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DD1421949—P1391
DataMaster® DF-2052 Tower
Display Manual

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Materials included in this manual:

Appendix A: Refer to the list of drawings in **Appendix A**. Print A-size drawings on A-size paper and B- and C-size drawings on B-size paper.

Appendix B: Part # **900-325**

Appendix C: **SL-02374**

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DataMaster® DF-2052 Tower

Display Manual

DD1421949

Rev 8—8 January 2016

DD1421949
Product 1391
Rev 8—8 January 2016

DAKTRONICS, INC.

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Section 1: Introduction

Reference Drawings:

Power Specifications, DF-2052 Series Parking Display.....	Appendix A
Shop Drawing	Appendix A
System Riser	Appendix A

1.1 How to Use this Manual

This manual provides installation, maintenance, and troubleshooting information for Daktronics DataMaster® parking garage DF-2052 displays. For additional information regarding the safety, installation, operation, or service of this system, please refer to the telephone numbers listed on the cover page of this manual.

The manual is divided into the following sections:

- **Introduction** covers the information needed to use this manual. Take time to read the introduction as it defines terms and explains concepts used throughout the manual.
- **Mechanical Installation** contains mechanical installation information for the display.
- **Electrical Installation** contains electrical installation information for the display.
- **Maintenance and Troubleshooting** provides maintenance and general troubleshooting information for the Daktronics DF-2052 series displays.
- **Replacement Parts and Exchange and Repair Programs** offer information regarding the location of part numbers on the individual components, a list of the replacement parts, and information regarding the Daktronics exchange and repair program.
- **Glossary** contains definitions for the terms and phrases commonly used throughout this manual and with the DataMaster® product.
- **Appendix A** contains drawings referenced throughout this manual.
- **Appendix B** contains the Daktronics Warranty and Limitation of Liability.

Listed below are a number of drawing types commonly used by Daktronics, along with the information each is likely to provide. All drawings referenced in this manual are located in **Appendix A**.

- **System Risers:** Overall system layout from the control computer to display, and power and phase requirements.

- **Shop Drawings:** Light sensor locations, display dimensions, mounting information, power and signal entrance points, and access method.
- **Assembly:** Component locations, part numbers, and assembly instructions.

Figure 1 illustrates a Daktronics drawing label. The drawing number is located in the lower-right corner of the drawing. This manual refers to drawings by listing the last set of digits and the letter preceding them. In the following example, the drawing is referred to as **Drawing A-489640**.


 DAKTRONICS, INC. BROOKINGS, SD 57006		THE CONCEPTS EXPRESSED AND DETAILS SHOWN ON THIS DRAWING ARE CONFIDENTIAL AND PROPRIETARY. DO NOT REPRODUCE BY ANY MEANS WITHOUT THE EXPRESSED WRITTEN CONSENT OF DAKTRONICS, INC. COPYRIGHT 2011 DAKTRONICS, INC.	
DO NOT SCALE DRAWING			
PROJ: OUTDOOR TRANSPORTATION PARKING DISPLAYS			
TITLE: POWER SPECS- DF-2052 SERIES PARKING DISPLAYS			
DESIGN: TSPRACK	DRAWN: TSPRACK		DATE: 13 JUN 08
SCALE: NONE			
SHEET	REV	JOB NO:	FUNC-TYPE-SIZE
	02	P1391	R-10-A
			489640

Figure 1: Drawing Label

All references to drawing numbers, appendices, figures, or other manuals are presented in bold typeface, as shown in the example below.

Refer to the **Power Specification** drawing for power specification information.

In addition, any drawings referenced within a particular section are listed at the beginning of the section in the following manner:

Reference Drawing:

Power Specifications **Appendix A**

Daktronics identifies manuals by a DD or ED number located on the cover page of each manual. For example, this manual is referred to as **DD1421949**.

Daktronics builds displays for long life and little maintenance. However, from time to time, certain display components need replacing. The replacement parts list in **Section 5.2** provides the names and part numbers of components that may need ordering during the life of the display.

Refer to the Daktronics Exchange and Repair and Return Programs in **Section 5.3** if any component needs replacement or repair.

1.2 Display Overview

Daktronics DF-2052 displays are designed and manufactured for performance, reliability, ease of maintenance, and long life. The displays are used in parking locations, and require switch inputs and third-party software.

The DF-2052 LED displays are available in monochrome red or green LEDs. Daktronics offers these displays with 5" or 7" character height and two or more levels. Refer to the appropriate **Shop Drawing** for details about each display size. The DF-2052 model numbers are described below.

