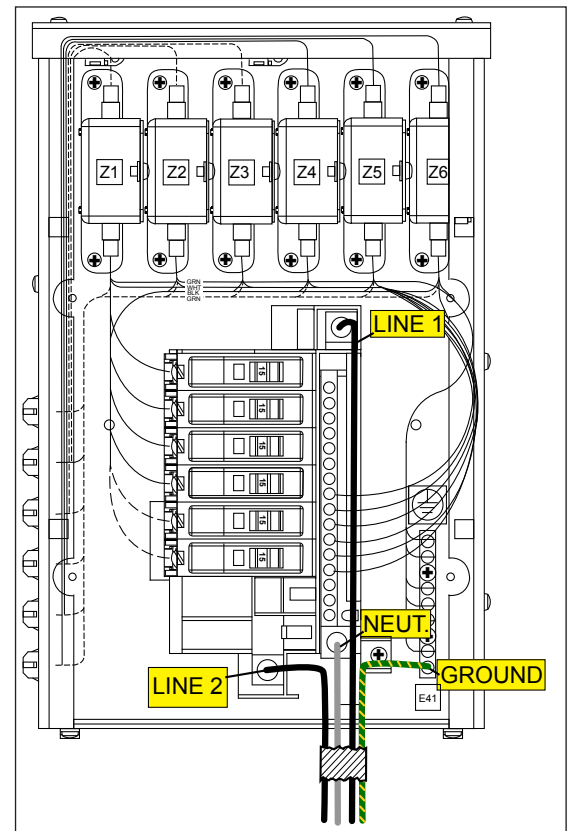


**Figure 6:** 120/240 V J-box Termination

## For Displays With Internal Power Termination

Terminating single-phase power to the internal power termination panel:

1. Open the display as explained in **Section 6** and locate the power termination panel.
2. Route the cable through conduit to the back of the display. Use the  $\frac{3}{4}$ " knockout for access, being careful not to damage internal components.
3. Connect the neutral wire to the neutral lug and the live wires to the Line 1 and Line 2 lugs.
4. The ground wire connects to the grounding bus bar. Refer to **Figure 7** for an example.

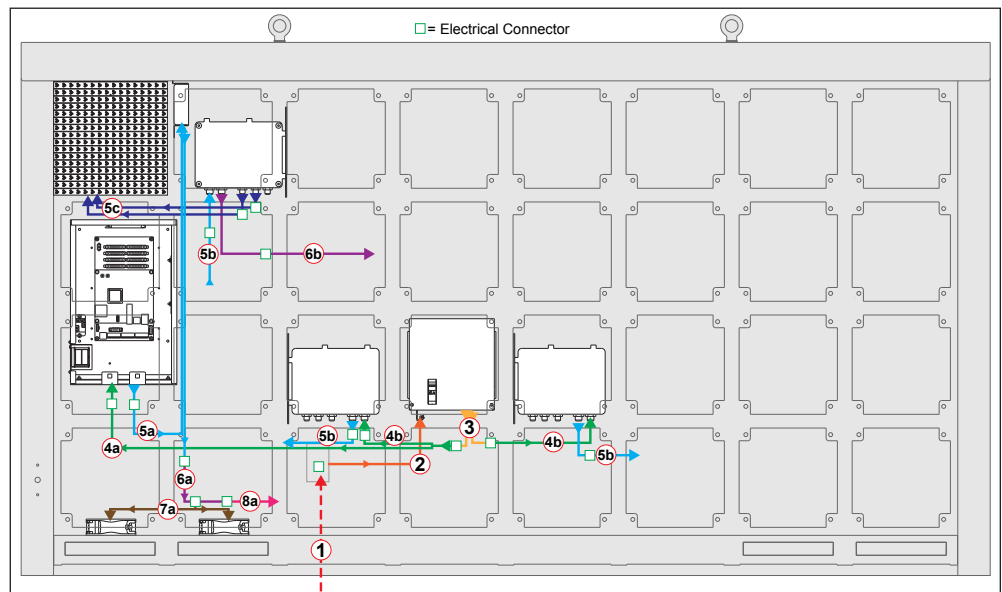


**Figure 7:** Single-phase 6-breaker Domestic Panel

## 3.7 Power Routing in the Display

The following list corresponds to the numbers and letters in **Figure 8**.

1. Power enters the display from an external power source, either through a rear-mounted J-box, or directly through a cabinet knockout.
2. Power then enters the internal circuit breaker box.
3. Power leaves the circuit breaker box through wiring harnesses including a Y harness that sends power to multiple components.
4.
  - a. Power travels into the display controller enclosure.
  - b. Power travels to power supplies.
5.
  - a. Power leaves the display controller enclosure and travels to the thermostat.
  - b. Power leaves the power supply and travels to the following power supply.
  - c. Low voltage power leaves the power supply and travels to the display module. One module per power supply connects to the voltage adjust cable.



**Figure 8:** Power Flow Summary

6.
  - a. Power leaves the thermostat and travels through a tapped wiring harness.
  - b. Power leaves this power supply and travels to the next power supply.
7.
  - a. The ventilation fans receive power from the tapped wiring harnesses.



# Section 4: Signal Installation Overview

For specific details on installing the communications, consult the quick guide and manual included with the communication equipment. Each type of communication is listed below with its manual number.

Communication Type	Communication Manual	Communication Quick Guide
Wireless Ethernet Bridge	<a href="#">DD1685027</a>	<a href="#">DD1417586</a>
Ethernet	<a href="#">DD1417609</a>	<a href="#">DD1417573</a>
Fiber Ethernet	<a href="#">DD1417611</a>	<a href="#">DD1417581</a>
WiFi	<a href="#">DD1417619</a>	<a href="#">DD1417592</a>
USB to Ethernet Adapter	N/A	<a href="#">DD1790707</a>

**Note:** These are the standard communication types but each site is unique and may include additional equipment. If problems arise, contact the display’s service company or Daktronics Customer Service.

## 4.1 Primary/Mirror Display Interconnections

If this display is a two-sided primary/mirror display, a quick-connect cable is provided to connect the signal between the two faces. Refer to **Figure 9** for an example. Secure the excess cable to the support structure to prevent damage from weather or vandalism.

## 4.2 USB to Ethernet Adapter

A USB to Ethernet adapter is included with the display and can be used to bypass network configuration in situations where simple point-to-point communication is required. The adapter creates a secondary network that is dedicated to communication with the display, but network operation is still enabled through the primary network.

The USB to Ethernet Adapter can be used in conjunction with communication kits supplied with the display. Refer to [DD1790707](#) for more information regarding the adapter.

## 4.3 Setting the IP Address on the Display Controller

Galaxy AF-35XX display controllers are set to the default IP address 172.16.192.25 prior to shipping. This address can be changed to an address specific to the local display network. Obtain an appropriate IP address for the display from the network administrator.

The display must have power and M2Config installed on the computer to complete the following steps. Download M2Config at: [dakfiles.daktronics.com/downloads/venus1500/utis/M2\\_Config](http://dakfiles.daktronics.com/downloads/venus1500/utis/M2_Config)

Communication with the display controller is necessary and can be done through the purchased communication method or directly to the display controller using a Cat5 cable.

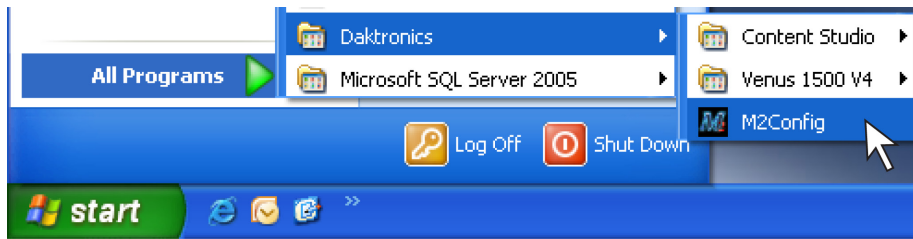
Display power must be On to complete this configuration.

