



SunSpot® Series AB-1010 Incandescent Display

Installation, Maintenance & Troubleshooting Manual

ED-12161

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Section 1: Introduction

1.1 How to Use this Manual

This manual explains the installation and maintenance of the SunSpot® Series AB-1010 Incandescent displays. For questions regarding the safety, installation, operation or service of this system, please refer to the telephone numbers listed on the cover page of this manual.

☛ Important Safeguards:

1. Read and understand these instructions before installing.
2. Do not drop the control console or allow it to get wet.
3. Be sure to ground the display properly with a ground rod at the display location.
4. *Disconnect power to the display when it is not in use.*
5. *Disconnect power when servicing the display.*
6. Do not modify the display structure or attach any panels or coverings to the display without the written consent of Daktronics, Inc.

The manual is divided into five sections: Introduction, System Overview, Mechanical Installation, Electrical Installation, Maintenance & Troubleshooting and Appendix A.

- **Introduction** covers the basic information needed to make the most of the rest of this manual. Take time to read the entire introduction as it defines terms and explains concepts used throughout the manual.
- **Mechanical Installation** provides general guidance on display mounting.
- **Electrical Installation** provides general guidance on terminating power & signal cable at the display.
- **Maintenance & Troubleshooting** addresses removing and exchanging basic display components, troubleshooting the display, performing general maintenance.
- **Appendix A: Drawings** contains drawings for the SunSpot® AB-1010 Series displays.

Listed below are a number of drawing types commonly used by Daktronics, along with the information that each is likely to provide.

- **System Riser Diagrams:** overall system layout from control room to display, power and phase requirements.
- **Shop Drawings:** fan locations, transformer locations, mounting information, power and signal entrance points and access method (front or rear).
- **Schematics:** power wiring, signal wiring, panel board or power termination panel assignments, signal termination panel assignments and transformer assignments.
- **Final Assembly:** component locations, part numbers, display dimensions, and assembly/disassembly 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 would be referred to as **Drawing A-114667**.

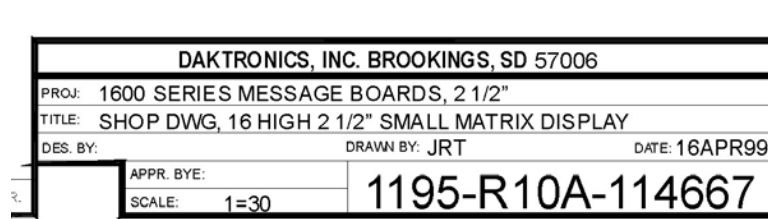


Figure 1: Drawing Label

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

“Refer to **Drawing A-114667** for the location of the panel board.”

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

Reference Drawing:

Shop Drawing; 16 High 2 ½” Small Matrix **Drawing A-114667**

Referenced drawings are found in the Appendix A.

Daktronics identifies manuals by an ED number located on the cover page of each manual. Its ED number will identify any manuals referenced in this manual. For example, this manual would be referred to as **ED-12161**.

The serial number and model numbers can be found on the ID label, located on the display. This label will look similar to the one shown in **Figure 2**. When calling Daktronics Customer Service, please have this information available to ensure that your request is serviced as quickly as possible.

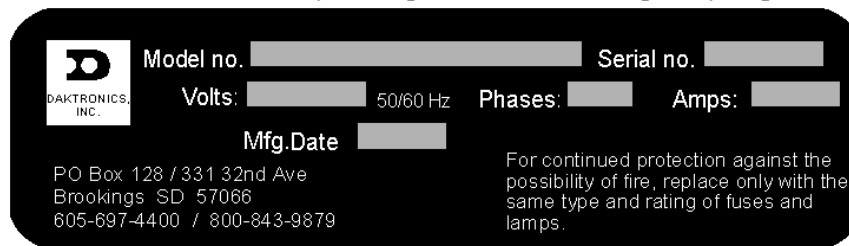


Figure 2: Display ID Label

Daktronics displays are built for long life and require little maintenance. However, from time to time, certain display components will need replacing. The Replacement Parts List in **Section 4** provides the names and part numbers of components that may need to be ordered during the life of this display.

Following the Replacement Parts List in **Section 4** is the Exchange/Replacement Procedure. Refer to these instructions if any display component needs to be replaced or repaired.

1.2 Daktronics Nomenclature

To fully understand some Daktronics drawings, such as schematics, it is necessary to know how various components are labeled in those drawings. You will find this information useful when trying to communicate maintenance or troubleshooting efforts.

A module is the building block of the Daktronics sign. By placing modules side-by-side and on top of one another a sign of any size can be designed and built. Individual modules can be easily removed from the sign if required. **Figure 3** illustrates how Daktronics numbers modules on a sign. **Figure 4** breaks down the module numbering method.

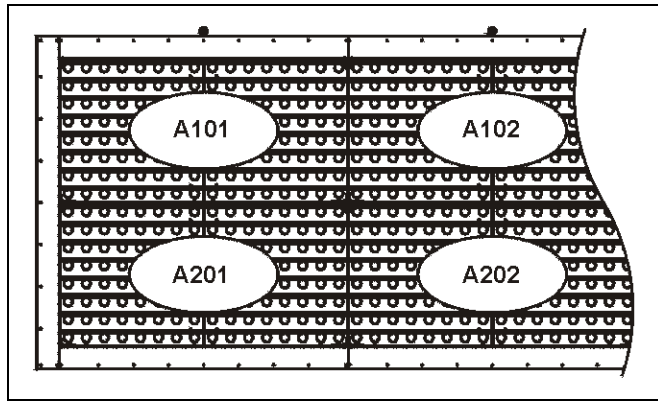


Figure 3: Example Module Numbering – 16x80 Display

The label “A” on a drawing typically 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. Assemblies are divided into two types: those that route signal and those that route power.

In addition, the following labeling formats might be found on various Daktronics drawings:

- “TB??” denotes a termination block for power or signal cable.
- “F??” denotes a fuse.
- “E??” denotes a grounding point.
- “J??” denotes a power or signal jack.
- “P??” denotes a power or signal plug for the opposite jack.

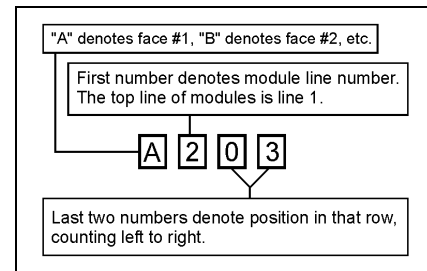


Figure 4: Module Numbering

Daktronics part numbers are commonly found on drawings. Those part numbers can be used when requesting replacement parts from Daktronics Customer Service. Take note of the following part number formats. (Not all possible formats are listed here.)

- “OP-????-????” denotes an individual circuit board.
- “OA-????-????” denotes an assembly, such as a circuit board and the plate or bracket to which it is mounted. A collection of circuit boards working as a single unit may also carry an assembly label.
- “W-????” denotes a wire or cable. Cables may also carry the assembly numbering format in certain circumstances. This is especially true of ribbon cables.
- “F-????” denotes a fuse.
- “T-????” denotes a transformer
- “PR-????-?” denotes a specially ordered part.

Most circuit boards and components within this SunSpot display carry a label that lists the part number of the unit. If a circuit board or assembly is not listed in the replacement parts list in **Section 4**, use the label to order a replacement. **Figure 5** illustrates a typical label. The part number is in bold.

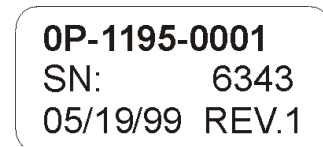


Figure 5: Typical Label

1.3 Definitions

Driver: A modular unit that receives display information from the controller and converts it to drive signals that switches the lamps on and off. It controls an array of lamps that is either 7 pixels high by 16 pixels wide or 8 pixels high by 16 pixels, depending on display specifications.

Incandescent: Displays that use lamps with filaments that are heated to incandescence by an electric current.