DF-2052-H-L-C	
DF-2052	DataMaster® tower parking garage display
H	Character height [5" or 7"]
L	Number of levels [2 or more]
C	Digit color [monochrome red (R) or green (G)]

1.3 Network Concepts

The following methods are available for controlling the DF-2052 displays.

Switch Inputs

Switch boxes wired directly to the display can control the signs in two configurations:

- Switches can make the displays show OPEN or FULL.
- Switches can increase or decrease a number shown on the display.

Refer to the appropriate **System Riser** for more information on using switch inputs.

Software

Software control is done using third-party software and using either multidrop protocol or Venus® 1500 protocol. Venus® 1500 Software is not used.

A multidrop protocol (MDP) system uses unidirectional communication where the control computer sends data to the display and the display does not communicate diagnostic information to the control computer.

Venus® 1500 (V1500) protocol uses bidirectional communication where the control computer sends data to the display and receives information regarding sign status and maintenance needs in return.

The jumper on the driver must be set to either MDP or V1500 depending on which protocol is used. Refer to **Section 3.4** for more information and the appropriate **System Riser** for more information on network types.

Section 2: Mechanical Installation

Reference Drawing:

Shop Drawing..... **Appendix A**

Daktronics engineering staff must approve any changes that may affect the weather tightness of the display. If making modifications, submit detailed drawings of the changes to Daktronics for evaluation and approval, or the warranty may be void.

Daktronics is not responsible for the integrity of the mounting structure or any mounting hardware not provided by Daktronics. It is the customer's responsibility to ensure a qualified structural engineer has approved the structure and any additional hardware.

Mounting angles on the back of the DF-2052 displays allow for use of tube steel mounting. Daktronics recommends using 3 x 3 tube steel. Tube steel and mounting hardware are provided by others. Refer to **Figure 2** and the appropriate **Shop Drawing** for mounting information.

The door hinges to the right; mount the display to allow clearance for the door to open.

Note: The customer must mount the display off the ground to allow the drain holes to drain properly.

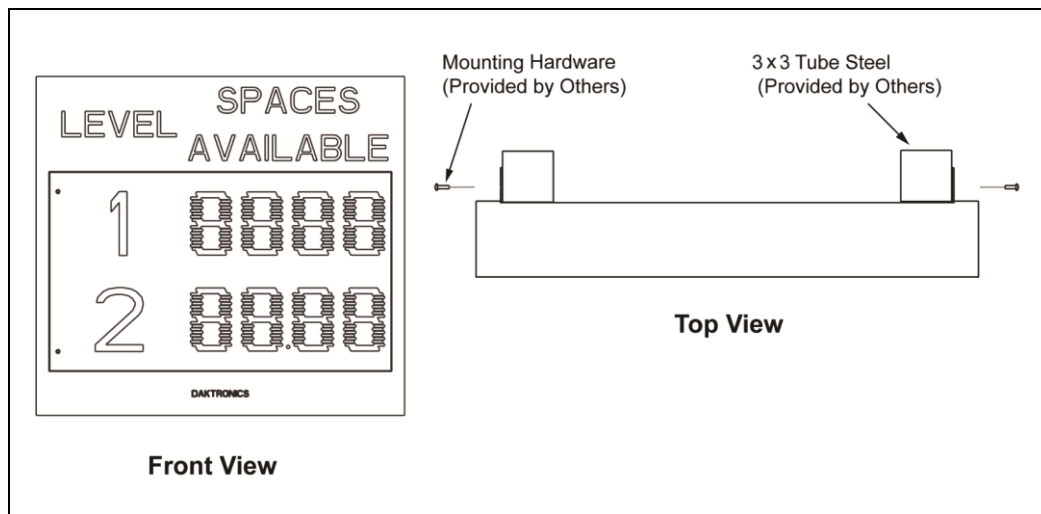


Figure 2: DF-2052 Tower Mounting

Section 3: Electrical Installation

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.

Daktronics parking garage displays are UL listed and tested to CSA standards. Contact Daktronics with any questions regarding the testing procedures.

Reference Drawings:

Address/Jumper Settings, DF-2052/2053	Appendix A
Schematic, Sign	Appendix A
Schematic, Light Sensor Connections	Appendix A
Shop Drawing	Appendix A
System Riser	Appendix A

3.1 Introduction

Refer to the **Sign Schematic** before making power and signal connections. Power and signal wires terminate at the terminal box in the bottom-left corner of the display. Refer to the appropriate **Shop Drawing** for the terminal box location and to the **System Riser** for signal termination details. A qualified electrician must complete signal and power termination.