1. Set the computer’s IP address to 172.16.192.20 and the Subnet Mask to 255.255.0.0.
2. Open M2Config:

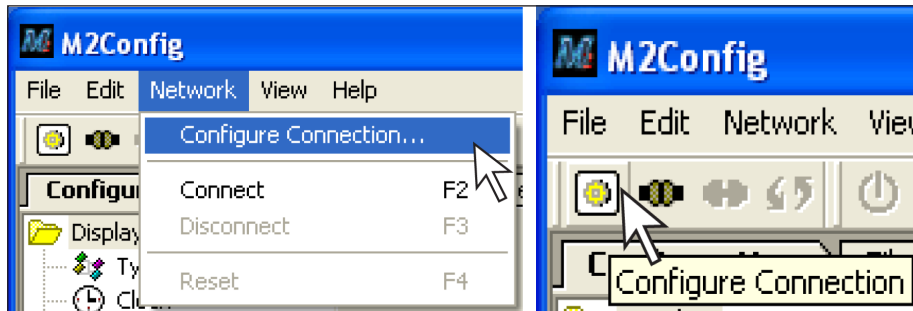


*Figure 9: Primary/Mirror Quick-connect Cable*

- Click **Start > All Programs > Daktronics > M2Config** or double-click the shortcut on the desktop.



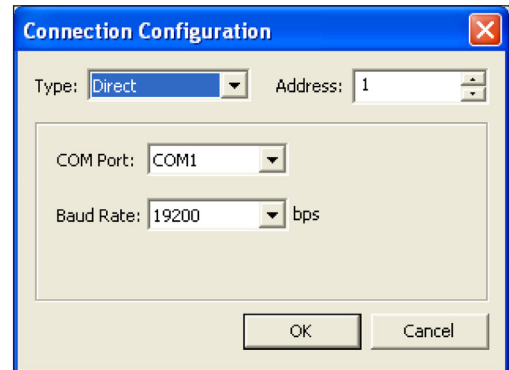
3. Configure the communication method to connect to the display by choosing **Network**, then **Configure Connection** or click the **Configure Connection** icon.



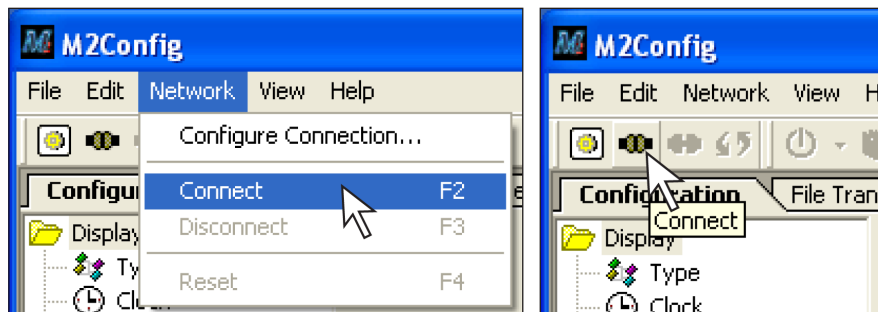
4. The M2 Configuration Studio has two folders under the Configuration tab: Click the **Communications** folder.

5. Choose the following for your display to configure a direct connection:

- Type: TCP/IP
- Address: 1 (refer to address dials on controller for actual setting)
- IP Address: 172.16.192.25

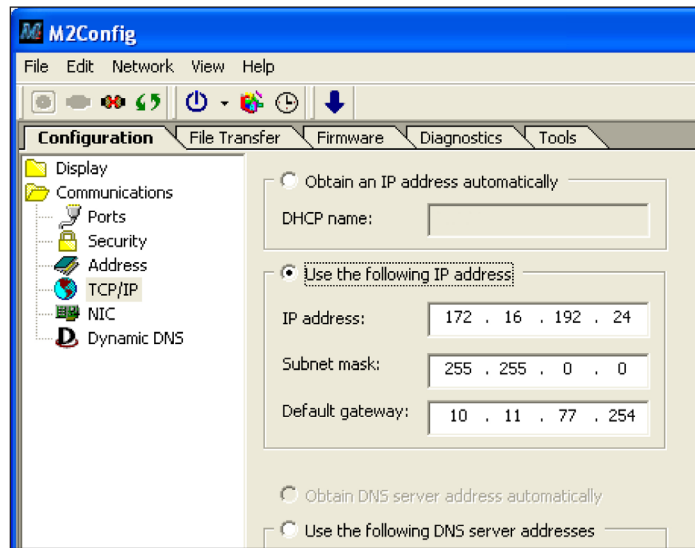


6. Choose **Network** and **Connect** or click the **Connect** icon to connect to the display.

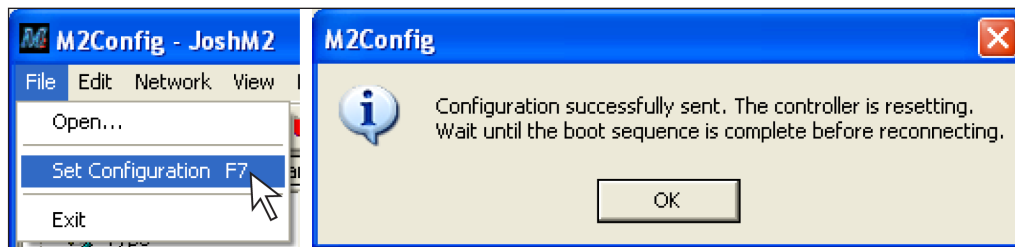




7. After connecting to the controller, select the **Communications** folder on the left side of the screen and select **TCP/IP**:
  - Input the **IP address**, **Subnet mask** and **Gateway** as provided by the Network Administrator.



8. Choose **File > Set Configuration** to upload the new IP address to the display.
9. When the warning appears, click **OK** and wait for display to reboot.



10. Close M2Config.

For further information on using a TCP/IP network with the display, refer to the Venus 1500 software help file.



# Section 5: Start-Up Procedure

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

## 5.1 Start-Up Checklist

- Confirm that power is correctly connected to the display.
- Allow for sufficient power as listed in the display Shop Drawing and Power Specs.
- Assure a main disconnect switch is used to control power.
- Inspect all circuit breakers (internal and external) for sufficient marking and size.
- Confirm that adequate grounding is installed. Each display face must have a separate earth-ground conductor with a resistance of 10 Ohms or less.
- Assure the external communication equipment (signal enclosure, client radio, etc.) is properly installed.
- Inspect signal connections at the control computer.
- Inspect signal connections at the display.  
Inspect signal connections between displays when necessary.
- Confirm that the control computer is correctly configured.  
Follow the step-by-step directions in the Venus® 1500 Help File’s Configuration section for correct setup.
- Inspect peripheral equipment (temperature sensor, etc.) for proper installation.

## 5.2 Start-Up Sequence

Each time the display is turned on, an initialization sequence runs, showing the information in the right column below.

**Note:** The Xs refer to numbers that vary for each display, such as the hardware address.

If there are no messages running on the display after this sequence is complete, the display will be blank. A single pixel flashes in the lower-right corner of the display to show that the display has power.