Lampbank: An 8x16 or 7x16 array of lamps, depending on display specifications.

Panel Board: The power junction box that connects incoming power to the display.

Matrix: The height and width of a display area according to the number of rows and columns of pixels.

Modem: A device that allows data to be sent or received over a phone line.

Pixel: The smallest single point of light on a message center that can be turned on or off. Each individual lamp on a SunSpot display is considered a pixel.

RS232: A standard PC communication type with a maximum cable length of 25 feet (8 meters).

RS422: A standard differential communication type with a maximum cable length of 4000 feet (1.2 kilometers).

SunSpot®: Monochrome incandescent message center displays.

Venus® 1500: A Daktronics designed, Windows based software used to create and edit messages on the displays.

1.4 Display Features & Overview

Reference Drawings:

System Riser Diagram, RS422 Incandescent Displays	Drawing A-148859
System Riser Diagram, RS232 Incandescent Displays	Drawing A-148870
System Riser Diagram; Fiber Incandescent Displays	Drawing A-148878
System Riser Diagram; Modem Incandescent Displays	Drawing A-148884
Shop Drawing, 7**-24 IOC-L	Drawing B-149589
Shop Drawing, 16**-24 IOC-L	Drawing B-149590

Daktronics AB-1010 SunSpot® incandescent displays offers eye-catching text messages, graphics, and animation with a wide variety of special effects available along with high visibility and affordable quality. The combination of reflector lamps and horizontal louvers create a display that is excellent for long distant viewing.

The AB-1010 Series displays are operated using a Venus® 1500 controller. The Venus 1500 software allows displays to run text messages, graphics and animations using a Windows based IBM-compatible computer. The controller can operate up to 240 signs within a local network and can also operate displays via telephone modem. Refer to **ED-12717** for more information.

The displays are available in 24", 30", 36", 48" and 60" character heights. In addition, they may be single-stand alone displays or they may have a master-echo configuration. The following lists additional display features:

- **Construction:** All aluminum cabinet with welded extrusion frame. Louvered egg crate light dividers attached directly to each lampbank section. Displays ordered with reflectorized lamps do not have light dividers. Lift eyes provided. Center cabinets not included
- **Finish:** Flat black acrylic enamel paint.

- **Lamps:** 30-watt (30R20) or 50-watt (50R20) 6000 hour reflector lamp
- **Electrical:** Standard 120/208 3-phase power. Internally mounted load centers and signal junction panels completely wired and assembled. Power cable requirements determined by local codes; conduit size depends upon cable used.
- **Service Access:** Each lampbank section hinges upward for front access to lamp drivers. Front access to lamps for replacement; lamp dividers may be removed for easier lamp access.

Each incandescent display has its own unique model number that describes its characteristics. The following explains each model number: **AB-1010-HHxWW-XX**

AB = Matrix, Incandescent Outdoor
1010 = Series Number
HH = Matrix Height (7, 16, 24 or 32)
WW = Matrix Width (32, 48, 64, 80, 96)
XX = Overall Character Height (24, 30, 36, 48, 60)

Section 2: Mechanical Installation

Daktronics engineering staff must approve *any* changes that may affect the weather-tightness of the sign. If you make any modifications, you must submit detailed drawings of the changes to Daktronics for evaluation and approval, or you may void the warranty.

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

2.1 Mechanical Installation Overview

Because every installation site is unique, Daktronics has no single procedure for mounting SunSpot signs. This section contains general information only and may or may not be appropriate for your particular installation.

A qualified individual must make all decisions regarding the mounting of this sign.

Read both the mechanical and electrical installation sections of this manual before beginning any installation procedures.

2.2 Support Structure Design

Support structure design depends on the mounting methods, sign size and weight. The structure design is critical; only a qualified individual should mount the sign. Sign height and wind loading are also critical factors. It is the customer's responsibility to ensure that the structure and mounting hardware are adequate. *Daktronics is not responsible for the installations or the structural integrity of support structures done by others.*

The installer is responsible to ensure the mounting structure and hardware are capable of supporting the sign and agrees with local codes.

Before beginning the installation process, verify the following.

- The mounting structure provides a straight and square frame for the sign.
- The mounting structure supports the sign without yielding at any unsupported points after mounting.
- Clearance: 3" of unobstructed space is available below the sign for filter removal from the sign. 1 ¼" of unobstructed space is available above the top of the sign.

Correct any deficiencies before installation.

2.3 Ventilation Requirements

Reference Drawings:

Shop Drawing, 7**-24 IOC-L	Drawing B-149589
Shop Drawing, 16**-24 IOC-L	Drawing B-149590

Fans mounted in the bottom of the sign allow for ventilation. Maintain a minimum distance of 3" (7.62cm) below the sign to maintain proper airflow. Refer to the appropriate shop drawing for additional information.

If the sign cabinet is completely enclosed:

- Provide 6 square inches of unobstructed opening per module to ensure adequate cooling.
- Make allowances to compensate for the percentage of material covering the openings in the structure.
- For adequate cooling, the cabinet may require forced ventilation. If the enclosed cabinet must use forced ventilation, it must ventilate at a rate of 10 cubic feet per minute per module (10.6" x 10.6" active area).

Failure to comply with these requirements voids the Series AB-1010 sign warranty.

2.4 Display Definitions

Reference Drawings:

Shop Drawing, 7**-24 IOC-L	Drawing B-149589
Shop Drawing, 16**-24 IOC-L	Drawing B-149590

Daktronics typically offers two display configurations, single face displays and 2V displays. **Figure 6** illustrates each of these two display types.

A 2V display consists of two single face units, one master and one echo. The two sides of this display may be mounted at any angle between 0 and 90 degrees. An interconnect harness used to power the echo unit is coiled up inside the master unit. Refer to **Drawing B-139876** for your sign's specifications.

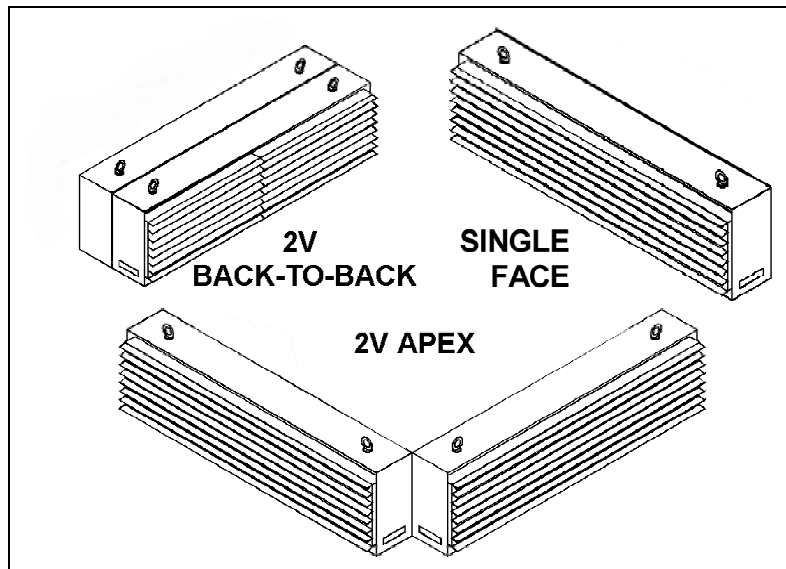


Figure 6: Display Configuration

2.5 Lifting the Sign

The top of the sign is equipped with eyebolts that are used to lift the unit. Take special care to ensure that the rated load of the eyebolts is not exceeded. Refer to the information at the end of this section labeled **Eyebolts** to determine the allowable load of the eyebolts.

Figure 7 illustrates both the correct (left example) and the incorrect (right example) method of lifting a sign. Lift the sign as shown on the left, *with the lifting bar*. Do not connect the eyebolts directly to the central lifting point; *doing so may cause the eyebolts to fail*.

Use every lifting point provided!

Do not attempt to permanently support the sign by the eyebolts.

