



**1600 Series, 1.5 Inch
Large Matrix Displays**
(120 Volt – Front/Rear Access)

**Installation, Maintenance &
Troubleshooting Manual**

ED 11946

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Display Serial # _____

Display Model # _____

Date Installed _____



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Section 1: Introduction

1.1 How to Use This Manual

This manual explains the installation, maintenance and troubleshooting of the Daktronics 1600 series Sunspot , 1.5-inch lens large matrix display system. For additional 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.

The manual contains four sections: **Introduction**, **Mechanical Installation**, **Electrical Installation** and **Maintenance & Troubleshooting**.

- **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 and signal cable at the display.
- **Maintenance & Troubleshooting** addresses such things as removing basic display components, troubleshooting the display, performing general maintenance and exchanging display components.

At the end of this manual are two appendices: **Appendix A: Reference Drawings** and **Appendix B: Forms & Reports**

- **Appendix A** contains standard drawings and general information relevant to this display. It also contains any drawings specific to this display. Daktronics will often alter a display's original design to better meet the needs of the customer. These drawings are the primary source for specific display information. Drawings are in alphanumeric order unless otherwise specified.
- **Appendix B** contains any checklists and forms used during installation or maintenance of the display.

Drawings in Appendix A always supersede any similar drawings found after any section of this manual.

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, panelboard or power termination panel assignments, signal termination panel assignments and transformer assignments.

The box below, **Figure 1**, is an illustration of 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 example below, the drawing is **Drawing A-114667**.

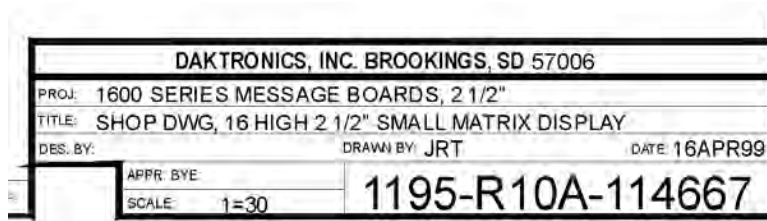


Figure 1: Drawing Label

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

“Refer to **Drawing A-114667** in **Appendix B** for the location of the Venus 1500 controller.”

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**

All drawings are in **Appendix A**.

Daktronics identifies manuals by the ED number located on the cover page of each manual. For example, this manual is **ED-11946**.

Please list the model number, display serial number and the date this display became operational in the blanks provided on the front page of this manual. The serial number and model numbers are on the ID label, located on the front of the display on the right end. 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 we can service your request as quickly as possible.

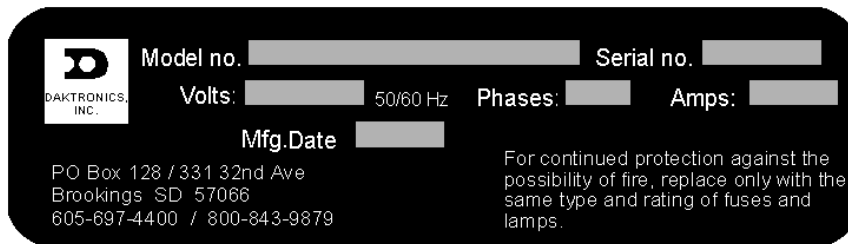


Figure 2: Display ID Label

Daktronics builds displays for long life and require little maintenance. However, from time to time, certain display components will need replacing. The **Replacement Parts Lists** in **Sections 4.25** and **4.26** provide the names and part numbers of components that may need replacement during the life of this display.

Following the Replacement Parts List in **Section 4** is the **Exchange/Replacement Procedure** in **Section 4.27**. Refer to these instructions if any display component requires repair or replacement.

1.2 Display Overview

Daktronics 1600 series 1.5” large matrix incandescent displays utilize a proprietary lens/reflector assembly, **Figure 3**, making them the brightest, sharpest color display systems available. Daktronics designs and manufactures these signs for performance, reliability, easy maintenance and long life.

Venus[®] 7000 software, installed on a controller computer, control the 1600 series large matrix displays. The controller computer, in turn, connects to the display controller. The display has one of two types of display controllers, a **Line Receiver** or **Data Distributor**.

It will be helpful to know if the display has a data distributor or a line receiver while reading this manual. If the display has a **Super Line Receiver**, refer to **ED-11441** in **Appendix C** for specific information regarding super line receivers.

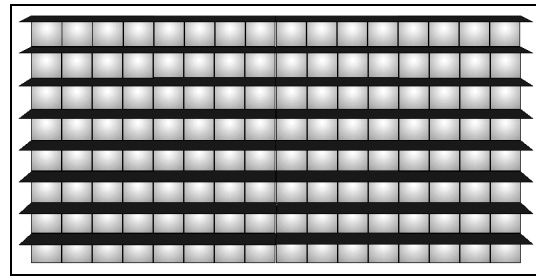


Figure 3: 1600 Series 8 x 16 Lens/Reflector Assembly

A display with a **Line Receiver** is capable of producing 16 color or monochrome images.

A display with a **Data Distributor** is capable of producing 16.7 million color or 64 shades of gray images.

Notice: A line receiver is inside a display, while a data distributor is outside, located somewhere near the display. **Figure 4** illustrates this difference between a line receiver and a data distributor. Information specific to each type of display controller is contained in this manual.

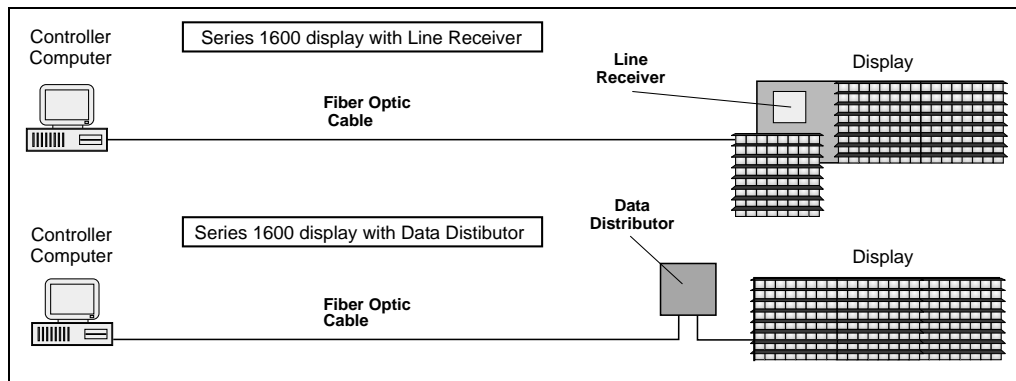


Figure 4: 1600 series displays have either a line receiver or a data distributor.

1.3 Definitions

The following list of definitions is in three sections: **General Display Definitions**, **Line Receiver Definitions** and **Data Distributor Definitions**. Since the display has either a line receiver or a data distributor, not all definitions will apply. Definitions that apply to displays with both types of display controllers are under **General Display Definitions**.

General Display Definitions

Controller Computer: The computer that controls what you see on the display. Information travels from the controller computer to the display controller through fiber optic cable.

Display Controller: A general term used to describe the device housed either inside or outside the display that receives signal from the controller computer. This display will use either a line receiver or a data distributor as a display controller.

Fan Controller Enclosure: An assembly found within the display that receives information from the cooling fans. The fan controller card within the enclosure provides power to the fans and monitors the fans for proper operation. If the fan control circuit detects a fan failure, it sends a signal to the data distributor telling it to blank the display. This prevents the display from overheating. If the display remains blanked for 30 minutes, the data distributor or line receiver sends a signal to the fan control circuits, turning the fans off. This extends the life of the fans and filters.

Lampbank: A circuit board consisting of an array of lamps 8 pixels high by 16 pixels wide. **Figure 5** illustrates a single lampbank from the front and back. One lampbank mounts to the rear of each lens/reflector assembly. If necessary, a lampbank can be easily removed from the lens/reflector assembly.

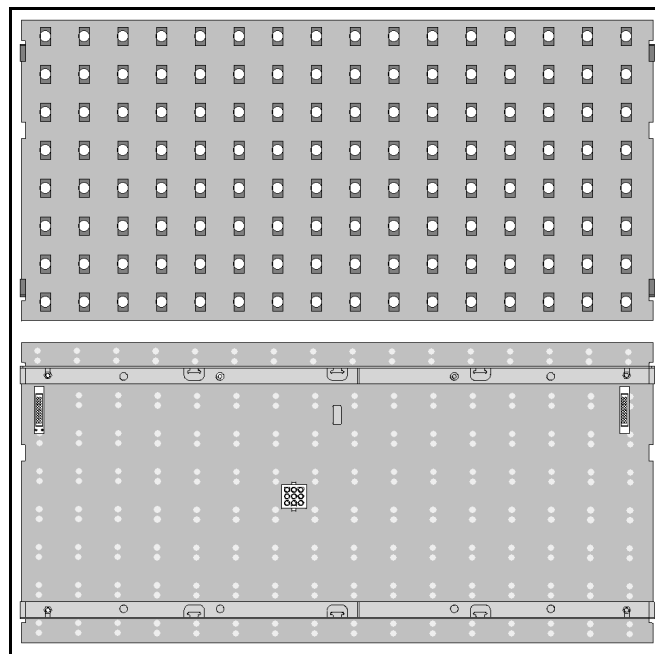


Figure 5: Lampbank (Lamp Side shown at top, Solder Side shown at bottom)

Lampbank Test Fixture: An optional unit designed to test a single lampbank separately from the display.

Lens/Reflector Assembly: Consists of reflectors, lenses and louvers. It is eight lenses high by 16 lenses wide. A lens/reflector assembly is easily removable for maintenance. **Figure 6** illustrates the front and back of a lens/reflector assembly. One lampbank mounts on the rear of this assembly.

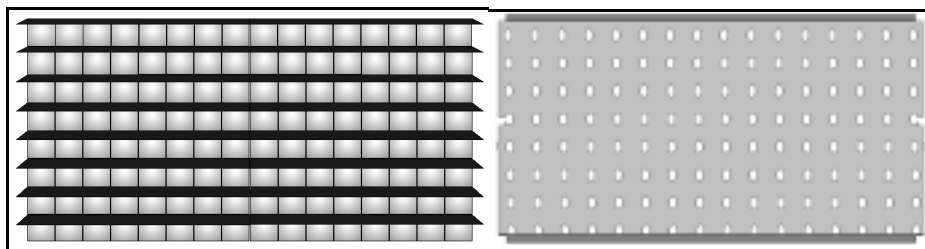


Figure 6: Lens/Reflector Assembly (Front View shown at left, Rear View shown at right.)

Light Detector: The light detector is a device that senses ambient light levels. The light detector and the controller operate together to dim the display when maximum lamp brightness is not required. This saves energy and extends lamp life. Refer to **ED-9490** and **Drawing A-79768** in **Appendix C** for light detector installation information.

Louver: A piece of aluminum, 16 pixels long, positioned above each row of lamps to provide contrast and help direct light.

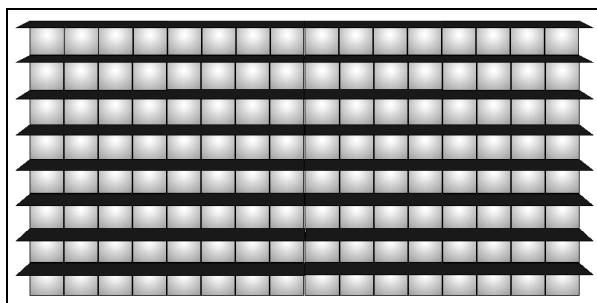


Figure 7: Module

Module: Consists of one 8x16 lampbank mounted to the back of a lens assembly. A module, **Figure 7**, is eight pixels high by 16 pixels wide. One transformer can power one module (128 lamps).

Multiple-Face Display: Consists of two or more independent displays, as seen in **Figure 8**.

Pixel: In the case of a Starburst display, a pixel is the smallest point on a display capable of producing red, green, blue, or white light. On a Sunspot display, a pixel is a single point of white light or a single lamp. A group of pixels can arrange to form a letter, word or image.

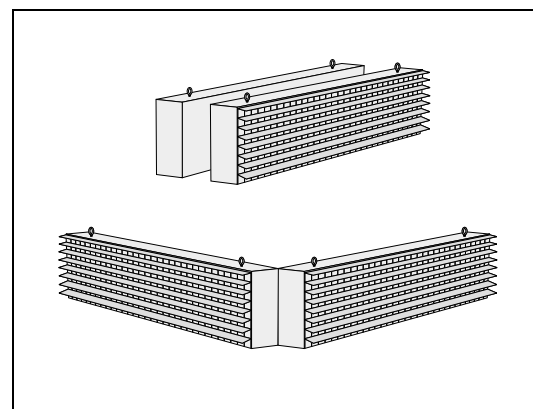


Figure 8: Multiple-Face Displays

Single-Face Display: A single-sided, independent display, as seen in **Figure 9**.

Starburst Display: Refers to one of the two types of displays available (SunSpot is the other). Starburst color displays use blue, red, green and white lenses. These lenses, combined with the proper display controller, can create 16 color or 16.7 million color images on a display. Starburst is a registered trademark of Daktronics.

Sunspot Display: A monochrome display capable of 64 shades of gray when used with the proper display controller. Sunspot is a registered trademark of Daktronics.

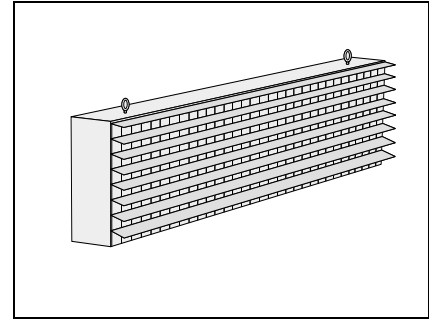


Figure 9: Single-Face Display

Temperature Sensor: A device mounted separately from the display that reports temperature information to a controller for processing and display. Refer to **ED-9489** and **Drawing A-79767** in **Appendix C** for temperature sensor installation information.

Line Receiver Definitions

The following definitions are specific to displays with line receivers.

Line Receiver: Sometimes called a serial line interface, a line receiver receives signal from the controller computer through fiber optic cable and routes it to the display through vertical shift boards. A line receiver is capable of producing monochrome or 16 color images. **Figure 10** shows a line receiver.

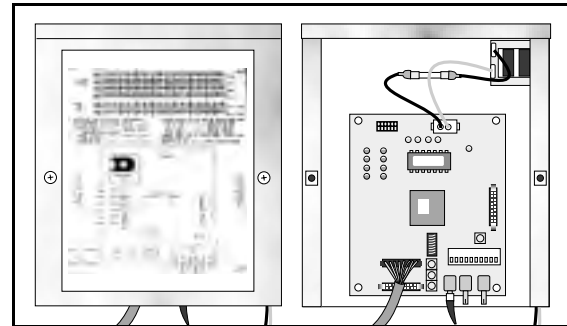


Figure 10: Line Receiver

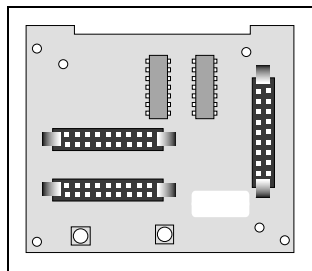


Figure 11: Vertical Shift Board

Vertical Shift Board: The vertical shift board is a circuit board mounted to the back of the left-most (front view) lampbank in each row of modules. It routes data from the line receiver both down the row and to the vertical shift board below it. **Figure 11** shows a vertical shift board.

Data Distributor Definitions

The following definitions are specific to displays with data distributors.

Column Director: This circuit board directs the flow of data coming from the data distributor to the proper line controller(s) through RJ45 cable. It is part of the interface for 16.7 million-color and 64 shades of gray technology.

Data Distributor: The data distributor is a display controller that consists of a receiver board and output cards. The number of output cards can range from 2 to 10, depending on the size of the

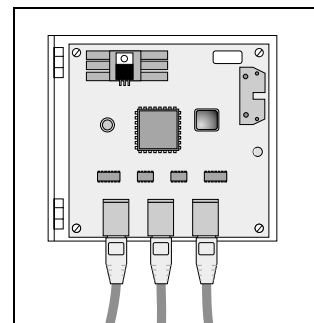


Figure 12: Column Director

display. The receiver board receives signal from the controller computer through fiber optic cable and distributes it to the output cards. The output cards send the signal to the display through the column directors and line controllers. A data distributor is capable of 16.7 million-color and 64 shades of gray display images.

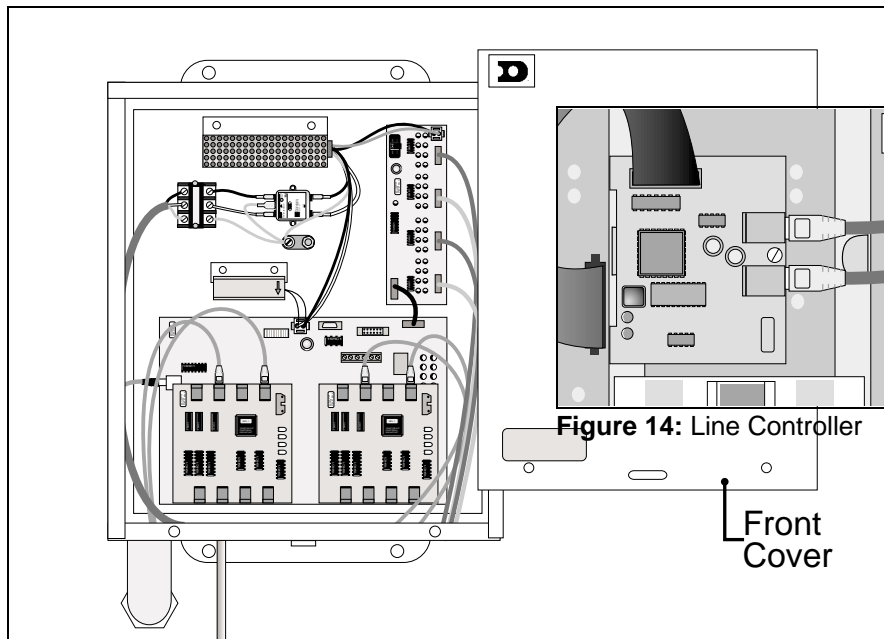


Figure 13: Data Distributor

Line Controller: A circuit board that receives signal from a column director and distributes it to the modules in a row. **Figure 14** shows an illustration of a line controller. The line controller mounts to the back of the left-most (front view) lampbank in each row of modules. It routes data from the column director both down the row and to the line controller below it.

1.4 Daktronics Nomenclature

The Daktronics module numbering system assigns numbers to modules to aid in wiring and troubleshooting. Remember, a module is two, side-by-side lens/reflector assemblies. **Figure 15** illustrates how the top two rows of a large matrix display number, starting from the left. **Figure 16** explains the meaning of the module numbering.

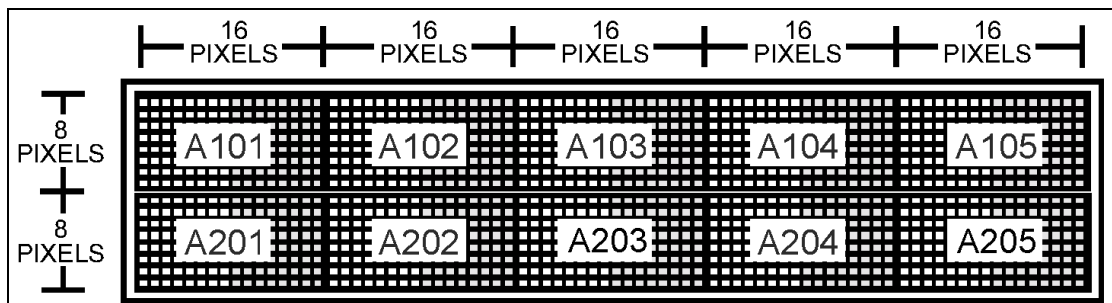


Figure 15: Module Numbering (16x80 display) – Front View

In addition, when using Daktronics drawings, it may also be helpful to know the following.

“**F**” denotes a fuse (F1, F2, F3...)

“**T**” denotes a transformer (T1, T2, T3)

“**TB**” denotes a termination block – power or signal.

“**A**” denotes an assembly. These are divided according to power or signal.

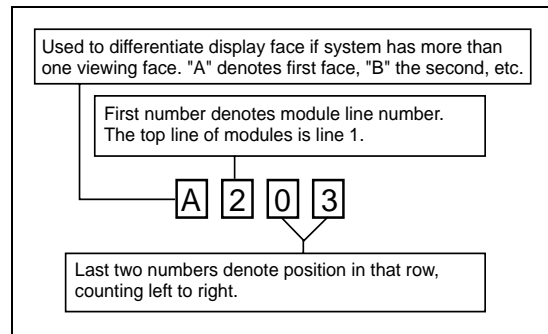


Figure 16: Module Numbering Detail

Section 2: Mechanical Installation

The Daktronics product manager's engineering staff must approve any changes that may affect the weather tightness of the display. This includes, but is not limited to, the border shrouding, back sheets, cooling fans, fan filters and filler panels. *Before making ANY modifications to the weather tightness of the display, submit detailed drawings of the changes to our engineering staff for evaluation and approval or the warranty will be null and void.*

Appendix C contains two copies of the Installation Quality Checklist. Keep one copy and send the other to Daktronics at the address listed on the form.

CAUTION: Fully attach backsheets to the display cabinet, with all of the screws, prior to lifting the display with the eye bolts. The backsheets provide structural support to the cabinet. Lifting the display with the backsheets removed may cause the cabinet members to twist, compromising the structural integrity and/or squareness of the display frame. If the display frame is not square, normal waterproofing measures may prove inadequate, leading to moisture related problems for the electronics.

2.1 Mechanical Installation Overview

Because every installation site is unique, there is no single Daktronics-approved procedure for mounting Series 1600 large matrix displays. The information contained in this section is general information only and may or may not be appropriate for this particular installation.

All decisions regarding the mounting of this display must conform to the specifications and guidelines in this section.

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

Series 1600 large matrix displays can be either **Sectional Displays** or **Full Cabinet Displays**.

Sectional Displays: Larger displays built and shipped in sections, which require assembly at the installation location. The display sections bolt to a mounting structure and to each other. Display sections must be bolted to each other horizontally and vertically to ensure uniform module spacing. Daktronics may or may not install the display border shroud at the factory.

Full Cabinet Displays: Shipped in one piece as a complete unit.

2.2 Support Structure Selection/Design

An adequate support structure must be present if this display is to mount in a safe and stable manner. Support structure design may be dependent on mounting method, display size and weight as well as the size and weight of any additional signs attached to the display or mounting structure. Display height and wind loading are also critical factors. **Continuously support the bottom of the display.**

It is the installer's responsibility to ensure the mounting structure and mounting hardware is capable of supporting the display.

Daktronics is not responsible for the mounting decisions made by others.

2.3 Lifting the Display

The top of the display (or display sections) will be equipped with eyebolts to lift the unit. Take special care not to exceed the rated load of the eyebolts. Refer to the information in **Appendix B** labeled **Eye Bolts** to determine the allowable load of the eyebolts shipped with the display.

Figure 17 illustrates both the correct (left example) and the incorrect (right example) method of lifting a display. Lift the display as shown on the left, with the lifting bar.

Stress on the eye bolts increase as the angle between the cable and the display top decreases.

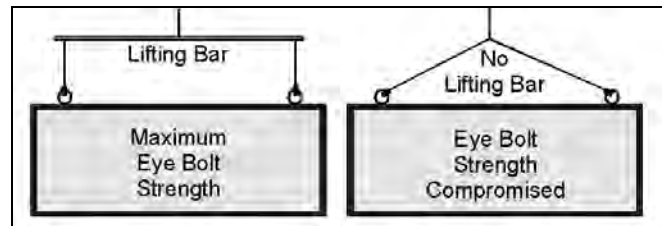


Figure 17: Display Lifting

Use every lifting point provided!

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

If mounting this display outside, make sure water or moisture doesn't get into the display.

1. Inspect the top and sides of the display for any holes that may allow moisture to enter the display. If the eyebolts were removed, plug the holes with bolts and the rubber sealing washer that came with the eyebolt.
2. Plug and seal the eyebolt holes and any other openings that may allow water to enter the display with silicone or another waterproof sealant.

CAUTION: Fully attach backsheets to the display cabinet, with all of the screws, prior to lifting the display with the eye bolts. The backsheets provide structural support to the cabinet. Lifting the display with the backsheets removed may cause the cabinet members to twist, compromising the structural integrity and/or squareness of the display frame. If the display frame is not square, normal waterproofing measures may prove inadequate, leading to moisture related problems for the electronics.

2.4 Display Mounting

Reference Drawing:

Sectional Display Assembly Example **Drawing A-116653**

The mounting methods for cabinet and sectional displays are similar. A cabinet display is a display small enough that it ships as a complete unit – not in sections.

It is the responsibility of the installer to ensure the installation will adequately meet local codes and standards. The mounting hardware and method is also the responsibility of the installer.

Before beginning the installation process, verify the following items.

- The mounting structure will provide a straight and square-mounting frame for the display. **Height variation in any four-foot horizontal section may not exceed ¼-inch.**
- The mounting structure will not give way at any unsupported points after the display is mounted.

In addition, keep the following critical points in mind.

- Continuously support the bottom of the display along its length. The bottom display attachment must support the weight of the display and any additional weight caused by ice, snow, etc., plus half the wind load.
- The top of the display must resist overturning and half the wind load.
- If the display shipped in sections, and the sections require removal from the trailer prior to installation, do not set the sections directly on the ground. Place them on spacers at least two inches high to prevent module damage.
- Ensure the mounting structure does not obstruct the drain holes in the bottom of the display or the bottom angle of the display. If this is the case, drill 3/8-inch drain holes through the mounting structure in the same location as the original holes. Be sure to maintain a minimum of 1/2-inch clearance between all bottom drain openings in the base of the sign and the mounting structure.
- Depending on display design, it may be necessary to jump ribbon cable from the last driver board in one section row to the first driver board in the section beside it. If this is the case, be sure not to crush the ribbon cables between the display sections.

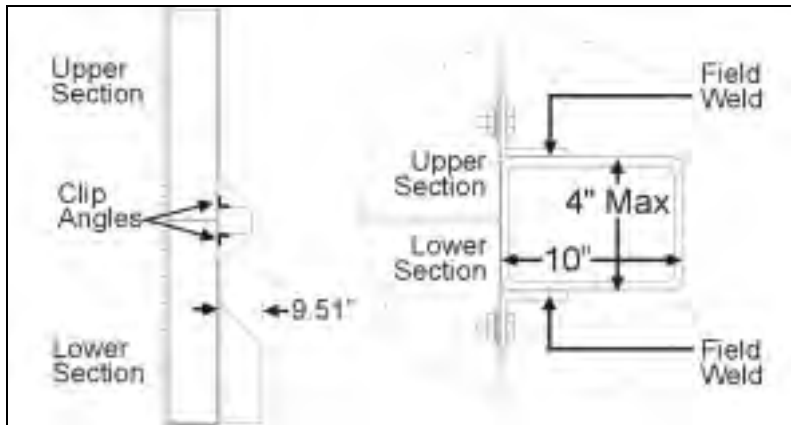


Figure 18: Outdoor Mounting Method Example (Horizontal Tubing)

Figure 18 illustrates one possible mounting method for a large matrix display. Refer to **Drawing A-116653** in **Appendix B** for details. **Figure 18** shows two display sections welded to a piece of horizontal tubing attached to a support structure by the customer/subcontractor. A cabinet display could attach in a similar manner.

Figure 19 and the steps below provide an example of how a sectional display might mount using the horizontal tubing method illustrated in **Figure 19**. The number of sections in a display may vary. The purpose of the following information is to provide general guidance in mounting the individual sections to a support structure. Refer to **Drawing A-96848** in **Appendix B** for details.

The circled numbers in **Figure 19** correspond to the numbers of the following steps.

1. Bring the first lower section, **Section 1**, of the display into position and weld the upper and lower clip angles to the upper and lower horizontal tubing. Pay close attention to this first display section. Ensure it is both vertically and horizontally straight, as all other sections will use this section's position as reference.
2. If an additional section is to be placed beside the first section, apply a 3/16-inch bead of silicone around all interconnect

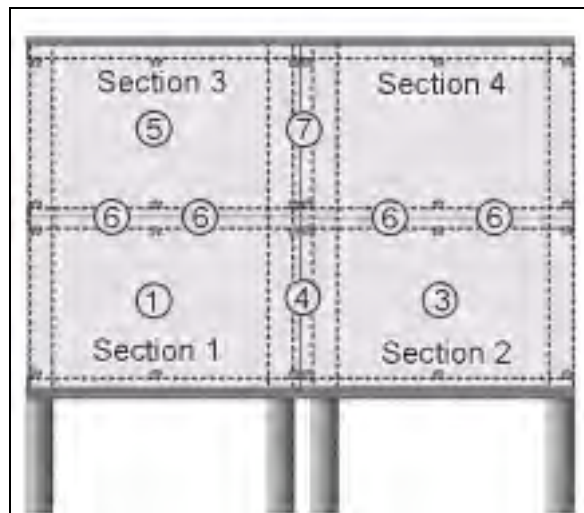


Figure 19: Sectional Mounting Method

holes and around the entire perimeter of the side of the section frames.

3. Lift the next section on the lower section row, **Section 2**, into position beside the first section mounted. Install all lower display sections first.
4. Bolt the lower display sections together vertically. A detailed illustration of section bolting is found in **Drawing A-96848** in **Appendix B**. Adjust the section's clip angles, if needed, and weld to the upper and lower horizontal tubing.
5. If additional sections are to mount to the top of the bottom sections, remove the lift eye bolts from the bottom sections and completely fill these holes with silicone. Apply a $\frac{3}{16}$ -inch bead of silicone around all interconnect holes and around the entire perimeter of the top of the bottom section frames. Bring the first top section, **Section 3**, into position.
6. Bolt the upper section to the lower section. Adjust the upper section clip angles, if needed, and weld to the upper and lower horizontal tubing. Apply a $\frac{3}{16}$ -inch bead of silicone around all interconnect holes and around the entire perimeter of the side of the section frame. Stack the next upper display section (**Section 4**) onto the next lower section and bolt them together horizontally.
7. Bolt the top sections together vertically. Adjust the section's clip angles, if needed, and weld to the upper and lower horizontal tubing.

**Height variation for any four-foot horizontal section must not exceed ¼-inch.
Display sections must bolt together vertically and horizontally.**

After installation is complete, carefully inspect the display for any holes that may allow water to seep into the display. Seal the any holes with silicone sealant.

If removing the eye bolts on the upper most sections (or the top of the display cabinet) from the display, plug the holes with bolts and the rubber-sealing washer that came with the eye bolt.

2.5 Full Cabinet Display Mounting

Reference Drawing:

MTG Example, Full Matrix **Drawing A-123964**

The mounting procedure for a full cabinet display (also called a full matrix) varies from the procedure used for a sectional display in a number of ways. The following is a general overview of the steps to use while mounting a full cabinet display.

1. Inspect the display mounting structure before beginning the installation process.
2. Ensure that the structure will provide level and plumb frame for mounting the display. Height variation in any 4-foot horizontal section must not exceed ¼ inch.
3. Also, check to see that the mounting frame will not give way at unsupported points after the display mounts. If any problems are noted, take corrective action before mounting the display.
4. Bring the display cabinet into position and weld the upper and lower clip angles to the upper and lower horizontal tubing as seen in **Drawing A-123964** in **Appendix B**. Make sure the cabinet is vertically plumb and horizontally level.

When applicable, project specific mounting details will be included in **Appendix A**. Call Daktronics for additional mounting details and specifications. *It is the responsibility of the installer to ensure the installation will adequately meet local codes and standards.* The mounting hardware and method is also the responsibility of the installer. Be sure to maintain a minimum of ½-inch clearance between all drain openings in the base of the sign and the mounting surface.

Refer to **Drawing A-123964** in **Appendix B** for a detailed illustration of a full-cabinet mounting example.

2.6 Light Detector & Temperature Sensor Installation

Refer to **ED-9490** and **Drawing A-79768** in **Appendix B** for light detector installation, **ED-9489** and **Drawing A-79767** in **Appendix B** for temperature sensor installation information.

2.7 Data Distributor Mounting

Reference Drawings:

Standard Data Distributor	Drawing A-117702
Standard Data Distributor Details	Drawing A-118499
Detail, ISO View of DD	Drawing A-119584

Whenever possible, Daktronics mounts the data distributor enclosure to the rear of the display or display section. However, structural variables sometimes require the shipping the data distributor independently and mounting it on site, either to the display itself or to a nearby structure.

Drawing A-118499 in **Appendix A** illustrates a data distributor mounted to the back of a display section. **Drawing A-119584** in **Appendix A** shows a data distributor mounted to a support structure.

Attached to the rear of the data distributor are two mounting plates – one on the top and one on the bottom. The data distributor can mount by running bolts through the holes in these mounting plates. Refer to **Drawing A-117702** in **Appendix A** for a detailed drawing of the mounting plates on a data distributor.

In displays with a data distributor (refer to *Data Distributor Definitions* in **Section 1.3** for data distributor description) data travels to column directors within the display through RJ45 cables. Be sure not to mount the data distributor enclosure so far away from the display that the RJ45 cables cannot reach between the two. Daktronics usually cuts RJ45 cables to length.

Signal and power cable into the data distributor enclosure should both be run through separate, rigid, metal conduit, as opposed to flexible conduit (metal or PVC). Section 3 addresses power and signal connection.

2.8 Display Ventilation Requirements

Reference Drawings:

Mounting Example, Small Line Displays	Drawing A-101424
Label, Filter Clearance.....	Drawing A-141064

Submit any new plans for filtering air in an enclosed display to Daktronics engineering staff for evaluation and approval or the warranty will be null and void. If modifying the Daktronics air filtration system in any way, Daktronics engineering staff must first approve these changes.

In enclosed displays, 12 square inches of unobstructed opening per module is required to ensure adequate display cooling. Make allowances to compensate for the percentage of screen in the material covering the openings in the enclosed structure. If forcing air into the enclosed area, the fans must

provide air at a rate of 110 cubic feet per minute, per module (one module = 20" x 40" display active area, or 8 rows by 16 columns of lamps).

For example, a 24x80 double-face display with an enclosed center cabinet would require 360 square inches, or 2.5 feet, of unobstructed opening in the bottom of the center cabinet.

$$[2(24 \times 80)] / 128 = 30 \text{ modules} \quad 30 \text{ modules} \times 12 \text{ square inches} = 360 \text{ in}^2 \text{ or } 2.5 \text{ feet}^2$$

2.9 Verifying Correct Lens & Module Position

The final steps of mechanical installation involve verifying that all lens position properly upon their respective lens/reflector assemblies and that all modules fully engage into the cabinet.

Look down the rows of louvers from either end of the display and ensure that all lenses secure properly. Lenses not secured properly are easily noticeable as the lens removal tab, or the lens itself, will not be in alignment with the other lenses or lens removal tabs of that row.

Refer to **Figure 20** and the following steps to return a lens to its correct position.

1. First, insert the bottom indexing tabs into the slots. There is one indexing tab on each bottom corner of the lens.
2. While gently pushing the above louver upward, grab the lens tab and push the top of the lens behind and under the louver offset. Only push the louver upward enough to allow the lens to snap into position behind the offset.
3. Release the louver and verify the lens aligns with others in the row.

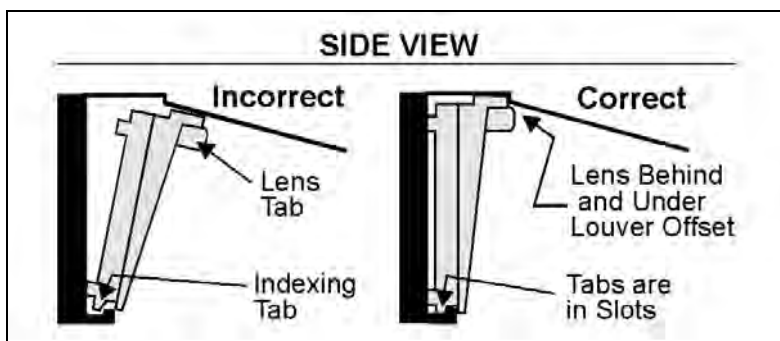


Figure 20: Correct Lens Position

Also, ensure that the rows of louvers are in proper alignment. If any rows seem out of position this may indicate that one, or both, sides of the lens/reflector assembly do not fully engage into the cabinet. If this is the case, a firm push to both sides of the module at the same time should snap the module into place.

Section 3: Electrical Installation

Appendix C contains two copies of the Installation Quality Checklist. It covers both mechanical and electrical installation. This form assists in display installation and assures dependable operation. Be sure to complete every item on the checklist. Following installation, return one copy to Daktronics Customer Service to receive a free set of replacement air filters. Contact Daktronics Customer Service if any product quality questions or concerns should arise.

3.1 Common Connectors

Daktronics displays use many different types of connectors for power and signal termination in this display. 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 encountered during display maintenance. These include, ribbon cable connectors, Mate-n-Lok connectors, Phoenix -style connectors, fiber optic connectors, termination panels and termination blocks, and tab connectors. Not all of these connectors are in every display.

1. Ribbon Cable Connectors:

Daktronics uses a variety of ribbon cables and ribbon cable as seen in **Figure 21**.

Before replacing a ribbon cable 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 are in the tool kit accessories package included with this display. Refer to the replacement parts list in **Sections 4.25** and **4.26** if requiring additional supplies of either.

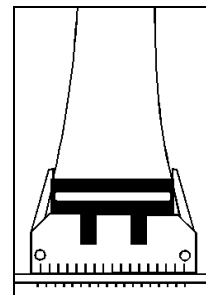


Figure 21:
Ribbon Cable
Connector

2. Fiber Optic Connectors:

At each end of a fiber optic cable is a “twist-on” connector. To remove the fiber plug from its jack, push it toward the jack and twist it counter-clockwise until the plug can be pull free.

Figure 22 illustrates a common type of fiber optic connector.

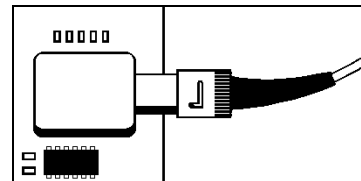


Figure 22: Fiber Optic
Connector

3. Termination Panels & Termination Blocks:

Termination panels and termination blocks connect internal power and signal wires to wires of the same type coming into the display from an external source. Most signal wire 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 23**.