Topic	Information Shown
Product Name	Galaxy
Display Size	#Rows x #Columns
Shading/Color Depth	4096 (Mono) or 68B (RGB)
Bootloader Version	OS X.XX
Firmware Number	DD1425608
Firmware Revision	Rev X.XX
Hardware Address	HW:XX
Software Address	SW:XX
IP Address:	(default) IP:172.16.192.25
Subnet MSK:	(default) MSK: 255.255.0.0
COM1 Configuration	C1: 115200
COM 2 Configuration	C2: RTD
Socket 3001	IP 3001: 115200
Socket 3002	IP 3002: RTD
Line Frequency	CLK: AUTO (60)
Display Description	Galaxy #Rows x #Columns

## 5.3 Post Installation Checklist

Verify the following after starting the display:

- Assure all ventilation fans are fully operational.
- Inspect all intake and exhaust vents for obstructions.
- Confirm proper communications from the control computer to the display(s).
- Assure proper communications between display faces when applicable.



## Section 6: Maintenance

**Important Notes:** Power must be turned OFF before any repair or maintenance work is done on the display.

Only a qualified individual should service internal electronic components.

Daktronics Galaxy® AF-35XX series displays are front accessible, meaning that access to the internal components is gained by removing the front modules of the display. **Figure 10** shows the approximate location of internal components.

### 6.1 Proper Ladder Use

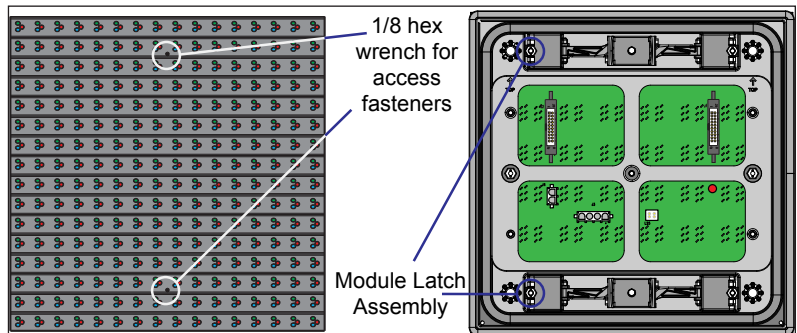
A ladder can be used to access displays, although it is not preferable. If a ladder must be used, do not place the ladder directly against the display face. The pressure from the two ladder ends, even when covered with pads, is too concentrated and can damage the LEDs and louvers.

Instead, use a padded or carpeted board across the top of the ladder to distribute the weight of the ladder evenly when placed against the display face, as shown in **Figure 11**. The padded board should be wide enough to spread the weight of the ladder across a minimum of two modules.

### 6.2 Internal Display Access

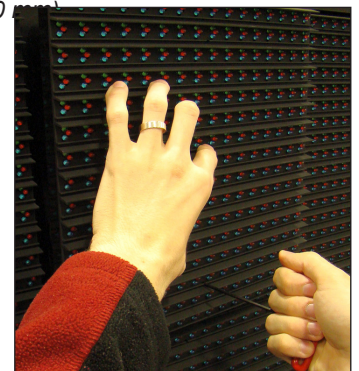
Access the display interior to perform maintenance or troubleshooting by removing the front modules.

1. Disconnect power to the display.
2. Locate the latch access fasteners on the module as shown in **Figure 12**. One is centered near the top and one is centered near the bottom.
3. With a  $\frac{1}{8}$ " hex wrench, turn the latch access fasteners a quarter turn counter-clockwise, as shown in **Figure 13**. Gently pull the module far enough forward to reach behind it and disconnect the power and ribbon cables.

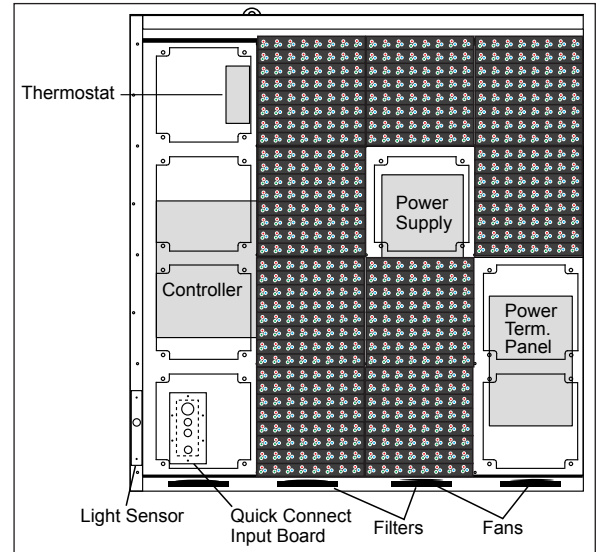


**Figure 12: Module Latch Locations (20**

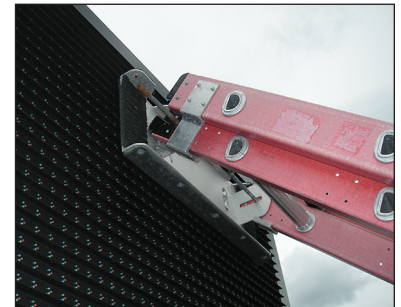
4. Disconnect the two ribbon cables from the module by spreading the tabs on the sides and then lifting the cable head from the jack. Note the cable connections so they can be reconnected correctly.
5. Unplug the power cables by squeezing the tabs on the sides of the plug head and pulling out.
6. When ready to reinstall the module, reconnect the cables, making sure that the tabs are tightly pushed against the cable head. Carefully



**Figure 13: Removing a Module**



**Figure 10: Interior Component Locations**



**Figure 11: Example Ladder Board**

push the ribbon wires back into the cabinet so they are clear of the module edges.

7. Place the module into its proper location, checking that the weather stripping is in place. Latch the module at both the top and bottom locations by turning the hex wrench clockwise a quarter turn.

**Notes:**

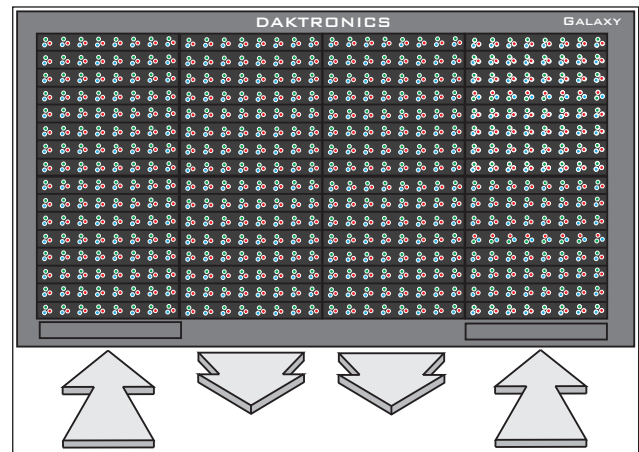
- Weather stripping on the back edge of the module must be intact and in good condition to prevent water from entering the display.
- Module latches must be fully engaged to create a watertight seal around the edge of the module. The module seats firmly against the display when the latches are fully engaged.

## 6.3 Ventilation System/Fans

AF-35XX series displays are equipped with ventilation systems that help keep internal electrical components at operable temperatures. Intake fans bring air into the display through vents on the bottom front. Exhaust leaves the display through adjacent vents along the bottom front. **Figure 14** shows an example of the display's airflow.

**Note:** Air vents are located behind a false face and cannot be readily seen.

A smaller fan is also located on the display controller enclosure cover which should always be running.



**Figure 14:** Ventilation Airflow

### Frequency of Inspection

Check fans every time the display is opened or at a minimum of once every three months. Check more often if the display is located in a dusty or harsh environment, such as along a gravel road.

Inspection frequency varies greatly from display to display as no two display installations are exactly the same. Daktronics advises users and service technicians use their discretion when establishing an inspection schedule.

### Fan Blades

Check the fan blades for dirt and debris. Clean them and the inside of the display if necessary to maintain fan efficiency and to ensure proper cooling. Spin the fan blades with a pen or pencil to ensure that the bearings are free and that the fan is in balance.