3.2 Power

Daktronics DF-2052 displays require a dedicated 120 VAC circuit for incoming power; the display itself has no breakers or fuses. Knockouts for suggested power entrances are located on the bottom-rear of the display. Refer to the appropriate **Shop Drawing** for knockout location.

3.3 Grounding

Displays must be grounded according to the provisions outlined in Article 250 of the National Electrical Code®. Daktronics requires a resistance to ground of 10 ohms or less. Connect the display to earth ground to ensure reliable equipment operation and to protect the equipment from damaging electrical disturbances and lightning. The display must be properly grounded or the warranty will be void. Refer to the appropriate **System Riser** for grounding information.

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.

Installation with Ground and Neutral Conductors

For installation with ground and neutral conductors provided, the power cable must contain an isolated earth-ground conductor. Do not connect neutral to ground at the disconnect or at the sign; this violates electrical code and voids the warranty. Use a disconnect so all hot lines and neutral can be disconnected. Refer to the appropriate **Shop Drawing** and **System Riser** for ground, neutral, hot line, and incoming power locations.

Installation with Only a Neutral Conductor

Installations where no grounding conductor is provided must comply with Article 250 of the National Electrical Code. For the installation to meet all of the requirements of Article 250, the following guidelines must be observed:

- Connect the grounding electrode cable at the local disconnect, never at the display driver or power enclosure.
- Use a disconnect that opens all the ungrounded phase conductors.

3.4 Signal Connection

The driver mounts directly the back of the LED digit board. Unscrew and open the door to access the drivers. Knockouts for suggested signal entrance are located on the bottom-rear of the display. Refer to the appropriate **Shop Drawing** for knockout locations.

Ethernet

An Ethernet network allows communication from a control computer to a primary display. Each display is identified by a unique address, which allows the control computer to communicate directly with the display. Ethernet networks have a maximum distance of 300' between the control computer and the display. Refer to the appropriate **System Riser** for more information on connecting an Ethernet network.

Display IP address, subnet mask, and Gateway IP address must be set using the Lantronix® DeviceInstaller™ application. Refer to **Section 3 IP Addresses** of the Lantronix® DeviceInstaller™ User Guide in **Appendix B**.

<http://www.lantronix.com/support/downloads/?p=DEVICEINSTALLER>

Unidirectional RS422—Multidrop Protocol

When using multidrop protocol, the standard communication method is unidirectional RS422. The distance between the control room and the display must be less than 2,000'. Refer to the appropriate **System Riser** for information on unidirectional RS422.

Bidirectional RS422—Venus® 1500 Protocol

When using Venus® 1500 software protocol, the standard communication method is bidirectional RS422. The distance between the control room and the display must be less than 4,000'. Refer to the appropriate **System Riser** for information on bidirectional RS422.

Manual Control—Switch Inputs

A switch input system is suitable for low-cost applications where an integrated, remote control system is not needed. Using the switches, a four-digit display can show numbers from 0 to 9999, or can show OPEN or FULL.

Data sent from third-party software overrides the switch inputs. When the data signal is disconnected, the display blanks until the switch is closed.

The switch box sends signal via 3 wires to the display driver. A switch box must be wired to the top of the DF-2052 display. Refer to the appropriate **System Riser** for wiring information.

The **System Riser** shows the terminal block where the switch connections are made. Wiring open switches to the terminal block implements switch control. The displays can use either an increment/decrement system or an open/close system.

If using an increment/decrement system:

- **Increment (+1):**
 - Pushing this button increments the count by 1.
 - Holding this button down causes the display to increment rapidly.
 - Pushing this button with the count at 9999 causes the display to blank.
 - Pushing this button for a blank display sets the count to 0.
- **Decrement (-1):**
 - Pushing this button decrements the count by 1.
 - Holding the button down causes the display to decrement rapidly.
 - Pushing this button with the count at 0 causes the display to blank.
 - Pushing this button for a blank display sets the count to 9999.

Note: Holding the Increment and Decrement switches closed at the same time resets the display to 0.

If using the open / full system:

- **OPEN:**
 - Pushing this button makes the display show OPEN.
 - A toggle switch can be connected to hold this switch closed. This makes the display revert to OPEN whenever the data signal is not present.
- **FULL:**
 - Pushing this button makes the display show FULL.
 - A toggle switch can be connected to hold this switch closed. This makes the display revert to FULL whenever the data signal is not present.