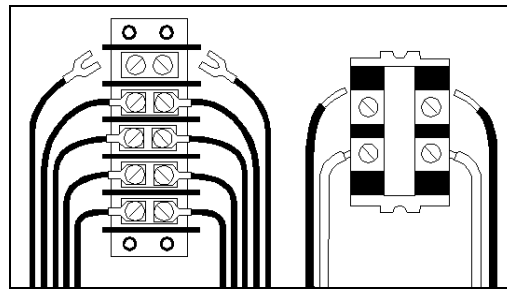


Figure 23: Termination Panel (Left) and Termination Block (Right)

4. Phoenix -Style Connectors:

Phoenix-style connectors, which are usually green, terminate signal on circuit boards. Refer to **Figure 24**. 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.

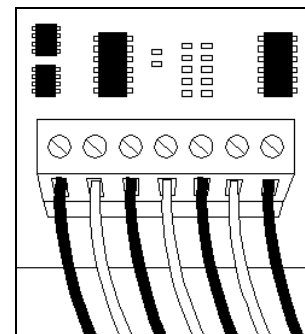


Figure 24: Phoenix Connector

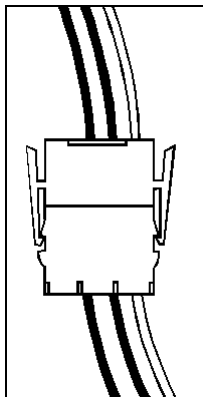


Figure 25: Mate-n-Lok Connector

5. Mate-n-Lok Connectors:

The Mate-n-Lok connectors found in this display are white and come in a variety of sizes. **Figure 25** illustrates 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.

6. Tab Connectors:

The tab connector, illustrated in **Figure 26**, is in most Daktronics displays. Grab the connector on the plastic terminal cover when removing. Do NOT pull it off the tab by pulling on the wire.

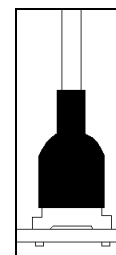


Figure 26: Tab Connector

3.2 Display Power Requirements

Reference Drawing:

Pwr Specs's: 8, 16, 24, 32, 40, 48 **Drawing A-103186**

The table on **Drawing A-103186** summarizes the power requirements for the various 1600 Series, 1.5-inch large matrix displays. **It states power per display face.**

3.3 Checking Line Voltage & 24-Hour Voltage Monitoring

Perform a two-part voltage check prior to display installation. This is a necessary step taken to maximize lamp life. By looking-up the line voltage on the table in this sub-section, estimated lamp life may be calculated and, if necessary, the user can take steps to extend it.

In **Appendix B** are two copies of the form, "Display Power Report." Three different voltage readings on this form are as follows.

1. Line voltage, addressed in this sub-section.
2. 24-hour monitoring, which also is in this sub-section
3. Lamp voltage, checked after the display powers-up for the first time.

When complete, send one of the “Display Power Report” forms to Daktronics Customer Service. The other form is for the customer’s records.

To complete the line voltage check, take a line reading of each phase and record the results on each of the power reports in **Appendix B**. Then place a voltage monitor on the phase with the highest reading for 24 hours. Record the maximum and minimum voltages on each of the reports as well.

If lacking the proper equipment to accurately monitor line voltage consider the following options.

- Have the local power company take the readings.
- Rent the equipment from a local service company.
- Have Daktronics Customer Service recommend the proper equipment.
- Rent the equipment from Daktronics.

If there is any reason to suspect large voltage fluctuations, place a recorder on the line for on at least one phase of the power for one week while the display operates normally. Contact Daktronics Customer Service with respect to this recording.

Display brightness and lamp life are generally determined assuming an average incoming line voltage of 120 volts AC at 60 hertz. If the line voltage varies from that value, it will affect both lamp life and brightness. Lamp life results will also vary with programming style and use of dimming mode.

🕒 *Lamp life predictions are for lamps operating in a laboratory with continuous operation in a stable temperature and mechanical environment. Actual values will differ from predicted life because of switched operation, varying temperature, mechanical vibrations due to wind, traffic and sign service and actual hours of operation. Data is that of the manufacturer.*

**T-1107 Transformer
1600 Series 1 1/2 Inch Displays**

**Xenon Lamp Voltage/Life/Candle Power with 24VAC Secondary
(Lamp life/candle power values are estimates based on laboratory conditions.)**

Line Volts	Marquee Application									Scoreboard Application		
	120V Only			7V Buck			7V Boost			10V Boost		
	Lamp Volts	Lamp Life Hours	Candle Power	Lamp Volts	Lamp Life Hours	Candle Power	Lamp Volts	Lamp Life Hours	Candle Power	Lamp Volts	Lamp Life Hours	Candle Power
106	9.60	87078	1.21	9.02	184986	0.97	10.26	39364	1.53	10.56	27631	1.70
108	9.80	67990	1.30	9.20	144222	1.05	10.47	30781	1.64	10.78	21620	1.82
110	10.00	53353	1.40	9.39	113011	1.12	10.68	24189	1.76	11.00	17000	1.95
112	10.20	42069	1.50	9.58	88985	1.21	10.89	19099	1.89	11.22	13430	2.09
113	10.30	37421	1.55	9.68	79101	1.25	11.00	17000	1.95	11.33	11958	2.16
114	10.40	33324	1.61	9.77	70395	1.29	11.11	15149	2.02	11.44	10659	2.24
115	10.50	29709	1.66	9.96	62718	1.33	11.21	13514	2.09	11.55	9511	2.31
116	10.60	26515	1.72	10.06	55940	1.38	11.32	12069	2.16	11.65	8496	2.39
117	10.70	23689	1.77	10.15	49948	1.43	11.42	10789	2.23	11.76	7597	2.47
118	10.80	21187	1.83	10.24	44645	1.47	11.53	9655	2.30	11.87	6801	2.55
119	10.90	18969	1.89	10.34	39946	1.52	11.64	8650	2.38	11.98	9064	2.63
120	11.00	17000	1.95	10.34	35779	1.57	11.74	7756	2.46	12.09	5466	2.72
121	11.10	15251	2.02	10.43	32079	1.62	11.85	6962	2.53	12.20	4907	2.81
122	11.20	13694	2.08	10.53	28789	1.68	11.96	6255	2.61	12.31	4410	2.90
123	11.30	12309	2.15	10.62	25862	1.73	12.06	5625	2.70	12.42	3967	2.99
124	11.40	11074	2.21	10.72	23255	1.78	12.17	5064	2.78	12.53	3572	3.08
125	11.50	9972	2.28	10.81	20930	1.84	12.27	4562	2.87	12.64	3219	3.17
126	11.60	8988	2.35	10.91	18854	1.90	12.38	4114	2.85	12.75	2903	3.27
127	11.70	8108	2.42	11.00	17000	1.95	12.49	3713	3.04	12.85	2621	3.37
128	11.80	7321	2.50	11.09	15342	2.01	12.59	3355	3.14	12.96	2368	3.47
129	11.90	6616	2.57	11.19	13857	2.07	12.70	3033	3.23	13.07	2142	3.57
130	12.00	5984	2.65	11.28	12527	2.14	12.81	2745	3.32	13.18	1938	3.68

If the line voltage is above 120 volts, changing the transformer configuration will increase lamp life. Refer to the lamp life chart in this sub-section to determine the estimated lamp life based on the line voltage check.

If the measured input line voltage is over the particular transformer's rated input voltage, the lamp will receive increased voltage. This will greatly reduce lamp life. Connecting to the 120-volt tap will reduce lamp voltage and increase lamp life.

Contact a local electrician or the local power company if line voltage is substantially above or below normal.

3.4 Power to the Display

All power routing and termination must comply with local codes and standards.

Proper grounding is necessary for reliable equipment operation. It also protects the equipment from electrical disturbances and lightning. Failure to adhere to the following grounding methods will void the warranty.

Ground displays according to the provisions outlined in Article 250 of the National Electrical Code®.

Do not use the steel support structure for grounding the display. The support is generally imbedded in concrete, and if it is in earth, the steel is either primed or it corrodes, making it a poor ground.

The two considerations for power installations, *new power installations* and *existing power installations*, differ slightly.

The display has built-in surge protection. However, for this to be effective the display must be properly earth grounded

Grounding

↳ *Ground displays according to the provisions outlined in Article 250 of the National Electrical Code®. Daktronics recommends a resistance to ground of 10 ohms or less.*

Connect the display system 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 ground properly or the warranty will be void.

The structure and 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. Do not use the support structure of the display 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 would violate electrical codes and void the warranty. Use a disconnect so that all hot lines and neutral can be disconnected. Refer to **Figure 27** for a rough detail of how this installation might look. The National Electrical Code requires the use of a lockable power disconnect within sight of or at the display.

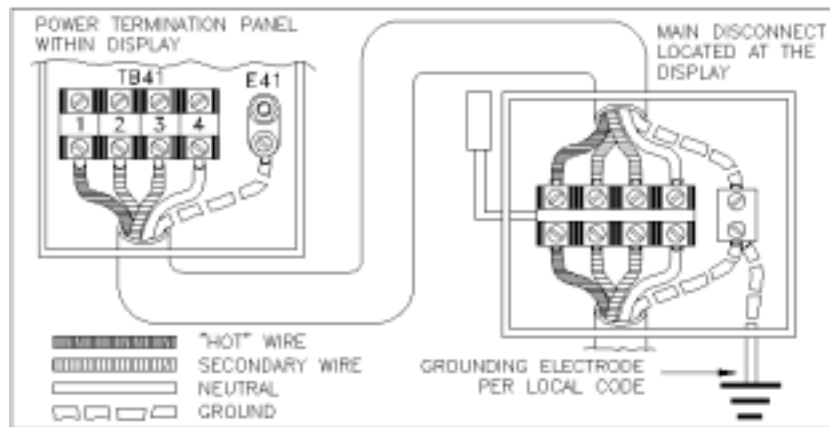


Figure 27: Installation with Ground and Neutral Conductor Provided

Installation with Only a Neutral Conductor Provided

Installations without a grounding conductor 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**, follow the guidelines listed below:

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

Refer to **Figure 28** for a rough detail of how this installation might look.

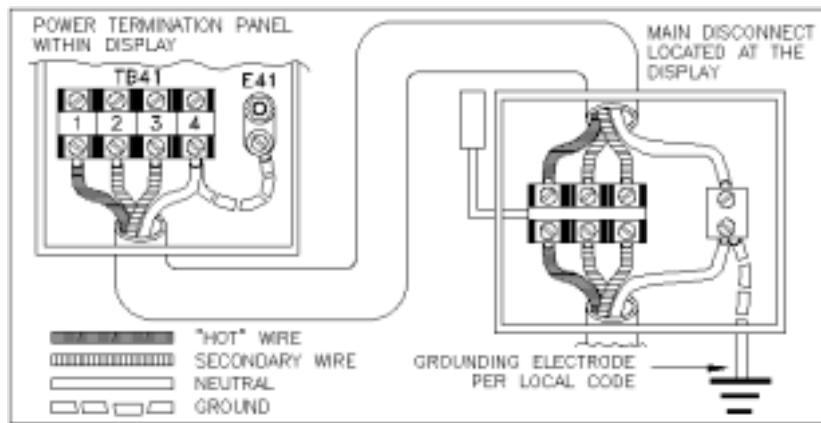


Figure 28: Installation with only Neutral Connector Provided

3.5 Power Disconnect Switch

Route power to the display through a fused disconnect switch capable of opening all ungrounded power conductors. Locate this disconnect within the line of sight of any personnel performing maintenance on the display. If locating the disconnect out of sight of the display, it must be able to lock in the open position.

Due to the inrush current (momentary surge) created by the display on start-up, Daktronics recommends using oversized current devices, high magnetic breakers or time delay fuses to handle the momentary surge.

The Over Current Protection Device needs to match the fault current available in the power delivery circuit. To determine the available fault current of circuit, have qualified personnel perform an onsite fault current survey at the site.

The National Electrical Code requires the Amp Inrush Current (AIC) rating of the electrical equipment in a circuit match the available fault current in the electrical circuit.

Because each installation is unique, Daktronics offers these instructions as guidelines only. Daktronics assumes no liability if installation steps have been omitted or other necessary procedures are not included in this manual.

Daktronics is not responsible for the quality of the power delivery system to the display. It is the customer's responsibility to ensure the undertaking of proper safety measures. Power and signal wiring in the display must comply with local, state and national electrical codes, with the correct cabling procedures for the installation determined and followed.

3.6 Panelboard Assignments (Full Matrix Displays)

Reference Drawing:

Surge Suppressor Wiring **Drawing A-74902**

A panelboard encompasses the electrical service point, circuit protection, and switching of the display power. A Daktronics supplied panelboard will be equipped with hi-magnetic trip breakers. If the customer supplies the panelboard, use hi-magnetic breakers. The customer is to supply a fused main

disconnect(s) and wire for power distribution to the multiple breaker boxes. This customer supplied fused main disconnect is considered the service entrance point.

Due to the inrush current required by the transformers on start-up, the main disconnect may have to be oversized or use hi-magnetic trip breakers to handle this momentary inrush current requirement. An alternative is to shut down the individual breakers on the panelboard before turning on the main disconnect and then turn on the panelboard breakers individually.

The following table illustrates a typical panelboard wiring list. A list similar to this is located inside the panelboard door. The Square D 30 amp QA breaker is UL listed for 1 or 2 #10 AWG wire(s).

Breaker	Wire	Wire	Breaker
1	Main	W101P & W201P (T1)	2
3		W102P & W202P (T2)	4
5		W103P & W203P (T3)	6
7	W104P & W204P (T4)	Not Used	8
9	Spare	Not Used	10
11	Not Used	Not Used	12=

Included with the panelboard is a surge suppresser *not* wired at the factory. Refer to **Drawing A-74902** for the wiring of the surge suppresser.

3.7 Configuring the Display Transformers

Reference Drawing:

Transformer Configuration (Voltage Taps) **Drawing A-77128**

The transformer used in this display has a 12V output to the lamp. Refer to **Drawing A-77128** in **Appendix B** for information on configuring the transformer for variable incoming voltage.

3.8 Line Receiver Electrical Installation

Reference Drawings:

Shop Drawing, 32YYY-10 S1600..... **Drawing B-103031**
 Shop Drawing, 40YYY-10 S1600..... **Drawing B-103032**
 Shop Drawing, 48YYY-10 S1600..... **Drawing B-102149**
 Shop Drawing, 56YYY-10 S1600..... **Drawing B-103034**
 Shop Drawing, 64YYY-10 S1600..... **Drawing B-103035**
 Shop Drawing 72YYY-10 S1600..... **Drawing B-103036**

If the display has a line receiver, **Figure 29** illustrates the data signal connection to the display. If the display has a data distributor, skip to the sub-section titled Data Distributor Electrical Installation. For a description of the difference between a display with a line receiver and a data distributor refer to **Section 1.3**.

Note: Refer to **Drawings B-103031, B-103032, B-102149, B-103034, B-103035** and **B-103036** in **Appendix B** for the location of the line receiver in the display. To access the inside of the display, refer to **Section 4.6**.

The data signal to the line receiver travels through fiber optic cable from the controller computer. The fiber optic cable connects to the line receiver at the J8 (Data In) jack, as seen in **Figure 29**. Run this cable through rigid, metal conduit, as opposed to flexible conduit (metal or PVC).

Once the signal reaches the line receiver, it goes to vertical shift boards within the display. The vertical shift boards distribute the signal to all of the display modules.

Daktronics completes the internal connections for power and the temperature monitoring system at the factory. From the serial line interface board, display information routes to the vertical shift board behind the upper-left-most lampbank (front view). A 20-pin ribbon cable connects J4 on the serial line interface to J2 (Input) on the vertical shift board.

The vertical shift board then sends the display information to the lampbank on which it is mounted. A 20-pin ribbon cable connects J1 (Data Out) on the vertical shift board to J2 (Input) on the lampbank. On 16 and 24-high displays, J3 (Output) on each vertical shift board connects to J2 (Input) on the vertical shift board below it. Each display row has one vertical shift board behind the left-most lampbank (front view).

The display data then cascades down the row as it passes from J3 (Output) on each lampbank to J2 (Input) on the next lampbank over 20-pin ribbon cable.

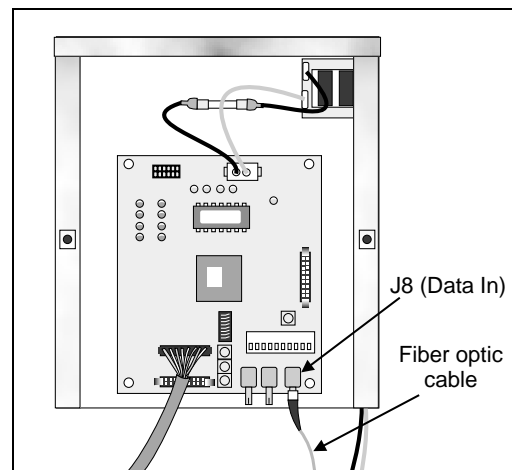


Figure 29: J8 (Data In) connection on the line receiver

3.9 Data Distributor Electrical Installation

If the display has a data distributor, follow these steps to complete **power, signal and internal temperature monitoring system** connections. For a description of the difference between a display with a line receiver and a data distributor refer to **Section 1.3**.

Connecting Power to the Data Distributor

Whenever possible, Daktronics runs power from the display or section panelboard to the data distributor prior to shipment. However, certain situations may require running this power in the field.

Power should run in conduit to the base of the data distributor enclosure. On the bottom of the enclosure are knockouts for conduit attachment. Conduit and labor to pull the power cable is the responsibility of the customer or contractor unless otherwise stated.

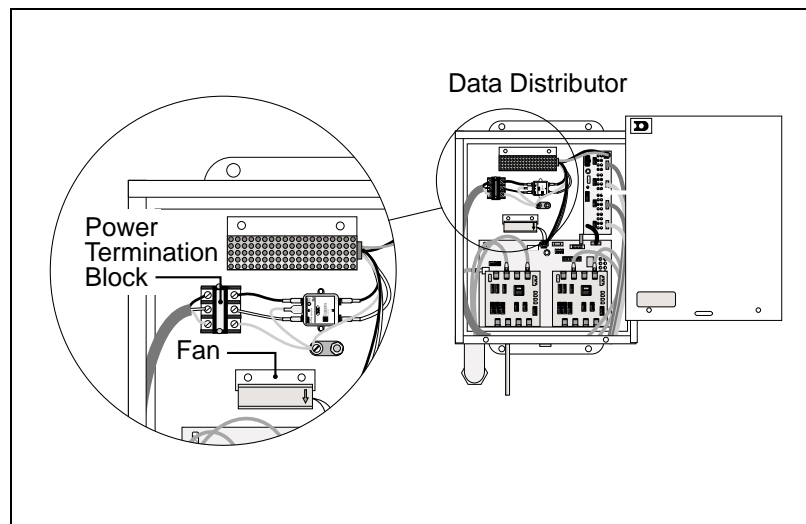


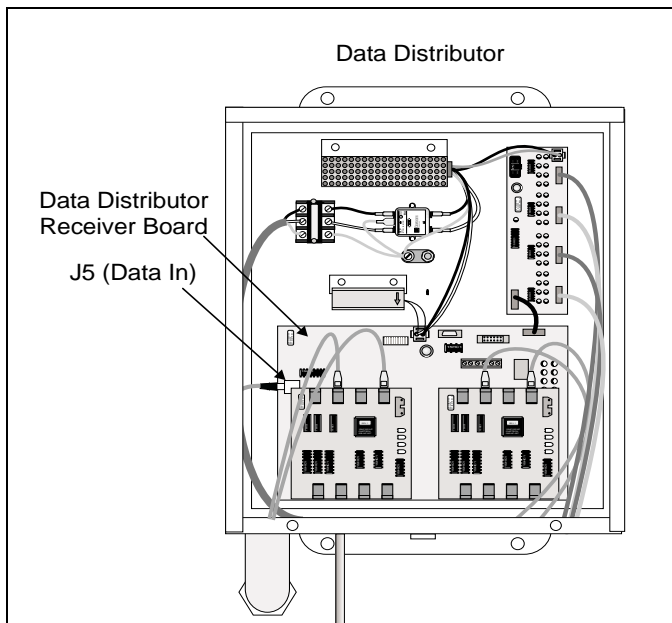
Figure 30: Close-up view of the power termination block in the data distributor

Having removed the front cover of the data distributor, pull the power cable to the power termination block in the upper-left hand corner of the enclosure. **Figure 30** illustrates the upper-left hand corner of the data distributor.

This termination block has a protective plate; remove this plate to connect the hot, neutral and ground wires. Strip and connect the incoming wires in agreement with the labels beside the termination block.

Connecting Signal to the Data Distributor

Signal from the controller computer must first route to the data distributor and then to the column directors in the display. This signal then travels through fiber optic cable, which should run through rigid, metal conduit, as opposed to flexible conduit.



Fiber optic cable from the controller computer connects to the data distributor receiver board at the J5 (data in) jack. **Figure 31** shows the data distributor and the location of the J5 jack on the receiver board.

Figure 31: J5 (Data In) jack on the data distributor receiver board

Sending Signal from the Data Distributor to the Display

RJ45 cable from the data distributor must connect to the column directors in a display. Route the RJ45 cable through rigid metal conduit.

Output cards in the data distributor, **Figure 32**, are responsible for sending the data signal to the column directors through the RJ45 cable. There can be anywhere between two and ten output cards in the data distributor – it depends on sign size. They are stacked on top of each other in pairs.

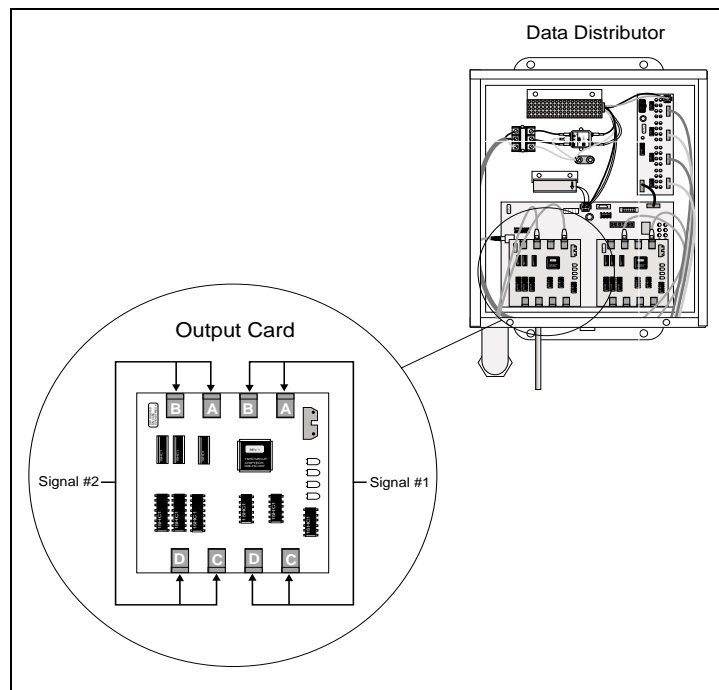


Figure 32: Output Card

Each output card has two signal outputs, as shown in **Figure 32**. Signal #1 travels to one of the display's column directors, **Figure 34**, while signal #2 would go to another. The number of signals a data distributor can send depends on the number of output cards.

Each signal routes to four jacks in case there is the need to send the same signal to multiple displays. If sending data to a single display, the data will use only one of the four jacks on each signal output.

In **Figure 32**, the jacks on each signal output (signal #1 and signal #2) are labeled A, B, C or D. The column directors within a display should all receive data from the same jack on both signal outputs on every output card. For instance, if only one display were present, one column director would be connected via RJ45 cable to A on signal #1 and another would be connected via another RJ45 cable to A on signal #2. This would be true of every output card in the data distributor.

The **System Riser Diagram** and/or schematics found in either **Appendix A** of this manual or in the **System Overview** manual, if present, will illustrate which column directors within the display receive signal from which data distributor outputs. Remember, each output card has two outputs.

Figure 33 labels the A outputs of a 10 output card data distributor. Ten is the maximum number of output cards the data distributor can accommodate. This display may have two, four, six, eight or ten output cards.

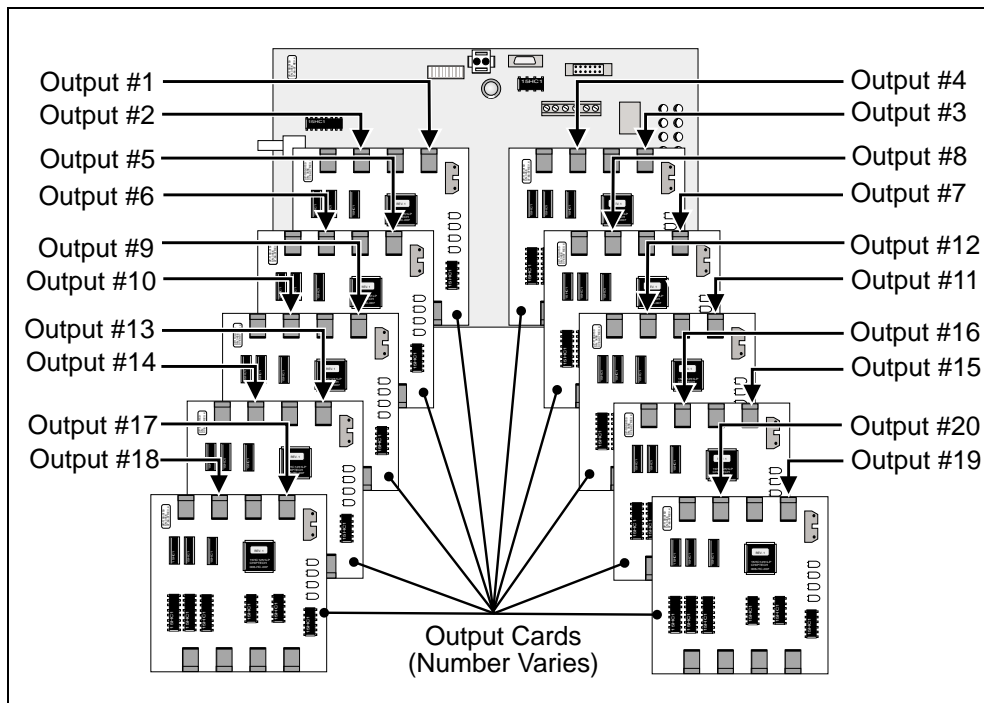


Figure 33: Data Distributor Output Numbering

Column directors within the display receive signal from the output cards in the data distributor. The signal then routes from the column directors to the line controllers.

Figure 34 shows the input and output jacks on a column director.

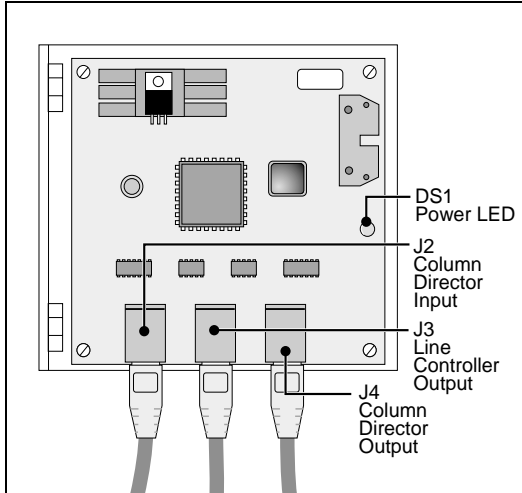


Figure 34: Column Director

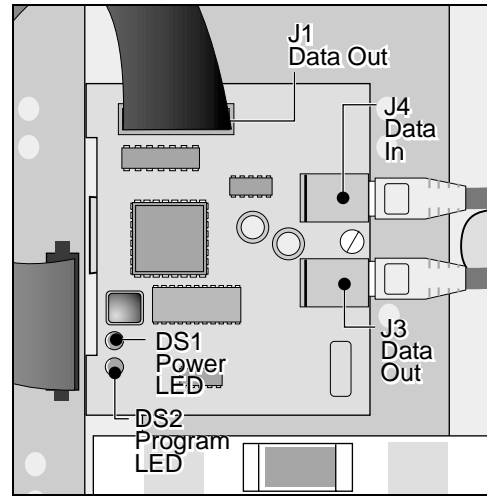


Figure 35: Line Controller

Line controllers receive signal from the column directors and send it to the modules in a given row and to the line controller in the next row below it. **Figure 35** shows the input and output jacks on a line controller.

3.10 Connecting the Internal Temperature Monitoring System

Figure 36 shows the inside of a fan control enclosure. Displays with line receivers and data distributors both have fan controller enclosures. The components in this enclosure are responsible for monitoring the cooling fans and sending information about the fan status to the display controller.

Refer to **Section 4.12** for details and a close-up view of the connections in the fan controller enclosure.

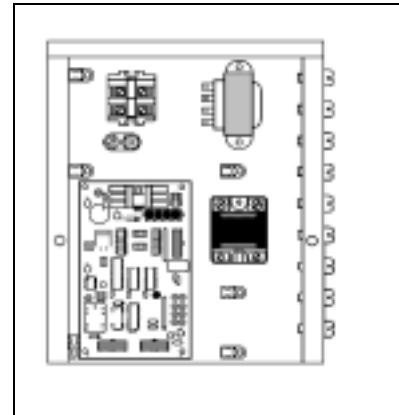


Figure 36: Fan Controller Enclosure

Connecting the Line Receiver to the Fan Controller Enclosure

In displays with a line receiver, Daktronics completes the connection from the line receiver to the fan controller enclosure at the factory. Multiple fan controllers can interconnect together. Refer to the **System Riser Diagram** in **Appendix A** or the **System Overview Manual**, if present, for details.

Connecting the Data Distributor to the Fan Controller Enclosure

In displays with a data distributor, the fan control enclosure must connect to the fan controller expander card in the data distributor. **Figure 37** shows a close-up view of a fan controller expander card in the data distributor. Multiple fan controllers can interconnect together. Refer to the **System Riser Diagram** in **Appendix A** or the **System Overview Manual**, if present, for details.

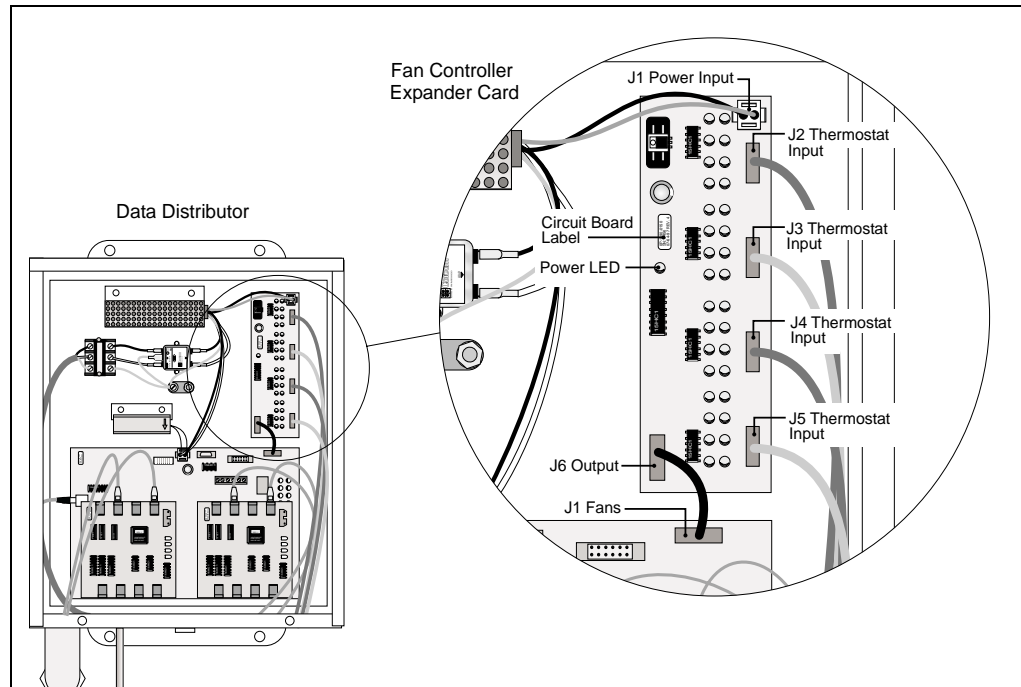


Figure 37: Close-up of the Fan Controller Expander Card in the Data Distributor.

3.11 Display Continuity Check

Prior to turning on the power to the display, perform a continuity check to ensure that no short circuits have occurred due to shipping vibration.

Caution: Before performing the following steps, be sure all the breakers are off!

1. Remove the cover from the panelboard.
2. Using an ohmmeter, place one probe on the neutral terminal and one probe to each of the taps on the breaker wire terminal. Repeat the same test for each of the breakers.
3. Place one probe to earth ground and one to each of the breaker wire terminals and repeat for each of the breakers.

All tests should result in a reading of infinity or indicate an open circuit.

3.12 First Time Power Up

After making all connections, turn on the display for a first-time field test.

1. Set all breakers to the OFF position.
2. Turn power ON to the display at the main disconnect.
3. Carefully check the voltage between the hot lines and neutral. Normal voltage range is between 120VAC and 125VAC.
4. If there are problems with voltage, check with your local electrician or Power Company.
5. Reset the breakers to the ON position.
6. Turn power ON to the display at the main disconnect (if it was turned off).

If the controller is not running, the display will blank after it has run through the power up test pattern. If the controller is running, the graphics or video will appear when the power comes back.

3.13 Lamp Voltage Check

The final step in display installation is the checking of lamp voltages. Excessive voltage to the lamps will cause premature burnout while insufficient voltage will hinder the display's effectiveness.

Although a line voltage check was completed prior to installation, it is necessary to run the lamp voltage test. This test will bring to light any internal problems, such as a transformer damaged during shipping that could result in excessive voltage going to the lamps.

Complete the following steps to test lamp voltages.

1. Turn on the power to the display and configure the display to have 50% of the lamps on per module. This can be done by either:
 - Creating a static sequence with alternate columns on, or
 - Selecting the sequence from the appropriate controller manual under the diagnostics section. Refer to the Controller Manual for more information on setting up and running sequences.
2. Lamps should be on bright (refer to **Section 3.14**).
3. Remove a lens and an ON lamp from any column from one of the above modules. Lens removal and replacement is in **Section 4.4. Figure 38** illustrates the use of the lamp removal tool.
4. Insert the lamp voltage tester into the empty lamp socket.
5. Place the probes of the voltage tester leads into the holes of the lamp voltage tester (**Figure 39**). Record the lamp voltage reading on each of the "1600 Series Display Power Report" forms found in **Appendix B. Drawing A-103186** lists expected lamp life based on line and lamp voltages.



USE EXTREME CAUTION!

Do not short across the terminals of the voltage tester. Doing so will damage the module electronics.

6. Repeat the above steps for at least two more modules.
7. Carefully replace the lamps and lenses.

Remember to record the lamp voltage readings on each "Display Power Report" found in Appendix B. Return one of the forms to Daktronics Customer Service.

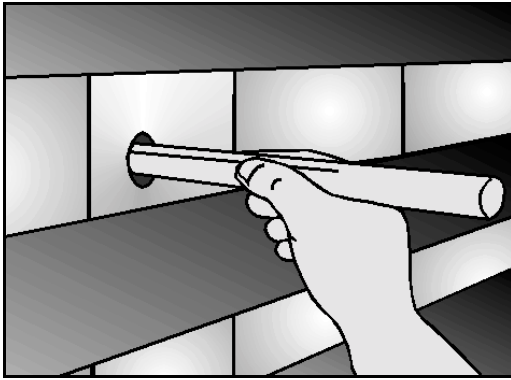


Figure 38: Removing an ON Lamp

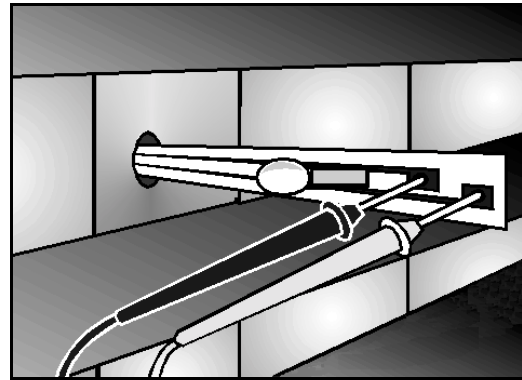


Figure 39: Lamp Voltage Tester

3.14 Dimming

For outdoor Starburst technologies, the display can dim and brighten manually. This happens under the BRIGHTNESS menu through the Automatic option (if there is a light detector with the display).

At a certain level of ambient lighting, the lamps will dim. During the day, the lamps should be brightest because they are competing with sunlight. In the evening and at night, they should be dimmer because they are not competing with sunlight. If a light detector is not present, make sure the controller is set to have manual brightness during daylight hours or control the dimming level through scheduling.

Section 4: Maintenance & Troubleshooting



IMPORTANT NOTES:

1. **Disconnect power before performing any repair or maintenance work on the display!**
2. **Only allow qualified service personnel to access internal display electronics.**
3. **Do not operate the display with the back sheets removed!** The cabinet is positively pressurized, directing adequate airflow around the lamps and out through the lenses. Display operation without the back sheets in place and fans running could cause damage to the display and will void the warranty. *Fasten the back sheets securely into place.*
4. **Dirt and contaminants may enter the display if it operates without the fan filters in place or with dirty fan filters.** These contaminants may cause premature failure of the electronic components. *Operating the display with dirty fan filters or without fan filters will void the warranty.*
5. **The Daktronics product managers engineering staff must approve any changes that may affect the weather-tightness of the display.** This is to include, but is not limited to, border shrouding, back sheets, cooling fans, fan filters and filler panels. *Before making ANY modifications to the weather tightness of the display, submit detailed drawings to our engineering staff for evaluation and approval or the warranty will be null and void.*

Sub-sections 4.3- 4.12 of Maintenance & Troubleshooting applies to the servicing of all Series 1600 large matrix displays.

Sub-sections 4.13 and 4.14 apply to servicing displays with *line receivers*.

Sub-section 4.15 applies to servicing displays with *data distributors*.

4.1 Maintenance & Troubleshooting Overview

Series 1600 large matrix displays are either front or rear accessible, depending on site requirements and customer preference.

Information in **Section 4** is below. The list also provides information found within each group.

- **Operational Summary:** outlines the power and signal routing of the display, as well as operation of the ventilation system.
- **Servicing of Display Components:** explains how to remove various display components and provides operational and diagnostic information on each item.
- **Maintenance:** addresses the steps taken to keep the display in safe, operational condition.
- **Troubleshooting:** lists the causes of a number of possible display malfunctions.

- **Replacement Parts List:** provides the descriptions and part numbers of selected display components.
- **Exchange/Replacement Procedure:** explains the process for returning a display component to Daktronics for repair or replacement.