### Filters

Below each intake fan is a filter tray. Each time the fans are inspected, the filters must also be inspected; clean or replace them when necessary.

To access the filter(s), press upward firmly on the tab located on the bottom front of the tray and pull outward.

Clean filters with water or compressed air (no greater than 60psi and at least 6" away) blown through the filter in the opposite direction from which air normally flows. Allow filters to dry before returning them to their trays. Again, Daktronics encourages users and service technicians to use their own discretion when deciding whether to clean or replace the filters.

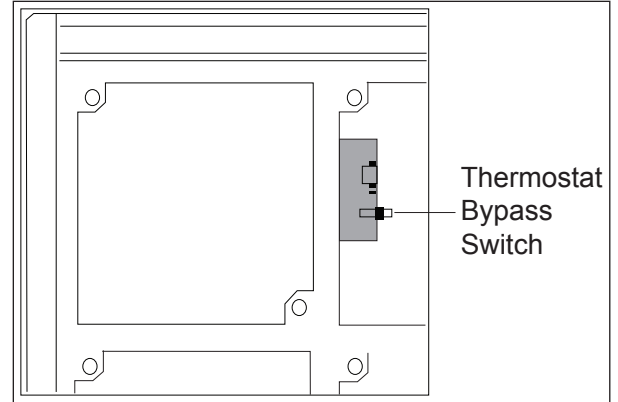
**Note:** Air is drawn upward through the filter. Be sure to check the bottom of the filter as this will be the side that requires cleaning.

## Fan Test

Once the display's internal components reach a certain temperature, the fans are activated. If the fans are not operating, they may be checked by bypassing the temperature controls. To check the operation of the fans, open the display to expose the thermostat in the upper left-hand corner. Press the test button, shown in **Figure 15**, to test fan operation. Some thermostats may have the button on the bottom. If a fan does not rotate or does not operate smoothly, replace it.

Make sure that the intake vents and exhaust vents on the bottom front of the display are not blocked and are free of dust or other debris. Hold a piece of lightweight paper in front of the bottom edge (under the filter trays) of the display to detect air movement through the vents.

**Note:** When mounting the display, the entire front must be exposed to allow for proper ventilation. Aesthetic shrouding (common in monument installations) is not advised. See **Figure 16** and **Figure 17** for examples.

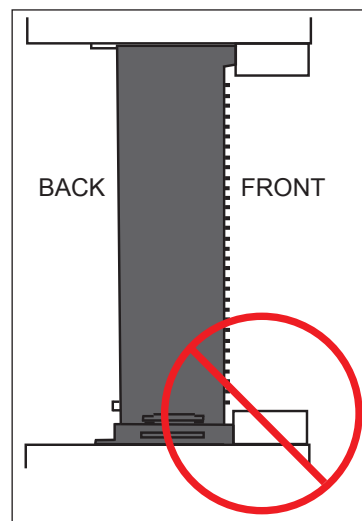


**Figure 15: Fan Test Button**

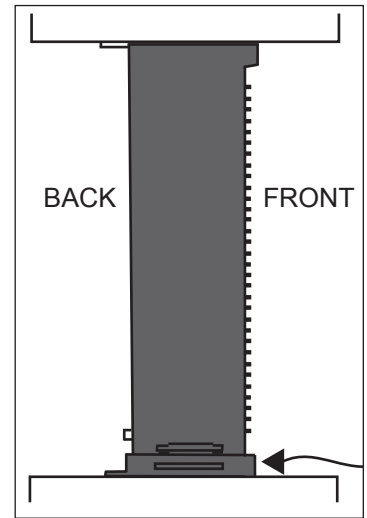
## 6.4 Display Face Cleaning

### 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 terrycloth 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.



**Figure 16: Restricted Airflow**



**Figure 17: Unrestricted Airflow**

## Dry Cleaning Process

1. Turn off power to the display.
2. Rub a dry, soft terrycloth towel horizontally across each row of LEDs. Make several 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.

## 6.5 Annual Inspection

Complete a yearly display inspection to maintain safe and dependable operation. Open the display to visually inspect the cabinet interior and the components. Refer to **Section 6.2** for directions to access the interior.

- Tighten and replace any loose fasteners.
- Vacuum or carefully wipe away dust and debris around the fans and inside the cabinet.
- Check for water intrusion or stains and replace weather stripping, tighten module latches, place silicone sealant around areas where water might enter, and replace damaged electronic components as necessary.
- Also, check the paint for cracking and peeling and touch up with rust-resistant enamel as necessary.
- Inspect the footings, tie points, and ground rods for corrosion and make sure the structural integrity and grounding connections are intact.

A log is provided in **Appendix D** to track maintenance and help determine a maintenance schedule specific to the individual display.



# Section 7: Diagnostics and Troubleshooting

Important Notes: Disconnect power when servicing the display. Only qualified service personnel should service internal electronic components.

## 7.1 Controller Diagnostics

The controller is the “brains” of the display, receiving communication from the computer and then sending information to the modules. The controller is located in the lower-left area of displays as shown in **Figure 10**. LEDs on the controller show whether power and communication signals are working properly.

Mirror displays do not contain a controller. Instead, they have an MLC or repeater card which helps relay information from the primary controller.

To access the interior of the display, refer to **Section 6.2** for instructions and illustrations. Remember to disconnect power to the display before accessing the interior. However, once the modules are removed and wires are found to be safe, power can be turned back on to view the diagnostic LEDs.

A Galaxy controller is illustrated in **Figure 18** with essential diagnostic LEDs labeled:

- The DS4 LED signifies the controller’s operational status. This LED flashes about once per second to indicate the controller is functioning properly.
- The DS3 LED signals the controller’s transmission status. This LED flashes only when transmitting information to the modules.
- The DS2 LED displays the controller’s receiving status. This LED flashes only when receiving information from the control computer.

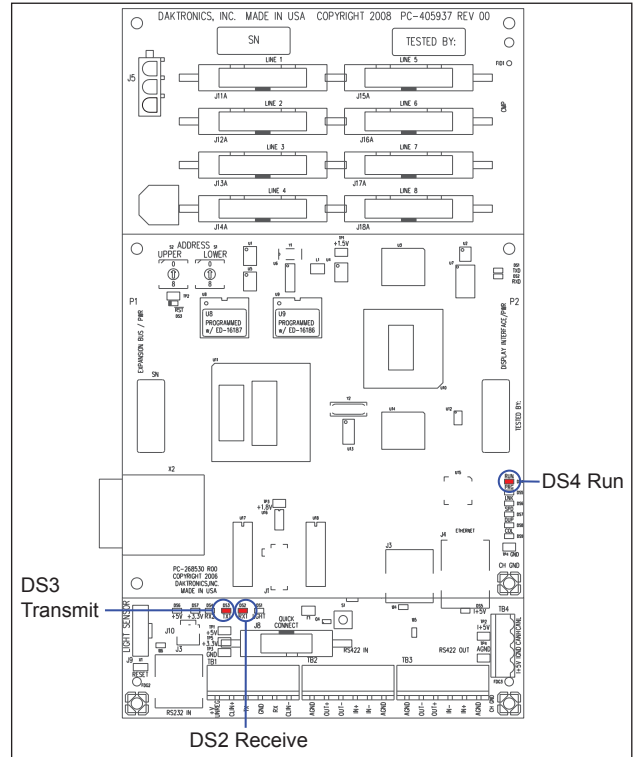


Figure 18: Controller Diagnostics

## 7.2 MLC Diagnostics

The Multi-Line Controller (MLC) unit contains four red diagnostic LEDs. When properly connected to the primary display, the LED labeled DS25 is off and the other LEDs are on, as shown in **Figure 19**.