If removing an eyebolt from the display, plug the hole with a bolt and the rubber sealing washer that was removed from the eyebolt.

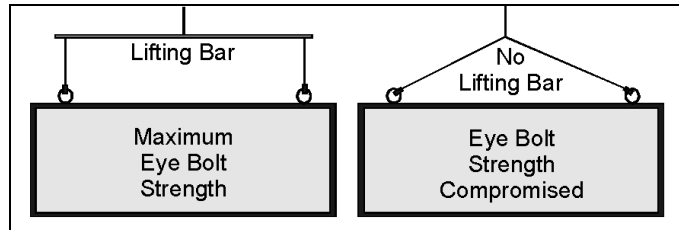


Figure 7: Lifting the Sign

2.6 Display Mounting

Reference Drawings:

- Shop Drawing, 7**-24 IOC-L..... **Drawing B-149589**
- Shop Drawing, 16**-24 IOC-L..... **Drawing B-149590**

The method used to mount signs varies greatly from location to location; as such, this manual covers only general mounting topics.

It is the installer’s responsibility to ensure the installation adequately meets local codes and standards. The installer is also responsible for the mounting method and the hardware.

Before beginning the installation process, verify the following items.

- The mounting structure will provide a straight and square frame for the sign. *Height variation in any four-foot horizontal section may not exceed 1/4- inch.*
- The mounting structure will not give way at any unsupported points after the sign is mounted.

The back of the sign uses 3x3 mounting clips at the locations shown in **the Shop Drawings**; one set is mounted to the back of the display and another set is mounted to the structure. The two sets of mounting clips are joined using 1/2" Grade-5 bolts; refer to **Figure 8**. These clips assist in mounting the sign. Remember to have *all* mounted signs inspected by a qualified structural engineer.

The customer *must* have a qualified structural engineer review the number of attachment points needed and the wall structure to ensure both meet all national and local codes. *Daktronics recommends using all clip angles as attachment points.*

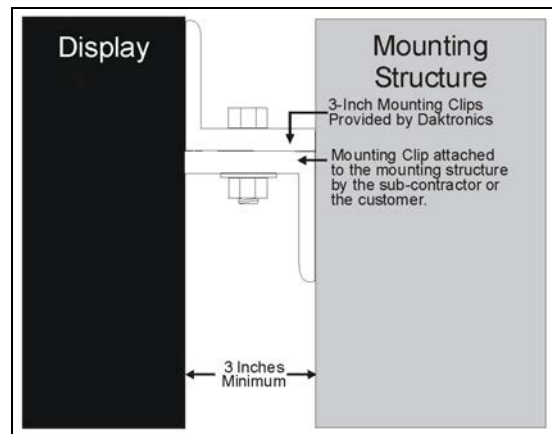


Figure 8: Mounting Example

1. Carefully uncrate the sign. Look each side of the sign over for damage during shipping. If you find damage, call Daktronics Customer Service at the numbers listed in **Section 4.14**.
2. Weld or use 1/2" Grade-5 bolts and hardware to secure the mounting clips to the support structure as shown in **the Shop Drawing**.
3. Following the guidelines described in **Section 2.4**, lift the sign into position on the support structure.

4. Line up the holes on both sets of mounting angles (those on the back of the sign and those on the support structure) and attach with ½" Grade-5 bolts.
5. Refer to **Section 3** for information on routing power and signal.
6. Upon completing installation, carefully inspect the sign for any holes that may allow water to seep into the sign. Seal any openings with silicone. If you remove the eyebolts on the top of the sign, plug the holes with bolts and the rubber sealing washers that you removed with the eyebolts.

2.7 Mounting Optional Light Detectors & Temperature Sensors

If your display has an optional light detector or an optional temperature sensor, refer to **Appendix B** for information on installation.

2.8 Prop Rods

Prop rods are stored in the master display behind the left most lampbank for shipment. The prop rods secure the socket panels open for front access to display electronics. Secure the end of the prop rod with the cotter pin into the pre-drilled holes in the bottom angle of the display. Secure the rod "T" shaped end to the bracket on the rear of the socket panel.

Prop rods are for safety use. Any deviation from their recommended use may cause serious bodily injury or damage to the display.

Section 3: Electrical Installation

3.1 Common Connectors

This display uses many different types of connectors for power and signal termination. Take special care when disengaging any connector so as not to damage the connector, the cable or the circuit board.

When pulling a connector plug from a jack, do not pull on the wire or cable; pull on the jack itself. Pulling on the wires may damage the connector.

The following information presents some common connectors that may be encountered during display maintenance. Not all of these connectors are found in every display.

1. Phone Jacks (RJ11 Connectors):

RJ11 connectors, as seen in **Figure 9**, are similar to the telephone connectors found in homes and are used on the ends of cable. In order to remove this plug from the jack, depress the small clip on the underside of the plug.

Before replacing an RJ11 connector, spray it with Deoxit™ contact cleaner to remove any foreign matter that may cause signal problems. In addition, apply a generous amount of Cailube™ protector paste to the plug before inserting it into the jack. This paste will protect both the plug and the jack from corrosion. Both the Deoxit and the Cailube can be found in the tool kit accessories package included with this display. Refer to the replacement parts list in **Section 4** if you need additional quantities of either.

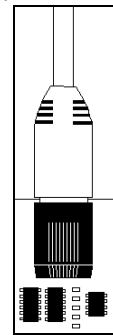


Figure 9: RJ11 Connector

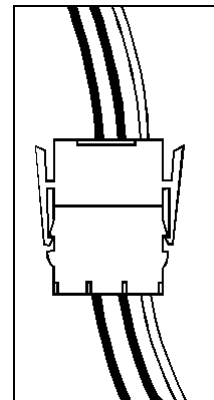


Figure 10: Mate-n-Lok Connector

2. Mate-n-Lok™ Connectors:

The Mate-n-Lok connectors found in this display are white and come in a variety of sizes. Circuit boards often used 9-pin Mate-n-Lok connectors while four-pin connectors and two-pin connectors are often used for power connection. **Figure 10** shows a four-pin Mate-n-Lok connector. To remove the plug from the jack, squeeze the plastics locking clasps of the side of the plug and pull it from the jack.

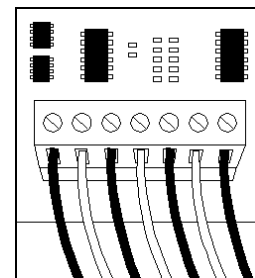


Figure 11: Phoenix-Style Connector

3. Phoenix™-Style Connectors:

Phoenix-style connectors are usually green and are often used for signal termination on circuit boards. Refer to **Figure 11**. Strip one-quarter inch of insulation from the wire prior to termination. To remove a wire, turn the above screw counter-clockwise to loose the connectors grip on the wire. To insert a wire, push the bare wire into the connector and turn the above screw clockwise to lock the wire into place.

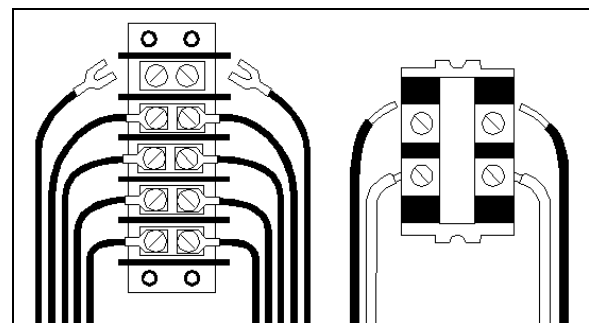


Figure 12: Termination Blocks (left: signal; right: power)

5. Termination Blocks:

Termination blocks usually connect internal power and signal wires to wires of the same type coming into the display from an external source. Most signal wires will come with forked connectors crimped to the ends of the wire. Power wires need to have one-half inch of insulation

stripped from the end of the wire prior to termination. Tighten all screws firmly to ensure a good electrical connection. Refer to **Figure 12**.