4.2 Operational Summary

Reference Drawings:

Schematic, Pwr Wiring, LR, Marquee.....	Drawing A-102918
Schematic, Pwr Wiring, LR, Sports.....	Drawing A-104272
Schematic, Pwr Wiring, 16 Mil, Marquee.....	Drawing A-98139
Schematic, Pwr Wiring, 16 Mil, Sports.....	Drawing A-103345
Shop Drawing, 32YYY-10 S1600.....	Drawing B-103031
Shop Drawing, 40YYY-10 S1600.....	Drawing B-103032
Shop Drawing, 48YYY-10 S1600.....	Drawing B-102149
Shop Drawing, 56YYY-10 S1600.....	Drawing B-103034
Shop Drawing, 64YYY-10 S1600.....	Drawing B-103035
Shop Drawing 72YYY-10 S1600.....	Drawing B-103036

This overview summarizes the power and signal functioning of the typical 1600 series, 1.5-inch large matrix display. Refer to the display schematics in **Appendix B** or any project specific drawings included in **Appendix A** for detailed power and signal information.

There are a number of schematics in **Appendix A**. Use the following table as a guide in choosing the one appropriate for this display.

In addition, the shop drawings in **Appendix A** show the locations of the panelboards, display controller and fan control enclosure, assuming no project specific drawings exist.

Use the following table to choose the correct shop drawing.

If the display being installed is...	Consult shop drawing...
32 high display (all lengths)	Drawing B-103031
40 high display (all lengths)	Drawing B-103032
48 high display (all lengths)	Drawing B-102149
56 high display (all lengths)	Drawing B-103034
64 high display (all lengths)	Drawing B-103035
72 high display (all lengths)	Drawing B-103036

Power Summary

As addressed in **Section 0**, incoming power terminates at the panelboard. The panelboard typically mounts within 20 feet of the display but may mount to the display itself in special circumstances. Display grounding is the responsibility of the installer; it must comply with both Article 250 of the National Electrical Code and all local codes and standards.

From the panelboard, power routes to the transformers from a 30-amp breaker to a map of four transformers. A MDL-7 slow blow fuse protects each transformer on its primary side.

From the transformers, power Travels to the individual lampbanks on the backsides of the lens/reflector assemblies. Each transformer is capable of powering a maximum of 128 pixels.

In addition, the panelboard also houses the breaker for the display controller (serial line interface). **Replace this breaker with only another of equal value.**

Power to the fans route through the fan controller from the panelboard. If the display is blank for 30 minutes, the display controller can flip a relay, turning off the fans and extending the life of both the fans and the filters.

Figure 40 provides a general summary of the power routing of the 1600 series large matrix line receiver displays. Neutral and ground wires are not illustrated. The illustration is for conceptual purposes only.

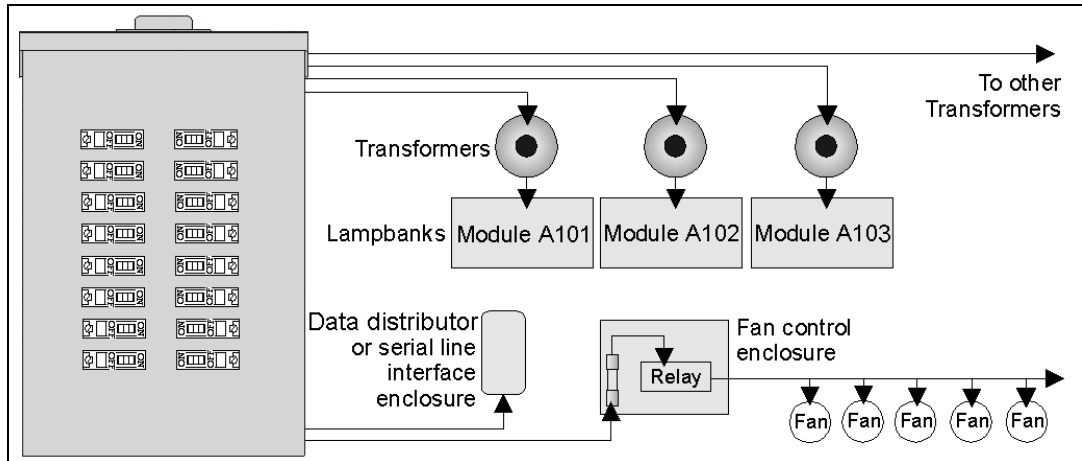


Figure 40: Power Routing Example

For detailed power and signal information, refer to the appropriate general schematic in **Appendix B**, or the project specific schematic in **Appendix A**, if one was included. Refer to the schematics listed in **Section 4.2**.

Line Receiver Signal Summary

Signal routing for Venus 4600 systems starts at the controller computer. This computer, running Venus 4600 software, sends data to the Venus A/B transmitter interface over serial cable. The DB15 male-to-male cable connects to the A/B transmitter at J1.

The data then goes to the serial line interface board within the display over fiber optic cable. The cable runs from the J5 fiber transmit jack within the A/B interface to the J6 fiber input jack on the serial line interface board. If an echo display is present, the data is shared with the displays by running a fiber optic cable between J6 or J7 (TX) on the master display's serial line interface to J8 (RX) on the echo display's serial line interface.

Data Distributor Signal Summary

Refer to **Section 3.9** for a detailed explanation of the data distributor signal summary.

Ventilation & Temperature Sensing Summary

Daktronics 1600 series large matrix displays depend on a ventilation system and internal temperature sensing equipment to prevent and monitor heat buildup within the cabinet. Excessive heat shortens the life of all electrical components, including lamps.

The three critical parts of the ventilation system are the filters, the fans and the lenses. On the back of the cabinet are a number of air filters, and in front of each air filter, within the cabinet, is a fan. The fans draw cooler air from outside the display through the filters and into the display.

This incoming air forces warm air already in the cabinet to exit through the lenses on the face of the display. Each lens has an exhaust port near the top to allow for airflow. Before the air exists through the lenses, it passes past the lamps, cooling them in the process. This maximizes the life of the lamps.

Refer to **Section 4.12** for troubleshooting information for the internal temperature monitoring system.

4.3 Accessing the Inside of the Display

Reference Drawings:

Correct Lens Position, 1 1/2"	Drawing A-75204
Lens Removal, Front Access.....	Drawing A-99898
Lens Assy Removal, Front.....	Drawing A-99899

Series 1600 large matrix displays are either front or rear accessible, depending on site requirements and customer preference.

Front Accessible Displays – Removing a Module

For many maintenance or repair procedures, the first step is to remove a module. Each 8x16 lens assembly secures to the frame by two spring-loaded latches, one on each side. Follow these instructions for access to these latches:

1. Remove the lens from row 4, column 1, and the lens from row 4, column 16 of the lens assembly. Refer to **Drawing A-99898**.
2. Place the front access tool, 0M-95442, into the latch access hole. The angled edge of the tool should be down so it wedges the latch pin down as it pushes further into the access hole. Refer to **Figure 41**.
3. When the front access tool inserts fully, the module latches should release. Refer to **Figure 42**, below.

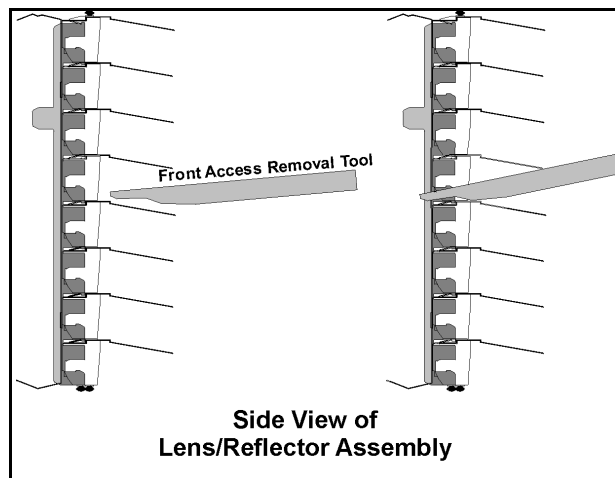


Figure 41: Lampbank and Lens/Reflector Assy



Figure 42: Removing a Module

4. With the latch released, pull the module slightly away (about a half-inch) from the display. This will prevent it from re-latching. Refer to **Drawing A-99899**. *Use care to avoid bending the louvers.*
5. Repeat this procedure on the other side of the module.
6. With both sides unlatched, the module should pull away from the display far enough so the signal and power harness can disconnect from the lampbank. When the signal and power harnesses are removed, the module can be removed from the display.

✓ **Note:** You may use a $\frac{3}{16}$ " slotted screwdriver in place of the access tool (Daktronics part number TH-1050).

Front Accessible Displays – Replacing a Module

To reinstall a module in the display:

1. Reconnect power and signal connections to the lampbank.
2. Tilt the module about 30 degrees and place the bottom corners of the side brackets to the inside of the frame verticals.
3. Push the lens assembly firmly back into place until the latches snap into place and the lens assembly secures to the display. It may be necessary to use a solid object, such as a short length of two-by-four, to properly seat the assembly.
 - Place the two-by-four across the louvers so the pressure on them distributes evenly and strike the board with the heel of your hand. This should drive the assembly in place.
4. Pull firmly on the assembly to ensure that it is fully in place and secured to the display. The lens assemblies must fit together tightly enough so the weather stripping forms a seal and prevents water from leaking between the lens assemblies and into the display. Check the seal between the assemblies with a 0.032" feeler gauge. Refer to **Section 4.17**.
5. Snap the lenses back into the faceplate of the lens assembly. Failure to properly replace a lens is quite noticeable. The lens removal tab or the lens itself will not be in alignment with the other lenses or lens tabs. Refer to **Drawing A-75204**.
6. Ensure that the rows of louvers on the lens assembly are in proper alignment.

Rear Accessible Displays – Removing Back Sheets

Rear accessible displays require back sheets be removed from the rear of the display in order to reach the internal display components.

To remove a back sheet from a rear accessible display, complete the following steps.

1. Remove all back sheet screws with a battery-powered screwdriver using a $\frac{5}{16}$ " hex bit.
2. Lift the back sheet up and *slightly* away from the display.
3. Reach behind the back sheet and unplug the fan power wires if present.
4. Pull the back sheet entirely away from the display.

Rear Accessible Displays – Removing a Module

If removing a lens/reflector assembly from a rear accessible display, complete the following steps while referring to Figures 41 and 42.

Note: A lens/reflector assembly does not need to be removed in order to replace a lamp or to remove a lampbank in most cases in a rear accessible display; refer to Section 4.7.

CAUTION: When removing an 8 by 16 module from the rear of the display, follow the safety lanyard procedure. The use of a safety lanyard will prevent the module from falling and causing damage or injury. Post a safety lanyard procedure list on each level of the catwalk. A copy of this procedure is in Appendix B.

1. After removing the back sheet from the rear of the display, disconnect all power and signal harness connections from the lampbank.
2. Place a safety lanyard snap into any one of the three holes in one of the side brackets of the lens assembly.
3. Loop the safety lanyard around the conduit and secure the remaining snap into one of the three holes in the bracket on the other side of the lens assembly.



Figure 43: Inserting the Tool to Release the Lens Assembly Retaining Latch.

4. Insert the tool (0M-95441) into the area just below the lampbank-positioning tab of the side bracket at a slight angle (refer to **Figure 43**). The tool will work best if positioned with the notched side up.
5. Slowly turn the tool downward so it pushes down on the lens assembly-retaining latch.
6. Gently push the corner of the lens assembly out of the display, just far enough (about a half-inch) to prevent the latches from springing back into place.

7. Repeat the same step for the remaining side of the module.
8. With both latches released, grasp the lens assembly with both hands and push the entire module forward and out through the front of the display.
9. Turn the lens assembly until it can pull back through the opening in the display, allowing removal.

Note: In some cases, components mounted to the display cabinet will not allow a module to pull through the opening created by removing the module. In this case, remove the lens assembly above or below that section first and remove the module through that opening.

10. Remove the safety lanyard from the side brackets and gently lay the lens assembly, lens side down, on a static free surface.

Rear Accessible Displays – Replacing a Module

Modules should fit into the matrix from the front of your display. However, there may be situations where you only have rear access. To replace the module from the rear, first connect it to the display with a safety lanyard (refer to **Appendix B**).

1. With the safety lanyard in place, pass the lens assembly through the opening, rotated right side up, and then pull it back into place.
2. When pulling the lens assembly into place, it should be tilted about 30 degrees so the bottom goes in first.
3. Pull the lens assembly firmly back into place until the latches, one on each side of the frame verticals snap into place.

There are some areas on the display where components prevent the lens assembly from passing through the opening in the display. In this case, remove a second lens assembly above or below the first one. This creates an opening large enough for the lens assembly to pass through.

Lens assemblies must fit together tight so the weather stripping forms a good seal and prevents water from leaking between the lens assemblies and into the display. Check the seal between the assemblies with a 0.032” feeler gauge. Refer to **Section 4.17**.

4.4 Lenses

A lens is in front of each lamp in the each lens/reflector assembly. The lenses, along with the reflectors, direct the light from the display. 128 lenses are on each lens/reflector assembly.

Complete the following steps to remove a lens from a lens/reflector assembly.

- Carefully pry out the lens tab using the lens/lamp extractor found in the tool kit. The lens tab is located at the top center of the lens. Refer to **Figure 44**. If necessary, gently press up on the louver above the lens to aid in removal. Applying excessive force to the louver may cause it to become deformed. Refer to **Figure 45**.

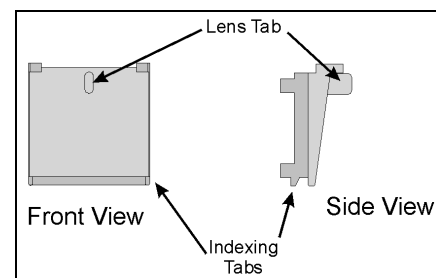


Figure 44: Individual Lens

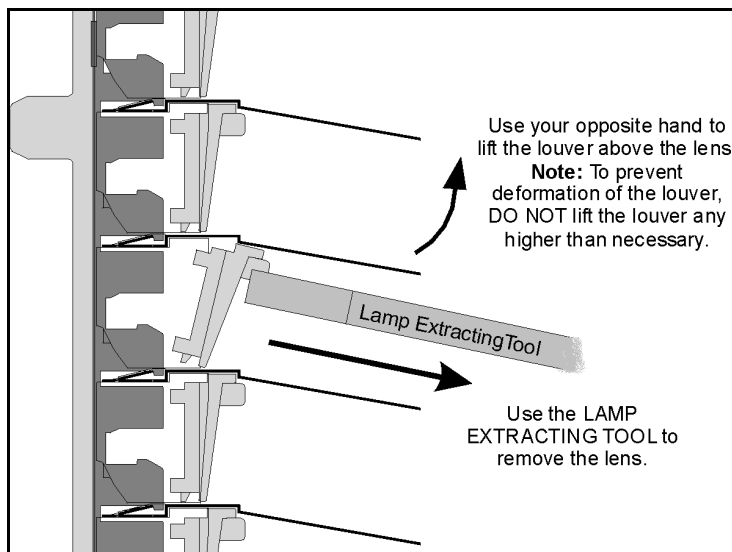


Figure 45: Removing a Lens

Complete the following steps to insert a lens into the lens/reflector assembly.

1. Insert the lens' indexing tabs into their respective slots on the lens/reflector assembly. There is one indexing tab on the bottom-left and bottom-right corners of the lens.
2. Push the lens into position behind the louver offset. If necessary, gently press up on the louver above the lens to aid in insertion. Applying excessive force to the louver may cause it to become deformed.
3. Verify that the lens position and placement is consistent with others in that row. If a lens looks out of position it is likely an indexing tab is not in its slot.

4.5 Lamp Testing & Replacement

This display design allows for easy lamp replacement with front access. Always replace non-functioning lamps prior to scheduled events, or as soon as possible, for best viewing.

A 3.58-watt lamp is behind each lens. Use the controller lamp test to locate bad lamps. Use the lamp test form located in **Appendix B** to mark the location of bad lamps. Refer to **Section 4.25** and **4.26** for the part numbers of replacement lamps and lenses.

- Daktronics-approved 3.58-watt lamps have an estimated life of 17,000 hours if operated at 11.0 volts. **Always use Daktronics approved lamps.** Lamps purchased from Daktronics have tighter specifications than similar lamps built in standard production. The recommended lamps give the sufficient intensity and beam spread to match the display design. Lamps not built to Daktronics specifications will not perform as well, will not give the intended results, and will adversely affect the beauty of the display.
- A qualified individual who is capable of operating the controller equipment should do lamp testing.
- *Display power must be OFF for lamp replacement.*

The life rating of a lamp is the average value in hours within which 50% of a test quantity is expected **not** to fail and within 70% of the rated life, 90% of a test quantity is expected **not** to fail. Lamp life will increase if the average intensity of the lamp is less than maximum intensity.

⌚ Predicted lamp life is for lamps operating in a laboratory with continuous operation in a stable temperature and mechanical environment. Actual lamp life will differ from predicted life due to switched operation, varying temperature, mechanical vibrations due to wind, traffic and display service, and actual hours of operation.

Typically, lamp failures for the 17,000 hour 11.0 volt lamp in the 1-1/2" displays may be as follows.

- ▶3% of the lamps normally fail upon reaching 35% of rated life (5,950 hours).
- ▶10% of the lamps normally fail upon reaching 70% of rated life (11,900 hours).
- ▶50% of the lamps normally fail upon reaching 100% of rated life (17,000 hours).

The balance of 50% of the lamps last longer than the rated life of 17,000 hours.

Example: The following chart shows predicted lamp failure for various displays based on a lamp voltage of 11.0 volts, assuming the display is in operation for 18 hours a day. This chart is based on the manufacturers' test data and on laboratory conditions.

B = c~ã äÉ	@ Ñ e çì ëë-fã= l éÉë-íáçã:	@ Ñ a ~óë-fã pÉã áÉ	@ Ñ ~ã éë-mÉÇÁÍÉÇ-qç= c~ãççêpÉáÉÍÉÇ-a äéä-ó-p ãÉë=					
			QÇíVS= QPMQ= ã-ã éé=	QVñNNO= QQUM= ã-ã éé=	QUñNOU= SINQQ= ã-ã éé=	SQñNOU= UINVO= ã-ã éé=	VSñOOQ= OPIQQQ= ã-ã éé=	NOUñORS= POITSU= ã-ã éé=
P=	RIVRM=	CRM=	SV=	NPQ=	NUQ=	QQS=	TMP=	VUQ=
NV=	NNIVMM=	RMM=	CPM=	QQU=	SNQ=	UNV=	QIPQQ=	PIOTT=
RM=	NTIMM=	TOO=	NINRO=	QIQM=	PIMTO=	QIMVS=	NNITNO=	NSIPUQ

Lamps in this display are accessed either by removing the lampbank to which the lamps are attached or by removing the lens in front to the lamp. If just a few lamps here and there need replacing it is easier to remove the lenses in front of them. If there are many lamps that need replacing on a single lampbank (five or more) it is easier to remove the lampbank from the lens assembly. Both methods of lamp removal/lamp replacement are addressed in this sub-section.

Complete the following steps to access and service lamps by removing a lens

1. Remove the necessary lenses as explained in **Section 4.4**.
2. As illustrated in **Figure 46**, remove the bad lamps with the lens/lamp extractor tool found in the tool kit.
3. Replace the necessary lamps. Use the lens/lamp extractor if the lamps are hot. **Use only Daktronics-approved lamps of the same wattage.**
4. Replace the lenses as explained in **Section 4.4**.

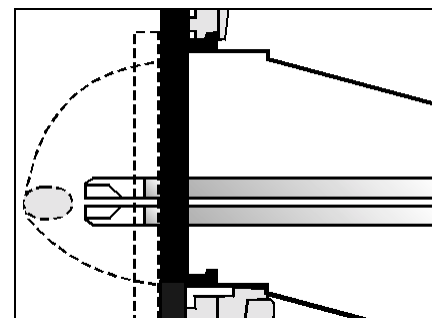


Figure 46: Lamp Removal

The Diagnostics Method of Lamp Testing & Replacement

A qualified individual who is capable of operating the controller equipment should do lamp testing.

The Venus 7000 *Diagnostics* program provides two ways to check for bad lamps. If the display is *not* visible from the controller, you must use the *Pattern Test* method. If the display is visible from the controller, you can use the *Pixel Locator* method that allows you to locate bad lamps

without leaving the controller.

Pattern Test Method: The *Pattern Test* method turns on the lamps in a pattern that makes it easy to spot bad lamps and record their location. When using the Pattern Test function, make photocopies of the test form in **Appendix B**. (Keep the original copy in **Appendix C**.) Complete one of these forms each time you test and replace lamps. Lamp test forms for your display size are available upon request.

To run the Test Pattern:

1. From the Venus 7000 Shell, open the *Monitor* program.
2. Open the *Diagnostics* program.
3. In the **Diagnostics** text box, select **Lamp Test**.
4. Be sure to highlight the sign you are testing in both the *Diagnostics* and the *Monitor* programs.
5. Under **Lamp Test Type**, select **Pattern Test**.
6. Click on **Start Test**. This will light up every other column, making it easy to spot any bad lamps. The monitor screen will show this pattern. To change to the alternate columns press <F5>.
7. Check your display and record the location of any bad lamps on the test form.

Note: A test pattern can also run from the data distributor. Refer to the data distributor manual for instructions on starting these test patterns.

The Pixel Locator Method: The pixel locator method checks for bad lamps without leaving the controller. To run the Pixel Locator:

1. From the Venus 7000 Shell, open the *Monitor* program.
2. Open the *Diagnostics* program.
3. In the **Diagnostic** text box, select **Pixel Locator**.
4. Select the driver size of your display, (8 by 16).
5. Click on **Start**. This will light the entire top row and the entire left column of lamps. You'll be able to see if any of the lamps in the top row are bad.
 - a) If you spot a bad lamp, arrow to the right until the lighted column is on the bad lamp, i.e., the intersection of the lighted row and the lighted column is on the bad lamp.
 - b) To record the location of the bad lamp, press the **Stuck Off** button. If you have a lamp that is stuck on, follow the same procedure but press the **Stuck-On** button instead of the **Stuck Off** button.
6. Arrow down one row at a time to check each row for bad lamps, recording each bad lamp in the same way.
7. After marking the location of all the bad lamps, turn the display power off at the main power disconnect.

Note: For more information about lamp testing and replacement, refer to the Venus 7000 controller manual or contact the Daktronics Animation Department.

Optional Lampbank Driver Test Table

The purpose of the test table is to check the lampbank input and output and to determine if all lamps are working within that lampbank. Use the following steps as a guide when using the test table.

1. Remove the lampbank from the lens/reflector assembly or from the display.

2. Plug the test table into a standard 120-volt outlet. Make sure the power switch is OFF.
3. Place the 4-pin jumper plug in J2 for the 1 ½” 8x16 lampbank.
CAUTION: Never insert jumpers into both J1 and J2 at the same time.
4. Attach power cable from J44 to the power plug of the lampbank.
5. Attach signal cables to the lampbank. The cable from J35 attaches to the input jack of the lampbank and the cable from J42 attaches to the output jack of the lampbank. For lampbanks with piggyback boards, connect the signal wire from the test fixture directly to the lampbank input.
6. Turn power switch ON and mark all bad lamps with a piece of masking tape.
Note: Do not remove or replace lamps with the power ON as this may damage the lampbank.
7. Turn fixture power OFF.
8. Replace all lamps with Daktronics approved lamps of the same wattage.
9. Turn test fixture power on and check if all lamps light up. If lamps don't light properly, check the troubleshooting section of the maintenance manual.
10. Test the lampbank output.
11. Unplug the lampbank and return it to the display.

4.6 Lampbanks

A self-contained lamp driver display board controls the lamps of the displays; the lamps also mount to this board. This circuit board receives display information from the controller and converts it to drive signals, which switch the lamps. The circuit board has all the drive components integrated onto the same circuit board as the lamp sockets. Refer to **Figure 47** for an illustration of the lamp driver display board.

After installation of lamps in the circuit board, it becomes a *lampbank*. There is one eight pixels high by 16 pixels wide lampbank mounted on the back of each lens assembly. When a lampbank mounts on the back of the lens/reflector assembly, the lamps extend into holes in the back of the reflector shells, allowing the reflectors and louvers to direct the light.

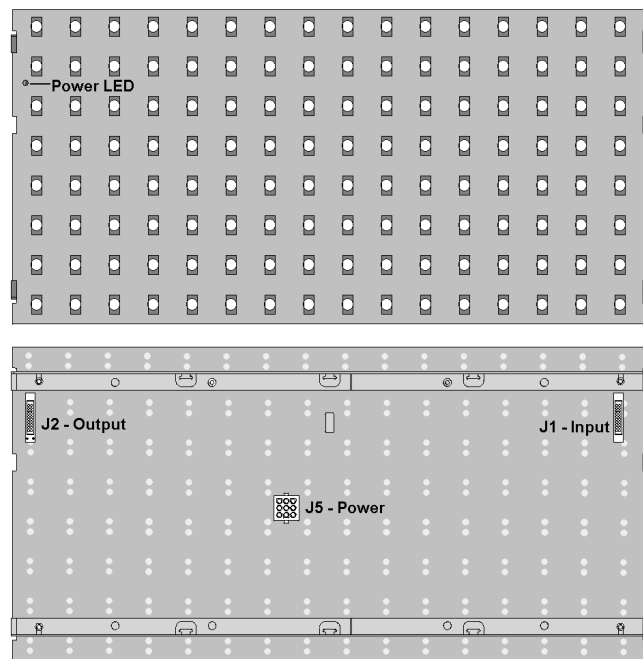


Figure 47: Lampbank Components

The functions of the labeled components are explained in the following table.

Component	Function
Power LED	A lit LED indicates the lampbank is receiving its operational voltage of 5 VDC.
J1-Power	Power from a transformer enters the lampbank at this connector.

J2-Input	Signal enters the lampbank at this connector from any of the following sources: <ul style="list-style-type: none"> • From a vertical shift board if it is the left-most lampbank in any row (front view). • From the previous lampbank in that row.
J3-Output	Signal exits the lampbank at this connector and passes to the next lampbank in that row. The last lampbank in each row does not use this connector.

4.7 Removing a Lampbank

The lampbank, also called the lamp driver display board, attaches to the lens assembly with a metal tab at each corner. **Figure 5** in **Section 1.3** illustrates the lampbank. To remove the lampbank:

1. Push the clips in with your thumb while gently pulling the lampbank out.
2. Repeat this step for the three remaining corners. Service lampbanks in a static-free area to prevent static electricity from damaging the components.

Note: When servicing the display from the rear, the above steps may be possible without removing the lens assembly from the display. However, if there are components mounted to the frame that do not allow removal of the lampbank, it will be necessary to remove the complete module from the cabinet in order to allow access to the lampbank.

In the event a lamp socket needs to be replaced on a lampbank, complete the following steps in a static-free environment.

1. Unsolder the two contacts of the socket.
2. Carefully pull the socket from the lampbank. Take care not to damage the pad or lift the trace.
3. Insert the new socket and solder in place.
4. Clean the area of solder residue and apply conformal coating to the circuit board to protect against moisture damage. Use PC-101 protective coating for circuit boards (or equivalent). SE-1003 is the Daktronics part number for such coating.

4.8 Replacing a Lampbank

When attaching lampbanks to the lens assemblies, be sure the lamp sockets seat tightly against the reflectors. The 8x16 lampbank mounting angles notch to allow the lampbank to secure to the lens/reflector assembly by the tabs on the side brackets. All four tabs, one at each corner, must snap securely onto the lampbank. If the lampbank does not secure properly to the lens assembly, the lamp filament will not be at the focal point of the reflector and the parts of that lens assembly will appear dim. If focal point adjustment is required, steps are provided in lampbank mounting angle to allow for variations in materials.

4.9 Display Ventilation Summary

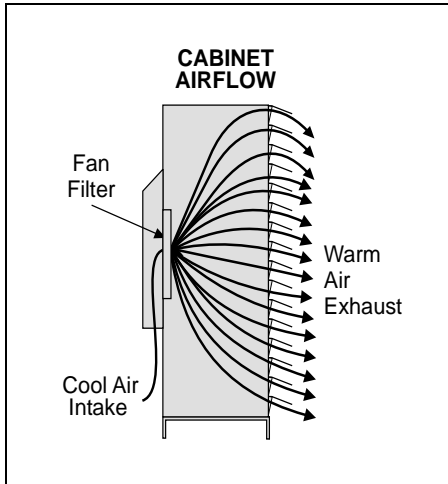


Figure 48: Cabinet Airflow

Excessive heat shortens the life of all electrical components, including lamps. Daktronics 1600 series large matrix displays depend on a three-part ventilation system to prevent heat buildup within the cabinet.

The three critical parts of the ventilation system are the filters, fans and lenses. The fans draw cooler air from outside the display through the filters and into the display. This incoming air forces warm air already in the cabinet to exit through the lenses on the face of the display, as illustrated in **Figure 48**. Each lens has an exhaust port near the top to allow for airflow. Before the air exits through the lenses, it passes past the lamps, cooling them in the process. This maximizes the life of the lamps. **Figure 49** illustrates this lens airflow process.

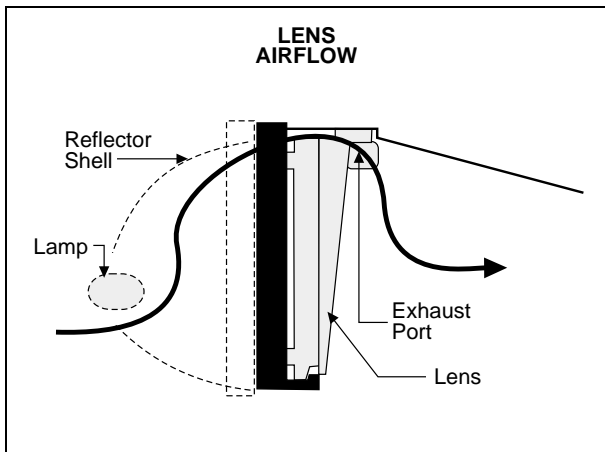


Figure 49: Lens Airflow

In addition, the display controllers in 1600 series large matrix displays will turn off power to the fans if they sense the display has been blank for 30 minutes. This action completes through the relay in the fan control enclosure. This extends the life of both the fans and the filters. The display controller will start the fans automatically when the display is in use.

4.10 Fan Filters

Shrouds on the rear of the display house the fan filters and shed rain. Check filters every 1500 hours of operation for accumulation of debris that could restrict airflow.

Check filters after the display has been in operation for 1500 hours—and every 1500 hours after that—to ensure that the display cools properly. Check filters more often if the display is located in a dusty or harsh weather environment (i.e. along a gravel road with dust-laden air).

1500 hours is equivalent to 83 days if the display is operated for 18 hours a day and the power to the display is turned off when not in use to ensure that the fans are not operating when the display is not running. 1500 hours is equivalent to 62 days if the display is on running non-stop, 24 hours a day.

Clean the filter with a portable canister-type vacuum cleaner by gently vacuuming or by blowing compressed air through the filter media. When using compressed air to clean the filter, direct the air through the filter in the same direction that it flows during normal operation. The arrow stamped on the outside of the filter frame indicates the direction of the airflow during normal operation. *Hold the air nozzle at least six inches from the filter to avoid damaging the filter material.*

You can also clean the filter with water. A garden hose nozzle set to direct the water as a fine mist works well. Hold the water nozzle back a few inches from the filter to prevent damage to the filter media and direct the water flow in the same direction that the air normally flows. Allow the filter media to dry completely before reusing. Use a mild detergent, like household dish washing soap, to assist in cleaning the filter media. *Do not use any acid type cleaner or harsh cleaning solvents.*

Daktronics recommends keeping spare filters on hand at all times. Ideally, all filters require replacement during routine maintenance. The dirty filters could then be brought back to the shop, cleaned and inspected, and would be available for use at the next job site.

The filter assembly has a 2-inch wide piece of masking tape applied across the filter frame and holder to provide extra security during shipping. Remove the masking to allow removal of the filter during its first time service using rear access.

If a filter media shows evidence of damage or wear, replace the filter with a Daktronics Filter (Daktronics part no. 0A-1176-0009).

If a filter other than a standard Daktronics filter is used, make sure it meets the following criteria.

- The filter media must have an average arrestance of 83% and resistance = 0.06 (in inches of water) at 310 fpm.
- The filter media must be cleanable, permanent 1/2" thick, 25 PPI (25 pores per inch) open cell polyurethane foam.
- The filter frame size must be 15.62" by 19.62" by 1.88" with an effective filter area of no less than 3.4 square feet.
- The filter must have a rating of UL 900 Class 2.

In order to access the air filters from the rear of the display, 8 inches of clearance are required between the bottom of the air inlet hoods and catwalk level. 8 inches is required to allow the air filter removal and replacement without damage to the filter.

Filter Removal (Front Access)

Turn the two latches to the horizontal position and remove the filter cover plate (refer to **Figure 50**).

Lift the filter up and out of the filter holder and pull it out through the access slot (refer to **Figure 51**).

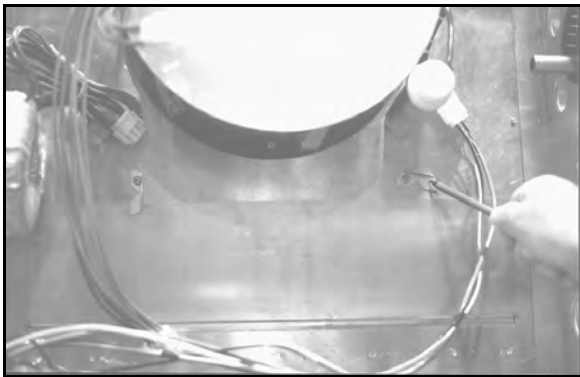


Figure 50: Loosening the filter cover plate

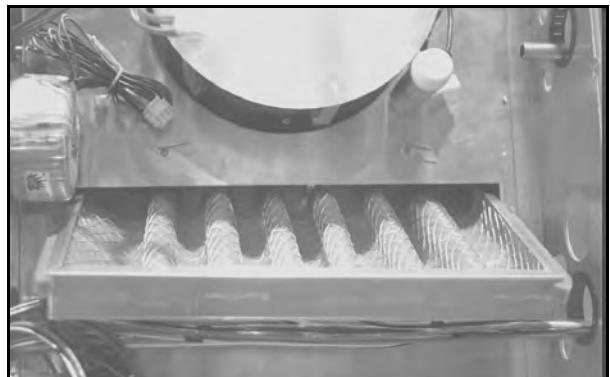


Figure 51: Removal of the filter

Filter Removal (Rear Access)

Filters are easy to remove if your display provides rear access.

Using the tab on the lower edge of the filter frame, lift the bottom edge of the filter up about an inch and out until it is free from the filter holder and remove.



Figure 52: Filter Removal - Rear Access

4.11 Fans

Fans control the heat buildup generated by the electronic components. One cooling fan will provide ventilation for eight to twelve 8x16 display modules (depending on display configuration).

Check fans after the display has been in operation for 1,500 hours and every 1,500 hours after that to ensure that the display cools properly. Check fans more often if the display is located in a dusty or harsh weather environment (i.e. along a gravel road with dust laden air).

1500 hours is equivalent to 83 days if the display is operated for 18 hours a day and the power to the display is turned off when not in use to ensure that the fans are not operating when the display is not running. 1500 hours is equivalent to 62 days if the display is on running non-stop, 24 hours a day.

Rear access displays allow for easy checking of the fans.

- After removing the filters (refer to **Section 4.10**), turn the power back on.
- Look up inside the rain shield and note if the fans are turning properly.

CAUTION: The fan blades are exposed during this step. **Turn the power off when finished checking the fans.**

After removing a module, take a minute to inspect the fans.

- Check the fan blades for dirt and debris. If the fan blades have a large accumulation of dirt and debris, this indicates that the filters require more frequent changing. Keep fan blades clean to maintain fan efficiency and ensure proper cooling.
- Spin the fan blades with a pen or pencil to ensure that the bearings are free and the fan is still in balance.

After replacing 10% of the fans, Daktronics recommends replacing all cooling fans to reduce associated maintenance costs that may incur with increased heat buildup from fan failure.

4.12 Troubleshooting the Internal Temperature Monitoring System

The fan controller enclosure, found within the display, contains various components for monitoring and controlling the fans in the display. Twelve LED indicators on the fan controller card report the status of the temperature monitoring system, as illustrated below.

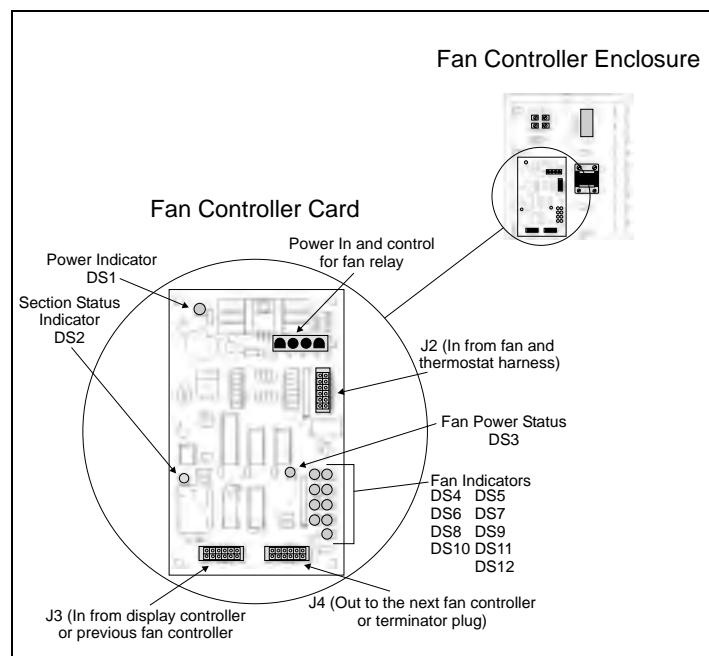


Figure 53: Fan Controller Card

The fan controller card, found in the fan controller enclosure, **Figure 53**, accepts signal from a maximum of eight fans.

If the RPM of any fan goes below a certain rate, the fan controller will send a signal to the display controller to blank the display. Bad fan bearings may cause a fan to run slowly. Use a pen or pencil to spin the fan. If the fan bearings are bad, the fan will not spin freely—refer to **Section 4.11** for more information regarding fans. A slow fan can also be caused by a plugged filter—refer to **Section 4.10** for filter maintenance information.

The following table describes the function of each LED indicator on the fan controller card.