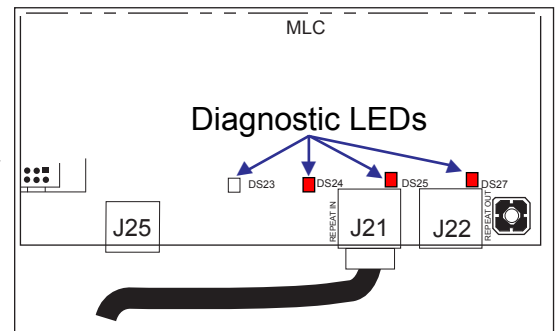


Figure 19: MLC Diagnostic LEDs

## 7.3 Troubleshooting Display Problems

This section contains some symptoms that may be encountered with displays. This list does not include every symptom or solution but does represent common situations and simple steps to resolve them.

Troubleshooting may require removal and replacement of modules. Refer to **Section 6.2** for more information. When replacing modules, make sure power and signal cables are reconnected correctly and the latches are tightly closed.

### Common Misconceptions

#### Blank display seen after boot-up

A blank display is normal after the boot-up procedure. When finished, the display is blank except for a flashing pixel in the lower-right corner. The display is waiting for a message to be sent.

### Module and LED Problems

One or more LEDs are not lighting

- Check/replace the ribbon cables on the module.
- If that does not help, the module may need to be replaced.

One or more LEDs on a single module will not turn off

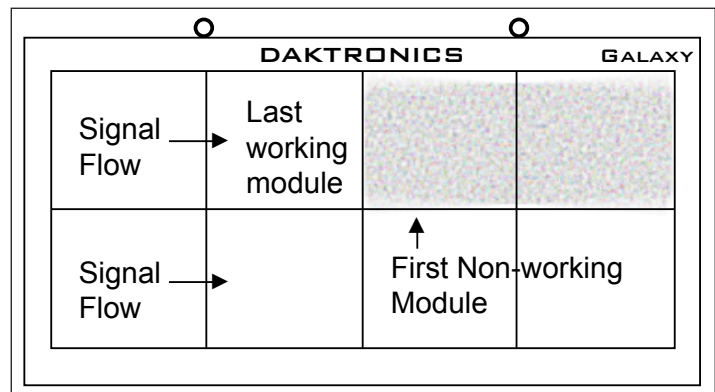
- Check/replace the ribbon cables on the module.
- If that does not help, the module may need to be replaced.

A section of the display is not working

- Check/replace ribbon cables from the last working module in the row to the first non-working module next to it. Refer to **Figure 20**.
- Check the back of the modules to see that the power LEDs are on.
- Make sure the power cable to the module is connected.
- Move or replace the first non-working module with the one on the left of the non-working section.
- Move or replace the first module to the left of the non-working modules.

One row of modules is not working or shows a distorted message

- Check/replace the ribbon cables to and from the first non-working module.
- Check for bent pins on the jack going to a non-working module.
- Move or replace the modules that show distorted text.
- Move or replace the first module to the left of the non-working module.



**Figure 20:** Modules Not Working

A column of the display does not work

- Check that the power cable is plugged into the module in the column.
- While power is on, look at the back of the malfunctioning module(s) to see if the diagnostic LED is off, implying a power supply problem.
- Verify power to the power supply.

Entire display fails to work

- Check the breakers in the building connected to main power source.
- Check the breakers in the power termination panel.
- Check the diagnostic LEDs on the controller for Power and Run. Refer to **Section 7.1** for more information.
- Check/replace the ribbon cable from the controller to the modules.
- Verify proper use of the software by checking the software manual.

## Brightness Problems

Display is stuck on bright or dim

- Check Manual/Auto dimming in Venus 1500 software. Brightness is typically set to Automatic. If not, refer to the Venus 1500 software manual (**DD1370296**) for more information.
- Check the light sensor cable and wiring for secure connections.
- Check the light sensor lens for obstructions (lower-left edge, front of primary cabinet).
- Replace the light sensor assembly.

## Message Problems

Message only shows up on one side of the display

Determine if the displays are set up as two primary displays or one primary and one mirror display. To do this, turn off the power, then turn it back on and observe the two display faces. If the setup involves two primary displays, one should show "HW1" and the other "HW2".

- Verify that two different addresses are setup for these two primary displays. Refer to the Venus 1500 software manual for more information.
- Verify that two different addresses are set on the controller(s).
- Send a different message to each display separately by clicking on that display name in the list.  
**Note:** With two controllers, messages may not always run simultaneously.
- If the setup consists of a primary/mirror display, check the cable between them.
- Check that the cable and plugs are in good condition.
- Check that the MLC in the mirror display has power.

- Check the dip switches on the MLC. They should be in the down position.

## Temperature Problems

(For displays with a temperature sensor installed)

No temperature showing on the display

- Refer to the Venus® 1500 software manual (DD1370296) for more information.  
**Note:** The temperature sensor must be correctly installed before a current temperature can be shown.

Temperature always reads -196F/-127C degrees

- Check the temperature sensor cable connections.
- Look for bent pins on connectors.
- Check that the temperature sensor is set to address 1.
- Make sure the sensor has power by checking that the diagnostic LED is blinking.

## Temperature Problems

No temperature showing on the display

- Refer to the Venus® 1500 software manual (DD1370296) for more information.  
**Note:** The temperature sensor must be correctly installed before a current temperature can be shown.

## Testing Displays

Start and stop the test pattern

- Refer to the Venus® 1500 software manual (DD1370296) for more information.  
**Note:** This procedure must be done for each primary display being tested.

## Before Calling For Help

Steps to take before calling Daktronics Customer Service

1. Turn off the power breaker switch. Wait a few minutes and turn it back on. Watch the display(s) to make sure that the initialization sequence runs.
2. Once the sequence is complete, try to communicate with the display.
3. Check the Communication and Troubleshooting sections of this manual.
4. Call the service technician or Daktronics Customer Service at 866-343-3122.  
**Note:** Sitting at the control computer while talking with the service technician allows more efficient service.

## Section 8: Parts Replacement

**Important Notes:** Disconnect power when servicing the display. Only qualified service personnel should service internal electronic components.

**0P-1127-0024**  
**SN: 2465**  
**02/19/12 Rev. 1**

### 8.1 About Replacement Parts

The following table contains some of the items that may need to be replaced in a display over a period of time. These components are generally located as shown in **Figure 10**. If a component is not listed in the replacement parts list, use the label to order a replacement. Most components within this display carry a label that lists the part number of the unit. A typical label is shown in **Figure 21** with the part number in bold.

*Figure 21: Typical Parts Label*

### 8.2 Instructions for Replacing Parts

#### Module Replacement

Tool Required:  $\frac{1}{8}$ " Hex Wrench

If LEDs have failed, do not attempt to replace individual LEDs. Return a failed module to Daktronics for replacement and/or repair.

Each module can be removed separately without moving other components of the display.

1. Turn off power to the display.
2. Follow the instructions in **Section 6.2** to release the module from the display cabinet.
3. Disconnect the two ribbon cables from the module, noting how they are connected to the back. Release ribbon cables by spreading the tabs on the sides and then lifting the cable head from the jack.
4. Unplug the power cables by squeezing the tabs on the sides of the plug head and pulling out.
5. Connect all three cables to the new module, making sure that the ribbon cable tabs are tightly pushed against the cable head. Carefully push the ribbon wires back into the cabinet so they are clear of the module edges.
6. Place the module into its proper location, checking that the weather stripping is in place. Latch the module tightly at both top and bottom by turning the hex wrench a quarter turn clockwise.