3.5 Jumper and Address Settings

Jumper Settings

There are three jumpers on the driver. Set the jumpers according to the **Address / Jumper Settings** drawing.

Address Settings

The address of each driver is set using an 8-position DIP switch. The address is based on the display system. In the tower, the lowest level is set to Address 1, where switch 1 is turned on and the remaining 7 are turned off. The addresses then increase sequentially up to the top level of the tower display. If a second display is connected to the first display, the lowest level of the second display begins where the highest level of the first display left off. Refer to the **Address/Jumper Settings** drawing and **Figure 3** for more information on setting display addresses and **Figure 4** for jumper settings.

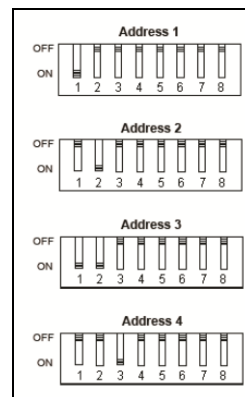


Figure 3: Common Address Settings

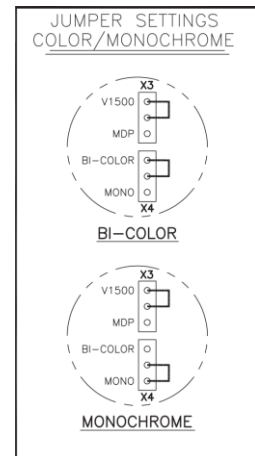


Figure 4: Common Jumper Settings

3.6 Brightness Primary / Mirror Mode

If more than one display is used at a location, LED brightness may vary between adjacent displays. If the location requires varying brightness, then each display may be left to control its own brightness. If a uniform brightness is desired, one display must act as the brightness control primary with all other adjacent displays as brightness control mirrors. Address settings do not denote brightness primary and mirror modes.

Each driver has a light sensor input and a light sensor output on TB2 pins 3 and 4 and pins 7 and 8, respectively. Any driver that does not have a light sensor signal connection at the light sensor input acts as a brightness control primary. It adjusts its LED brightness according to its own light sensor readings and forwards that signal to the light sensor output.

To make a display a brightness mirror, connect the light sensor signal from the output on the topmost driver of the first display (TB2 pins 7 and 8) to the input of the driver on the lowest level of the next display (TB2 pins 3 and 4). The mirror will then use the same LED brightness as the primary. The primary light sensor signal is also forwarded to the mirror's light sensor output, which can connect to additional mirror light sensor inputs. Refer to the **Light Sensor Schematic** drawing for information regarding light sensor connection.

3.7 Fans

The DF-2052 series displays are equipped with circulation fans to prevent overheating. The circulation fans are controlled by a thermostat and automatically activated; refer to the **Sign Schematic**.

Section 4: Maintenance and Troubleshooting

Important notes:

1. Disconnect power before doing any repair or maintenance on the display.
2. Permit only qualified service personnel to access internal display electronics.
3. Disconnect power when the display is not in use.

Reference Drawing:

Shop Drawing Appendix A

4.1 Component Location and Access

DataMaster® DF-2052 tower displays are front-access displays, meaning the displays open from the front for all service. Refer to **Figure 5** and the appropriate **Shop Drawing** for component locations.