LED indicator	LED – On	LED – Off	LED – Blinking
DS 1 Power	Power on	Power off	–
DS 2 Section Status	Section good	Section failure	–
DS 3 Fan Power	Fan power on	Fan power off	–
DS 4 Fan 1 Status	Fan good	Fan not present	Fan failure
DS 5 Fan 2 Status	Fan good	Fan not present	Fan failure
DS 6 Fan 3 Status	Fan good	Fan not present	Fan failure
DS 7 Fan 4 Status	Fan good	Fan not present	Fan failure
DS 8 Fan 5 Status	Fan good	Fan not present	Fan failure
DS 9 Fan 6 Status	Fan good	Fan not present	Fan failure
DS 10 Fan 7 Status	Fan good	Fan not present	Fan failure

DS 11 Fan 8 Status	Fan good	Fan not present	Fan failure
DS 12 Thermostat input	Thermostat input good	Thermostat input failure	—

To remove the fan controller card, remove all cables from jacks J2, J3 and J4, along with the white power-in connector. After removing the four corner nuts, you should be able to remove the fan controller card from its enclosure.

4.13 Troubleshooting the Line Receiver

Reference Drawings:

Line Receiver Settings, 32 & 40 High	Drawing A-109450
Line Receiver Settings, 64 & 72 High	Drawing A-109648
Line Receiver Settings, 48 & 56 High	Drawing A-110166

Remember, the display will have either a line receiver or a data distributor. For a general description of both, refer to **Section 1.3**.

To access the line receiver, remove the appropriate modules per **Section 4.3**. Refer to drawings in **Appendix A** for the location of the line receiver in your display.

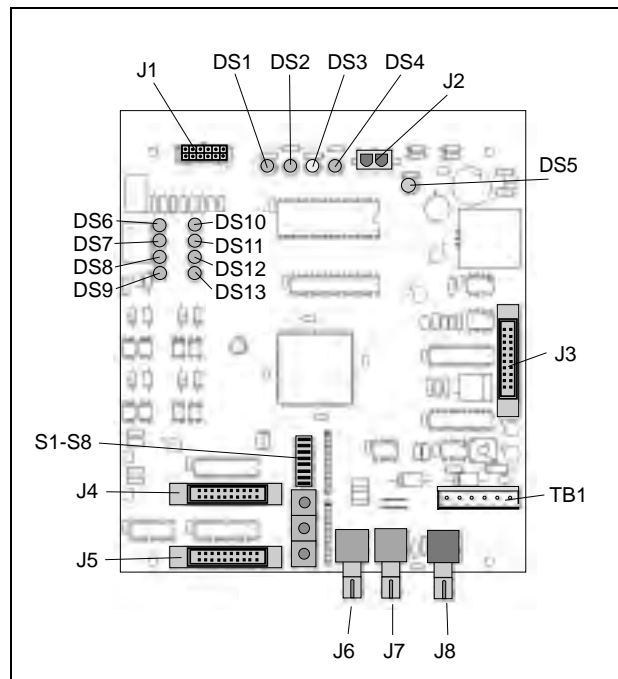


Figure 54: Line Receiver Board

On the following page is a description of each LED indicator on the line receiver board.

DS1 - Line Fault: This indicates if the controller and data cable are connected correctly. With the controller turned on, and a good fiber optic connection, it should be OFF (it may flash ON occasionally). If DS1 stays ON, there is probably a break in the fiber optic cable, a bad termination or something wrong with the controller computer.

DS2 - Test Mode: This indicates when the line receiver is in test mode. If it is ON, a test pattern will appear on the display.

DS3 - Data: This indicates when line receiver is receiving data from the controller. It will flash ON when it receives data.

DS4 - Bright: This indicator will be ON when the photocell is detecting a full bright light level and OFF for other light levels. If no photocell connects to line receiver, it will flash.

DS5 - Power: This indicates when the power on the line receiver is working. It should ALWAYS be ON.

DS6 - DS13 - Thermostat Inputs: These indicate proper cooling of the display. These should ALL be ON. An OFF LED indicates a failed fan. When this occurs, the line receiver will automatically blank the display to prevent heat damage to the electrical components.

DS14 - Program: This indicates the line receiver powered-up OK. It should be ON.

DS15 and/or DS16 - Transmit: Indicate(s) signal transmission out of the fiber optic transmitter(s) (possibly to another display).

Line Receiver Connections

J1: In from the fan controller enclosure

J2: Power in

J3: Echo display dimming.

J4: Display 2 out

J5: Display 1 out

J6: Fiber optic cable out

J7: Fiber optic cable out

J8: Fiber optic cable in

Daktronics configures the switch settings (S1-S12) at the factory. If the need arises to verify switch settings, use the label on the cover of the line receiver as a guide or refer to **Drawings A-109450, A-109648 and A-110166 in Appendix B.**

Complete the following steps to remove a line receiver board from its enclosure.

1. To access the enclosure housing the serial line interface, remove the necessary lens/reflector assemblies as explained in **Section 4.7 above.**
2. Remove the cover from the enclosure.
3. Disconnect all signal cables from the circuit board. It may be helpful to label the cables to ensure correct placement when installing another serial line interface board.
4. Remove the nuts holding the board in place and remove the board from the enclosure.

4.14 Vertical Shift Boards

A vertical shift board is on the back on the left-most lampbank in each row. It routes signal from the line receiver down each row of lampbanks.

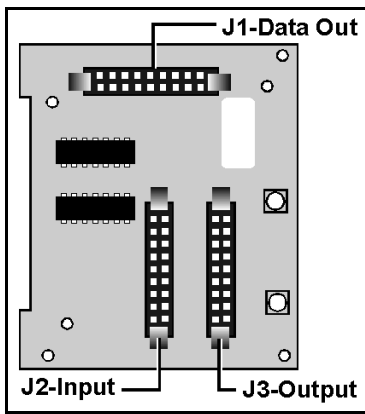


Figure 55: Vertical Shift Board

A vertical shift board is in **Figure 55**. The following is a description of the connections on the vertical shift board.

J1 – Data Out: Signal is sent from this connector to the next lampbank in a row.

J2 – Input: This connector receives signal from the line receiver or the vertical shift board above it.

J3 – Output: Signal is sent from this connector to the vertical shift board below.

Complete the following steps to remove a vertical shift board.

1. Remove the appropriate lens/reflector assembly as explained in **Section 4.7 above**.
2. Disconnect any remaining signal cables from the vertical shift board.
3. Remove the nut holding the board in place.
4. Remove the board from the lampbank.

4.15 Troubleshooting the Data Distributor

If the display has a data distributor, this sub-section describes the functions of various components within it. If the display has a line receiver, refer to **Section 4.13 above**. For a description of data distributors and line receivers, refer to **Section 1.3 above**.

The receiver board and output cards in a data distributor work together to route display data from the controller computer to the column director boards within the display. **Figure 56** illustrates the receiver board and outputs cards as they might appear in the data distributor.

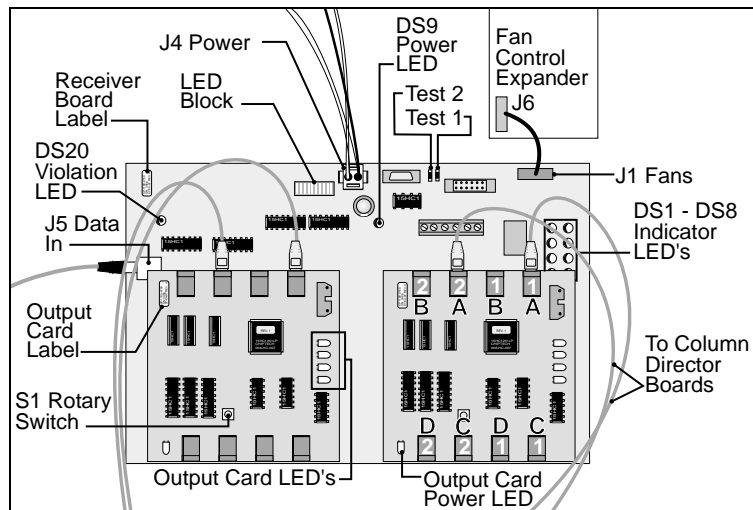


Figure 56: Data Distributor – Receiver Board and Output Cards

The DS1-DS8 indicator LEDs on the receiver board must all be ON if using a fan control expander with this display. This indicates the fan control expander board is receiving no fan failure notices from the fan controllers.

If a fan controller expander is not used each LED corresponds to a fan controller within the display. All must be ON for the display to operate.

If the display is out of use for 30 minutes, the receiver board sends a signal, either directly or through the fan control expander board, to the fan controllers to turn off the fans. This design extends the life of the fans/cooling system and electronics of the display. The fans will automatically turn back on when the display is back in use.

The following tables list the functions of some of the connectors on the receiver board and output cards, as well as the meanings of the diagnostic LEDs.

Receiver Board Connectors	
Connector	Function
J1 (Fans)	Input from either fan controllers or fan control expander bd.
J4 (Power)	Power input from power supply
J5 (Data In)	Fiber Optic Input from controller or other equipment

Receiver Board DS1-DS8 LEDs WITHOUT Fan Control Expander Board	
LED	Function
DS1	ON if fan controller number 1 reports all fans good
DS2	ON if fan controller number 2 reports all fans good
DS3	ON if fan controller number 3 reports all fans good
DS4	ON if fan controller number 4 reports all fans good
DS5	ON if fan controller number 5 reports all fans good
DS6	ON if fan controller number 6 reports all fans good
DS7	ON if fan controller number 7 reports all fans good
DS8	ON if fan controller number 8 reports all fans good

Receiver Board DS1-DS8 LEDs WITH Fan Control Expander Board	
LED	Function
DS1 & DS2	ON if fan controller expander board input J2 reports all fan controllers good.
DS3 & DS4	ON if fan controller expander board input J3 reports all fan controllers good.
DS5 & DS6	ON if fan controller expander board input J4 reports all fan controllers good.
DS7 & DS8	ON if fan controller expander board input J5 reports all fan controllers good.

Receiver Board DS10-DS19 LED Block	
LED	Function
DS10	N.C.
DS11	Processor Initialization Complete
DS12	EPLD Configuration Complete
DS13	Test Mode
DS14	Taxi Command Received (Will Flash with Data Received)
DS15	Sign is Blank
DS16	Sign Forced Blank – Signal Loss or Fan Failure
DS17	On=Fans On, Blinking=Fan Failure, Off=Fans Off
DS18	Heartbeat
DS19	N.C.

Receiver Board Miscellaneous LEDs and Jumpers	
DS9	Power LED should be ON
DS20	Violation LED – If ON indicates a problem with signal format or configuration
W1	Jumper – Test Pattern, Bottom=ON / Top=OFF
W2	Jumper – Fan Sensing, Top=Enable / Bottom=Disable

Output Card Connectors	
Connector	Function
J2, J3, J6, J7	Data 1 Output – All connectors XMIT same data
J4, J5, J8, J9	Data 2 Output – All connectors XMIT same data

Output Card DS1-DS4 Indicator LEDs	
LED	Function
DS1	Should blink when data is received from Venus 7000
DS2	Should blink when data is received from Venus 7000

DS3	Should blink when data is received from Venus 7000
DS4	All DS4 LEDs in data distributor will light and then count sequentially through card addresses from 0 to 15.

Output Card Miscellaneous LEDs and Switches	
DS5	Power LED should be ON
S1	Board Address – Set in sequential order starting at 0. Four output cards would be set 0, 1, 2, 3. Not 1, 2, 3, 4.

The fan controller expander board, **Figure 57**, is part of the data distributor. Each of the LEDs on the fan control expander board corresponds to a fan controller in the display. All the LEDs must be ON for the display to operate. An OFF LED indicates a fan controller is reporting a bad fan. At that point, check that fan controller to determine which fan is failing.

The table below lists the connectors of the fan control expander board along with their functions.

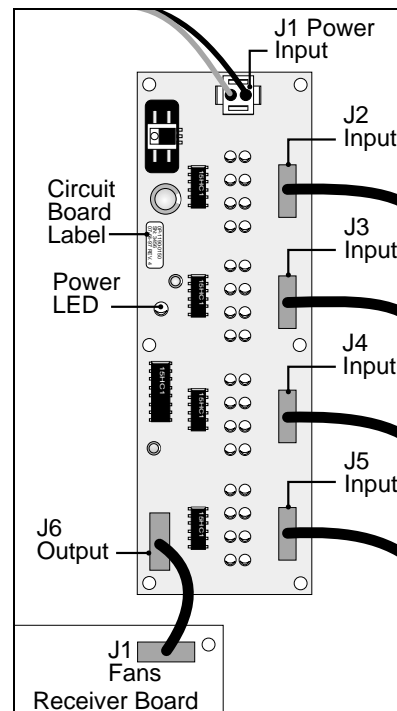


Figure 57: Fan Controller Expander Board

Connector	Function	
J1	Power input from power supply	
J2	Input from fan controllers 1-8	NOT EVERY DISPLAY USES ALL INPUTS (J2-J5). ANY UNUSED INPUTS MUST HAVE A TERMINATOR PLUG.
J3	Input from fan controllers 9-16	
J4	Input from fan controllers 17-24	
J5	Input from fan controllers 25-32	
J6	Output fan controller reports to J1 on receiver board	

4.16 Line Filters

Line filters, as illustrated in **Figure 58**, are used in conjunction with data distributor displays and remove electromagnetic noise from the power system that might otherwise interfere with local communications channels. Line filters sometimes mount on brackets or power supplies. Generally, each line from the panelboard will pass through a line filter.

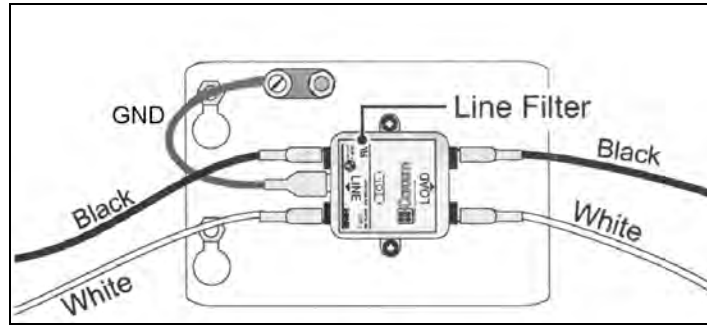


Figure 58: Line Filter

The white, black and green wires from the panelboard connect to the filter on the “LINE” end. Notice how the green ground wires is first routed to the ground lug before connecting to the line filter. The white and black wires to the display electronics connect on the “LOAD” end.

On Daktronics drawings, a “Z” followed by the filter number indicates line filters.

To remove a line filter disconnect the power wires from the filter and remove the two nuts that hold the unit to its bracket.

4.17 Weather Stripping Maintenance

Reference Drawings:

Lens/Reflector Assy, 816-10.....**Drawing A-91100**

The top and bottom of each 8x16 lens assembly has a strip of pile weather stripping (Daktronics part number HS-1149). There is tape weather stripping between each louver assembly (Daktronics part number HS-1051). The weather stripping helps keep moisture out of the display and maintains the positive air pressure necessary for proper display cooling. When doing routine display maintenance, which involves removing the 8x16 lens assemblies, make sure the weather stripping is intact. If any weather stripping appears damaged, replace it. Refer to the following instructions and **Drawing A-91100**.

1. After removing the old pile weather stripping, clean the top and bottom of the lens assembly with an adhesive remover so the new weather stripping will adhere.
2. Apply the weather stripping in one continuous strip on both the top and bottom of the lens assembly.
3. When finished, the weather stripping should be flush at the bottom. If the weather stripping is not tight or buckles anywhere on the lens assembly, it will be difficult to reinstall it in the display, and it will allow water to enter the display and damage the electrical components.
4. Check the module spacing and weather stripping tightness with the 0.032” feeler gauge as follows:

- a) Look down the rows of louvers from either end of the display and ensure that all lenses secure properly. It is very easy to notice lenses that are not secure, as the lens removal tab or the lens itself will not be in alignment with the other lenses or removal tabs of that row.
- b) Ensure the rows of louvers are in proper alignment.
- c) Insert the feeler gauge between the module and the top of the display. As the feeler gauge slides along the top of the display, there should be considerable resistance. This indicates that the weather-stripping (HS-1149) is providing a good, tight seal against moisture. If the gauge moves freely or with very little resistance, find the cause.
 - It may be that the weather-stripping on either the module or the border is damaged and requires replacement.
 - If the weather-stripping is undamaged, then adjust the perimeter border to obtain a good, tight seal between the weather-stripping of the module and the perimeter border.

If the display shipped in sections and bolt together on site, check the weather-stripping tightness between adjacent modules of each section with the feeler gauge. If the feeler gauge moves freely:

- a) Check the weather-stripping on the 8x16 lens assemblies.
- b) If the weather-stripping is okay, this would indicate that the sections do not bolt together closely enough, creating a gap between the sections where moisture can enter the sign. Refer to the installation procedure to ensure that all installation instructions for bolting the sections together were followed.

4.18 Louver Replacement

Replace all bent or damaged display louvers. Return the lens/reflector assembly containing the damaged louvers to Daktronics for repair or replacement.

4.19 Interior Maintenance

Do not allow dust and/or dirt to accumulate within the display cabinet. The debris can deposit behind the lenses. This may restrict airflow out of the display and cause overheating problems. Use an air hose and vacuum to keep the inside of the cabinet clean.

Occasionally, it is wise to check the airflow through the lenses using the “smoke test.” This is especially true if the display controller is blanking the display but the cause of overheating is not apparent.

Perform the smoke test in the following manner.

1. Light a smoke ball or similar smoke-producing device beneath a fan inlet.
2. Observe where the smoke exits the display. It should only exit through the lens exhaust ports. If smoke exits from between two or more lens/reflector assemblies the weather stripping likely needs replacing.
3. If smoke does not exit a particular group of lenses, remove the lenses to clean out any debris, replace the lenses and retest. A failed fan may create an effect similar to that of clogged lens exhaust ports.

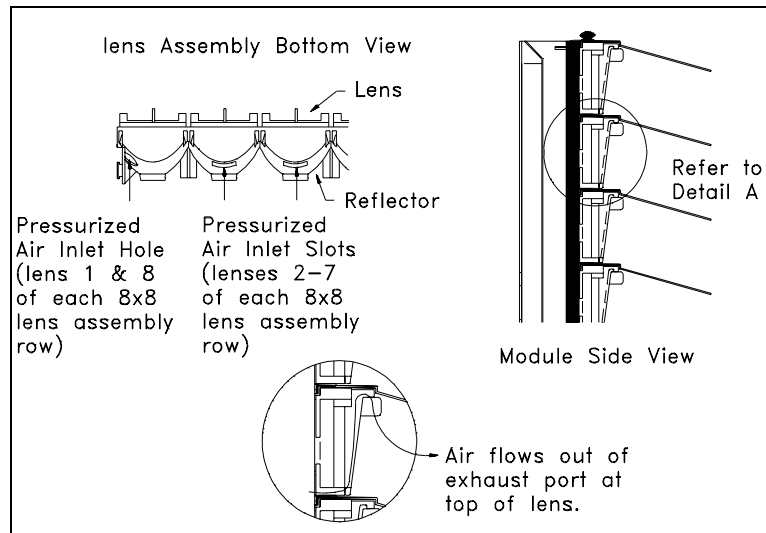


Figure 59: Lens Airflow

4.20 Structural Maintenance & Inspection

Complete a yearly inspection to maintain safe and dependable display operation. This inspection should address the following issues.

- **Corrosion**
Check the paint and look for corrosion, especially at footing, structural tie points and ground rods.
- **Loosened Hardware**
Verify fasteners, such as bolts and rivets, have not come loose. Check fasteners and tighten or replace them as required.
- **Water Stains**
Check the inside of the cabinet for any signs of water intrusion. Pay special attention to the area around the eye bolt holes
- **Electrical Components**
Check all electrical components closely for signs of corrosion.

If any of the above conditions are present, take action to correct the situation.

4.21 Cleaning the Signal Connectors

If it becomes necessary to remove or replace a signal cable, clean the plugs and the circuit board jacks with DeoxIT (Daktronics part number CH-1015). Inspect and clean the jacks and plugs thoroughly to ensure the absence of any foreign matter. The presence of dirt or water may cause signal interconnect problems.

After cleaning the parts, push the plug into a jar of CaiLube (Daktronics part number CH-1019), ensuring the paste wets the plug to a depth of at least 1/8" on all four sides. Also, check to make sure all of the pinholes of the plug fill with paste and that sufficient paste is present to form a "V" on the

end of the plug. There should be enough paste on the end of the plug to form a weatherproof seal (from the paste pushed out around the jack) when the plug inserts into the circuit board jack.

DeoxIT is the electrical contact cleaner in an aerosol can and CaiLube is the electrical contact lubricant and protector paste in a 1 oz jar. Both are in the *Tool Kit Accessories* package. CaiLube also comes in an 8 oz jar (Daktronics part number CH-1021). If needing additional supplies, contact Customer Service for ordering information.

4.22 Modem/FCC Regulations

The modem on the Venus interface complies with Part 68 of the FCC rules and regulations. With each device shipped, a label contains, among other information, the FCC Registration number and Ringer Equivalence Number (REN) for this product. Upon request, the customer must provide this information to the telephone company.

The REN is useful to determine the number of devices that may connect to a telephone line and still have all devices ring when the number is called. In most, but not all areas, the sum of the RENs of all of these devices connected to one line should not exceed five. To be certain of the number of devices that may connect to the line, as determined by the REN, the customer should contact the local telephone company to determine the maximum REN for the calling area.

If the system causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, they will notify the customer in advance. If advance notification is not practical, the telephone company will notify the customer as soon as possible. The telephone company may make changes in its facilities, equipment, operations or procedures that could affect proper functioning of the equipment. If the telephone company does this, it will notify the customer in advance to give ample opportunity to maintain uninterrupted telephone service.

If trouble occurs with this device, please contact Daktronics customer service for information on obtaining service or repairs. The telephone company may ask to disconnect this device from the network until it has corrected the problem or until it is certain the device is not malfunctioning.

Do not use the device on coin service lines provided by the telephone company (this does not apply to private coin telephone applications which use standard telephone lines). Connection to party lines is subject to state tariffs.

4.23 Troubleshooting Checklist – Line Receiver Displays

If the display has a line receiver, the following table covers a few problems that you may encounter while operating the display, along with a cause/remedy. While this list does not cover every possible problem, it does list those that are most likely to occur.

Problem	Possible Cause/Solution
One or more lamps will not light.	<ul style="list-style-type: none"> • Replace the lamp. • Replace the socket. • Replace the lampbank.
One or more lamps will not turn off.	<ul style="list-style-type: none"> • Check for metallic foreign objects on the lampbank causing a short. • Replace the lampbank.
Not all of one row of modules, or part of one row of modules, is working.	<ul style="list-style-type: none"> • Check for a bad vertical shift board (VSB) by swapping in a known good vertical shift board. • Replace the ribbon cable from the VSB to the underlying lampbank. • Check appropriate breaker in panelboard. • Check for 120 VAC incoming display power. • Replace the last working lampbank in that row.
Garbled display or shifted sequence.	<ul style="list-style-type: none"> • Set computer and line receiver to high line feed. • Double check line receiver is set for correct display size. • Replace line receiver.
Entire display does not work	<ul style="list-style-type: none"> • Check for 120 VAC incoming display power. • Check fuse in fan control enclosure. • Check line receiver indicator LEDs. • Check all signal connections.
Single module does not work	<ul style="list-style-type: none"> • Check signal connection. • Check power connections. • Check appropriate breaker in panelboard. • Check in-line transformer fuse. • Replace lampbank.
Display works for a short time and then blanks.	<ul style="list-style-type: none"> • Check that all fans are operational and running at full RPM. • Check that filters are not plugged and limiting airflow.

4.24 Troubleshooting Checklist – Data Distributor Displays

If the display has a data distributor, the following table covers a few possible problems that you may encounter while operating the display, along with a cause/solution. While this list does not cover every possible problem, it does list those that are most likely to occur.

Problem	Possible Cause/Solution
One or more lamps will not light.	<ul style="list-style-type: none"> • Replace the lamp. • Replace the socket. • Replace the lampbank
One or more lamps will not turn off.	<ul style="list-style-type: none"> • Check for metallic foreign objects on the lampbank causing a short. • Check for foreign objects on PC board. • Replace the lampbank
All of one row of modules across the entire display is not working.	<ul style="list-style-type: none"> • Check output card at data distributor. • Replace output card at data distributor. • Check signal cables to first column director in that row. • Replace column director.
A section of the display is not working (multiple rows in a group up to 4 modules long.)	<ul style="list-style-type: none"> • Check signal cables to the column director for that section. • Replace the column director.
A row of modules up to 4 modules long is not working.	<ul style="list-style-type: none"> • Check the signal cable to the line controller in that row. • Replace the line controller.
Garbled display or shifted sequence.	<ul style="list-style-type: none"> • Check RJ45 network cable. • Check output on data distributor output card. • Set computer and line receiver to high line feed.
Single module does not work	<ul style="list-style-type: none"> • Check signal connection (ribbon cable). • Check power connections. • Check appropriate breaker in panelboard. • Check in-line transformer fuse. • Replace lampbank.
Entire display does not respond to any source of data.	<ul style="list-style-type: none"> • Check clear LED on receiver board (if red, data distributor is not getting signal) • Controller may be off • Fiber optic connection may be bad or broken
Display works for a short time and then blanks.	<ul style="list-style-type: none"> • Check that all fans are operational and running at full RPM. • Check that filters are not plugged and limiting airflow.

4.25 Replacement Parts List – Line Receiver Displays

Part Description	Daktronics Part Number
8x16 Lens Reflector Assembly; Starburst	0A-1176-0061
8x16 Lens Reflector Assembly; SunSpot	0A-1176-0062
Electrical Contact Lubricant & Protector, 8 oz. Jar	CH-1021
Fan, 120 Volt, 1060 CFM w/ Capacitor	0A-1176-0012
Fan Controller Card	0P-1176-0003
Fan Filter, 19.62" x 15.62"	0A-1176-0009
Fuse, Line Receiver, MDL- 2 ½, 2 ½ A	F-1002
Fuse, Pwr Harness, MDL-7, ¼" x 1 ¼", Slow-Blow	F-1031
Lamp, T-3 ¼, Wedge Base	DS-1241
Lampbank, 816-10 w/ Xenon Lamp	0P-1176-0002
Lens; Blue - StadiaView	DS-1232
Lens; Green - StadiaView	DS-1234
Lens; Monochrome White - StadiaView	DS-1235
Lens; Red - StadiaView	DS-1233
Lens; Starburst White - StadiaView	DS-1231
Line Receiver Interface Board	0P-1176-0008
Portable Test Fixture, 1 1/2 or 2 1/2 Lampbank, 120 V	0A-1176-0007
Safety Lanyard	0A-1176-0010
Socket, Mini-Wedge Base	X-1209
Transformer (120V), Marquee	T-1107
Vertical Shift Board	0P-1176-0009
Weather Stripping, Pile	HS-1149
Tool Kit – (includes the following items)	0A-1176-0008
Front Access Module Remover Tool	0M-95442
Lamp Voltage Tester	0P-1089-0010
Lamp/Lens Extractor	TH-1032
Electrical Contact Cleaner & Lubricant, 1 oz. Jar	CH-1019
Electrical Contact Cleaner, Spray Can	CH-1015
0.032 Feeler Gauge	0M-69133
Rear Access Tool Module Remover Tool	0M-95441
2-foot, 20-position cable (from VSR to VSR)	0A-1000-0016
3-foot, 20-position cable (from LR to VSR)	0A-1000-0018
5-inch, 20-position cable (module to VSR)	W-1356
12-inch, 20-position cable (8x4 module to 8x4 module)	W-1357
18-inch, 20-position cable (8x8 to 8x8 and 8x16 to 8x16)	W-1387

4.26 Replacement Parts List – Data Distributor Displays

Part Description	Daktronics Part No.
8x16 Lens Reflector Assembly; Starburst	0A-1176-0061
8x16 Lens Reflector Assembly; SunSpot	0A-1176-0062
Electrical Contact Lubricant & Protector (paste) 8oz jar	CH-1021
Column Director Card	0P-1145-0068
Data Distributor Output Card	0P-1145-0078
Data Distributor Receiver Board	0P-1145-0050
Fan, 120 Volt, 1060 CFM w/ Capacitor	0A-1176-0012
Fan Control Expander Card	0P-1176-0010
Fan Controller Card	0P-1176-0003
Fan Filter, 19.62" x 15.62"	0A-1176-0009
Fuse, Power Harness, MDL-7; ¼" x 1 ¼" Slow-Blow	F-1031
Lamp, T-3 ¼, Wedge Base	DS-1241
Lampbank, 816-10 with Xenon Lamp	0P-1176-0001
Lens; Blue - StadiaView	DS-1232
Lens; Green - StadiaView	DS-1234
Lens; Red - StadiaView	DS-1233
Lens; Starburst White - StadiaView	DS-1231
Lens; Monochrome White - StadiaView	DS-1235
Line Controller Card	0P-1145-0044
Portable Test Fixture; 1 ½ & 2 ½ Lampbank, 120V	0A-1176-0007
Safety Lanyard	0A-1176-0010
Socket, Mini-Wedge Base	X-1209
Transformer (120V), Marquee	T-1107
Weather Stripping, Pile	HS-1149
Tool Kit – (includes the following items)	0A-1176-0008
Front Access Module Remover Tool	0M-95442
Lamp Voltage Tester	0P-1089-0010
Lamp/Lens Extractor	TH-1032
Electrical Contact Cleaner & Lubricant, 1 oz. Jar	CH-1019
Electrical Contact Cleaner, Spray Can	CH-1015
0.032 Feeler Gauge	0M-69133
Rear Access Tool Module Remover Tool	0M-95441
5-Inch, 20-Position Cable (LC to Module)	W-1356
12-Inch, 20-Position Cable (8x4 Module to 8x4 Module)	W-1357
18-Inch, 20-Position Cable (8x16 to 8x16 and 8x8 to 8x8)	W-1387
3-Foot, Cat-5 Cable (CD to LC and LC to LC)	W-1382
10-Foot, Cat-5 Cable (CD to CD)	W-1383

Part Description	Daktronics Part No.
Cat-5 Cable from DD to CD (Length Will Vary)	
10-Foot	W-1383
20-Foot	W-1406
30-Foot	W-1446
40-Foot	0A-1000-0101

4.27 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. Daktronics provides this service 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 (1-800 / 843-9879) 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 shipped 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, we will invoice you for the replacement part at the time it ships. This invoice is due when you receive it.

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

If you do not ship the defective equipment to Daktronics within 30 working days from the invoice date, we will assume you are purchasing the replacement part and will invoice you 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, we will credit you 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 normal shipment does not damage it. Either install electronic components such as printed circuit boards in an enclosure or put them 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: 1-800/843-9879
or 1-605/697-4400

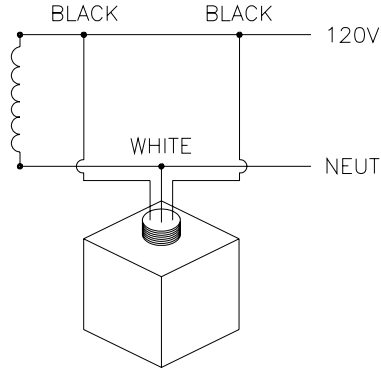
Customer Service Fax: 1-605-697-4444

E-mail: helpdesk@daktronics.com

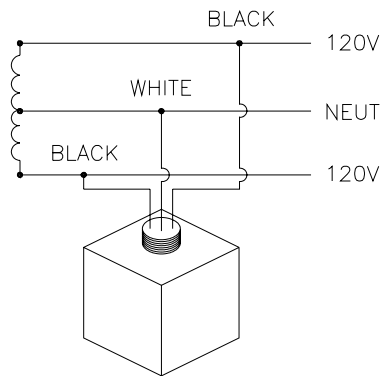
Appendix A: Reference Drawings

The Daktronics drawing number is located in the bottom right corner of the drawing. Refer to **Section 1.1** for information regarding how to read the drawing number.

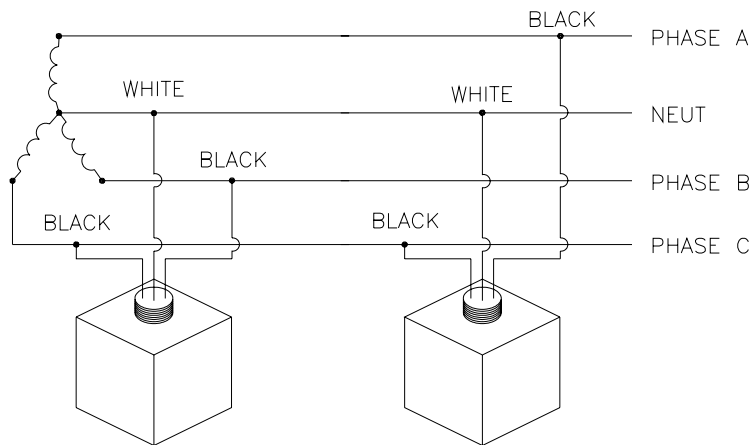
Surge Suppressor Wiring	Drawing A-74902
Correct Lens Position, 1 ½”	Drawing A-75204
Xfrmr Config. (Voltage Taps).....	Drawing A-77128
Lens Assy, Weatherstripping Location, for Manual.....	Drawing A-91100
Lens Removal, Front Access, for Manual Use.....	Drawing A-99898
Lens Assy Removal, Front Access, for Manual Use	Drawing A-99899
Mounting Example, Small Line Displays	Drawing A-101424
Schematic, Power Supply Wiring, LR, Marquee	Drawing A-102918
Pwr Spec's; 8, 16, 24, 32, 40, 48, 56, 64, 72 High Displays	Drawing A-103186
Schematic, Power Wiring, 16 Mil., Sports.....	Drawing A-103345
Schematic, Power Wiring, LR, Sports.....	Drawing A-104272
Line Receiver Settings, 3264-32192, 4064-40192	Drawing A-109450
Line Receiver Settings, 6464-64192, 7264-72192	Drawing A-109648
Line Receiver Settings, 4864-48192, 5664-56192.....	Drawing A-110166
Sectional Display Assembly Example, 120x160	Drawing A-116653
Detail, Data Distributor	Drawing A-117702
Detail, ISO View of Installed DD	Drawing A-118499
Detail, ISO View of DD Installed on Pole	Drawing A-119584
Mtg Example, Full Matrix Message Center	Drawing A-123964
Label, Filter Clearance	Drawing A-141064
Shop Drawing, 32YYY-10 S1600	Drawing B-103031
Shop Drawing, 40YYY-10 S1600	Drawing B-103032
Shop Drawing, 48YYY-10 S1600	Drawing B-102149
Shop Drawing, 56YYY-10 S1600	Drawing B-103034
Shop Drawing, 64YYY-10 S1600	Drawing B-103035
Shop Drawing, 72YYY-10 S1600	Drawing B-103036



TWO-WIRE SERVICE UP TO 175VAC



SINGLE-PHASE THREE-WIRE 120/240VAC

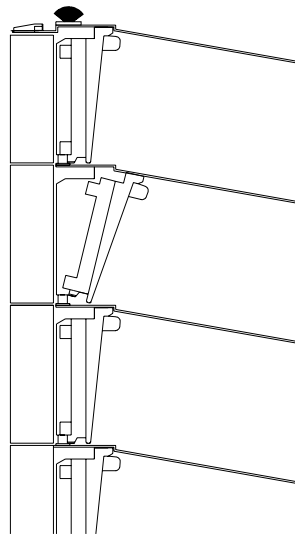


TWO SURGE ARRESTERS ON 208Y/120VAC
THREE-PHASE FOUR-WIRE SERVICE

© COPYRIGHT 1995 DAKTRONICS, INC

DAKTRONICS, INC. BROOKINGS, SD 57006				
PROJ: WIRING DIAGRAM				
TITLE: TWO WIRE/THREE WIRE/TWO SURGE ARRESTERS (A-1129)				
DES. BY:		DRAWN BY: DOK		DATE: 09-13-95
REVISION	APPR. BY:	7000-P08A-74902		
	SCALE: 1=20			

REV.	DATE	DESCRIPTION	BY	APPR.
1	01AUG97	REMOVED GND SYMBOL ON WHT WIRES PER DAN SCHULTE. ADDED DAKTROICS PART NO. TO TITLE	RLONG	



TILT LENS, SET BEHIND LOUVER OFFSET, AND SNAP UP INTO THE VERTICAL POSITION. LENS MUST BE SNAPPED UP IN AND BEHIND UPPER LOUVER OFFSET.

SIDE VIEW

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: 1500 SERIES MESSAGE CENTERS, 1 1/2"

TITLE: CORRECT LENS POSITION, 1 1/2"

DES. BY:

DRAWN BY: MMEISS

DATE: 09-26-95

REVISION

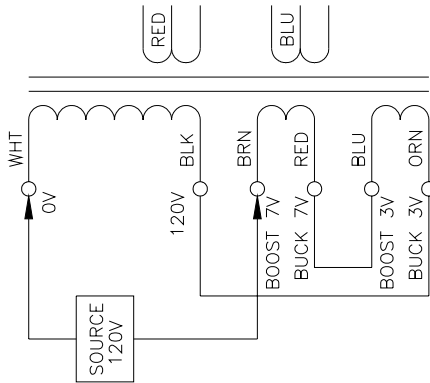
APPR. BY:

SCALE: 1=2

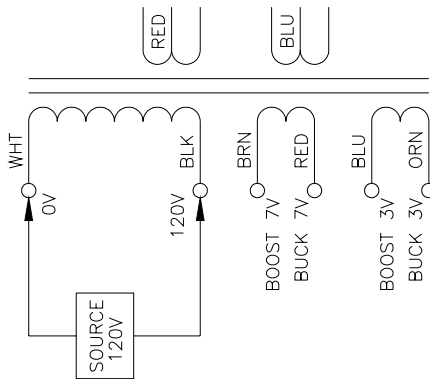
7000-P08A-75204

1	8DEC97	CORRECTED DWG TO CORRECT SCALE	JRT	
REV.	DATE	DESCRIPTION	BY	APPR.