Part Description	Part Number
Module; AF-3500 34 mm Amber	0A-1208-5009
Module; AF-3500 34 mm Red	0A-1208-5005
Module; AF-3550 34 mm RGB	0A-1208-5650
Module; AF-3500 20 mm Amber	0A-1266-5017
Module; AF-3500 20 mm Red	0A-1266-5005
Module; AF-3550 20 mm RGB	0A-1266-5650
Module; AF-3550 16 mm RGB	0A-1569-5551
M3 Controller III	0A-1382-0016
MLC	0P-1273-0067
Power Supply, 3-6.5V	A-2307
Transformer	T-1119
Transformer, International	T-1121
RFI Filter	Z-1007
Relay	K-1040
Temperature Sensor	0A-1151-0011
Thermostat	0A-1327-3103
Light Level Detector	0P-1151-0002
Light Sensor Assembly	0A-1327-3000
Fan, Ventilation	B-1053
Filter, Air	EN-2310
Primary signal input, Serial	0P-1415-2000
Primary signal input, RJ45	J-1474
Primary signal output / Mirror signal input	J-1470
Cable; RJ45, CAT5E, Shielded, 2'	W-1537
Cable; RJ45, CAT5E, Shielded, 20'	W-1547
Cable; 22 Awg 2-Pair, Dual Foiled, Single	W-1234
Cable Assy; 20 pos Ribbon, 18", Dual Row	W-1387
Ribbon Assy; 10 Pos. @ 24"	0A-1000-0074
Ribbon Assy; 20 Pos, 24"	0A-1000-0016
Ribbon Assy; 20 Pos, 30"	0A-1000-0017
Ribbon Assy; 20 Pos, 42"	0A-1000-0019
Ribbon Assy; 20 Pos, 60"	0A-1000-0021
Ribbon Assy; 20 Pos, 72"	0A-1000-0022
Ribbon Assy; 20 Pos, 84"	0A-1000-0023
Interconnect Cable; RJ45	W-1921
Electrical Contact Cleaner/Lubricant	CH-1020

## Notes:

- Weather stripping on the back edge of the module must be in good condition and returned to its proper position to prevent water from entering the display.
- Module latches must be fully engaged to create a watertight seal around the edge of the module. The module seats firmly against the display when the latches are fully engaged.

## Controller Replacement

Tools required:  $\frac{1}{8}$ " hex wrench,  $\frac{5}{16}$ " nut driver, and flathead screwdriver

Complete the following steps to replace a controller in the display:

1. Turn off power to the display.
2. Remove the module directly in front of the controller in the lower left area of the display. Refer to **Figure 10** for the location.
3. Loosen screws and remove the cover in front of the controller.
4. Disconnect the power input.
5. Remove all power and signal connections from the board. Label the cables as they are removed to ensure proper replacement.
6. Remove the six nuts holding the board in place using a  $\frac{5}{16}$ " nut driver.
7. Take note of the rotary address on the controller to ensure the address on the replacement board is the same. See **Figure 22**.
8. To install the new controller, replace the six nuts holding it to the display back. Reconnect power and signal cables. Turn on power, observe the boot-up sequence, and note that the pixel in the lower-right corner shows power.

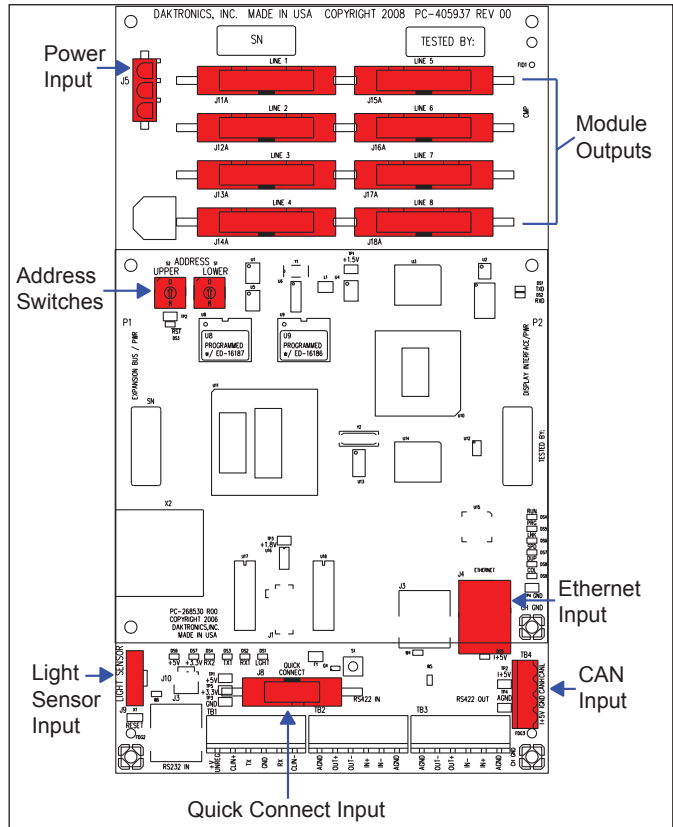


Figure 22: Galaxy Controller

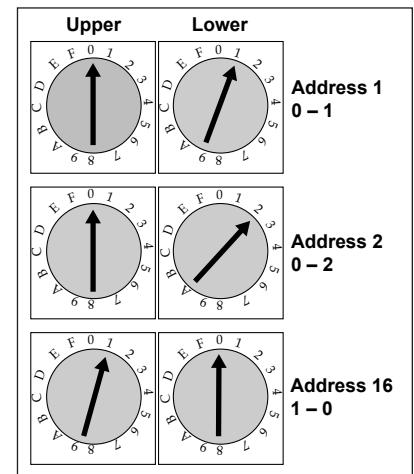
## Controller Address Setting

The rotary switches set the hardware address which the software uses to identify each particular display. Each controller in a network needs a unique address.

To set the rotary address switches, rotate them until the arrow points to the desired number, as shown in **Figure 23**. The display's power must be turned off and then turned back on to activate the test mode or to change an address.

### Notes:

- Setting both rotary switches to address 0 will activate Test Mode. Turn the display's power off and back on to activate testing.
- After testing, reset the rotary switches to an address other than 0/0 and repower the controller (the software will not recognize an address of 0).



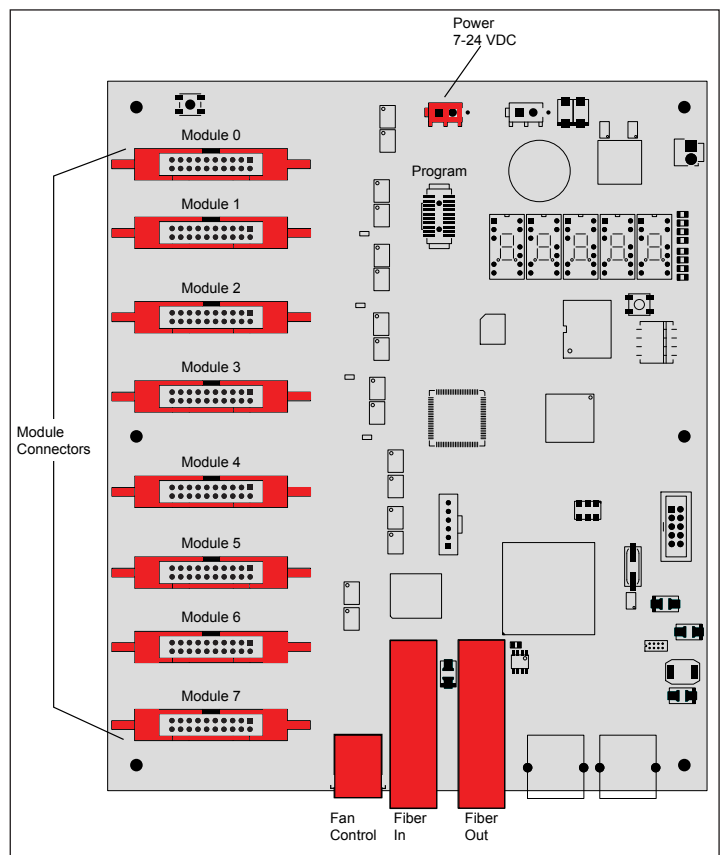
**Figure 23:** Rotary Address Switches

## MLC Replacement

Tools required:  $\frac{1}{8}$ " hex wrench,  $\frac{5}{16}$ " nut driver, and flathead screwdriver

In mirror displays, the Multi-Line Controller (MLC) receives signal from the primary controller and distributes it to the modules. Ribbon cables run from the module connectors on the MLC to the first modules in each row via ribbon cables. The power supply nearest the MLC will provide its power via a transformer in the enclosure with the MLC.