3.2 Before Installation

Reference Drawings:

System Riser Diagram, RS422 Incandescent Displays	Drawing A-148859
System Riser Diagram, RS232 Incandescent Displays	Drawing A-148870
System Riser Diagram; Fiber Incandescent Displays	Drawing A-148878
System Riser Diagram; Modem Incandescent Displays	Drawing A-148884
Shop Drawing, 7**-24 IOC-L	Drawing B-149589
Shop Drawing, 16**-24 IOC-L	Drawing B-149590

Before installing signal and power to the display, locate the necessary display parts where connections will need to be made, including the panel board, the V15DR, the Junction Box (J-Box) and the drivers.

Refer to **Figure 13** for a typical layout of the electrical components within a 16x64 matrix display. Electrical component locations may vary with display size. Refer to **Drawings B-149590** and **B-149589** for component layout.

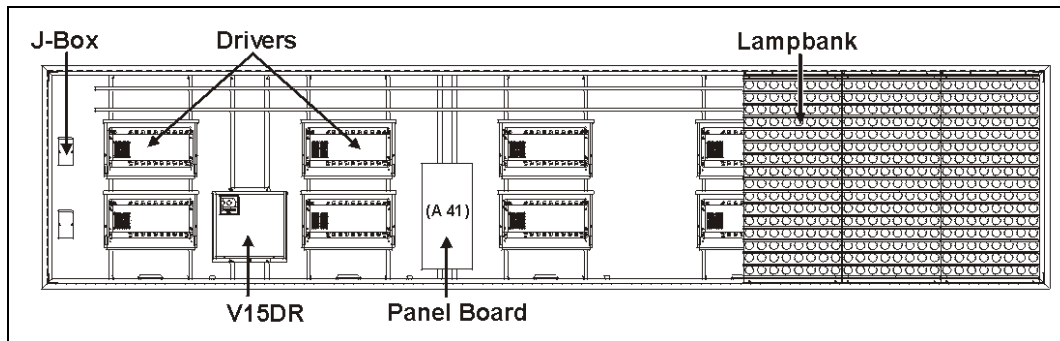


Figure 13: Component Locations

3.3 Power

Proper power installation is imperative for proper display operation. The following sub-sections give details of display power installation.

Grounding

➔ *Displays **MUST** be grounded according to the provisions outlined in Article 250 of the National Electrical Code®. Daktronics recommends a resistance to ground of 10 ohms or less.*

The display system *must* be connected to earth-ground. Proper grounding is necessary for reliable equipment operation. It also protects the equipment from damaging electrical disturbances and lightning. **The display must be properly grounded or the warranty will be void.**

The material of an earth-ground electrode differs from region to region and from conditions present at the site. Consult the National Electrical Code and any local electrical codes that may apply. The support structure of the display cannot be used as an earth-ground electrode. The support is generally embedded in concrete, and if in earth, the steel is either primed or it corrodes, making it a poor ground.

Branch Circuit Grounding

A grounding electrode at separate structures/displays shall not be required where only one branch circuit supplies the structure and the branch circuit includes an equipment grounding conductor for grounding the non-current-carrying parts of all equipment.

Power Installation

There are two considerations for power installation; installation with ground and neutral conductors provided and installation with only a neutral conductor provided. These two power installations differ slightly, as described in the following paragraphs:

Installation with Ground and Neutral Conductors Provided

For this type of installation, the power cable *must* contain an isolated earth-ground conductor. Under this circumstance, *do not* connect neutral to ground at the disconnect or at the display. This violates electrical codes and voids the warranty. Use a disconnect so that all hot lines and neutral can be disconnected. Refer to **Figure 14** for installation details; the National Electrical Code requires the use of a lockable power disconnect within sight of or at the display.

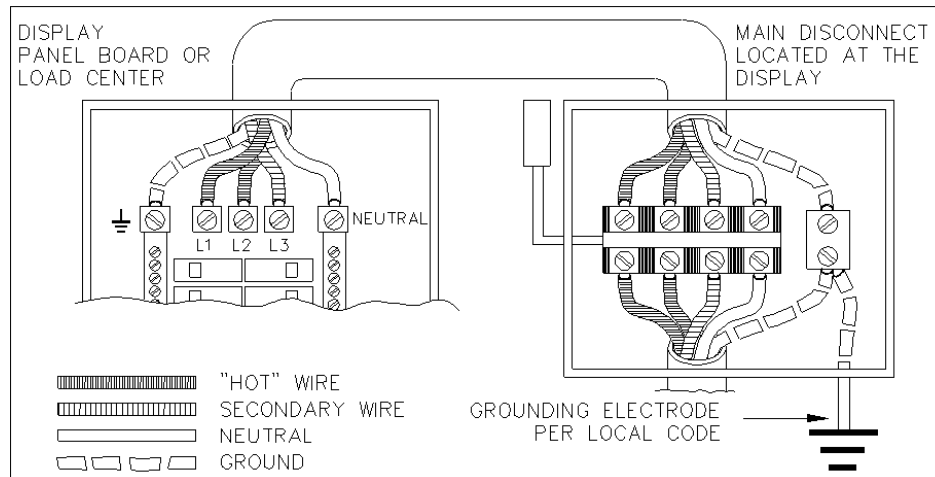


Figure 14: Installation with Ground and Neutral Conductor Provided

Installation with Only a Neutral Conductor Provided

Installations where no grounding conductor is provided must comply with article 250-32 of the National Electrical Code. If the installation in question meets all of the requirements of article 250-32, the following guidelines must be observed:

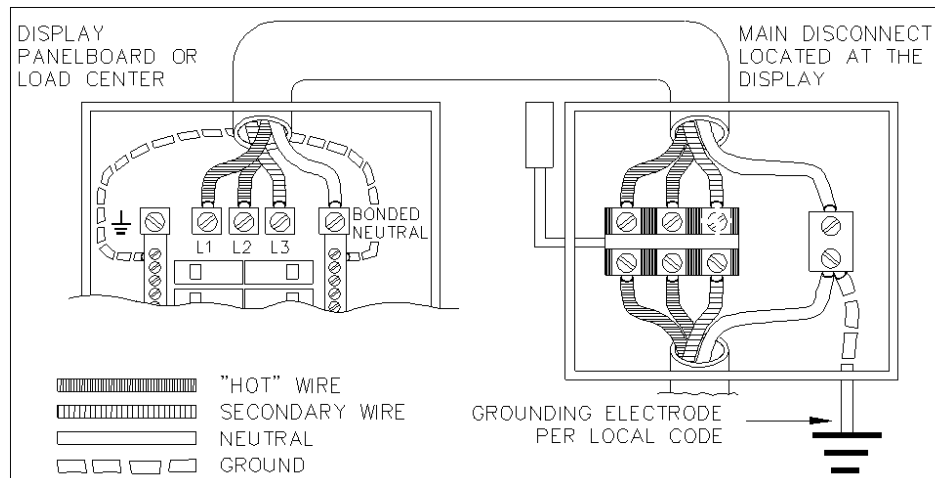


Figure 15: Installation with only Neutral Conductor Provided

- Connect the grounding electrode cable at the local disconnect, never at the display panelboard.
- A disconnect that opens all of the ungrounded phase conductors should be used.
- The neutral and the ground conductors should be bonded in the display panelboard.

Refer to Error! Reference source not found. for installation details.

3.4 Electrical Service Requirements

Reference Drawings:

Two Wire/Three Wire/ Two Surge Arresters (A-1129)	Drawing A-74902
System Riser Diagram, RS422 Incandescent Displays	Drawing A-148859
System Riser Diagram, RS232 Incandescent Displays	Drawing A-148870
System Riser Diagram; Fiber Incandescent Displays	Drawing A-148878
System Riser Diagram; Modem Incandescent Displays	Drawing A-148884
Power Specs, Sunspot	Drawing A-148967

The panel board is provided internally for display power distribution to the driver circuits. Refer to the tables below for electrical service requirements. **Note:** All electrical service requirements listed in these tables are calculated based on the maximum wattage lamp offered for each display size. The installer is to supply an external mounted fused main disconnect(s) and wire to the panel board. The installer must field punch a hole or holes in the cabinet at the appropriate location for power cable entrance to panel board.