SPORTS NOMINAL
(UP 10)



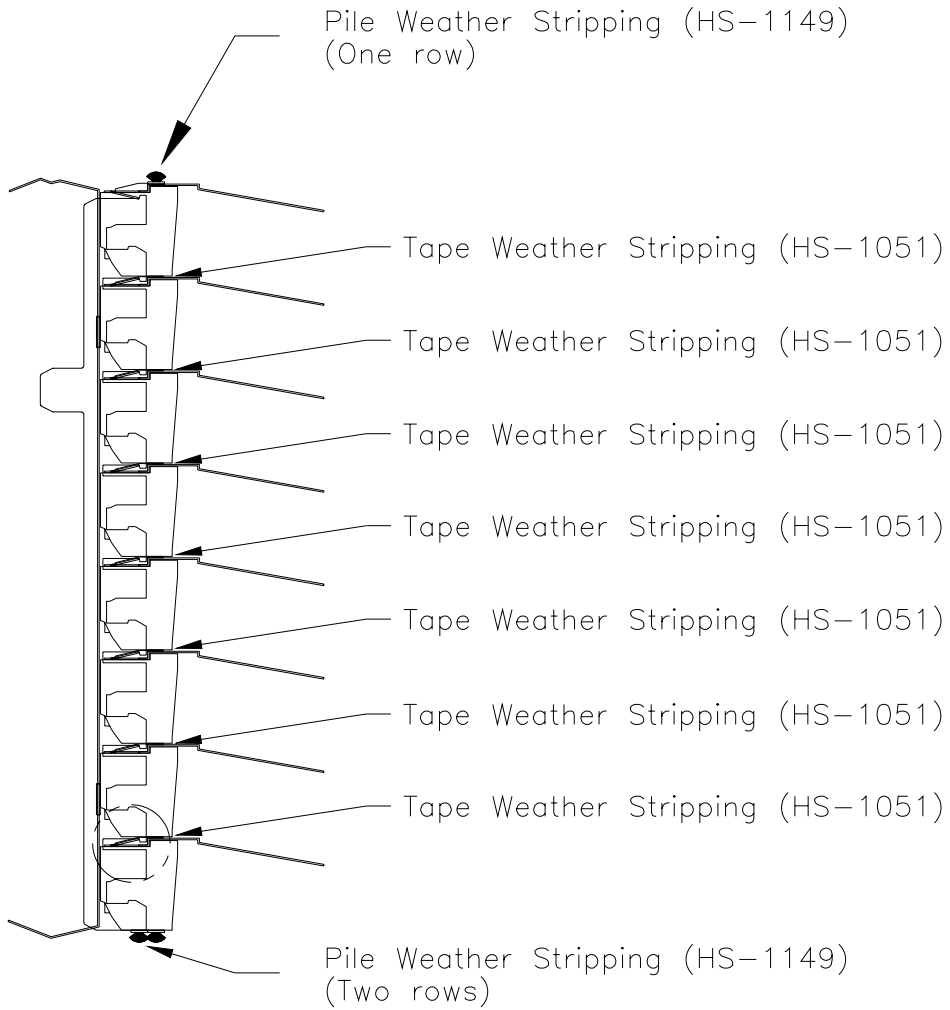
MARQUEE NOMINAL



FOR OPTIONAL POWER SETTING REFER TO DWG A-77129

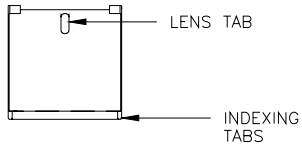
1	14DEC99	ADDED DWG REFERENCE	TGW	JT
REV.	DATE	DESCRIPTION	BY	APPR.

DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: 1600 SERIES MESSAGE CENTERS			
TITLE: XFRMR CONFIG. (VOLTAGE TAPS)			
DES. BY: TWOODARD	DRAWN BY: TWOODARD	DATE: 26JAN98	
REVISION	APPR. BY:	1176-R03A-77128	
	SCALE: 1=1		

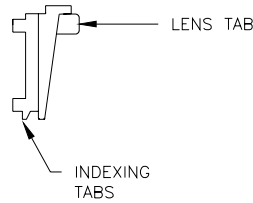


SIDE VIEW OF LENS/REFLECTOR ASSY

DAKTRONICS, INC. BROOKINGS, SD 57006				
PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"				
TITLE: LENS ASSY, WEATHERSTRIPPING LOCATION, FOR MANUAL				
DES. BY:		DRAWN BY: JRT		DATE: 15JAN98
REV.	DATE	DESCRIPTION	BY	APPR.
REVISION			APPR. BY:	1176-R10A-91100
			SCALE: 1=3	

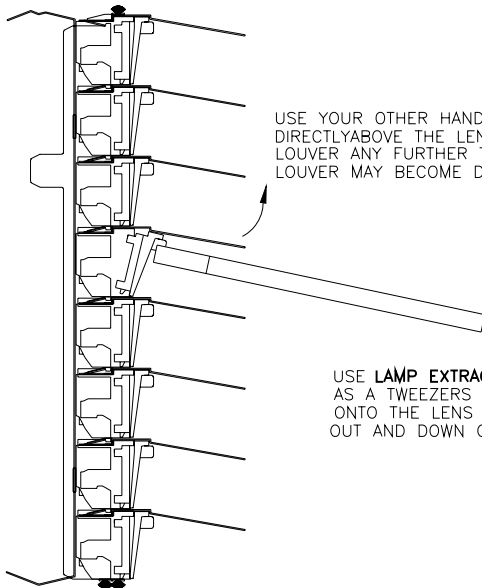


FRONT VIEW



SIDE VIEW

INDEXING TABS: THE SLOTS IN THE BOTTOM OF THE REFLECTOR ACCOMMODATE THE LENS INDEXING TABS. TO INSERT A LENS, SET THE TABS INTO THE REFLECTOR SLOTS AND SNAP THE LENS UP INTO THE VERTICAL POSITION.



USE YOUR OTHER HAND TO LIFT UP ON THE LOUVER DIRECTLY ABOVE THE LENS (**DO NOT** PRESS UP ON THE LOUVER ANY FURTHER THAN NECESSARY OR THE LOUVER MAY BECOME DEFORMED).

USE **LAMP EXTRACTING TOOL** AS A TWEEZERS TO GRASP ONTO THE LENS TAB. PULL OUT AND DOWN ON THE TAB.



RUBBER-TIPPED
LAMP EXTRACTING TOOL
DAK PART No. TH-1032

SIDE VIEW OF LENS/REFLECTOR ASSY

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"

TITLE: LENS REMOVAL, FRONT ACCESS, FOR MANUAL USE

DES. BY:

DRAWN BY: JRT

DATE: 15JAN98

REVISION

APPR. BY:

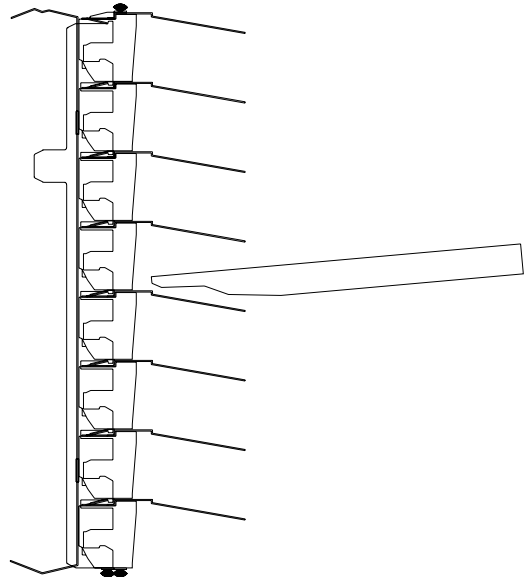
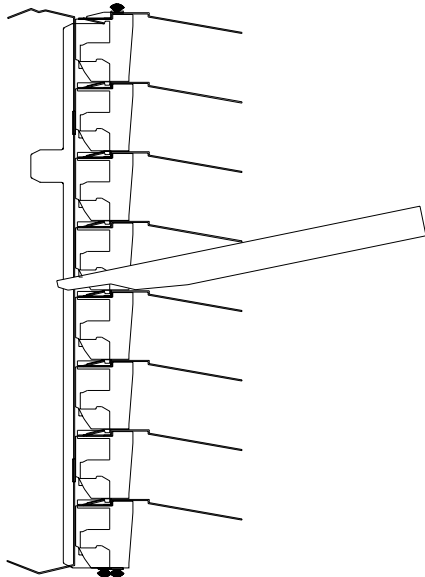
SCALE: 1=4

1176-R19A-99898

1	27APR98	CORRECTED DWG TITLE FROM "LENS ASSY REMOVAL" TO "LENS REMOVAL".	JRT	
REV.	DATE	DESCRIPTION	BY	APPR.



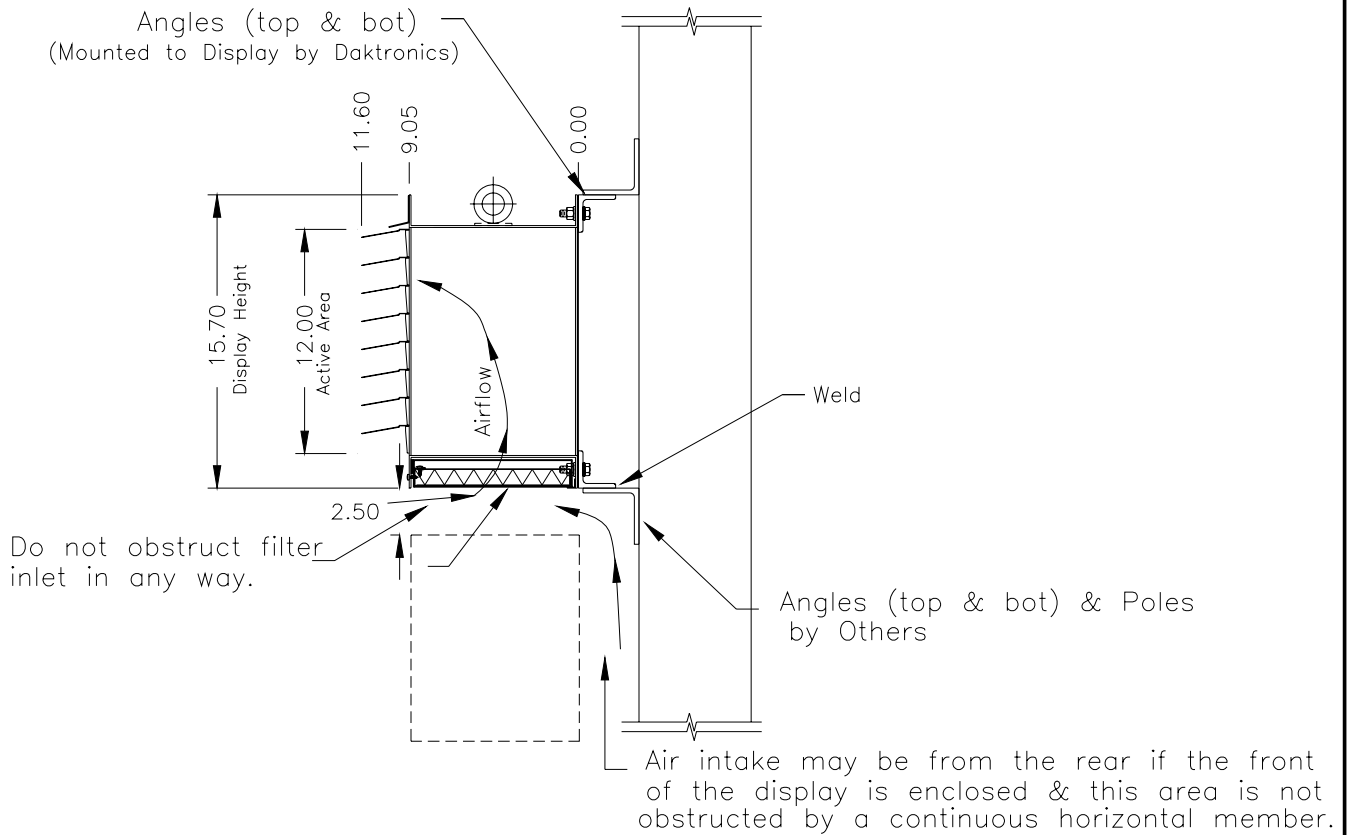
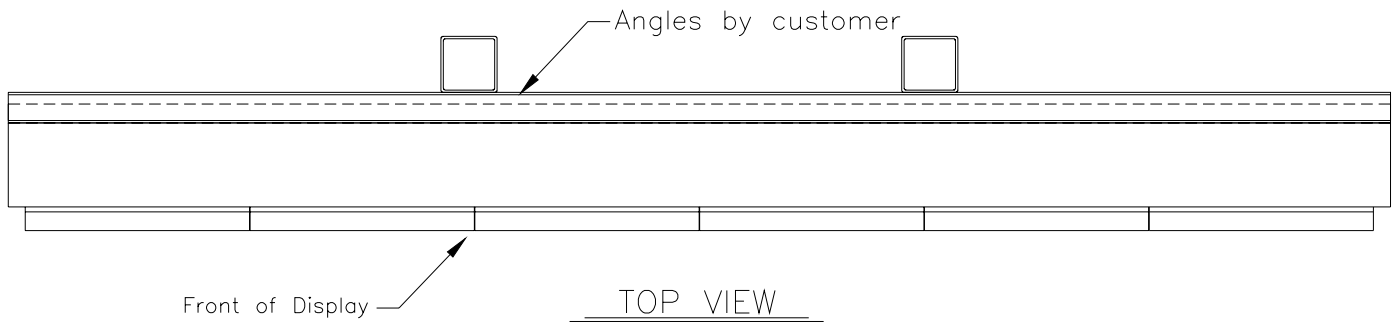
FRONT ACCESS REMOVAL TOOL
DAK PART No. 0M-95442



SIDE VIEW OF LENS/REFLECTOR ASSY

REV.	DATE	DESCRIPTION	BY	APPR.
------	------	-------------	----	-------

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"	
TITLE: LENS ASSY REMOVAL, FRONT ACCESS, FOR MANUAL USE	
DES. BY:	DRAWN BY: JRT
DATE: 15JAN98	
REVISION	APPR. BY:
	SCALE: 1=4
1176-R10A-99899	



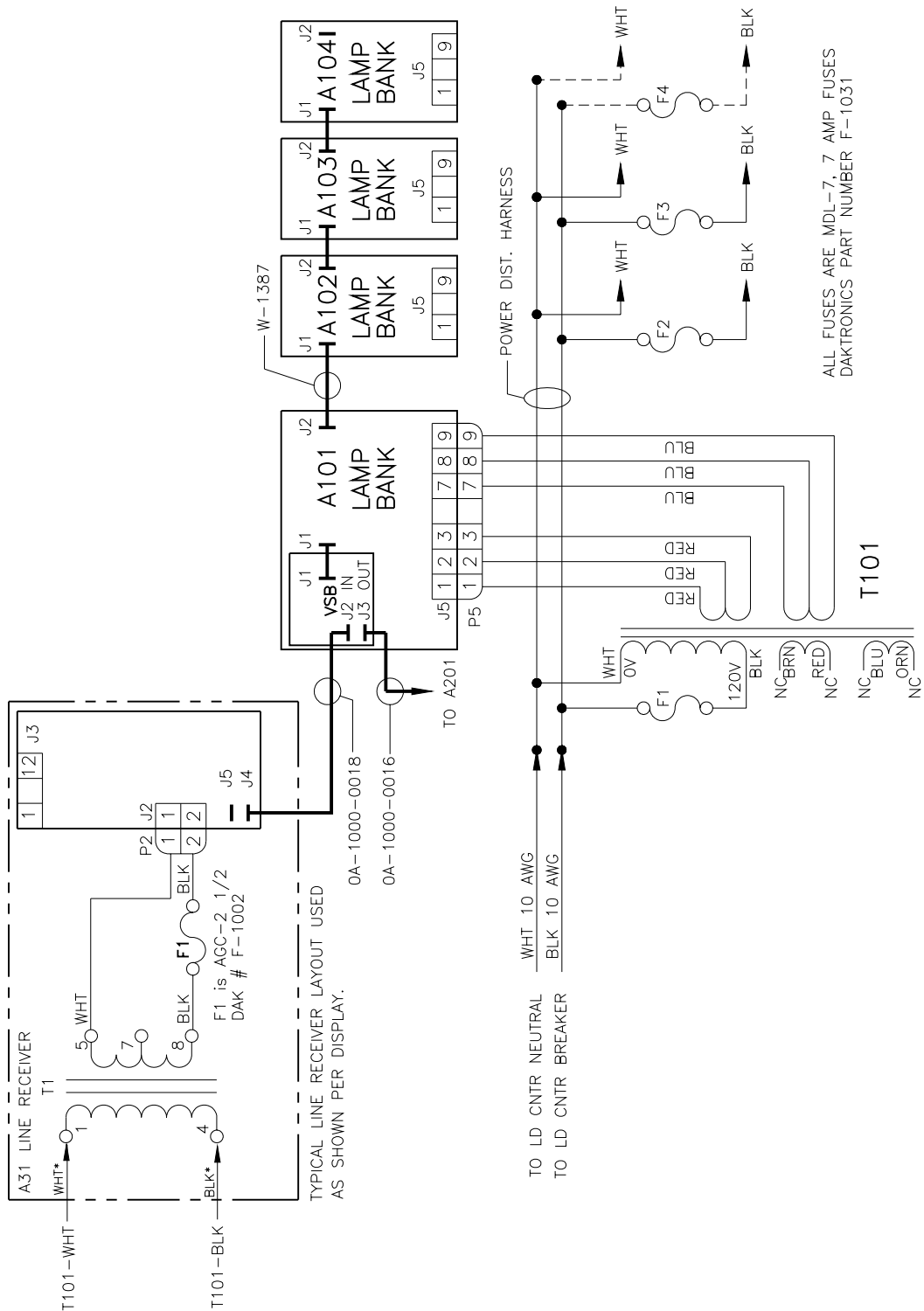
SIDE VIEW

Scale: 1=10

Notes:

1. 2 1/2" of clearance between the bottom of the display & any other display/obstruction below is required for filter access & air intake.
2. The gap between displays may be shrouded if air is allowed to enter from the rear.
3. Filter can be accessed only from the front of the display.

3	29SEP99	CORRECTED 2.25 TO 2.50 FILTER CLEARANCE.	JRT		DAKTRONICS, INC. BROOKINGS, SD 57006	
2	27Jul98	ADDED NOTES.	JRT		PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"	
1	15APR98	ADD ACTIVE AREA & DISPLAY HEIGHT	JRT		TITLE: MOUNTING EXAMPLE, SMALL LINE DISPLAYS	
REV.	DATE	DESCRIPTION	BY	APPR.	DES. BY:	DRAWN BY: JRT DATE: 9APR98
					REVISION	APPR. BY: SCALE: 1=20
						1176-R10A-101424



ALL FUSES ARE MDL-7, 7 AMP FUSES
DAKTRONICS PART NUMBER F-1031

TYPICAL POWER WIRING

NOTES:
 ALL WIRING IS 10 AWG EXCEPT * IS 14 AWG
 UNLESS OTHERWISE NOTED.
 REFER TO DWG B-94930 FOR CABLE ROUTING
 OF POWER DIST. HARNESS FROM LOAD CENTER
 REFER TO STANDARD OR CONTRACT LAYOUT
 DRAWING FOR LOAD CENTER BREAKER ASSIGNMENTS,
 MODULE DESIGNATIONS, SECTION LAYOUT
 AND TRANSFORMER LOCATIONS.

REV.	DATE	DESCRIPTION	BY	APPR.
4	27JAN00	SWAPPED RED AND BLU WIRES ON SECONDARY SIDE OF TRANSFORMER	RLONG	
3	01OCT98	CHANGED T1 ON LINE RECEIVER TO MATCH T1 ON LINE DISPLAYS	RLONG	
2	15SEP98	ADDED A31 LINE RECEIVER	RLONG	
1	25JUN98	CHANGED LABELING OF TRANSFORMER FROM NUMBER TO COLORS. ADDED MARQUEE TO TITLE BLOCK	RLONG	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"

TITLE: SCHEMATIC, POWER WIRING, LR, MARQUEE

DES. BY: TWOODARD DRAWN BY: RLONG DATE: 19MAY98

REVISION APPR. BY:

SCALE: 1=1

1176-R03A-102918

SINGLE FACE MESSAGE CENTER DISPLAYS

MATRIX SIZE	120/208 3 PHASE 4 WIRE PLUS GROUND (IN AMPS)		120/240 SINGLE PHASE 3 WIRE PLUS GROUND (IN AMPS)		TOTAL WATTS	
	MARQUEE	SPORTS	MARQUEE	SPORTS	MARQUEE	SPORTS
8 X 48	5	6	11	12	1920	2235
8 X 64	11	12	11	12	2560	2980
8 X 80	11	12	16	19	3200	3725
8 X 96	11	12	16	19	3840	4470
8 X 112	16	19	21	25	4480	5215
8 X 128	16	19	21	25	5120	5960
8 X 144	16	19	27	31	5760	6705
16 X 48	11	12	16	19	3840	4470
16 X 64	19	19	21	25	5120	5960
16 X 80	21	25	27	31	6400	7450
16 X 96	21	25	32	37	7680	8940
16 X 112	27	31	37	43	8960	10429
16 X 128	32	37	43	50	10240	11919
16 X 144	32	37	48	56	11520	13409
24 X 48	16	19	27	31	5760	6705
24 X 64	21	25	32	37	7680	8940
24 X 80	27	31	43	50	9600	11174
24 X 96	32	37	48	56	11520	13409
24 X 112	37	43	59	68	13440	15644
24 X 128	43	50	64	74	15360	17879
24 X 144	48	56	75	87	17280	20114
32 X 80	43	50	64	74	13182	15282
32 X 96	46	53	67	78	15742	18262
32 X 112	64	75	85	99	18493	21433
32 X 132	64	75	90	104	21053	24413
32 X 144	70	81	107	124	23804	27584
40 X 80	51	59	72	83	16381	18901
40 X 96	64	74	85	99	19772	22924
40 X 112	64	74	107	121	22972	26332
40 X 128	85	99	111	129	26172	30372
40 X 144	85	99	128	149	29563	34289
48 X 80	64	74	85	99	19964	22904
48 X 96	69	79	107	124	23612	27392
48 X 112	85	99	117	137	27451	31862
48 X 128	92	106	134	155	31483	36523
48 X 144	107	124	149	174	35322	40993
56 X 80	64	74	107	121	22972	26332
56 X 96	85	99	119	137	27643	32054
56 X 112	97	111	140	161	32123	37163
56 X 128	107	124	156	180	36602	42482
56 X 144	123	143	179	207	41273	47888
64 X 80	85	99	111	129	26172	30372
64 X 96	92	106	134	155	31483	36523
64 X 112	107	124	157	182	36794	42674
64 X 128	128	149	180	208	42106	48826
64 X 144	138	159	202	233	47225	54785
72 X 80	85	99	128	149	29563	34289
72 X 96	107	124	149	174	35322	40993
72 X 112	123	143	179	207	41273	47888
72 X 128	138	159	202	233	47225	54785
72 X 144	149	174	226	261	53368	61873

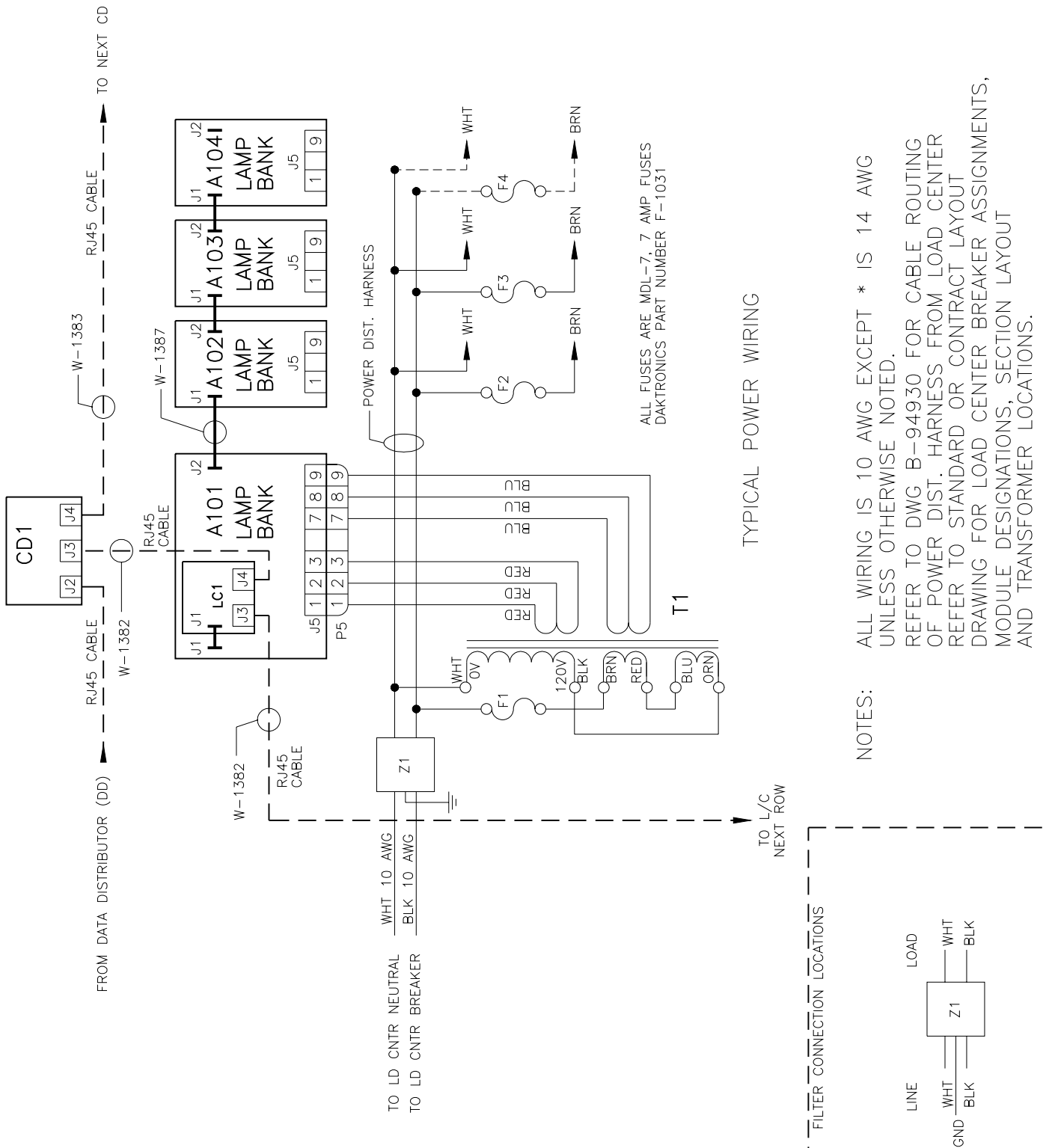
ABOVE CHART IS FOR SINGLE FACE DISPLAY. FOR DOUBLE FACE OR 2V DISPLAYS,
EACH DISPLAY FACE WILL REQUIRE POWER AS IF IT WERE A SINGLE FACE DISPLAY.

3	14JAN00	CHGD 2496 MARQUEE TOTAL WATTS FROM 1150 TO 11520.	JRT	
2	10JUL98	CHANGED SPORTS 8X48 120/208 FROM 3 TO 6.	RLONG	
1	30JUN98	ADDED PWR SPECS FOR 32, 40, 48, 56, 64, AND 72 MATRIX.	RLONG	
REV.	DATE	DESCRIPTION	BY	APPR.

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ:	1600 SERIES MESSAGE BOARDS
TITLE:	PWR SPEC'S: 8, 16, 24,32,40,48,56,64,72 HIGH DISPLAYS
DES. BY:	TWOODARD
DRAWN BY:	RLONG
DATE:	05JUN98
REVISION	APPR. BY:
SCALE:	1=1
1176-R01A-103186	

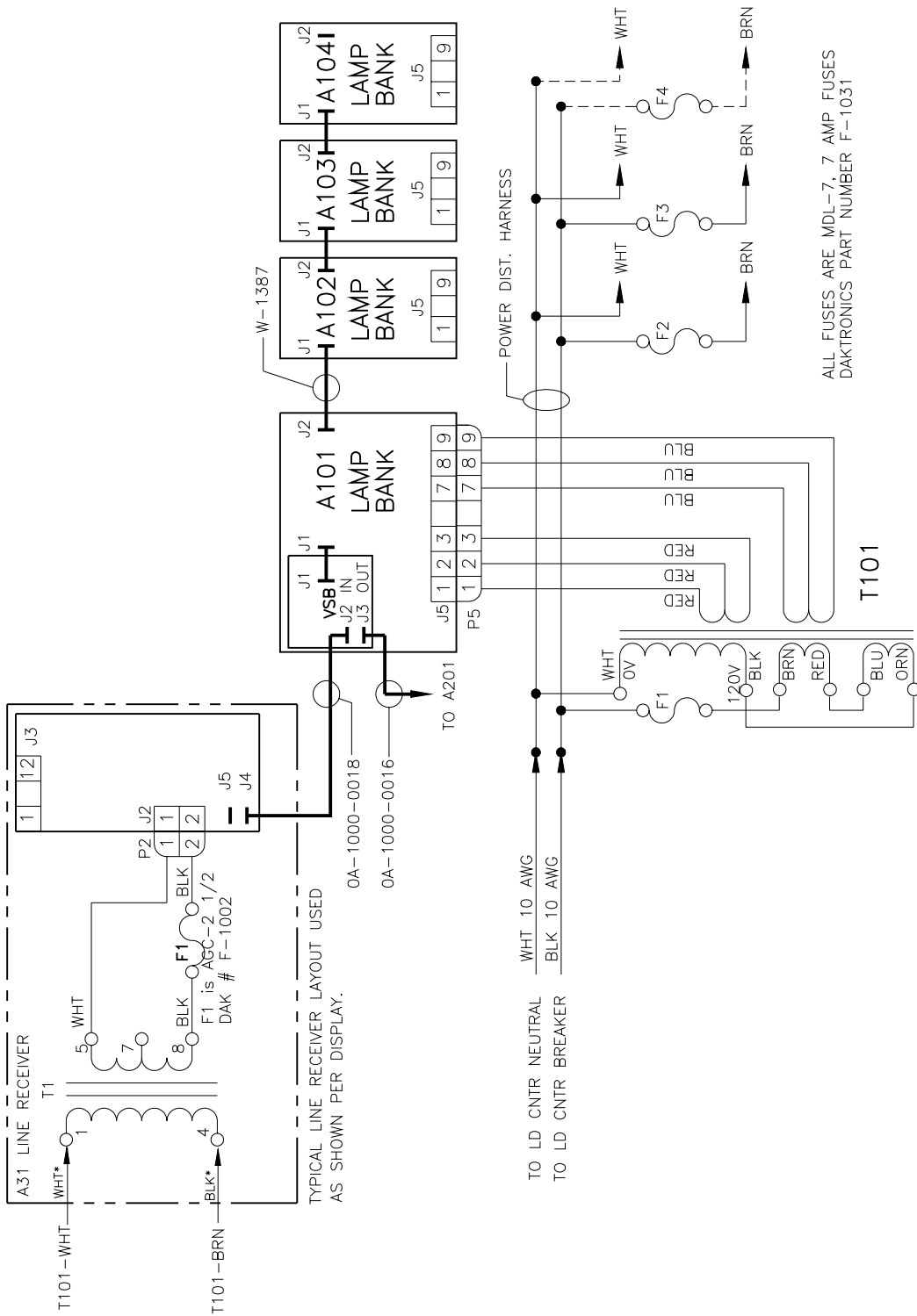
REV.	DATE	DESCRIPTION	BY	APPR.
4	27JAN00	SWAPPED RED AND BLUE WIRES ON SECONDARY SIDE OF TRANSFORMER.	RLONG	
3	29APR99	ADDED LINE FILTER TO POWER WIRING AND FILTER DETAIL	JSO	
2	05AUG98	CHANGED CD1 FROM J4, J3, J3, TO J2, J3, J4	RLONG	
1	25JUN98	CHANGED NUMBERING OF TRANSFORMER TO WIRE COLORS.	RLONG	

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"	
TITLE: SCHEMATIC, POWER WIRING, 16 MIL, SPORTS	
DES. BY: TWOODARD	DRAWN BY: RLONG
DATE: 02JUN98	
REVISION	APPR. BY:
SCALE: 1 = 1	
1176-R03A-103345	



REV.	DATE	DESCRIPTION	BY	APPR.
4	27JAN00	SWAPPED RED AND BLUE WIRES ON SECONDARY SIDE OF TRANSFORMER.	RLONG	
3	29APR99	ADDED LINE FILTER TO POWER WIRING AND FILTER DETAIL	JSO	
2	05AUG98	CHANGED CD1 FROM J4, J3, J3, TO J2, J3, J4	RLONG	
1	25JUN98	CHANGED NUMBERING OF TRANSFORMER TO WIRE COLORS.	RLONG	

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"	
TITLE: SCHEMATIC, POWER WIRING, 16 MIL, SPORTS	
DES. BY: TWOODARD	DRAWN BY: RLONG
DATE: 02JUN98	
REVISION	APPR. BY:
SCALE: 1 = 1	
1176-R03A-103345	



ALL FUSES ARE MDL-7, 7 AMP FUSES
DAKTRONICS PART NUMBER F-1031

TYPICAL POWER WIRING

NOTES: ALL WIRING IS 10 AWG EXCEPT * IS 14 AWG UNLESS OTHERWISE NOTED.
REFER TO DWG B-94930 FOR CABLE ROUTING OF POWER DIST. HARNESS FROM LOAD CENTER REFER TO STANDARD OR CONTRACT LAYOUT DRAWING FOR LOAD CENTER BREAKER ASSIGNMENTS, MODULE DESIGNATIONS, SECTION LAYOUT AND TRANSFORMER LOCATIONS.

REV.	DATE	DESCRIPTION	BY	APPR.
3	27JAN00	SWAPPED RED AND BLU WIRES ON SECONDARY SIDE OF TRANSFORMER	RLONG	
2	01OCT98	CHANGED LINE RECEIVER T1 TO MATCH LINE DISPLAY WIRING	RLONG	
1	15SEP98	ADDED A31 LINE RECEIVER	RLONG	

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ:	1600 SERIES MESSAGE BOARDS, 1 1/2"
TITLE:	SCHEMATIC, POWER WIRING, LR, SPORTS
DES. BY:	TWOODARD
DRAWN BY:	RLONG
DATE:	25JUN98
REVISION	APPR. BY:
	SCALE: 1 = 1
1176-R03A-104272	

32 HIGH

3264 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	3

3280 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	4

3296 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	5

32112 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	6

32128 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	7

32144 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	8

32160 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	9

32176 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	A

32192 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	3
ROTARY S10	0
ROTARY S11	B

40 HIGH

4064 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	3

4080 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	4

4096 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	5

40112 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	6

40128 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	7

40144 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	8

40160 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	9

40176 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	A

40192 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	4
ROTARY S10	0
ROTARY S11	B

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: 1600 SERIES MESSAGE BOARD

TITLE: LINE RECEIVER SETTINGS, 3264-32192, 4064-40192

DES. BY: TWOODARD

DRAWN BY: RLONG

DATE: 12NOV98

REVISION

APPR. BY:

SCALE: 1=1

1176-R01A-109450

REV.	DATE	DESCRIPTION	BY	APPR.
2	29DEC99	CHANGED S3, S4, S7	RLONG	
1	11DEC98	CHANGED DIP S3 ON ALL SWITCH SETTING TO OFF. CHANGED 40 HIGH DIP S6 TO OFF	RLONG	

64 HIGH

6464 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	3

6480 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	4

6496 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	5

64112 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	6

64128 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	7

64144 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	8

64160 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	9

64176 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	A

64192 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	7
ROTARY S10	0
ROTARY S11	B

72 HIGH

7264 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	3

7280 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	4

7296 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	5

72112 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	6

72128 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	7

72144 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	8

72160 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	9

72176 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	A

72192 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	OFF
DIP S6	ON
DIP S7	OFF
DIP S8	OFF
ROTARY S9	8
ROTARY S10	0
ROTARY S11	B

REV.	DATE	DESCRIPTION	BY	APPR.
4	28DEC99	CHANGED S3, S4, S7	RLONG	
3	17MAR99	CHANGED S5 TO OFF AND S6 TO ON FOR 72 HIGH DISPLAYS.	RLONG	
2	14JAN99	CHANGED S5 TO ON AND S6 TO OFF ON 64 HIGH DISPLAYS.	RLONG	
1	11DEC98	CHANGED DIP S3 TO OFF ON ALL SETTINGS. CHANGED DIP S6 TO OFF ON 64 HIGH SETTINGS. CHANGED DIP S5 TO OFF ON 72 HIGH	RLONG	

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARD	
TITLE: LINE RECEIVER SETTINGS, 6464-64192, 7264-72192	
DES. BY: WOODARD	DATE: 18NOV98
DRAWN BY: RLONG	
REVISION	APPR. BY:
SCALE: 1=1	1176-R01A-109648

48 HIGH

4864 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	3

4880 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	4

4896 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	5

48112 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	6

48128 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	7

48144 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	8

48160 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	9

48176 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	A

48192 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	5
ROTARY S10	0
ROTARY S11	B

56 HIGH

5664 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	3

5680 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	4

5696 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	5

56112 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	6

56128 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	7

56144 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	8

56160 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	9

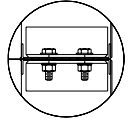
56176 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	A

56192 SWITCH SETTINGS	
DIP S1	ON
DIP S2	OFF
DIP S3 N.U.	OFF
DIP S4 N.U.	OFF
DIP S5	ON
DIP S6	OFF
DIP S7	OFF
DIP S8	OFF
ROTARY S9	6
ROTARY S10	0
ROTARY S11	B

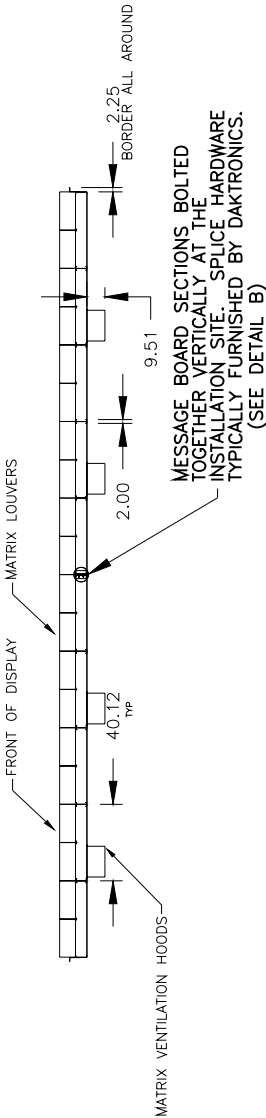
DAKTRONICS, INC. BROOKINGS, SD 57006

REV.	DATE	DESCRIPTION	BY	APPR.
2	28DEC99	CHANGED S3, S4, S7 TO OFF	RLONG	
1	11DEC98	CHANGED DIP S3 & S6 TO OFF	RLONG	

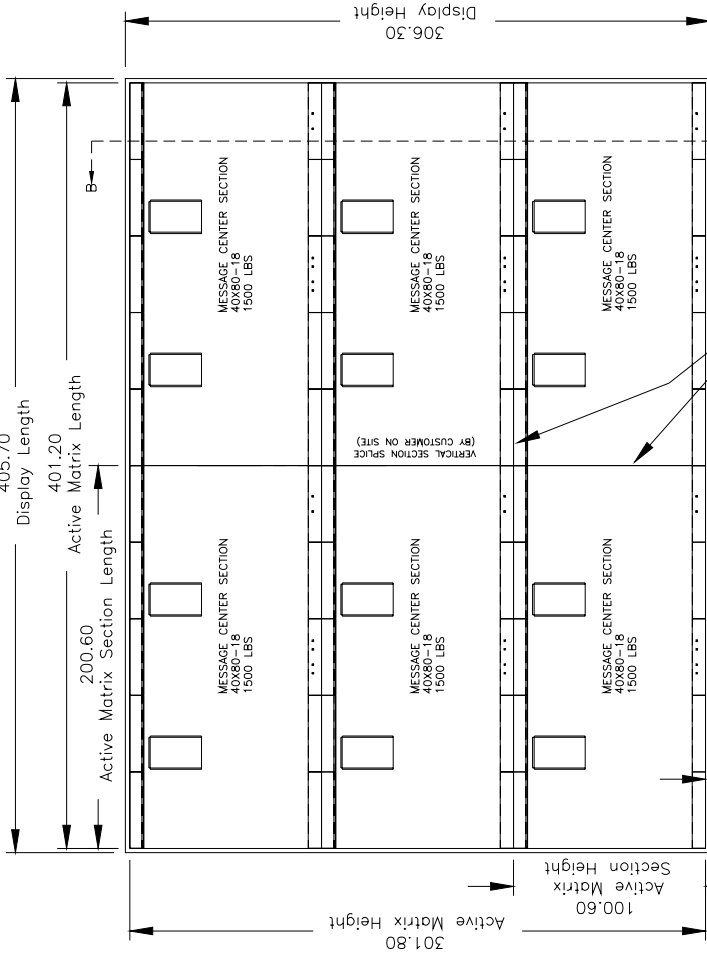
PROJ: 1600 SERIES MESSAGE BOARD	
TITLE: LINE RECEIVER SETTINGS, 4864-48192, 5664-56192	
DES. BY: TWOODARD	DRAWN BY: RLONG
DATE: 08DEC98	
REVISION	APPR. BY:
SCALE: 1=1	1176-R01A-110166



DETAIL B

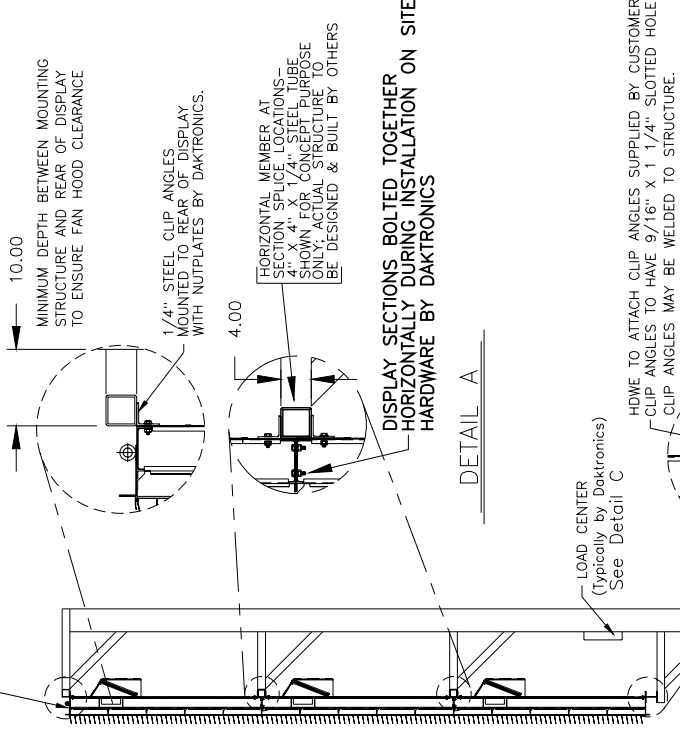


TOP VIEW



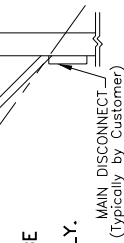
REAR VIEW

DISPLAY SECTIONS MUST BE BOLTED TOGETHER BOTH HORIZONTALLY & VERTICALLY. SEE DETAILS A & B.