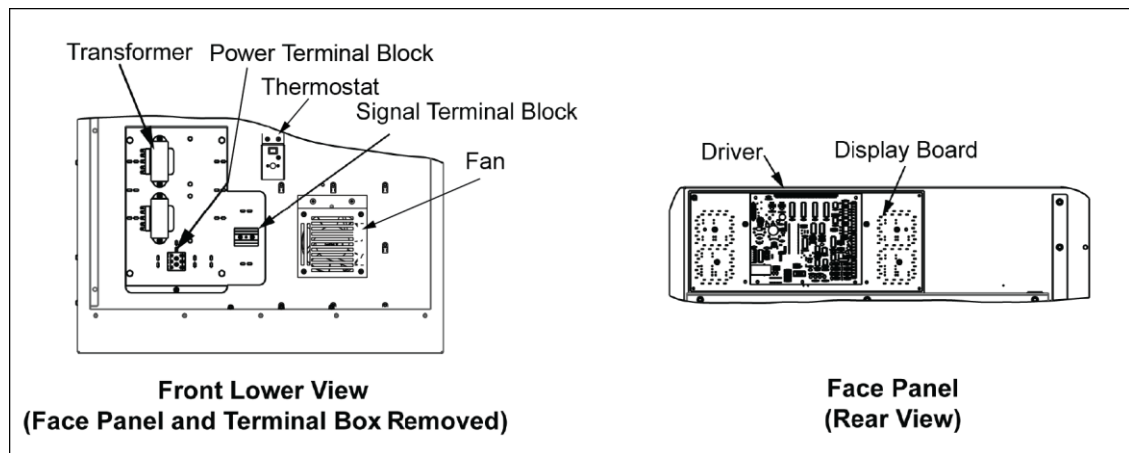


Figure 5: Component Location

To access the internal components:

1. Remove the TORX®-head screws on the left side of the door using a T-25 TORX-head screwdriver.
2. Pull the door open. The door opens to the right.
3. A lanyard will prevent the door from opening too far and damaging the cables running to the display drivers.

4.2 Service

Display Board Replacement

The digit circuit board mounts to the back of the face panel. If any LEDs malfunction, replace the entire display board.

1. Access the interior of the display as described in **Section 4.1**.
2. Remove connections from the display driver.
3. Remove the nuts holding the display board to the face panel.
4. Lift the display off the face panel.
5. Perform steps in reverse order to reinstall.

Display Driver Replacement

1. Access the interior of the display as detailed in **Section 4.1**.
2. Remove connections from the display driver.
3. Remove the nuts securing the driver to the display board.
4. Pull the driver from the display board, applying even pressure at the 40-pin header that connects the driver to the display board.
5. Perform steps in reverse order to reinstall.

Fan Replacement

1. Access the interior of the display as detailed in **Section 4.1**.
2. Disconnect power from the bottom-left corner of the fan.
3. Remove the two #10 screws on fan bracket to remove fan assembly from rear wall.
4. Remove the four screws and nuts to remove fan from fan bracket.
5. Perform steps in reverse order to reinstall. Verify the fan airflow is directed toward the face of the display. Refer to **Figure 6**.

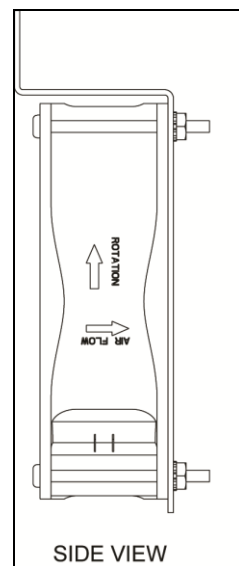


Figure 6: Fan Airflow

4.3 Troubleshooting

Problem	Solution
Entire display fails to work.	Check for proper line voltage at termination panel.
	Check connections from 16 VAC transformer to driver.
	Check power LED on driver.
Cannot communicate with display using the signal converter.	Check power to the signal converter and display.
	Check connections between signal converter and display.
	Check the serial cable from computer to signal converter.
The display is garbled.	Replace the driver.
Digit will not light.	Check contact at driver connector.
	Replace the driver.
	Replace wire to the digit.
Segment will not light.	Check contact at driver connector.
	Replace the driver.
Segment stays lit.	Replace the driver.
	Replace the digit.
Data appears in the wrong place on the display, or wrong data appears on a particular line of the display.	Verify the correct address on drivers.

Section 5: Replacement Parts and Repair & Return Programs

5.1 Daktronics Part Numbers

All parts in Daktronics signs 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 sign 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 7**. The part number is bolded.

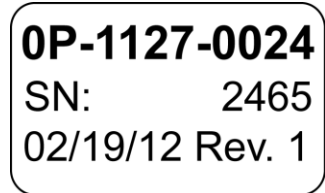


Figure 7: Typical Label

5.2 Replacement Parts List

When ordering replacement parts, refer to the Daktronics part numbers in the table below. Daktronics recommends putting replacement parts in a lockable storage cabinet to prevent theft or accidental loss.

Part Description	Daktronics Part #
Display Board, 5", 4 Column, Bi-Color	0P-1391-0010
Display Board, 7", 4 Column, Bi-Color	0P-1391-0020
Driver, Bi-Color Parking Driver, RS422	0P-1391-0001
Driver, Bi-Color Parking Driver, Ethernet	0P-1391-0002
Fan	B-1053
Switch, Push Button	S-1217
Transformer	T-1066
Thermostat	S-1229

5.3 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 unique Exchange Program is 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 Sign (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 will be 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:**
Refer to the appropriate market number in the chart listed on the previous page.
Fax: 605-692-0145
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. Daktronics does not recommend using packing peanuts when shipping.
4. **Enclose:**
 - your name
 - address
 - phone number
 - the RMA number
 - a clear description of symptoms

Shipping Address

Daktronics Customer Service
331 32nd Ave
RMA# _____
Brookings, SD 57006

Email

transportationhelp@daktronics.com

5.4 Daktronics Warranty and Limitation of Liability

The Daktronics warranty and limitation of liability is located in **Appendix C**. The warranty is independent of extended service agreements and is the authority in matters of service, repair, and display operation.