The panel board is provided in the master display cabinet. Single panel boards are always located to the left of the right-most lamp driver enclosure assembly. When a second panel board is provided, it will be found to the left of the first panel board (between two lamp driver enclosure assemblies). When a second panel board is provided, two externally mounted fused main disconnects are required. Refer to the tables below for the number of disconnects required for your particular application.

Note: Surge Suppressors are installed in the panel board(s) but are not hooked up. They *must* be connected when the main power is hooked up to the panel board. Refer to **Drawing A-74902** for the proper connections.

3.5 Panel Board Assignments

Reference Drawings:

Lamp Driver, 16 Column w/ Fan	Drawing A-37070
-------------------------------------	------------------------

Drawing A-37070 illustrates the electrical distribution from the panel board to the drivers. **Note:** Two or four breakers feed each driver. All power wires are labeled with a number in the format **A** (as illustrated in the following set of tables) where **A** indicates the driver/module number.

This table is for a 16x64 single face display. It has a 125-amp panel board and uses 16 of 20 positions. Note that two breakers feed each driver.

Breaker	Wire	Driver	Wire	Breaker
1	A101 (Black)	A101	A101 (Red)	2
3	A102 (Black)	A102	A102 (Red)	4
5	A103 (Black)	A103	A103 (Red)	6
7	A104 (Black)	A104	A104 (Red)	8
9	A201 (Black)	A201	A201 (Red)	10

11	A202 (Black)	A202	A202 (Red)	12
13	A203 (Black)	A203	A203 (Red)	14
15	A204 (Black)	A204	V15DR/Fans	16
17	A204 (Red)		Not Used	18
19	Not Used		Not Used	20

- A list similar to one of the above is located inside the panel board door.
- The square D 20 amp QO breaker is UL listed for 1 or 2 #12 AWG wire(s).
- Breakers above the dark solid line within the tables are for line one (upper 8 rows of lamps) of the display. Breakers below the solid line are for line two (lower 8 rows of lamps) of the display.

3.6 Signal Termination From Computer To Display

Reference Drawing:

V1500 Signal Termination **Drawing A-103727**

The method used to route and terminate signal at the display differs according to the type of control cable used. The following sets of instructions cover the various control options listed in **Section 1.4** or **3.7**. Refer to the procedure that is appropriate for your display. **Drawing A-103727** illustrates Venus 1500 signal terminations for RS232, RS422, modem and fiber optic control cables.

3.7 Signal Junction Box Terminations

Reference Drawing:

System Riser Diagram, RS422 Incandescent Displays..... **Drawing A-148859**
 System Riser Diagram, RS232 Incandescent Displays..... **Drawing A-148870**
 System Riser Diagram; Fiber Incandescent Displays **Drawing A-148878**
 System Riser Diagram; Modem Incandescent Displays..... **Drawing A-148884**

Drawing A-42461 shows examples of a one- and a two-line display signal junction box. The signal wires for the drivers in the first line of the display are connected to TB31. The signal wires for the second line are connected to TB32. Each signal pair location is labeled with the driver number it corresponds to. Connect the signal wire to the junction box in correspondence to their connection orientation at the controller (refer to appropriate controller manual). Be sure to note the + and - signal orientation.

RS232

One end of the signal cable should be terminated to the 6 position terminal block in the display labeled “IN RS232” (TB1). The opposite end is terminated at the J-Box at the display structure. The laptop PC connects to the J-box through the serial cable. Refer to **Drawing A-148870** for the correct wire type.

J-Box	Field Cabling	Terminal Block (Data In)
		Pin 1 (N.C.)
		Pin 2 (N.C.)
Pin 2 (RX-P)	Clear	Pin 3 (TX-P)
Pin 3 (GND)	Shield	Pin 4 (GND)
Pin 1 (TX-P)	Black	Pin 5 (RX-P)
		Pin 6 (N.C.)

RS422

Route conduit and cable from the PC running Venus 1500 to the left end of the master display. Continue cable into the controller box fitting labeled “Signal In.” One end of the signal cable should be terminated to the 6-position terminal block in the display labeled “RS422 IN” (TB2). **Drawing A-103727** is an example of the termination block. The other end is terminated at the signal converter (Daktronics part number 0A-1127-0237) in the control room (as seen in the following table). Refer to **Drawing A-148859** for the correct wire type.

Signal Converter (J4/J5)	Field Cabling	Terminal Block (Data In)
Pin 1 (GND)	Red	Pin 1 (GND)
Pin 2 (RX-P)	Black	Pin 2 (TX-P)
Pin 3 (RX-N)	Brown	Pin 3 (TX-N)
Pin 4 (TX-P)	White	Pin 4 (RX-P)
Pin 5 (TX-N)	Blue	Pin 5 (RX-N)
Pin 6 (GND)	Green	Pin 6 (GND)
	Shield (Bare)	N.C.

Modem

Terminate the signal telephone wires to J-1094 as designated on **Drawing A-130246**. Refer to **Drawing A-148884** for the correct wire type.

Telephone Wires	Terminal Block
N.C.	Pin 1
N.C.	Pin 2
TIP-P	Pin 3
Ring-P	Pin 4
N.C.	Pin 5
N.C.	Pin 6

Note: Ask the phone line installer which wire color is “tip” and which is “ring”.

Fiber Optic

Route conduit and fiber cable from the PC to the left end of the master display. Continue routing fiber to the controller box. Connect fiber cable from the signal converter of the PC to the fiber card in the display as described on the following table. Refer to **Drawing A-148878** for the correct wire type.

Signal Converter Data Out (J2 & J3)	Field Cabling	Sign A Data In (J4 & J5)
J2 (TX1)		J5 (RX2)
J3 (RX1)		J4 (TX2)

3.8 Master/Echo Connection

Reference Drawing:

Schematic, Sunspot 24", 30" and 36"	Drawing B-141704
System Riser Diagram, RS422 Incandescent Displays.....	Drawing A-148859
System Riser Diagram, RS232 Incandescent Displays.....	Drawing A-148870
System Riser Diagram; Fiber Incandescent Displays	Drawing A-148878
System Riser Diagram; Modem Incandescent Displays.....	Drawing A-148884

For a master/echo display system, signal is hooked up to the master display according to **Section 3.6**. Signal is then sent from the master display's signal junction box to the echo's corresponding signal junction box with 22-gauge, shielded wire.

3.9 Light Detectors & Optional Temperature Sensors Electrical Connection

Refer to **Appendix B** for information on installing the light sensor.

If your display has an optional temperature sensor, refer to **Appendix B** for information on electrical installation.

Section 4: Maintenance & Troubleshooting



IMPORTANT NOTES:

1. **Disconnect power before any repair or maintenance work is done on the display!**
2. **Any access to internal display electronics must be made by qualified service personnel.**
3. **Disconnect power when the display is not in use.**

4.1 Maintenance & Troubleshooting Overview

The Series AB-1010 incandescent displays are front accessible; meaning access to the internal components can be gained only from the front of the display.

This section provides the following display information.

- **Signal & Power Overview:** gives a quick description of how power and signal route through the display system.
- **Component Access & Replacement:** explains how to open the display and how to access and replace components within.
- **Maintenance:** lists a number of steps to take to keep this display in safe, working order.
- **Troubleshooting:** lists some possible display malfunctions and provides a number of possible causes for that malfunction.
- **Replacement Parts Lists:** lists the part description and part number of display components that could possibly need replacing during the life of this display.
- **Daktronics Exchange/Repair & Return Programs:** explains the Daktronics component return policy.