1. Turn off power to the display.
2. Remove the module directly in front of the MLC. Refer to **Figure 10** for the approximate location.
3. Disconnect the input cables.
4. Remove all ribbon cables, labeling the module number as they are removed to ensure proper replacement.
5. Remove the six nuts holding the board in place using a  $\frac{5}{16}$ " nut driver.
6. To install the new MLC, move the unit into place and replace the six nuts holding it to the display back. Reconnect input and ribbon cables. Turn on power, observing the boot-up sequence. Note that the LEDs to the right of the fiber jacks are on; DS23 to the left of the fiber cable should be off. Refer to **Figure 19** and **Figure 24** for more information.



**Figure 24:** Multi-Line Controller

**Note:** Ensure all dip switches on the MLC are in the down position.

## Power Supply Replacement

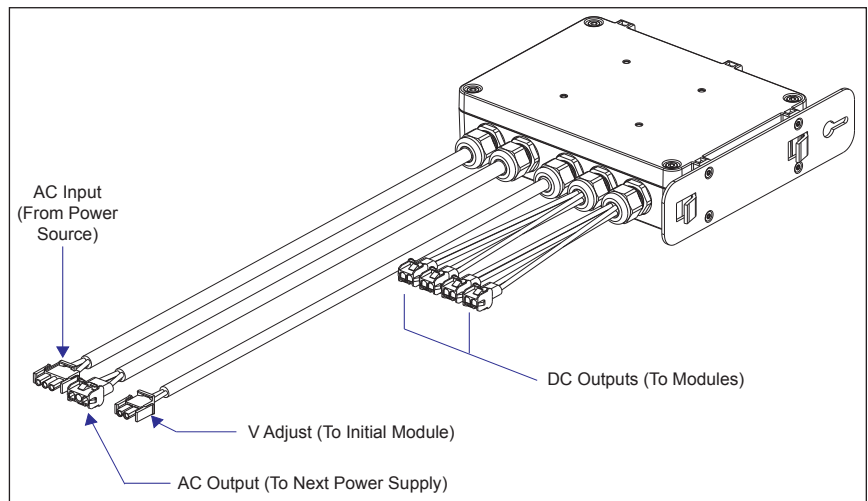
Tool required: Phillips screwdriver

Galaxy displays use 135-watt power supplies that run up to four modules (eight modules in 34 mm monochrome displays).

Each module is connected to a wire harness on the power supply by a Mate-n-Lok® cable. Refer to **Figure 25** for an example.

Complete the following steps to replace a power supply:

1. Turn off power to the display.
2. Remove the module directly in front of the appropriate power supply.
3. Disconnect the Mate-n-Lok® connectors from the power source as well as those going to the modules. Be sure to label each connector so that it can be properly reconnected.
4. Loosen the screw holding the power supply bracket to the cabinet upright and lift it off the hooks.
5. Carefully pull the power supply out of the cabinet.
6. Move the new power supply into place and tighten the screw on the support bracket.
7. Reconnect all the Mate-n-Lok® plugs so that each module will receive power.



**Figure 25: Power Supply**

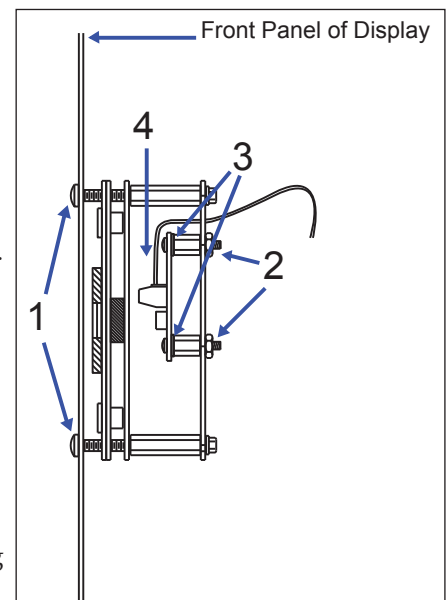
## Light Sensor Replacement

Tools required:  $\frac{3}{16}$ " nut driver, Phillips screwdriver

The light sensor assembly is mounted inside the bottom-left edge of the cabinet. Refer to **Figure 10** for location.

If the light sensor fails, only the circuit board needs to be replaced. Remove the bottom-left module on the display to access the light sensor. To replace a light sensor circuit board as shown in **Figure 26**, follow these steps:

1. Remove the screws that hold the light sensor to the cabinet.
2. Remove the #4-40 nuts securing the circuit board to the plate.
3. Remove the standoffs and attachment screws from the board.
4. Disconnect the four electrical wires on the sensor by unscrewing each screw that holds a wire in place. Note the order the wires are connected so they can be reconnected in the same locations on the replacement.
5. The light sensor plug on the controller does not need to be detached.
6. Reattach the new circuit board, following these steps in reverse.



**Figure 26: Light Sensor Assembly**



**Note:** Align the new circuit board so that the lens lines up with the 1/2" circular opening in the bottom left edge of the display when the assembly is in place.

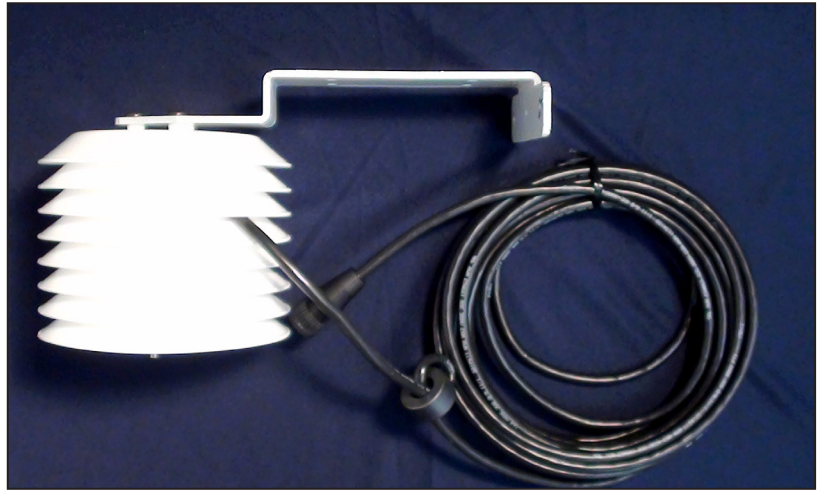
## Temperature Sensor Replacement

Tools required: Phillips screwdriver

If the temperature sensor malfunctions, replace the entire unit.

The temperature sensor enclosure, shown in **Figure 27**, is composed of eight plastic disks, a metal mounting bracket, and a 25-foot weather-resistant cable.

In most cases, the enclosure is mounted using four screws. The cable plugs into quick-connect jack J31 on the back of the display.



**Figure 27:** Temperature Sensor and Mounting Bracket



# Section 9: Daktronics Exchange and Repair & Return Programs

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## 9.1 Exchange Program

The Daktronics Exchange Program is a quick, economical service for replacing key components in need of repair. If a component fails, Daktronics sends a replacement part to the customer who, in turn, returns the failed component to Daktronics. This not only saves money but also decreases equipment downtime. Customers who follow the program guidelines explained below will receive this service.