DETAIL A

HOW TO ATTACH CLIP ANGLES: SUPPLIED BY CUSTOMER. CLIP ANGLES TO HAVE 9/16" X 1 1/4" SLOTTED HOLE. CLIP ANGLES MAY BE WELDED TO STRUCTURE.



SECTION VIEW B-B

BOTTOM OF DISPLAY TO BE CONTINUOUSLY SUPPORTED.

36.00 Minimum distance required from front of Load Center to Wall to meet NEC.

DETAIL C

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: 1600 SERIES MESSAGE BOARDS, 2 1/2 IN

TITLE: SECTIONAL DISPLAY ASSEMBLY EXAMPLE, 120 X 160

DES. BY: DRAWN BY: JRT DATE: 02JUN99

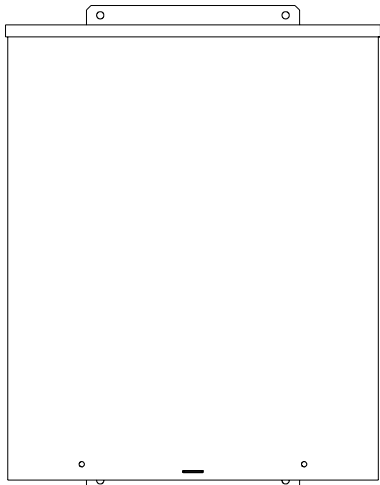
REVISION

APPR. BY:

SCALE: 1=100

1195-R10A-116653

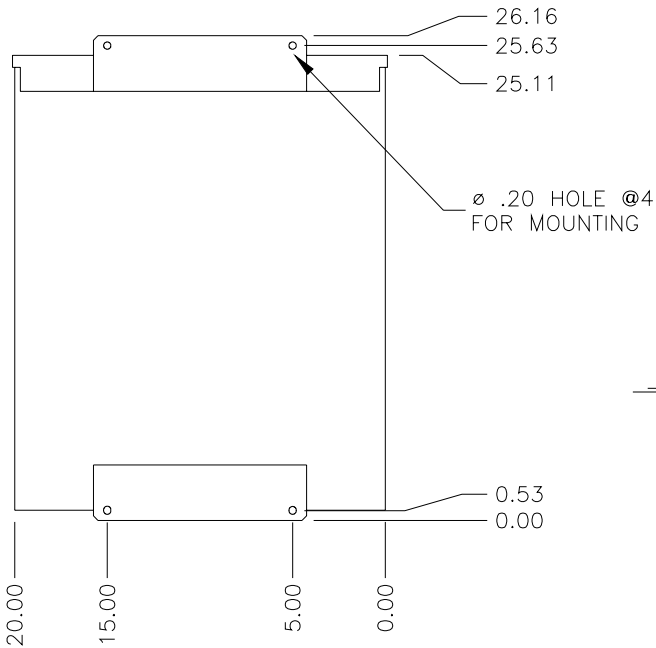
REV.	DATE	DESCRIPTION	BY	APPR.
1	13DEC99	ADDED NOTE "BOTTOM OF DISPLAY TO BE CONTINUOUSLY SUPPORTED."	JRT	



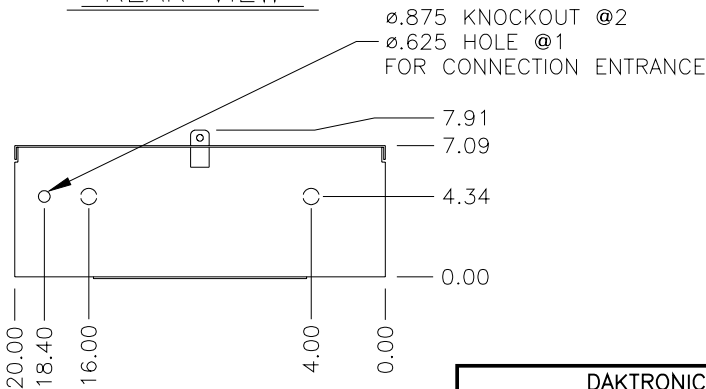
FRONT VIEW



SIDE VIEW



REAR VIEW



BOTTOM VIEW

NOTES:

1. ALL DIMENSIONS ARE IN INCHES.
2. DATA DISTRIBUTOR WEIGHS 25 LBS.
3. ENCLOSURE IS PAINTED GLOSS WHITE.
4. SECURE COVER WITH SCREWS.
5. ENTRANCE OF ALL CONNECTIONS MUST BE THROUGH BOTTOM.
6. DATA DISTRIBUTOR PROVIDED BY DAKTRONICS, BUT REMOTELY MOUNTED BY CUSTOMER.

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: STANDARD DATA DISTRIBUTOR

TITLE: DETAIL, DATA DISTRIBUTOR

DES. BY: RLUTZ

DRAWN BY: JTHURIN

DATE: 24JUN99

REVISION

APPR. BY:

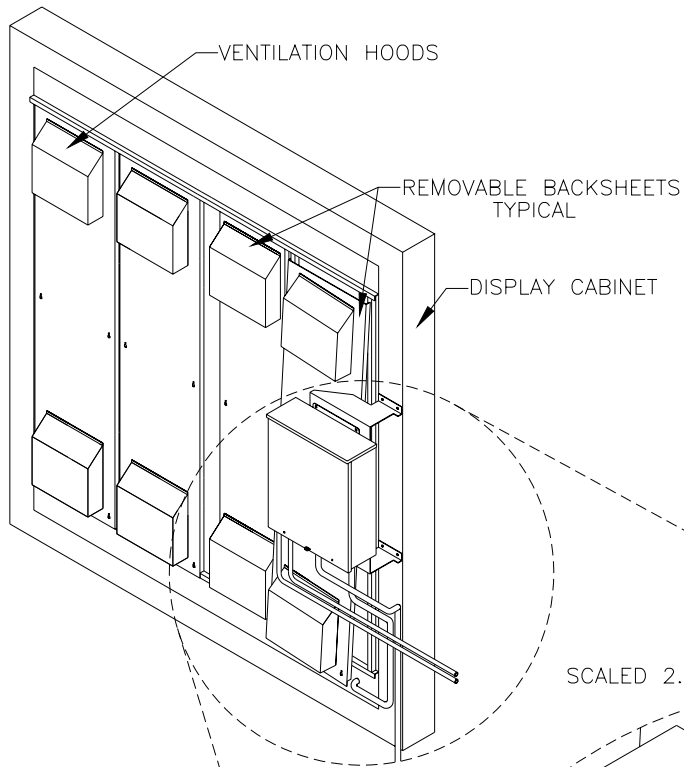
SCALE: 1 = 10

1000-E07A-117702

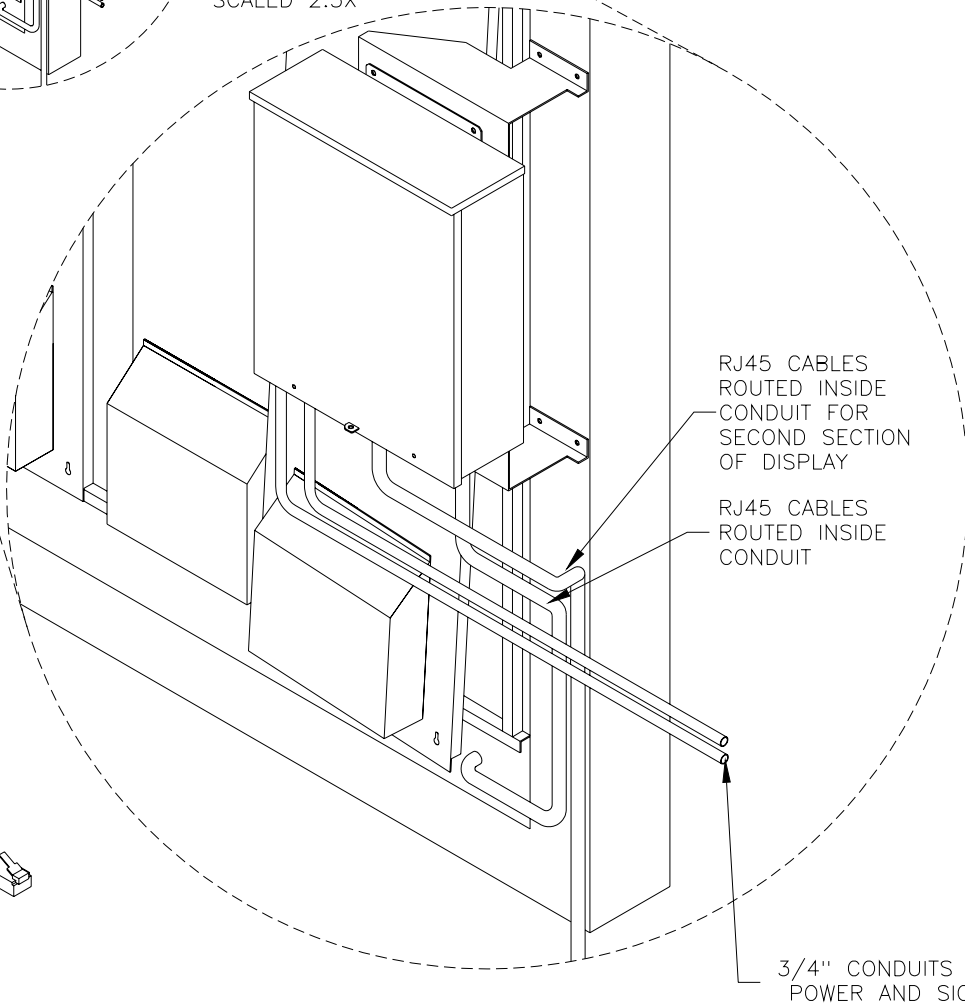
REV.	DATE	DESCRIPTION	BY	APPR.
01	29JUL99	ADDED WEIGHT OF 25 LBS.	JJT	

NOTES:

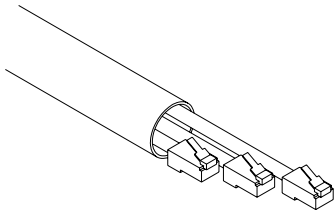
1. DATA DISTRIBUTOR PROVIDED BY DAKTRONICS.
2. DATA DISTRIBUTOR MAY BE FIELD MOUNTED TO STRUCTURE.
3. CONDUIT ROUTING MUST ALLOW FOR REMOVAL OF THE BACKSHEETS.
4. DATA DISTRIBUTOR WEIGHS 25 LBS.
5. ALL CONNECTIONS MUST BE MADE THROUGH BASE OF ENCLOSURE.
6. ENCLOSURE IS PAINTED GLOSS WHITE.
7. SECURE COVER WITH SCREWS.
8. POWER CABLE ROUTED FROM LOAD CENTER.
9. SIGNAL CABLE ROUTED FROM CONTROL ROOM.
10. RJ45 CABLES CAN BE NO LONGER THAN 30 FEET SO ROUTING AND DATA DISTRIBUTOR PLACEMENT MUST COMPLY.
11. DAKTRONICS RECOMMENDS THE USE OF 3/4" CONDUIT FOR UP TO 4 RJ45 CABLES, 1" CONDUIT FOR UP TO 6 CABLES, AND 1 1/4" CONDUIT FOR UP TO 8 CABLES.
12. SEE DETAIL A FOR FOR PLUG POSITIONING DURING CABLE PULLING.
13. DISPLAY AND MOUNTING SHOWN FOR CONCEPT PURPOSES. ACTUAL DISPLAY AND MOUNTING MAY VARY.



SCALED 2.5X

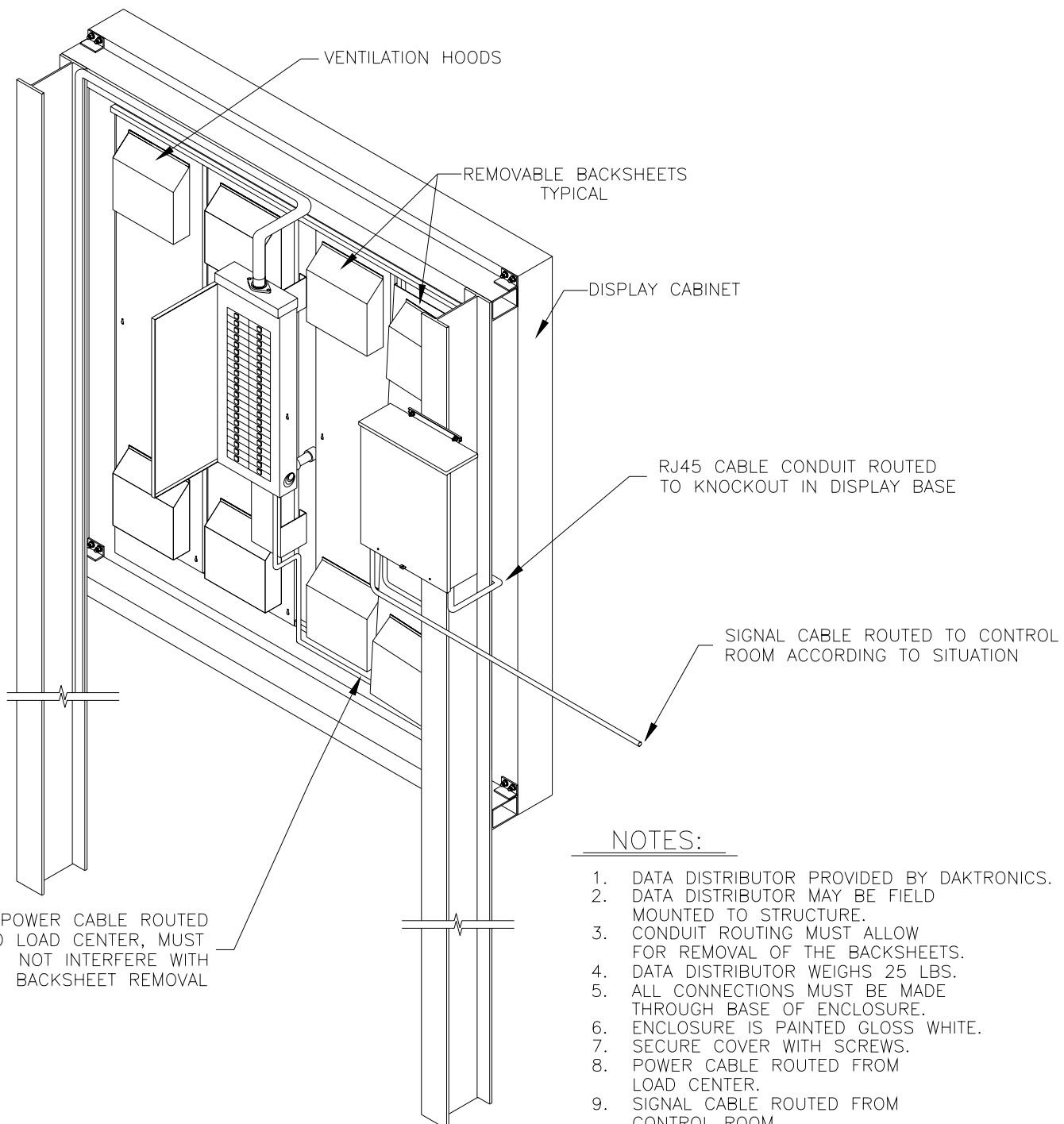


DETAIL A
SCALED 7X



DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: STANDARD DATA DISTRIBUTOR DETAILS	
TITLE: DETAIL, ISO VIEW OF INSTALLED DD	
DES. BY: RLUTZ	DATE: 15JUL99
DRAWN BY: JTHURIN	
REVISION	APPR. BY:
	SCALE: 1=40
1000-E10A-118499	

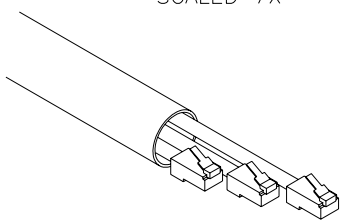
REV.	DATE	DESCRIPTION	BY	APPR.



NOTES:

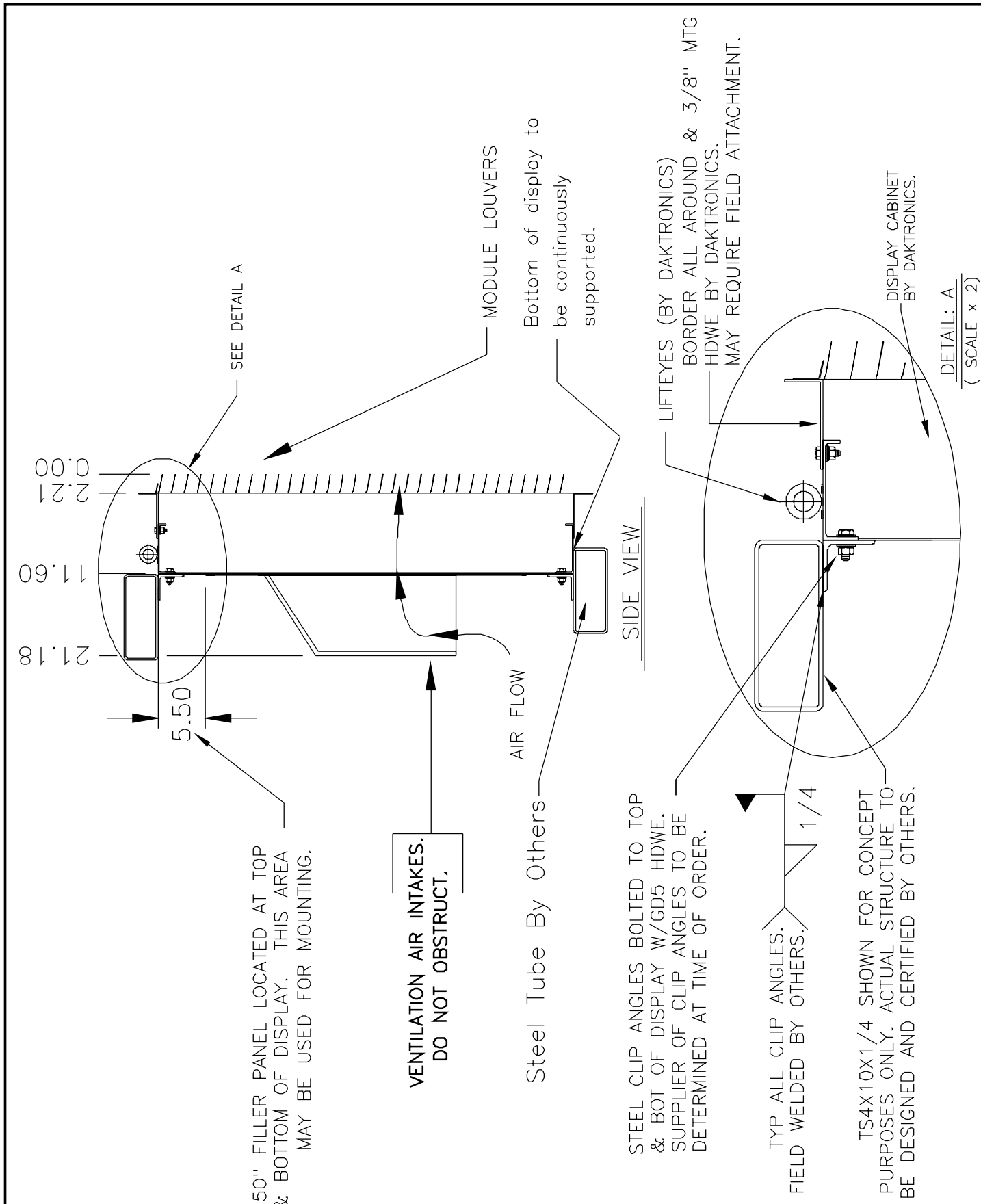
1. DATA DISTRIBUTOR PROVIDED BY DAKTRONICS.
2. DATA DISTRIBUTOR MAY BE FIELD MOUNTED TO STRUCTURE.
3. CONDUIT ROUTING MUST ALLOW FOR REMOVAL OF THE BACKSHEETS.
4. DATA DISTRIBUTOR WEIGHS 25 LBS.
5. ALL CONNECTIONS MUST BE MADE THROUGH BASE OF ENCLOSURE.
6. ENCLOSURE IS PAINTED GLOSS WHITE.
7. SECURE COVER WITH SCREWS.
8. POWER CABLE ROUTED FROM LOAD CENTER.
9. SIGNAL CABLE ROUTED FROM CONTROL ROOM.
10. RJ45 CABLES CAN BE NO LONGER THAN 30 FEET SO ROUTING AND DATA DISTRIBUTOR PLACEMENT MUST COMPLY.
11. DAKTRONICS RECOMMENDS THE USE OF 3/4" CONDUIT FOR UP TO 4 RJ45 CABLES, 1" CONDUIT FOR UP TO 6 CABLES, AND 1 1/4" CONDUIT FOR UP TO 8 CABLES.
12. SEE DETAIL A FOR FOR PLUG POSITIONING DURING CABLE PULLING.
13. DISPLAY AND MOUNTING SHOWN FOR CONCEPT PURPOSES. ACTUAL DISPLAY AND MOUNTING MAY VARY.

DETAIL A
SCALED 7X



DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: STANDARD DATA DISTRIBUTOR DETAILS	
TITLE: DETAIL, ISO VIEW OF DD INSTALLED ON POLE	
DES. BY: RLUTZ	DRAWN BY: JTHURIN DATE: 02AUG99
REVISION	APPR. BY:
SCALE: 1=30	1000-E10A-119584

REV.	DATE	DESCRIPTION	BY	APPR.



5.50" FILLER PANEL LOCATED AT TOP & BOTTOM OF DISPLAY. THIS AREA MAY BE USED FOR MOUNTING.

**VENTILATION AIR INTAKES.
DO NOT OBSTRUCT.**

Steel Tube By Others

STEEL CLIP ANGLES BOLTED TO TOP & BOT OF DISPLAY W/GD5 HDWE. SUPPLIER OF CLIP ANGLES TO BE DETERMINED AT TIME OF ORDER.

TYP ALL CLIP ANGLES. FIELD WELDED BY OTHERS.

TS4X10X1/4 SHOWN FOR CONCEPT PURPOSES ONLY. ACTUAL STRUCTURE TO BE DESIGNED AND CERTIFIED BY OTHERS.

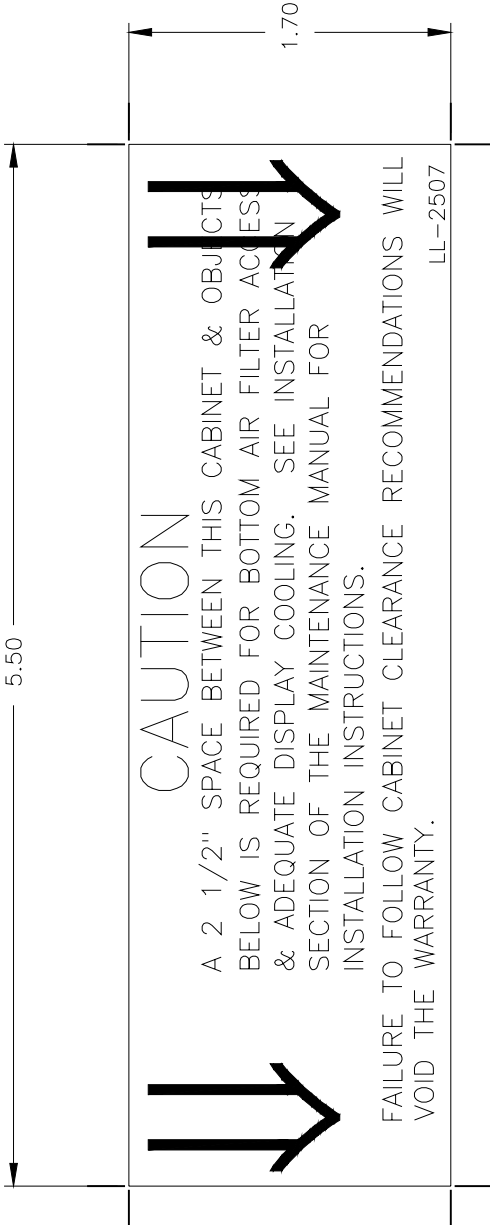
LIFTEYES (BY DAKTRONICS) BORDER ALL AROUND & 3/8" MTG HDWE BY DAKTRONICS. MAY REQUIRE FIELD ATTACHMENT.

DISPLAY CABINET BY DAKTRONICS.

DETAIL: A
(SCALE x 2)

REV.	DATE	DESCRIPTION	BY	APPR.

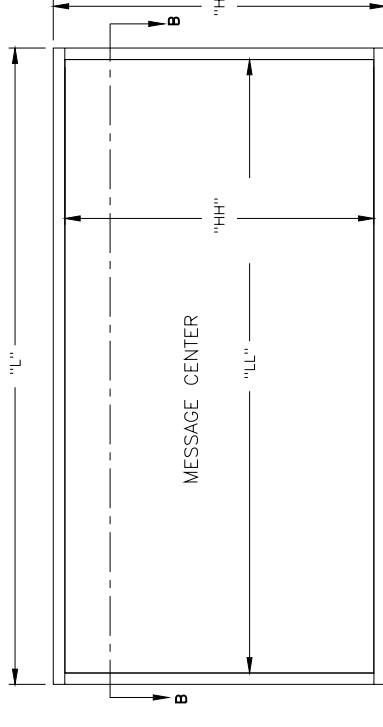
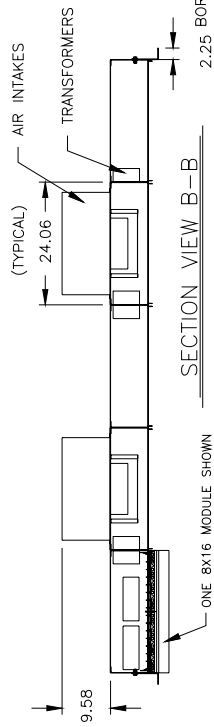
DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS	
TITLE: MTG EXAMPLE, FULL MATRIX MESSAGE CENTER	
DES. BY:	DRAWN BY: JRT
	DATE: 11NOV99
REVISION	APPR. BY:
	SCALE: 1=15
1000-R08A-123964	



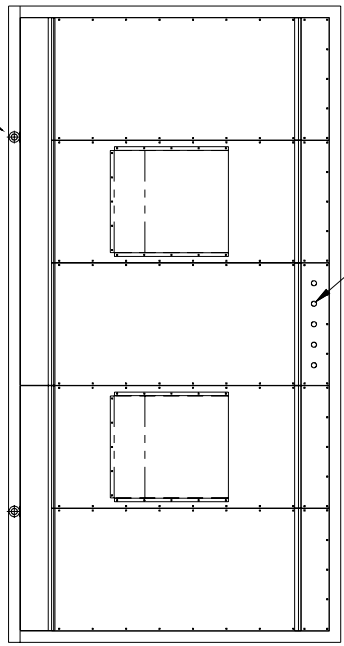
- SPECIFICATIONS:
1. DAKTRONICS PART NUMBER IS LL-2507.
 2. MATERIAL IS ALUMINUM FOIL WITH ACRYLIC ADHESIVE.
 3. COPY IS RIGHT READING ON BLACK BACKGROUND
 4. TEXT IS SILVER.
 5. PAPER BACKING TO BE SPLIT TO FACILITATE REMOVAL.
 6. LABEL TO BE CUT PER DIMENSIONS.

REV.	DATE	DESCRIPTION	BY	APPR.

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS	
TITLE: LABEL, FILTER CLEARANCE	
DES. BY:	DRAWN BY: JRT
DATE: 13NOV00	
REVISION	APPR. BY:
	SCALE: 1 = 1
1195-V08A-141064	



FRONT VIEW
SHOWN WITHOUT MODULES



REAR VIEW

5.50" FILLER PANEL LOCATED AT TOP & BOTTOM OF DISPLAY. THIS AREA MAY BE USED FOR MOUNTING.

VENTILATION AIR INTAKES. DO NOT OBSTRUCT.
Bottom of display to be continuously supported.

Steel Tube & Mtg Angles by Customer

NOTES:

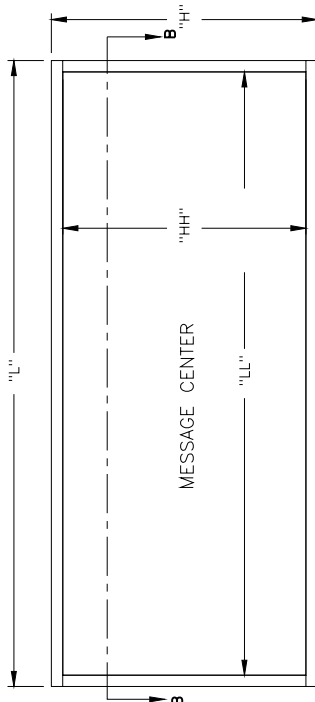
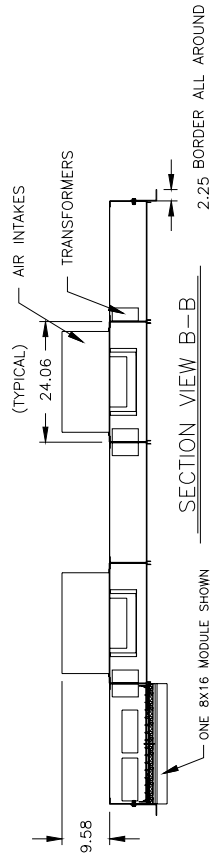
1. DISPLAY IS ALL ALUMINUM CONSTRUCTION
2. DISPLAY CAN BE DESIGNED FOR FRONT OR REAR ACCESS, BUT FROM THE DISPLAY STANDPOINT ONLY, FRONT ACCESS MAY BE MORE EFFICIENT. **YOU MUST SPECIFY FRONT OR REAR ACCESS AT TIME OF ORDER.**
3. LOAD CENTER IS TO BE MOUNTED EXTERNAL TO MOUNTING STRUCTURE.
4. MAIN ELECTRICAL DISCONNECT TO BE FURNISHED BY CUSTOMER
5. AIR INLET HOODS, ON REAR OF DISPLAY, CAN NOT BE OBSTRUCTED.
6. ALL DIMENSIONS ARE IN INCHES.
7. VENTILATION: IN ENCLOSED CABINET SITUATIONS, TWELVE SQ INCHES OF UNOBSTRUCTED OPENING PER MODULE MUST BE PROVIDED TO INSURE ADEQUATE DISPLAY COOLING. ALLOWANCES MUST BE MADE TO COMPENSATE FOR THE PERCENTAGE OF SCREEN IN THE MATERIAL COVERING THE OPENINGS IN THE STRUCTURE. IF AIR MUST BE FORCED INTO THE ENCLOSED CABINET, 120 CUBIC FEET PER MINUTE MUST BE PROVIDED PER MODULE (12" X 24" ACTIVE AREA)
8. DISPLAY WILL BE EQUIPPED WITH EITHER A SERIAL LINE INTERFACE OR A DATA DISTRIBUTOR.
9. CUSTOMER IS RESPONSIBLE FOR THE STRUCTURAL INTEGRITY OF THE STRUCTURE THAT THE DISPLAY IS MOUNTED TO.
10. THE BOTTOM OF A DISPLAY MUST BE CONTINUOUSLY SUPPORTED. THE TOP DISPLAY ATTACHMENT MUST RESIST DISPLAY OVERTURNING AND HALF THE WIND LOAD.
11. **ANY OBJECTS IN THE VICINITY OF THE REAR OF THE DISPLAY MUST ALLOW FOR REMOVAL OF THE BACKSHEETS WHEN NECESSARY FOR MAINTENANCE & SERVICE. THIS IS TO INCLUDE POWER & SIGNAL CONDUIT.**

MODEL	TOTAL DISPLAY		ACTIVE AREA		WEIGHT (SF)	# OF MODULES
	DIM "L"	DIM "H"	DIM "LL"	DIM "HH"		
4080	124.80	65.13	120.30	60.60	1050	25
4096	148.86	65.13	144.36	60.60	1260	30
40112	172.92	65.13	168.42	60.60	1470	35
40128	196.98	65.13	192.48	60.60	1680	40
40144	221.04	65.13	216.54	60.60	1890	45
40160	245.10	65.13	240.60	60.60	2100	50
40176	269.16	65.13	264.66	60.60	2310	55
40192	293.22	65.13	288.72	60.60	2520	60

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"	
TITLE: SHOP DWG. 40YYY-10 S1600	
DES. BY: JRT	DATE: 21MAY98
REVISON	DRAWN BY: JRT
APPR. BY:	SCALE: 1=25
	1176-R08B-103032

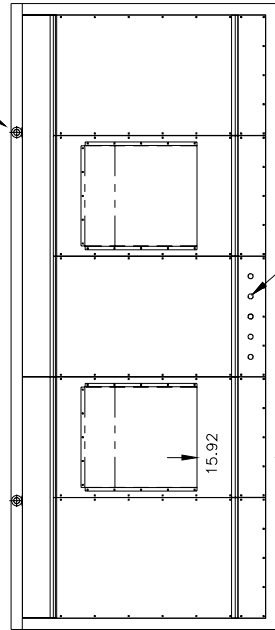
REV.	DATE	DESCRIPTION	BY	APPR.
1	17JUN98	REVISED PER I CONCERNING OBJECTS NEAR REAR OF DISPLAY.	JRT	

Power & Signal Entrance Knockouts. Standard Power Harness Length of 20 feet measured from the bottom centerline of the displays is furnished



FRONT VIEW
SHOWN WITHOUT MODULES

EYE BOLTS PROVIDED FOR
LIFTING DISPLAY (BY DAKTRONICS)

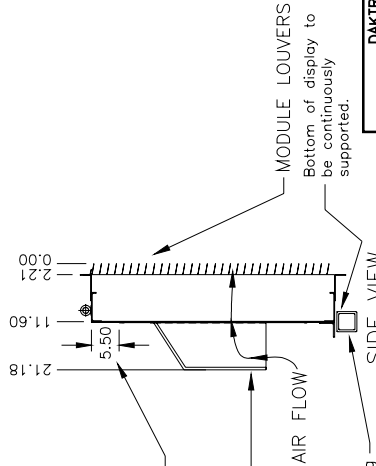


Power & Signal Entrance Knockouts. Standard Power Harness
Length of 20 feet measured from the bottom centerline of the
displays is furnished

5.50" FILLER PANEL LOCATED AT TOP
& BOTTOM OF DISPLAY. THIS AREA
MAY BE USED FOR MOUNTING.