4.2 Signal Overview

Reference Drawing:

System Riser Diagram, RS422 Incandescent Displays.....	Drawing A-148859
System Riser Diagram, RS232 Incandescent Displays.....	Drawing A-148870
System Riser Diagram; Fiber Incandescent Displays	Drawing A-148878
System Riser Diagram; Modem Incandescent Displays.....	Drawing A-148884

Signal travels from the Venus 1500 controller to the Venus 1500 Display Receiver (V15DR) located inside the sign. Refer to **Drawings A-148859, A-148870, A-148878 and A-148884**. The signal junction boxes for each row of modules receives the data sent by the V15DR and distributes it to the appropriate drivers. The drivers in turn distribute the signal to the display modules.

4.3 Power Overview

Power routes from the power disconnect to the panel board within the display. From there, power routes to the display drivers; the drivers distribute the power to individual components within the display. Refer to the **Schematic**.

4.4 Component Access

The Series AB-1010 SunSpot displays have front component access. The following sections cover how to open the three different types of displays.

Top Revolving Socket Panels

1. Turn the two bottom fasteners securing the socket panel ¼-turn counter-clockwise and swing the panel up. The fasteners remain in the socket panel.
2. Brace the socket panel(s) with the prop rod(s).

Middle Revolving Socket Panels

Turn the two top fasteners securing the socket panel ¼-turn counter-clockwise and swing the panel down. The fasteners remain in the socket panel and the panel rests on a landing plate.

Side Revolving Socket Panels

1. Turn the two side fasteners securing the socket panel ¼-turn counter-clockwise and swing the panel to the side. The fasteners remain in the socket panel.
2. Secure the pins into place by the pivot(s).

4.5 Lamp Testing & Replacement

Venus 1500 Lamp Test

To run a lamp test on a Venus 1500 system the display must be started in test mode. To start the display in test mode complete the following steps:

1. Turn off display power at the power disconnect.
2. Access the Venus 1500 display controller.
3. Write down the current settings of the DIP switch on the underside of the MDC board located inside the Venus 1500 Display Receiver (V15DR). Refer to **Section 4.9**.
4. Set the DIP switches on the MDC board on the display controller to address zero (flip all the switches toward the numbers on the circuit board).
5. Restore power and observe the lamp test.

To exit test mode complete the following steps:

1. Turn off display power.
2. Set address back to original setting.
3. Restore power to display.

Note: The Venus 1500 software, version 2.0 or higher, has a “Test Pixel” option. Refer to **ED-12717**.

Lamp Replacement

1. Locate the defective lamp using the testing procedure above.
2. Turn off power to the sign before replacing lamps to avoid damaging the driver.
3. Replace defective lamps only with Daktronics approved lamps of the same wattage; refer to **Section 4.13**. **Note:** *Do not over-tighten lamps!*

Note: Light dividers may be removed for easier lamp access. Remove the screws at the top and bottom of the light divider and lift off.

4.6 Socket Replacement

Reference Drawing:

Lampbank Assembly and Wiring, 8x16-36 IOC-L **Drawing C-147146**

1. Open the display according to **Section 4.6**.
2. Remove the power and signal wire to the bad socket. Refer to **Detail B** and **Detail C** on **Drawing C-147146**.
3. Remove the lamp in the bad socket.
4. Remove the old socket.
5. Snap the new socket into place.
6. Replace the lamp, rewire the socket (refer to **Detail D** on **Drawing C-147146**) and secure the socket panel.

4.7 Lamp Driver

Reference Drawing:

Lamp Driver, 16 Col., w/Fan **Drawing A-37070**

Shop Drawing, 7**-24 IOC-L..... **Drawing B-149589**

Shop Drawing, 16**-24 IOC-L..... **Drawing B-149590**

The lamp driver switches the lamps of the incandescent displays on and off. This unit receives display information from the controller and converts it to the drive signals that switch the lamps.

Refer to **Section 4.12, Troubleshooting**, if the display malfunctions. If a lamp driver needs to be replaced, follow the steps below.

1. Shut power off to the display.
2. Locate the driver you need to replace using **Drawings B-149589** and **B-149590**.
3. Open the display according to **Section 4.6**.
4. Remove the screws fastening the cover on the driver enclosure and lift off the cover.
5. Unplug wiring connections (J1 through J20).
6. Remove the two wing nuts in the top corners of the enclosure and remove the driver.
7. Reverse **Steps 1** through **4** to install the new driver.

4.8 Fuse Replacement

A 7 or 8 high column of pixels has one fuse. If an entire column is out, a fuse may be blown.

To replace a blown fuse:

1. Shut power off to the display.
2. Gain access to the driver as stated in **Section 4.7, Steps 1-3**.
3. Remove the two driver cover wing nuts and lift off the cover to gain access to the fuses.
4. Replace the blown fuses.

4.9 Venus 1500 Display Receiver

Reference Drawings:

2-Board V1500 Display Receiver Wiring Layout	Drawing A-138543
Assy; V1500 Display Recvr, RS232/422.....	Drawing B-130244
Assy; V1500 Display Recvr, Modem	Drawing B-130246
Assy; V1500 Display Recvr, Fiber Optic.....	Drawing B-130247
Schematic, V15DR, 1500	Drawing B-140468
Shop Drawing, 7**-24 IOC-L	Drawing B-149589
Shop Drawing, 16**-24 IOC-L	Drawing B-149590

The Venus 1500 Display Receiver receives signal from the Venus 1500 controller which routes signal to each display driver (8 pixels/16 pixels). The Venus 1500 controller stores messages, schedules, etc., in its memory. The controller is also addressable. Refer to **Drawings B-149589** and **B-149590** for the location of the V15DR.

The V15DR consists of several components, including a controller board, a fan and two Current Loop Output cards.

To remove a V15DR component from the display:

1. Locate the V15DR placement within the display on **Drawings B-149589** and **B-149590**.
2. Open the display according to **Section 4.4**.
3. Remove the screw on the bottom middle of the V15DR cover and lift off the cover from the enclosure.
4. Individual parts in the V15DR may be removed from the enclosure by disconnecting the power and signal connectors and removing the screws and lifting the components from the standoffs.

Controller Board and MDC Board

The table below lists the functions of the connectors found on the controller board.

Connector	Function
J1	RS232 In – COM1
TB1	RS232 In – COM1
TB2	RS422 In – COM1
TB3	RS422 Out – COM1
TB4	RS232 In – COM2
TB5	RS422 In – COM2
TB6	RS422 Out – COM 2
J2	10 VAC Input
J3	N/A
TB11, TB12	Current Loop Out
J11, J12, J13	Output to Current Loop Output cards

On the controller board are a number of diagnostic LEDs. The LEDs and their respective functions and operations are listed in the following table.

LED Name		Operation
PWR	Controller has power	Always On
RUN	Controller is running	Flashes approximately once per second
LGHT	Light Detector Input	Light Level=Flash Rate
TEMP	Temp Sensor Input	Temperature=Flash Rate
RX2	Data In – COM1	On while Communicating
RX2	Data In – COM2	On while Communicating

The W1 and W2 jumpers on the controller board must be ON for modem communication and OFF for all others: RS232, RS422 and fiber optic.

Before this display can be run in a sign network it must have an address. The display address can be set using the DIP switches on the MDC board. The switches are on the underside of the MDC

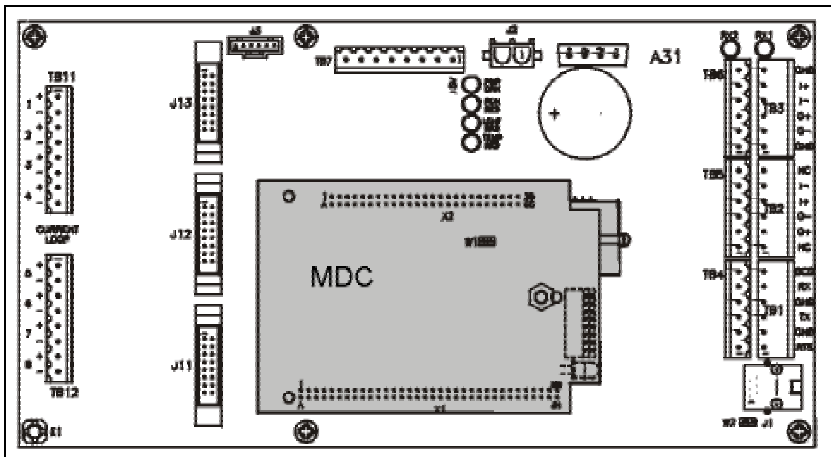


Figure 16: Controller Board

board near TB7 of the controller board. The following table lists the switch setting for various addresses.