Before Contacting Daktronics

Fill in these numbers before calling Customer Service:

Display Model Number: \_\_\_\_\_

Date Installed: \_\_\_\_\_

Location of Display: \_\_\_\_\_

Daktronics Customer ID Number: \_\_\_\_\_

To participate in the Exchange Program, follow these steps:

1. Call Daktronics Customer Service: 866-343-3122.
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.

If the failed part or replacement part is not returned to Daktronics within 3 weeks of the ship date, Daktronics will assume that the customer is purchasing the replacement part and will send an invoice for the value of the new sale part. If the part or parts are returned within 2 weeks of the second invoice date, Daktronics will credit the customer for the second invoice.

If after 2 weeks Daktronics has still not received the parts back, the customer must pay the second invoice and will not be credited for the return of the failed part. Daktronics reserves the right to refuse parts that have been damaged due to acts of nature or causes other than normal wear and tear.

## 9.2 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: 866-343-3122 Fax: 605-697-4444
2. Receive a Return Materials Authorization (RMA) number before shipping.  
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.
4. Enclose:
  - Your name
  - Address
  - Phone number
  - The RMA number
  - A clear description of symptoms

### Shipping Address

Daktronics Customer Service

PO Box 5128

201 Daktronics Dr.

Brookings SD 57006

## 9.3 Daktronics Warranty and Limitation of Liability

The Daktronics Warranty and Limitation of Liability is located in Appendix E. The Warranty is independent of Extended Service agreements and is the authority in matters of service, repair, and display operation.

# Glossary

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**Cabinet:** The metal frame of the display (back, sides, top, and bottom).

**Column:** A vertical line of pixels.

**Controller:** The “brains” of the display. The controller receives signal communication from the computer and sends the information to the modules. Messages and schedules may also be stored on the controller for use when desired.

**Display Address:** An identification number assigned to each display of a network. The control software uses the address to locate and communicate with each display. Displays that are on the same network must have different addresses.

**Galaxy®:** One of Daktronics’ trademarked names for commercial LED matrix displays.

**Light Emitting Diode (LED):** A low energy, high intensity lighting element. When grouped together, LEDs produce the messages that appear on the display.

**Louwer:** Black plastic ledge positioned horizontally above each pixel row. Louvers block sunlight to increase the level of contrast on the display face.

**Mirror:** The second display in a two-sided (2V) configuration. The mirror display does not have a controller, but rather an MLC. It displays an exact copy of the information on the primary display. All signal information to the mirror is received through an inter-connect cable from the primary display.

**Multi-Line Controller (MLC):** Used in mirror displays to repeat data from the primary display and to control the mirror display’s ventilation fans.

**Module:** Modules are the “building blocks” of the display. Individual module sizes vary depending on the pixel pitch of the display. Each module is individually removable from the front of the display.

**Network:** Consists of multiple displays connected to each other. As many as 240 primary displays can exist on one network.

**Picture Element (Pixel):** A single LED or cluster of LEDs. The number and color of the LEDs depends on display application.

**Pixel Pitch:** The amount of space between the center of two pixels. The pixel pitch is equidistant both vertically and horizontally.

**Primary:** The first display in a two-sided (2V) configuration. The communication signal, light sensor, and temperature sensor are connected to this display. Information is relayed from the primary through an inter-connect cable to the MLC in the mirror so it shows exactly the same information.

**Venus 1500 Software:** The software on the control computer used to create messages and send them to displays. The Venus 1500 software manual is included on the software’s installation disk.



## Appendix A: Reference Drawings

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Shop drawings show display dimensions, signal and power connection locations, as well as information on service access and power requirements. To obtain copies of shop drawings or other reference drawings specific to your display, use the links listed below or contact Daktronics Customer Service:

Phone: 866-343-3122 Fax: 605-697-4444

Click [here](#) for AF-3500 shop drawings.

Click [here](#) for AF-3550 shop drawings.

Click [here](#) for layout drawings.





# **Appendix B: Temperature Sensor Installation (DD2638167)**

Click [here](#) to open the temperature sensor installation quick guide.



# Appendix C: International Installation

The biggest difference between domestic and international applications is the power sources. International displays run on 240 VAC.

### Terminating hot, neutral, and ground wires at the J-box

1. Route the power cable through conduit to the rear of the display and into the power termination J-box.
2. The power termination enclosure contains two wires plus a ground coming from the interior of the display. These wires are pre-terminated to the power termination panel inside the display.
3. Inside the display's external power termination J-box, connect the power wires to the wires coming from the display interior using wire nuts. Refer to **Figure 28**.

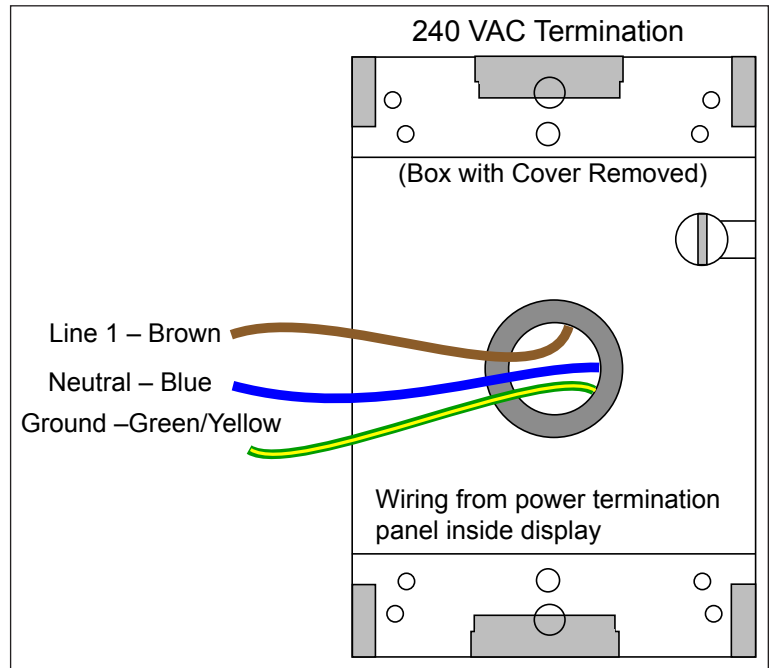
**Note:** The following colors are used for the pre-terminated wires:

240 VAC	
Line 1	Brown
Neutral	Blue
Ground	Green/Yellow

### Terminating single-phase power to the internal power termination panel

Daktronics' displays used for international applications are equipped with different power termination panels than domestic displays. However, the termination method is similar to the domestic termination discussed in **Section 3.6**.

1. Open the display as explained in **Section 6.2** and locate the power termination panel.
2. Route the cable through conduit to the back of the display. Use the  $\frac{3}{4}$ " knockout for access, being careful not to damage internal components.
3. Remove the cover of the power termination panel.
4. Connect the neutral wire to the neutral lug and the live wire to the Line 1 lug.
5. The ground wire connects to the grounding bus bar.



**Figure 28:** 240 V Power Termination



# Appendix D: Maintenance Log

Inspection Item:	Date performed:								
General: Exterior Visual Inspection									
General: Interior Visual Inspection									
Modules: Weather Stripping									
Modules: Electrical Connections									
Modules: Latch Operation									
Ventilation System: Fans									
Ventilation System: Filters									
Hardware/Fasteners: Loose bolts, nuts, screws, rivets, etc.									
Cabinet (Int. & Ext.): Paint cracking and peeling									
Cabinet (Int. & Ext.): Metal Corrosion									



## **Appendix E: Daktronics Warranty and Limitation of Liability (SL-02374)**

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Click [here](#) to view Warranty and Limitation of Liability information.