VENTILATION AIR INTAKES.
DO NOT OBSTRUCT.

Steel Tube & Mtg
Angles by Customer



MODEL	TOTAL DISPLAY DIM "L" DIM "H"	ACTIVE AREA DIM "LL" DIM "HH"	WEIGHT (SF)	# OF MODULES
3264	100.74	96.24	560	16
3280	124.80	120.30	700	20
3296	148.86	144.36	840	24
32112	172.92	168.42	980	28
32128	196.98	192.48	1120	32
32144	221.04	216.54	1260	36
32160	245.10	240.60	1400	40
32176	269.16	264.66	1540	44
32192	293.22	288.72	1680	48

NOTES:

- DISPLAY IS ALL ALUMINUM CONSTRUCTION
- DISPLAY CAN BE DESIGNED FOR FRONT OR REAR ACCESS, BUT FROM THE DISPLAY STANDPOINT ONLY. FRONT ACCESS MAY BE MORE EFFICIENT. **YOU MUST SPECIFY FRONT OR REAR ACCESS AT TIME OF ORDER.**
- LOAD CENTER IS TO BE MOUNTED EXTERNAL TO MOUNTING STRUCTURE.
- MAIN ELECTRICAL DISCONNECT TO BE FURNISHED BY CUSTOMER
- AIR INLET HOODS, ON REAR OF DISPLAY, CAN NOT BE OBSTRUCTED.
- ALL DIMENSIONS ARE IN INCHES.
- VENTILATION: IN ENCLOSED CABINET SITUATIONS, TWELVE SQ INCHES OF UNOBSTRUCTED OPENING PER MODULE MUST BE PROVIDED TO INSURE ADEQUATE DISPLAY COOLING. ALLOWANCES MUST BE MADE TO COMPENSATE FOR THE PERCENTAGE OF SCREEN IN THE MATERIAL COVERING THE OPENINGS IN THE STRUCTURE. IF AIR MUST BE FORCED INTO THE ENCLOSED CABINET, 120 CUBIC FEET PER MINUTE MUST BE PROVIDED PER MODULE (12" X 24" ACTIVE AREA)
- DISPLAY WILL BE EQUIPPED WITH EITHER A SERIAL LINE INTERFACE OR A DATA DISTRIBUTOR.
- CUSTOMER IS RESPONSIBLE FOR THE STRUCTURAL INTEGRITY OF THE STRUCTURE THAT THE DISPLAY IS MOUNTED TO.
- THE BOTTOM OF A DISPLAY MUST BE CONTINUOUSLY SUPPORTED. THE TOP DISPLAY ATTACHMENT MUST RESIST DISPLAY OVERTURNING AND HALF THE WIND LOAD.
- ANY OBJECTS IN THE VICINITY OF THE REAR OF THE DISPLAY MUST ALLOW FOR REMOVAL OF THE BACKSHEETS WHEN NECESSARY FOR MAINTENANCE & SERVICE. THIS IS TO INCLUDE POWER & SIGNAL CONDUIT.**

FRG: DAKTRONICS, INC. BROOKINGS, SD 57006
 TITLE: 1600 SERIES MESSAGE BOARDS, 1 1/2"
 DES. BY: JRT
 DRAWN BY: JRT
 DATE: 21MAY98
 REVISION SCALE: 1=25
 APPR. BY: JRT

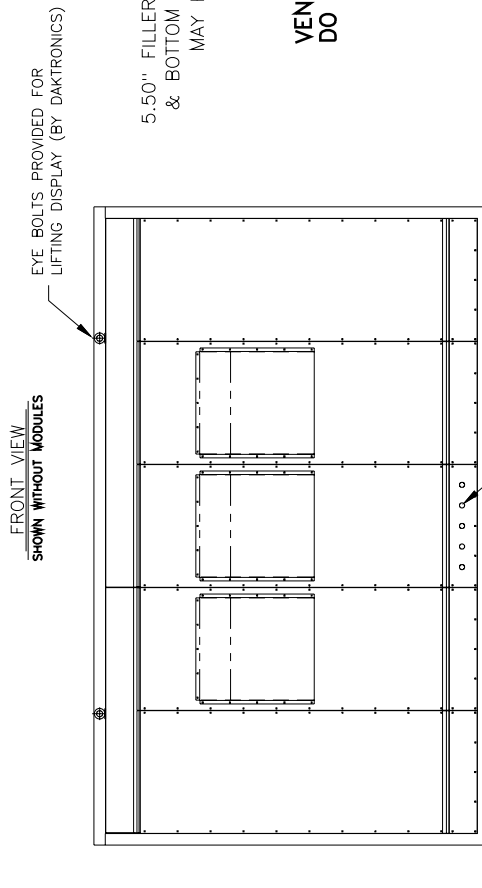
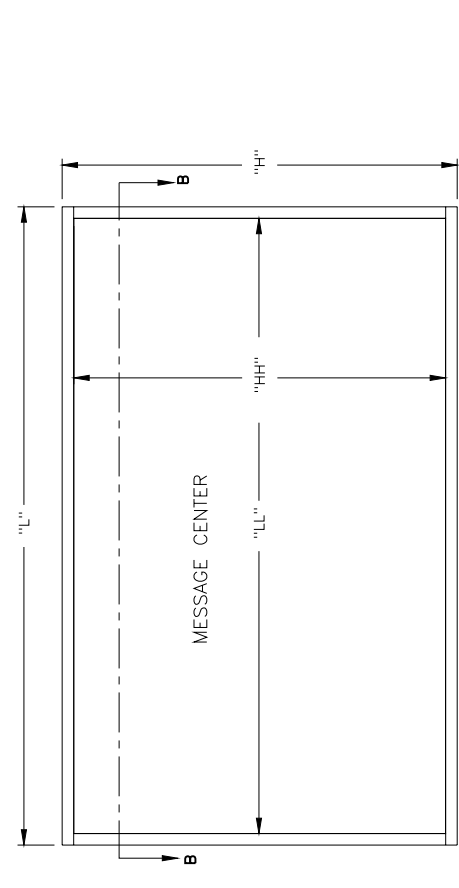
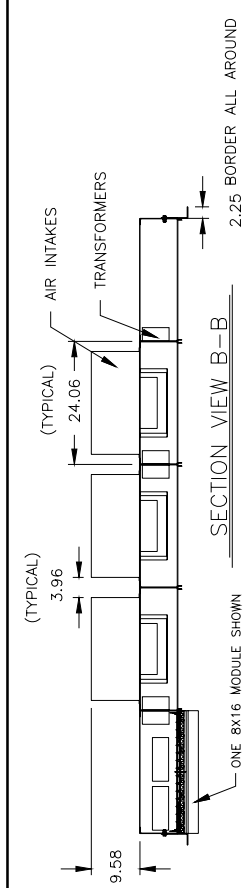
REV.	DATE	DESCRIPTION	BY	APPR.
1	16JUN98	REVISED DRAWING CONCERNING OBJECTS NEAR REAR OF DISPLAY	JRT	

1176-R08B-103031

MODEL	TOTAL DISPLAY		ACTIVE AREA		WEIGHT (SF)	# OF MODULES
	DIM "L"	DIM "H"	DIM "LL"	DIM "HH"		
4880	124.80	77.25	120.30	72.72	1050	30
4896	148.86	77.25	144.36	72.72	1260	36
48112	172.92	77.25	168.42	72.72	1470	42
48128	196.98	77.25	192.48	72.72	1680	48
48144	221.04	77.25	216.54	72.72	1890	54
48160	245.10	77.25	240.60	72.72	2100	60
48176	269.16	77.25	264.66	72.72	2310	66
48192	293.22	77.25	288.72	72.72	2520	72

NOTES:

- DISPLAY IS ALL ALUMINUM CONSTRUCTION
- DISPLAY CAN BE DESIGNED FOR FRONT OR REAR ACCESS, BUT FROM THE DISPLAY STANDPOINT ONLY, FRONT ACCESS MAY BE MORE EFFICIENT. **YOU MUST SPECIFY FRONT OR REAR ACCESS AT TIME OF ORDER.**
- LOAD CENTER IS TO BE MOUNTED EXTERNAL TO MOUNTING STRUCTURE.
- MAIN ELECTRICAL DISCONNECT TO BE FURNISHED BY CUSTOMER
- AIR INLET HOODS, ON REAR OF DISPLAY, CAN NOT BE OBSTRUCTED.
- ALL DIMENSIONS ARE IN INCHES.
- VENTILATION: IN ENCLOSED CABINET SITUATIONS, TWELVE SQ INCHES OF UNOBSTRUCTED OPENING PER MODULE MUST BE PROVIDED TO INSURE ADEQUATE DISPLAY COOLING. ALLOWANCES MUST BE MADE TO COMPENSATE FOR THE PERCENTAGE OF SCREEN IN THE MATERIAL COVERING THE OPENINGS IN THE STRUCTURE. IF AIR MUST BE FORCED INTO THE ENCLOSED CABINET, 120 CUBIC FEET PER MINUTE MUST BE PROVIDED PER MODULE (12" X 24" ACTIVE AREA)
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- THE BOTTOM OF A DISPLAY MUST BE CONTINUOUSLY SUPPORTED. THE TOP DISPLAY ATTACHMENT MUST RESIST DISPLAY OVERTURNING AND HALF THE WIND LOAD.
- ANY OBJECTS IN THE VICINITY OF THE REAR OF THE DISPLAY MUST ALLOW FOR REMOVAL OF THE BACKSHEETS WHEN NECESSARY FOR MAINTENANCE & SERVICE. THIS IS TO INCLUDE POWER & SIGNAL CONDUIT.**



Power & Signal Entrance Knockouts. Standard Power Harness Length of 20 feet measured from the bottom centerline of the displays is furnished

5.50" FILLER PANEL LOCATED AT TOP & BOTTOM OF DISPLAY. THIS AREA MAY BE USED FOR MOUNTING.

Bottom of display to be continuously supported.

Steel Tube & Mtg Angles by Customer

ADDED NOTE: 11 CONCERNING OBJECTS NEAR REAR OF DISPLAY.

REV.	DATE	DESCRIPTION	BY	APPR.
2	17JUN98		JRT	

REV	APPR. BY	SCALE
1	JRT	1=25

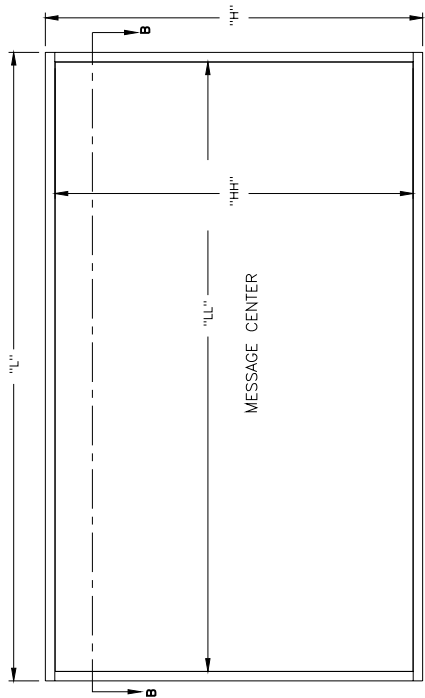
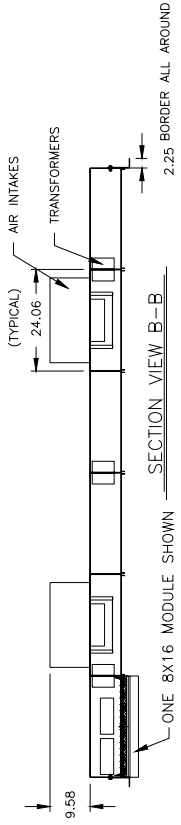
1	20MAY98	ADD BOT OF DISPLAY MTG NOTE, CHGD DIM H FROM 75.25 TO 77.25.	JRT
DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: 1600 SERIES MESSAGE BOARDS. 1 1/2"			
TITLE: SHOP DRAWING, 48YYY-10 S1600			
DES. BY: JRT		DRAWN BY: JRT	
DATE: 28APR98		DATE: 28APR98	

1176-R08B-102149

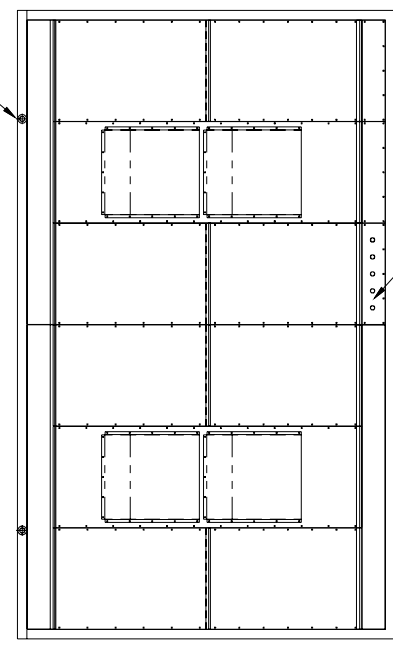
MODEL	TOTAL DISPLAY		ACTIVE AREA		# OF MODULES
	DIM "L"	DIM "H"	DIM "LL"	DIM "HH"	
5696	148.86	89.37	144.36	84.84	42
56112	172.92	89.37	168.42	84.84	49
56116	172.92	89.37	168.42	84.84	49
56144	221.04	89.37	216.56	84.84	66
56160	245.10	89.37	240.60	84.84	70
56176	269.16	89.37	264.66	84.84	77
56192	293.22	89.37	288.72	84.84	84

NOTES:

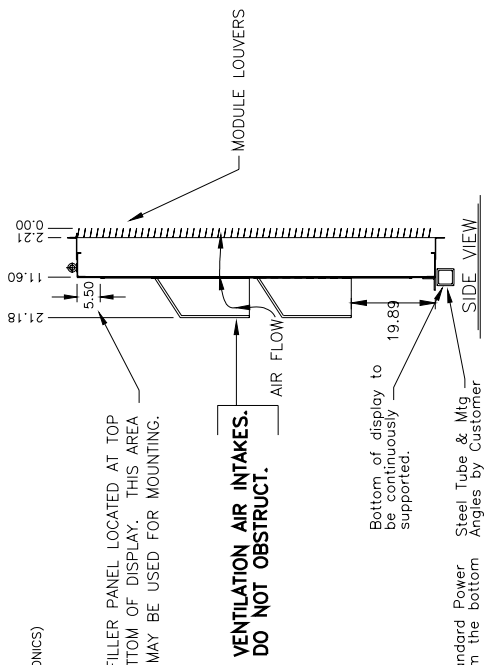
1. DISPLAY IS ALL ALUMINUM CONSTRUCTION
2. DISPLAY CAN BE DESIGNED FOR FRONT OR REAR ACCESS, BUT FROM THE DISPLAY STANDPOINT ONLY, FRONT ACCESS MAY BE MORE EFFICIENT. **YOU MUST SPECIFY FRONT OR REAR ACCESS AT TIME OF ORDER.**
3. LOAD CENTER IS TO BE MOUNTED EXTERNAL TO MOUNTING STRUCTURE.
4. MAIN ELECTRICAL DISCONNECT TO BE FURNISHED BY CUSTOMER
5. AIR INLET HOODS, ON REAR OF DISPLAY, CAN NOT BE OBSTRUCTED.
6. ALL DIMENSIONS ARE IN INCHES.
7. VENTILATION: IN ENCLOSED CABINET SITUATIONS, TWELVE SQ INCHES OF UNOBSTRUCTED OPENING PER MODULE MUST BE PROVIDED TO INSURE ADEQUATE DISPLAY COOLING. ALLOWANCES MUST BE MADE TO COMPENSATE FOR THE PERCENTAGE OF SCREEN IN THE MATERIAL COVERING THE OPENINGS IN THE STRUCTURE. IF AIR MUST BE FORCED INTO THE ENCLOSED CABINET, 120 CUBIC FEET PER MINUTE MUST BE PROVIDED PER MODULE (12" X 24" ACTIVE AREA)
8. DISPLAY WILL BE EQUIPPED WITH EITHER A SERIAL LINE INTERFACE OR A DATA DISTRIBUTOR.
9. CUSTOMER IS RESPONSIBLE FOR THE STRUCTURAL INTEGRITY OF THE STRUCTURE THAT THE DISPLAY IS MOUNTED TO.
10. THE BOTTOM OF A DISPLAY MUST BE CONTINUOUSLY SUPPORTED. THE TOP DISPLAY ATTACHMENT MUST RESIST DISPLAY OVERTURNING AND HALF THE WIND LOAD.
11. **ANY OBJECTS IN THE VICINITY OF THE REAR OF THE DISPLAY MUST ALLOW FOR REMOVAL OF THE BACKSHEETS WHEN NECESSARY FOR MAINTENANCE & SERVICE. THIS IS TO INCLUDE POWER & SIGNAL CONDUIT.**



FRONT VIEW
Shows Mount Modules



REAR VIEW
Power & Signal Entrance Knockouts. Standard Power Harness Length of 20 feet measured from the bottom centerline of the displays is furnished



5.50" FILLER PANEL LOCATED AT TOP & BOTTOM OF DISPLAY. THIS AREA MAY BE USED FOR MOUNTING.

VENTILATION AIR INTAKES. DO NOT OBSTRUCT.

Bottom of display to be continuously supported.

Steel Tube & Mig Angles by Customer

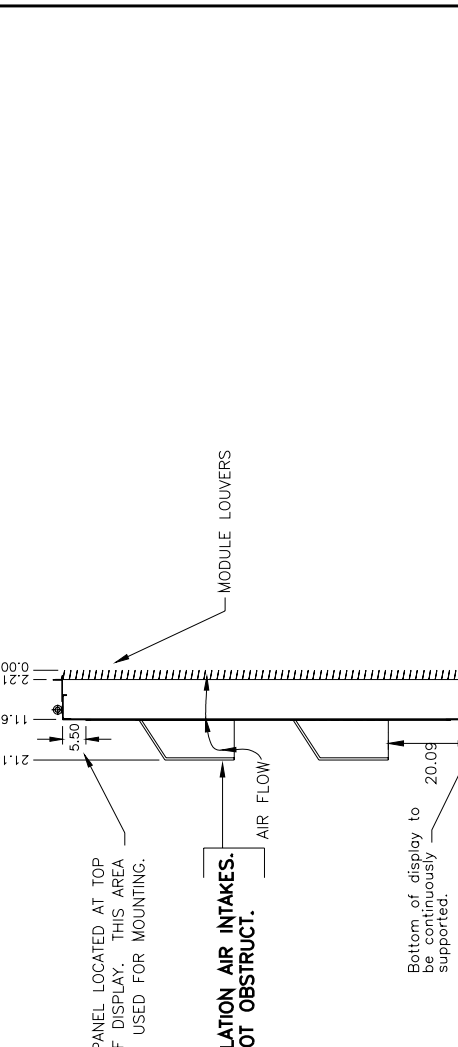
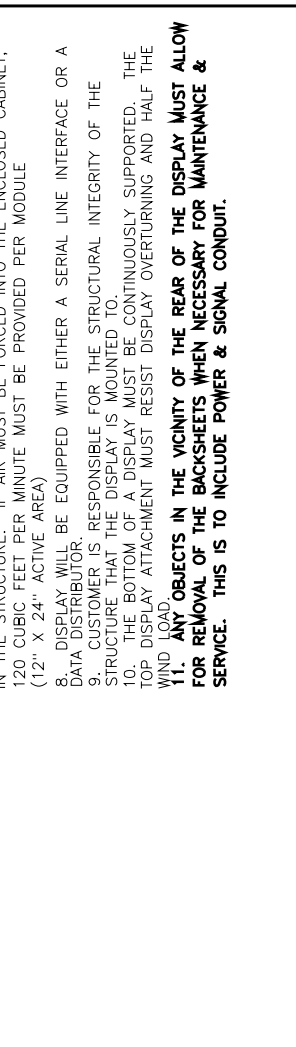
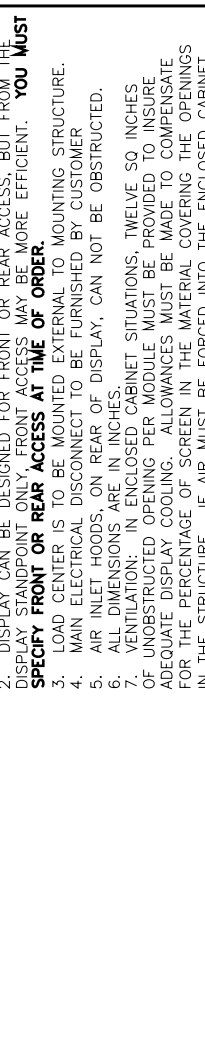
DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"	
TITLE: SHOP DWG. 569Y-10, S1600	
DES. BY: REYSON	DATE: 21MAY98
APP. BY: REYSON	DRAWN BY: JRT
SCALE: 1=30	1176-R08B-103034

1	17JUN98	JRT	
REV.	DATE	BY	APPR.
		DESCRIPTION	

ADDED NOTE #11 CONCERNING OBJECTS NEAR REAR OF DISPLAY.

MODEL	TOTAL DISPLAY		ACTIVE AREA		# OF MODULES
	DIM "L"	DM "H"	DIM "L"	DM "H"	
6496	148.86	101.49	144.36	96.96	48
6497	186.38	101.49	186.38	96.96	66
64128	196.38	101.49	196.38	96.96	66
64144	221.04	101.49	216.54	96.96	72
64160	245.10	101.49	240.60	96.96	80
64176	269.16	101.49	264.66	96.96	88
64192	293.22	101.49	288.72	96.96	96

NOTES:
 1. DISPLAY IS ALL ALUMINUM CONSTRUCTION
 2. DISPLAY CAN BE DESIGNED FOR FRONT OR REAR ACCESS, BUT FROM THE DISPLAY STANDPOINT ONLY, FRONT ACCESS MAY BE MORE EFFICIENT. **YOU MUST SPECIFY FRONT OR REAR ACCESS AT TIME OF ORDER.**
 3. LOAD CENTER IS TO BE MOUNTED EXTERNAL TO MOUNTING STRUCTURE.
 4. MAIN ELECTRICAL DISCONNECT TO BE FURNISHED BY CUSTOMER
 5. AIR INLET HOODS, ON REAR OF DISPLAY, CAN NOT BE OBSTRUCTED.
 6. ALL DIMENSIONS ARE IN INCHES.
 7. VENTILATION: IN ENCLOSED CABINET SITUATIONS, TWELVE SQ. INCHES OF UNOBSTRUCTED OPENING PER MODULE MUST BE PROVIDED TO INSURE ADEQUATE DISPLAY COOLING. ALLOWANCES MUST BE MADE TO COMPENSATE FOR THE PERCENTAGE OF SCREEN IN THE MATERIAL COVERING THE OPENINGS IN THE STRUCTURE. IF AIR MUST BE FORCED INTO THE ENCLOSED CABINET, 120 CUBIC FEET PER MINUTE MUST BE PROVIDED PER MODULE (12" X 24" ACTIVE AREA)
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 10. THE BOTTOM OF A DISPLAY MUST BE CONTINUOUSLY SUPPORTED. THE TOP DISPLAY ATTACHMENT MUST RESIST DISPLAY OVERTURNING AND HALF THE WIND LOAD.
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5.50" FILLER PANEL LOCATED AT TOP & BOTTOM OF DISPLAY. THIS AREA MAY BE USED FOR MOUNTING.
 VENTILATION AIR INTAKES. DO NOT OBSTRUCT.
 AIR FLOW
 MODULE LOUVERS
 Bottom of display to be continuously supported.
 Steel Tube & Mtg Angles by Customer
 ADDED NOTE: 11. CONCERNING OBJECTS NEAR REAR OF DISPLAY.

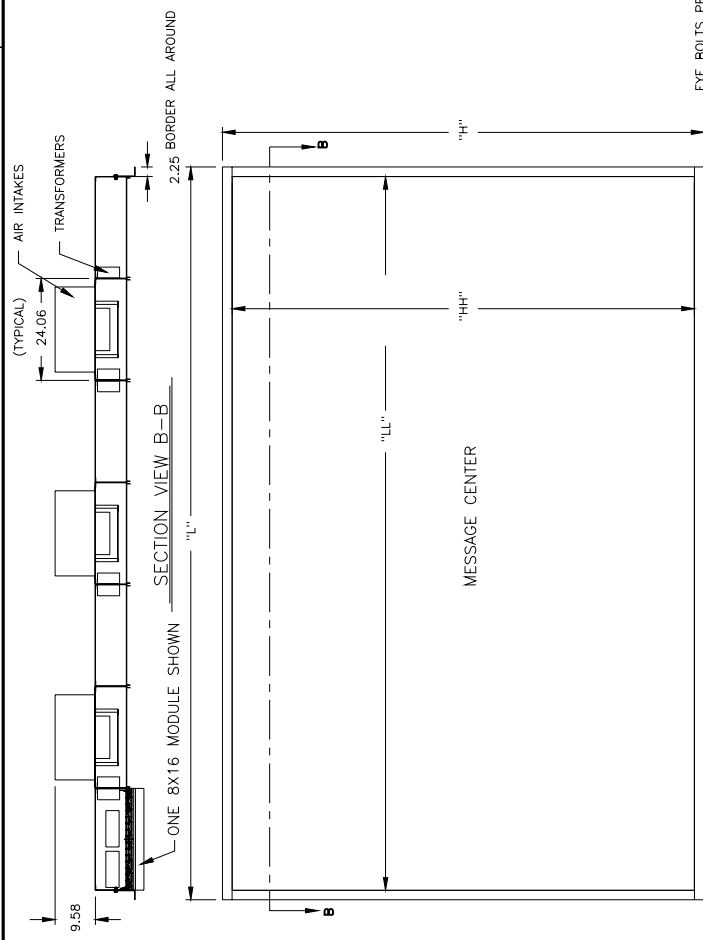
REV	DATE	DESCRIPTION
1	17JUN88	ADDED NOTE 11 CONCERNING OBJECTS NEAR REAR OF DISPLAY.

DAKTRONICS, INC. BROOKINGS, SD 57006
 PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"
 TITLE: SHOP DWG. 64YY-10, S1600
 DES. BY: DRAWN BY: JRT DATE: 21MAY98
 APPRO. BY: SCALE: 1=50
 1176-R08B-103035

MODEL	TOTAL DISPLAY DIM "L"		ACTIVE AREA DIM "L" "H"		WEIGHT (SF)	# OF MODULES
	DIM "L"	DIM "H"	DIM "L"	DIM "H"		
72112	172.92	113.61	168.42	109.08	2205	63
72128	196.98	113.61	192.48	109.08	2520	72
72144	221.04	113.61	217.04	109.08	2835	81
72160	245.10	113.61	241.60	109.08	3150	90
72176	269.16	113.61	266.16	109.08	3465	99
72192	293.22	113.61	288.72	109.08	3780	108

NOTES:

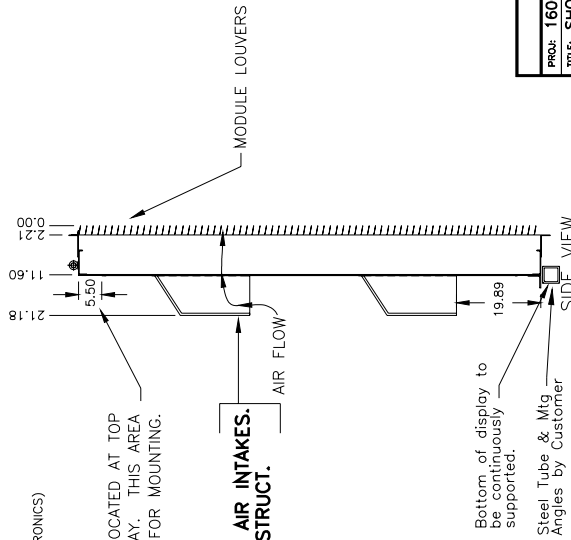
1. DISPLAY IS ALL ALUMINUM CONSTRUCTION
2. DISPLAY CAN BE DESIGNED FOR FRONT OR REAR ACCESS, BUT FROM THE DISPLAY STANDPOINT ONLY. FRONT ACCESS MAY BE MORE EFFICIENT. **YOU MUST SPECIFY FRONT OR REAR ACCESS AT TIME OF ORDER.**
3. LOAD CENTER IS TO BE MOUNTED EXTERNAL TO MOUNTING STRUCTURE.
4. MAIN ELECTRICAL DISCONNECT TO BE FURNISHED BY CUSTOMER
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6. ALL DIMENSIONS ARE IN INCHES.
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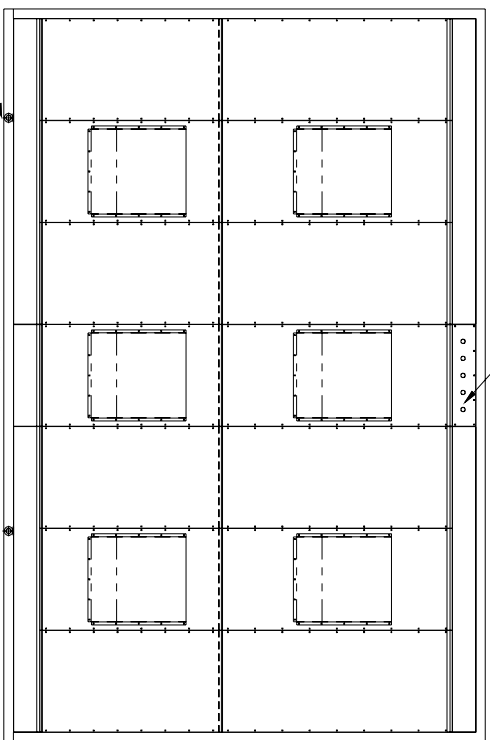
EYE BOLTS PROVIDED FOR LIFTING DISPLAY (BY DAKTRONICS)

5.50" FILLER PANEL LOCATED AT TOP & BOTTOM OF DISPLAY. THIS AREA MAY BE USED FOR MOUNTING.

VENTILATION AIR INTAKES. DO NOT OBSTRUCT.



FRONT VIEW SHOWN WITHOUT MODULES



Power & Signal Entrance Knockouts. Harness Length of 20 feet measured from the bottom centerline of the displays is furnished

REAR VIEW

REV.	DATE	DESCRIPTION	BY	APPR.
1	17 JUN 98	REVISED DRAWING CONCERNING OBJECTS NEAR REAR OF DISPLAY	JRT	

DAKTRONICS, INC. BROOKINGS, SD 57006	
PROJ: 1600 SERIES MESSAGE BOARDS, 1 1/2"	
TITLE: SHOP DWG. 72YY-10, S1600	
DES. BY: DRAWN BY: JRT	
REVISION	DATE: 21 MAY 98
APPR. BY:	
SCALE: 1=30	

1176-R08B-103036

Appendix B: Forms and Reports

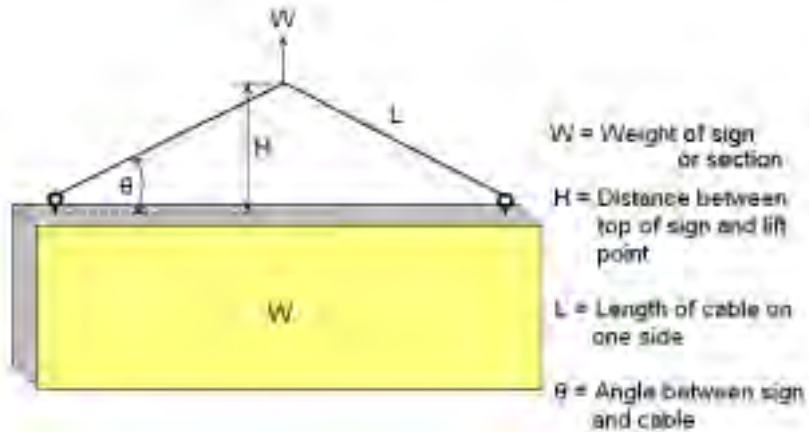
This appendix contains the following forms and reports relevant to the Daktronics 1600 series Sunspot , 1.5-inch lens large matrix display system.

Display Power Report.....	DF-1796
Installation Quality Checklist.....	DF-1859
Maintenance Checklist	DF-1866
Form, All Lens Lamp Test.....	Drawing B-46049
Eye Bolts	ED-7244
Temp Sensor Mounting	ED-9489
Temp Sensor Mounting	Drawing A-79767
Light Detector Mounting	ED-9490
Light Detector Mounting.....	Drawing A-79768
10" 1600 Series Safety Lanyard Procedure	ED-10529
Super Line Receiver	ED-11441

Eyebolts

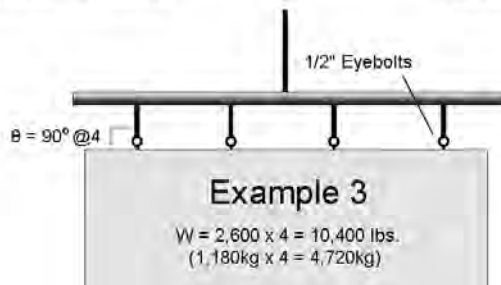
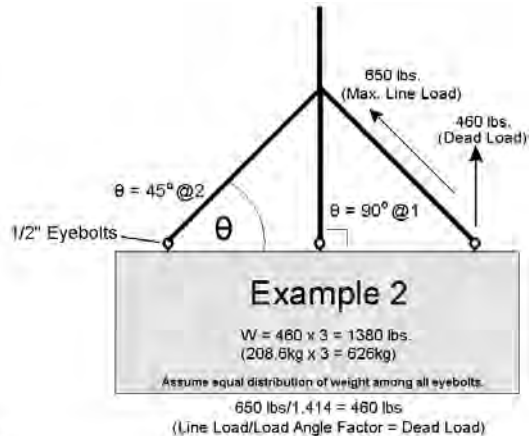
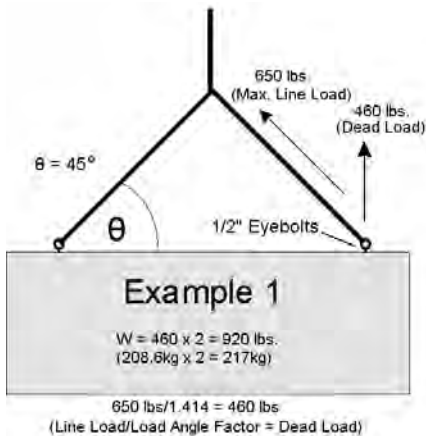
Almost every display that leaves Daktronics is equipped with eyebolts for lifting the display. There are two standard sizes of eyebolts: 1/2" and 5/8".

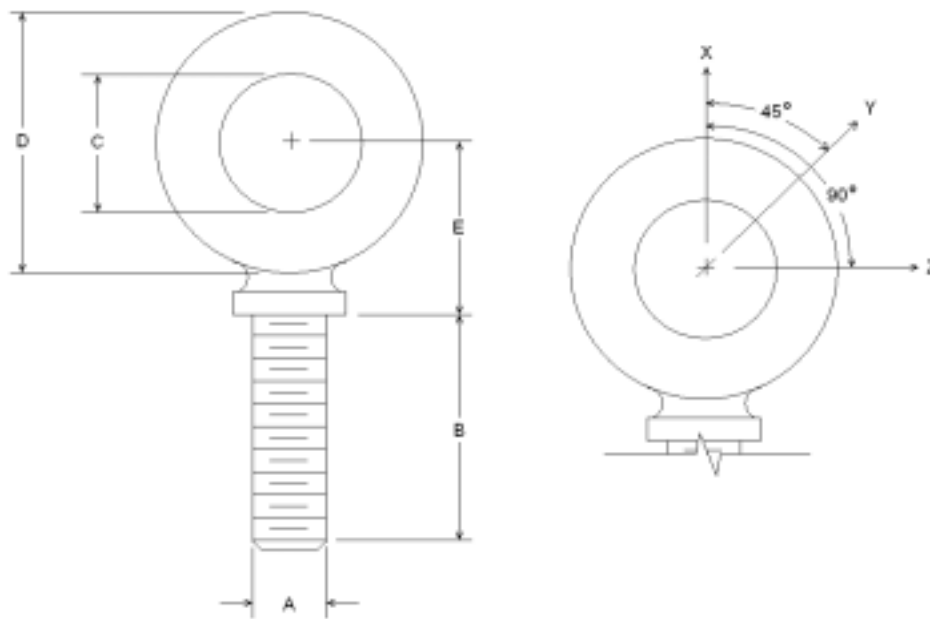
Load Increase Factor: The load increases as the lift angle (θ) decreases. The allowable load on the eyebolts also decreases with the lift angle due to the bending stress on the eyebolts. In sum, the smaller the angle between the cable and the top of the display, the lighter the sign must be to safely lift it. *Do NOT attempt to lift the display when the lift angle is less than 30 degrees.*



Horizontal Angle	Load Angle Factor (L/H)
90	1.00
60	1.155
50	1.305
45	1.414
30	2.00

θ	1/2"		5/8"	
	Line Load	Weight/Anchor	Line Load	Weight/Anchor
90	2600	2600	4000	4000
60	1500	1299	3300	2858
45	650	460	1000	707
30	520	260	800	400





A	B	C	D	E	No.	Min. Proof Load (lbs.)	Min. Break Load (lbs.)	Stocked	Min. Eff. Thrd. Length	Line Loads		
										Wx	Wy	Wz
1/4	1	3/4	1-3/16	25/32	21	600	2,000	Blank 1/4-20	7/8	400	100	80
3/8	1-1/4	1	1-21/32	1-3/16	23	2,100	5,000	Blank 3/8-16	1-1/8	1,400	350	250
1/2	1-1/2	1-3/16	2-1/16	1-13/32	25	3,900	9,200	Blank 1/2-13	1-11/32	2,600	650	520
9/16	1-5/8	1-9/32	2-13/16	1-17/32	26	4,500	11,830	Blank 9/16-12	1-3/8	3,000	750	600
5/8	1-3/4	1-3/8	2-1/2	1-11/16	27	6,000	14,700	Blank 5/8-11	1-9/16	4,000	1,000	800
3/4	2	1-1/2	2-13/16	1-13/16	28	9,000	21,700	Blank 3/4-10	1-5/8	6,000	1,500	1,200
7/8	2-1/4	1-11/16	3-1/4	2-1/16	29	10,000	30,000	Blank 7/8-9	1-13/16	6,600	1,670	1,330
1	2-1/2	1-13/16	3-9/16	2-5/16	30	12,000	39,400	Blank 1-8	2-1/16	8,000	2,000	1,600
1-1/2	3-1/2	2-9/16	5-1/2	3-5/32	34	27,000	91,300	Blank 1-1/2-6	3	17,800	4,500	3,600

- A. Do not use eyebolts on angular lifts unless absolutely necessary. For angular lifts, the shoulder pattern eyebolt is preferred.
- B. Load should always be applied to eyebolts in the plane of the eye, not at some angle to this plane.
- C. Shoulder eyebolts must be properly seated (should bear firmly against the mating part), otherwise the working loads must be reduced to those indicated for regular eyebolts. A washer or spacer may be required to put the plane of the eye in the direction of the load when the shoulder is seated.
- D. No load greater than the safe working load listed in the data table should be used.
- E. To obtain the greatest strength from the eyebolt, it must fit reasonably tight in its mounting hole to prevent accidental unscrewing due to twist of cable.
- F. Eyebolts should never be painted or otherwise coated when used for lifting. Such coatings may cover potential flaws in the eyebolt.
- G. To attain the safe working loads listed for regular eyebolts, 90% of the thread length must be engaged.