Address	Switch 8			5	4	3	itch 2	Switch 1
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
8	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
9	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
10	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
11	OFF	OFF	OFF	OFF	ON	OFF	ON	ON
...
127	OFF	ON	ON	ON	ON	ON	ON	ON

If ever the need arises to replace the Venus 1500 display controller, make sure the DIP switches on the MDC are set for the same address as the old controller.

The controller board is one functional unit and must be replaced as a single device.

Complete the following steps to remove the Venus 1500 controller.

1. Flip the main disconnect to the OFF position.
2. Disconnect all power and signal connections from the controller board.
3. Remove the nuts holding the controller board in the enclosure.
4. Write down the MDC switch settings.
5. If sending the controller back to Daktronics, keep the modem or fiber board (if present) and all mounting hardware.

When installing a new display controller, verify the MDC DIP switch is set correctly.

Current Loop Output Card Termination

The drawings provide guidelines for wiring the current loop output terminals and the driver for each module of the display. The label on the inside of the V15DR enclosure shows where to plug in each connector on each of the current loop output cards. Any unused current loop outputs should be left unconnected.

Note: Depending on specific site requirements, displays may be shipped in different sections or configurations and wiring instructions may vary. Consult the appendix at the end of this manual for information specific to your site.

After determining which V15DR model best represents the height and length of your section, refer to **Drawing A-138543** to see how each individual current loop output board connects to each module driver.

When all applicable terminations have been made on each terminal block, plug the terminal blocks into the cards as designated on the label inside the enclosure.

The output cables should route downward between the output cards, and exit through the conduit knockouts at the bottom of the V15DR enclosure. The actual routing and the number of conduit knockouts used varies with the display matrix size, V15DR model number and number of conductors in each output cable.

When the cables are connected, route the cables downward and fasten the strain relief cable ties. Be sure there is no excessive strain on any of the individual wires.

4.10 Display Cooling System

Reference Drawings:

Fan Mounting Detail **Drawing A-43185**

The display cooling system consists of a fan control thermostat assembly and cooling fans. The thermostat assembly is located at the top and the center of the master display cabinet. It stud mounts to the display back sheet. The first breaker to driver A101 at the panel board provides power to the fans and thermostat.

The thermostat assembly consists of a fuse (MDL-2 ½ amp, 125 volt), temperature sensor, momentary switch and an enclosure. The temperature sensor activates the display cooling fans to turn on at 140 degrees Fahrenheit and to turn off at 110 degrees Fahrenheit. The momentary switch is used to check fan operation. Check fans periodically to ensure they are running smoothly.

The stainless steel ball bearing fans provide cooling to the interior of the master cabinet only and are thermostatically controlled. The fan air inlets are located in the bottom of the cabinet. The fans

pressurize the cabinet and force warm air from inside the cabinet out four small holes near each lamp. *Airflow cannot be restricted to the bottom of the display cabinet.* If the display frame is “skinned” over, adequate ventilation ports must be provided throughout the skin. Holes in the skin must be equal to the size and quantity of the holes provided in the Daktronics cabinet. Holes must be located in the bottom of the display cabinet.

A faulty thermostat or cooling fan must be repaired or replaced as soon as possible to extend the life of the display’s electrical components. If a cooling fan or fans in the bottom of the display should fail, use the following guidelines to locate and correct the malfunction.

1. Make sure the breakers to driver A101 (refer to the following table for A101 location) are in the ON position and are not blown.
2. Remove the two screws securing the appropriate socket panel(s), and swing panel(s) up. Secure panel(s) with prop rod(s).
3. Push the momentary switch on the thermostat assembly to see if fans are activated. If one or more fans operate while others do not, replace the fans that do not work.
4. If the momentary switch fails to activate any of the fans, remove the cover from the thermostat assembly and check for a blown fuse. Replace fuse if necessary (MDL-2 ½ amp, 125 volt).
5. If the momentary switch activates all the fans, test the thermostat by using a soldering iron to heat up the thermostat (heat the metal behind the ½" hole punched in the cover). If the fans do not activate by heating up the thermostat, the thermostat assembly should be replaced.

If problems with the display cooling system persist, contact a Daktronics customer service representative.

To remove a fan from the display, follow the steps below while referring to **Drawing A-43185**.

1. Open the display according to **Section 4.4**.
2. Disconnect the power wiring to the fan.
3. Remove the screws attaching the fan to the display.
4. Lift the fan from the sign.
5. Reverse the above procedure to install a new fan.

4.11 Structural Inspection

Visually inspect signs annually to check paint and possible corrosion, especially at footings, structural tie points and ground rods. Check fasteners and tighten or replace as required.

4.12 Troubleshooting

This section contains some symptoms that may be encountered with the AB-1010 Series display. Possible remedies are provided. This list does not include every possible problem, but does represent some of the more common situations that may occur.

Problem	Possible Solutions
Single lamps do not light	<ul style="list-style-type: none"> • Inspect lamps, sockets and wires. • Switch the nine-pin Mate-n-Lok plugs controlling that column on the driver. If the problem moves, the driver is defective and needs to be replaced.
Lamps stay lit on both faces	<ul style="list-style-type: none"> • Switch the plugs on the driver. If the problem moves, the driver is defective and needs to be replaced.
Columns do not light correctly	<ul style="list-style-type: none"> • Check the common (black) wire to the column. • Check the breaker in the panel board.

	<ul style="list-style-type: none"> • Check the fuse for that column in the driver. • Check the power connection to the driver. • Check the main breaker, disconnect, power source and power terminal in the display.
Columns turn on out of sequence	<ul style="list-style-type: none"> • Check the plugs at the driver board.
Display intensity cannot be controlled manually	<ul style="list-style-type: none"> • Check the wiring to the circuit card in the light sensor housing. • Check the light sensor for obstruction.

4.13 Replacement Parts List

Parts Description	Part Number
Driver, 16 col., w/Fan	0A-1033-0125
Fuse; AGC-1/2, 1/2A 250V	F-1000
Fuse; AGC-10, 10A, 32V, Glass	F-1006
Fuse; Thermostat Assembly, MDL-2 1/2A, 125V	F-1002
Lamp; 33 Watt, 33A19 (clear)	DS-1075
Lamp; 30 Watt, 30A15 (clear)	DS-1076
Lamp; 30 Watt, 30R20, 2000 Hrs.	DS-1094
Lamp; 30 Watt, 30R20, 6000 Hrs.	DS-1126
Lamp: 15 Watt, 15S14 (clear)	DS-1248
Socket; Med Base Lamp	X-1046
Power Cord; 24" w/ 90 Angle Plug	W-1069
Fan, 250 CFM, 115 VAC	B-1019
Fan, 250 CFM, 230 VAC	B-1020
Fan Finger Guard	HS-1289
Controller II	0A-1146-0037
Current Loop Output Card	0P-1099-0002
Fan; 32 CFM, 115 VAC	B-1010
Fan Finger Guard	HS-1182
Fuse; AGC-2 ½ , 2 ½ A, 250V	F-1001
Venus 1500 Manual, Version 2.0	ED-12717
SunSpot Series AB-1010 Manual	ED-12161

4.14 Daktronics Exchange/Repair & Return Programs

To serve customers' repair and maintenance needs, Daktronics offers both an exchange and a repair and return program. The exchange program reduces down time by providing timely replacement of key components. This service is provided to qualified customers who follow the program guidelines explained below. It is our pleasure to provide this service to ensure you get the most from your Daktronics products. Please call our Help Desk (1-877 / 605-1113) if you have any questions regarding the exchange program or any other Daktronics service.