Glossary

Digit Circuit Board: The LEDs are mounted to a circuit board, which mounts directly to the back of the driver board. Problems with individual segments or LEDs may require accessing or replacing this board.

Display Address: Identification number assigned to each display in a network. It is set using the display's controller. The controller computer uses the address to differentiate between displays connected on the same network. Displays on the same network cannot have the same address.

Ethernet: A local area network (LAN) protocol using a bus topology. The Ethernet network card uses the TCP/IP interface to communicate with the server via the LAN.

LED (light emitting diode): LEDs are high-intensity, low-energy lighting units.

Module: A unit of the display that consists of LEDs, a display board, and a driver board. One driver board is located on the back of each module.

Network: Multiple signs connected to each other. Up to 240 Venus® 1500-controlled displays can exist on one network.

Pixel: A group of LEDs that power on and off to form character and graphic content.

RS232: Standard PC communication type with a maximum cable length of 25' (7.62 meters).

RS422: Standard differential communication type with a maximum cable length of 4,000 feet (1.2 kilometers).

Section: A section consists of one modular enclosure and its contents.

Venus® 1500 Software: Daktronics-designed, Windows®-based software that creates and edits messages on displays.

Appendix A: Reference Drawings

The Daktronics drawing number is located in the bottom-right corner of the drawing. The drawings are grouped together by drawing type, and then listed in alphanumeric order.

General Drawings:

Power Specification Chart.....	Drawing A-0489640
Address / Jumper Settings, DF-2052 / 2053.....	Drawing A-0517678

Mechanical Drawings:

Shop Drawing, DF-2052-5-2-*	Drawing B-0702680
Shop Drawing, DF-2052-5-3-*	Drawing B-0702681
Shop Drawing, DF-2052-5-4-*	Drawing B-0702682
Shop Drawing, DF-2052-5-5-*	Drawing B-0702683
Shop Drawing, DF-2052-5-6-*	Drawing B-0702684
Shop Drawing, DF-2052-5-7-*	Drawing B-0702685
Shop Drawing, DF-2052-5-8-*	Drawing B-0702686
Shop Drawing, DF-2052-7-2-*	Drawing B-0702687
Shop Drawing, DF-2052-7-3-*	Drawing B-0702688
Shop Drawing, DF-2052-7-4-*	Drawing B-0702689
Shop Drawing, DF-2052-7-5-*	Drawing B-0702690
Shop Drawing, DF-2052-7-6-* (1-6).....	Drawing B-0702691
Shop Drawing, DF-2052-7-7.....	Drawing B-0702692
Shop Drawing, DF-2052-7-8-*	Drawing B-0702693
Shop Drawing, DF-2052-7-9-*	Drawing B-1025728
Shop Drawing, DF-2052-7-5-* (3-7).....	Drawing B-1074221
Shop Drawing, DF-2052-7-6-* (5-G).....	Drawing B-1089047

Electrical Drawings:

System Riser, DF-2052 Series Displays, Ethernet.....	Drawing A-0495374
System Riser, DF-2053 Series Displays, Ethernet.....	Drawing A-0512886
System Riser, DF-2052 / 2053, Switch Inputs.....	Drawing A-0517734
Schematic, Light Sensor Connections, DF-2053 Series.....	Drawing A-0517865
System Riser, DF-2053, RS422, Unidirectional (MDP).....	Drawing A-0519861
System Riser, DF-2053, RS422, Bilateral.....	Drawing A-0521685
System Riser, DF-2052, RS422, Unidirectional (MDP).....	Drawing A-0524781
System Riser, DF-2052, RS422, Bilateral.....	Drawing A-0524786
Schematic, DF-2052 Series Parking Display, 2-8 Levels.....	Drawing B-0491890

Appendix B: Laktronix[®] Device Installer[™] User Guide (Part # 900-325)

Appendix C: Daktronics Warranty and Limitation of Liability (SL-02374)