Super Line Receiver

The super line receiver (SLR) is a circuit board used in data-intensive display applications. The Venus[™] controller sends a single, data-heavy signal to the SLR, which splits the signal according to display section. This optimizes display response time because each section receives only the data it needs.

The SLR is often housed in an enclosure similar to that shown in **Figure 1**.

Incoming power to the unit is terminated at the power termination panel within the enclosure. Terminate power according to the label found below the termination panel. **Figure 2** shows an SLR enclosure with the front cover removed.



Figure 1: SLR Enclosure

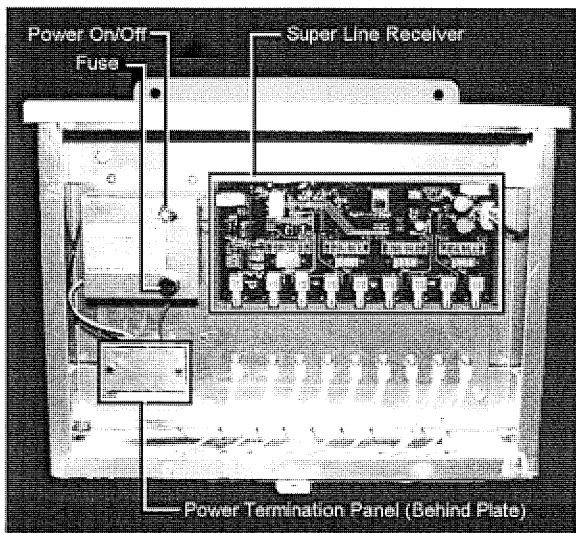


Figure 2: SLR Enclosure with Cover Removed

From the termination panel, power enters the switch box. In addition to a power switch, the box holds a single AGC 2.5 amp fuse. Check this fuse if it is suspected data is not reaching the display. Replace the fuse only with one of the same type and rating.

Power from the switch box connects to the SLR board at J10. It is the only connector of its kind on the circuit board. The input voltage to the board should be 12-16 VAC. **Figure 3** shows the locations of some SLR board components.

The SLR receives and transmits data over fiber optic cable. Each SLR has a single fiber optic input jack and eight fiber optic output jacks labeled J1-J8. The number of output jacks used depends on display size.

Each output jack has a diagnostic LED associated with it. The LED will light when data is being sent through the output jack. Check these LED's if it is suspected one or more sections are not receiving data from the SLR.

The DIP switches S1-S32 are set prior to shipment and should be adjusted only by, or with the help of, Daktronics personnel.

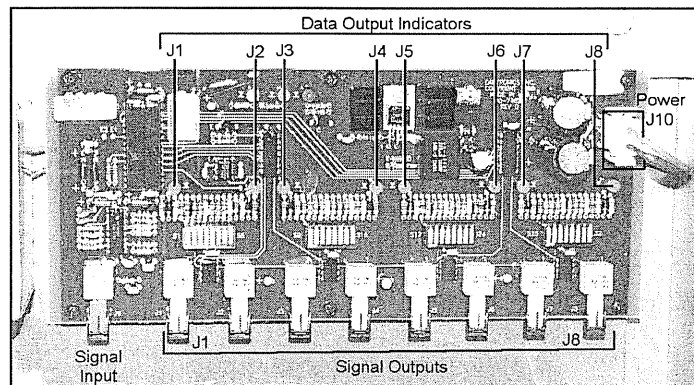


Figure 3: SLR Circuit Board

10" 1600 Series Safety Lanyard Procedure

When removing a module from the rear of the display, the safety lanyard procedure should be followed to avoid personal injury or damage to a module. Refer to the appropriate figures and use the following steps to remove a module from the rear of the display:

⊗ **Disconnect any power and signal harness from the lampbank.**

Removal of Module

1. Place a safety lanyard snap into any one of the three holes in one of the side brackets of the lens/reflector assembly. Note arrow in **Figure 1**.
2. Loop the safety lanyard around the conduit and secure the remaining snap into one of the three holes in the remaining side bracket as pointed out in **Figure 2**.
3. Insert tool (0M-95441) into area just below the lampbank positioning tab of the side bracket at a slight angle as in **Figure 1**. The tool will work best if it is positioned with notch side up.
4. While slowly twisting the tool downward to release the module retaining latch, gently push the corner of the module out of the display.
5. Repeat **Steps 3 and 4** for remaining side of module.
6. Grasp the module with both hands and push the entire module forward out in front of the display.
7. Turn the module which allows it to be pulled back through the opening of the display and removed.
8. Remove the safety lanyard from the side brackets and gently lay the module lens side down on a static free surface.

Re-Installation of Module

1. Loop the safety lanyard around the support conduit and secure the safety lanyard snaps in the center holes of the side brackets.
2. Push the module through the opening of the display and place into position.
3. Pull back on the safety lanyard near the areas where the snaps are attached to the side brackets until the latches securing the module snap into place.
4. Gently push out on the module corners to test and insure that the latches are indeed secured to the frame
5. Remove the safety lanyard.

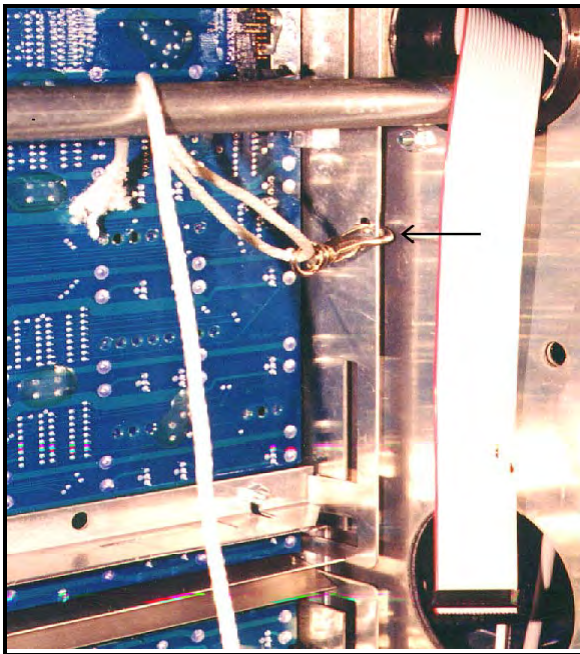


Figure 2: Securing and Looping Lanyard

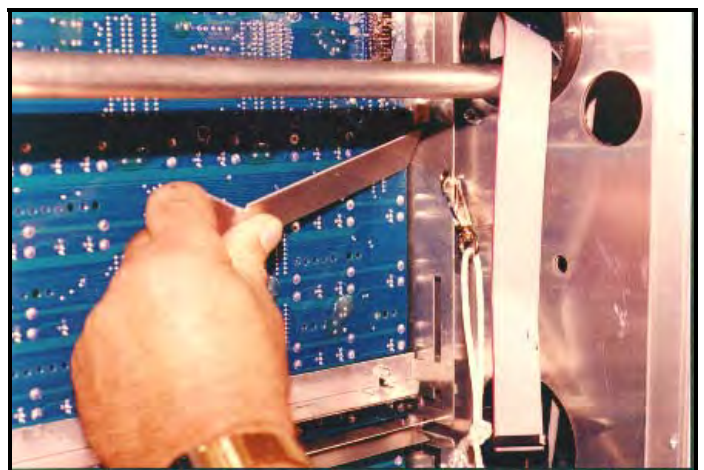


Figure 1: Releasing Module Retainer

Light Detector Mounting

Tools needed:

- Small standard screwdriver
- Medium standard screwdriver
- Drill
- 13/16" drill bit
- Ratchet

Directions

1. Turn off the power to the display and to the controller.
2. Drill a 13/16" hole in cabinet where sensor is to be located, either bottom or side.
3. Disassemble the sensor.
4. Place threaded nipple in hole from inside of the display, attach the conduit outlet body to the nipple. If bottom mount, use the hole in back of conduit body, (Figure C). If side mount use the hole in the side of the conduit body, (Figure D). **Make sure the opening of the conduit outlet body faces the ground.**

☞ **EXCEPTION!** If LED display, use side hole of conduit body only (Figures E & F). **Make sure the opening of the conduit outlet body faces in the direction that the display faces.**
5. Route the cable from the controller thru the conduit body and cut the cable to the desired length. Leave approximately 2 feet extra cable to work with.
6. Attach wires to sensor as shown in figure A.

Red = + V	Blk = Gnd
Grn = P	Wht = N
7. Attach the lens to the sensor and then to the conduit body and push the excess cable thru the conduit body and back into the display.
8. Use the ratchet to put the plug into the hole not used.
9. Attach the cable to the display/controller per display/controller instructions.
10. Restore all power.

☞ **NOTE:** If locating the sensor somewhere other than attached to the display, the conduit outlet body is made to attach to ½" conduit. The specified cable is a 2 pair, individually shielded cable (Belden 5594, Dak. P.N. W-1234) and the maximum cable length is 1000 feet. The cable should be run in ½" conduit and the conduit should be earth grounded to help protect the sensor from lightning damage.

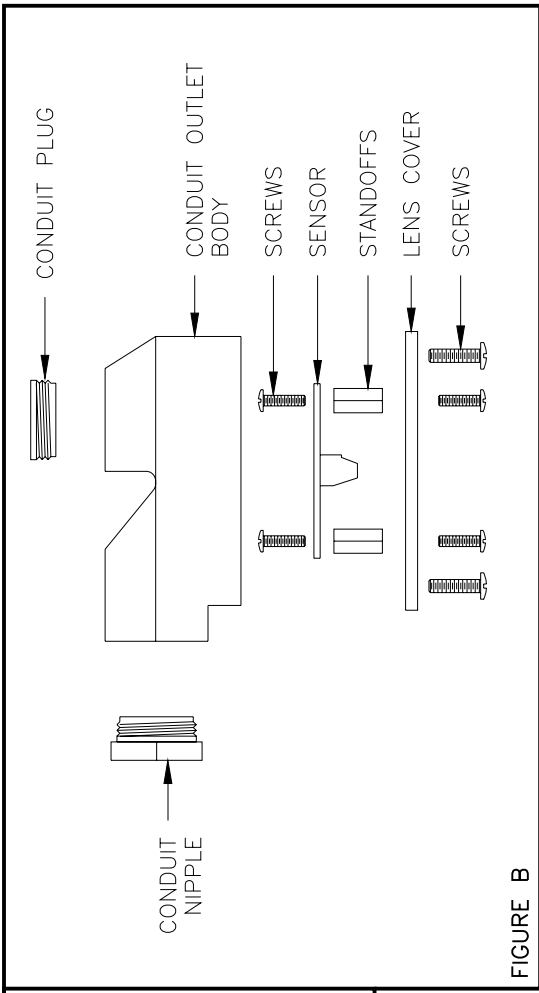
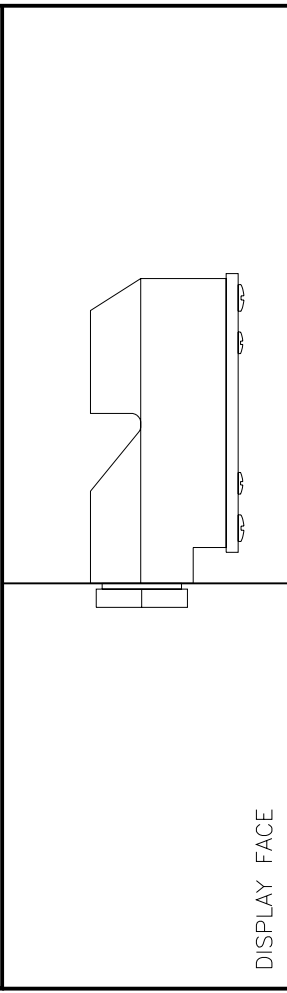
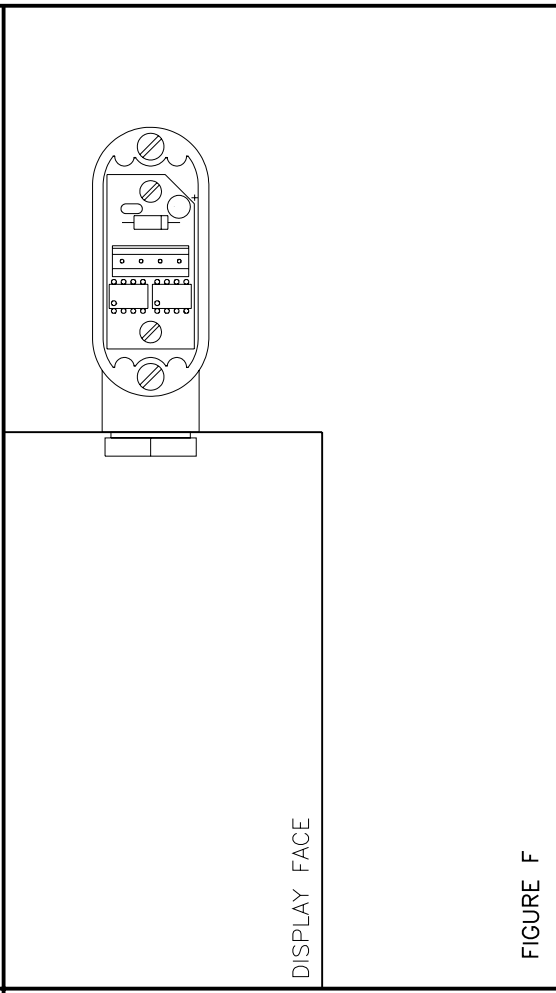


FIGURE B



DISPLAY FACE

FIGURE D



DISPLAY FACE

FIGURE F

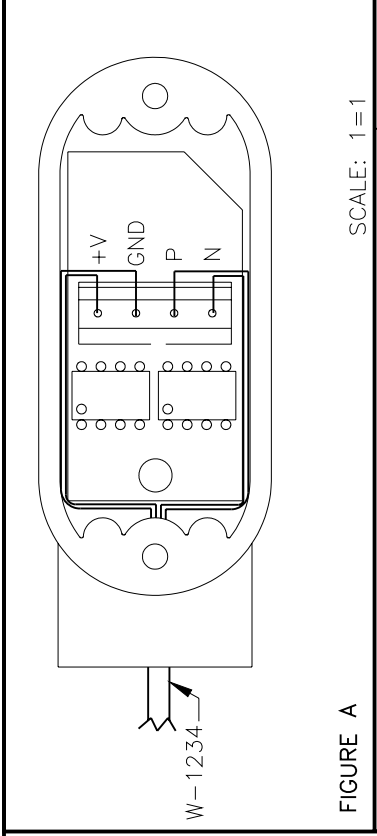
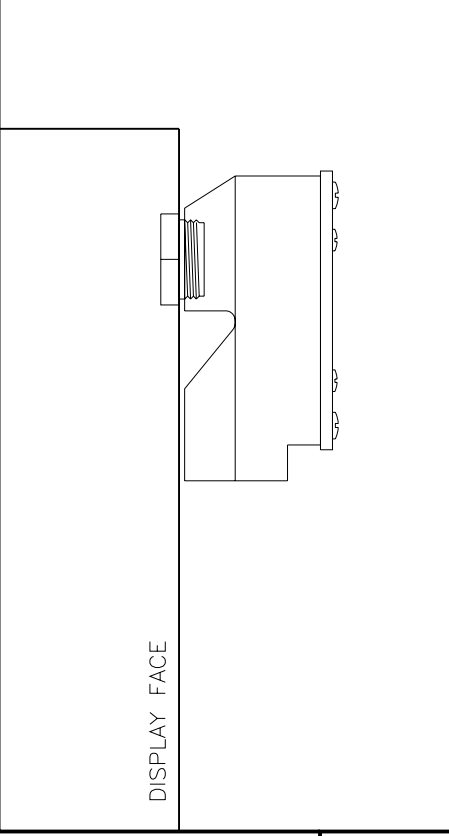


FIGURE A

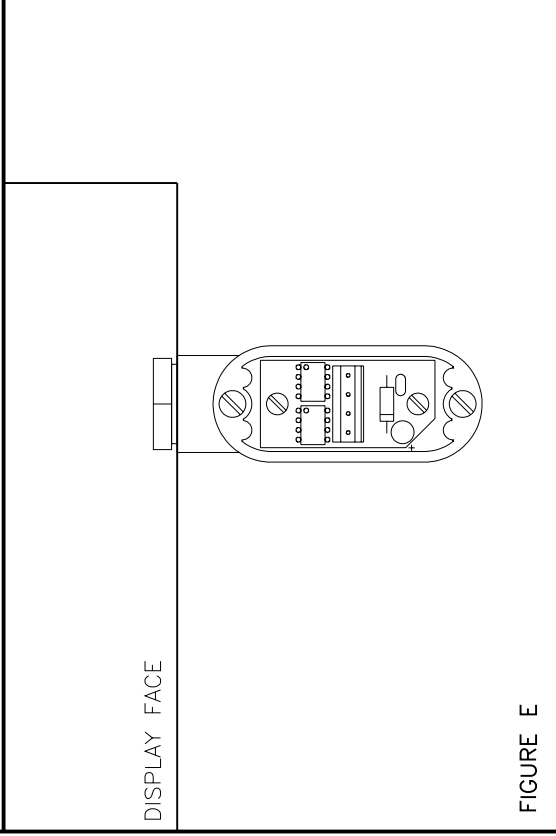
SCALE: 1=1

W-1234



DISPLAY FACE

FIGURE C



DISPLAY FACE

FIGURE E

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ:
 TITLE: LIGHT DETECTOR MOUNTING
 DES. BY: DRAWN BY: CIVERSEN DATE: 7 MAR 96

1	06MAY97	ADDED W-1234 CABLE AND WIRING TO FIGURE A FOR INSTALLATION PURPOSES	RLONG	
REV.	DATE	DESCRIPTION	BY	APPR.

REVISION	APPR. BY:
	SCALE: 1=1

1151-R11A-79768

Temperature Sensor Mounting

The Temperature Sensor is mounted separately and requires a location away from the influence of chimneys, air conditioners, vents, tar roofs, concrete, and parking lots which can cause abnormal temperature fluctuations. Usually a separation of at least 20-30 feet horizontally and 8 feet vertically is required to achieve this. Locations where air movement is restricted are also unsatisfactory.

A first-choice sensor location is a north eave or northern exposure away from direct sun light and above grass. This location gives extra stability and accuracy to the sensor because of the added shading usually obtained on a northern exposure.

The second choice for locating a temperature sensor is on the display itself, or somewhere on the display structure. A light-colored display is preferred in this application. Location of the sensor should be above, below, or on a northern edge of the display to try to keep the sensor shaded. If mounting above the display, a minimum height above of 6 feet is required. If mounting below the display, a minimum of 8 feet above ground and a minimum of 1 foot between sensor and display is required. Greater accuracy is obtained if there is grass below the sign rather than concrete or some other material.

A 2 pair, individually shielded cable (Belden 5594, Dak. P.N. W-1234) is used to connect the sensor to the display controller. Maximum length is 1000 feet.

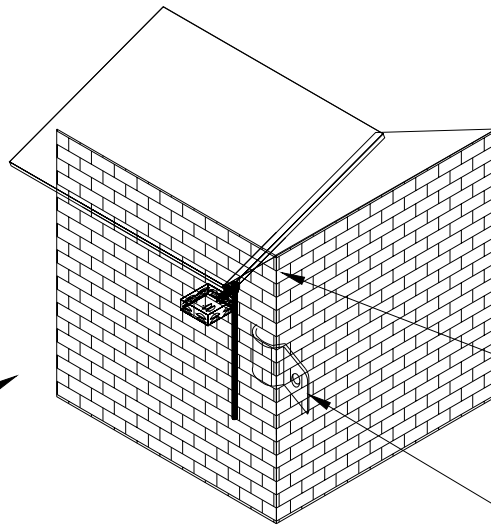
Directions

1. Run ½" conduit from the sensor location to the controller where the sensor cable is to be attached. The cable must be routed thru ½" metal conduit which should be earth grounded to help protect the sensor and controller from lightning damage.
2. Power down the controller where the sensor cable is to be attached.
3. Connect the cable to the temperature sensor terminal block as follows:

RED = V+	BLK = GND
GRN = P	WHT = N
4. Install the mesh screen with the four screws enclosed.
5. Connect the cable to the display controller as described in the controller installation manual.
6. Power up the controller.

THERE SHOULD BE AT LEAST 1 FT BETWEEN THE BOTTOM OF THE EAVE AND THE TOP OF THE TEMP SENSOR HOUSING FOR ACCURATE READINGS.

TEMP SENSOR HOUSING (SUPPLIED BY DAKTRONICS)



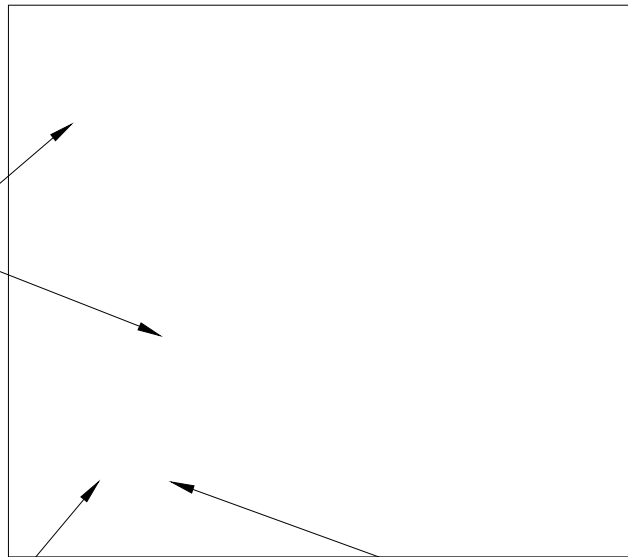
CONDUIT OUTLET BODY (SUPPLIED BY DAKTRONICS)

INSURE THAT CONDUIT IS SUPPORTED AT TOP END NEAR SENSOR.

1/2" CONDUIT (SUPPLIED BY CUSTOMER)

EAVE/WALL MOUNT

BOTTOM OF DISPLAY
1 FT OF 1/2" CONDUIT (SUPPLIED BY CUSTOMER)



MOUNTING TO THE TOP OF THE DISPLAY IS DONE IN THE SAME MANNER EXCEPT THE CONDUIT HAS TO BE 6 FT LONG.

TEMP SENSOR HOUSING (SUPPLIED BY DAKTRONICS)

CONDUIT OUTLET BODY (SUPPLIED BY DAKTRONICS)

MOUNTING TO BOTTOM OF DISPLAY

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DAKTRONICS, INC. BROOKINGS, SD 57006

2	27DEC99	CLEANED UP DRAWING.	NJA	
1	19AUG98	ADDED CONDUIT CLAMP FOR EAVE/WALL MOUNT	JRT	
REV.	DATE	DESCRIPTION	BY	APPR.

PROJ:			
TITLE:	TEMP SENSOR MOUNTING		
DES. BY:	DRAWN BY: NJA	DATE: 20 MAR 96	
REVISION	APPR. BY:	1151-R11A-79767	
	SCALE: NONE		

Display Power Report

Site: _____

Line Voltage:

Phase A Voltage: _____

Phase B Voltage: _____

Phase C Voltage _____

Line Recorder on Phase: _____

Hours per day display is
expected to operate on dim: _____

Send 1 Display Power
Report to the Daktronics
Address Below.

Daktronics Customer Service
P.O. Box 5128
Brookings, SD
57006-5128

Module Number	Row Number	Column Number	Voltage

Customer Service – Route Copies to the Following:

- 1 Copy – Customer Service File
- 1 Copy – Mechanical Design
- 1 Copy – Project Manager File
- 1 Copy – Sales Person



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Phone (605) 697-4035 or (877) 605-1114 Fax (605) 697-4444
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Installation Quality Checklist

1½ Inch and 2½ Inch Displays

Send 1 Copy (Front and Back of this Installation Quality Checklist to the Daktronics Address below.

Daktronics Customer Service
P.O. Box 5128
Brookings, SD 57006-51285

This checklist is intended to serve as a general guide during display installation. If this display is to operate in a dependable manner it must be installed properly. Date and initial each of the following tasks as they are completed. Because each installation site is unique, the tasks below may not necessarily be in the order in which they should be performed. If product quality concerns arise during check off, please note them on the back of this form or contact Daktronics Customer Service.

Contract/Work
 Order Number: _____

Display
 Serial Number: _____

Display
 Description: _____

✓ OK box if acceptable. ✓ Rej box if a deficiency is noted & correction is required.

OK	Rej	Initial	Date	
<input type="checkbox"/>	<input type="checkbox"/>			Inspect the display & all crates & boxes for any damage as they are unloaded at the site. Note any shipping damage on this form or notify Daktronics
<input type="checkbox"/>	<input type="checkbox"/>			Review the installation manual & installation procedures with the installation crew prior to beginning the installation work. Stress the importance of water tightness at all points.
<input type="checkbox"/>	<input type="checkbox"/>			Check the display mounting structure to ensure a straight & square mounting frame for the display. The height variation in any 4 foot horizontal should not exceed ¼ inch. This check should be done well in advance of the scheduled installation to allow for repairs if necessary.
<input type="checkbox"/>	<input type="checkbox"/>			Mount the display as per the engineering plan & shop drawing. If the display is shipped in sections, ensure that the sections were bolted together vertically & horizontally.
<input type="checkbox"/>	<input type="checkbox"/>			If eyebolts are removed, plug the holes with bolts & the rubber water sealing washer which was removed with the eyebolt. Plug & silicone around any hole or openings in the top of the display.
<input type="checkbox"/>	<input type="checkbox"/>			Inspect the top & side front shrouds for weather tightness. If the shrouding has been field attached, ensure it was done per the engineering drawing. All shroud overlaps must be siliconed.
<input type="checkbox"/>	<input type="checkbox"/>			Note that there are drain holes in the bottom on the display. There should be a minimum of ½ inch clearance between these holes & any mounting surface.
<input type="checkbox"/>	<input type="checkbox"/>			Check the spacing between modules of sectional displays with the 0.032 feeler gauge. Also check the weather stripping tightness with the feeler gauge (OM-69133).
<input type="checkbox"/>	<input type="checkbox"/>			Check the lens to see if they are secured properly & that the rows of louvers are in proper alignment with each other. Ensure that all lampbanks are secured properly & all lamps are the focal point of the reflector.
<input type="checkbox"/>	<input type="checkbox"/>			During assembly of sectional displays, check the interconnect ribbon cables at the splice locations to ensure they are not pinched.
<input type="checkbox"/>	<input type="checkbox"/>			Use electrical contact cleaner (Daktronics part number CH-1015) to clean the 16 & 20 pin connectors any time a ribbon cable is removed during installation. Use electrical contact lubricant & protector (CH-1019) to protect the connector from moisture.
<input type="checkbox"/>	<input type="checkbox"/>			Ensure that all electrical entrance connections are watertight.
<input type="checkbox"/>	<input type="checkbox"/>			Ensure that each load center is properly earth grounded as per National Electrical Code. Refer to the grounding information in the Electrical Installation section of the manual.
<input type="checkbox"/>	<input type="checkbox"/>			Ensure that the supply voltage rating matches the voltage rating of the display.
<input type="checkbox"/>	<input type="checkbox"/>			Ensure that all cooling fans are operational after the initial fire up of the display.

OK	Rej	Initial	Date
<input type="checkbox"/>	<input type="checkbox"/>		Monitor display voltage per the Line Voltage and 24-Hour Monitoring instructions in the Electrical Installation section of the manual. Fill out and complete both copies of DF-1796 (Display Power Report). Send one copy of the form to Daktronics customer service & keep one copy of the report for your records.
<input type="checkbox"/>	<input type="checkbox"/>		Ensure that the display controller is set to have the lamp level on bright during the daylight hours.
<input type="checkbox"/>	<input type="checkbox"/>		If any modifications have been made to the Daktronics air filtration system, ensure that these changes have been approved by the Daktronics Engineering Staff.
<input type="checkbox"/>	<input type="checkbox"/>		If displays are mounted back to back inside a center cabinet, adequate clearance must be provided between the rain shields to provide for proper air flow to all ventilation fans. Ensure that this clearance has been approved by the Daktronics Engineering staff.
<input type="checkbox"/>	<input type="checkbox"/>		In enclosed display situations, ensure that 12 square inches of unobstructed opening is provided for each module. Allowances must be made to compensate for the percentage of screen or any other material covering the ventilation opening in the enclosed structure.
<input type="checkbox"/>	<input type="checkbox"/>		Ensure that all wiring clears the bottom of the display by a minimum of 1/2" and is not in contact with any sharp edges.
<input type="checkbox"/>	<input type="checkbox"/>		Ensure that the backsheets of rear access displays are removable and are not obstructed by conduit or support structure members.
<input type="checkbox"/>	<input type="checkbox"/>		On displays with bottom ventilation, 2 1/2" of clearance between the bottom of the display & any other display/obstruction is required for air intake & filter maintenance.

I certify that all items listed above have been checked and approved.

Signature of Installer

Date

Signature of Owner/Owner Rep

Date

Owner's signature signifies they have been shown the installation checklist and the periodic maintenance located in the manuals. The owner also understands the importance of air filter and fan maintenance. When customer service receives this completed form, they will send the first set of replacement air filters to the customer at no charge.

Comments

Items rejected and later corrected, and the person making the correction

Return one copy of the installation checklist to Daktronics at the address listed on the front of this form!

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1½ Inch and 2½ Inch Displays

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Maintenance Checklist

1½ Inch and 2½ Inch Displays

This form can be used as both as a maintenance guide and a record of maintenance performed. Store these forms in maintenance file as they are completed. Each form is designed to cover one year of maintenance.

Circle the operational year to which this form applies	1	2	3	4	5	6	7	8	9	10
--	---	---	---	---	---	---	---	---	---	----

Maintenance Procedures

1. Check fans at 1,500 hour intervals to ensure proper operation. With display power off, clean dust from blades and spin the blades with a pen or pencil to make sure the bearings are free and the fan is still 'in balance.
2. Check the filters at 1,500 hour intervals. Check the filter for excessive dust/dirt buildup and for damage, such as holes, which may allow unfiltered air into the display.
3. Check line and lamp voltage every 4,500 hours or whenever a significant change occurs in the area that could affect line voltage. Refer to the Electrical Installation section of the Installation and Maintenance Manual for more information.
4. At least once each 9,000 operational hours check the inside of the display, including the circuit boards, for signs of water intrusion such as water stains. Water may enter the display due to any of the following:
 - Loose or deteriorating weather stripping.
 - Loosened fasteners which allow gaps to open between panels.
 - Weak seals around hardware, such as eye bolts, on the top of the display.
5. At least once each 9,00 operational hours inspect the paint and check for signs of corrosion on the structure. Pay special attention to footings, structural tie points and ground rods. Fasteners should be tightened or replaced as required.

Operation Hours	Perform Above Steps Numbered	Date Performed	Checked By
1,500 Hrs * Day 83 * Day 62	1,2		
3,000 Hrs * Day 166 ** Day 125	1,2		
4,500 Hrs * Day 249 ** Day 187	1,2,3		
6,000 Hrs * Day 332 ** Day 250	1,2		
7,500 Hrs * Day 415 ** Day 312	1,2		
9,500 Hrs * Day 498 ** Day 365	1,2,3,4,5		

- * Assuming the display is operated 18 hours per day and is turned off when not in use.
- ** Assuming the display is operated 24 hours per day.

Consult the Installation and Maintenance Manual for additional Maintenance Details.



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Maintenance Checklist

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7,500 Hrs * Day 415 ** Day 312	1,2		
9,500 Hrs * Day 498 ** Day 365	1,2,3,4,5		

- * Assuming the display is operated 18 hours per day and is turned off when not in use.
- ** Assuming the display is operated 24 hours per day.

Consult the Installation and Maintenance Manual for additional Maintenance Details.



DAKTRONICS, INC.

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 Phone (605) 697-4035 or (877) 605-1114 Fax (605) 697-4444
 www.daktronics.com e-mail helpdesk@daktronics.com



Maintenance Checklist

1½ Inch and 2½ Inch Displays

This form can be used as both as a maintenance guide and a record of maintenance performed. Store these forms in maintenance file as they are completed. Each form is designed to cover one year of maintenance.

Circle the operational year to which this form applies	1	2	3	4	5	6	7	8	9	10
--	---	---	---	---	---	---	---	---	---	----

Maintenance Procedures

1. Check fans at 1,500 hour intervals to ensure proper operation. With display power off, clean dust from blades and spin the blades with a pen or pencil to make sure the bearings are free and the fan is still 'in balance.
2. Check the filters at 1,500 hour intervals. Check the filter for excessive dust/dirt buildup and for damage, such as holes, which may allow unfiltered air into the display.
3. Check line and lamp voltage every 4,500 hours or whenever a significant change occurs in the area that could affect line voltage. Refer to the Electrical Installation section of the Installation and Maintenance Manual for more information.
4. At least once each 9,000 operational hours check the inside of the display, including the circuit boards, for signs of water intrusion such as water stains. Water may enter the display due to any of the following:
 - Loose or deteriorating weather stripping.
 - Loosened fasteners which allow gaps to open between panels.
 - Weak seals around hardware, such as eye bolts, on the top of the display.
5. At least once each 9,00 operational hours inspect the paint and check for signs of corrosion on the structure. Pay special attention to footings, structural tie points and ground rods. Fasteners should be tightened or replaced as required.

Operation Hours	Perform Above Steps Numbered	Date Performed	Checked By
1,500 Hrs * Day 83 * Day 62	1,2		
3,000 Hrs * Day 166 ** Day 125	1,2		
4,500 Hrs * Day 249 ** Day 187	1,2,3		
6,000 Hrs * Day 332 ** Day 250	1,2		
7,500 Hrs * Day 415 ** Day 312	1,2		
9,500 Hrs * Day 498 ** Day 365	1,2,3,4,5		

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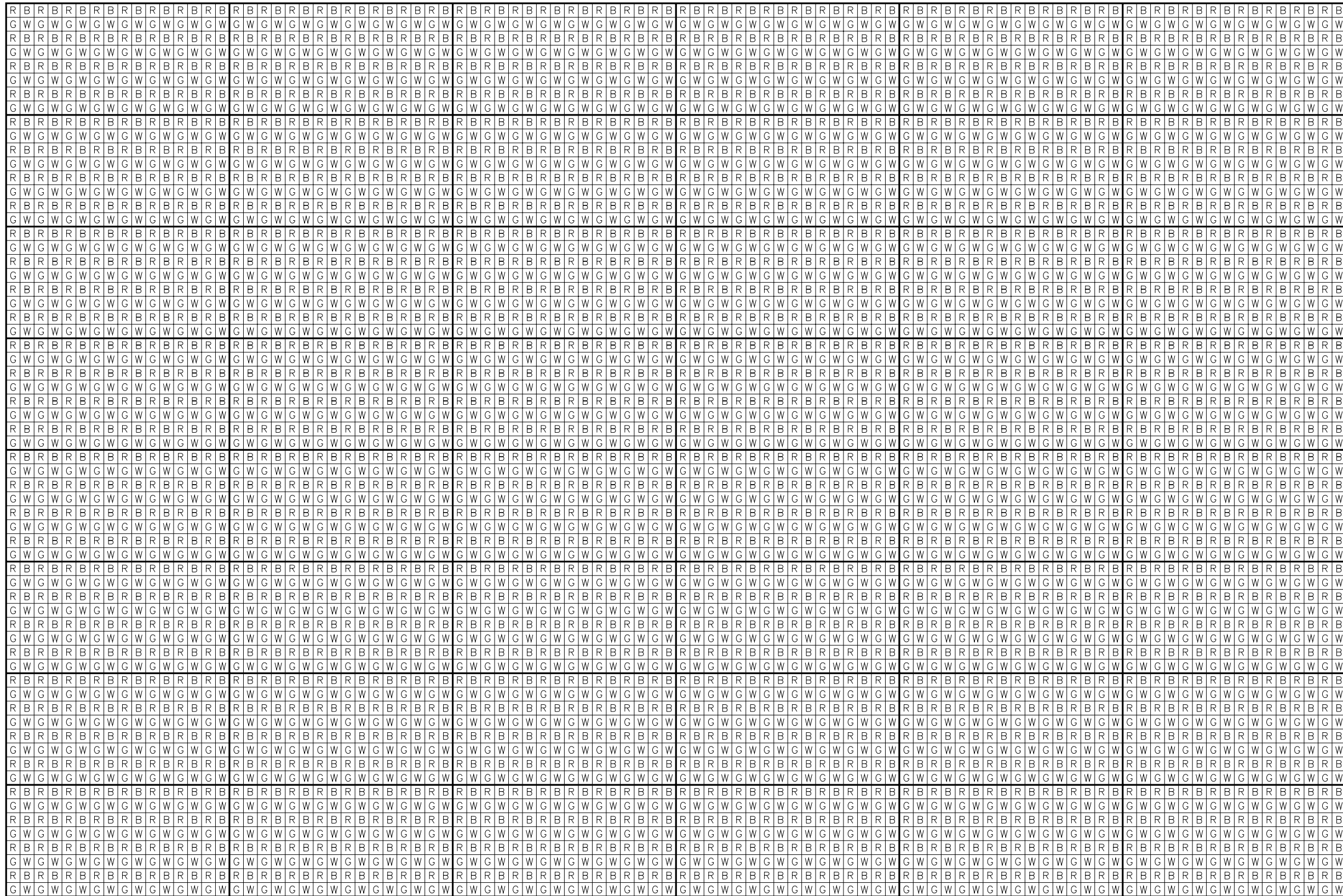
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DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: DIGAL, 5.A. de C.V.			
TITLE: FORM, ALL LENS LAMP TEST			
DES. BY: WOELZKE		DRAWN BY: JRT	
DATE: 04FEB91		REVISION	
APPR. BY:		SCALE: 1=1.5	
4457-R11B-46049			

REV.	DATE	DESCRIPTION	BY	APPR.
1	14 APRIL 99	RESCALED DWG. UPDATED BORDER	JEM	JEM