When you call the Daktronics Help Desk, a trained service technician will work with you to solve the equipment problem. You will work together to diagnose the problem and determine which exchange replacement part to ship. If, after you make the exchange, the equipment still causes problems, please contact our Help Desk immediately.

If the replacement part fixes the problem, package the defective part in the same packaging the replacement part arrived in, fill out and attach the enclosed UPS shipping document and **RETURN THE PART TO DAKTRONICS**. (You may use the same box and packing the exchange part was sent in.) This will speed up the transaction and alleviate confusion when the failed component arrives

at Daktronics. (Daktronics expects immediate return of the exchange part if it does not solve the problem.) For most equipment, you will be invoiced for the replacement part at the time it is shipped. This invoice is due when you receive it.

Daktronics reserves the right to refuse equipment that has been damaged due to acts of nature or causes other than normal wear and tear.

If the defective equipment is not shipped to Daktronics within 30 working days from the invoice date, it is assumed you are purchasing the replacement part and you will be invoiced for it. This second invoice represents the difference between the exchange price and the purchase price of the equipment. This amount is due when you receive the second invoice. If you return the exchange equipment after 30 working days from invoice date, you will be credited for the amount on the second invoice minus a restocking fee.

☞To avoid a restocking charge, please return the defective equipment within 30 days from the invoice date.

Daktronics also offers a Repair and Return program for items not subject to exchange.

Where to Send: To return parts for service, contact your local representative prior to shipment to acquire a Return Material Authorization Number (RMA#). If you have no local representative, call the Daktronics Help Desk for the RMA#. This will expedite the receiving process.

Packaging for Return: Package and pad the item well so that it will not be damaged in shipment. Electronic components such as printed circuit boards should either be installed in an enclosure or should be put in an anti-static bag before boxing. Please enclose your name, address, phone number and a clear description of symptoms.

Mail: Daktronics, Inc., Customer Service
PO Box 5128
331 32nd Avenue
Brookings, SD 57006

Phone: Daktronics Help Desk: 1-877 / 605-1113 (toll free)
or 1-605 / 697-4034

Customer Service Fax: 1-605 / 697-4444

e-mail: helpdesk@daktronics.com

Appendix A: Reference Drawings

Lamp Driver, 16 Col., w/ Fan.....	Drawing A-37070
Assy, Signal, 7 High Display.....	Drawing A-42461
Two Wire/Three Wire/Two Surge Arrestors	Drawing A-74902
V1500 Signal Terminations	Drawing A-103727
2 Board Retro Fit Wiring Layout	Drawing A-138543
System Riser Diagram; RS/422 Incandescent Displays	Drawing A-148859
System Riser Diagram; RS/232 Incandescent Displays	Drawing A-148870
System Riser Diagram; Fiber Incandescent Displays	Drawing A-148878
System Riser Diagram; Modem Incandescent Displays	Drawing A-148884
Power Specs, Sunspot.....	Drawing A-148967
Assy; V1500 Display Recvr, RS232/422	Drawing B-130244
Assy; V1500 Display Recvr, Modem	Drawing B-130246
Assy; V1500 Display Recvr; Fiber Optic.....	Drawing B-130247
Schematic, Sunspot 24", 30" and 36"	Drawing B-141704
Final Assembly, 7**-24 IOC L.....	Drawing B-148266
Final Assembly, 16**-24 IOC L.....	Drawing B-148267
Final Assembly, 24**-24 IOC L.....	Drawing B-148268
Final Assembly, 32**-24 IOC L.....	Drawing B-148269
Final Assembly, 7**-30 IOC L.....	Drawing B-148272
Final Assembly, 16**-30 IOC L.....	Drawing B-148273
Final Assembly, 24**-30 IOC L.....	Drawing B-148274
Final Assembly, 32**-30 IOC L.....	Drawing B-148275
Final Assembly, 7**-36 IOC L.....	Drawing B-148276
Shop Drawing, 7**-24 IOC L	Drawing B-149589
Shop Drawing, 16**-24 IOC L.....	Drawing B-149590
Lampbank Assembly and Wiring, 8x16-36 IOC-L.....	Drawing C-147146
Final Assembly, 16**-36 IOC-L.....	Drawing C-148277
Final Assembly, 32**-36 IOC-L.....	Drawing C-148279

Appendix B: Signal Converter

The following table gives the typical state of the signal converter when the LEDs are either on or off. Refer to **Figure 17** for an illustration of the signal converters and the locations of the various components.

LED Indicators	Typical States	
PWR	ON	Signal Converter (SC) is receiving power.
	OFF	SC is not receiving power. Internal 1 AMP Fuse is bad.
TX	ON Steady	SC is not connected to a serial port. (If connected to serial port) Serial port or serial cable may be bad.
	OFF Steady	Normal state, SC is not transmitting data.
	Brief Flicker	SC is transmitting data.
RX	ON Steady	Field cabling between SC and display is bad, connected to display out or terminated incorrectly.
	OFF Steady	Normal state, SC is not receiving data.
	Brief Flicker	SC is receiving data.

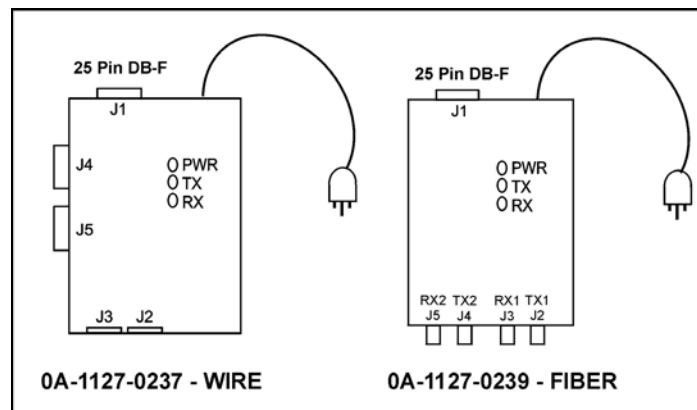


Figure 17: Signal Converters

0A-1127-0237 – Wire

The following tables list the jack pin-outs for a wire signal converter.

J2 & J3 - RJ/11	
PIN	OPERATION
1	GND
2	TX-N (out)
3	TX-P (out)
4	RX-N (in)
5	RX-P (in)
6	GND

J4 & J5 – Phoenix	
PIN	OPERATION
1	GND
2	RX-P (in)
3	RX-N (in)
4	TX-P (out)
5	TX-N (out)
6	GND

J1 25 Pin DB-F	
PIN	OPERATION
2	TX-P (out)
3	RX-P (in)
7	GND

Loop-Back Test: To perform a loop-back, for testing purposes only, connect the following using copper conductor jumpers.

☞ **NOTE:** This test should be performed with only one jack at a time. Do not connect loop back to more than one jack at a time.

J2 & J3	OR	J4 & J5
TX-N to RX-N		RX-P to TX-P
TX-P to RX-P		RX-N to TX-N

0A-1127-0239 – Fiber

The following tables give the jack pin-outs for a fiber signal converter.

JACK	OPERATION	J1 – 25 Pin DB-F	
J2	TX1 (out)	PIN	OPERATION
J3	RX1 (in)	2	TX-P (out)
J4	TX2 (out)	3	RX-P (in)
J5	RX2 (in)	7	GND

Loop-Back Test: To perform a loop-back, for testing purposes only, connect the following using a fiber optic cable jumper.

J2 & J3 or J4 & J5
TX to RX

Serial Cable (W-1249)

This table lists the pin connections when using a serial cable (W-1249).

DB9-F	DB25-F
Pin 3 – TX	Pin 2 – TX
Pin 2 – RX	Pin 3 – RX
Pin 5 – GND	Pin 7 - GND

Serial Adaptor (A-1603)

DB9-F	DB25-M
Pin 3 – TX	Pin 2 – TX
Pin 2 – RX	Pin 3 – RX
Pin 5 – GND	Pin 7 - GND